IFC Issues and Resolutions Database

Issue Number **GI - 001** **Issue Date** 7/8/97

Author See **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.5 - Pre-Beta

Issue Description Recent changes are so broad that it is clear we are not even close to stabilization.

Proposed Solution We need to begin using a well disciplined methodology for affecting any and ALL changes to the models. This means first finding a baseline definition for each schema and then agreeing a process for any changes to be made after that. Thomas has suggested a "Change Proposal" system. If we do this, then we will need to expand our STF DB to include tracking of such proposals and references between issues and proposed/completed changes.
Examples:
- Addition of IfcSequence, IfcPlacement, IfcConstructionAid, IfcControl all on the first page of the Kernel since the last STF meetings.
- Subtyping all of the pre-defined properties from the runtime defined IfcPropertyDef (please see notes below in IfcPropertyDefResource).

Resolution Not resolved in first pass (21-Aug-97)

Resolution (25-April-98) will use combination of IRD + FoxPro based tools for this in R2.0.

Action # 1 **Assignee** See **Status** Eliminated **Resolved in Version** R2.0 - Beta

RS and TL will work out a process and make a simple proposal for remainder of R1.5. A more complete proposal to be done for the R2.0 timeframe -- see action 3 from this issue. Simple proposal is to use this tool to track actions. NO CHANGES TO SCHEMATA WITHOUT RECORDING ISSUE AND RESOLUTION IN THIS DB. Confirmed (RS)

Action # 2 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R2.0 - Beta

RS and TL will work out a process and make a simple proposal for remainder of R1.5. A more complete proposal to be done for the R2.0 timeframe -- see action 3 from this issue. Simple proposal is to use this tool to track actions. NO CHANGES TO SCHEMATA WITHOUT RECORDING ISSUE AND RESOLUTION IN THIS DB. Confirmed (RS)

Action # 3 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Beta

RS will add to list of projects for R2.0 -- A more complete proposal to be done for the R2.0 timeframe --

Action # 4 **Assignee** See **Status** Incomplete **Resolved in Version** R2.0 - Beta

Work with Jiri to document process for review by STF

Action # 5 **Assignee** Hietanen **Status** Incomplete **Resolved in Version** R2.0 - Beta

Work with RS to document process for review by STF

Action # 6 **Assignee** See **Status** Incomplete **Resolved in Version** R2.0 - Final

close this issue and create a new one for R3 -- proposal for model change management system.

Issue Number **GI - 002** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Resolved

Schema All Schemata **Version** R1.5 - Pre-Beta

Issue Description We have a LOT of schemas for such a "simple" model (relative to the scope we will face in R2,3,4). We now have 16 schemas and 2 more on "gray pages"

Proposed Solution Initially, I would suggest the following simplifications:
- ShapeRep is just another property and could be combined into the Properties Res. This would also address the issue about the TypeDef defined, but not available to ShapeRep
- Construction Aids might be combined with Modeling Aids into a general Utilities/Aids Res. When we introduce it (where did this one come from anyway?). It is driven by requirements in R1.0? -- I understand from Thomas that this has not been absorbed into the Kernel -- right?

Resolution Agreed:

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will attempt to subtype IfcShapeRep from IfcPropertyDef (and check consequences). This means that the we will eliminate the ShapeDef schema. Confirmed (RS). Note: IfcPropertyDef name changed to IfcProperty.

Action #	2	***Assignee***	Wix	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

JW - ConstructionAids was renamed to IfcResource (used in IfcResourceUse by IfcWorkTask). Confirmed (RS).

Issue Number	***GI - 003***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Pre-Beta		

Issue Description Handling of the Root differently in Kernel/ Relationships and Properties - what has been done is not consistent with the 'Pseudo Model' (not using the term 'Meta-Model' here as we have been using that to refer to the SDAI based model definition repository) developed together on 30-May. Either we all need to agree a new meta-model or we need to discuss these inconsistencies (please see notes below in Kernel and PropertyDefRes).

Proposed Solution Implement root info consistently or change the Pseudo Model -- Note: it needs to be updated anyway.

Resolution This was resolved by:

1) the rename of IfcKernelRoot to IfcRoot

2) creation of IfcSeed (includes OwnerID and AuditTrail) which is used in 4 places

3) use of ProjectUniqueID in MANY places

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make changes. Confirmed (RS. Note: IfcSeed was eliminated in favor of making AuditTrail an attribute on IfcOwnerHistory (renamed from IfcOwnerID) - which means that IfcOwnerHistory can be used instead of IfcSeed.

Issue Number	***GI - 004***			***Issue Date***	7/8/97
Author	See	***Owner***	See	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Pre-Beta		

Issue Description We REALLY NEED TO get some internal documentation into the EXG models. Some of the abstracted relationships and generalizations are very difficult to figure out without documentation that is local to the tool. I know that Jeff started to do this for the IfcPropertyResource.

Proposed Solution We should assign ourselves the task of doing this for all of the schema going forward.

Complication: The only obvious issue is that we need a way to capture this such that it can be regenerated by the tool we use to produce the EXG diagrams after we move onto the Meta-Model toolset.

Resolution Deferred until R2.0 -- new processes for model development.

Rejected for R2.0 -- cannot find a way to do this in an automated way.

Action #	1	***Assignee***	See	***Status***	Complete	***Resolved in Version***	R2.0 - Alpha-1

RS will add to list of projects for R2.0

Action # 2 **Assignee** Hietanen **Status** Incomplete **Resolved in Version**

JH will create the "Fully atttributed view" to which a link from each entity definition will be added.

Issue Number **GI - 005** **Issue Date** 7/12/97

Author See **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.5 - Pre-Beta

Issue Description There are a number of cross-schema issues in this review that will have a significant impact on the toolboxes being built by Concad and CSTB.

Proposed Solution Consider: we may want to advise that they wait until all of the cross schema issues are resolved.

Resolution This is resolved in the EXPRESS code posted in early August -- may still exist in the EXPRESS-G because these two are now disjoint. Issue of coordination of EXPRESS and EXPRESS-G deferred to R2.0.

Official EXPRESS code is long form.

Action # 1 **Assignee** See **Status** Eliminated **Resolved in Version** R2.0 - Alpha

RS: log an issue with regard to toolset - EXPRESS and EXPRESS-G disjoint -- need to generate the EXPRESS-G from the repository based tools or using the STEP Tools generation from EXPRESS.

Action # 2 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R2.0 - Alpha

Confirm publically that R2.0 EXPRESS code will be in Short Form.

Note: has Concad fixed their limitation which made this a problem for them?

Issue Number **GI - 006** **Issue Date** 7/12/97

Author See **Owner** See **Status** Rejected

Schema All Schemata **Version** R1.5 - Pre-Beta

Issue Description TypeDefinition -- the enhanced schema is more flexible in that it provides for nesting of TypeDefs (I think) and overriding of individual attributes (something I am not sure our users will want). I have also proposed a slight enhancement that will allow use of multiple typedefs, from differing industry perspecitves (JIM F. -- we talked about this one sometime back). I am somewhat concerned that we may have gone too far with this flexibility and that things will become ambiguous.

Proposed Solution Consider: To know, we need some prototyping and hands-on experience. However, we should be thinking of a logical fallback, just in case.

Resolution Not resolved in first pass (21-Aug-97)

Rejected because this is not specific enough.

Action # 1 **Assignee** See **Status** Eliminated **Resolved in Version** R1.5 - Final

RS: re-submit more specific recommendation --

resolved by other resolutions ..

Issue Number **GI - 007** **Issue Date** 7/12/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Beta

Issue Description Subtyping all Properties from IfcPropertyDef -- This is both disturbing and exciting to me. On the one hand, pre-defined simple attributes carry the overhead (and confustion) of the optional PropertyDescriptor (proposed below) and OccurrenceReference -- this is disturbing. On the other hand, this opens up the possibility of attaching ALL attributes at runtime (even predefined ones) and maybe (someday) objects that can change class at runtime. This would be ULTIMATE flexibility -- this is the exciting part. In general, this is contributing to my concern that we are making things WAY to flexible and that performance in implementation will be unacceptable.

Proposed Solution Consider: We need to simplify, simplify, simplify ? even if it means we lose some flexibility.

Resolution Resolved --

1) moved the descriptor from IfcPropertyDef to SimpleProperty and PropertySet (which solves the overhead problem)

2) overriding of attributes has been eliminated

3) subtyping pre-defined properties from IfcPropertyDef will remain -- since #1 above addressed the main concern

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will make changes. Confirmed (RS).

Issue Number ***GI - 008*** ***Issue Date*** 8/8/97

Author See ***Owner*** All STF ***Status*** Deferred to R3.0

Schema All Schemata ***Version*** R1.5 - Pre-Beta

Issue Description Objectified Relationships: I would make the case that Relationships can/should be thought of as typed. If you look at what has been happening to the models in the past 6 weeks, there are a growing number of objectified relationships that are driven simply by associated data. TypeDefinitions were developed to remedy this ‘class explosion’ and they can be applied equally to objectified relationships as they have been to products. Examples of classes that could be elimintated --> IfcRelUsesProducts, IfcRelUsesConstructionAids, IfcRelConnectsElements, IfcRelGroupsWorks, IfcRelVoidsElements, IfcRelFillsElements, IfcRelAssemblesElements, IfcRelSeparatesSpaces, IfcRelCoversBldgElements, IfcRelGroupsCostSchedules, IfcRelGroupsSpaceProgrammes <-- 11 classes which currently do nothing more than redeclare the relationships (RelatingObject / RelatedObjects).

Proposed Solution 1) add a mandatory attribute "L[0:N] TypeDefinition" [IfcTypeDefResource.IfcPropertyTypeDef] {{ note: this matches the modified attribute recommended for IfcObject}} . 2) add a mandatory attribute "OccuranceProperties" L[0:N] -- as on IfcObject.

Resolution Related to 9 and 10. Not resolved for R1.5 --> deferred to R2.0

Agreed that this is something to consider, but probably too complex for implementers (and STF!) in the R2.0 timeframe. Will look at the possibilities again in the R3.0 timeframe.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

JW - Wall Paper view of models (will ask Japanese chapter, who did one for BCCM)

Action # 2 ***Assignee*** Forester ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

JF - Entity Hierarchy chart

Action # 3 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

RS - Long form presentation format for Entities (which shows attr/rela) for each level of Supertypes
(RS will prototype this for a few classes)

Issue Number ***GI - 009*** ***Issue Date*** 8/8/97

Author See ***Owner*** All STF ***Status*** Rejected

Schema All Schemata ***Version*** R1.5 - Pre-Beta

Issue Description We need to enable redeclaration of objectified relationships w/o creating new classes -- we currently have a REAL BIG problem building in that we have some VERY generalized concepts for which 1) relationships should be redeclared in specializations in order to insure consistent semanic interpretation, however 2) doing so in cases where no additional data/relationships/behavior is defined results in a subtyped class explosion which bloats the model just for the sake of interpretation.

Proposed Solution we need to find a way to provide such redeclaration and/or specialized interpretation of generalized concepts (e.g. RelatingObject/RelatedObjects for Obj.Relationships) without having to create subtyped classes.

Resolution Related to 8 and 10.

The specialized relationships are justified because they have specific target objects and related data. It is also felt that these will include specialized behavior in applications.

Action #		Assignee		Status		Resolved in Version	
Action #	1	**Assignee**	See	**Status**	Complete	**Resolved in Version**	R2.0 - Alpha

RS and TL will look into a standard way to handle this. 7-Sep-97: RS to include a proposal for this in his proposal for documenting superclasses and inherited interfaces.

Action #	2	**Assignee**	Liebich	**Status**	Eliminated	**Resolved in Version**	R2.0 - Alpha

RS and TL will look into a standard way to handle this. 7-Sep-97: RS to include a proposal for this in his proposal for documenting superclasses and inherited interfaces.
This has been resolved by the new modeling rule that we will not subtype from concrete Objectified Relationships.

Issue Number	**GI - 010**			**Issue Date**	8/8/97
Author	See	**Owner**	All STF	**Status**	Deferred to R3.0
Schema	All Schemata	**Version**	R1.5 - Pre-Beta		

Issue Description Redeclaration of the relationships on Objectified Rels (for specializations) would be significantly enhanced if we renamed the realtionships to be semanically accurate rather than redeclaring the 'RelatingObject' and 'RelatedObjects' from the abstract level.

Proposed Solution If we have to redeclare anyway, then use semantically accurate relationship names. This may not be allowed in EXPRESS. If not, then we need to find a way to alias the attribute name because it is exceptionally confusing the way it is now (where all redelarations are the same; yet the data types change).

Resolution Related to GI-8 and GI-9
Redeclaration with a changed name cannot be done in EXPRESS.
However, redeclaration can be avoided if we remove the relationship (Relating and Related Objects) in the abstract supertypes - IfcRelationship1to1 and IfcRelationship1toN. See resolution to I-310

Action #	1	**Assignee**	See	**Status**	Eliminated	**Resolved in Version**	R2.0 - Alpha

RS and TL will look into a standard way to handle this. 7-Sep-97: RS to include a proposal for this in his proposal for documenting superclasses and inherited interfaces.

Action #	2	**Assignee**	Liebich	**Status**	Eliminated	**Resolved in Version**	R2.0 - Alpha

RS and TL will look into a standard way to handle this. 7-Sep-97: RS to include a proposal for this in his proposal for documenting superclasses and inherited interfaces.

Issue Number	**GI - 011**			**Issue Date**	8/8/97
Author	See	**Owner**	All STF	**Status**	Resolved
Schema	All Schemata	**Version**	R1.5 - Pre-Beta		

Issue Description We need a way of declaring the semantics of inherited attributes (as well as relationships -- see above). For example: IfcElement.calcTotalArea = "AreaPerSide" for IfcWall, IfcFloor, IfcRoofslab. This can be a REAL problem as our hierarchy gets to be deep because attributes defined in the abstraction layers can be interpreted differently the further removed they are from a leaf class.

Proposed Solution Add an "Attributes and Relationships Re-definition" section to our documentation template -- which only includes redefinition for the ones deemed ambiguous. These can also be filled in over time as we 'discover' which things were ambiguous.

Resolution Recommendation is to create a tool that allows us to declare a more accurate name at the local level -- expanded view of inherited attributes and relationships as described in GI-8.

Cannot do this in time for R1.5. Deferred to R2.0.

This has been resolved by the new approach to objectified relationships -- which allows a semantically accurate name and definition.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

Add to the list of projects for R2.0

Action # 2 ***Assignee*** Hietanen ***Status*** Eliminated ***Resolved in Version*** R2.0 - Alpha

Prototype HTML documentation which presents the specialized semantic definition for an inherited attribute in the Class section for a subtype.
Work w/ TL and implementers on formatting for both the online and HTML documentation.

Action # 3 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R2.0 - Alpha

Work with JH and implementers to define best format to insure use of specialized semantic definitions in both the onlline and printed forms of reference docs.

Issue Number ***GI - 012*** ***Issue Date*** 8/8/97

Author See ***Owner*** All STF ***Status*** Resolved

Schema All Schemata ***Version*** R1.5 - Pre-Beta

Issue Description "Geometry Use" sections of the reference documentation are not yet specific enough. I have received multiple calls complaining that the current scheme in R1.5 allows any object to have ANY shape -- and that this will bring about pandamonium.

Proposed Solution These reference documentation sections should be expanded to define three things which are not currently clear: 1) Standard ShapeRepresentation -- what is the standard use of geometry, 2) Multiple possible ShapeReps -- where multiple 'standard' possibilities exist, 3) DisAllowed ShapeReps -- where certain use cases are not to be allowed (e.g. use of them will fail certification). This will take a lot of time and cannot be done in a single issue of the IFCs. However, we should state our intention to do so and explain that this clarification will be developed over the next 2 or 3 releases.

Resolution Not resolved in first pass (21-Aug-97).

Fundamentally agreed. However, we will not be able to complete these all in time for R1.5. We will get started and do _some_ in R1.5. Will work to complete for all Class/types which use Implicit Geometry by R2.0.
Final Resolution: Will make use of diagrams from R1.0 and from Implementers agreements. Those not complete will be added to the list of projects for R2.0. Will do #1 for all, #2 for some critical ones for Addendum. All will be done for R2.0.

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R1.5 - Addend

Will do #1 for all, #2 for some critical ones for Addendum

Action # 2 ***Assignee*** See ***Status*** Incomplete ***Resolved in Version*** R2.0 - Alpha

Create list of those not done for R1.5 and put in list of projects for R2.0

Issue Number ***GI - 013*** ***Issue Date*** 8/21/97

Author Wix ***Owner*** All STF ***Status*** Resolved

Schema All Schemata ***Version*** R1.5 - Pre-Beta

Issue Description Aggregate relationships are defined differently thorugh the models

Proposed Solution All 1toN relationships (simple, not objectified) should be declared as mandatory with a minimum low bound of zero

Resolution Just say yes -- do it!

Action # 1 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

All to revise their schemata to comply with this agreed model design rule.

Action # 2 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

All to revise their schemata to comply with this agreed model design rule.

Action # 3 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

All to revise their schemata to comply with this agreed model design rule.

Action # 4 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

All to revise their schemata to comply with this agreed model design rule.

Issue Number	**GI - 014**			**Issue Date**	8/21/97
Author	Liebich	**Owner**	All STF	**Status**	Resolved
Schema	All Schemata	**Version**	R1.5 - Pre-Beta		

Issue Description Materials are referenced at very different levels of the model within different branches

Proposed Solution Look to insure consistency in the level at which Materials are referenced

Resolution Resolved by resolutions to other issues.

Issue Number	**GI - 015**			**Issue Date**	9/18/97
Author	See	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R1.5 - Pre-Final		

Issue Description Model Design Conventions: Naming conventions for Defined data types: All Enumerations should end with "Enum", all Select Types should end with "Select".

Proposed Solution Change the names of the following for the final:
- IfcProfilePreference -- to -- IfcProfilePreferenceEnum
- IfcReferencePreference -- to -- IfcProfilePreferenceEnum
- IfcTransitionCode -- to -- IfcTransitionCodeEnum
- IfcTrimmingPreference -- to -- IfcTrimmingPreferenceEnum
- IfcActor -- to -- IfcActorSelect
- IfcRole -- to -- IfcRoleEnum
- IfcCostOperator -- to -- IfcCostOperatorEnum
- IfcModifierBais -- to -- IfcModifierBaisEnum

Resolution Will do this for all entities that WE define, but will NOT do it for Geometry -- in order to maintain compatibility with STEP part 42.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

Modify names of Enums and Select types accordingly in IfcPropertyResource.

Issue Number	**I - 001**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGenericResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcOwnerIdentification.OwningActor - I think it would be useful to create a registry of project team members in the same way we have created a registry of applications which touch the project? In fact, it could be useful in incorporating a model for standard roles for project processes (e.g. workflow control). This would allow application developers to incorporate workflow messaging (e.g. Architect reaches "Arch. Concept Design" milestone and submits to shared model with messages to "Structural Engr" and "HVAC Engr" project roles that they are next in line to create their correstponding "Concept Design"s. This messaging could then be routed to the appropriate team member -- based on who has been assigned these roles in the Project Team Registry. NOTE: I am not suggesting that we include workflow features in R1.5 or even in R2.0, but that a project team registry would be essential to such things in the future, so let's structure for it now and not have to re-structure later.

Proposed Solution OwningActor should be of type INTEGER -- an index into the IfcProjectTeamRegistry - type List[0:N] Ref [IfcActor]. Include a "role" for each actor in the team registry and think about how this could be used for workflow management within the design team. Note: this is different than the document oriented workflow done by products like WorkCenter -- this is workflow in the design process - independent of particular documents.

Resolution TL - The idea of a registry is convincing for both actor and application registry.
Rich: do you volunteer to help defining the correct nice model equivalent?

21-Aug-97 --> compromise seems to be a simple registry of Actors (IfcActorRegistry) and leave the roles and workflow issues to later (maybe R2.0).

Partially resolved -- partially deferred - see I-191

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL and RS to develop - TL to include this in the UtilitiesResource (renamed from GenericResource). Confirmed (RS).

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL and RS to develop - TL to include this in the UtilitiesResource (renamed from GenericResource). Confirmed (RS).

Issue Number I - 002 ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGenericResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcOwnerIdentification.UsedApplication is misleading name choice as there will be many users of an object, but only one owner (at any one time).

Proposed Solution "UsedApplication" should be "OwningApplication" .

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the change. Confirmed (RS).

Issue Number I - 003 ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGenericResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcOwnerIdentification.ApplicationRegistry (note spelling) - just a Set of names from an enumeration - this is really ugly. How will we be able to keep a valid list of applications. The original reason for suggesting this was to allow applications which touch the project to register themselves as in the Windows Op. Sys. - NOTE: in that case, Windows does not attempt to maintain an exhaustive list, MS just provides an interface for any app. to register. We should use this model -- it is cleaner and removes the burden of proof from us. FURTHER: if this were a list, then references from OwnerIdent and AudtitTrail could simply use indexes (much more efficient).

Nikolay proposed to add Bentleys products to the list (email 7-Aug-97)

Proposed Solution "OwningApplication" should be of type INTEGER -- an index into the IfcProjectAppRegistry - type

List[0:N] Ref [IfcAppIdentification]. IfcAppIdentification should be an class with attributes for: AppFullName: STRING, AppIdentifier: STRING (limited to 8 character), AppDeveloper: IfcActor.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to update EXPRESS per the SS sent by RS. Confirmed (RS).

Issue Number I - 004 ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGenericResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcAuditTrail.LastModifiedXxx -- Currently this is not a "Trail".

Proposed Solution These 3 attributes should probably be of type - List [1:AuditListLength] -- where "AuditListLength" is another attribute, set by the owning app --> the number of modification records stored in the List.
This idea was pushed by Nikolay in March. I fought it initially as being more complex than we want. His argument was to design it in, even if we force the AuditListLength to 1 for R1.5, R2.0 -- to insure backward compatibility. Complications: The added issue with this is that, to do this "right", we would need to capture a whole lot more information than just "who done it".

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to update EXPRESS per the SS sent by RS. Confirmed (RS).

Issue Number I - 005 ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcAttDrivenRepresentationItem -- Naming problem - not sematically accurate.

Proposed Solution This should really be called IfcAttDrivenGeomRepItem as there are many types of representations besides geometric.

Resolution Will eliminate this supertype and subtype these from IfcGeometricRepresentationItem -- see issue #180.

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the change. This change superseded by elimination of this supertype and subtyping the AttDriven types from IfcGeometricRepresentationItem.

Issue Number I - 006 ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcAttDrivenRepresentationItem -- there is nothing defined for this abstract class!

Proposed Solution Consider: alternative is to use a SelectType -- what are the consequences?

Resolution This supertype is now gone as a result of other resolutions.

Issue Number I - 007 ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcAttDrivenRepresentationItem -- Lost VertexPoint and EdgeCurve as subtypes of GeometricRepresentation. These were useful as topological elements used by connections (for example).

Proposed Solution Put them back in (please see also comment on Diagram 7 regarding loss of IfcTopologicalRepresentationItems).

Resolution A proper topological model will be addressed in the R2.0 timeframe.

This has been resolved by the new IfcTopologyResource schema.

Action #	1	***Assignee***	See	***Status***	Complete	***Resolved in Version***	R2.0 - Alpha

RS add to list of projects for R2.0

Issue Number	***I - 008***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Classes: IfcPlacement and Subtypes (Axis1Placement, Axis2Placement3D, Axis2Placement3D) -- programmer/reader problems in understanding 3 varieties of placement

Proposed Solution We really need some concept diagrams in order to understand the differences between these 3 types of placement.

Resolution Descriptions are complete now. Diagrams still need to be added.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

TL will do diagrams

Issue Number	***I - 009***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Classes: IfcPlacement and Subtypes (Axis1Placement, Axis2Placement3D, Axis2Placement3D) -- Attribute names like "Z" and "P" are too cryptic.

Proposed Solution Please use more descriptive names (even if it means they are different than STEP.

Resolution Rejected. Policy agreed (at this time) is that a STEP entity used exactly 'as is' will keep the attribute names the same.

Action #	1	***Assignee***	Wix	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

add this to the STF Modeling Guide

Issue Number	***I - 010***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Classes: IfcPlacement and Subtypes (Axis1Placement, Axis2Placement3D, Axis2Placement3D) -- Axis1Placement.Axis, Axis2Placement3D.Axis and .RefDirection and Axis2Placement2D.RefDirection all are shown as optional -- how can this be. These objects would be ill-defined without these attributes -- wouldn't they ?

Proposed Solution make them mandatory.

Resolution This is consistent with STEP approach -- they assume a default direction if it is not included.

Reject change in order to be consistent with STEP entity -- BUT, will issue a SEDS to STEP asking them to change this.

Action # 2 ***Assignee*** Wix ***Status*** Eliminated ***Resolved in Version*** R2.0 - Alpha

TL will write SEDS, JW will push with STEP.

Eliminted: we later discovered that this is solved by the functions in this class.

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R2.0 - Alpha

TL will write SEDS, JW will push with STEP.

Eliminted: we later discovered that this is solved by the functions in this class.

Issue Number ***I - 011*** ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcCartesianPoint -- Coordinates is shown as a list[1:3] -- seems like this should be [2:3] or even [3:3]. I don't know of a case where we use 1D coordinates, but there are some 2D.

Proposed Solution Coordinates: L[2:3]

Resolution Policy to date has been to 'take it from STEP and apply rules to make acceptable in the IFC context' -- this has been forced to be 2 or 3 through an EXPRESS where rule.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

TL to add implementers interpretation section to .DOC after the where rules.

Issue Number ***I - 012*** ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Classes: IfcCurve and IfcBoundedCurve -- there is nothing defined for this abstract class!

Proposed Solution Consider: alternative is to use a SelectType -- what are the consequences?

Resolution These are needed as they are used as generalizations for data type referenced elsewhere -- leave them in.

Issue Number ***I - 013*** ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcBoundedCurve -- Error found: 'off page' references for IfcTrimmedCurve and IfcCompositeCurve should be updated to diagram 4 (not 3).

Proposed Solution Fix them

Resolution Fixed in newest

Issue Number ***I - 014*** ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcLine.Dir -- name "Dir" is misleading -- Vector used defines not only direction, but length as well.

Proposed Solution Dir would better be named "Extent"

Resolution This is consistent with STEP approach attribute naming.

Reject change in order to be consistent with STEP entity -- BUT, will issue a SEDS to STEP asking them to change this.

Action # 1 **Assignee** See **Status** Incomplete **Resolved in Version** R2.0 - Alpha

RS will write SEDS, JW will push with STEP.

Action # 2 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.0 - Alpha

RS will write SEDS, JW will push with STEP.

Issue Number **I - 015** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcVector -- Error found: 'on to page' reference for inheritence should be to Diagram 3 (not 2).

Proposed Solution Fix them

Resolution Fixed in newest

Issue Number **I - 016** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcVector -- Error found: there is a spelling error in the Magnitude reference to IfcMeasureResource.

Proposed Solution Fix them

Resolution Fixed in newest

Issue Number **I - 017** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description Class: Ifc2DCompositeCurve -- there is nothing defined for this class

Proposed Solution Consider: alternative is to use a SelectType -- what are the consequences?

Resolution Rejected. There are 'Where' rules which constrain its use to act in a plane

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Issue Number **I - 018** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description Class: Ifc2DCompositeCurve -- the attribute "Outer" : Boolean -- defined for this class in the Alpha-2 review is missing.

Proposed Solution if there is not attribute or relationship for this class, then eliminate it.

Resolution Rejected. This was needed in STEP because it is used with entities that are bounded (where this was set to TRUE), we only use this with unbounded Planes -- therefore we don't need it.

Issue Number **I - 019** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcSolidModel -- there is nothing defined for this abstract class!

Proposed Solution Consider: Subtyping IfcFacetedBrep and IfcSweptAreaSolid -- what are the consequences?

Resolution 21-Aug-97 --> consensus is that we should accept and implement this.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL to discuss it with Nikolay. This supertype has been eliminated and TL has proposal for combining IfcSweptAreaSolid and IfcAttDrivenExtrusionSolid. See issue on Beta model somewhere after #215.

Issue Number **I - 020** **Issue Date** 7/8/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcBoundingBox -- The convention for --> where on the box is the origin (or placement) is not clear.

Proposed Solution This must be made crystal clear in documentation.

Resolution This is resolved by the new entity documentation

Issue Number **I - 021** **Issue Date** 7/8/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcBoundingBox -- The attributes "Z", "Y" and "Z" are not clear and 2 are redundant. Do you mean "X-Dim", "Y-Dim", "Z-Dim" ??

Proposed Solution Eliminate redundancy and make names more descriptive.

Resolution First one was resolved -- error found. Second one agreed -- different than other STEP attribute names policy because this one has a different entity name than the equivalent in STEP.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL to make changes. Confirmed in Pre-final (RS).

Issue Number **I - 022** **Issue Date** 7/8/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcClosedShell -- Error found: (2) 'on to page' references should be updated as coming from page 6 (not 5).

Proposed Solution fix them

Resolution Fixed in newest

Issue Number **I - 023** **Issue Date** 7/8/97

Author	See	**Owner**	Liebich	**Status**	Rejected
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcFaceOuterBound -- there is nothing defined for this class!

Proposed Solution Consider: alternative is to use a SelectType -- what are the consequences?

Resolution Rejected -- in favor of STEP compatibility.

Issue Number	**I - 024**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcPolyLoop - Error found: the 'off page' reference to IfcCartesianPoint should be 2,5 (not 1,5)

Proposed Solution fix them

Resolution Fixed in newest

Issue Number	**I - 025**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Rejected
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description The IfcTopologicalRepresentationItems from the Alpha-2 version are missing! These were very useful for connections and alignment of objects. Where have they gone?

Proposed Solution put them back in so that they can be used for alignment and connections based on geometry.

Resolution We decided not to have topological model in R1.5. A proper topological model will be addressed in the R2.0 timeframe. See action on I-7.

Issue Number	**I - 026**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcProfileSegment -- If my assumption about how this works (see question on PathDef below, in IfcAttDrivenPathDef and in ShapeRep schema), the name "IfcProfileSegment" is misleading in that 'Segment' more commonly refers to one segment of a series.

Proposed Solution 'IfcExtrusionSubProfile' would probably be better since it implies that each profile in the list is a subset of the profile 'set' to be extruded along a common path.

Resolution This was a misunderstanding -- these are really segments in a series. However, the IfcProfileSegment is REALLY an ExtrusionSegment.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL will change
IfcProfileSegment to IfcExtusionSegment. Confirmed in Pre-final (RS).
IfcStraightSegment to IfcStraightExtrusionSegment. Changed to "UniformExtrusionSegment" (See resolution to I-28). Confirmed in Pre-final (RS).
IfcTaperedSegment to IfcTaperedExtrusionSegment. Confirmed in Pre-final (RS).
IfcMorphingSegment to IfcMorphingExtrusionSegment. Confirmed in Pre-final (RS).

Issue Number	**I - 027**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: AttDrivenExtrusionSolid -- Torsion: Boolean -- as per my comments on this 4 months ago, a receiving app cannot do much with the knowledge that an extrusion includes torsion without information defining the rate and direction of torsion -- e.g. 90 degree rotation clockwise about the path for every 5 meters of extrusion.

Proposed Solution Add attributes for rate and direction of torsion

Resolution Torsion will be delayed to R2.0 so that we have more time to resolve the consequences.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

Delete the Torsion attribute for R1.5. Confirmed in Pre-final (RS).
RS will add to projects list for R2.0.

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

RS add to list of projects for R2.0

Issue Number ***I - 028*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcStraightSegment -- class name is misleading

Proposed Solution This classname should be 'IfcUniformSubProfile' in that is is not always 'straight' and should be called a SubProfile (rather than segment - see above).

Resolution Uniform" is agreed. 'Sub-profile' was not right -- see last issue.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to change "IfcStraightSegment" to "IfcUniformExtrusionSegment". Confirmed in Pre-final (RS).

Issue Number ***I - 029*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcTaperedSegment -- Classname is misleading.

Proposed Solution This classname should be 'IfcTaperedSubProfile' (not a segment as explained above).

Resolution Rejected - see I-26

Issue Number ***I - 030*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcTaperedSegment -- TaperingFactor: IfcParameterValue - what is this value? Seems too ambiguous.

Proposed Solution define a RateOfTaper: CompoundMeasure (see general notes question above about how to handle 'Unit per Unit' - e.g. Meter (taper) per Meter (of extrusion))

Resolution Should be a ratio. Attribute should be "TaperingRatio" of type IfcRatioMeasure.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will make changes. Confirmed in Pre-final (RS).

Issue Number ***I - 031*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcMorphingSegment -- Classname is misleading.

Proposed Solution This classname should be 'IfcMorphingSubProfile' (not a segment as explained above).

Resolution Rejected - see I-26

Issue Number	***I - 032***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Deferred to R3.0
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcMorphingSegment -- StartProfileDef / EndProfileDef - there appears to be no constraining of these profiles (to be of the same profile type for example --> both rectangular, circular, trapazonidal). This will be a problem if an app defines two different profile types for start/end.

Proposed Solution Constrain these to be of the same profile type and disallow the 'ArbitraryProfile' unless we can constrain the number of verticies to be the same. Additionally, include in the documentation the convention --> that each vertex will map to the like vertex in the next profile (e.g. vertex a-1 extrudes to vertex b-1, etc.).

Resolution Agreed -- and already done --> This is constrained in the 'Where' rules.

Arbitrary profiles and other predefined profiles (ellipse, triangle, etc.) will be considered in R3.0. This may be done with the help of STEP parametric geometry resource.

A method of defining mapping between verticies of dissimilar profiles will also be studied for R3.0.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

add to the list of projects for R2.0:
- support of arbitrary and other pre-defined profiles
- method for mapping extrusion from/to verticies of dissimilar profiles

Issue Number	***I - 033***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcAttDrivenProfileDef -- GeometricResolution - the fact that this enumeration allows either 'Curve' or 'Surface' leads me to believe that 'CurveResolution' and 'SurfaceResolution' should be optional (as only one will be used). Right?

Proposed Solution Make them optional (?)

Resolution Rejected. Derived (DER) attributes cannot be optional in EXPRESS (arrrrgh!)

However, some changes were agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to change name of attribute from GeometricResolution to ResultingGeomType, the enum from IfcProfilePreference to IfcSurfaceOrSolid, attribute 'CurveResolution' to 'CurveForSurface', 'SurfaceResolution' to 'SurfaceForSolid'. Note: IfcSurfaceOrSolid is not right for "ResultingGeomType" of a profile -- set to IfcCurveOrSurface (where a profile that is a Curve will be extruded to create a surface and a Surface will be extruded to create a solid. Confirmed in Pre-Final (RS). See also GI-15 for name of Enum

Issue Number	***I - 034***			***Issue Date***	7/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcCircleProfileDef, IfcRectangleProfileDef, IfcTrapeziumProfileDef -- it is VERY difficult to sleuth what some of the attributes mean without concept diagrams.

Proposed Solution Complete concept diagrams for each of these profiles which show each attribute.

Resolution Cannot use 'Length', 'Width', etc. here because the use of the profile in different cases will be different. Compromise --> "Xdim", "Ydim", etc.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

TL to make changes.

Issue Number ***I - 035*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcCircleProfileDef, IfcRectangleProfileDef, IfcTrapeziumProfileDef -- Radius, Y, X, BottomX, TopX, Y, MaxX, MaxY - these names are too cryptic!

Proposed Solution Please make the attribute names descriptive - even if it means they are different from STEP -- as they were in the Alpha-2 versions.

Resolution Agreed to do the same as in I-34.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

TL to make changes

Issue Number ***I - 036*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcAttDrivenPathDef -- The mulit-segment paths defined in R1.0 and in the Alpha are missing. These are VERY important and powerful in that it is clear to the receiving application, how to clean up the 'joints'. As you will remember, this was an issue for the implementers at first (in that they had not used a system for unambiguously transferring such connection geometry before), but then became one of the most obvious features of the demos in Frankfurt and Philadelphia.

Proposed Solution Restore muli-segment (BoundedCurve) paths as in R1.0 and Alpha-2

Resolution Convention is that the extrusion is along the 'Z'-axis of the local placement of the Extrusion Segment (see IfcExtrusionSolid). Not resolved in first pass (21-Aug-97). Second pass (23-Aug-97) - We will live with single segment paths for R1.5 -- will look at this again in R2.0.

This was added back in R1.5.1.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

RS: add to the list of projects for R2.0 --> consider restoring multi-curve extrusion paths (as in R1.0)

Issue Number ***I - 037*** ***Issue Date*** 7/8/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcArcPathDef -- Where is the center of the Arc? You have ExtrAngles and Radius, but can't construct the Arc path without a center point.

Proposed Solution Add center of Arc or clarify where it is defined.

Resolution Convention is that the center is the origin of the local coordinate system

However, one change was agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

TL will add reference to Local Placement on the IfcAttDrivenPathDef. Note confirmed in Pre-Final (RS - email to TL 15-Sep).

Issue Number	*I - 038*			*Issue Date*	7/8/97
Author	See	*Owner*	Liebich	*Status*	Rejected
Schema	IfcGeometryResource	*Version*	R1.5 - Pre-Beta		

Issue Description Class: IfcArcPathDef -- ExtrAngles: L[1:N] - why is this a list of angles. You should only need angle to extrude 'from' and angle to extrude 'to'.

Proposed Solution Change to ExtAngleStart and ExtAngleEnd.

Resolution Rejected. This is mis-understood -- this list allows multiple extrusion segment along the curve.

Issue Number	*I - 039*			*Issue Date*	7/8/97
Author	See	*Owner*	Liebich	*Status*	Resolved
Schema	IfcGeometryResource	*Version*	R1.5 - Pre-Beta		

Issue Description Class: IfcStraightPathDef -- Where are the starting point and Direction for this path?. How can the receiving system reconstruct the path without these?

Proposed Solution Add starting point and direction (or change ExtrLength to a Vector).

Resolution Rejected. Convention is that the start is the origin of the local placement -- now to be put on the IfcAttDrivenDef

Issue Number	*I - 040*			*Issue Date*	7/8/97
Author	See	*Owner*	Liebich	*Status*	Resolved
Schema	IfcGeometryResource	*Version*	R1.5 - Pre-Beta		

Issue Description Class: IfcStraightPathDef -- ExtrLengths: L[1:N] - why is this a list of lengths. If this is a single segment extrusion (see other notes on this), then only one should be needed. See also the note above on multi-segment paths.

Proposed Solution Change this to a single length for this single segement path definition.

Resolution Not resolved in first pass (21-Aug-97) -- to be resolved with I-36. Second pass (23-Aug-97) - We will live with single segment paths for R1.5 -- will look at this again in R2.0.

IfcStraightPathDef was eliminated in R1.5 or R1.5.1.

Action #	1	*Assignee*	See	*Status*	Complete	*Resolved in Version*	R2.0 - Alpha

RS: add to the list of R2.0 STF projects

Issue Number	*I - 041*			*Issue Date*	7/8/97
Author	See	*Owner*	Liebich	*Status*	Resolved
Schema	IfcShapeRepResource	*Version*	R1.5 - Pre-Beta		

Issue Description General comments - This schema seems too complex. Why does it use two separate levels of containment -- Product and ShapeRep. Introduction of the "Product" terminology here is confusing and foreign to an AEC application developer. Currently we have ProductShape; containing ProductComponentShapes; which contain ShapeReps.

Proposed Solution Why not simply allow nesting of ComponentShapes (components can have components --> to any level of detail) which are contained within a ShapeRepresentation which is referenced as a Property of a semantic model object.

Resolution Nesting agreed. Elimination of Positive/Negative subtypes agreed. Eliminated IfcProductComponentShape (reference IfcShapeRep directly from IfcProductShape).

Add Boolean (PositiveOrNegative) to IfcProductShape (to replace removed subtypes).

Remove TypeDefID (this was added originally to allow PropertySets on ProductShape components = mixing of semantic and geometric models. Remove "Usage" as this in now replaced by "Description" pushed up to ProductShape (from ComponentShape).

Semantic model obj. points to IfcProductShape, which refs List[0:N] IfcProductShape (self reference), which optionally refs IfcShapeRepresentation (optional in the case where the shape is only defined by the component ProductShapes).

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make changes. Note: the nesting proposed has been implemented using a recursive 'CSG-like' tree structure which allow combination of any number of component shapes and the use of boolean operators (limited to subtraction for R1.5). Confirmed in Pre-Final (RS).

Issue Number **I - 042** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcShapeRepResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcProductShape -- ProjectID, OwnerID, AuditTrail - these three are defined in IfcRoot agree in San Rafael on 30-May. They should not be attached independently in multiple places. We agree that the IfcRoot should be defined independently and then contained (aggregated) into three root classes at per our 'Pseudo Model' (see also the discussion in A-2c).

Proposed Solution If we want ID on shape (see next issue), then it should be done through aggregation of a common IfcRoot object.

Resolution 1) IfcKernelRoot will now be IfcRoot and will have a single attribute (IfcProjectUniqueID).
2) IfcSeed will be defined in the GenericResource and will include the IfcOwnerID and the IfcAuditTrail
3) IfcSeed will be contained by IfcObject, IfcRelationship, IfcProject and IfcPropertyTypeDef
4) All objects in a project should reference IfcProjectUniqueID

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make changes. Note: changes since this was captured. 1) IfcSeed is now IfcOwnerHistory. Confirmed with exception - IfcSeed refs in Kernel and IfcPropertyTypeResource should be updated to IfcOwnerHistory (RS email to TL - 15-Sep)

Issue Number **I - 043** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcShapeRepResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcProductShape -- ID on ShapeReps - We did not include the IfcRoot (ID) object in the ShapeRep in our 'Pseudo Model' because we argued that the shape is not independent of the owning object, therefore. We agreed that we have to make some hard choices about which objects need independent ID because we need to reduce the overhead involved in putting this type of 'heavy' identification and tracking on every property in our model. This will be a performance killer.

Proposed Solution Look into the consequences of excluding independent ID on all properties, including ShapeRep. We may find that we have to, but if we don't, then we should try to reduce this overhead.

Resolution Rejected -- see decision #4 on I-42.

Issue Number **I - 044** **Issue Date** 7/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcShapeRepResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcProductShape -- MainComponent/SubComponents - I tend to agree with other notes I have seen that this distinction of a main component seems somewhat artificial. I don't see the advantage other than it being viewed as the basis for the additions and subtractions of sub-components (which I don't think we need if we use a LIST of components (#1 in the list becomes the basis).

Proposed Solution Remove the Main/Sub component distinction and allow components to be nested as destibed in the general notes for this schema.

Resolution Resolved -- see solution described in I-41

Issue Number	**I - 045**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcShapeRepResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcProductShape -- Usage:STRING - Is this attribute really supposed to be a "Description" of the ProductShape?.

Proposed Solution Pick a more semanically accurate attribute name.

Resolution Resolved -- see solution described in I-41

Issue Number	**I - 046**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Rejected
Schema	IfcShapeRepResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcProductComponentShape -- ProjectId - do we really want to track an ID for every component of every object in our models? This seems like awfully heavy overhead. So far as I can see, these component shapes do not exist independently and are not shared between multiple objects, therefore we should be able to contain them in the owning object instance (which has independent ID).

Proposed Solution Look into the consequences of excluding independent ID for components.

Resolution Rejected -- see decision #4 on I-42.

Issue Number	**I - 047**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcShapeRepResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcProductComponentShape -- TypeDefID:STRING - ShapeReps currently don't have TypeDefinitions, so what could this be used for?

Proposed Solution Eliminate this attribute unless we enhance ShapeDefs to allow TypeDefinition -- something I don't think would be very useful.

Resolution Agreed - Resolved in solution described in I-42

Issue Number	**I - 048**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcShapeRepResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcPositiveComponentShape / IfcNegativeComponentShape -- So far as I can tell, these two subtypes do nothing.

Proposed Solution Add a LOGICAL attribute on IfcProductComponentShape (or IfcComponentShape as recommended above) which states whether the component shape is positive or negative.

Resolution Agreed - Resolved in solution described in I-42

Issue Number	**I - 049**			**Issue Date**	7/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcShapeRepResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcRepresentationContext -- IfcRepViewSelect / IfcRepViewType / IfcUserDefinedType - While I believe that it is a good idea to define such "Types" for shape representation now (even though we are only doing physical ShapeRep in R1.5 and R2.0), I do believe that UserDefinedTypes is over the top at this time. Let's just define some standard types for now and SIMPLIFY.

Nikolay seconds this one (7-Aug-97)

Proposed Solution Eliminate IfcRepViewSelect and the reference to IfcMeasureResource.IfcUserDefinedType --> ViewType:IfcRepViewType.

Resolution Agreed:
1) remove IfcRepViewSelect and IfcUserDefinedType
2) directly reference IfcRepViewTypeEnum (note name change) from IfcRepresentationContext and add more types to this enumeration (Plan, Section, Elevation, Isometric, Diagramatic,Undefined)
3) add IfcRepViewDetailEnum which includes (Sketch, Outline, Design, Detail, Undefined)

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make changes. Confirmed in Pre-Final (RS).

Issue Number I - 050 ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcShapeRepResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRepresentationContext -- Error found: IfcMeasureResource.IfcUserDefinedType does not exist in the .EXG file for the IfcMeasureResource schema.

Proposed Solution fix it

Resolution Already fixed

Issue Number I - 051 ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcShapeRepResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRepresentationContext -- PreferenceType:IfcRepPreferenceType [Accurate, Approximate] - what does this mean -- that the creating app preferred this type of rep or that the associated rep IS Accurate or Approximate?

Proposed Solution Use a more semantically accurate attribute name -- such as "IfcRepresentationAccuracy"

Resolution Eliminate for R1.5 and study for better solution in R2.0.

This was not added in R2 because it is not clear that implementers want it.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

1) TL to make the change and communicate with Eberhard M. - why was he arguing for this. Confirmed in Pre-Final (RS).

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

2) RS to add this to the list of STF projects for R2.0

Issue Number I - 052 ***Issue Date*** 7/8/97

Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcShapeRepResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcShapeRepresentation -- ProjectId - As with components, I believe we will want to avoid tracking an ID for every ShapeRep forf every object in our models? So far as I can see, these

ShapeReps do not exist independently and are not shared between multiple objects, therefore we should be able to contain them in the owning object instance (which has independent ID).

Proposed Solution Look into the consequences of excluding independent ID for ShapeReps.

Resolution Rejected - see resolution item #4 on I-42

Issue Number	***I - 053***			***Issue Date***	7/12/97
Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcMeasureResource	***Version***	R1.5 - Pre-Beta		

Issue Description DefinedTypes: IfcCompoundPlaneAngleMeasure and IfcSolidAngleMeasure -- the first of these is new since the Alpha Reviews and is a List of 3 REAL and the second is a single REAL -- Is the first used for Degrees/Minutes/Seconds (=Surveyor's angle measure) and the second is in decimal degrees? If so, I believe the first should be a List of INTEGER as I don't think I have every seen decimal values used in Surveyor's angle measure.

Proposed Solution use an INTEGER

Resolution Agreed -- but also have to constrain to list of [3:3] of integer.

Also need to enhance documentation to describe where to use each of IfcCompoundPlaneAngleMeasure and IfcSolidAngleMeasure.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

JW to make changes described above, plus add to documentation re: where to use each. Model change confirmed in Pre-Final (RS). Doc change confirmed 26-Nov-97

Issue Number	***I - 054***			***Issue Date***	7/12/97
Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcMeasureResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcTimeDuration -- this appears to be the replacement for the IfcCompoundTimeDurationMeasure -- this should REMAIN one of the IfcMeasureValue select type choices -- it is a measure of time duration.

Proposed Solution Include it in the set of IfcMeasureValue possibilities -- cross page ref. from diagram 2 to this entity

Resolution Agreed, but there is a complication -- all of the MeasureValues are defined data types.

Proposed solution:
1) eliminate the IfcTimeDuration class and replaced it with a defined data type of IfcTimeDurationMeasure [REAL], also add time measurement units to the UnitsInContext.
2) Move IfcCalendar, IfcDateAndTime, IfcLocalTime to the IfcPropertyResource schema and subtype each from IfcPropertyDef (so the they are available for use in PropertySets.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make changes. Confirmed in Pre-Final (RS).

Issue Number	***I - 055***			***Issue Date***	7/12/97
Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcMeasureResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcTimeDuration -- EndTime - why is this optional?? It cannot be optional if you are to have a duration because you need two times to do that.

Proposed Solution make is mandatory

Resolution Agreed -- resolved in the solution presented in I-54

Issue Number ***I - 056*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcMeasureResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcCoordinatedUnniversalTimeOffset -- Sense [EnumeratedType] - Again (see Alpha review notes), I don't see why this is an Enumeration!

Proposed Solution It can only be ahead or behind, so it should be a boolean called "Ahead". In the case where it is the same, make it true and set the offset to zero.

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make changes. Not confirmed in Pre-Final (RS- email to JW, 15-Sep).

Issue Number ***I - 057*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Superclass: IfcTypeDefResource.IfcPropertyDef -- Subtyping off of IfcPropertyDef is not shown in the IfcTypeDefResource schema.

Proposed Solution Update IfcTypeDefResource schema.

Resolution Rejected -- this is a limitation of the tools we are using -- cannot show inheritence to another schema

Issue Number ***I - 058*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcPersonAnOrganization -- I believe that this class should be eliminated and one attribute added to each of IfcPerson and IfcOrganization.

Proposed Solution The design change proposed will allow everything possible now AND will allow association of multiple persons with an organization (e.g. BuildingAuthority is listed as an Actor and there are 3 plan checkers assigned to this project.

CHANGES PROPOSED:
1) eliminate IfcPersonAndOrganization altogether
2) add an optional attribute "Organization" on IfcPerson
3) add a mandatory attribute "Persons L[0:N] Ref [IfcPerson]".

Resolution Rejected - this does not allow a person to be in multiple organizations.

Issue Number ***I - 059*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcPerson -- At least one field in every class should be mandatory. In this case it does not make sense to allow a person for which you have no name.

Proposed Solution Make FamilyName and GivenName mandatory.

Resolution Rejected -- There is a 'where' rule which requires one of the two names.

Issue Number ***I - 060*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcPerson -- MiddleNames, PrefixTitles, SuffixTitles (all L[1:N]). allowing a list for each of these is "over the top" and unnecessary -- since they are STRINGs, a list can (and should) be concatenated.

Proposed Solution Reduce each to a single optional STRING value.

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make changes. Confirmed in Pre-Final (RS).

Issue Number ***I - 061*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcPerson --Addresses[L[1:N], Roles[L1:N] - Somewhere along the way, we lost our convention to support implementers by eliminating optional Lists and Sets --> in favor of mandatory [0:N].

Proposed Solution Change each of these to mandatory L[0:N].

Resolution Resolved by policy.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make changes.   Confirmed in Pre-Final (RS).

Issue Number ***I - 062*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcOrganization -- Addresses[L[1:N], Roles[L1:N] - Somewhere along the way, we lost our convention to support implementers by eliminating optional Lists and Sets --> in favor of mandatory [0:N].

Proposed Solution Change each of these to mandatory L[0:N].

Resolution Resolved by policy.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make changes. Confirmed in Pre-Final (RS).

Issue Number ***I - 063*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcAddress -- At least one field in every class should be mandatory. In this case it does not make sense to allow an address for which there is not AT LEAST the Town and Country.

Proposed Solution Make Town and Country mandatory

Resolution Rejected -- There is a 'where' rule which requires one of the attributes..

Issue Number ***I - 064*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Superclass: IfcTypeDefResource.IfcPropertyDef --Subtyping off of IfcPropertyDef is not shown in that schema.

Proposed Solution Update IfcTypeDefResource schema

Resolution Rejected -- this is a limitation of the tools we are using -- cannot show inheritence to another schema

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Issue Number	**I - 065**			**Issue Date**	8/8/97
Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcMaterialLayer - Relationships between the parts in a MaterialLayerSet and its use in an occurrence of Wall, Floor, etc. is VERY confusing.

Proposed Solution Create and include in the documentation the diagram we (STF) drew on the whiteboard on 30-May-97 in San Rafael.

Resolution Agreed.

Action #	1	**Assignee**	Forester	**Status**	Complete	**Resolved in Version**	R1.5 - Final

JF will create the diagram (from notes during the May STF meeting) and pass to JW.

Action #	2	**Assignee**	Wix	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

JW to incorporate the diagram into the documentation.

Issue Number	**I - 066**			**Issue Date**	8/8/97
Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcMaterialLayer - LayerOffset [IfcLengthMeasure] -- the meaning of this attribute is STILL ambiguous -- even in the .DOC file.

Proposed Solution 1) rename to "OffsetFromMlsBase" (Mls=MaterialLayerSet, "MlsBase" = outside face of Layer 1 (first in list) -- depends on the "Sense" defined in each occurrence (see IfcWall for example), 2) CLEARLY state in the documentation that the offset is from this "MlsBase" to the first face of the layer (layer thickness is always positive and continues in the "Sense" direction to the other layer face) -- NOTE: Positive measure will be taken to mean --> in the direction defined by sense (e.g. a sense of LeftToRight means measure is positive from "Left to Right").

Resolution Agreed.

Action #	1	**Assignee**	Wix	**Status**	Complete	**Resolved in Version**	R1.5 - Final

JF and JW will implement. Model change confirmed, doc extensions not (15-Sep).

Action #	2	**Assignee**	Forester	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

JF and JW will implement. Model change confirmed, doc extensions not (15-Sep).

Issue Number	**I - 067**			**Issue Date**	7/12/97
Author	See	**Owner**	Wix	**Status**	Deferred to R2.0
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcMaterialLayer -- Material[Ref [IfcMaterial] - I have long been bothered by the fact that our MaterialLayerSets do not handle composite or elemented configurations well. Issue: how do we use this for ElementedWalls? --> e.g. 1) insulated stud wall, 2) concrete wall w/ repeating pilaster.

Proposed Solution Consider: IfcMaterialLayerComposition which provides for the definition of 1) % of phyisical volume filled by alternative materials, 2) spacing (along extrusion path) for repeating elements, 3) length (along extrusion path) for repeating elements --> this would be VERY useful to simulation apps and to CAD apps generating views of such layers.

Resolution

This is too complex for R1.5. Delay to projects for R2.0.
(JW-980510) Accepting that this is not a final solution to the question of layering (which will need to be put off to R3 due to current constraints):

Include a new class of IfcMaterialComponent where the material component is manufactured/ constructed from exactly one Material. Make a relationship between IfcMaterialLayer and IfcMaterialComponent such that an IfcMaterialLayer has at least one IfcMaterialComponent (to account for the situation where the layer in fact comprises a single material). Allow for the IfcMaterialComponent to be a placed with an offset from the MLSBase as for the IfcMaterialLayer. It shall also have an XaxisRelOffset and a ZaxisRelOffset as positive length measures so that its location within the layer can be determined. Also allow for the IfcMaterialComponent to have a positive length and height. Width is not specified since, for present purposes, the width of the IfcMaterialComponent should be considered to be the width of the layer that contains it by default.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

Add this to the list of projects for R2.0.

Issue Number **I - 068** **Issue Date** 7/12/97

Author	See	**Owner**	Wix	**Status**	Deferred to R3.0
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Beta		

Issue Description

Class: IfcMaterial -- MaterialName [STRING] - using STRINGS for material definition has VERY limited value.

Proposed Solution

Consider: references into an industry standard (international?) for construction materials. Short of this (if we cannot find one), it would be MORE USEFUL is we defined an enum of pre-defined materials and an optional STRING to support cases where "Other" is used from the Enum.

Resolution

This is too complex for R1.5. Delay to projects for R3.0..
(JW-980510) Considering the Uniclass classification, I see the following main material groups and sub groups

(Material
 (Ston
  (Natur
(Basalt, Bauxite, Chalk, Flint, Granite, Gravel, Gritstone, Limestone, Marble, Quartzite, Sand, Sandstone, Slate)
, Reconstituted
(……..)

 (Cementitious and Concrete and Mineral Bound Material
(Cementitious Materials, Cementitious Binders, Concrete, Other Mineral Bound Materials)

 (Mineral
  (Mineral Based Materials, Soils, Clay Based Materials, Bitumen Based Material

 (Meta
  (Steel, Iron, Aluminium, Copper, Zinc, Lead, Other Meta

 (Timbe
  (General Wood, Laminated Wood, Fibre Building Boar

 (Animal and Vegetable material
  (Animal Material, Vegetable Materia

 (Plastics and Rubber and Chemicals and Synthetic
(Plastics General, Plastics Composite, Natural Rubber, Synthetic Rubber, Synthetic Chemicals)
 (Combined and Undefined Material
  (Composite Material, Othe

)

There are in fact 2 pages of them. We would probably need to add others from other classification systems to cover the range of classifications. The model file C-Uni shows the above as a hierachical subtype model (schema would be identified as Classification-Uniclass or something of that nature; others might be Classification-CISfB, Classification-CAWS, Classification-Masterformat etc.). See remarks against Classification issues for further suggested amendments to the Classification model.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

Add this to the list of projects for R3.0.

Issue Number ***I - 069*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Superclass: IfcTypeDefResource.IfcPropertyDef -- Subtyping off of IfcPropertyDef is not shown in that schema.

Proposed Solution Update IfcTypeDefResource schema

Resolution Rejected -- this is a limitation of the tools we are using -- cannot show inheritence to another schema

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Issue Number ***I - 070*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcCost -- How in the world can this be an Abstract class?

Proposed Solution Make it a concrete (instantiable) class.

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW will fix this. Confirmed in Pre-Final (RS).

Issue Number ***I - 071*** ***Issue Date*** 7/12/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcPropertyResource ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcCost -- CostStage [STRING] - using a STRING is not very useful as we can expect that each application will use their own standard "Stages".

Proposed Solution Consider: Enumeration called IfcCostStageEnum which will allow multiple apps dealing with costs across stages to coordinate and support a common semantic meaning for each "Stage"

Resolution This cannot be well solved in R1.5. Remove CostStage from R1.5 and re-think a better way to handle this for R2.0.

(JW-980510) We have an R3 domain project ES-2 Cost Planning which is looking at the development of cost. We should either ask them to provide a definitive list of cost stages for use in R2 (I have done this) or wait until they complete their work for R3. When I get response from ES2, I will make the change.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

1) JW - remove CostStage from R1.5. Confirmed in Pre-Final (RS).

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

2) RS -add to list of R2.0 STF projects

Issue Number I - 072 **Issue Date** 7/12/97

Author See **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcCost -- BasisNumber/BasisMeasure - These are only need for Unit Costs -- and therefore should be optional (two are mandatory now).

Proposed Solution Combine both 'BasisNumber' and 'BasisMeasure' into a single, optional attribute called "UnitCostBasis" of the type [IfcMeasureResource.IfcMeasureWithUnit] .

Resolution Agreed.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW will make changes. Confirmed in Pre-Final (RS).

Issue Number I - 073 **Issue Date** 7/12/97

Author See **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcCost -- BasisDate - this appears to be the date on which this cost was assigned, therefore it seems to be useful for ANY cost (not just Unit Costs).

Proposed Solution Change the 'BasisDate' to "CostDate" -- still optional.

Resolution Agreed.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make the changes. Confirmed in Pre-Final (RS).

Issue Number I - 074 **Issue Date** 7/12/97

Author See **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Beta

Issue Description Class: IfcCost --I don't see a way to reference a Bid (say from a contractor or sub-contractor). It seems like such cross referencing from summary/estimate cost items to component cost items (bids or estimates) will be important. Therefore, I would suggest considering the following:

Proposed Solution Add a mandatory attribute called "CostComponents L[0:N]". This will allow an estimator to roll up components (estimates or bids) into composite costs for assemblies -- directly in the cost model (as opposed to doing it only in a cost Schedule).

Resolution Agreed.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make the changes. Confirmed in Pre-Final (RS).

Issue Number I - 075 **Issue Date** 7/12/97

Author See **Owner** Wix **Status** Rejected

Schema IfcPropertyResource **Version** R1.5 - Pre-Beta

Issue Description Superclass: IfcTypeDefResource.IfcPropertyDef -- Subtyping off of IfcPropertyDef is not shown in that schema.

Proposed Solution Update IfcTypeDefResource schema

Resolution Rejected -- this is a limitation of the tools we are using -- cannot show inheritence to another schema

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Issue Number	**I - 076**			**Issue Date**	7/12/97
Author	See	**Owner**	Wix	**Status**	Rejected
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcClassification -- Table and Edition - given that the Notation (which is, of course, mandatory) is really dependent on the table and edition for a classification system, does it make sense for these to be optional?

Proposed Solution Consider: making Table and edition mandatory.

Resolution Rejected. This may reference an in-house classification system where there is not a table or edition.

Issue Number	**I - 077**			**Issue Date**	7/12/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcTypeDefResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcPropertyTypeDef -- OwnerId, ProjectId, AuditTrail - These are the IfcRoot defined in the 'Pseudo Model' Therefore, this class should "have" an IfcRoot (using aggregation) -- see also issue I-3 in the review notes dated 8-Jul-97.

Proposed Solution Replace these three attributes with a mandatory attribute "PropertyIdAudit" of type IfcRoot (now shown as IfcKernelRoot in the Kernel Schema).

Resolution Resolved. See resolution described in I-42:
1) attach IfcSeed and IfcProjectUniqueID to IfcPropertyTypeDef
2) attach IfcProjectUniqueID to IfcPropertySet
3) contact Francois regarding why he argued for ProjectID on every atomic property (e.g. IfcSimpleProperty.

Tentative Design Policy decision: in order to lighten the identification load on the model, we need to identify the containers' that will have project unique ID and remove that ID from the contained objects -- e.g. no ID on each property, but only on the PropertySet which contains it -- AND -- no ID on geometry elements, but only on the ShapeRep in which the geometry is used.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to lead this study and work. Note: changes since this was captured. 1) IfcSeed is not IfcOwnerHistory. Confirmed with exception - IfcSeed refs in Kernel and IfcPropertyTypeResource should be updated to IfcOwnerHistory (RS email to TL - 15-Sep).

Issue Number	**I - 078**			**Issue Date**	7/12/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcTypeDefResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcPropertyTypeDef -- Type Driven Occurance Properties have been lost (see R1.0 spec). This is important because it is the type definition which identifies which of the "OccurrenceProperties" (on IfcObject) are associated with this Type. Without this reference, only the 'typing' application knows what was added into the "OccurrenceProperties". With this, any querying app can search and find the type driven OccurrenceProperties for this TypeDef. This will become imparative when we allow for object typing by different disciplines/domains/apps types.

Proposed Solution Add an attribute "OccurrencePropertySetName [STRING].

Resolution Alternative by TL is to add a reference from the Occurrence PropertySet to the TypeDef that drove it.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL to study and fix. Confirmed in Pre-Final (RS). Note: further issue by RS on 2 added classes (IfcOccurrencePropertySet and IfcSharedPropertySet - subtyped from IfcPropertySet), just to allow this alternative (as opposed to method outlined above - used in R1.0).

Issue Number ***I - 079*** ***Issue Date*** 7/12/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcTypeDefResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcPropertyTypeDef -- We have already discussed at length the eventual need to be able to "Type" objects or "Groups" for multiple AEC industry perspectives (e.g. Architects view of a wall - Typed as exterior, interior, partition, etc. -- versus the structural engineer's view of a wall - Typed as bearing, shear, non-structural, etc.). We are VERY close to being able to do this now -- with two changes as recommended here and in the Kernel review of IfcObject.

Proposed Solution 1) add the attribute to IfcPropertyTypeDef -- "ObjTypeDomainView" which is an Enumeration [CrossDomain, Architect, HVAC, Structural, Civil, Constructor, FM],

2) on IfcObject -- change the optional 'TypeDefinedProperty' to a mandatory "TypeDefinitions" L[0:N] Ref [IfcTypeDefResource.IfcPropertyTypeDef].

This will allow multiple domain views to type the object (or Group) from their perspective. A list of TypeDefs (shared properties) will be referenced and a corresponding list of OccurrenceProperties will be attached.

Resolution Seems like and interesting idea, but should be double checked.

Agreed in email thread from 9/2-9/4 in order to support attachment of multiple type driven Occurrence PropertySets - defined on IfcObject.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL to implement. Not confirmed (item 1 above not yet done) in Pre-Final (RS - email TL, 15-Sep).

Issue Number ***I - 080*** ***Issue Date*** 7/12/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcTypeDefResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcPropertyDef -- AttDescriptor - this should be optional since you have made this the Supertype for all pre-defined Properties as well as the Runtime defined ones. We don't need a descriptor for pre-defined simple attributes since each has a name and pre-defined semantic definition.

Proposed Solution Make this attribute optional.

Resolution Alternative solution: move this to the two subtypes which need it (IfcPropertySet and IfcSimpleProperty) and thus remove it for the ones that don't need it.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will fix it. Confirmed in Pre-Final (RS).

Issue Number ***I - 081*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcTypeDefResource	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcPropertyDef -- OccurrenceReference [IfcPropertyDef] - this self reference is also confusing. The inverse relationship implies that the primary purpose for this is to allow occurrence level overriding of attributes -- either simple attributes or individual attributes within a Set. Is this right?
Possible Use Cases --> 1) an application assiciates default values with a number of occurrences through the use of a type -- however, for special cases, the app can attach an individual property in the OccurrenceProperties list which provides an overriding value and points to the attribute in the shared set which is supersedes. Any receiving application must then replace the default value with the override. --- Is this correct?? If so, there is some question if you SHOULD allow this as it defeat a primary reason for standard types -- to reduce construction costs through standardization and quantity pricing.

Proposed Solution Leave this overriding out unless application developers request it. Alternatively, let's do a member survey which asks if this should be allowed.

Resolution Agreed. This overriding will be removed for R1.5.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL to make the change. Confirmed in Pre-Final (RS).

Issue Number	***I - 082***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcKernelRoot - Naming -- This should be designed to be used in the three places indicated in the ‘Meta Model’ developed on 30-May -- see also issue GI-3 above) AND should be named appropriately.

Proposed Solution Rename to IfcRoot

Resolution Resolved -- see resolution in I-42.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the change. Confirmed in Pre-Final (RS).

Issue Number	***I - 083***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Deferred to R3.0
Schema	IfcKernel	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcKernelRoot - Attribute lost from R1.0 -- needs reference to IfcVersion (probably better named IfcObjectVersion).

Proposed Solution Create ObjectVersion object and add reference to it here.

Resolution Deferred to R3.0.

Action #	1	***Assignee***	See	***Status***	Complete	***Resolved in Version***	R2.0 - Alpha

RS to add to the list of STF projects for R2.0.

Issue Number	***I - 084***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcProject - I would argue that projects are typed and may have associated properties just as the products they contain to. Additionally, projects in the firms I worked in were classified to support comparison and locating historical data in order to prepare proposals.

Proposed Solution 1) subtype from IfcObject
2) add a genericType
3) add classification.

Resolution Agreed - will be implemented as proposed.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Pre-Fin

TL will make the change.

Issue Number	**I - 085**			**Issue Date**	8/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcObject - TypeDefinedProperty [IfcPropertyTypeDef] -- Naming issue, cardinality enhancement recommendation -- this is the TypeDefinition, which associates the shared properties and also drives the OccurrenceProperties. See also GI-6 (support for multiple TypeDefs from different domain points of view.

Proposed Solution Call it "TypeDefinition" and make it a mandatory attribute - List [0:N] --> this will also require the addition of a mandatory attribute "TypeForDomain" in the IfcPropertyTypeDef class -- the application defining type will have to define the Domain for which this 'Type' is valid/intended. We may also want to consider establishment of an enumeration of 'standard' domain/aplication view 'Types' so that we don't end up with types defined for 'Interior Designer' and 'Furniture Selection Rep' when we want these two to be one.

Resolution Agreed to call it "TypeDefinition". See also I-79 regarding multiple TypeDefs and identification of the DomainViewType.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to fix -- also pending results from checking with Implementers and Domain. Confirmed in Pre-Final with execption noted in I-79 (RS - email TL, 15-Sep).

Issue Number	**I - 086**			**Issue Date**	8/8/97
Author	See	**Owner**	Liebich	**Status**	Rejected
Schema	IfcKernel	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcModelingAid - During the discussions in San Rafael late May (28/29/30), we re-introduced IfcControl as the supertype for ModelingAid and other types of constraints/controls.

Proposed Solution Remove IfcModelingAid from the Kernel and subtype from IfcControl in the IfcModelingAidExtension.

Resolution Rejected. Agreed that ModelingAid is not a control.

Issue Number	**I - 087**			**Issue Date**	8/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcConstructionAid - I don't see a reason for including this in the models at all. It has no data and only a single relationship described on D2. Therefore, it has little or no semanic meaning and is not justified.

Proposed Solution Remove it from the R1.5 models and only re-introduce it when we have a definition and data which is specific enough to prevent mis-interpretaion.

Resolution Agreed -- May be reconsidered in R2.0.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

RS to add to the list of STF projects for R2.0.

Issue Number	**I - 088**			**Issue Date**	8/8/97
Author	See	**Owner**	Liebich	**Status**	Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description Class: IfcRelGroups - seems like we will need one or more attributes to assign a semantic meaning or purpose behind the grouping. This is one of the subtopics in XM-3 for R2.0.

Proposed Solution Add attribute "GroupPurpose [STRING]".

Resolution Agreed, except that it should be attached to the IfcGroup rather than IfcRelGroups.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make the change. Confirmed in Pre-Final with exception that attribute is on IfcGroup rather than on the relationship (RS).

Issue Number I - 089 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description Class: IfcRelUsesProducts and IfcRelUsesConstructionAids - These could be eliminated based on the typing of relationships proposed above (general issue GI-8 in the general comments for review 3C).

Proposed Solution Eliminate from the model.

Resolution Related to GI-8. Not resolved in first pass (21-Aug-97)

Second pass (23-Aug-97) - 11 classes (listed in GI-8) exist only to redeclare the RelatingObject and RelatedObjects. Still need to look for was to reduce this meaningless class count.

The classes no longer exist in R2 -- resolved.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Alpha

TL/JW will look into a way of doing this with constraints in EXPRESS.

Action # 2 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.0 - Alpha

TL/JW will look into a way of doing this with constraints in EXPRESS.

Issue Number I - 090 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description Class: IfcRelUsesProducts - This can be replaced by a 'typed' IfcRelationship1toN (see rationalization in GI-8 regarding typed relationships). Also, this is an awkward name.

Proposed Solution Replace with typed superclass.

Resolution Related to GI-8. Not resolved in first pass (21-Aug-97)

Second pass (23-Aug-97) - 11 classes (listed in GI-8) exist only to redeclare the RelatingObject and RelatedObjects. Still need to look for was to reduce this meaningless class count.

This has been resolved by a more general relationship in R2.

Action # 1 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R2.0 - Alpha

TL/JW will look into a way of doing this with constraints in EXPRESS.

Action # 2 **Assignee** Wix **Status** Eliminated **Resolved in Version** R2.0 - Alpha

TL/JW will look into a way of doing this with constraints in EXPRESS.

Issue Number I - 091 **Issue Date** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcProduct - Inverse relationships -- from IfcElement = HasReferencingElements (elements which declare they are related to this container) and HasElements (elements which declare they are owned by this container).

Proposed Solution Include these in the interface definition -- Note: we still need a way to include these in the EXG diagrams -- don't we ? Excluding them makes it difficult to understand the model from the EXG diagrams.

Resolution Agreed. These need to be included in the Interface definitions in the spreadsheet, but also in the documentation and EXPRESS code.

NOTE: this superseded by inclusion of generalized containment using IfcRelContains (subtype of IfcRelationship1toN). However, another issue is that there is no inverse relationship from IfcObject to IfcRelContains. This means that the only way to find out all the elements 'contained' in an object (say Building), is to iterate over the IfcRelContains rels and find the ones which reference the Building as the RelatingObject. --> logged as issue #313

Action #	1	***Assignee***	See	***Status***	Eliminated	***Resolved in Version***	R1.5 - Final

RS to insure inclusion in the R1.5 SS. --

eliminated by the inclusion of generalized containment relationships.

Action #	2	***Assignee***	Liebich	***Status***	Eliminated	***Resolved in Version***	R1.5 - Final

Include in EXPRESS code and documentation for IfcProduct. --

eliminated by the inclusion of generalized containment relationships.

Issue Number	***I - 092***	***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcKernel	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcProduct - LocalPlacement [IfcLocalPlacement] -- this was the I_EntityPlacement in R1.0. Making it into an object -- seems okay. However, pushing it up to the IfcProduct class level creates an issue with respect to definition of a local placement for IfcNetwork, IfcSite, IfcSiteComplex, IfcBuildingComplex -- remember that we pushed this placement down to 4 places (from IfcProduct) just to avoid having placement on IfcSiteObject, IfcSiteComplex, IfcBuildingObject, IfcBuildingComplex . . .

Proposed Solution Consider: Personally, I like it this way because I have always argued that these containers should also have their own ShapeRep which is used in the early stages of design (before components have been designed) and in cases where abstract representation is needed. However, it does represent a shift is the consensus during the R1.0 discussions.

Resolution This is incorrect. These classes are subtyped from IfcGroup, which does not have LocalPlacement. Rejected.

Issue Number	***I - 093***	***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSequence - SequenceRelTo:IfcProcess, ResultsIn S[0:N] -- This appears to simply be a special case of a ‘Relationship1toN’ -- so it should not be subtyped from IfcRoot. Additionally, the "TimeLag" to successor processes may not always be the same. Consider: This could be a subtype of ‘Relationship1to1’ where there may be multiple IfcRelSequence objects associated with a process.

Proposed Solution Remove from the model as this can be a ‘typed’ ‘Relationship1to1’ or ‘Relationship1toN’ as described in general issue GI-8.

Resolution Related to GI-8. Not resolved in first pass (21-Aug-97)

Second pass (23-Aug-97) - IfcSequence is a 1toN relationship -- still need to solve the 'many to many' relationship problem on diagram 2. This will be revised to 1toN, Predecessor driven (e.g. RelatingObject = Predecessor, RelatedObject = Successors).

NOTE: this was superseded by I-200, in which IFcSequence was made a subtype of IfcRelationship1to1 instead.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL will make changes. Confirmed in Pre-Final (RS).

Issue Number **I - 094** **Issue Date** 8/8/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcControl and IfcDocument - There is nothing defined for these classes. It appears that they are only included to provide structuring of the model. If so, they should be abstract.

Proposed Solution Make both abstract classes.

Resolution Agreed.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL will make changes. Confirmed in Pre-Final (RS).

Issue Number **I - 095** **Issue Date** 8/8/97

Author	See	**Owner**	Liebich	**Status**	Rejected
Schema	IfcProductExt	**Version**	R1.5 - Pre-Beta		

Issue Description General Issue for Schema - Building Element Containers still need their own geometry. See RS email on 970526 - "Re[2]: Open issues in ProductExt and SharedBldgElements".

Proposed Solution Add an optional "ContainerShape" to IfcGroup in the Kernel.

Resolution Rejected. The subtypes don't really need shape.

Issue Number **I - 096** **Issue Date** 8/8/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcSpatialElement (reference) - Error found -- called IfcSpatialObject in this reference.

Proposed Solution Correct to IfcSpatialElement.

Resolution Already resolved -- TL fixed it.

Issue Number **I - 097** **Issue Date** 8/8/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcSiteComplex, IfcBuildingComplex, IfcZone, IfcSystem - Ambiguous meaning for RelatedObjects allowed for each of these containers.

Proposed Solution Redeclare the specialized meanings for RelatedObjects for each of these containers -- see also GI-9.

Resolution Related to GI-9. Not resolved in first pass (21-Aug-97)

This must be handled in the documentation for R1.5.

Long term solution deferred to R2.0

Action #	1	***Assignee***	See	***Status***	Complete	***Resolved in Version***	R2.0 - Alpha

Add research for long term solution to the list of projects for R2.0

Action #	2	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Enhance the reference documentation to clarify the meaning of RelatedObjects for these types.
WR added on IfcZone.

Issue Number ***I - 098*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSystem - Relationship lost from R1.0 -- In R1.0, we had a specialized relationship for IfcSystem --> IfcRelBldgSystems, which related a system to one or more buildings which it serviced.

Proposed Solution Add it back in.

Resolution Resolved. Add it back.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the change. Confirmed in Pre-Final (RS).

Issue Number ***I - 099*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRelConnectsElements & subtypes - Connections are Controls -- because they impose a geometric constraint on the connected elements. They are not Products.

Proposed Solution These entities should be moved to an IfcControls Schema. Note: the IfcControls schema is where I would anticipate we will put the general purpose constraint entities recommended by the Codes and Standards group.

Resolution Rejected. These are really Relationships, not Products or controls.

Issue Number ***I - 100*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRelConnectsElements & subtypes - These definitions are ambiguous and do not allow n-way connections. The subtypes define a single Point or Curve at which the connection is made, however they do not establish the corresponding point or curve within the "Connected" element's geometry. Therefore, the "Connected" element(s) are floating with respect to the connection point/curve.

Proposed Solution 1) subtype from IfcRelationship1toN
2) define the "ConnectionPoint" and "ConnectionCurve" within the RelatingObject's LCS
3) add the attributes "PointOnElements" and "CurveOnElements" to the two subtypes where these points/curves are defined in the LCS of the reference RelatedObjects.

Resolution TL agreed in principal, but not resolved in first pass (21-Aug-97). Compromise: Point currently defined in the ConnectionAtPoint relationship will be taken as being a point on the RelatingObject geometry (in its LCS). Another point will be added which is a point defined on the RelatedObject geometry (in its LCS). This second point will be optional. If the second point is omitted, the ReleatedObject will be connected at its origin (its placement location). Note: the compromise is that this is subtyped from IfcRelationship1to1, not 1toN.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

RS and TL will work on this process and make a proposal. Compromise: Point currently defined in the ConnectionAtPoint relationship will be taken as being a point on the RelatingObject geometry (in its LCS). Another point will be added which is a point defined on the RelatedObject geometry (in its LCS). This second point will be optional. If the second point is omitted, the ReleatedObject will be connected at its origin (its placement location). Note: the compromise is that this is subtyped from IfcRelationship1to1, not 1toN. Confirmed in Pre-Final (RS).

Action # 2 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to implement agreed solution. Confirmed in Pre-Final (RS).

Issue Number I - 101 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcRelConnectsElements & subtypes - Naming issues -- IfcRelConnectsByPoint, ByPoint, IfcRelConnectsByCurve and ByCurve are all a bit ‘forced’.

Proposed Solution Replace with IfcRelConnectedAtPoint, ConnectionPoint, IfcRelConnectedAtCurve, ConnectionCurve.

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make changes. Confirmed in Pre-Final (RS). Note: is actually IfcConnectsAtPoint.

Issue Number I - 102 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Deferred to R3.0

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcElement - PerformedFunctions S[1:N] [IfcElementFunctionTypeEnum] -- I don't think that we are ready to introduce support for multi-funcitonality. This concept is CERTAINLY not well discussed or documented.

Proposed Solution Remove this concept until it has more discussion and explanation -- target for inclusion in R2.0.

Resolution Agreed (15-July-98)
NOTE: it has been proposed (by RJ/RS) that multi-functionality of elements is now handled in another way. See IfcElementGroupByFunction. Elements may belong to any number of functional groups. A number of The values that were in IfcSystemTypeEnum will be moved to the enum IfcFunctionTypeEnum because they were not systems, but were functional groups (e.g. Furnishings and SpaceSeparators).

This will be resolved in R3.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

Elminate PerformedFunctions from IfcElement and also IfcElementFunctionTypeEnum

Not complete as of 27-Nov-97 (RS) - overlap on "enclosure" for example - also, "furnishing", "Spacial" (note spelling error) and "Enclosing" are not systems.

Action # 2 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

Correct the IfcSystemTypeEnum to eliminate those that are not systems. Examples: "enclosure", "furnishing" and "Spatial"

Action #	3	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R2.0 - Beta

TL/RS - Consider functional groups proposal for inclusion in R3.0

Action #	4	***Assignee***	See	***Status***	Eliminated	***Resolved in Version***	R2.0 - Beta

TL/RS - Consider functional groups proposal for inclusion in R3.0

Issue Number	***I - 103***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcElement - QuantityAccording [IfcMeasureResource.IfcUserDefinedType] -- after reading the documentation I would argue that this name is ambiguous. Also, the documentation states the data type as being a STRING.

Proposed Solution 1) rename to "QtyCalculationStd", 2) update the documentation to proper data type.

Resolution Agreed. The data type should be STRING. NOTE: this will be moved to an PropertySet in resolution to I-104.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

TL to make the changes in ProductExt. RS to make additions to PropertySets to be used with Elements (see action in I-104).

NOTE: this has been moved to a PropertySet along with the quantity attributes per the suggestion in I-104. Change to model confirmed, but not doc (RS).

Issue Number	***I - 104***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcElement - calcQuantityByXxxx [various] -- This list of optional attributes is a bit tedious.

Proposed Solution Consider: these _could_ be defined as a standard PropertySet or as a List[0:N] IfcPropertyDef called calcQuantity.

Resolution Agreed. Move 5 quantities plus the QtyCalcStd attribute (see I-103) to an PropertySet called "Att_ElementQty".

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

TL to remove attributes from IfcElement. Not confirmed in Pre-Final (RS - email TL, 15-Sep).

Action #	2	***Assignee***	See	***Status***	Complete	***Resolved in Version***	R1.5 - Final

RS to create new PropertySet.

Issue Number	***I - 105***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcBuildingElement - This class appears to be included to provide model structure -- it appears that it should not be instantiated.

Proposed Solution Make it abstract.

Resolution Agreed.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS).

Issue Number	***I - 106***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcElementAssembly - This class appears to do the same thing as an IfcGroup, yet it is subtyped from IfcElement. If the relationship from IfcRelAssemblesElements were made to IfcBuildingElement, then BUILDING ELEMENTS COULD BE NESTED. This would be VERY powerful and desirable as elements could be approximations and illdefined in the early stages of design and more elaborate assemblies of component elements later in the design process. This parallels the design process and is VERY desirable.

Proposed Solution Eliminate IfcElementAssembly and redirect the relationship from IfcRelAssemblesElements to IfcBuilidngElement in order to allow any Building Element to be an assembly.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS) with exception that the relationships from IfcRelAssemblesElements are to the supertype, IfcElement - which also allows an 'assembly' (or grouping) of openings.

Issue Number	***I - 107***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcElementAssembly - IF NOT INTEGRATED INTO IFCBUILDINGELEMENT -- This class appears to be included to provide model structure -- it appears that it should not be instantiated.

Proposed Solution Make it abstract.

Resolution Already resolved. See resolution in I-106

Issue Number	***I - 108***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcBuilding - Buildings are definitely 'Typed' by Architects -- and I suspect they are by other disciplines as well.

Proposed Solution Add an optional attribute 'GeneicType [IfcBldgTypeEnum]. Also define the enumeration and associated PropertySets.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS).

Issue Number	***I - 109***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcBuilding - calcTotalHeight, calcSiteCoverage, calcTotalVolume -- This list of optional attributes is a bit tedious.

Proposed Solution Consider: these could be defined as a standard PropertySet or as a List[0:N] IfcPropertyDef called calcBldgQuantity.

Resolution Reject. Not agreed. These are semantically specific to these classes (and not a bunch of subtypes). Therefore, they should stay.

Issue Number I - 110 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcBuilding - Redeclaration of containment relationship with IfcBuildingComplex.

Proposed Solution Redeclare relationships from IfcRelBldgsComplex -- RelatingObject = IfcBldgComplex, RelatedObjects = IfcBuilding.

Resolution Rejected. This was in R1.0. It has been replaced by the general purpose grouping mechanism in R1.5.

Issue Number I - 111 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcBuilding - R1.0 Objectified relationship "IfcRelBldgService" has disappeared -- Redeclaration of the Relationship1toN needed?

Proposed Solution Add IfcRelBldgService where -- RelatingObject = IfcBuilding, RelatedObjects = IfcSystem.

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS), with exception that the relationship is reversed -- that is, a System may service multiple Buildings.

Issue Number I - 112 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcBuildingStorey - There are definitely cases where it would be useful to allow 'Typing' of BuildingStoreys (e.g. Retail, Business Offices, Mechanical Equipment, Interstitial).

Proposed Solution Add an optional attribute 'GeneicType [IfcBldgTypeEnum]. Also define the enumeration and associated PropertySets.

Resolution Resolved. Reference solution in I-108.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS).

Issue Number I - 113 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcBuildingStorey - calcTotalHeight, calcTotalArea, calcTotalVolume -- This list of optional attributes is a bit tedious.

Proposed Solution Consider: these could be defined as a standard PropertySet or as a List[0:N] IfcPropertyDef called calcBldgStoreyQuantity.

Resolution Rejected. Not agreed. These are semantically specific to these classes (and not a bunch of subtypes). Therefore, they should stay.

Issue Number I - 114 **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcBuildingStorey - PartOfBuilding [IfcBuilding] -- this containment relationship is declared explicitly where such relationships are handled by the general purpose '1toN' relationship mechanism in almost all other cases.

Proposed Solution Consider: does this make it redundant? Is there a problem?

Resolution For the sake of consistency, create an objectified relationship between Building and BuildingStorey.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS), with execption that this is not an explicit objectified relationship, it is one of may 'uses' of the IfcRelContains, defined in the Kernel.

Issue Number ***I - 115*** ***Issue Date*** 8/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcProductExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcBuildingSection, IfcBuildingSubStorey - Currently these classes have nothing defined in them -- therefore the need for them is questionable. However, I could see the case for justifying them on the basis that they could be typed -- e.g. Entry Foyer, Stair Tower, Core, Manufacturing Wing, etc.

Proposed Solution If we are to keep these two, They should include attributes "GenericType" and data types [BldgSectionTypeEnum] and [BldgSubStoreyTypeEnum].

Resolution IF Building Section and BuildingSubStorey are kept in the model (JW checking with Steve Race for his input on this) --> then agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the changes. BuildingSubStorey eliminated, but BuildingSection kept. The change NOT confirmed in Pre-Final (RS email to TL, 15-Sep). This is not possible in EXPRESS since BuildingSection is subtyped from Building - which already has "GenericType". Action eliminated.

Issue Number ***I - 116*** ***Issue Date*** 8/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcProductExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcBuildingSection, IfcBuildingSubStorey - PartOfBuilding [IfcBuilding], PartOfStorey [IfcBuildingStorey] -- these containment relationships are declared explicitly where such relationships are handled by the general purpose '1toN' relationship mechanism in almost all other cases. Additionally, this appears to be redundant with the "ReferencesContainers" and "PartOfContainer" attributes on the IfcElement supertype.

Proposed Solution Consider: does this make it redundant? Is there a problem?

Resolution For the sake of consistency, create an objectified relationship between Building and BuildingSection. IfcSubStorey is now gone. See I-192.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the changes. Confirmed in Pre-Final (RS), with execption that this is not an explicit objectified relationship, it is one of may 'uses' of the IfcRelContains, defined in the Kernel.

Issue Number ***I - 117*** ***Issue Date*** 8/8/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcProductExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcSpaceBoundary - PhysicalOrVirtual [BOOLEAN] -- This attribute appears to be redundant. The answer to the question can be derived from the INV relationship to IfcRelSeparatesSpaces.RelatedObjects L[1:N]. If this INV relationship is not NULL, then there is one or more physical elements creating the boundary -- therefore it will be "Physical". Conversely, if the relationship is NULL, then the boundary must be "Virtual"

Proposed Solution Remove the attribute.

Resolution Rejected. This can be used to communicate design intent -- this boundary SHOULD be virtual.

Issue Number	***I - 118***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Rejected
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSpace - calcTotalPerimeter, calcTotalArea, calcTotalVolume -- This list of optional attributes is a bit tedious.

Proposed Solution Consider: these could be defined as a standard PropertySet or as a List[0:N] IfcPropertyDef called calcSpaceQuantity.

Resolution Reject. Not agreed. These are semantically specific to these classes (and not a bunch of subtypes). Therefore, they should stay.

Issue Number	***I - 119***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSpace - Access to contained elements is rather inconvenient now. Where in R1.0 we had an attribute "HasElements" which gave us direct access, we now have only indirect access through the INV relationship - IfcProduct.HasElements S[0:N].

Proposed Solution Insure that these inverse relationships are exposed through interfaces in the IDL model view.

Resolution Agreed. -- However, this is even more different after introduction of generalized containment relationships (IfcProduct.HasElements is now missing too!). Resolution actions eliminated and problem restated for current model in I-313.

Action # 1 ***Assignee*** See ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

RS to insure that this is exposed in the SS and thus the IDL interfaces.

Eliminated because this is now invalide due to introduction of generalized containment relationships. See actions from I-313 --> which restates problem for resulting model configuration.

Issue Number	***I - 120***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRelSeparatesSpaces - RelatingObject [IfcElement] -- It appears to me that this data type should really be IfcBuildingElement (so long as IfcBuildingElement and IfcElementAssembly are combined as recommended).

Proposed Solution Change to IfcBuildingElement.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make the change. Confirmed in Pre-Final (RS).

Issue Number ***I - 121*** ***Issue Date*** 8/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcRelSeparatesSpaces - RelatingObject, RelatedObjects L[1:N] -- it appears that the direction of these is reversed from what would be normal -- that is, a SpaceBoundary would normally be defined by one or more Elements --> therefore, the RelatingObject should be the IfcSpaceBoundary and the RelatedObjects should be the IfcBuildingElements.

Proposed Solution Reverse the directions and cardinality of these relationships.

Resolution Rejected. The SpaceBoundary should be broken up so that there is never more than one BuildingElement per SpaceBoundary.

Issue Number ***I - 122*** **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcPartialSpace - why create another subtyped class when the same thing could be accomplished by simply allowing Spaces to contain Spaces -- something which does not appear to be prevented in any event!

Proposed Solution Allow Spaces to be nested (to contain other spaces) and eliminate this class.

Resolution Will eliminate IfcPartialSpace and allow nesting of Spaces in the same way as for IfcBuildingElement (see I-106) using an objectified relationship.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make changes. Confirmed in Pre-Final (RS).

Issue Number ***I - 123*** **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcPartialSpace - IF THIS CLASS IS KEPT -- one rationalization would be to provide a Domain or Functional Point of View (POV). In most cases, partial spaces are defined from the point of view of a particular domain or application.

Proposed Solution Add an optional attribute "FunctionalPOV [IfcFuncPovTypeEnum]". Then define the enumeration. I believe this ties in with the explanation in the .DOC file.

Resolution Rejected. Will not be keeping Partial Space.

Issue Number ***I - 124*** **Issue Date** 8/8/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcSite - SiteGeometry (Contours and boundaries) AND BuildableVolumeGeometry -- which were defined in R1.0 -- are missing. This is a BIG problem as these information sets are VERY commonly used by the project team

Proposed Solution Add these back in.

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

TL to add. See also I-194.

Diagrams added, IfcShapeRepresentation.UsageTag used to distinguish.

Issue Number ***I - 125*** **Issue Date** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSite - calcTotalPerimeter (not yet defined), calcSiteArea, calcBuildableVolume (not yet defined) -- This list of optional attributes could be handled in the same way proposed for Building, BuildingStorey and Space.

Proposed Solution Consider: these could be defined as a standard PropertySet or as a List[0:N] IfcPropertyDef called calcSiteQuantity.

Resolution Agree to add "calcTotalPerimeter" but not to make the ParameterSet.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make changes. Note confirmed in Pre-Final (RS email to TL, 15-Sep).

Issue Number ***I - 126*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSite - Redeclaration of containment relationship with IfcSiteComplex.

Proposed Solution Redeclare relationships from IfcRelSiteComplex -- RelatingObject = IfcSiteComplex, RelatedObjects = IfcSite.

Resolution IfcSiteComplex was eliminated -- we are using IfcGroup with "Purpose" = "Site Complex".

Issue Number ***I - 127*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcSite - Access to contained elements is rather inconvenient now. Where in R1.0 we had attributes "HasBuildings" and "HasElements", which gave us direct access, we now have only indirect access through the INV relationships - IfcProduct.HasElements S[0:N] and IfcSite.HasBuildings

Proposed Solution Insure that these inverse relationships are exposed through interfaces in the IDL model view.

Resolution Agreed. --   -- However, this is even more different after introduction of generalized containment relationships
(IfcProduct.HasElements S[0:N] and IfcSite.HasBuildings are now missing too!).

Resolution actions eliminated and problem restated for current model in I-313.

Action # 1 ***Assignee*** See ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

RS to insure this is included in the SS and JL to include in the IDL.

Eliminated because this is now invalide due to introduction of generalized containment relationships. See actions from I-313 --> which restates problem for resulting model configuration.

Issue Number ***I - 128*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRelGroupsWorks - Naming issue -- Groups Works sounds clumsey .

Proposed Solution "IfcRelGroupsWork" (drop the plural on work) OR "IfcGroupsWorkTasks".

Resolution This subtype of IfcRelGroups was eliminated in favor of using the generalized IfcRelGroups. The resulting IfcGroup.Purpose = "Groups Work Tasks".

Action # 1 ***Assignee*** Wix ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

JW will make the change. Confirmed in Pre-Final (RS)

Issue Number ***I - 129*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRelGroupsWorks - redeclaration of the RelatedObjects side of the relationship is missing.

Proposed Solution Add redeclared SELF\IfcRelationship1toN.RelatedObjects L[1:N] [IfcWorkTask]. It would also be useful to rename this relationship to "HasWorkTasks" and the INV "PartOfWorkGroup" (see also GI-10).

Resolution Obsolete. Since this attribute no longer exists (see I-128), we don't need to rename.

Action # 1 ***Assignee*** Wix ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

JW will make the change. Not confirmed in Pre-Final (RS email to JW, 15-Sep).

Issue Number ***I - 130*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcWorkGroup - WorkSectionID [STRING], WorkSectionName [STRING] -- naming issue -- these must carry over from an old naming of WorkSection.

Proposed Solution Rename to "IfcGroupID" and "IfcGroupName".

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW will make the change. Confirmed in Pre-Final (RS)

Issue Number ***I - 131*** ***Issue Date*** 8/8/97

Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcWorkTask - It appears that we have lost one of the most important things we had in the R1.0 Process Model (as argued by the Estimating and Construction guys in the NA) --> I_ResourceUse -- which included Resources, ResourceQuantity and ResourceDuration.

Proposed Solution 1) create a new object called IfcResourceUse which includes these three things defined in the I_ResourceUse interface on IfcWorkTask from R1.0. 2) add an attribute on IfcWorkTask --> ResourceUse L[1:N] [IfcResourceUse]

Resolution Agreed:
1) Add IfcResource at the Kernel level
2) Add the IfcResoureUse class as described above.
3) Add attribute "ResourceUse" as described above.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make change to Kernel. JW to make changes to Process model. Confirmed in Pre-Final (RS)

Action # 2 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL to make change to Kernel. JW to make changes to Process model. Confirmed in Pre-Final (RS)

Issue Number ***I - 132*** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcProcessExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcWorkTask - TaskCost [IfcPropertyRes.IfcCost] and WorkMethod [STRING], both of which were defined in R1.0 are missing.

Proposed Solution Add them back in -- both optional.

Resolution Agreed.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make the change. Confirmed in Pre-Final (RS).

Issue Number ***I - 133*** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcProcessExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcWorkTask - TaskNumberID [STRING] and WorkSchedule [IfcWorkSchedule] -- both of these attribute names are not very semantically accurate.

Proposed Solution change them to "WorkTaskID [STRING]" and "WorkTaskSchedule [IfcWorkTaskSchedule] ".

Resolution Agreed.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make the change. Not completely confirmed in Pre-Final (RS - email JW 15-Sep) - TaskNumberID not yet renamed.

Issue Number ***I - 134*** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcProcessExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcWorkSchedule - Classname is not semantically accurate.

Proposed Solution Rename it to "IfcWorkTaskSchedule".

Resolution Agreed.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make the change. Confirmed in Pre-Final (RS).

Issue Number ***I - 135*** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Rejected

Schema IfcProcessExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcWorkSchedule - The only attribute shown as mandatory on this class is ID. Surely Status, Duration, ScheduledStart should be mandatory also ??

Proposed Solution Change Status, Duration, ScheduledStart to mandatory.

Resolution Rejected. A schedule object may be created before you know the start date or duration. Then information filled in over time.

Issue Number ***I - 136*** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcProcessExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcWorkSchedule - ScheduleDuration [IfcMeasureResource.IfcTimeDuration] -- At first I was confused as to whether this was the duration between the "early" dates, the "late" dates, or the "scheduled" dates. The documentation does say duration "scheduled", but it can be confusing.

Proposed Solution Change the name of the attribute to "ScheduledDuration" (note the "d").

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make the change. Confirmed in Pre-Final (RS).

Issue Number	***I - 137***			***Issue Date***	8/8/97
Author	See	***Owner***	See	***Status***	Rejected
Schema	IfcModelingAidExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcModelingAid - Model Structure -- as discussed in the issues for the Kernel, It was my understanding that we agreed in late May that IfcmodelingAid should be subtyped from IfcControl. If that is the case, it should not be defined in the Kernel, but as a subtype of IfcControl in this schema.

Proposed Solution Move IfcModelingAid class to this schema (from Kernel) and subtype from IfcKernel.IfcControl.

Resolution Rejected. It was agreed that a ModelingAid is not a Control.

Issue Number	***I - 138***			***Issue Date***	8/8/97
Author	See	***Owner***	See	***Status***	Resolved
Schema	IfcModelingAidExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: Proposed new classes - IfcRefPoint, IfcRefCurve, IfcRefFace -- these utility classes will be used as references in the placement of other elements. The reason we need them (rather than using the geometry entities directly) is that our LocalPlacement relates the Axis2Placement to an IfcObject. This means that the geometry entities cannot be used directly, but must be wrapped and used as ModelingAids. The first and most common practical application of these is in the definition of Reference lines for the placement of Walls (ref. the discussions with our Japanese chapter developers).

Proposed Solution Create 3 new classes -- subtyped from IfcModelingAid --> IfcRefPoint (which has a relationship named "RefPoint" to [IfcGeometry.IfcCartesianPoint]), IfcRefCurve(which has a relationship named "RefCurve" to [IfcGeometry.IfcCurve]), IfcRefFace (which has a relationship named "RefSurface" to [IfcGeometry.IfcSurface]).

Resolution Not resolved in first pass (21-Aug-97). Second Pass (23-Aug-97) - Agreed.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

RS will make changes. Confirmed in Pre-Final (RS).

Issue Number	***I - 139***			***Issue Date***	8/8/97
Author	See	***Owner***	See	***Status***	Resolved
Schema	IfcModelingAidExt	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcPlacementRelToGrid - I am not really convinced that we need this special type of placement. I don't find the added attributes (OffsetToGridAxis, DistanceToCrossingAxes, CrossingNearIntersection) to be particularly useful to applications -- although I do acknowledge that some of the attributes defined in some of the Architecture group's attribute sets could make use of some of these.

Proposed Solution Consider using the default LocalPlacements or come up with strong rationalizations for the value in the added attributes.

Resolution Not resolved in first pass (21-Aug-97). Second pass (23-Aug-97) - Proposal for a more generalize solution for "Constrained" Placements was discussed and will be finalized by TL and RS. NOTE: this may mean that the ModelingAids cannot be moved down to the Resource Layer.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL and RS to finalize for inclusion in Kernel. IfcConstrainedPlacement (relative to Curves) will now be defined in IfcModelingAid schema. IfcLocalPlacement was also moved into this schema. See notes from 7-Sep-97 mtg. Confirmed in Pre-Final (RS) - IfcConstrainedPlacement subtyped from IfcLocalPlacement - and allows constraint of one or both end points of a path - using an IfcPlacementConstraint, the first subtype of which is IfcConstraintRelIntersection.

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL and RS to finalize for inclusion in Kernel. IfcConstrainedPlacement (relative to Curves) will now be defined in IfcModelingAid schema. IfcLocalPlacement was also moved into this schema. See notes from 7-Sep-97 mtg. Confirmed in Pre-Final (RS) - IfcConstrainedPlacement subtyped from IfcLocalPlacement - and allows constraint of one or both end points of a path - using an IfcPlacementConstraint, the first subtype of which is IfcConstraintRelIntersection.

Issue Number ***I - 140*** **Issue Date** 8/8/97

Author	See	**Owner**	See	**Status**	Resolved
Schema	IfcModelingAidExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcPlacementRelToGrid - SELF\IfcPlacement.PlacementRelTo [IfcGridAxis] -- Placement relative to grids is QUITE OFTEN relative to intersections, not just axes.

Proposed Solution Generalize this to be relative to any of the grid related object types.

Resolution Not resolved in first pass (21-Aug-97). Second Pass (23-Aug-97) - resolved - see I-139

Issue Number ***I - 141*** **Issue Date** 8/8/97

Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcDocumentExt	**Version**	R1.5 - Pre-Beta		

Issue Description General issues for schema - Schema content - I am a bit troubled by the fact that the cost schedule and general purpose table that are the only contents of this schema are not really documents. They are general purpose data structures that may be presented (or partially presented) in documents. I have been viewing the DocumentsExtension as the place where we build links to and from real documents, but that we stop short of trying to capture the actual content of these documents (or else we will be trying to model the whole world).

Proposed Solution Consider: Since they are general purpose, maybe a better location for these would be at the Resource Layer. I believe this is particularly true for the general purpose table; although, since cost is such an important factor in all decisions, I would make the case for the CostSchedule (CostEstimate) as well.

Complication: Since the CostSchedule schema uses an objectified relationship, it would be difficult to push it to the resource layer without also moving the root for objectified relationships to that layer as well.

Resolution Partial agreement. Push general purpose tables to the Resource Layer and create a new Resource called "IfcUtilityResources". Leave CostSchedule as it is.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make changes. Confirmed in Pre-Final (RS).

Issue Number ***I - 142*** **Issue Date** 8/8/97

Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcDocumentExt	**Version**	R1.5 - Pre-Beta		

Issue Description General schema issues - Sub-Schema naming -- In looking at the entities included in the Cost Schedule, I would argue that this is not really a Cost Schedule, but the data structures for a Cost Estimate instead. A schedule includes provisions for presentation in a document -- this does not. Having said this, I think that it is EVEN MORE USEFUL to include a Cost Estimate schema because it is more general purpose than a Cost Schedule.

Proposed Solution 1) Change the name of this sub-schema to CostEstimate. 2) change the names of the following 4 entities: IfcCostSchedule ? IfcCostEstimate, IfcCostScheduleGroup ? IfcCostEstimateGroup, IfcCostScheduleElement ? IfcCostEstimateElement, IfcRelGroupsCostSchedules ? IfcRelGroupsCostEstimate

Resolution Deferred until R2.0

Resolved by the new schemas in R2.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

RS to add to the list of STF projects for R2.0.

Issue Number **I - 143** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcDocumentExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcRelGroupsCostSchedules - RelatingObject [IfcCostScheduleGroup], RelatedObjects L[1:N] [IfcCostScheduleOrGroup] -- The direction of these relationships is backwards -- that is, a Schedule includes one or more other schedules or groups, which may include other schedules or groups, etc.

Proposed Solution Reverse the 'Relating' and 'Related' directions and cardinality.

Resolution IfcRelGroupsCostSchedules eliminated. IfcRelGroups used instead. Resulting IfcGroup.Purpose = "Groups Cost Schedules".

No action required as this issue was eliminated.

Action # 1 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R1.5 - Pre-Fin

TL/JW to make the changes. Not confirmed in Pre-Final (RS email JW, 15-Sep).

Action # 2 **Assignee** Wix **Status** Eliminated **Resolved in Version** R1.5 - Pre-Fin

TL/JW to make the changes. Not confirmed in Pre-Final (RS email JW, 15-Sep).

Issue Number **I - 144** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcDocumentExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcCostScheduleGroup - Attribute missing (?) -- the attribute "GroupNumber" was included in R1.0 but is missing now.

Proposed Solution Add it back in as "GroupIdentifier [STRING]"

Resolution Agreed --> "GroupID"

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW to make the changes. Confirmed in Pre-Final (RS) -- named "GroupID".

Issue Number **I - 145** **Issue Date** 8/8/97

Author See **Owner** Wix **Status** Resolved

Schema IfcDocumentExt **Version** R1.5 - Pre-Beta

Issue Description Class: IfcCostScheduleGroup - Element [IfcCostScheduleElement] -- this does not follow our agreed 'rule of thumb' that all optional lists of 1:N should be changed to mandatory lists of 0:N.

Proposed Solution Make mandatory and change cardinality to L[0:N].

Resolution Agreed..

Action #	1	**Assignee**	Wix	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

JW to make the changes. Confirmed in Pre-Final (RS).

Issue Number	**I - 146**			**Issue Date**	8/8/97
Author	See	**Owner**	Wix	**Status**	Rejected
Schema	IfcDocumentExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcCostSchedule - ApprovedBy [IfcPerson] -- Approvals may come from a department or group. Additionally, approvals may come from a list of people or groups.

Proposed Solution Change this attribute to a mandatory L[0:N] [IfcActor].

Resolution Reject. In practice, a person approves a cost schedule -- someone has to sign it.

Issue Number	**I - 147**			**Issue Date**	8/8/97
Author	See	**Owner**	Wix	**Status**	Rejected
Schema	IfcDocumentExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcCostSchedule - PreparedBy, ApprovedBy, SubmittedBy -- These concepts apply for various types of analysis and documents 'workflow'. Therefore, they should be generalized and referenced.

Proposed Solution create a generic "WorkFlow" schema including these concepts and others appropriate to workflow -- then reference it here.

Resolution Reject. This is a simplified method for cost schedules only in R1.5.

Issue Number	**I - 148**			**Issue Date**	8/8/97
Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcDocumentExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcCostScheduleElement - ExtensionCost [IfcCostResource.IfcCost] -- is this really needed -- it is simple math, ElementCost x Quantity = ExtensionCost.

Proposed Solution Consider: eliminating this attribute for efficiency.

Resolution Parial agreement. This attribute can be derived (DER).

Action #	1	**Assignee**	Wix	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

JW to make the changes. Confirmed in Pre-Final (RS).

Issue Number	**I - 149**			**Issue Date**	8/8/97
Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcDocumentExt	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcCostScheduleElement - Schedules [IfcKernel.IfcProduct] -- naming is ambiguous.

Proposed Solution Rename to "ProductsCosted".

Resolution Will make "SchedulesProducts".

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW to make the changes. Confirmed in Pre-Final (RS).

Issue Number ***I - 150*** ***Issue Date*** 8/8/97

Author See ***Owner*** Wix ***Status*** Rejected

Schema IfcDocumentExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcTable - Heading [IfcTableHeading] -- naming.

Proposed Solution Rename to "TableHeadings".

Resolution Rejected..

Issue Number ***I - 151*** ***Issue Date*** 8/8/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcDocumentExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcTableHeading - HeadingDescriptions [STRING] -- name seems redundant (Heading and Description). Also, the cardinality should not be linked to a value in another object unless this one is to be contained only (violates encapsulation).

Proposed Solution 1) rename to "TableHeadings", 2) change cardinality of the Array to [1:N].

Eliminate these classes and roll them in as attributes of the IfcTable.

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. JW has included his compromise solution in release for 8-Sep. Not confirmed in Pre-Final (RS email to JW, 15-Sep).

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. JW has included his compromise solution in release for 8-Sep. Not confirmed in Pre-Final (RS email to JW, 15-Sep

Action # 3 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. JW has included his compromise solution in release for 8-Sep. Not confirmed in Pre-Final (RS email to JW, 15-Sep

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Issue Number ***I - 152*** ***Issue Date*** 8/8/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcDocumentExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcTableHeading - This is a single attribute class -- it could/should be eliminated.

Proposed Solution Convert the "TableHeadings" attribute from IfcTable to be and Array [1:Number of Columns] [STRING].

Resolution Agreed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. Not confirmed in pre-final (RS) - done differently and has some new problems - see new issue on this somewhere after I-215.

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. Not confirmed in pre-final (RS) - done differently and has some new problems - see new issue on this somewhere after I-215.

Action # 3 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. Not confirmed in pre-final (RS) - done differently and has some new problems - see new issue on this somewhere after I-215.

Issue Number ***I - 153*** ***Issue Date*** 8/8/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcDocumentExt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcTableRow - ValueComponent [IfcMeasureResource.IfcMeasureValue] -- name is a bit too generic and cardinality should not be linked to an attribute in another object (NumberOfColumns) unless this one is to be contained only (violates encapsulation).

Proposed Solution 1) rename "ValueComponent" to "RowValues"

2) change cardinality of this Array to [1:N] OR move "NoOfCellsInRow" attribute into this class (IfcTableRow) from IfcTable.

Resolution Agreed - will make "RowValues" a LIST [1:?].

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings.

Made "RowValues" a LIST [1:?].

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. Not confirmed in pre-final (RS email to JW, 15-Sep) - simply not done.

Action # 3 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JW/RS/TL will discuss and work out how to eliminate the classes for row and headings. Not confirmed in pre-final (RS email to JW, 15-Sep) - simply not done.

Issue Number ***I - 154*** ***Issue Date*** 8/8/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcSharedBldgElements ***Version*** R1.5 - Pre-Beta

Issue Description General issues for this schema - Missing class: IfcCeiling (from R1.0) is no longer included in the R1.5 model.

Proposed Solution Add it back in -- either as a subtype of IfcCovering or as a subtype of IfcBuildingElement.

Resolution Rejected. This was removed at the request of the implementers in the January Munich meeting.

Issue Number ***I - 155*** ***Issue Date*** 8/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcSharedBldgElements ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcWall, IfcFloor, IfcRoofSlab - Redundant attributes -- all three of these classes have exactly the same attributes with the exception of the data type for GenericType. This provides an argument for shared implementation through a supertype. This supertype existed in R1.0 in the LayeredElement. Now we we will encouraging redundant implementations. See also the issued for IfcCovering.

Proposed Solution Re-introduce a supertype (possibly called "IfcLayeredBldgElement" which allows sharing of these attributes (and implementation). Subtype these classes from it.

Complication: this would re-introduce another layer in the model.

Resolution In order to avoid the extra layer -- will introduce an new class called "IfcMaterialLayerSetParameters"

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will add new class in IfcPropertiesResource and then reference from inside of IfcWall, IfcFloor, IfcRoofslab and IfcCoveringElement. Confirmed in pre-final (RS) - although with some problems (see new issues on IfcmaterialLayerSetUsage - after #215).

Issue Number	***I - 156***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcWall, IfcFloor, IfcRoofSlab - MaterialLayerSetSense [BOOLEAN] -- naming is ambiguous -- when it could be so clear.

Proposed Solution Rename to "MaterialLayerSetLtoR" (LtoR = Left to Right).

Resolution Agreed.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL to make changes. Done as "MlsSetLtoR").

Issue Number	***I - 157***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcWall, IfcFloor, IfcRoofSlab - calcTotalWidth [IfcPositiveLengthMeasure] -- naming is ambiguous -- what is really meant here is the "thickness" of the wall. "Width" is normally used to refer to the measure left to right when facing a wall segment.

Proposed Solution Rename to "calcTotalThickness".

Resolution Agreed.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will change in the new class defined in the resolution to I-155. Done in IfcMaterialLayerSetUsage (referenced by these classes).

Issue Number	***I - 158***			***Issue Date***	8/8/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcWall, IfcFloor, IfcRoofSlab - MaterialLayerSetOffset [IfcLengthMeasure] -- naming is ambiguous -- what is really meant here is the MaterialLayerSet (MLS) offset from the Baseline (which is analoguous to the extrusion path defined in the ShapeRep).

Proposed Solution Rename to "MlsOffsetFromBaseline".

Resolution Will change to "MMlsOffsetFromBaseline".

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the change. Confirmed (RS).

Issue Number	***I - 159***			***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcBuiltIn - Material [IfcMaterial] -- this attribute does not make sense for a Built-In because these are normally assemblies.

Proposed Solution Remove the attribute.

Resolution Agreed.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the change. Confirmed in pre-final (RS).

Issue Number	***I - 160***	***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcUserDefBuildingElement - this class is redundant with IfcProxy class currently being discussed.

Proposed Solution Remove it, but be sure to include IfcProxy as has been discussed.

Resolution Agreed.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the change. Confirmed in pre-final (RS).

Issue Number	***I - 161***	***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcCovering - This class has the exact same attributes as for IfcWall, IfcFloor, IfcRoofslab. This further supports the notion of a superclass which allow sharing of these attributes and their implementation.

Proposed Solution Re-introduce a supertype (possibly called "IfcLayeredBldgElement" which allows sharing of these attributes (and implementation). Subtype this class from it.

Resolution The solution described in I-155 will be used here as well.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the changes. Confirmed in pre-final (RS). See solution to I-155

Issue Number	***I - 162***	***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcCovering - MaterialLayerSetSense [BOOLEAN] -- naming is ambiguous -- when it could be so clear.

Proposed Solution Rename to "MaterialLayerSetLtoR" (LtoR = Left to Right).

Resolution Agreed. See also the discussion in I-155.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Pre-Fin

TL will make the changes. Done in IfcMaterialLayerSetUsage (referenced by this class).

Issue Number	***I - 163***	***Issue Date***	8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcCovering - MaterialLayerSetOffset [IfcLengthMeasure] -- naming is ambiguous -- what is really meant here is the MaterialLayerSet (MLS) offset from the Baseline (which is analoguous to the extrusion path defined in the ShapeRep.

Proposed Solution Rename to "MlsOffsetFromBaseline".

Resolution Agreed. See also the discussion in I-155.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will make the changes. Done in IfcMaterialLayerSetUsage (referenced by this class).

Issue Number I - 164 ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcRelCoversBldgElements - RelatingObject, RelatedObjects -- currently, this shows an IfcBuildingElement as the 'driver' of this '1toN' relationship (it 'has 1toN Coverings"), but this could be the other way around -- that is, there could be an IfcCovering which "covers 1 to N Building Elements". Therefore, I would assert that this relationship should not be to IfcBuildingElements, but to ReferenceFaces on those BuildingElements. The Covering will be 'aligned' with these referenece faces (which may be subsets of actual faces of the Buidling Element geometry). Since IfcCovering now has its own geometry (since it is an IfcProduct), this will be possible.

Proposed Solution 1) reverse the direction of this objectified relationship, 2) change the data type for the RelatedObjects L[1:N] --> IfcModelingAids.IfcReferenceFace ,3) add a set of IfcControls which provide for alignment Points, Curves and Faces to the 'Reference' set in IfcModelingAids -- such alignment classes would allow for any fixed offset from the reference entity.

Resolution Part 1 is rejected -- this relationship direction is consistent with the Space to SpaceBoundary relationship. NOTE: this _can_ be done either way, but we need to do it consistently in the 3 or 4 places where the relationships are essentially 'many to many'. In this case, if the covering covers multiple BuildingElements, each will have a relationship to the covering. Each building element may, by the current direction, relate to multiple coverings.

Parts 2 and 3 are deferred to R3.0.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

Parts 2 and 3 are deferred to R2.0. RS to add to R2.0 STF projects list.

Action # 2 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

Just do it.

Issue Number I - 165 ***Issue Date*** 8/8/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description Class: IfcDoor, IfcWindow - With the generalization of the shape representation in R1.5, mapping of semantic meaning to 'components' of the ShapeRep geometry has been lost. Specifically, we no longer have a mapping from attributes in the Semantic Model object for the profiles: TrimA, TrimB, Frame, PanelFrames -- or the overall measures: Thickness, OverallWidth, OverallHeight.

Proposed Solution Provide attributes that are accessible to applications (e.g. simulation apps which need to derive the area of glass versus the area of frame for 'U' value calculations) which drive the actual geometry (through Attribute Driven Geometry ShapeRep).

Resolution 1) Create PropertySets including properties for the Semantic Model objects -- driven by type -- attached to the semantic model object

2) Create an Enum per generic type -- which includes the "Identifiers" for a set of standard Att-Driven ShapeRep components (for this object type) --> these "Identifiers" will be used by the creating app and conformance testing should check these.

3) Add to documentation -- limitation in R1.5 is that the parameters in AttDriven geometry are not yet 'driven' by the properties on the semantic model

4) We will look into including in the documentation -- for each class where the geometry could use attribute driven geometry -- description of the "standard" method for interpreting the semantic model attributes to create the Implicit Geom.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

RS to take on parts 1 & 2. Not confirmed by (RS email, 15-Sep) - this must still be done.

1 complete
2. Must be checked - see enums in I-317.

Action # 2 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will take on 3 and 4. Not confirmed by (RS email, 15-Sep) - this must still be done.

Partially complete in late November (see TL email 4-Dec-97) - see also I-317.

Issue Number ***I - 166*** ***Issue Date*** 8/8/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcSharedBldgElements ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcDoor, IfcWindow - Attributes should be shared -- most of the attributes driving geometry (described in the last issue) are common to doors and windows -- their implementation should be shared. This can be done through a supertype. In R1.0, this was done through the supertype "IfcFillingElement".

Proposed Solution Create a supertype which defines all of the shared attributes (as described in the previous issue) and subtype Door and Window from it.

Resolution This will be done through PropertySets as described in I-165. Commonly referenced Psets are defined for Frames, Glazing, Hardware, and OpeningFillers (e.g. screening and louvers).

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

RS to handle this with the other PropertySets for Arch.

Issue Number ***I - 167*** ***Issue Date*** 8/8/97

Author See ***Owner*** Forester ***Status*** Resolved

Schema IfcSharedBldgServiceElem ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcBuildingServiceElement - There is no real need for this class to be defined in the Kernel. It would be more appropriate to move it to this schema --subtyping from a reference to IfcBuildingElement.

Proposed Solution Move this class to this schema and subtype here from a reference to IfcBuildingElement.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

TL/JF to make changes. This supertype was eliminated.

Action # 2 ***Assignee*** Wix ***Status*** Eliminated ***Resolved in Version*** R1.5 - Pre-Fin

TL/JF to make changes. This supertype was eliminated.

Issue Number ***I - 168*** ***Issue Date*** 8/8/97

Author	See	**Owner**	Forester	**Status**	Resolved
Schema	IfcSharedBldgServiceElem	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcBuildingServiceElement - Missing Attributes from R1.0 -- This class effectively replaces the IfcManufacturedElement in R1.0. The attributes that were inherited by ElectricalAppliance, Fixture and Equipment are now missing.

Proposed Solution Add the following attributes (from R1.0) to this class: I_BldgServiceElement --> Manufacturer [IfcActor], ModelLabel [STRING], WarrantyDuration [IfcTimeDuration], OperatingWeight [IfcMassMeasure]; I_Acquisition --> AcquisitionDate [IfcTimeStamp], Supplier [IfcActor], ShippingWeight [IfcMassMeasure].

Resolution This can be handled through an extension PropertySet which is added to Equipment, Fixture, ElectricalAppliance. --> Pset called "Pset_ManufactureInformation" to be included in the IfcProductExtension Schema.

Action # 1 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JF to add new attributes. Not yet confirmed in pre-final (RS).

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

RS to insure that this is also referenced by manufactured elements in the SharedBldgElement, Architecture and FM schemata.

Issue Number I - 169 **Issue Date** 8/8/97

Author	See	**Owner**	See	**Status**	Rejected
Schema	IfcArchitecture	**Version**	R1.5 - Pre-Beta		

Issue Description Select type: IfcProgrammeGroupOrSpace - Name is misleading because it can be taken to indicate that one of the choices is IfcSpace.

Proposed Solution Change name to "IfcProgrammeGroupOrSpaceProgramme".

Resolution Rejected because this SelectType had to be removed -- since select types cannot be used in this way in EXPRESS

Issue Number I - 170 **Issue Date** 8/8/97

Author	See	**Owner**	See	**Status**	Resolved
Schema	IfcArchitecture	**Version**	R1.5 - Pre-Beta		

Issue Description Use from Schema: IfcActor, IfcSpace - in each of these cases, the "USE" from should be changed to a "Reference" from. Additionally, the schema for IfcActor is IfcPropertyResource, not IfcActorRes.

Proposed Solution Change to "Reference" from and correct error in schema name for IfcActor.

Resolution Agreed.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

RS to make the change. Confirmed in pre-final (RS).

Issue Number I - 171 **Issue Date** 8/8/97

Author	See	**Owner**	See	**Status**	Resolved
Schema	IfcArchitecture	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcRelAdjacencyReq - RelatingObject, RelatingObject[type] -- The attribute "RelatingObject" for the supertype 'Relationship1to1" is redeclared twice. This cannot be right.

Proposed Solution The one with the INV relationship called "HasAdjacencyReqFrom S[0:N] should be a redeclaration of the "RelatedObject".

Resolution Agreed.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

RS to make the change. Confirmed in pre-final (RS).

Issue Number I - 172 **Issue Date** 8/8/97

Author See **Owner** Forester **Status** Resolved

Schema IfcHVAC **Version** R1.5 - Pre-Beta

Issue Description Class: IfcFluidMover - DataTypes incorrect -- As stated in the R1.0 specifications, the data type for many of the attributes on this class should be updated to use the new measure schema.

Proposed Solution FlowRate [IfcFlowRateMeasure], WorkingPressure [IfcPressureMeasure], OperatingEfficiency/MinimumEfficiency [IfcPercentageMeasure], OperatingPower/MaximumPower [IfcEnergyMeasure], Speed [IfcVelocityMeasure(?)].

Resolution Agreed in principle, but these measure types are not included as MeasureValues, therefore, all but Speed will be of type IfcMeasureWithUnit.

Action # 1 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JF will make changes. Confirmed in pre-final (RS) - except that even Speed was set to date type IfcMeasureWithUnit.

Issue Number I - 173 **Issue Date** 8/8/97

Author See **Owner** See **Status** Resolved

Schema IfcFacilitiesMgmt **Version** R1.5 - Pre-Beta

Issue Description Superclass: IfcProductExtension.IfcElement - This should not be a "Use" from schema (if it is to be consistent with our convention).

Proposed Solution Change it to a "Reference" from schema.

Resolution Agreed.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

RS will make change. Confirmed in pre-final (RS).

Issue Number I - 174 **Issue Date** 8/8/97

Author See **Owner** See **Status** Resolved

Schema IfcFacilitiesMgmt **Version** R1.5 - Pre-Beta

Issue Description Missing Superclass: IfcFacilitiesElement - In R1.0, IfcFuriture derived from IfcManufacturedElement. As this superclass has been eliminated in R1.5, the attributes that were inherited from it must be replaced.

Proposed Solution Add the following attributes (from R1.0) to this class: I_FacilitiesElement --> Manufacturer [IfcActor], ModelLabel [STRING], WarrantyDuration [IfcTimeDuration], OperatingWeight [IfcMassMeasure]; I_Acquisition --> AcquisitionDate [IfcTimeStamp], Supplier [IfcActor], ShippingWeight [IfcMassMeasure].

Resolution Will use the "Pset_ManufactureInformation" propertyset described in I-168 and attach as a Domain View - Type driven OccurrencePropertySet.

All property sets requiring this information must be modified to utilize the common Pset_ManufactureInformation property set

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

RS to modify, Product, SharedBldgElement and Architecture Property Sets

Action # 2 ***Assignee*** Forester ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

JF to modify HVAC Property Sets

Action # 3 ***Assignee*** Yu ***Status*** Complete ***Resolved in Version*** R1.5 - Final

KY to modify FM Property Sets

Issue Number ***I - 175*** ***Issue Date*** 8/8/97

Author See ***Owner*** See ***Status*** Rejected

Schema IfcFacilitiesMgmt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcFurniture - AssignedTo [IfcActor] -- this attribute should be mandatory.

Proposed Solution Make it mandatory.

Resolution Rejected. You may not know to whom it belongs.

Issue Number ***I - 176*** ***Issue Date*** 8/8/97

Author See ***Owner*** See ***Status*** Resolved

Schema IfcFacilitiesMgmt ***Version*** R1.5 - Pre-Beta

Issue Description Class: IfcFurniture - Condition [STRING, MainColor [STRING], PhysicalVolume [IfcVolumeMeasure] -- these attributes should be optional as they may not be know.

Proposed Solution Make them optional.

Resolution Changed -- MainColor, PhysicalVolume, Condition will be made optional.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

RS to make changes. Confirmed in pre-final (RS).

Issue Number ***I - 177*** ***Issue Date*** 7/28/97

Author Forester ***Owner*** Liebich ***Status*** Resolved

Schema IfcMeasureResource ***Version*** R1.5 - Pre-Beta

Issue Description Missing specific unit types for attributes in the IfcHvac Schema.

Proposed Solution Need to add the following specific unit measure support in IfcMeasureResource:

IfcVolumetricFlowrateMeasure - REAL (m3/s)
IfcMassFlowrateMeasure - REAL (kg/s)
IfcPercentMeasure - REAL (Unitless: range 0 - 1.0000) <-- this is ratio
IfcPressureMeasure - REAL (Pa)
IfcEnergyMeasure - REAL (J)
IfcPowerMeasure - REAL (W)
IfcAngularVelocityMeasure - REAL (rad/s)
IfcLinearVelocityMeasure - REAL (m/s)
IfcRotationalFrequencyMeasure - REAL (rev/s)
IfcHeatfluxDensityMeasure - REAL (W/m2)
IfcMassDensityMeasure - REAL (kg/m3)
IfcThermalAdmittanceMeasure - REAL
IfcThermalResistanceMeasure - REAL (m2 K / W)
IfcThermalTransmittanceMeasure - REAL (W/m2 K)
IfcVoltageMeasure - REAL (V)
IfcDynamicViscosityMeasure - REAL (Pa s)

IfcKinematicViscosityMeasure - REAL (m2/s)

Resolution Solution:
1) add enumeration to the IfcDerivedUnit (IfcDerivedUnitEnum) which includes these
2) do not add these to the IfcMeasureValue select type, but use the IfcPropertyWithUnit in Properties and PropertySets instead.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL will make changes to the Measure schema. Confirmed (RS).

Issue Number	**I - 178**			**Issue Date**	8/15/97
Author	Forester	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description IfcBoundingBox has attributes of Z,Y,Z in EXPRESS-G

Proposed Solution Should be X,Y,Z

Resolution Already resolved by TL

Issue Number	**I - 179**			**Issue Date**	8/15/97
Author	Forester	**Owner**	Liebich	**Status**	Rejected
Schema	IfcPropertyTypeResource	**Version**	R1.5 - Pre-Beta		

Issue Description Does not appear to be any relationship between IfcPropertySet and IfcSimpleProperty

Proposed Solution There should be a relationship here

Resolution Rejected. This is already in the model -- it is one level up - in the relationship to the supertype IfcPropertyDef.

Issue Number	**I - 180**			**Issue Date**	8/7/97
Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Geometry is geometry is geometry

Proposed Solution All geometry entities should be derived from IfcGeometryRepresentationItem -- including the AttDrivenGeom Profile, Path, ExtrusionSolid entities

Resolution Agreed.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Pre-Fin

TL to make the change. Confirmed in pre-final (RS).

Issue Number	**I - 181**			**Issue Date**	8/7/97
Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Beta		

Issue Description Numeric precision of B-Reps is undefined in IFC

Proposed Solution Someone should study this and define it. Nikolay has volunteered to help.

Resolution Short term solution is inclusion of attribute "Precision" on IfcRepresentationContext.

Long term solutions deferred for inclusion in R3.0.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R3.0 - Alpha

TL to work with Nikolay Shulga to investigate and make recommendations.

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

RS to add to R2.0 STF projects list.

Issue Number *I - 182* **Issue Date** 8/7/97

Author Shulga, Nikolay **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description There is no geometry supertype for attribute driven solids

Proposed Solution Should be subtyped from IfcSolidModel

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Make the change as proposed.

Issue Number *I - 183* **Issue Date** 8/7/97

Author Shulga, Nikolay **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description IfcAttributeDriven profile definition uses a different mechanism for placement

Proposed Solution Should use IfcAxisPlacement

Resolution Agreed. PosX, PosY and Alpha will be replaced by a single attribute called Placement (of type IfcAxisPlacement2D.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make changes with help from Nikolay on the changing the functions for creating the xxxResolution geometry in the subtypes. Confirmed in pre-final (RS) - except that the attribute is called Position (to be consistent with the rest of geometry.

Issue Number *I - 184* **Issue Date** 8/15/97

Author Forester **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description There is a problem for implementers w/o IfcProxy

Proposed Solution We need to include the proposed IfcProxy

Resolution Agreed -- will use the generalized Proxy proposed by TL in email on 8/6/97

Single IfcProxy
-> subtype proxy from IfcObject, use "ExtendedProperties" to attach
the appropriate properties. Since all predefined properties (like
IfcCost, IfcActor, ...) are now subtyped from IfcPropertyDef they can be
handled by those dynamic lists.

Pros: very flexible

Cons: needs solution for shape (but this can be tight to the
other issueto consider shape as being just another property under
IfcPropertyDef)

TL prefers the last alternative:

```
ENTITY IfcProxy
  SUBTYPE FROM (IfcObject);
     ProxyType      : IfcProxyTypeEnum;
     LocalPlacement : OPTIONAL IfcLocalPlacement;
     ResultsIn : OPTIONAL  IfcSequence;
(*  Solution for ProductShape *)
WHERE
   WR1 : NOT (EXISTS (SELF\IfcObject.TypeDefinedProperty));
   WR2 : HIINDEX (OccurrenceProperties) = 0;
END_ENTITY;
```

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL will make changes in the Kernel. Confirmed inpre-final (RS).

Issue Number I - 185 **Issue Date** 8/21/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcTypeDefResource **Version** R1.5 - Pre-Beta

Issue Description Currently, both "Generic" and "Specific" PropertySets are optional

Proposed Solution We need a constraint that either a "Generic" or "Specific" type will be defined

Resolution Agreed -- this will be done with a WHERE rule on IfcPropertyTypeDef.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

TL to make the change.

Issue Number I - 186 **Issue Date** 8/21/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description Currently, we can add simple properties directly through OccurrenceProperties and ExtendedProperties

Proposed Solution Change the data type for both from IfcPropertyDef to IfcPropertySet

Resolution Agreed. This will be changed to allow attachment of PropertySets only.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL to make the change. Confirmed inpre-final (RS).

Issue Number I - 187 **Issue Date** 8/21/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcTypeDefResource **Version** R1.5 - Pre-Beta

Issue Description Currently, IfcPropertySet does not have to have any properties (list of 0:?)

Proposed Solution Change the cardinality of the list to 1:?

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

TL to make the change. Not confirmed inpre-final (RS email to TL, 15-Sep).

Issue Number I - 188 **Issue Date** 8/21/97

Author	Liebich	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcTypeDefResource	**Version**	R1.5 - Pre-Beta		

Issue Description Currently the uniqueness of simple properties is not defined.

Proposed Solution Add a unique label which insures that each simple property is uniquely defined and understood.

Resolution Defer discussion and proposed solution until R2.0.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

RS to add to R2.0 STF projects list.

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R3.0 - Alpha

TL to study this and make a proposal

Issue Number I - 189 **Issue Date** 8/21/97

Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcSharedBldgElements	**Version**	R1.5 - Pre-Beta		

Issue Description We do not have any information to resolve layered wall connection (e.g. the layer priority problem)

Proposed Solution Do it!

Resolution 1) We will introduce a table of FundamentalMaterials (7 are currently defined in Germany - which seem to be appropriate to all countries).

2) Will add an Priority Index to the MaterialLayerSet. The order in which the layers should be connected to the other wall.

3) We will add an optional Array of a pair of Integers -- called ConnectionOverrides.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL and RJ will make the changes. Confirmed (RS).

Action # 2 **Assignee** Junge **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL and RJ will make the changes. Confirmed (RS).

Issue Number I - 190 **Issue Date** 8/21/97

Author	Forester	**Owner**	Forester	**Status**	Resolved
Schema	IfcSharedBldgServiceElem	**Version**	R1.5 - Pre-Beta		

Issue Description There is no reference to Material for the subtypes of BuildingElements

Proposed Solution Add material references

Resolution Done

Issue Number I - 191 **Issue Date** 8/21/97

Author	See	**Owner**	Drogemuller	**Status**	Resolved
Schema	IfcUtilityResource	**Version**	R1.5 - Pre-Beta		

Issue Description Class: IfcOwnerIdentification.OwningActor - This is an add-on issue related to I-001. Resolution to that issue resulted in a simple list of Actors referenced by this attribute (now an integer index into the ProjectTeamRegistry). This issue is to add enhancements to the ProjectTeamRegistry by incorporating a model for standard roles in project processes (e.g. workflow control). This would allow application developers to incorporate workflow messaging (e.g. Architect reaches "Arch. Concept Design" milestone and submits to shared model with messages to "Structural Engr" and "HVAC Engr" project roles that they are next in line to create their correstponding "Concept

Design"s. This messaging could then be routed to the appropriate team member -- based on who has been assigned these roles in the Project Team Registry. NOTE: I am not suggesting that we include workflow features in R1.5 or even in R2.0, but that a project team registry would be essential to such things in the future, so let's structure for it now and not have to re-structure later.

Proposed Solution Include a "ProjectRole" for each actor in the project team registry and think about how this could be used for workflow management within the design team. Note: this is different than the document oriented workflow done by products like WorkCenter -- this is workflow in the design process - independent of particular documents.

Resolution This was partially resolved in I-001, workflow and project roles ideas through a more complete, general purpose registry deferred to this issue.

Workflow and project roles related enhancements deferred to R2.0

This is resolved by the IfcRelParticipantRole in the Kernel

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

Workflow and project roles related enhancements deferred to R2.0.

RS to add to R2.0 STF projects list.

Issue Number I - 192 **Issue Date** 8/22/97

Author Forester **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description The IfcBuildingSection and IfcBuildingSubStorey could be represented by Zones.

Proposed Solution Eliminate these classes and use IfcZone instead.

Resolution Agreed in principal -- but investigation first.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

JW will do some investigation with Steve Race for his input (based on his experience in developing Oxes and BDS).

Issue Number I - 193 **Issue Date** 7/15/97

Author Haiat **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description I would like to have an ordered list of SpaceBoundaries for each Space.

Proposed Solution Reverse the relationship between Space and SpaceBoundary and make it a list.

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Pre-Fin

TL will make the change. Confirmed in pre-final (RS).

Issue Number I - 194 **Issue Date** 8/22/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Beta

Issue Description Currently cannot differentiate the use for multiple alternative shape representations.

Proposed Solution Need to add a "Usage" attribute on the IfcShapeRepresentation so that we can identify what the shape represents -- e.g. this one represents site boundaries, that one represents countours, last one represents ground form.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will make the addition. Confirmed in pre-final (RS).

Issue Number I - 195 ***Issue Date*** 8/23/97

Author	Forester	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Beta		

Issue Description IfcCoveringElement is missing the GenericType to drive the TypeDefinition.

Proposed Solution Add GenericType in

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will make the addition. Confirmed in pre-final (RS).

Issue Number I - 196 ***Issue Date*** 8/21/97

Author	Wix	***Owner***	Liebich	***Status***	Deferred to R3.0
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Beta		

Issue Description Limiting IfcMorphingExtrusionSegment to the same profile type at start and end is too limiting. An example would be rectangular to round duct transitions.

Proposed Solution Support different profiles and profiles with different numbers of verticies.

Resolution This will be deferred to R3.0

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

RS to add to R3.0 STF projects list.

Issue Number I - 197 ***Issue Date*** 8/23/97

Author	See	***Owner***	See	***Status***	Resolved
Schema	IfcModelingAidExt	***Version***	R1.5 - Pre-Beta		

Issue Description It should not be possible to TypeDef an IfcModelingAids.

Proposed Solution Subtype from IfcRoot instead.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Pre-Fin

TL will make the change to Kernel. Confirmed (RS).

Issue Number I - 198 ***Issue Date*** 8/19/97

Author	Yu	***Owner***	Wix	***Status***	Resolved
Schema	IfcMeasureResource	***Version***	R1.5 - Pre-Beta		

Issue Description IfcTimeDuration - I believe we need two entities to represent time period: one is IfcTimeDuration as defined in the current version. I however would prefer to rename it as IfcTimePeriod since it does represent a specific period of time. The other one is an entity that represents a longevity of time.

Proposed Solution The following is my proposal.

ENTITY IfcTimePeriod

```
    StartTime: IfcDateTimeSelect;
    EndTime: OPTIONAL IfcDateTimeSelect;
END_ENTITY;
ENTITY IfcTimeDuration
       TimeDuration: IfcTimeMeasure;  //could also be IfcTimeUnit, see below
END_ENTITY;

TYPE IfcTimeUnit = SELECT (Second, Minute, Hour, Day, Week, Month, Quarter, Year);
END_TYPE;
```

(* I understand Thomas's concern about 1week 2 days problem. I think we can deal with this by conversion functions in later release *)

Resolution Have added IfcTimeDurationMeasure and a time measure unit in the IfcUnitTypeEnum. This allows measure of time duration.

Issue Number	***I - 199***			***Issue Date***	8/19/97
Author	Yu	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Beta		

Issue Description IfcWorkSchedule - In the model document, the description of TotalFloat of IfcWorkSchedule has the following statement:
Float time may be either positive, zero or negative. Where it is zero or negative, the task becomes critical.
I think a more accurate description would be:
Free float time may be either positive, zero or negative. Total float time my be either positive or zero. Where the total float is zero, the task becomes critical.

The following definitions are for reference or documentation:
Total Float is: the amount of time that an activity can be delayed without affecting the final duration of the project. (the current description about total float is good too).

Free Float is: the maximum amount of time that an activity can be delayed without having any other effect on the activities around it.

There are other types of activity floats but these 2 are the fundamental ones.

Proposed Solution

```
ENTITY IfcWorkTaskSchedule;      //is renamed as suggested by Richard
    ProjectId        : IfcProjectUniqueId;
    ActualStart      : OPTIONAL IfcDateTimeSelect;
    EarliestFinish   : OPTIONAL IfcDateTimeSelect;
    LatestFinish     : OPTIONAL IfcDateTimeSelect;
    ActualFinish     : OPTIONAL IfcDateTimeSelect;
    EarliestStart    : OPTIONAL IfcDateTimeSelect;
    LatestStart      : OPTIONAL IfcDateTimeSelect;
    StatusTime       : OPTIONAL IfcDateTimeSelect;
    ScheduledStart   : OPTIONAL IfcDateTimeSelect;
    ScheduledFinish  : OPTIONAL IfcDateTimeSelect;
    ScheduleDuration : OPTIONAL IfcTimeDuration;    //use new data type
RemainingTime    : OPTIONAL IfcTimePeriod        //use new data type
    TotalFloat       : OPTIONAL IfcTimeDuration;        //use new data type
    FreeFloat        : OPTIONAL IfcTimeDuration;         //new added attribute
ActualDuration        :  OPTIONAL IfcTimePeriod;  //new added attribute
IsCritical       : OPTIONAL BOOLEAN;
TaskStatus       : OPTIONAL IfcTaskStatusEnum;
END_ENTITY;
```

(* some of the attributes are derived attributes. A DERIVE clause can be added in later release when enough operation functions are provided for time measuring types *)

Resolution JW to work with KY to improve definitions.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

JW/KY to work on final changes.

Action # 2 **Assignee** Yu **Status** Complete **Resolved in Version** R1.5 - Final

JW/KY to work on final changes.

Issue Number **I - 200** **Issue Date** 8/19/97

Author Yu **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description IfcSequence - There are a few problems around IfcProcess and IfcSequence. First, the sequence type (SS, SF, etc.) is missing in IfcSequence. Second, IfcSequence has link to multiple IfcProcesses. This doesn’t work for the single value of TimeLag and Sequence type. In a real construction project, it is not common to see one process link a multiple processes with the same lag and link type. Even though one could happen to find such links, it is not a good idea to model these links with one entity, since CM applications always tend to manipulate each process (i.e.task or activity) and each link individually. Therefore, speaking the models, I don’t think it is a good idea for IfcSequence to have multiple links to IfcProcess either directly or as Inverse. Third, it also makes sense to me that IfcSequence is a subtype of IfcRelationship1to1 between a predecessor and a successor, and would like to leave this idea open for discussion.

Proposed Solution Proposed solution - ENTITY IfcSequence

```
SUBTYPE OF (IfcRoot);
   SequenceRelTo    : IfcProcess;
   TimeLag               : IfcTimeDuration;     //use new data type
   SequenceType     : IfcSequenceType;  //new data type, see below
 INVERSE
   IsPredecessorFrom : IfcProcess//note: Set[0:?] is eliminated
       FOR ResultsIn;
END_ENTITY;

TYPE IfcSequenceType = SELECT (
FS, (*represents Finish-Start relationship*)
SS, (*represents Start-Start relationship*)
FF, (*represents Finish-Finish relationship*)
SF) (*represents Start-Finish relationship*)
END_TYPE;
```

Resolution JW to work with KY on final resolution

15-Nov-97: IfcSequence will now subtype from IfcRelationship1to1 - note this means that multiple relationship will have to be created for 1toN and NtoN conditions.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

JW/KY to work on final changes.

Action # 2 **Assignee** Yu **Status** Complete **Resolved in Version** R1.5 - Final

JW/KY to work on final changes.

Issue Number **I - 201** **Issue Date** 8/19/97

Author Yu **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Beta

Issue Description IfcRelUsesConstructionAids - I was 100% sure about this but I thought this entity was to replace IfcResourceUse. If so, I don’t think this entity is correctly modeled it only allows one IfcProcess to link to one IfcRelUsesConstructionAids (as Inv. UsesConstructionAids S[0:1]) which cannot deal with each resource usage individually. If however not for this purpose, we need another entity to represent resource use.

Proposed Solution I would propose the following model in addition to the existing ones or to replace IfcRelUsesConstructionAids. (note: an Inverse relationship needs to be added in IfcProcess accordingly).

```
ENTITY IfcResourceUse;  // or IfcConstructionAidUse
   Usedby: IfcProcess;  //use reference
   Resource: IfcConstructionAid;  //use reference
   Quantity: IfcMeasureValue;
   Duration: IfcTimeMeasure;
   Cost: IfcCost;
END_ENTITY;
```

Resolution IfcRelUsesConstructionAids was eliminated.

KY to double check new IfcResourceUse class and work with JW if does not match up.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

JW/KY to work on final changes.

Action # 2 **Assignee** Yu **Status** Complete **Resolved in Version** R1.5 - Final

JW/KY to work on final changes.

Issue Number I - 202 **Issue Date** 8/19/97

Author Yu **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Beta

Issue Description IfcSpace, IfcPartialSpace - I don't think the IfcPartialSpace is needed here because of two following reasons: 1). it is a subtype of IfcSpace; 2). it doesn't have any more attributes and that of IfcSpace. What we really want to model here is a containment (i.e. has) relationship between IfcSpace and IfcSpace. I think this is the place where we could use IfcRelationship1ToN.

Proposed Solution I think this is the place where we could use IfcRelationship1ToN. I would propose the following for consideration:

```
ENTITY IfcRelHasSpaces
SUBTYPE OF (IfcRelationship1ToN);
SELF\IfcRelationship1ToN.RelatingObject : IfcSpace;
SELF\Relationship1ToN.RelatedObjects : SET [1:?] OF IfcSpace;
END_ENTITY;

ENTITY IfcRelationship1ToN
(*all the existing attributes, plus the following*)
      SUPERTYPE OF (IfcRelHasSpaces);
END_ENTITY;

ENTITY IfcSpace;
(*all the existing attributes, plus the following*)
  INVERSE
HasSpaces : IfcRelHasSpaces FOR SELF/IfcRelationship1ToN.RelatingObject;
IsPartOfSpace : IfcRelHasSpaces FOR SELF\Relationship1ToN.RelatedObjects;
END_ENTITY;
```

Please note that I use 'SET' in IfcRelHasSpaces. I think it is ok to redeclare the attribute at subtype level using different aggregation data type.

Resolution PartialSpace has been eliminated in favor of allowing nesting of Spaces. KY -- check the new schema.

Action # 1 **Assignee** Yu **Status** Complete **Resolved in Version** R1.5 - Final

Check the new schema and inform TL if still have issues.

Issue Number	***I - 203***			***Issue Date***	8/19/97
Author	Yu	***Owner***	See	***Status***	Resolved
Schema	IfcArchitecture	***Version***	R1.5 - Pre-Beta		

Issue Description IfcRelAdjacencyReq - The IfcRelAdjacencyReq is currently associated with IfcSpaceProgramme but not IfcSpace. I think the space adjacency relationship should relate directly to 2 spaces that are adjacent each other. I think this requirement fits for both Architectural and FM.

Proposed Solution I would propose the following models:

```
ENTITY IfcRelAdjacencyReq
SUBTYPE OF (IfcRelationship1To1);
SELF\IfcRelationship1To1.RelatingObject: IfcSpace;
SELF\IfcRelationship1To1.RelatedObject: IfcSpace;
  INVERSE
IsForSpaceProgramme : IfcSpaceProgramme FOR HasAdjacencyReqs;
END_ENTITY;

ENTITY IfcRelationship1To1
(*all the existing attributes, plus the following*)
SUPERTYPE OF (IfcRelAdjacencyReq);
END_ENTITY;

ENTITY IfcSpace;
(*all the existing attributes, plus the following*)
 INVERSE
HasAdjacencyReqFrom : SET[0:?] OF IfcRelAdjacencyReq
FOR   SELF\IfcRelationship1To1.RelatingObject;
HasAdjacencyReqsTo : SET[0:?] OF IfcRelAdjacencyReq
FOR  SELF\IfcRelationship1To1.RelatedObject;
END_ENTITY;

ENTITY IfcSpaceProgramme;
(*all the existing attributes, plus the following*)
HasAdjacencyReqs : SET [0:?] OF IfcRelAdjacencyReq;
END_ENTITY;
```

Resolution RS and TL are not really convinced. It is indirectly related to the space through its program.

Issue Number	***I - 204***			***Issue Date***	8/19/97
Author	Yu	***Owner***	See	***Status***	Resolved
Schema	IfcArchitecture	***Version***	R1.5 - Pre-Beta		

Issue Description IfcSpaceProgramme - SpaceName and SpaceUse attributes are not clearly explained. In the documentation, it says: programme name for and space use required of ‘this’ space. Note, that the space programme links to multiple spaces. What does the ‘this’ refer to? IfcSpace should also have a link or an Inverse link to IfcSpaceProgramme.

Proposed Solution Improve the documentation in these areas.

Resolution Improve the documentation for attribute definitions. Cannot do the inverse relationship because Space is in the ProductExt and cannot upward reference the SpaceProgramme.

Action #	1	***Assignee***	See	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Improve the documentation as proposed.

Issue Number	***I - 205***			***Issue Date***	8/19/97
Author	Yu	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGenericResource	***Version***	R1.5 - Pre-Beta		

Issue Description IfcProjectUniqueID and IfcGloblyUniqueID - I think Richard commented this also. I wasn’t so sure about what was the original purpose of having this two Ids. If both are to represent unique Ids generated by a computer program such as COM, they will be globally unique anyway. If so, why bother have two? But, if IfcProjectUniqueID is for a user to set a project level code for an object, like PROJ001-ACT1, it is fine. We need more explanation in the documentation.

Proposed Solution Improve the documentation in the areas cited.

Resolution Add a better explanation of how the two uniqueIDs are combined to form a global unique ID.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

improve the documentation of IfcUtilityResource as described.

Issue Number	**I - 206**			**Issue Date**	8/19/97
Author	Yu	**Owner**	See	**Status**	Resolved
Schema	IfcModelingAidExt	**Version**	R1.5 - Pre-Beta		

Issue Description IfcModelingAid - I didn’t look into this in very detail, but I have the feeling most IfcModelingAid related entities in the IfcModelingAid Schema are related to design. In this sense, the ‘IfcModeling’ seems a little bit confusing for me.

Proposed Solution Can we call it "IfcDesignAid" ?

Resolution Name change not substantially different. Would prefer not to make the change at this late date.

Issue Number	**I - 207**			**Issue Date**	8/23/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Beta		

Issue Description [raised by Peter Muigg - issue logged by R.See]

IfcSpace - this class is missing an attribute for the Height of the Space. This is needed in order to calculate the volume. While it may be possible to deduce this from the

Proposed Solution Add an attribute for Height

Resolution Agreed -- called "calcAverageHeight"

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

TL to add it

Issue Number	**I - 208**			**Issue Date**	8/23/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcTypeDefResource	**Version**	R1.5 - Pre-Beta		

Issue Description IfcTypeDefResource - IfcPropertyTypeDef

Currently SharedProperties is mandatory, but we have type def's that define only occurrence properties

Proposed Solution make optional

Resolution Agreed. Corrected by TL.

Issue Number	**I - 209**			**Issue Date**	8/23/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcTypeDefResource	**Version**	R1.5 - Pre-Beta		

Issue Description IfcTypeDefResource - IfcSimpleProperty

Currently ValueComponent is OPTIONAL, but it should be always given

Proposed Solution Make mandatory

Resolution Agreed. Corrected by TL.

Issue Number	**I - 210**			**Issue Date**	8/23/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcTypeDefResource	**Version**	R1.5 - Pre-Beta		

Issue Description Now that that other predefined properties have been combined into this schema, the name TypeDefResource no longer seems appropriate.

Proposed Solution Rename this schema to "IfcPropertyTypeResource"

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

make the change as proposed.

Issue Number	**I - 211**			**Issue Date**	8/23/97
Author	Liebich	**Owner**	See	**Status**	Rejected
Schema	IfcModelingAidExt	**Version**	R1.5 - Pre-Beta		

Issue Description ModelingAid entities don't 'feel' like Core Layer concepts. They 'feel' more like resources. If PlacementRelToGrid is generalized to "ConstrainedPlacement"s, then it should be possible to push all of the ModelingAid entities down to the resource layer.

Proposed Solution Push all of the ModelingAid entities down to the resource layer.

Resolution Rejected - This is a problem with regard to placement of model elements. Presumably, "ConstrainedPlacement" should be subtyped from LocalPlacement. LocalPlacement references an IfcObject (as the 'relative to') object. This would mean that you could not place elements relative to ModelingAids.

Issue Number	**I - 212**			**Issue Date**	9/5/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description LocalPlacement.PlacementRelTo [IfcObject] - placement relative to an IfcObject is a problem -- many IfcObjects done have geometry and therefore don't have a placement that can be used (relative to)

Proposed Solution There are really only two subtypes that have placement (that can be referenced) - IfcProduct and IfcModelingAid. Please add a WHERE rule limiting to these OR create a select type which is referenced by LocalPlacement.

Resolution This should be done with a SelectType called "IfcObjectWithPlacement"

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

make the change as resolved.

Issue Number	**I - 213**			**Issue Date**	9/8/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Final		

Issue Description IfcSiteComplex and IfcBuildingComplex: Both do not define any particular data, they just carry the meaning that this group only contains either sites or buildings.

Proposed Solution	Delete both classes, use the direct instanciation of IfcGroup instead, and make use of the new GroupPurpose attribute to indicate an SiteComplex or a BuildingComplex. Add this to documentation.
Resolution	Agreed. Eliminate these two classes and document the use of IfcGroup with the "GroupPurpose" set to SiteComplex and BuildingComplex, respectively

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Eliminate the classes.

Action # 2 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R1.5 - Final

Update the documentation for IfcGroup to describe its use for this purpose.

Not complete as of 26-Nov-97.

Issue Number ***I - 214*** ***Issue Date*** 9/18/97

Author	See	***Owner***	See	***Status***	Resolved
Schema	IfcControlExt	***Version***	R1.5 - Pre-Final		

Issue Description	We need a general purpose constraint mechanism to support code checking constraints in particular, but can also be used for things like designer imposed constraints.
Proposed Solution	See general purpose constraint proposal from the CS-1 team -- would like to see this introduced in R1.5 so that it can be used to develop solutions for CS-1 and CS-2 projects in R2.0
Resolution	Agreed. This has been resolved by the IfcConstraintExtension in R2.

Action # 1 ***Assignee*** Forester ***Status*** Complete ***Resolved in Version*** R2.0 - Beta

Introduce IfcControlExt schema including general purpose constraint as agreed with STF and CS teams.

Action # 2 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Beta

Review the general purpose constraint mechanism proposed by the CS team and make comments

Action # 3 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R2.0 - Beta

Review the general purpose constraint mechanism proposed by the CS team and make comments

Action # 4 ***Assignee*** Forester ***Status*** Incomplete ***Resolved in Version*** R2.0 - Beta

Review the general purpose constraint mechanism proposed by the CS team and make comments

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Issue Number ***I - 215*** ***Issue Date*** 9/18/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcUtilityResource	***Version***	R1.5 - Pre-Final		

Issue Description	Class: IfcAuditTrail -- Attribute "AuditTrailLength" - which holds the length of the Audit trail length was agreed, but is still not in. We did agree that we would limit this to a single transaction, (through where rules limits), but this attribute is needed to insure backward compatibility in future versions.
Proposed Solution	Add this attribute (type integer). NOTE: this allows an owning application to "set" the length for this trail on an object by object basis.
Resolution	Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Make the change as proposed

(RS) 26-Nov-97: in the .HTML, the data type, min, max, default not set for "AuditTrailLength"

Issue Number ***I - 216*** **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcUtilityResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcAuditTrail -- Transactions [IfcTransaction] -- cardinality should be limited to the AuditTrialLength (discussed above).

Proposed Solution change cardinality to List [0:AuditTrailLength]. Note: this assumes IfcTransaction will be contained within IfcAuditTrail and will be made a 'friend' to the IfcAuditTrail.

Resolution [TL] to I-215, I-216: The final chosen resolution is adding a WHERE clause
WR1: HIINDEX(Transactions) <= 1;
[RS] No -- agreed compromise was to make this attribute derived so that it is available for query
[RS] No -- this is STILL not right. The original intention was for the owning application to have control of the length of this trail. Therefore, it should not be derived, but set.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Add the attribute

Issue Number ***I - 217*** **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcUtilityResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcRegisteredApplication -- ApplicationDeveloper [ref [IfcActor]] -- shouldn't we make this an integer index into the TeamRegistry as in other places?

Proposed Solution change data type to INTEGER and document that this is index into ProjectTeam.

Resolution [TL] disagreed: the semantic of TeamRegistry is to register team members of the AEC project. I don't see, that an application developer becomes a member of the Project Team.
Recommendation: leave it as it is.
[RS] agreed

Issue Number ***I - 218*** **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcUtilityResource **Version** R1.5 - Pre-Final

Issue Description IfcTable -- revised schema will allow multiple headings (only one of which will be used).

Proposed Solution [TL] There are multiple headings, look at diagram in MS word document "RAS_R15rev4_Compsite_1d.doc"

[RS] Yes, this is valid. However, you need to establish a convention for interpreting where the headings span multiple columns (e.g. if heading for col, 3,4,5 are blank, then col 2 heading extends for all for columns).

Resolution Leave schema as it is, but add documentation to clarify convention for interpreting where the headings span multiple columns.
[RS] This still leaves a problem. Currently, the NumberOfRows will include both the data rows and the heading rows. How will one query for the number of data rows?
Final Resolution: 1) class definition modified so that Rows is LIST [0:?], NumberOfDataRows and NumberOfHeadingRows are now derived attributes.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

complete items 1 & 2

Issue Number ***I - 219*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcTable -- NR, NC -- These names are awfully cryptic.

Proposed Solution Change them back to NumberOfRows and NumberOfColumns (as before).

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make the change

Issue Number ***I - 220*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcTable -- NR, NC -- If the Rows and RowValue lists were made 0:?, then these values could (and should) be derived.

Proposed Solution Change lists to 0:? And make these attributes derived.

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Make the change as proposed

Issue Number ***I - 221*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcTable -- Rows [List[1:NR] of IfcTableRow] -- This will result in one too few rows unless NR is defined to be the number of rows + 1 (for the headings).

Proposed Solution Change cardinality to List[1:NR+1]

Resolution [TL] why not considering a heading just as another row?
[RS] agreed so long as the documentation is clear that headings are inlcuded. However, this kind of defeats the purpose of the values for NumberOfRows and NumberOfColumns (since you won't really know how many data rows you have until you check to see which ones are headings.
Final resolution: will reverse the direction of the relationship to TableRows and will change the attribute "Rows" to 2 attributes (both derived values) - for "NumberOfDataRows" and "NumberOfHeadingRows".

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make changes as resovled.

Issue Number ***I - 222*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcTableRow -- RowValues [List[1:NC] IfcMeasureValue] -- this still violates encapsulization. Also, values should be contained and not "Ref" erenced as they are now.

Proposed Solution 1) move renamed NC to IfcTableRow class (still derived) since is is only needed in this contained object.
2) change "Ref IfcMeasureValue" to just "IfcMeasureValue" --> "List[1:NoOfColumns] IfcMeasureValue"

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Make the change as proposed.

(RS) 26-Nov-97: "NumberOfColumns" not moved into IfcTableRow yet - note: "List[1:NoOfColumns]" defined at data type for "RowValues" violates encapsulization. Also, values should be contained and not "Ref" erenced as they are now.

Issue Number ***I - 223*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Final

Issue Description Type: IfcAxis2Placement -- Naming convention recommendation.

Proposed Solution All Select types should be called "IfcXxxxSelect".

Resolution [TL] agreed in general, but disagreed in particular: one modeling principle in Pewsey was to leave STEP names as they are

[RS] Not agreed. We have already renamed the class names. What is the problem with being consistent with the names of Select types too?

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

Review all schemata to insure that all Select types follow the naming convention.

Issue rejected after all --

Issue Number ***I - 224*** ***Issue Date*** 9/18/97

Author Liebich ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Final

Issue Description We don't have a Point entity presently

Proposed Solution add the class "IfcPoint" for backward compatibility from R2.0 -- in the gray page Network we already use another subtype IfcPointOnCurve

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Add the class - coordinated with STEP P42

Issue Number ***I - 225*** ***Issue Date*** 9/18/97

Author Liebich ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Beta

Issue Description Class IfcCurveBoundedSurface -- name clashes with STEP entity curve_bounded_surface

Proposed Solution Rename into IfcCurveBoundedPlane, this is more precise. Change data type of BasisSurface to IfcPlane to be more precise

Resolution Agreed

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

make the changes described

Issue Number ***I - 226*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description We don't have a fundamental "Surface" supertype. This will be needed in R2.0 for the HVAC model (IfcCylindricalSurface)

Proposed Solution Add the class "IfcElementarySurface" for upward compatibility with R2.0 -- basis non planar surfaces such as IfcCylindricalSurface.

Resolution Agreed.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Add the class - compatible with P42

Issue Number ***I - 227*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema		***Version***	R1.5 - Pre-Final		

Issue Description We don't have a fundamental base type for non-closed Breps. This will be needed for the HVAC model in R2.0.

Proposed Solution Add the class "IfcConnectedFaceSet" for upward compatibility -- supertype for non closed Breps

Resolution Agreed

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Add the class - compatible with P42

Issue Number ***I - 228*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcAttDrivenExtrusionSolid -- This name is not consistent with others

Proposed Solution 1) Rename into IfcAttDrivenExtrudedSolid for naming consistency with IfcExtrudedAreaSolid.

2) Group List of IfcExtrusionSegment and List of Path Length (corresponding Lists) into a single List of IfcAttDrivenExtrudedSegment. Note: this was an implementers request at the Munich meeting.

Resolution Agreed

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Make the changes as proposed

Issue Number ***I - 229*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcAttDrivenExtrusionSolid -- We don't have the baseline for these entities defined

Proposed Solution Add (DER) Path, defines the ExtrudedSolid "Baseline" to which we relate the material layer set base line. It is computed by the function IfcExtrusionPath

Resolution [RS] agreed, however, determining the path indirectly is a bit troubling. See also comments on attachment of MaterialLayerSets too high in the model.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

make the changes as described

Issue Number	**I - 230**			**Issue Date**	9/18/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Final		

Issue Description Class IfcAttDrivenExtrusionSolid -- simplification of ExtrudedSolid segments means that the "position" (placement) should be moved back up to this class.

Proposed Solution 1) Add position back to IfcAttDrivenExtrudedSolid, since it now defines the path as well.
2) Eliminate the IfcStraightPathDef.

[RS] StraightPathDef is now default in the revised (now concrete) IfcAttDrivenExtrudedSolid

Resolution Is there some disagreement about StraightPathDef?

IfcStraightPathDef is omited but information is present in IfcAttDrivenExtrudedSolid and IfcAttDrivenExtrudedSegment.

Issue Number	**I - 231**			**Issue Date**	9/18/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Final		

Issue Description We don't currently have a class for Att Driven revolved solids. Additionally, the design for a series of extrusion segments could be improved with the concept of an extrusion segment (Note: this was an implementers request at the Munich meeting.)

Proposed Solution 1) Add IfcAttDrivenRevolvedSolid,
2) eliminate the IfcArcPathDef,
3) Group List of IfcExtrusionSegment and List of Path Length (corresponding Lists) into a single List of IfcAttDrivenExtrudedSegment.

Resolution Agreed with resolution of the following question -- Do we have some confusion about the ArcPathDef? Are all paths now a simple curve (line or arc) ?

Yes, simplification from R1.0 to R1.5 was to delay support for polycurve paths to some future release. R1.5 supports the straight path that can be derived from an AttDrivenExtrudedSolid defintion and the arc path that can be derived from an AttDrivenRevolvedSolid.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

make the changes as described

Issue Number	**I - 232**			**Issue Date**	9/18/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Pre-Final		

Issue Description Class IfcAttDrivenRevolvedSolid -- we need to insure that we can place material layers for such a solid.

Proposed Solution Add (DER) Path, defines the baseline for the extrusion, to which we relate the material layer set baseline. It is computed by the function IfcRevolutionPath.

Resolution [RS] agreed, however, determining the path indirectly is a bit troubling. See also comments on attachment of MaterialLayerSets too high in the model.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make the changes as described

Issue Number ***I - 233*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcAttDrivenRevolvedSolid -- Now that extrusion segments are self contained and dependent on the placement of the parent ExtrudedSolid, we need the "position" (placement) back in this class.

Proposed Solution Add position back to IfcAttDrivenRevolvedSolid, since it now defines the path as well.

Resolution Agreed. -- but later superseded by other changes in the definition of AttDrivenExtrusionSegments. Placement was finally added for each of the Segments (see I292)

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

make the change as described.

Issue Number ***I - 234*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcExtrusionSegment -- this name is not inconsistent. It should also be moved under IfcExtrudedAreaSolid (Note: this was a request from the implementers meeting in Munich).

Proposed Solution Rename into IfcAttDrivenExtrudedSegment for naming consistency. Now subtyped from IfcExtrudedAreaSolid. The explicit attributes are overridden by Derived Attributes, since it is driven by those attributes.

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Make the change as described

Issue Number ***I - 235*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description Now that we have added a RevolvedSolid, we will need segments.

Proposed Solution Add the new class "IfcAttDrivenRevolvedSegment" for revolved segments, it is subtyped from IfcRevolvedAreaSolid, since both define the same functionality. The explicit attributes are overridden by Derived Attributes, since it is driven by those attributes.

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make the addition as described

Issue Number ***I - 236*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcTaperedExtrusionSegment -- This class could not be used for sloped walls as discussed in Sep-97 Munich implementers meeting. Also, it was pointed out that resulting shaped _could_

be defined using morphed extrusions.
Is it to specialized? Should we reduce class count?

Proposed Solution Consider deleting this class.

Resolution Not agreed. Leave it in as a convenient way to do uniformly tapered shapes.

Issue Number **I - 237** **Issue Date** 9/18/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description Class IfcMorphingExtrusionSegment -- name is inconsistent with new scheme. It is also possible to define morphed segments that twist.

Proposed Solution Rename to IfcAttDrivenMorphedExtrudedSegment for naming consistency. Add a where rule that requires the start and end profile to have the same orientation (to avoid twisted configurations)

Resolution [RS] agreed. However, note that about all you can do is insure that the LCS does not rotate between profile 'A' and 'B', this does not insure that the user/programmer did not rotate the profile within the second LCS.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

make the changes as described

Issue Number **I - 238** **Issue Date** 9/18/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description Need to add segment object for revolved extrusions (new) that morph.

Proposed Solution Introduce a new class for morphed revolved segments -- "IfcAttDrivenMorphedRevolvedSegment", using the same constraints as for IfcAttDrivenMorphedExtrudedSegment

Resolution [RS] agreed. Perfect example for the graphics on this is a curved spread footing wall where the wall slopes.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

add new class and example of use in documentation

Action # 2 **Assignee** Liebich **Status** Complete **Resolved in Version** R2.0 - Alpha

Add an example diagram for morphing, revolved segment.

Issue Number **I - 239** **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description Classes: IfcAttDrivenProfileDef, IfcArbitraryProfileDef -- CurveForSurface [IfcBoundedCurve] -- In Implementers meeting (9-Sep), we discussed moving this down to the ArbitraryProfileDef level and thus eliminate all of the DER redefinings in the other subtypes.

Proposed Solution Move this attribute down to IfcArbitraryProfileDef

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

make the change as proposed

Issue Number I - 240 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcPropertyTypeDef -- Agreed attribute for identifying the domain point of view from which a 'type' is defined (from Pewsey) -- is missing.

Proposed Solution Attribute called "ObjTypeDomainView" [IfcObjTypeViewpointsEnum].

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

make the change as proposed.

Issue Number I - 241 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcPropertyTypeDef -- TypeReference [IfcPropertyTypeDef] -- We need to establish a convention for the way references to other TypeDefs will be done.

Proposed Solution 1) Establish the convention that ALL references to other TypeDefs (in the subject TypeDef) is to the parent TypeDef. Example: TypeDef for the Specific WindowType "WoodFrameAwning" references TypeDef "Awning", which references TypeDef "Window". 2) rename the attribute to "ParentTypeDef"

Resolution [TL] agreed and done as ParentTypeReference - (INV) ReferencedByChildType
[RS] Good! This will be used by the new definitions for Door and Window property sets.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

change as described

Issue Number I - 242 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcOccurrencePropertySet, IfcSharedPropertySet -- I am uncomfortable with the rational for introducing these two subtypes because they don't add anything.

Proposed Solution eliminate them.

Resolution [TL] still prefer to leave them in, since they utilize semantically different concepts and have different attributes
[RS] agreed in the spirit of cooperation.

Issue Number I - 243 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcRepresentationContext -- ProjectID [IfcProjectUniqueID] -- This isn't really needed. If we take the convention that objects from this class should be contained in the ShapeRepresentation.

Proposed Solution eliminate attribute.

Resolution [TL] disagreed: an instance of IfcRepresentationContext can be shared among multiple instances of IfcShapeRepresentation, it can therefore not be contained
[RS] Okay; agreed -- leave it as is.

Issue Number ***I - 244*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcPropertyTypeResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcProductShape -- RootComponent [IfcProductComponentShape] -- This attribute name is a bit uncomfortable in this it is really the resultant product shape (not the root).

Proposed Solution rename it to ProductShape

Resolution [TL] agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make change as proposed

Issue Number ***I - 245*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcPropertyTypeResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcShapeBody -- AnalysisTag [STRING] -- If this is the descriptor for standardized components in product shapes (loose link to semantic model attributes side of model), then this name is misleading.

Proposed Solution 1) rename to StdComponentDescriptor, 2) pump up the documentation to insure that EVERYBODY understands the relationship between the StdComponentDescriptorsEnum (no the semantic model side) and use of them here on the shape models for each component. This is the only reliable way applications will have to know which parts of the geometry corresponde to known parts of products (e.g. a Window frame or glazing).

Resolution [TL] should be done as ComponentDescriptor::STRING, Note: we cannot use enum there, since then the resource would depend on lower level schemas - violation of IFC Architecture
[RS] NOTE: use of a STRING here is VERY weak. We MUST look for a stronger link between the semantic model attributes that must 'drive' the AttDrivenGeom. Thomas to look into doing this in R2.0 using Schema rules (? Can't remember the exact name)

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Add the ComponentDescriptor to the ComponentShapeRep

Action # 2 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R3.0 - Beta

Develop method by which ComponentShapeReps will be 'driven' from attributes on the semantic model object to which the ShapeRep is related.

Issue Number ***I - 246*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Rejected

Schema IfcPropertyTypeResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcShapeRepresentation -- UsageTag [STRING] -- Doc says that this is to identify usage for this shape (e.g contrours or boundaries for Site). This seems very WEAK at this point; expecially given that it is only a STRING. How will we achieve any consistency across vendors, let alone users.

Proposed Solution No proposal developed at this point.

Resolution It is acknowledged that UsageTag is weak and somewhat redundant with the RepresentationType already on the ShapeRep. However, we do not have a better solution in time for R1.5.

Therefore, we are going to defer this for resolution in R3.0.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

Add to the list of R2.0 STF projects

Issue Number	**I - 247**			**Issue Date**	9/18/97
Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyTypeResource	**Version**	R1.5 - Pre-Final		

Issue Description Class IfcShapeResult -- in some cases, the shape result will be a standard component shape (e.g. a Window "Frame").

Proposed Solution add ComponentDescriptor, since also the result can be a standard component, referenced by a semantic type, e.g. the union of all four frame sides

Resolution Agreed.

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

make the addition as proposed

Issue Number	**I - 248**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcMaterialLayerSetUsage -- SenseLtoR [Boolean] -- naming convention dictates other name.

Proposed Solution rename to "MaterialLayersLtoR".

Resolution [TL] should be done as "MlsSenseLtoR", note we uses the abbrevation Mls everywhere else
[RS] agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

make the change as resolved.

Issue Number	**I - 249**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcMaterialLayerSetUsage -- CenterOffset [IfcLengthMeasure] -- This is the old naming and method. Additionally, this attribute is not needed as it is redundant with the one discussed next.

Proposed Solution remove the attribute.

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

change as proposed

Issue Number	**I - 250**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcMaterialLayerSetUsage -- CenterOffsetFromPath [IfcLengthMeasure] -- This is the old naming and method.

Proposed Solution Rename to MlsBaselineOffset.

Resolution [TL] will be done to comply with drawing from May STF mtg (done by JF)

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

change as resolved.

Issue Number I - 251 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcMaterialLayerSetUsage -- TotalWidth [IfcLengthMeasure] -- I made the case in the last set of comments (and believe we agreed in Pewsey) that this dimension is virtually all cases is better referred to as the "thickness".

Proposed Solution rename to "TotalThickness".

Resolution [TL] should be "MlsTotalThickness" according to the diagram. Also, the function IfcMlsTotalThickness must be updated to new layer definition.

[RS] main point here was the use of the term "Thickness" instead of "Width"

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

change as resolved.

Issue Number I - 252 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description We need to be able to reference objects (other than simple property objects) from with PropertySets. For example, to specify a IfcDocument from within a PropertySet -- say for a cost estimate or construction schedule.

Proposed Solution wrap a ProjectUniqueID in a subtype of IfcProperty so that such references (essentially object pointers) can be included in PropertySets. Call the new property subtype "IfcObjectReference "

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Add the "IfcObjectReference " subtype of IfcProperty in the IfcPropertyTypeResource

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Issue Number I - 253 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcCoordinatedUniversalTimeOffset -- Ahead [IfcAheadOrBehind] -- it was agreed in Pewsey that this should be a Boolean, so why introduce the intermediate type?

Proposed Solution Eliminate IfcAheadOrBehind and make "Ahead" a Boolean.

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

change as resolved

Issue Number I - 254 **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Final

Issue Description Class: IfcModelingAid -- The IR log from Pewsey says that this should be subtyped from IfcRoot, not IfcObject.

Proposed Solution Subtype from IfcRoot.

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final
			change as proposed				

Issue Number	**I - 255**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcLocalPlacement -- In our discussions in Munich (10-Sep-97, we agreed that IfcLocalPlacement should be subtyped from IfcModelingAid.

Proposed Solution Subtype from IfcModelingAid.

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final
			change as proposed.				

Issue Number	**I - 256**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcObject -- TypeDefinition List [0:?] [IfcPropertyTypeDef] -- Convention has been use plural naming for attributes with such cardinality.

Proposed Solution Rename to "TypeDefinitions".

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final
			change as proposed.				

Issue Number	**I - 257**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Rejected
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcProduct -- ProductShape [IfcProductShape] -- shouldn't this be a List ? For example, one to hold the BoundingBox rep, another to hold the AttDrivenShape rep and a third to hold the Explicit Shape rep.

Proposed Solution Make it a list? Am I missing something?

Resolution [TL] the definition is different, you shall use many IfcShapeRepresentation instead, each is characterized by the RepresentationType as either BoundingBox, AttributeDriven or Explicit
[RS] agreed -- no change needed

Issue Number	**I - 258**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcRelSequence -- INV IsPredecessorFrom S[0:?] -- should read "IsPredecessorTo".

Proposed Solution Rename to "IsPredecessorTo".

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final
			change as proposed.				

Issue Number	**I - 259**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcRelSequence -- Cardinality on these relationships reads as 1to1 on the primary rels and NtoN in the Inverse rels

Proposed Solution Reset so that it is truly 1toN, one predecessor to many successors. Note: as discussed in Pewsey, some relationships are truly NtoN (as with this one). Documentation should be clear that, in these cases, it is necessary to create multiple relationships where there are multiple predecessors to a WorkTask.

Resolution Agreed.

Changed after I-200 in which KY argued that IfcSequence should be a subtype of IfcRelationship1to1 in all cases. Therefore this issue has been superseded.

Action # 1 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R1.5 - Final

Correct cardinality as proposed.

Action # 2 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Insure that documentation is clear about the need for applications to create multiple relationships where relationships are truly NtoN (as the model now only supports 1to1 relationships).

(RS) 26-Nov-97: not done in Final-Candidate HTML reference docs.

Issue Number	**I - 260**			**Issue Date**	9/18/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcLocalPlacement -- This class was moved to ModelAidExtension.

Proposed Solution Remove it from the Kernel. Reference should also be removed from diagram 3.

Resolution [TL] disagreed and error found: moving IfcLocalPlacement down to IfcModelingAid would cause a violation of the IFC Architecture, since IfcProduct.LocalPlacement is using IfcLocalPlacement and would now reference a schema on a higher level. Recommendation: leave it in IfcKernel
[RS] Agreed. TL will move LocalPlacement back into the Kernel (still subtyped from IfcModelingAid) and RS will remove and reference it from the ModelingAidExtension.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Move localPlacement back to Kernel

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

Remove LocalPlacement from IfcModelingAidExtension and reference it there - from Kernel

Issue Number	**I - 261**			**Issue Date**	9/18/97
Author	See	**Owner**	See	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcBuildingElement -- HasMaterial [IfcMaterialSelect] -- this reference to materials is MUCH TOO HIGH in the model. Such references should be made at the leaf nodes, in the definition of TypeDefs.

Proposed Solution Remove from BuildingElement and establish a convention for references to Materials, MaterialsLayersSets, etc. in TypeDefs.

Resolution [TL] disagreed: we have never seriously attempted to look at all consequences, when dealing

with materials in Property Sets, in particular the connectivity problem, where we need material information, is required in ACS, but Type Definition and Property Sets are currently not in Exchange Class -- would have severe implications: Recommendation: leave Material as explicitly handled attribute for now and defer the issue to Release 2.0
[RS] The point is that one does not know how to specify materials until the detailed type is known. The type and configuration of materials is 'type driven'. Further, other attributes, which relate to material will be in Type Driven PropertySets. Therefore, references to Material should be done at the leaf node level -- in the Type Driven PropertySets. This will still be compatible with the Layer Priority scheme included in the IfcRelConnectsElements.
Final Resolution: 1) A new type of Materials reference will be added to the IfcPropertyResource -- for list of materials (IfcMaterialList). This will be referenced for things that have more than one material, but not arranged as MaterialLayers. 2) IfcMaterialSelect will now include IfcMaterialList and NOT include IfcMaterial. 3) documentation for subtypes of BuildingElement will be expanded to note which of the materialSelect types should be used (e.g. MaterialLayer for Walls, MaterialList for Windows and Doors). 4) references to materials in the Psets will reference one of the materials in these lists as an index in the list (e.g. a window frame Pset may reference material 3 in the list).

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

TL to complete items 1, 2, 3, RS to complete item 4

(RS) 26-Nov-97: IfcMaterialSelect must not include IfcMaterial or else the use of indicies to reference materials (from Psets) will not work! Use an IfcMaterialList with a single material in those cases and eliminate IfcMaterial from IfcMaterialSelect

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

RS to complete item 4 described in the final resolution

Issue Number **I - 262** **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Final

Issue Description Class: IfcBuildingSection -- As discussed in Pewsey, if this class remains, it should allow type definition.

Proposed Solution Add the attribute "GenericType" of type IfcBldgSectionTypeEnum.

Resolution [TL] how does the IfcBldgSectionTypeEnum differ for IfcBuildingTypeEnum? Attaching another GenericType at IfcBuildingSection is impossible, since it inherits GenericType from superclass.
[RS] Cannot TypeDef BuildingSection because it is subtyped from Building, which already has a Type and EXPRESS will not let us override this. These EXPRESS limitations are a real pain sometimes! We should eliminate BuildingSection or define it such that it is not subtyped from Building.
Final resolutions: remove this class and include in the documentation the use of IfcZone to represent BuildingSections --

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

remove the BuildingSection class

Action # 2 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Add to the IfcZone documentation about how to represent BuildingSections using Zones.

(RS) 26-Nov-97: Not done in Final-Candidate HTML reference docs.

Issue Number **I - 263** **Issue Date** 9/18/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Final

Issue Description Class: IfcSpace -- As discussed in Pewsey, we need an average height for a space.

Proposed Solution Add and attribute "calc_AvgHeight" of type IfcPositiveLengthMeasure

Resolution [TL] agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

add attribute as resolved.

Issue Number ***I - 264*** **Issue Date** 9/18/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcRelConnectsElements -- there are 4 new attributes which are related to resolving drawing at connections of multilayered elements. This seems too specific for such a generalized class.

Proposed Solution Subtype a logical connector for objects using multiple layers and move these attributes to the subtype.

Resolution [TL] attributed attached as required by implementers, they are just INTEGER, and should therefore not create a big overhead
[RS] The point is that they don't make sense in in a connection between a pipe and equipment, or between two ducting elements. These four parameters could be encapsulated into a new class called LayeredElementConnectionParameters (similar to the LayeredSetUsageParameters) -- which is used as an optional attribute on this class.
Final Resolution: 1) Current subtypes are by type of connection geometry. This connection geometry information will be moved up to an optional attribute on IfcRelConnectsElements called "ConnectionGeometry ". 2) create a subtype of IfcRelConnectsElements with "IfcRelConnectsLayeredElements" and push these 4 attributes to the subtype.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Complete items 1 & 2 described in the resolution.

Issue Number ***I - 265*** **Issue Date** 9/18/97

Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcRelConnectsElements -- What about Peter Muigg's proposal for Logical Connections Enum?

Proposed Solution Incorporate implementers consensis on that -- as discussed in Munich Implementer meeting of 14-Oct-97.

Resolution Reduce the number of options in the Enum (see notes from the 14-Oct-97 meeting).

Study this for a longer term solution in IFC R2.0.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Incorporate final agreed enum on IfcRelConnectsElements

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Alpha

Work with implementers to develop a better solution for the long term. See email from R.Steinmann for disucssion on situations current solution will not solve.

Action # 3 **Assignee** See **Status** Eliminated **Resolved in Version** R2.0 - Alpha

Work with implementers to develop a better solution for the long term. See email from R.Steinmann for disucssion on situations current solution will not solve.

Issue Number ***I - 266*** **Issue Date** 9/18/97

Author	See	**Owner**	Wix	**Status**	Resolved

Schema	IfcProcessExt	***Version***	R1.5 - Pre-Final

Issue Description Class: IfcWorkTask -- WorkMethod [STRING], TaskCost [IfcCost] -- these are two new attributes (at this late date!).

Proposed Solution Leave them out if not essential.

Resolution These are needed for the concept of ResourseUse -- see other issue on ResourceUse.

Rejected

Issue Number	***I - 267***			***Issue Date***	9/18/97
Author	See	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Final		

Issue Description Class: IfcWorkTask -- TaskNumberID [STRING] -- confusing name.

Proposed Solution Rename to WorkTaskID. Note: this follows the naming convension used elsewhere.

Resolution Agreed

Action #	1	***Assignee***	Wix	***Status***	Complete	***Resolved in Version***	R1.5 - Final

make change as proposed

Issue Number	***I - 268***			***Issue Date***	9/18/97
Author	Liebich	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcRelGroupsWorkTask -- The objectified relationship subtype does not define further information

Proposed Solution Delete and use IfcRelGroups instead; set the "GroupPurpose" to GroupsWorkTasks". Update documentation to make the usage clear.

Resolution [RS] agreed with same reservations about clearly communicating meaning of generalized relationships in specialzed cases where the specialized semantics will now be lost or obscure.

Action #	1	***Assignee***	Wix	***Status***	Complete	***Resolved in Version***	R1.5 - Final

change as proposed

Issue Number	***I - 269***			***Issue Date***	9/18/97
Author	Liebich	***Owner***	Wix	***Status***	Resolved
Schema	IfcProcessExt	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcWorkTaskSchedule -- has independent ProjectId, but is contained in IfcWorkTask

Proposed Solution Delete ProjectId

Resolution [RS] agreed

Action #	1	***Assignee***	Wix	***Status***	Complete	***Resolved in Version***	R1.5 - Final

remove attribute as proposed

Issue Number	***I - 270***			***Issue Date***	9/18/97
Author	Liebich	***Owner***	See	***Status***	Resolved
Schema	IfcModelingAidExt	***Version***	R1.5 - Pre-Final		

Issue Description Class IfcLocalPlacement -- error found: the IfcLocalPlacement has to be defined in the IfcKernel, since it is directly reference by another class in IfcKernel -- now the IFC Architecture is violated (see also I-242).

Proposed Solution Bring it back into IfcKernel

Resolution [RS] agreed.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

eliminate Local placement and reference it from the kernel

Issue Number ***I - 271*** ***Issue Date*** 9/18/97

Author See ***Owner*** See ***Status*** Resolved

Schema IfcModelingAidExt ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcGridIntersection -- This should be subtyped from IfcReferencePoint so that constrainded placements will really work with Grid intersections (since that placement references ReferencePoints and not ModelingAid).

Proposed Solution Subtype IfcGridIntersection from IfcReferencePoint.

Resolution [TL] I agree

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

change as proposed

Issue Number ***I - 272*** ***Issue Date*** 9/18/97

Author See ***Owner*** See ***Status*** Resolved

Schema IfcModelingAidExt ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcGridAxis -- This should be subtyped from IfcReferenceCurve so that constrainded placements will really work with Grid Axes (since that placement references ReferenceCurves and not ModelingAid).

Proposed Solution Subtype IfcGridAxis from IfcReferenceCurve.

Resolution [TL] I agree

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

change as proposed

Issue Number ***I - 273*** ***Issue Date*** 9/18/97

Author See ***Owner*** See ***Status*** Resolved

Schema IfcModelingAidExt ***Version*** R1.5 - Pre-Final

Issue Description Classes: IfcReferencePoint, IfcReferenceCurve, IfcReferenceSurface -- All of these need local placement or an 'implementers convention' that says they are always placed relative to a standard element (Site or Project for example). On reflection, it seems that taking a convention will not work well. In some projects, there may be multiple Sites -- and Project does not have placement.

Proposed Solution Add a mandatory attribute to each -- "RelativePlacement" of type IfcLocalPlacement.

Resolution Agreed.

Note: this LocalPlacement was actually put on the supertype of these 3 classes -- IfcReferenceGeometryAid

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

Add attributes as described.

Issue Number I - 274 **Issue Date** 9/18/97

Author See **Owner** Wix **Status** Resolved

Schema IfcDocumentExt **Version** R1.5 - Pre-Final

Issue Description Class: IfcCostScheduleGroup -- GroupID -- no type specified in the EXG (did not check EXP or documentation).

Proposed Solution Include data type.

Resolution Agreed

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

Add data tyep and insure that it is consistent for EXP, EXP, DOC

Issue Number I - 275 **Issue Date** 9/18/97

Author See **Owner** Wix **Status** Rejected

Schema IfcDocumentExt **Version** R1.5 - Pre-Final

Issue Description Class: IfcCostSchedule -- ApprovedBy -- I would still argue that 1) cardinality should be a list [0:?] and 2) the data type should be IfcActor because sometimes, approval is needed from an agency (e.g. an organization). While the person that would be used may indeed be part of an organization, it may not be redily apparent. Where the person is important (for accountability/liability), then the SelectType "IfcPersonAndOrganization" will be used. See I-146.

Proposed Solution Make a list [0:?] of IfcActorSelect. Note name change for this SelectType

Resolution Not the same as generalized approval (something for R2/R3), which will then replace this. For R1.5, Approval in this case indicates the person in the organization who approved the costs.

Reject proposed change -- approval to be expanded in R2/R3.

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

expand documentation here to clarify the intent as described above.

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

Put development of generalized 'Approval' concept in R2 projects list

Issue Number I - 276 **Issue Date** 9/18/97

Author Liebich **Owner** Wix **Status** Resolved

Schema IfcDocumentExt **Version** R1.5 - Pre-Final

Issue Description Class IfcRelGroupsCostSchedules -- The objectified relationship subtype does not define further information

Proposed Solution Delete and use IfcRelGroups instead; with the "GroupPurpose" set to "GroupsCostSchedules" - update documentation to make the usage clear

Resolution [RS] agreed

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

Remove IfcRelGroupsCostSchedules and document use of IfcRelGroups instead.

Issue Number I - 277 **Issue Date** 9/18/97

IFC Issues and Resolutions Database

Author	Liebich	***Owner***	Wix	***Status***	Resolved
Schema	IfcDocumentExt	***Version***	R1.5 - Pre-Final		

Issue Description Type IfcCostScheduleOrGroup -- was only needed for the IfcRelGroupsCostSchedules (see I-280).

Proposed Solution Delete it

Resolution [RS] I agree

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

delete it as proposed

Issue Number ***I - 278*** ***Issue Date*** 9/18/97

Author	Liebich	***Owner***	Wix	***Status***	Resolved
Schema	IfcDocumentExt	***Version***	R1.5 - Pre-Final		

Issue Description Class: IfcCostScheduleGroup -- This class is subtyped from IfcGroup, therefore: the grouping of IfcCostScheduleElement shall be handled by the IfcRelGroups objectified relationship -- each IfcGroup has a mandatory relationship to IfcRelGroups.

Proposed Solution Delete Element L[0:?] and use IfcRelGroups and an IfcGroup with the "GroupPurpose" set to "CostScheduleGroup". Clarify in the documentation.

Resolution [RS] agreed, but reinforces general issue regarding use of generalized relationships and the need to find a method for redefinition of semantic meaning in derived classes (especially where the classes are many levels below where the generalized relationships are defined).

Final resolution - to be done as proposed.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

change as proposed.

Issue Number ***I - 279*** ***Issue Date*** 9/18/97

Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Pre-Final		

Issue Description Class: IfcCovering, IfcFloor, IfcRoofSlab, IfcWall -- Layer Information
[IfcMaterialLayerSetUsage] -- this reference to materials should be made in type driven Psets.

Proposed Solution Remove from base BuildingElement definitions and establish a convention for references to Materials, MaterialsLayerSets, etc. in type driven PropertySets. See also I-261.

Resolution Compromise resolution: References to Materials from the classes in the statically defined model will remain, but will be modified to allow coordination with Psets. References to materials in Psets will reference an index in the Materials list associated on the static model class. Specific actions:
1) Some objects have multiple materials,but are not layered -- IfcMaterialsList will be added to the Materials part of the PropertyResource - a list of indexes into the IfcMaterialRegistry (see other issue),
2) IfcMaterialSelect will be modified to include IfcMaterialsList and IfcMaterialLayerSet, but NOT IfcMaterial (so that references from Psets can always be an index into a list of materials).
3) references to materials in a Pset will always be an integer index into the MaterialSelect (which of course references materials in the project MaterialRegistry).

Action # 1 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R1.5 - Final

complete items 1 & 2

(RS) 26-Nov-97: In Final-Candidate HTML reference docs - item 1 complete. Item 2 note complete as the MaterialSelect still includes IfcMaterial -- which means that references as indexes (from Psets) will not work. This must be a select of LISTs only.

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

complete item 3 as described in the final resolution

Issue Number ***I - 280*** ***Issue Date*** 9/18/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcSharedBldgElements ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcWall -- Error found - GenricType -- misspelled.

Proposed Solution Fix spelling

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

change as proposed

Issue Number ***I - 281*** ***Issue Date*** 9/18/97

Author See ***Owner*** Forester ***Status*** Resolved

Schema IfcSharedBldgServiceElem ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcDistributionElement, IfcElectricalAppliance, IfcFixture -- We had a LONG discussion on these classes in Seattle this week. One conclusion was that these classes are at odds with our stated intent to avoid 'categorizing' element in the class hierarchy (e.g. removal of the IfcLayeredElement and IfcProfiledElement that were in IFC R1.0). This group voiced support for this goal because (they said) we will find real world objects that defy any single classification. Example: a watercooler is BOTH an ElectricalAppliance and a (plumbing) Fixture.

Proposed Solution Continue looking for ways to enable the attachment of multiple extensions onto generic elements (like ElectricalAppliance 'stuff' and Fixture 'stuff'). This should also be consistent with the solution introduced to support multi-functionality in elements (element Groups by functionality). An element can belong to any number of such groups or have any number of the extensions proposed here (e.g. Type "ElectricalAppliance" and "Fixture", each of which results in relating one or more PropertySets.

Resolution [RS] Agreed. However, while in R1.5, extentions for such 'typing' are limited to PropertySets, they will most likely include relationships to objects which define behavior in future releases (e.g. behavior of an "ElectricalAppliance" or a "Fixture". We need to be sure that we have an alternative for 'adding in' such behavior which replaces the inheritence currently used.
[JW] Agreed -- this is related to the multi-functionality problem. Including a supertype which is related to form or function will most likely eventually be removed - as it was for AssembledElement, ManufacturedElement and LayeredElement -- in favor of typing -- multi-typing objects (provided in R1.5) is analogous to multiple functionality.
Final Resolution: leave as it is in R1.5, but study muti-typing along with multi-functionality for R2.C enhancements.

Action # 1 ***Assignee*** Forester ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

Study multi-typing along with multi-functioality (see other issues) in order to propose improvements which truly resolve this issue in R2.0/R3.0.

Action # 2 ***Assignee*** See ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

Study multi-typing along with multi-functioality (see other issues) in order to propose improvements which truly resolve this issue in R2.0/R3.0.

Action # 3 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

Study multi-typing along with multi-functioality (see other issues) in order to propose improvements which truly resolve this issue in R2.0/R3.0.

Action # 4 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

Add this to the list of projects for R2.0.

Issue Number	***I - 282***			***Issue Date***	9/18/97
Author	See	***Owner***	Forester	***Status***	Resolved
Schema	IfcSharedBldgServiceElem	***Version***	R1.5 - Pre-Final		

Issue Description Class: IfcMatter -- The BS guys in Seattle had a real problem with this class.

Proposed Solution Use the standard fuel sources instead.

[TL] I agree with recommendation to delete IfcMatter

Resolution Agreed, resolve using 'standard fuel sources' and MeasureWithUnits.

Action # 1 ***Assignee*** Forester ***Status*** Complete ***Resolved in Version*** R1.5 - Final

modify as proposed.

Issue Number	***I - 283***			***Issue Date***	9/18/97
Author	See	***Owner***	Forester	***Status***	Resolved
Schema	IfcSharedBldgServiceElem	***Version***	R1.5 - Pre-Final		

Issue Description Class: IfcEngineeringMaintenance -- 1) this class definition is DEFINITELY NOT a subtype of IfcControl (as we have defined it) because is does not control, dictate or determine anything in the project. 2) it defines extension information for equipment (note the access space attributes). It should be modeled as a type driven OccurencePropertySet for Equipment and other elements that require maintenance. 3) It should probably also include some information about a maintenance contract and periodic maintenance schedule.

Proposed Solution This is essentially information about the maintenance contacts and access space.

Alt 1) Remodel in the dynamic part of the model as an OccurencePropertySet. Example: see the solution for Door and Window type driven PropertySets which reference an OccurencePropertySet for ManufactureInfo.

Alt 2) See the alternative proposed by email xx-Sep-97 to create a new subtype of IfcObject called "IfcAspect". Maintenance information can be described as a view or "aspect" of an element. Having said that, the Properties associated for this view or aspect could/should use the standard mechanism for associating such 'type driven' propoerties --> back to the first solution alternative proposed.

Resolution The IfcEngineeringMaintenance class really defines maintenance related properties for a piece of equipment (note the access space properties). This will be replaced by an Occurrence Pset reference (from Pset_EquipmentType called Pset_ElementMaintenance (note "Element" rather than "Equipment" so that it can also be used for other subtypes of BuildingElement. This moves these properties from the static part of the model to the dynamic part of the model and can be referenced by any subtype of BuildingElement. Note that Pset_ElementMaintenance should be defined in the IfcProductExt schema so that it can be shared by any building element.

Action # 1 ***Assignee*** Forester ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Define Pset for inclusion in the IfcProductExtension schema as resolved.

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Insure reference from TypeDriven Psets for elements in Core, Arch and FM models which need maintenance to Pset_ElementMaintenance.

Action # 3 ***Assignee*** Forester ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Insure reference from HVAC Type driven Psets (Equipment, etc.) which need maintenance to Pset_ElementMaintenance.

Action # 4 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Insure that this Pset is included in the spreadsheet for the IfcProductExtension schema

Issue Number	**I - 284**			**Issue Date**	9/18/97
Author	See	**Owner**	Forester	**Status**	Rejected
Schema	IfcSharedBldgServiceElem	**Version**	R1.5 - Pre-Final		

Issue Description Class: IFcEquipment -- TagIdentifier [STRING] -- Name seems redundant. Also, we have a user descriptor on the OwnerIdentification object. So this may be redundant with that.

Proposed Solution 1) rename to EquipmentDescriptor, 2) remove if this the same as the "UserDescriptor" in the IfcOwnerIdentification object.

Resolution Rejected. The "Tag" is different than the UserDescriptor, which is also different than the User Descriptor in the OwnerIdentification.

Issue Number	**I - 285**			**Issue Date**	9/18/97
Author	See	**Owner**	Forester	**Status**	Resolved
Schema	IfcSharedBldgServiceElem	**Version**	R1.5 - Pre-Final		

Issue Description Class: IfcManufacturedElement -- 1) this class definition is DEFINITELY NOT a subtype of IfcControl (as we have defined it). 2) instead, it defines extension information for any manufactured element. It should be modeled as a type driven OccurencePropertySet for Equipment and other elements that are manufactured.

Proposed Solution [RS] note that attaching IfcManufacturedElement at this level of the model (attribute on IfcEquipment) is essentially a workaround for the lack of support for multiple inheritence. This is evident in our difficulty with where to 'place' this class in the model -- it CERTAINLY is NOT a control (it is info about the manufacture - a set of semantically related properties which are related to type).
Alt 1) Remodel in the dynamic part of the model as an OccurencePropertySet referenced from Type driven SharedPropertySets. Example: see the solution for Door and Window type driven PropertySets which reference an OccurencePropertySet for ManufactureInfo.

Alt 2) This is essentially information about the manufacturer. It is not really a control.   See the alternative proposed by email xx-Sep-97 to create a new subtype of IfcObject called "IfcAspect". Maintenance information can be described as a view or "aspect" of an element. Having said that, the Properties associated for this view or aspect could/should use the standard mechanism for associating such 'type driven' propoerties --> back to the first solution alternative proposed.

Resolution These properties should be attached through a nested Pset reference from the primary type driven Pset for any element that is manufactured (effectively enabling multiple inheritence). From the Pset_EquipmenType. Include a referenence to an OccurrencePropertySet called Pset_ManufactureInformation as is done with Door and Window types.
The IfcManufacturedElement class really defines information related to the manufacture of an element. This will be re-modeled as an Occurrence Pset referenced from Pset_EquipmentType (and the Shared Psets for other manufactured elements). This Pset will be named Pset_ManufactureInformation. This moves these properties from the static part of the model to the dynamic part of the model and can be referenced by any manufactured element (generally subtypes of IfcElement). Note: this Pset will be defined in the ProductExt schema so that it can be used by any subtype of IfcElement.

Action # 1 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Final

Define the Pset for inclusion in the IfcProductExtension schema as resolved.

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

Insure reference from TypeDriven Psets for manufactured elements in Core, Arch and FM models to Pset_ElementMaintenance.

Action # 3 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Final

Insure reference from HVAC Type driven Psets (Equipment, etc.) which need maintenance to Pset_ElementMaintenance.

Action # 4 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

Insure that this Pset is included in the Pset spreadsheet for the IfcProductExtension schema

Issue Number I - 286 **Issue Date** 9/18/97

Author See **Owner** See **Status** Resolved

Schema IfcArchitecture **Version** R1.5 - Pre-Final

Issue Description Class: IfcSpaceProgramme, IfcProgrammeGroup -- During the September domain meetings in Seattle, the group was adamant that we should not use the UK spelling for this class since the UK meaning for this word is different than this use implies (that is, programme means schedule).

Proposed Solution Rename to IfcSpaceProgram and IfcSpaceProgramGroup.

Resolution Agreed

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

change as proposed

Issue Number I - 287 **Issue Date** 9/18/97

Author Haiat **Owner** See **Status** Resolved

Schema IfcModelingAidExt **Version** R1.5 - Pre-Final

Issue Description [raised by J.C. Haiat - logged by R.See]
IfcDesignGrid and IfcGridLevel -- It was discussed in the September Implementers meeting that it might be better to reverse the relationships "HasAxes" and "HasLevels" in the Design Grid entities.

Proposed Solution Please reverse them.

Resolution Agreed

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

reverse the direction for these relationships

Issue Number I - 288 **Issue Date** 9/18/97

Author Haiat **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description [raised by J.C. Haiat, entered by R.See]
The current mechanism for defining walls is cumbersome in a number of cases.

Proposed Solution We need to be able to extrude Walls vertically and allow them to be 'trimmed' by floor and Ceiling planes.

In an attempt to generalize the solution, the following compromise is proposed by RS.
1) extrusion along the path will be retained (since it is 'most' appropriate in some cases) (see also 3)
2) a top and bottom clipping "curve" will be defined along with an extrusion direction vector (note that these curves are aligned with the path). The receiving application must extrude these curves along the matched vectors creating clipping surfaces. The Wall, Floor, Roofslab (or whatever uses this AttDrivenShape type (to be called "IfcAttDrivenTrimmedExtrudedSolid") will then be trimmed, eliminating the portions above the top clipping surface and below the bottom clipping surface.
3) A "Geometry Use" case will be added for Walls -- where the extrusion direction is perpendicular to the wall path (e.g. vertical).

Resolution Final Resolution: 1) Vertical extrusion is an extension that we will consider in R2.0. For R1.5, we will only support extrusion along the path. Note that the advantages cited for vertical extrusion are now supported through the abiliy to trim at the ends of the extrusion (as well as top and

bottom).
2) Trimming will be done by a ClippingHalfSpaces = LIST [0:?] IfcHalfSpaceSolid (an IfcHalfSpace is defined by a surface and a BOOLEAN indicating which side of the surface is solid).

Note: this is not limited to top and bottom. This will allow trimming at the ends of walls as well (to allow the mitered corners shown in the implementer's meeting on 9-Sep-97).

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Created two new subtypes: - IfcAttDrivenClippedExtrudedSolid, IfcAttDrivenClippedRevolvedSolid

each getting the attribute: ClippingHalfSpaces : LIST [1:?] OF IfcHalfSpaceSolid;

Also requires adding an additional Entity: IfcHalfSpaceSolid (BaseSurface : IfcSurface; AgreementFlag : BOOLEAN;)

Action #	2	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R1.5 - Addend

Add a new "Geometry Use" case for vertically extruded wall segments -- investigate the consequences of connecting such elements at the end points of their paths, rather than the endpoints of their extrusions.

Issue Number	***I - 289***			***Issue Date***	9/30/97
Author	See	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExt	***Version***	R1.5 - Pre-Final		

Issue Description IfcRelConnectsElements -- The agreed Dependency flags (one each for RelatingObject and RelatedObject) have been left out.

Proposed Solution Add two dependencey flag (BOOLEAN) attributes (RelatingObjectDependent, RelatedObjectDependent) as agreed in email thread from mid-September -- at the location where the "Dependency" flag was in the Pre-Beta.

Resolution Agreed -- note that these flags are on IfcRelationship.

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

change as proposed.

Issue Number	***I - 290***			***Issue Date***	10/15/97
Author	Shulga, Nikolay	***Owner***	Liebich	***Status***	Rejected
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description IfcBoundingBox should be renamed because BoundingBox has special meaning to me for spatial comparisons of min/max points.

Proposed Solution Rename to IfcBlockShapeRep

Resolution Not convinced that this must be done

Issue Number	***I - 291***			***Issue Date***	10/15/97
Author	Shulga, Nikolay	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Pre-Final		

Issue Description IfcAttributeDrivenProfileDef - Arbitrary profile def. Should not have a descriptor based on products (geometry should be separated from the Semantic model objects).
Also the 'geometry use' definitions need some improvements - see proposed edits in document sent to TL.

Proposed Solution Remove the 'Descriptor' attribute from the model and consider the edits proposed in the doc given to TL.

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Make changes as described.

Issue Number ***I - 292*** **Issue Date** 10/15/97

Author Shulga, Nikolay **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description AttDrivenExtrudedSolid / AttDrivenExtrudedSegment
AttDrivenRevolvedSolid / AttDrivenRevolvedSegment - it is a real problem to have only one placement for the AttDrivenExtrudedSolid -- should have a placement for each segment.

Proposed Solution add a placement for each segement and remove the one for the extruded solid container.

Resolution Agreed, NOTE a WHERE rule will have to be added which insures that the direction of extrusion axes (Z-axis) are equivalent.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Make changes as proposed.

Issue Number ***I - 293*** **Issue Date** 10/15/97

Author Shulga, Nikolay **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description IfcMorphedExtrudedSegment - the descriptions are confusing. Is the intent that the resulting surfaces must be planar?

Proposed Solution Add an informal proposition to clearly state this intention. See wording proposed in doc sent to TL.

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Make changes as proposed.

Issue Number ***I - 294*** **Issue Date** 10/15/97

Author Shulga, Nikolay **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Pre-Final

Issue Description IfcAttDrivenRevolvedSolid - "Radius" is meaningless here. What you really need is an axis. Additionally, the geometry is defined in the Segements, so the axis is needed there not in the aggregator.

Proposed Solution Remove the "Radius" attribute and reference a placement which defines the revolution axis. Each segment would then need a StartAngle and SweepAngle (second one is inherited from IfcRevolvedAreaSolid).

Resolution Partially agreed. NOTE: We want to insure that the Axis for each segment is the same. NS would like to insure the segments reference a common placement through a WHERE rule in the IfcAttDrivenRevolvedSolid.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Make changes as discussed in Munich meeting 15-Oct.

Issue Number ***I - 295*** **Issue Date** 10/15/97

Author Shulga, Nikolay ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Final

Issue Description In the IfcAttDrivenProfileDef - these shapes need a distinction between use as a curve (for swept shells - future) and use as areas (for swept solids - now).

Proposed Solution Add back the attribute "ProfileType" [enumeration for IfcProfileTypeEnum (Curve, Area)] on IfcAttDrivenProfileDef.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Make the changes as proposed.

Issue Number ***I - 296*** ***Issue Date*** 10/15/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Final

Issue Description What happened to the TaperedExtrusion segment we agreed in September -- was in the Pre-Beta and then disappeared in the Pre-Final

Proposed Solution "IfcAttDrivenTaperedExtrudedSegment" needs to be added back in as agreed in discussions after Pewsey.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Add it in as discussed and to be consistent with other extrusion 'segments'.

Issue Number ***I - 297*** ***Issue Date*** 9/30/97

Author Cole ***Owner*** Wix ***Status*** Resolved

Schema IfcProcessExt ***Version*** R1.5 - Pre-Final

Issue Description I see that IfcWorkGroup is no longer an IfcProcess. Instead it is an IfcGroup. I think this is a problem.

In costing and scheduling, we often want to break down tasks to a finer granularity than we will want to schedule. Therefore, we will want to schedule a grouping of tasks, rather than each elemental task.
This is no longer possible since an IfcWorkGroup does not have
"IfcProcess" capabilities. This will especially make it difficult to share task information between costing and scheduling.

Proposed Solution Make IfcWorkGroup a process.
[RS] Alt1) what if the relationship to IfcWorkTaskSchedule were reversed and made into a List (e.g. SchedulesWorkTasks ::LIST[1:N] IfcWorkTask). Drawback: This does not guarantee 1to1 correspondence between an IfcGroup used in a Cost Schedule and a group schedule by this LIST.
[RS] Alt 2) reverse the relationship and redirect to IfcWorkGroup - meaning that you can only schedule groups of one or more tasks. Note - this does not necessarily mean that the IfcWorkGroup must be a Process.
[RS] Alt 3) reverse relationship and redirect to a Select type "IfcWorkTaskOrGroupSelect"

Resolution Note: For any of the proposed solutions, since the Schedule object would be used for either Tasks or Groups of tasks, the schedule class should be renamed to "IfcWorkSchedule" -- where a group will have one or more tasks.
Final resolution - will use alternative 3 and change the name of the schedule to "IfcWorkSchedule".

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make changes as resolved.

Issue Number **I - 298** **Issue Date** 10/15/97

Author See **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description There are a VERY LARGE number of material references in the PropertySets which are now left to uncoordinated STRING values. This will lead to chaos in trying to coordinate material designations between applications.

Proposed Solution Create a project materials registry and allow indexed use of material definition entries (as with Project teams members and applications) from within PropertySets.

Resolution See also I-261 and I-304

Agreed.

1) Add IfcProjectMaterialsRegistry to the PropertyResource (referenced by IfcProject).
2) Add IfcMaterialList to the PropertiesResource (to be referenced by any object having none layered materials. Each entry in a MaterialLayerSet or a MaterialList will be an integer index into the Registry described in 1.
3) Update all material references in PropertySets to use references into the MaterialLayerSet or MaterialSet related to the base object (see reference on IfcBuildingElement). These references will be of type INTEGER (an index into the list of materials for this object).

Action # 1 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

1) Add IfcProjectMaterialsRegistry to the PropertyResource.

Action # 2 **Assignee** Wix **Status** Complete **Resolved in Version** R1.5 - Final

2) Add IfcMaterialList to the PropertiesResource (to be referenced by any object having none layered materials. Each entry in a MaterialLayerSet or a MaterialList will be an integer index into the Registry described in 1.
Done originally at IfcMaterialComposite -- then name changed to IfcMaterialList as result of I-315.

Action # 3 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

3) Update all material references in PropertySets to use references into the MaterialLayerSet or MaterialSet related to the base object (see reference on IfcBuildingElement). These references will be of type INTEGER (an index into the list of materials for this object).

Issue Number **I - 299** **Issue Date** 10/15/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description We haven't captured the "TypeDefName" and therefore could not even query the name of a TypeDef

Proposed Solution Add an attribute "TypeDefName" and a query in the default interface.

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

change as proposed

Issue Number **I - 300** **Issue Date** 10/15/97

Author See **Owner** Liebich **Status** Rejected

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description In developing the Type Definitions and associated PropertySets, it became apparent that the 'Parent' PropertySet should be listed with any other nested PropertySets. Otherwise, it is too difficult to tell if an attribute is already covered -- the relationship that is included in the TypeDef object makes the aggregate collection of properties too separate.

Proposed Solution Eliminate the relationship to parent in favor of including the parent as a referenced PropertySet (see examples for Walls, Doors, Windows sent to implementers on 19-Oct).

Resolution NOTE: this is already covered in the descriptions and resolutions to I-306. Referenced from there, but Rejected here as it is already covered.

Issue Number	**I - 301**			**Issue Date**	10/15/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyTypeResource	**Version**	R1.5 - Pre-Final		

Issue Description IfcPropertyDef - we need to be able to include LISTs and SETs of properties within a PropertySet.

This issue re-opened in telecon 26-Nov - using reference Psets for this is VERY HARD TO FOLLOW. Furthermore, we need to include variable length LISTs/SETs of same data types. How do we specify this in our spreadsheets where we have to pre-declare everything ??

Proposed Solution Add two subtypes to IfcPropertyDef - aggregators - one for SETs and one for LISTs

Resolution Aternative solution agreed. Instead, we will use the ability to nest Psets - explained in the documentation.
For example, a candiate List Property in a Pset will be defined as data type [[LIST [x:y] OF IfcProperty]]. The Model Guide documentation will explain to implementers that this should be implemented as a nested PropertySet -- either Shared or Occurrence depending on whether the data is shared by all occurrences or varies with each. NOTE: this solution will be used for each of LIST, SET, BAG, ENUM

This issue re-opened in telecon 26-Nov - using reference Psets for this is VERY HARD TO FOLLOW.

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

Update all Core model and Architecture related PropertySets which currently include LIST, SET, BAG or Enum

Action # 2 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Final

Update all Building Service related PropertySets which currently include LIST, SET, BAG or Enum

Action # 3 **Assignee** Yu **Status** Complete **Resolved in Version** R1.5 - Final

Update all FM related PropertySets which currently include LIST, SET, BAG or Enum

Action # 4 **Assignee** See **Status** Incomplete **Resolved in Version** R1.5 - Final

Include in the Model Guide -- the interpretation instructions to implementers as described in Resolution.

Issue Number	**I - 302**			**Issue Date**	10/15/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyTypeResource	**Version**	R1.5 - Pre-Final		

Issue Description We need a way to reference some types of geometry from within PropertySets. For example, the need to include a Polyloop profile as in the PropertySets for Doors and Windows.

Proposed Solution Alt 1) Create a subtype of IfcPropertyDef which wraps selected Geometry entities -- for example the PolyLoop used in the Door and Window PropertySets -- called "IfcProfileProperty".
Alt 2) subtype IfcGeometryRepresentationItem from IfcPropertyDef -- in which case we could include any type of geometry in a PropertySet
Alt 3) require that any use of geometry in PropertySets be defined within an IfcProductShape, which is already subtyped from IfcPropertyDef. This was considered in the examples listed, but considered to be too heavy for including a simple Polyloop.

Resolution Will add a ProjectUniqueID to the two types of ComponentShape (which is a select type) --> IfcShapeResult and IfcShapeBody -- in the ProductShape part of IfcPropertyType schema -- so that these can be referenced from PropertySets -- using the IfcObjectReference subtype of IfcProperty. This means that the "Frame" of a window can point directly to the geometry shape component used for representation.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

change as resolved

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Final

Update all PropertySets to use the new type added in action 1

Issue Number I - 303 **Issue Date** 10/15/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcSharedBldgElements **Version** R1.5 - Pre-Final

Issue Description The "Geometry Use" sections of the documentation for IfcDoor and IfcWindow have not been completed. It is IMPERATIVE that we include these sections in order to eliminate ambiguity regarding the 'standard way' to use geometry for the IfcProductShape of these and other entities.

Proposed Solution Develop these sections of documentation before the Final Specifications are published.

Resolution Agreed.

(RS) 26-Nov-97: Still needed for Door, Window, BuildingStorey, Building, Site. Should probably should improve for Beam (horzontal extrusion - given definition).

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Final

Develop additional documentation as described.

(RS) 26-Nov-97: Not done in Final-Candidate HTML reference docs.

Issue Number I - 304 **Issue Date** 10/15/97

Author See **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description We MUST, MUST, MUST define a registry of materials for the project (as with the IfcProjectAppRegistry and IfcTeamRegistry). The number of material references that are currently of type STRING in the PropertySets demands it. NOTE: it is not necessary to reference them using integers as with the examples. It IS necessary that the list of Materials is non-redundant and that any material can be referenced from a PropertySet.

Proposed Solution Insure a SIMPLE method to develop a registry of unique material designations that can be referenced from PropertySets

Resolution NOTE: this is essentially already covered in the resolution to I-298. See resolution there.

Issue Number I - 305 **Issue Date** 10/15/97

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Pre-Final

Issue Description We have not incorporated an enum for connections between path based elements (extruded) into the IfcRelConnectsElements class. However instances of this class will be used to connect non path based elements also (e.g. connecting two pieces of Equipment (equipment is not path based). The enum inappropriate for such connections.

Proposed Solution Subtype IfcRelConnectsPathElements from IfcRelConnectsElements, which will include the enum. The "LayeredElementConnectionParameters::IfcLayeredElementConnectionParameters" (see resolution to I-264) should also be moved down to this subtype since LayeredElements will always be path based.

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Create the subtype and move the two attributes down

Issue Number **I - 306** **Issue Date** 10/15/97

Author See **Owner** See **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description We have two dilemas to resolve in the definition of type driven PropertySets and relationships between these (using the nesting references and the "Parent" references).
1) excluding references to Parent PropertySets (Pset) from a Pset definition makes it too obscure. It is VERY difficult to 'see' when some obvious properties are missing from a Pset -- that they are included in a Parent Pset UNLESS the reference to the Parent Pset is included as a nested reference.
2) Nested references to type driven OccurrencePropertySets from SharedPropertySets will have to be of type STRING, since there will be a different one for each occurrence of the type.

Proposed Solution 1) since a nested reference (within a Pset) is funtionally equivalent to the Parent reference (defined overtly in the TypeDef), we should eliminate the second in favor of the first to enhance common understanding of the models.
2) change all nested references to type driven OccurrencePropertySets from SharedPropertySets to IfcString. This STRING will contain the name of the Pset, which is in the list of Occurrence Psets attached to the "typed" object. Applications will need to search this OccurrencePropertySet list (at the IfcProduct level) to find the named Pset.
NOTES: 1) this underscores the importance of including the Pset name in the Pset definition. 2) We cannot use IfcOccurrencePropertySet or IfcObjectReference here because it is a "1 to N" relationship between the referencing Pset and the occurrence values for multiple instances.

Resolution see also I-300
1) Agreed - reference from TypeDef changed to "GenericTypeRef" (not parent) as this was included so that TypeDefs for Specific types could reference their GenericType.
2) Agreed -- documentation should make this clear with diagrams. Note that an application interpreting an object with such a Pset (containing a reference to an occurrence Pset) will have to search the Occurrence Pset list (at the IfcObject level) of the 'typed' object -- to find the one for which the "Descriptor" (should be "PsetName") matches the STRING value in the reference.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

Change the Parent Pset reference in the TypeDef class to an optional reference to the Generic Type definition associated with this type -- NOTE: only used in the case of Specific Type Defs.

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Addend

Change all references to Occurrence Psets (in Psets) to be of type IfcString.

Action # 3 **Assignee** See **Status** Incomplete **Resolved in Version** R2.0 - Final

Enhance Model Guide documentation regarding different types of nested references from with Psets -- using diagrams and clarifying differences between references to Shared Psets and references to Occurrence Psets.

Action # 4 **Assignee** Adachi **Status** Incomplete **Resolved in Version** R2.0 - Final

Enhance Model Guide documentation regarding different types of nested references from with Psets -- using diagrams and clarifying differences between references to Shared Psets and references to Occurrence Psets.

Issue Number **I - 307** **Issue Date** 10/15/97

Author See **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description Class: IfcMaterial -- "SystemClassification::IfcMaterialClassification"
1) this attribute name is misleading
2) it is probably better to allow ofr multiple classifications here as in classification of objects. Material classifications will be different for different regions of the world.

Proposed Solution 1) Change name of attribute to "MaterialClassification"
2) Can we simply add "Classification" instead? Only if we modify the IfcClassification class to allow for multipart "Notation"s (currently only a single string) -- in this case, we need to use a "MainCategory"

Resolution 1) Agreed - change it.
2a) modify Notation to breakdown into 3 fields (as in the ISO simple classification scheme). Field 2 and 3 should be optional
2b) change the attribute on IfcMaterial (and its data type) to "MaterialClassification::IfcMaterialClassificationList"
(JW-980510) Move the classification relation to from IfcMaterialList to fcMaterial. This enables the IfcMaterialList to be deleted and makes material classification work in the same way as other classification forms. Subtyping from IfcProperty should also be extended to all of the main entities in the Material model.

Action # 1 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Final

modify the Material and Classification sheets of this schema as resolved.

Issue Number **I - 308** **Issue Date** 10/20/97

Author See **Owner** See **Status** Rejected

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description We have lost the ability to "TYPE" properties -- examples where this was done in R1.0 = IfcActor (now a select type --> IfcPerson, IfcOrganization).
Other examples where this is desirable = IfcCost, IfcMaterial

Proposed Solution Either associate TypeDef and OccurrencePsets at these properties specifically, or with IfcProperty (their supertype).

Resolution This would require enabling TypeDefinitions for IfcProperty (and subtypes) -- which seems a bit premature for R1.5. Therefore, we will defer to R2.0.

Issue Number **I - 309** **Issue Date** 10/15/97

Author See **Owner** See **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Pre-Final

Issue Description We have several examples where we need to include enumerations as the data type for properties in Psets.

Proposed Solution Alt 1) Comma delimited values, stored in a STRING, prefaced with a selection for this occurrence (of the Pset). Agreed values to be published in the IFC Specifications will allow conformance testing.
Example: (2, value1, value2, value3)
Alt 2) define the range of values in a Pset and then refernce a value from the subject Pset. Note: this means that the subject Pset will need 2 values for each enum, one referencing the Pset_XxxEnum and the other with the selected value index (index into the list of values in the Pset_XxxEnum.

Resolution Will go for alternative 2.

Note: this solution superseeded by agreement between RS and JF. Enums will be documented in the same way as LIST, SET and BAG in Psets (see resolution to I-301) --> they will be defined with the list of valid values in the data type declaration. Implementers will be instructed in the Model Guide documentation to implement each of these types as nested Psets.

Action # 1 ***Assignee*** See ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

Define Pset_XxxxEnum for each of the enums currently defined in Core and Arch Psets.

For each, define the range of values in a Pset and then refernce a value from the subject Pset. Note: this means that the subject Pset will need 2 values for each enum, one referencing the Pset_XxxEnum and the other with the selected value index (index into the list of values in the Pset_XxxEnum.

Action # 2 ***Assignee*** Forester ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

Define Pset_XxxxEnum for each of the enums currently defined in HVAC Psets.

For each, define the range of values in a Pset and then refernce a value from the subject Pset. Note: this means that the subject Pset will need 2 values for each enum, one referencing the Pset_XxxEnum and the other with the selected value index (index into the list of values in the Pset_XxxEnum.

Action # 3 ***Assignee*** Yu ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

Define Pset_XxxxEnum for each of the enums currently defined in Core and Arch Psets.

For each, define the range of values in a Pset and then refernce a value from the subject Pset. Note: this means that the subject Pset will need 2 values for each enum, one referencing the Pset_XxxEnum and the other with the selected value index (index into the list of values in the Pset_XxxEnum.

Issue Number I - 310 ***Issue Date*** 10/28/97

Author Child ***Owner*** See ***Status*** Resolved

Schema All Schemata ***Version*** R1.5 - Pre-Final

Issue Description Subtyping of Objectified relationship in order to further specialize the RelatingObject/RelatedObjects violates the "Liskov substitution" tenant in object oriented software design --> that is: the interface contract set by the supertype is broken by further specialization in the subtypes.
See email discussion thread beginning 28-Oct-97 entitled "Modelling of relationships in IFCs"

Proposed Solution Eliminate this subtyping and limit the object types in the desired circumstances through the use of WHERE rules.

Resolution Eliminating this from the model now would take months. We must find a workaround and look at evolving the model to eliminate this (apparent) design shortcoming. 1) TL will contact Martin at Nemetschek to find out how he resolved this problem in his programming and will look at adding to our documentation -- implementer advice about how to deal with it. T.Child should be review group lead for proposed implementer advice (and invited to contribute to it). 2) RS to add to list of R2.0 projects, search for longer term solution.

Resolution for R2.0 --> remove the relationships RelatingObject and Related Object(s) in the abstract supertypes --> IfcRelationship1to1 and IfcRelationship1toN. This will eliminate the redeclaration of these relationships in the subtype. NOTE: will add to the modeling guidelines that subtyped Objectified Relationships must not redeclare the RelatingObject and Related Object(s).

Done in R2.

Action # 1 ***Assignee*** Liebich ***Status*** Eliminated ***Resolved in Version*** R1.5 - Final

Work out implementer advice (with help from Martin and T.Child) .

Action # 2 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Alpha

Add to list of R2.0 projects --> research and development of longer term solution (R2.0 and beyond)

Action # 3 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Alpha

Make the changes to the Kernel schema as described above in the resolution for R2.0.

Issue Number ***I - 311*** ***Issue Date*** 11/28/97

Author Shulga, Nikolay ***Owner*** See ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Pre-Final

Issue Description Class: IfcAxis2Placement3D - defaulting only one of axis or ref_direction can lead to invalid transform matricies.

Proposed Solution In IfcAxis2Placement3D: either both axis and ref_direction should be defaulted, or none. A rule should be added to that effect. That should replace the 'adjusted as needed' phrase.

Resolution Agreed. Will add a where rule which requires both values or neither value.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Add 'where rule' (WR) and note that this is different than STEP P42.

Issue Number ***I - 312*** ***Issue Date*** 10/29/97

Author Muigg ***Owner*** Liebich ***Status*** Resolved

Schema IfcKernel ***Version*** R1.5 - Pre-Final

Issue Description LocalPlacement is mandatory for all Products, also for Site. The PlacementRelTo attribute is also mandatory at IfcLocalPlacement. Therefore a Site MUST be placed relative to another Product or ModelingAid.

Proposed Solution Make PlacementRelTo at IfcLocalPlacement optional. Indication: if set, placement is relative, if not set, placement is absolute (WCS).

[RS email - 1-Nov] This recommendation sounds good initially, but there is a catch = we don't have a WCS established for the project. This is because the Project has no placement. It also points out another 'gotcha' in our model that would have come up at some point = a project may have multiple Sites, each of which has a different reference geographic reference point. To remedy this and enable your recommended solution I suggest the following changes in the R1.5 Final Models (NOT FOR ACS):

IfcProject:
1) Add the attributes IfcReferenceLongitude, IfcReferenceLatitude and IfcReferenceElevation (currently defined for IfcSite)
2) Add the attribute ProjectWCS of type IfcAxis2Placement3D. This placement will be relative to the geographic reference point established by the attributes above and will establish the WCS for the project.

IfcObjectsWithPlacement
3) Add IfcProject to this select type (so that objects can be placed relative to the project WCS)

IfcSite
4) Remove the attributes IfcReferenceLongitude, IfcReferenceLatitude and IfcReferenceElevation (now moved to the Project)
5) Add the attribute LocalPlacement of type IfcLocalPlacement (by convention, Sites will be placed relative to the Project WCS).

I think that this will cover it and also believe that this is a better solution all around. Now placement of sites is just as with any other product and the Project object is the only special case. Additionally, Modeling Aids (like the DesignGrid) can be placed relative to the Project WCS.

This brings up a very good point! This means that the RelativeTo attribute of LocalPlacement could remain mandatory. This is because the only special case (IfcProject) does not use LocalPlacement, but uses the IfcAxis2Placement3D directly. Two sides to this: a) making the attribute optional (and taking the convention that this means placement relative to the project

WCS) is simpler, b) it is also slightly more ambiguous.

Resolution 1)WCS must be established on the IfcProject level. Sites must therefore be placed relative to the Project. We consider latitude/longitude/elevation - Geographic reference point to be inadequate for GIS placement. Therefore we will leave the Geographic reference point on the site as approximate and not reconciled to the exact placement -- for use by applications related to sun angle,climate, etc. We will wait to add GIS palcement on IfcProject in R2.0. 2) IfcProject will be added to IfcObjectsWithPlacementSelect, 3) placement for site will use the normal LocalPlacement w/ WR that will force placement relative to Project. 4) PlacementRelTo on LocalPlacement will be made optional -- with the convention that, where not included, placement is in the WCS (as established by the IfcProject LCS).

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

make changes in IfcKernel (items 2,3,4)

Action # 2 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Alpha

Add to R2.0 list of projects -- addition of GIS placement on IfcProject

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Issue Number ***I - 313*** **Issue Date** 11/25/97

Author See **Owner** See **Status** Resolved

Schema IfcKernel **Version** R1.5 - Pre-Final

Issue Description There is no inverse relationship from IfcProject to IfcRelContains. This means that the only way to find out all the elements 'contained' in a project (say Building), is to iterate over the IfcRelContains rels and find the ones which reference the Building as the RelatingObject. There is no way to query a project for all the objects it contains.

This is not a problem for IfcBuilding, IFcBuildingStorey or IfcSpace as the inverse relationship has been declared for each of these.

Proposed Solution The inverse relationships we had in the PreBeta(Contains and ReferencedBy) should be replaced -- inverse for the IfcRelContains relationships rather than the relationships directly to other objects (as before).

Resolution Agreed.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Final

Make the changes as agreed

Issue Number ***I - 314*** **Issue Date** 11/25/97

Author See **Owner** See **Status** Resolved

Schema IfcMeasureResource **Version** R1.5 - Pre-Final

Issue Description As discussed in Frankfurt meetings -- we NEED a measure value that we can use in Psets for INTEGER. Currently there is no way to do an INTEGER in Psets (only REAL and NUMBER).

Proposed Solution Add a Measure Value called IfcIntegerCountMeasure of type INTEGER.

Resolution Agreed.

Superseded by more comprehensive solution in I-316.

Action # 1 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R1.5 - Final

Add entity as defined.

Issue Number ***I - 315*** **Issue Date** 11/25/97

Author See **Owner** See **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Pre-Final

Issue Description IfcCompositeMaterial -- this is a BAD name for the intended purpose this class (see description in I-261). This is supposed to be a simple LIST of materials = IfcMaterialList. The work "Composite" in the US has a specific meaning -- as in fused or structurally combined materials -- as are used in high end manufacturing. This is NOT what we mean when we want to include a list of materials for a Door or Window (where one material is the frame, another is the glazing, another is the panel, etc.).

Proposed Solution Change the name to IfcMaterialList

Resolution Agreed.

Action #	1	***Assignee***	Wix	***Status***	Complete	***Resolved in Version***	R1.5 - Final

change as proposed

Issue Number	***I - 316***			***Issue Date***	9/18/97
Author	All STF	***Owner***	See	***Status***	Resolved
Schema	IfcMeasureResource	***Version***	R1.5 - Pre-Final		

Issue Description Currently, the following data types are EXCEEDINGLY difficult to represent in PropertySets: STRING, INTEGER, BOOLEAN. Additionaly, it would be good if we had a simple REAL that we could use in Psets.

Note: There is currently no data types in the Measure schema (all simple properties are of type IfcMeasureValue) for STRING, INTEGER, BOOLEAN.

Proposed Solution Add base data types for these in either the Measure or Utility Resources

Resolution Agreed - see also I-314 for specific issue regarding INTEGER.

Add these 4 data types (IfcString, IfcInteger, IfcReal, IfcBoolean) to the IfcMeasureResource (must be subtyped from IfcMeasureValue" since this is the data type for IfcSimpleProperties to be included in Psets).

Action #	1	***Assignee***	Liebich	***Status***	Complete	***Resolved in Version***	R1.5 - Final

Make additions as described.

Issue Number	***I - 317***			***Issue Date***	11/26/97
Author	See	***Owner***	See	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Final Candi		

Issue Description Component lists for Doors and Windows are not correct. Appear to be based on the ACS demos subset rather than the R1.5 definitions.

Proposed Solution For Doors: Lining, Frames, Panels, Trim, Hardware [[Component breakdown:
Door < Lining + (Panels < Panels + Openings + OpeningFiller) + Trim + Hardware]]

For Windows: Lining, Panels, Frames, Glazing, Trim, Hardware [[note: a panel in this case can be an operable panel - which includes a frame and glazing. Thus the components breakdown will be:
Window < Lining + (Panels < Frames + Glazing + hardware) +Trim]]

Note: according to BSI 6100 - the LINING lines the opening (e.g. also called Jamb, Sill, Head), the FRAME is the friame immediatey around the door or window. Previously I had been calling these the "Frame" and "Inner Frame". Also, it should be noted that the work SASH means a sliding frame - a special type of frame. I have not made the distinction between fixed or operable

Resolution Change them for the Final.

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R1.5 - Final

Make changes as proposed.

Issue Number ***I - 318*** ***Issue Date*** 11/26/97

Author See ***Owner*** See ***Status*** Resolved

Schema IfcProductExt ***Version*** R1.5 - Final Candi

Issue Description IfcElement.ConnectedWith / IfcElement.ConnectedBy - the difference between these two is NOT CLEAR in the documentation - I am assuming that ConnectedWith is on the RelatingObject side and ConnectedBy is on the RelatedObject side, but it is NOT CLEAR from the documentation - NOR is it clear WHY this distinction is important (e.g. whay two sets of connections?).

Proposed Solution Rename to "ConnectedElements" and "ConnectionToElements" (clearer names) and add to documentation - RelatingObject/RelatedObject. The intent is to more clearly indicate the meaning behind the two lists. Since the RelatingObject side of an objectified relationship is intended to be the "driving" side of the relationship (if one side is driving), then this name is more 'possessive'.

Resolution Agreed.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Final

make the changes as proposed

Issue Number ***I - 319*** ***Issue Date*** 11/16/97

Author See ***Owner*** Liebich ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R1.5 - Final Candi

Issue Description Hard to believe, but IfcTable still has some problems.

1) NoOfCellsInRow should be an attribute of IfcTableRow, NOT IfcTable. Because it is not used in the Table, but IS used in theTableRow (to set the length of the list of values). NOTE: this is currently INCORRECTLY referenced as "NoOfColumns" in the TableRow class.

2) NoOfHeadings and NoOfDataRows are inconsistently named.

Proposed Solution 1) move the attribute NoOfCellsInRow to the IfcTableRow class.

2) rename NoOfHeadings to NoOfHeadingRows

Resolution 1) Disagreed. Leaving NoOfCellsInRow as a derived value on the IfcTable provides an easy attribute that any app can check. NOTE: the documentation should be enhanced to clarify that the number of cells is DETERMINED by the number of cells in the first row and a WHERE rule insures that all other rows include the same number of cells. Attribute will be left on IfcTable.

2) No, want to avoid changes to the Schema for R1.5 addendum. This will be fixed in improved "Tables" design in R2.0.

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Addend

Enhance the documentation for IfcTable and IfcTableRow should be enhanced to clarify that the number of cells in all rows is DETERMINED by the number of cells in the first row and a WHERE rule on IfcTable insures that all other rows include the same number of cells

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Issue Number ***I - 320*** ***Issue Date*** 11/26/97

Author See ***Owner*** Wix ***Status*** Resolved

Schema IfcDocumentExt ***Version*** R1.5 - Final Candi

Issue Description Documentation for IfcCostScheduleGroup discusses the grouping of IfcCostScheduleElements -- yet this class does not exist in the schema. IfcRelCostScheduleElements is subtyped from IfcRelationship1toN, and points to a LIST of IfcProduct objects (as RelatedObjects), but they are not called IfcCostScheduleElements. It appears that the intent was --> IfcCostScheduleGroup groups IfcRelCostScheduleElements (but this cannot be done - IfcRelGroups groups IfcObjects (not IfcRelationships))

Further, IfcRelCostScheduleElement related IfcProduct objects directly to the IfcCostSchedule - seemingly bypassing the IfcCostScheduleGroup.

Proposed Solution 1) replace IfcRelCostScheduleElement with a subtype of IfcGroup called IfcCostElement (keeping all of the attributes currently defined - except the relationship to CostSchedule).
2) Document utilization of IfcRelGroups to group multiple objects into a single CostElement (note that this will be group of IfcObject rather than IfcProduct since we should allow costing of Process and Proxy)
3) Document utilization of IfcRelGroups to group multiple IfcCostScheduleElements into a single CostScheduleGroup (as described in I-278).
4) Create a select type called IfcCostScheduleOrGroupSelect -- select for IfcCostScheduleGroup and IfcCostSchedule.
5) ReCreate (from PreFinal) objectified relationship called IfcRelGroupsCostSchedules (subtyped from IfcRelGroups) for which the RelatingObject is IfcCostSchedule and the LIST [1:?] of RelatedObjects are IfcCostScheduleOrGroupSelect

Resolution 1) agreed to create new class called IfcCostElement, but it is subtyped from IfcControl and is related to multiple IfcProducts through the IfcRelCostScheduleElements. This solves the "N to N" relationship problem in allowing a IfcProduct to be included in multiple IfcCostElements.
2) Disagreed - this is handled as described in (1) above.
3) This is done in the EXPRESS-G and in the documentation.
4) Agree to create the select type, but it will be referenced by the IfcCostSchedule only -- as the IfcRelGroups relationship will already allow us to "group" collections of IfcCostElementGroups and IfcCostElements.
5) This has been done as a simple relationship called "HasCostElementsOrGroups". We don't currently allow CostElements or CostElementGroups to be "part of" multiple Cost Schedules. This would appear to be a relationship that was missing from R1.5 FINAL and should be added for the Addendum.

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

Complete item (1) above

Action # 2 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

handle item (3) as described above.

Action # 3 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

complete item (4) as described above

Action # 5 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R1.5 - Final

complete item (5) as described above -- NOTE: the relationship from IfcCostSchedule ("HasCostElementsOrGroups") must be redirected to the select type "IfcCostElementOrGroupSelect" -- Add the missing relationship

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Issue Number ***I - 321*** ***Issue Date*** 11/26/97

Author See ***Owner*** Wix ***Status*** Deferred to R3.0

Schema IfcPropertyResource ***Version*** R1.5 - Final Candi

Issue Description 1) IfcClassificationNotation.NotationStrings -- these are more specifically called facets.
2) IfcClassificationNotation.Separator for each facet is too heavy
3) LIST [1:?] strings in a notation seems too heavy

Proposed Solution 1) "NotationStrings" --> should really be called "NotationFacets"
2) How about a single "separator" up on the ClassificationNotation object?
3) Probably want to limit the number of facets to 3 or 4. More than this becomes ridiculous (change using a WHERE rule)

(JW-980510) The proposed "C-Uni" model shows a proposed revised model of classification (using the Uniclass classification system as an example). This proposes a number of modifications that would enable us to use current classification systems directly within the IFC model. It is not yet fully complete. However, I believe it moves us towards a situation that would create a good set of common ground with classification specialists whilst providing additional flexibility over what we already have.

A key aspect of the revised model is that it introduces the notion of registered classification systems (IfcRegisteredClassificationEnum). A registered classification system is one that has created a hierarchical model that can be directly interpreted by an application to give the relevant classification information directly to a model that can be exported via IFC. Allowing that not all classification systems in existence will register (especially local or company systems) an IfcUnregisteredClassification is allowed that has a name and using which, a user would have to enter information directly. Selectionof registered or unregistered classification would be via an IfcClassificationSourceSelect select type.

The classification would have its edition and description as before. Description is an optional attribute. Edition is mandatory.

An IfcClassification can have a list of IfcClassicationFacet where each facet has attributes of table and notation (giving the value). The list of facets gives the potential for using multiple facets of a classification. We should not restrict the number of facets even though I agree that 3 or 4 is a sensible maximum; Uniclass has 11 tables and it is feasible (if impracticable) to use every one.

This gets rid of the NotationString class that was in the 1.5 model.

The key to populating the classification is in the provision of the classification hierarchy and we should encourage classification societies to do this. We have a number of such societies as members (NBS, Swedish organisation whose name I cannot pronounce, CSI etc.). Using these hierarchical models, it should be possible to populate the relevant attributes of the classification model. It will need some rules to achieve but I cannot see that it cannot be done. It would also stretch the capacity of the model significantly.

Note that items dealing with IfcClassificationList remain unchanged.

If this idea gains acceptance within the STF, I can float it further amongst classification specialists to see how they respond.

Resolution For R1.5 we will do 1 and 2.

For R3.0 we will discuss the proposal by Jeff.

Action # 1 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

change recommendations 1 and 2 for R1.5+1

Issue Number ***I - 322*** ***Issue Date*** 12/9/97

Author NA Arch Group ***Owner*** Drogemuller ***Status*** Deferred to R2.0

Schema IfcMaterialResource ***Version*** R1.5 - Final

Issue Description IfcMaterial -- Need to include a finish.

Proposed Solution Add an attribute "Finish : STRING"

Resolution (JW-980510) I would suggest that Finish is a separate class that should be applied to an element, is separate from the material, and is selected from a range of possible finishes. It could be an applied finish such as paint, and would have its own attributes such as emissivity, colour, reflectance – all of which are independent of material.

However, for R2, I have created the class IfcMaterialFinish with an optional HasFinish relation and an inverse AppliedTo relation that is a set since the same finish could be applied to many elements/materials. In this way, we do not have to create separate instances of IfcMaterial for every different type of Finish that might be applied which would otherwise be the case.

The Finish would also determine the surface spread of flame characteristics and so we should invite the AR2 team to contribute the extension requirements to this class for this purpose to provide more flexibility in the model and to enable its use within a domain process already established.

For the present, I have identified Color and FinishType as enumerations without attempting to fill out the lists. Architects, being creative beings, would probably want to use something like a Pantone list. There are probably other definitive lists around and so this might need to turn into a ColourRangeSelect in the longer term.

Action # 1 **Assignee** Wix **Status** Eliminated **Resolved in Version** R1.5 - Final

develop as described

Issue Number **I - 323** **Issue Date** 12/9/97

Author NA PM Group **Owner** Wix **Status** Resolved

Schema IfcProcessExt **Version** R1.5 - Final

Issue Description We REALLY need to be able to use nested Processes (e.g. IfcWorkTask). That is, a WorkTask may (or may not) contain other WorkTasks, which may contain . . . The primary driver of this requirement is that different applications (e.g. cost estimating vs scheduling) will refer to different levels of these 'nesting trees' (e.g. estimating may 'cost' at the 3rd level of detail while scheduling may only 'schedule' at the 2nd level. This means that each of these applications must be able to 'manipulate' any level of these 'nesting trees' as a process object. Waiting until R2.0 (complete in Fall 1998) would cause hardship for Timberline and other cost estimating developers who are planning their development now. We would like to see a resolution completed in the R1.5 addendum.

Please see email thread between Tom Froese, Mike Cole, Kevin Yu and Richard See in early December.

Proposed Solution Enable nesting (recursive self references) in IfcWorkItem (NOTE: proposed renaming of IfcWorkTask). Note: this will eliminate IfcWorkGroup as the general purpose grouping mechanism does not work in this case.

Resolution Agreed in principle. Propose to solve this using general purpose solution allowing nesting of several subtypes of IfcObject -- see I-338 for solution description.

1) rename of IfcWorkTask to IfcWorkItem agreed (since the name "task" is relative to which level of a process hierarchy at which you look).

2) eliminate IfcWorkGroup as it will no longer be needed.

Action # 1 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Addend

Rename IfcWork to IfcWorkTask

Action # 2 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Addend

Eliminate IfcWorkGroup as it will no longer be needed (replaced by nesting) and insure adaptation of Process schema to take advantage of the general purpose solution provided by I-338

Action # 3 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Addend

Insure that the general purpose solution provided by I-338 will satisfy the requirements of the issue listed above.

Action # 4 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Addend

Enhance documentation for IfcProcess (and/or IfcWorkTask) to insure that the reader understands how to make use of the general purpose nesting mechanism (I-338).

Issue Number **I - 324** **Issue Date** 12/9/97

Author NA PM Group **Owner** Wix **Status** Resolved

Schema IfcKernel **Version** R1.5 - Final

Issue Description In Release 1.0 we were able to "Type" IfcResource as one of "Labor", "Equipment" or "Material". This has been removed from R1.5 and should not have been. We need it back. See email thread from early December 1997.

Proposed Solution Add the GenericType and other reasonable attributes (that were included in IFC R1.0) back onto IfcResource.

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

enhance IfcResource as described in the proposed solution above.

Issue Number	**I - 325**	**Issue Date**	12/9/97

Author	NA PM Group	**Owner**	Wix	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Final		

Issue Description We (estimators and schedulers) need to be able to use nested Resources (IfcResource). For example, it is quite common in an estimate or schedule to list a work crew or subcontractor as a resource for complex tasks or sub-processes. Such a 'crew' will be bid at a set rate per hour or per day - which is what should be included in an estimate - at the 'crew' level.

Proposed Solution Enable nesting (recursive self referencing) in IfcResource.

Resolution Agreed in principle. Propose to solve this using general purpose solution allowing nesting of several subtypes of IfcObject -- see I-338 for solution description.

Action #	1	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

Insure that the general purpose solution provided by I-338 will satisfy the requirements of the issue listed above.

Action #	2	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

Enhance documentation for IfcResource to insure that the reader understands how to make use of the general purpose nesting mechanism (I-338).

Issue Number	**I - 326**	**Issue Date**	12/9/97

Author	NA PM Group	**Owner**	Wix	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Final		

Issue Description We (estimators and schedulers) need to be able to use nested cost elements (IfcCostElement). That is, a cost element may contain other cost elements . . . The reason is that estimates are prepared at various levels of detail. A cost element in one estimate may be a hierarchy (or nested) set of cost elements in another estimate. It is not practical to maintain different estimate hierarchies for these. We need to be able to 'use' different levels of detail, knowing that each contains (and sums) all of the lower level contained CostElements.

Proposed Solution Enable nesting (recursive self referencing) in IfcCostElement.

Resolution Agreed in principle. Propose to solve this using general purpose solution allowing nesting of several subtypes of IfcObject -- see I-338 for solution description.

1) eliminate IfcWorkGroup as it will no longer be needed.

Action #	1	**Assignee**	Wix	**Status**	Complete	**Resolved in Version**	R1.5 - Addend

Eliminate IfcWorkGroup and insure that the general purpose solution provided by I-338 will satisfy the requirements described for this issue.

Action #	2	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

Insure that the general purpose solution provided by I-338 will satisfy the requirements of the issue listed above.

Action #	3	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

Enhance documentation for IfcCostElement to insure that the reader understands how to make use of the general purpose nesting mechanism (I-338).

Issue Number	**I - 327**			**Issue Date**	12/12/97
Author	See	**Owner**	Wix	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Final		

Issue Description Why are IfcMaterialLayer and IfcMaterialLayerSetUsage NOT subtyped from IfcProperty when all of the other classes related to materials are?? (e.g. IfcMaterial, IfcMaterialLayerSet, IfcMaterialList)

Proposed Solution Subtype from IfcProperty (?)

Resolution Agreed

Action # 1 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Addend

Change for R1.5 Addendum

Issue Number	**I - 328**			**Issue Date**	12/12/97
Author	See	**Owner**	Liebich	**Status**	Resolved
Schema	IfcPropertyResource	**Version**	R1.5 - Final		

Issue Description IfcProjectMaterialRegistry should be defined at at the Kernel level, as with the other registrys related to the Project. This will allow an inverse relationship from this registry to the Project -- as with the other registrys

Proposed Solution 1) Move IfcProjectMaterialRegistry into the Kernel so that it can be referenced by Project
2) add an inverse relationship from IfcProjectMaterialRegistry to IfcProject as with the other registries

Resolution 1) Don't need to move it to the Kernel. IfcProject can reference it within the IfcPropertyResource in the same way as it references the other two registries in the IfcUtilitiesResource.

2) Don't need the inverse relationship for R1.5 -- consider a general purpose Project Registry for R2.0 - defined at the Kernel level.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

Add a reference from IfcProject (in IfcKernel) -- called ProjectMaterialRegistry : IfcMaterialRegistry (same as the references to the other two registries on IfcProject).

Issue Number	**I - 329**			**Issue Date**	12/10/97
Author	Forester	**Owner**	See	**Status**	Resolved
Schema	IfcSharedBldgElements	**Version**	R1.5 - Final		

Issue Description There is currently no way to tell if an occurrence of IfcWall is "interior" or "exterior". This is critical for thermal performance simulation and thermal load calculation applications.

Proposed Solution Add an "Exterior" property to the Pset_WallType (common to all Walls) which is type IfcBoolean.

Resolution Agreed

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Addend

make the addition to the Pset_WallType property set

Issue Number	**I - 330**			**Issue Date**	12/10/97
Author	Autodesk reviewers	**Owner**	See	**Status**	Resolved
Schema	IfcPropertyTypeResource	**Version**	R1.5 - Final		

Issue Description An IfcProductShape has an IfcProductComponentShape.

An IfcProductComponentShape is either an IfcShapeBody or an IfcShapeResult

An IfcShapeBody contains a list of IfcShapeRepresentations

My understanding is that this is to allow for multiple representations of an object. For example, there is always a bounding box, and there might be different geometric representations for different kinds of views.

This next part is where I get confused:

an IfcShapeResult is basically a boolean of two or more IfcProductComponentShapes

This means that an IfcShapeResult can be a boolean of two IfcShapeBodies, but IfcShapeBody is the thing that has multiple representations. How are you supposed to boolean together the sets of multiple representations? It seems to me that the IfcShapeResult is at too high a level.

Proposed Solution 1) Move the componentization concept down to IfcShapeRepresentation level so that the componentization of a representation is done at the Representation level --> this will allow such componentization to be different for each representation. See proposed alternative "ShpR_new.exg"

Resolution Have discussed two alternatives to solving this for R1.5 addendum:
1) severely limit the Product Shape schema --> single shape representation allowed
2) implement proposed longer term solution early

Agreed that we will implement #2 for R1.5 addendum

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R1.5 - Addend

complete proposal and send to RS to incorporate in IfcPropertyTypeResource schema

Action # 2 ***Assignee*** See ***Status*** Eliminated ***Resolved in Version*** R1.5 - Addend

Incorporate solution developed by T.Liebich into the IfcPropertyTypeResource schema

---

Issue Number I - 331 ***Issue Date*** 1/9/98

Author Haiat ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Final

Issue Description In EXPRESS the Range of Attribute ClippingHalfSpaces for IfcAttDrivenClippedExtudedSolid and IfcAttDrivenClippedRevolvedSolid is contraint to [1:2], whereas Express-G and Specs show [1:?].

Proposed Solution The [1:?] is correct and shall be updated in EXPRESS.

Resolution Agreed

Action # 0 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Addend

"Just do it" (TL)

Issue Number I - 332 ***Issue Date*** 1/9/98

Author Horvath, Jens-Peter ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.5 - Final

Issue Description At IfcAxis2Placement3D: It is not clear from the Specification, that the default for Attribute RefDirection is [1.0,0.0,0.0].

Proposed Solution Update the documentation.

Resolution Agreed

Action # 1 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.5 - Addend

make change to documentation

Issue Number I - 333 ***Issue Date*** 1/9/98

Author	Horvath, Jens-Peter	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Final		

Issue Description At IfcCurveBoundedPlane the default and the min value for Dim shall be 3, not 2.

Proposed Solution Update the documentation

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Final

"Just do it"

Issue Number I - 334 **Issue Date** 2/1/98

Author	Ohta, Takakazu	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Final		

Issue Description At IfcBuildingStorey: The specification shows for calcTotalArea the data type IfcLenghtMeasure, the correct data type is IfcAreaMeasure. (express and express-g are correct).

Proposed Solution change specification

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

change specification as described

Issue Number I - 335 **Issue Date** 2/1/98

Author	Forester	**Owner**	Liebich	**Status**	Resolved
Schema	IfcMeasureResource	**Version**	R1.5 - Final		

Issue Description IfcMeasureValue currently does not include the IfcString, IfcBoolean, IfcInteger, IfcReal in its select list within the EXPRESS code view of the model (EXPRESS-G and Specification are correct).

Proposed Solution Correct the EXPRESS code to add these four types to the select type.

Resolution Agreed

Action #	1	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

Change the EXPRESS code

Issue Number I - 336 **Issue Date** 2/1/98

Author	Muigg	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExt	**Version**	R1.5 - Final		

Issue Description Support for logical connections between elements has been disabled between the R1.5 Pre-Final and the R1.5 Final versions of the model. IfcRelConnectsElements a now has an attribute called ConnectionGeometry WHICH IS MANDATORY. This means that the application MUST provide connection geometry and logical connections of path based elements (in which the connection location is calculated by the app) are disabled. Implementers CLEARLY wanted to include support for logical connection of Path based elements.

Proposed Solution Change the ConnectionGeometry attribute on IfcRelConnectsElements to be OPTIONAL

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Incomplete	**Resolved in Version**	R1.5 - Addend

change the IfcProductExt schema accordingly

Issue Number	**I - 337**			**Issue Date**	2/1/98
Author	See	**Owner**	Yu	**Status**	Deferred to R2.0
Schema	IfcControlExtension	**Version**	R1.5 - Final		

Issue Description IfcCostElement is NOT a control -- it is more like an Aspect (or data view) of other objects.

Proposed Solution Subtype from IfcObject for R1.5 (since there is nothing added in IfcControl now anyway and this reduces the depth in the hierarchy) and subtype from IfcAspect in R2.0.

Resolution Agreed that it is not a control. However, subtyping from IfcObject is not a good idea (bad precedent). Leave it where it is for R1.5 addendum and look again under the IfcAspect proposed for R2.0 (BS-4 project).

Issue Number	**I - 338**			**Issue Date**	2/9/98
Author	Liebich	**Owner**	See	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Final		

Issue Description Issues I-323 (Processes), I-325 (Resources) and I-326 (Cost Elements) -- all describe the requirement for nesting in primary subtypes of IfcObject. This was also the case with I-106 (nesting of IfcBuildingElements (Ifcproducts)). It will be inefficient to define 4 different (or redundant) solutions.

Proposed Solution Consider defining an objectified relationship at the IfcObject level that will allow nesting of like type elements (to be checked by a WHERE rule). See diagram "GeneralGrouping.vsd"

Resolution Implement as described in "GeneralGrouping" proposal. See notes on I-323, I-325, I-326 for cleanup of old solutions and checking that new solution works as well.

Decided that we cannot remove IfcRelAssemblesElements because it allows assembly of dissimilar element types.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Addend

Make the addition to IfcObject -- as described above

Action # 2 **Assignee** Liebich **Status** Eliminated **Resolved in Version** R1.5 - Addend

Remove IfcRelAssemblesElements in the IfcProductExt schema and replace with a note explaining how this is now covered by the general purpose solution added at the IfcObject level.

Decided that we cannot remove IfcRelAssemblesElements because it allows assembly of dissimilar element types.

Action # 3 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Addend

note on I-323 (Processes), I-325 (Resources) and I-326 (Cost Elements) that this general purpose solution addresses those requirements and ADD NEW ACTIONS to enhance documention which describes this.

Issue Number	**I - 339**			**Issue Date**	9/4/98
Author	Han, Chuck	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R1.5 - Final		

Issue Description EXPRESS allows you to redeclare the data type for attributes in subtype classes. IDL does not. This creates a problem in developing IDL code that is consistent with the EXPRESS.

Proposed Solution See if it is possible to avoid redeclaration of attribute data types. See also the issue logged by Tim Child regarding the Von Liskov principal in OO design.

Resolution Assumption: the only place we have done this is in redeclaring relationships on Obj. Rels.

If this is true, then this is resolved by the resolution to I-310.

Issue Number	***I - 340***			***Issue Date***	2/4/98
Author	Han, Chuck	***Owner***	See	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Final		

Issue Description IDL compilers tested complained about duplicate names in Enumerations.

Proposed Solution Eliminate duplicate names by prepending the name of the class or something similar. This should probably also make EXPRESS compilers happier

Resolution Agreed -- will preface the enum values with the name of the enumeration as is done automatically by EXPRESS compilers.

Action #	1	***Assignee***	Hietanen	***Status***	Incomplete	***Resolved in Version***	R1.5 - Addend

make the change to the IDL generation

Issue Number	***I - 341***			***Issue Date***	3/11/98
Author	Bouman-Eijs, Anita	***Owner***	See	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Final		

Issue Description The following errors are reported by the EPM EXPRESS compiler:

```
> ----- Errors and warning in Ifc150_Final_Express_LF.exp -----
> ENTITY IfcRevolvedAreaSolid
> In the assignment of derived attribute AxisLine, the entity
> constructor
> of supertype IfcCurve is missing.
>
> FUNCTION IfcCircleProfileIntoCurve
> In the assignment of local variable Circle, the constructor of
> supertype
>
> IfcCurve is missing.
> In the assignment of local variable ResCurve, the constructor of
> supertype IfcCurve is missing.
>
> FUNCTION IfcRectangleProfileIntoCurve
> In the assignment of local variable ResCurve, the constructors of
> supertype IfcBoundedCurve and IfcCurve are missing.
>
> FUNCTION IfcTrapeziumProfileIntoCurve
> In the declaration of local variable TempPoint, the constructor of
> supertype IfcPoint is missing.
> In the assignment of local variable ResCurve, the constructors of
> supertype IfcBoundedCurve and IfcCurve are missing.
>
> FUNCTION IfcPointTranslation
> In the assignment of local variable Point, the constructor of
> supertype
>
> IfcPoint is missing.
>
> FUNCTION IfcRevolutionPath
> In the declaration of local variable Circle, the constructor of
> supertype IfcCurve is missing.
> In the assignment of local variable Path, the constructor of
> supertype
> IfcCurve is missing.
>
> FUNCTION IfcProfileIntoArea
> In the assignment of local variable ResSurface, the constructor of
> supertype IfcPoint is missing.
```

```
>
> ENTITY IfcExtrudedAreaSolid
> The supertype clause to entity IfcAttDrivenExtrudedSegment is missing.
> (Warning)
>
> ----- Error in IfcDocumentExtension.exp -----
> In REFERENCE clause to schema IfcKernel are IfcProduct and IfcControl
> missing.
>
> ----- Error in IfcKernel.exp -----
> In REFERENCE clause to schema IfcUtilityResource are
> IfcProjectTeamRegistry and IfcProjectAppRegistry missing.
>
> ----- Error in IfcModelingAidExtension.exp -----
> In REFERENCE clause to schema IfcGeometryResource is IfcBoundedCurve
> missing.
>
> ----- Error in IfcProcessExtension.exp -----
> In REFERENCE clause to schema IfcPropertyResource is IfcDateTimeSelect
> missing.
>
> ----- Errors in IfcProductExtension.exp -----
> In USE clause to schema IfcKernel is IfcControl missing.
> In REFERENCE clause to schema IfcMeasureResource is
> IfcPositiveLengthMeasure missing.
>
> ----- Error in IfcUtilityResource.exp -----
> In REFERENCE clause to schema IfcMeasureResource is IfcMeasureValue
> missing.
> ----- end -----
```

Proposed Solution Resolve each EXPRESS error in turn

Resolution Agreed -- method to be determined.

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R1.5 - Addend

Resolve EXPRESS compiler errors for Addendum

Issue Number ***I - 342*** ***Issue Date*** 3/12/98

Author Liebich ***Owner*** Wix ***Status*** Resolved

Schema IfcPropertyResource ***Version*** R1.5 - Final

Issue Description On IfcMaterial -- the attribute MaterialClassification is mandatory. That means, we always require the
classification of material in an IFC file/db.

Proposed Solution My proposal would be to make MaterialClassification optional.

Resolution Agreed

Action # 1 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R1.5 - Addend

Make the change as proposed

Issue Number ***I - 343*** ***Issue Date*** 3/18/98

Author Liebich ***Owner*** See ***Status*** Resolved

Schema IfcProductExt ***Version*** R1.5 - Final

Issue Description Class: IfcBuilding

The inverse for IfcRelContains on this class [xxx] does not limit the container to IfcSite object.
This is a problem since IFC model integrity assumes the containment hierarchy --> site ->

building -> building storey -> space

Proposed Solution Add a second WHERE rule :

WR2: SIZEOF(QUERY(Temp <* IsContainedBy |
Temp.RelationshipType = SiteContainer)) = 1;

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Addend

"Just do it"

Issue Number I - 344 **Issue Date** 3/18/98

Author Liebich **Owner** See **Status** Resolved

Schema IfcGeometryResource **Version** R1.5 - Final

Issue Description Class: IfcAxis2Placement2D

Currently there is no contraint that prohibits the use of a three dimensional points for the location of a two dimensional placement

Proposed Solution add a second WHERE rule:

WR2: SELF\IfcPlacement.Location.Dim=2;

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

"Just do it"

Issue Number I - 345 **Issue Date** 4/25/98

Author See **Owner** See **Status** Deferred to R3.0

Schema All Schemata **Version** R1.5 - Final

Issue Description We need a method to automate the generation of EXG files (from EXPRESS).

Proposed Solution Use EDM tools for this

Resolution

1. Will use EDM for automated generation of EXG files.
2. Will ask VTT about purchase of a license for EDM and about providing experts to generate the EXG files through the development of R2.0.
3. Note: will try to find a method for adding notes on redeclared relationships (as we do on subtyped objectified relationships) in order to clarify the semantic meaning of the redeclared relationship. -- this one no longer valid in R2

Action # 1 **Assignee** Hyvarinen **Status** Incomplete **Resolved in Version** R3.0 - Alpha

Complete initial testing with EDM and document process for semi-automated generation of EXG diagrams from EXPRESS. Also want to check the STEP TOOLS EXG generation.

Action # 2 **Assignee** Hyvarinen **Status** Incomplete **Resolved in Version** R2.0 - Beta

Follow through with VTT about purchase and completing the EXG generation through the R2.0 project.

Issue Number I - 346 **Issue Date** 5/5/98

Author See **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Final

Issue Description 1) IfcRelAssemblesSpaces.RelatedObjects - this should be a LIST [0:?] IfcSpace. Currently it is a single IfcSpace -- which breaks the interface contract extablished in the Supertype IfcReleationship1toN.

2) The name for this class is misleading. The original intent was to allow nesting of spaces. The name implies assembling (grouping) which is different.

Proposed Solution 1) Change IfcRelAssemblesSpaces.RelatedObjects to a LIST [0:?] IfcSpace

2) change the name to IfcRelNestsSpaces

Resolution Agreed. However, see solutions to I-323, I-325 and I-326. If a general purpose solution is used at the IfcObject level, this objectified relationship may be removed because it will be redundant with such a general purpose nesting solution.

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R1.5 - Final

Change as described.

Issue Number	***I - 347***			***Issue Date***	5/5/98
Author	Monceyron	***Owner***	Liebich	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Final		

Issue Description The following issues with WHERE rules have been identified within CSTB:

```
******************************

// Issue with WR2: validation always returns False
// IfcMaterial type is not a selection item of IfcMaterialSelect select type

ENTITY IfcColumn
 SUBTYPE OF (IfcBuildingElement);
    GenericType : IfcColumnTypeEnum;
 WHERE
    WR1: SIZEOF(QUERY( Temp <* SELF\IfcObject.TypeDefinitions |
          NOT(Temp.TypedClass = 'IfcColumn'))) = 0;
    WR2: 'IFC150FINAL.IFCMATERIAL' IN TYPEOF(SELF\IfcBuildingElement.HasMaterial);
END_ENTITY;

TYPE IfcMaterialSelect = SELECT (
    IfcMaterialLayerSet
   ,IfcMaterialList);
 END_TYPE

******************************

// Issue with WR2: validation always returns False
// IfcMaterial type is not a selection item of IfcMaterialSelect select type

ENTITY IfcBeam
 SUBTYPE OF (IfcBuildingElement);
    GenericType : IfcBeamTypeEnum;
 WHERE
    WR1: SIZEOF(QUERY( Temp <* SELF\IfcObject.TypeDefinitions |
          NOT(Temp.TypedClass = 'IfcBeam'))) = 0;
    WR2: 'IFC150FINAL.IFCMATERIAL' IN TYPEOF(SELF\IfcBuildingElement.HasMaterial);
END_ENTITY;

TYPE IfcMaterialSelect = SELECT (
    IfcMaterialLayerSet
   ,IfcMaterialList);
 END_TYPE

******************************
```

```
ENTITY IfcAttDrivenMorphedExtrudedSegment
 SUBTYPE OF (IfcAttDrivenExtrudedSegment);
   EndProfileDef   : IfcAttDrivenProfileDef;
 DERIVE
   EndSweptArea    : IfcCurveBoundedPlane
                := IfcProfileIntoArea(EndProfileDef);
 WHERE
   WR1: TYPEOF(SELF\IfcAttDrivenExtrudedSegment.ProfileDef) = TYPEOF(EndProfileDef);
   WR2: NOT('IFC150FINAL.IFCARBITRARYPROFILEDEF' IN
TYPEOF(SELF\IfcAttDrivenRevolvedSegment.ProfileDef));
   WR3: SELF\IfcAttDrivenExtrudedSegment.ProfileDef.Position.P[1] =
EndProfileDef.Position.P[1];
END_ENTITY;
```

An issue with WR2 : IfcAttDrivenRevolvedSegment is not a subtype of
IfcAttDrivenMorphedExtrudedSegment
Thus, specification SELF\IfcAttDrivenRevolvedSegment.ProfileDef is wrong.
A guess could be : SELF\IfcAttDrivenExtrudedSegment.ProfileDef

****

```
ENTITY IfcAttDrivenMorphedExtrudedSegment
 SUBTYPE OF (IfcAttDrivenExtrudedSegment);
   EndProfileDef   : IfcAttDrivenProfileDef;
 DERIVE
   EndSweptArea    : IfcCurveBoundedPlane
                := IfcProfileIntoArea(EndProfileDef);
 WHERE
   WR1: TYPEOF(SELF\IfcAttDrivenExtrudedSegment.ProfileDef) = TYPEOF(EndProfileDef);
   WR2: NOT('IFC150FINAL.IFCARBITRARYPROFILEDEF' IN
TYPEOF(SELF\IfcAttDrivenRevolvedSegment.ProfileDef));
   WR3: SELF\IfcAttDrivenExtrudedSegment.ProfileDef.Position.P[1] =
EndProfileDef.Position.P[1];
END_ENTITY;
```

An issue with WR3: is at stake to test equality between two instances of IfcDirection ?
Should we test an equality member to member or an equality of directions - with a geometric meaning ?

The same kind of problem is encoutered with entity IfcAttDrivenExtrudedSolid

```
ENTITY IfcAttDrivenExtrudedSolid
 SUPERTYPE OF (ONEOF (
   IfcAttDrivenClippedExtrudedSolid))
 SUBTYPE OF (IfcSolidModel);
   Segments        : LIST [1:?] OF IfcAttDrivenExtrudedSegment;
 DERIVE
   Path            : IfcPolyline := IfcExtrusionPath(SELF);
 WHERE
   WR1: SIZEOF(QUERY( Temp <* Segments | Temp.Position.Axis <>
Segments[1].Position.Axis)) = 0;
END_ENTITY;
```

****

```
ENTITY IfcAttDrivenRevolvedSegment
 SUPERTYPE OF
(ONEOF(IfcAttDrivenMorphedRevolvedSegment,IfcAttDrivenTaperedRevolvedSegment))
 SUBTYPE OF (IfcRevolvedAreaSolid);
   Position        : IfcAxis2Placement3D;
   StartAngle      : IfcPlaneAngleMeasure;
   ProfileDef      : IfcAttDrivenProfileDef;
 DERIVE
```

```
    SELF\IfcSweptAreaSolid.SweptArea : IfcCurveBoundedPlane
                 := IfcProfileIntoArea(ProfileDef);
 INVERSE
    PartOfSolid     : IfcAttDrivenRevolvedSolid FOR Segments;
 WHERE
    WR1: SELF\IfcRevolvedAreaSolid.Axis.Location.Coordinates[3] = 0;
END_ENTITY;
```

Issue with WR1: third element of Coordinates may not exist as
Coordinates : LIST [1:3] OF IfcLengthMeasure

****

```
ENTITY IfcArbitraryProfileDef
 SUBTYPE OF (IfcAttDrivenProfileDef);
    CurveForSurface : IfcBoundedCurve;
 WHERE
    WR1: (('IFC150FINAL.IFCPOLYLINE' IN
            TYPEOF(CurveForSurface)) AND (CurveForSurface.Dim = 2))
         OR
         (('IFC150FINAL.IFCTRIMMEDCURVE' IN
            TYPEOF(CurveForSurface)) AND (CurveForSurface.Dim = 2))
         OR
         (('IFC150FINAL.IFCCOMPOSITECURVE' IN
            TYPEOF(CurveForSurface)) AND (CurveForSurface.Dim = 2));
END_ENTITY;
```

issue with WR1 : attribute Dim is not defined at the level of IfcBoundedCurve but within each subtype of IfcBoundedCurv.

```
ENTITY IfcRelContains
 SUBTYPE OF (IfcRelationship1toN);
    RelationshipType       : IfcContainmentTypeEnum;
    ContainedOrReferenced  : BOOLEAN;
 WHERE
    WR1: ((RelationshipType = ProjectContainer) AND
          ('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)))
         XOR (RelationshipType <> ProjectContainer);
    WR2: ((RelationshipType = SiteContainer) AND
          ('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN
TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> SiteContainer);
    WR3: ((RelationshipType = BuildingContainer) AND
          ('IFC150FINAL.IFCBUILDING' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> BuildingContainer);
    WR4: ((RelationshipType = BuildingStoreyContainer) AND
          ('IFC150FINAL.IFCBUILDINGSTOREY' IN
TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)) AND
          NOT('IFC150FINAL.IFCBUILDING' IN
TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> BuildingStoreyContainer);
    WR5: ((RelationshipType = SpaceContainer) AND
          ('IFC150FINAL.IFCSPACE' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)) AND
```

```
        NOT('IFC150FINAL.IFCBUILDING' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
        NOT('IFC150FINAL.IFCBUILDINGSTOREY' IN
TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
       XOR (RelationshipType <> SpaceContainer);
END_ENTITY;
```

Issue : the type ofSELF\IfcRelationship1toN.RelatedObjects is a list of IfcObject
(TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))=LIST)
and then the test will fail

****
****

Proposed Solution see comments in the text above

Resolution Agreed - mostly -- TL will work with CSTB to find agreement.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Addend

Work w/ CSTB expert to resolve all

Issue Number I - 348 **Issue Date** 5/10/98

Author Liebich **Owner** Wix **Status** Resolved

Schema IfcPropertyResource **Version** R1.5 - Final

Issue Description IfcMaterialList is not a list of materials in EXPRESS, since currently the attribute Materials is a single attribute.

Proposed Solution Update EXPRESS so that IfcMaterialList.Materials is a List [1:?]

Resolution Agreed

Action # 1 **Assignee** Wix **Status** Incomplete **Resolved in Version** R1.5 - Final

Update EXPRESS schema as proposed

Issue Number I - 349 **Issue Date** 5/8/98

Author Liebich **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.5 - Final

Issue Description "TypeDescription" fields described in many of the Pset definitions is really an attribute of the IfcPropertySet object. It is NOT one of the LIST [1:?] OF IfcProperty.

Proposed Solution It should be clearly separated in the spreadsheet definitions.

Resolution Actually, this is not true. The "Descriptor" attribute on IfcPropertySet should really be renamed to "PsetName" -- and should contain the name of the Pset (from the definition spreadsheets). For example, "Pset_DoorSliding". Therefore, the "TypeDescription" property is still needed to capture the user description for this type (e.g. "Pella 8' sliding door").

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Final

change the name of the attribute on IfcPropertySet from "Descriptor" to "PsetName" to more accurately reflect the purpose of this attribute.

Issue Number I - 350 **Issue Date** 5/8/98

Author Liebich **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.5 - Final

Issue Description All references to nested Psets (inside other Psets) are currently shown as IfcObjectReference(s). This is not necessary since IfcPropertySet is a subtype of IfcProperty -- and can therefore be referenced directly.

Proposed Solution They should all be changed to the data type IfcPropertySet.

Resolution This is only true in the case of references to IfcSharedPropertySet (where there is a 1 to 1 relationship). Referenced to IfcOccurrencePropertySet should be handled as described in I-306

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R1.5 - Addend

Update all references for IfcSharedPropertysets defined in R1.5 (for which you are responsible)

Action # 2 **Assignee** Forester **Status** Complete **Resolved in Version** R1.5 - Addend

Update all references for IfcSharedPropertysets defined in R1.5 (for which you are responsible)

Action # 3 **Assignee** Yu **Status** Complete **Resolved in Version** R1.5 - Addend

Update all references for IfcSharedPropertysets defined in R1.5 (for which you are responsible)

Issue Number I - 351 **Issue Date** 5/14/98

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcSharedBldgElements **Version** R1.5 - Final

Issue Description the WR2 at IfcBeam and IfcColumn is wrong, since it states, that the material information has to be of type IfcMaterial:
WR2: 'IFCPROPERTYRESOURCE.IFCMATERIAL' IN TYPEOF(SELF\IfcBuildingElement.HasMaterial);
However IfcMaterial is not a member of IfcMaterialSelect, the attribute type of HasMaterial

Proposed Solution Change WR so that it requests IfcMaterialList as type.
WR2: 'IFCPROPERTYRESOURCE.IFCMATERIALLIST' IN TYPEOF(SELF\IfcBuildingElement.HasMaterial);

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Addend

Change the WR as described

Issue Number I - 352 **Issue Date** 4/30/98

Author Drogemuller **Owner** Drogemuller **Status** Deferred to R2.0

Schema IfcMaterialResource **Version** R1.5 - Final

Issue Description A layered material may need to be stored as part of a layered building element.

Proposed Solution Allow recursive references in MaterialLayerSets -- allow a layer to be a layer set.

Resolution As proposed.

Action # 1 **Assignee** Drogemuller **Status** Incomplete **Resolved in Version** R2.0 - Pre-Fin

Just do it.

Issue Number I - 353 **Issue Date** 4/30/98

Author Drogemuller **Owner** Liebich **Status** Deferred to R3.0

Schema IfcSharedSpatialElements **Version** R1.5 - Final

Issue Description Need to be able to store different types of Spaces -- Access space around doors in CS-2 (accessibility), Operable space (area where a door swing), and Operation space (space in front of an oven or stove).

Have tried to do this with AccessSpace on IfcEquipment. This proposal simply goes farther.

Proposed Solution Modify the existing Pset in IfcEquipment to include these additional space functions.

Also add AccessSpace, OperableSpace and OperationSpace to the enum for "types" of IfcSpace.

See also I-355 about a lightweight space.

Resolution Not enough time to resolve in time for R2. Will do in R3.

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

Investigate and propose solution.

Issue Number ***I - 354*** ***Issue Date*** 4/30/98

Author	Drogemuller	***Owner***	See	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Final		

Issue Description Thermal boundaries (aligned to external BuildingElements) - we need to be able to define "thermal boundaries" -- boundaries to thermal zones.

Proposed Solution Assess whether SpaceBoundaries can be adapted to satisfy this requirement.

Resolution This has been resolved in R2.

Action # 1 ***Assignee*** Drogemuller ***Status*** Eliminated ***Resolved in Version*** R2.0 - Beta

Investigate solution proposed by JF -- does it work.

Issue Number ***I - 355*** ***Issue Date*** 7/15/98

Author	Liebich	***Owner***	Liebich	***Status***	Deferred to R3.0
Schema	IfcProductExt	***Version***	R1.5 - Final		

Issue Description We need a lightweight space object for use as AccessSpace, etc.

Proposed Solution Investigate definition of a supertype to the existing space.

Resolution

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

develop proposal for R3.0

Issue Number ***I - 356*** ***Issue Date*** 5/30/98

Author	See	***Owner***	See	***Status***	Resolved
Schema	IfcPropertyTypeResource	***Version***	R1.5 - Final		

Issue Description There is no real benefit to having the two subtypes of IfcPropertySet (IfcSharedPropertySet, IfcOccurrencePropertySet). In fact it causes some confusion as to when to use which.

Proposed Solution remove the two subtypes (IfcSharedPropertySet, IfcOccurrencePropertySet) and make IfcPropertySet concrete.

Resolution 15-July - agreed
During work on Psets in Aug-98: [RS] Would like to withdraw this issue as I now disagree with my initial assertion for the following reasons. There is a "1 to 1" relationship between a TypeDef and SharedPsets and a "1 to N" relationship between OccurrencePsets. This is only clearly represented by distinguishing the two with separate relationships to each.

Action # 1 ***Assignee*** See ***Status*** Eliminated ***Resolved in Version*** R1.5 - Addend

make this change for Psets in all Schemata except SharedBldgServiceElements, HVAC and FM

Eliminated

Action # 2 **Assignee** Forester **Status** Eliminated **Resolved in Version** R1.5 - Addend

make this change for Psets in SharedBldgServiceElements and HVAC

Eliminated

Action # 3 **Assignee** Yu **Status** Eliminated **Resolved in Version** R1.5 - Addend

make this change for Psets in FM

Eliminated

Issue Number I - 357 **Issue Date** 9/18/97

Author	Steinmann	**Owner**	See	**Status**	Resolved
Schema	IfcSharedBldgElements	**Version**	R1.5 - Final		

Issue Description See email discussion "URGENT ISSUE for R1.5 Addendum" which began in early June 1998. Extrusion direction for IfcWall.

The current active implementers have many problems with extrusions along the path as the norm.

Proposed Solution The current active implementers have agreed that -- if we only support extrusion for walls in a single direction in R1.5 (not 3 alternatives as proposed by STF), then that direction should be vertical.

Resolution Resolve in R2.

Extrusion is still horizontal, but special connection types were used to resolve intersections.

Issue Number I - 358 **Issue Date** 7/15/98

Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Final		

Issue Description at ENTITY IfcAxis1Placement no rule enforces the location to be three-dimensional

Proposed Solution add WHERE rule WR2 that requires 3D Cartesian Point for Location.

Resolution agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

"just do it"

Issue Number I - 359 **Issue Date** 7/15/98

Author	Liebich	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Final		

Issue Description Ecco reports errors when executing FUNCTION IfcFirstProjAxis

Proposed Solution the line IF (NOT EXISTS(ZAxis) OR (NOT EXISTS(Arg)) OR (Arg.Dim <> 3) has to be replaced by IF (NOT EXISTS(ZAxis) OR ((EXISTS(Arg)) AND (Arg.Dim <> 3)), the variable Z had been deleted and its occurrence has to be replaced by Zaxis

Resolution agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

"just do it"

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Beta

consider writing a SEDS, since the error originates from Part42 function first_proj_axis

Issue Number	**I - 360**			**Issue Date**	7/16/98
Author	Liebich	**Owner**	See	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Final		

Issue Description at ENTITY IfcAttDrivenProfileDef, the DERIVE attributes PositionToOrigin and AngleInOrigin do not add semantics, and the current computation contains errors according to the instantiation check with Ecco

Proposed Solution delete DERIVE attributes PositionToOrigin and AngleInOrigin

Resolution agreed

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

"just do it"

Issue Number	**I - 361**			**Issue Date**	7/27/98
Author	See	**Owner**	See	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Final		

Issue Description IfcProject no longer contains the "Contains" inverse relationship to IfcRelContains. All of the other containers have this inverse relationship. This must be a simple mistake?

Proposed Solution Put it back.

Resolution Agreed

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Addend

add inverse relationship between IfcProject and IfcRelContains.

Issue Number	**I - 362**			**Issue Date**	7/15/98
Author	Forester	**Owner**	See	**Status**	Resolved
Schema	IfcUtilityResource	**Version**	R1.5 - Final		

Issue Description See email thread regarding use of "globally unique object Ids".
Summary: If we are ever to enable the following:
1) exchange of patial models
2) client/server implementations that will allow checkout of model subsets
3) model servers that manage multiple models

then objects must have globally unique Ids at the object level -- not just project unique.

Proposed Solution Proposal (from J.Forester) - use Microsoft OS call for GUID
Proposals (from P.Muigg/J.Tammik) - shorten ID from 32 bytes to 20 bytes using algorithm distributed via email

Resolution 1) Agreed to use MS GUID solution for R1.5 and look for longer term solution that is not MS specific.
2) will use code for shortening GUIDs to 20 characters as provided by P.Muigg

Action # 1 **Assignee** Drogemuller **Status** Complete **Resolved in Version** R1.5 - Addend

Make necessary changes to the utility resource

Issue Number	**I - 363**			**Issue Date**	7/15/98
Author	Poyet	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R1.5 - Final		

Issue Description Long Form EXPRESS is different than the Short Form EXPRESS. This creates a significant problem for developers who use the Short Form. Specifically, Explicit "ONEOF" declarations have been added in the Long Form. This is not consistent with ISO 10303-11 (definition for EXPRESS).

Proposed Solution Make them consistent and insure absolute conformance to ISO 10303-11.

Resolution The "ONEOF" declarations were added into the Short Form because of the implicit "ANDOR" in EXPRESS. As we our modeling rules only allow the use of "ONEOF", these had to be declared explicitly.

We will find a way to modify our model development toolset to insure consistency between Short Form and Long Form for IFC R2.0. For this and other reasons raised by Hartmut Steinn, we have declared that the Long Form is the only "official" form of EXPRESS for the IFC R1.5 model.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Beta

Work with Hartmut Stein to resolve the issues he raised.
Propose a process for developing EXPRESS for R2.0 that will result in Short Form and Long Form versions of the EXPRESS that are consistent.

Issue Number ***I - 364*** **Issue Date** 8/8/98

Author See **Owner** Liebich **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Final

Issue Description The Occurrence Pset includes a mandatory reference to a Type Def. This will not be valid in the case where an Occurrence Pset is referenced as as nested rather than directly Type Driven. In this case, the reference should be to an IfcPropertySet (not IfcPropertyTypeDef).

Proposed Solution 1) Make the relationship to IfcPropertyTypeDef optional.
2) Add an optional relationship to IfcPropertySet.

Resolution Agreed (?)

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Addend

Make changes as proposed.

Issue Number ***I - 365*** **Issue Date** 8/12/98

Author IAI Implementers **Owner** Liebich **Status** Deferred to R3.0

Schema IfcProductExt **Version** R1.5 - Final

Issue Description Moving the quantity related attributes that were on IfcElement (Pre-Final for R1.5) and to the Pset "Pset_ElementQuantities". Furthermore, this is inconsistent with the fact that the quantities on IfcSpace remain on the object. Additionally, it would make the model much more understandable if these attributes were defined at the "leaf class" level so that the attribute names have clear semantic meaning.

Proposed Solution Move these quantities (or their class specific semantic equivalents) into the definitions of leaf node subtypes of IfcElement

Resolution Add explicit attributes to all subtypes of IfcElement, using the calcXxx naming convention. Note: attributes shall be added to leaf note classes to allow for semanically meaningful names.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R3.0 - Alpha

complete changes to many subtypes of IfcElement as described in the proposed solution and resolution.

Issue Number ***I - 366*** **Issue Date** 8/23/98

Author See **Owner** Drogemuller **Status** Resolved

Schema IfcUtilityResource **Version** R1.5 - Final

Issue Description The EXPRESS code for IfcRegisteredApplication.ApplicationIdentifier should be "FIXED" at 16 characters. Additionally, the ApplicationFullName should most likely be changed to just

"STRING" as the length of 255 was arbitrary.

Proposed Solution Update the .EXP and .DOC files for this schema

Resolution Done as proposed.

Issue Number ***I - 367*** **Issue Date** 8/23/98

Author See **Owner** Drogemuller **Status** Resolved

Schema IfcUtilityResource **Version** R1.5 - Final

Issue Description IfcTransaction -- Since a transaction is uniquely related to a single object instance, it and the host IfcAuditTrail should be contained within the IfcOwnerHistory object. Therefore, the inverse relationship (ToAuditTrail) is unnecessary.

Proposed Solution "ToAuditTrail" should be removed.

Resolution Done as proposed.

Issue Number ***I - 368*** **Issue Date** 8/23/98

Author See **Owner** Drogemuller **Status** Resolved

Schema IfcUtilityResource **Version** R1.5 - Final

Issue Description 5. IfcTable -- the attribute ProjectID is badly named now that we have expanded the objectID to be globally unique. This is probably an issue on many classes as it is a "carry over" from the way we used to do IDs.

Proposed Solution Update all Object ID attribute names to be named "ObjectID"

Resolution ProjectID has been replaced by UniqueID -- resolved.

Issue Number ***I - 369*** **Issue Date** 7/15/98

Author Forester **Owner** Karstila **Status** Resolved

Schema IfcMeasureResource **Version** R1.5 - Final

Issue Description It is currently unclear, whether real and integer are signed or unsigned.

Proposed Solution Add to the semantic definition of IfcInteger and IfcReal so that they represent signed values

Resolution Agreed

Action # 1 **Assignee** Karstila **Status** Complete **Resolved in Version** R2.0 - Beta

make changes to these types of measure

Issue Number ***I - 370*** **Issue Date** 9/18/97

Author Liebich **Owner** Liebich **Status** Resolved

Schema IfcProductExt **Version** R1.5 - Final

Issue Description 1 to 1 relationship for void and filling relationships - Implementation would be easier, if the fcRelVoidsElements and IfcRelFillsElements would be of type 1 to 1.

Proposed Solution Change IfcRelVoidsElements and IfcRelFillsElements to 1 to 1 relationships and change relationship
type from IfcElement to IfcBuildingElement. Add a note, that many relationship objects have to be created in case of many openings in a element, or many filling elements in an opening.

Resolution Agreed for R1.5.1 -- extending this to 1 to N will be re-considered later.

Action # 1 **Assignee** Liebich **Status** Complete **Resolved in Version** R1.5 - Addend

Change the cardinality for the subject relationships

Issue Number	**I - 371**			**Issue Date**	8/20/98
Author	Martin Herbst	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.5 - Final		

Issue Description current propositions at morphed segments are not stricted enough. Corresponding edges need not to be
paralel in case of IfcTrapeziumProfileDef, and no bound for angle value.

Proposed Solution add informal properties to IfcRevolvedAreaSolid, IfcAttDrivenMorphedRevolvedSegment, IfcAttDrivenRevolvedRevolvedSegment, forcing edges to be parallel and angle in range of {0 < angle <
2PI}

Resolution Agreed

Action #	1	**Assignee**	Liebich	**Status**	Complete	**Resolved in Version**	R1.5 - Addend

make the changes to IFcRevolvedAreaSolid and IfcAttDrivenMorphedRevolvedSegment

Issue Number	**I - 372**			**Issue Date**	9/11/98
Author	See	**Owner**	See	**Status**	Deferred to R2.0
Schema	All Schemata	**Version**	R1.5 - Addendum		

Issue Description Since IfcSpace does not have an inverse relationship to IfcSpaceProgram, an implementer requested that SpaceName (which already exists in IfcSpaceProgram) be added to IfcSpaceCommon. The result is redundant data in these two classes -- BECAUSE WE DON'T ALLOW UPWARD REFERENCES -- which means that core and interop layer classes cannot reference Domain/App model classes.

Proposed Solution This should be resolved as it will happen in many cases as we go forward.
1. One possible consideration is to push IfcSpaceProgram down to the core level. But this will not work in the long run because we would end up pushing everything down to core or interop.
2. Another possibility is to consider allowing upward references -- as optional attributes so that not everyone is required to support them.
3. Still another possibility is to add an IfcObjectReference in a Pset - either type driven or extension.

Resolution

Action #	1	**Assignee**	Liebich	**Status**	Incomplete	**Resolved in Version**	R2.0 - Pre-Fin

TL to think on this and make a proposal.

Issue Number	**I - 373**			**Issue Date**	9/17/98
Author	See	**Owner**	See	**Status**	Deferred to R3.0
Schema	All Schemata	**Version**	R1.5 - Addendum		

Issue Description As new classes are added at the Domain/Applications model layer, they will inevitably build relationships with classes at the Core and Interop layers. In some cases, the nature of the relationship is such that an inverse relationship is also needed - to truly reflect the informational links in the real world. This is not possible with the current modeling "rule" that we can have no upward references. While I think we all believe that this is a good modeling rule, this is a negative consequence.

Proposed Solution Consider ways to allow such relationships to be established.

Resolution see action in #372

Issue Number	**I - 374**			**Issue Date**	9/25/98
Author	See	**Owner**	See	**Status**	Deferred to R3.0

Schema All Schemata **Version** R1.5 - Addendum

Issue Description In many cases, we are talking ourselves into replacing direct relationships between objects (representing well understood semantics) with "use of" the general purpose objectified relationships defined on IfcObject, etc. EXAMPLE: TL recommendation regarding the relationship "AtticSpace" proposed for IfcRoofFrame - "shouldn't we use the general IfcRelContains relationship to express element to space relation?"

As a modeler, this is a better way to model the relationship as the semanics "could be" the same. However, as an implementer and/or a domain expert, it is filled with problems -- as least given the way we are currently specifying these classes. THE REASON IS: If we model it this way, the intended relationship disappears from the model and we have no mechanism for instructing implementers that it is required (by the end users).

As I have said many times, these general purpose relationships are beautiful - BUT ONLY IF we can solve this problem.

Proposed Solution Alt 1) It appears that we need to add a new section to the specification section for each class - similar to Geometry Use - but for Use of General Purpose Relationships. It must be possible to capture requirements like this as a "use" of something like IfcRelContains.
2) We could separate the attributes and relationships at the top of each class spec and alter the "Relationships" section to allow definition of required use of general purpose relationships (as in the example above).

Resolution

Issue Number I - 375 **Issue Date** 10/23/98

Author See **Owner** See **Status** Resolved

Schema IfcPropertyTypeResource **Version** R1.5 - Addendum

Issue Description The GenericType attribute should not be optional. In all cases, where you are defining either a generic type or a specific type, the GenericType must be specified.

Proposed Solution Make GenericType mandatory.

Resolution This has been resolved by the inclusion of "NotDefined" in all TypeEnums

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Issue Number I - 376 **Issue Date** 11/14/98

Author Liebich **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.5 - Addendum

Issue Description INTEGER references to Materials, TeamMembers and Applications are obscure and error prone.

Proposed Solution Change references all references to registry entries to be a reference to the subject data type

This implies :

1) where rulles for to insure that all instances of such entities are in the registry
2) insure that all registry entries are unique

Resolution Resolved by replacing all integer references by direct object references -- also by eliminating registries.

Issue Number I - 377 **Issue Date** 3/15/99

Author See, Richard **Owner** See **Status** Unresolved

Schema All Schemata **Version** R1.5 - Final

Issue Description **** MARKER ***

ITEMS -- I-378 TO I-4XX

CONTAIN OLD ISSUES WHICH PRECEEDED THE IRD OR WERE NOT CAPTURED ARE ENTERED
= OUT OF CALENDAR SEQUENCE.

Proposed Solution

Resolution

Issue Number	**I - 378**			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description 1) The terminology in the geometry sections is problematic, because it uses terms which are generally reserved to mathematics or CAD-CAM, and which have a very precise menaing for the scientific community in this context. For example, 'implicit', 'explicit' and 'parametric' geometry. The current use of this terminology promotes confusion or does not conform to that which is commonly employed in the scientific community.
2) Note that is a general problem of unspecified scientific references.

Proposed Solution 1) Geometry documentaiton sections should be thoroughly reviewed and edited by someone for which geometry is their area of expertise. 2) Appropriate scientific references should be included.

Resolution Agreed.

Issue Number	**I - 379**			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description 1) There are problems with the current definition of Explicit geometry. A true geometry with explicit knowledge of shapes must absolutely include a "pure geometry" part, which allows it to determine surfaces by means of points, straight lines, curves, planes, etc. by imposing upon them sufficient geometric conditions; it must also eventually include a topological part allowing it to construct complex objects in the case of a topological representaiton, like for example solid B-rep.
2) While the concept of 'explicit geometry' is less amorphous than that of "implicit geometry", it is formulated no more rigorously and thus poses the risk of misinterpretation and severe criticism.
2) the current geometry is insufficient to model a certain number of buildings ro artworks. From the document, it is difficult to know whether these deficiencies stem from the necessity to be compliant with existing mechanics-oriented normes for data exchange, or more simply from an involuntary omission, or finally from an intentionally simplified vision by AEC.

Proposed Solution 1) add a "pure geometry" core to the model - which can be used in the context of different use types (e.g. "implicit", "explicit", "Reference", etc.).
2) formalize the formulation of "explicit geometry" through better examples and scientific references.
3) explain (as being intentional or not) or fill the defínciencies so that more of the real world building shapes can be represented.

Resolution Agreed

Issue Number	**I - 380**			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Problems with "implicit geometry" - the definition of this type of geometry initially resembles a disguised form of the defintion of the associative geometry that is goverened by certain geometric physical constraints like for example distances (provided in particular by the dimensions in technical drawings).
The concept of "implicit geometry" is not very clear and seems, through the scarce explanations given, inconceivable to use for the definition of the complete geometry of a building.

Proposed Solution Chose documentation examples that demonstrate the difficult issues surrounding the definition of an object by the method referred to as implicit. It would be appropriate to rigorously formalize the limitations of such a concept and the extent to which it coexists with or completes the concept of "explicit geometry." The examples given must absolutely be corrected for they appear to be true counter-examples in their current form.

Resolution Mostly agreed.

Issue Number	***I - 381***			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Problems with "parametric geometry" - The definition given - "a geometry driven by functions" corresponds to the exact notion of functional geometry, used in certain systems. However, it appears that this terminology is mis-used in IFC, as the examples given much more closely correspond to the notion of constrained geometry.
While this concept is less amorphous than that of "implicit", it is formulated no more rigorously and thus poses the risk of misinterpretation and severe criticism.

Proposed Solution The definition for this type of geometry must be clarified and/or modified to established scientific conventions.

Resolution Agreed

Issue Number	***I - 382***			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Extrusion/Revolution methods for geometry generation - these are classic generation methods in most CAD systems. However they cannot generate Helix-type objects which are often encountered in the AEC environment (as in the case of a circular stair).

Proposed Solution Since helical surfaces are obtained thorugh the composition of rotation and translation matrices, establishing a method that allows the use and management of matrices (similar to those used in the SWEPSECT method) could prove indispensable for certain types of architectural objects.
The method of dissection and definition of geometrical objects by extrusion of profiles must be perfectly mastered in its use, since it carries so many potential theoretical and application problems. Research articles and concrete examples should be used to validate it.

Resolution Agreed, but probably in Release 3.0 or 4.0.

Issue Number	***I - 383***			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Composition method for geometry generation - The composition function (DEFINE), as described allows the assembling of surfaces as well as that of solids. How are the CSG solid operators (union, intersection, difference), which allow the defintion of complex objects, specified. It appears that these operators are missing from IFC. This means that definition of a CSG tree will not be possible.

Proposed Solution Consider how to add support for these and other solids operations.

Resolution To be considered . . .

Issue Number	***I - 384***			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Regarding geometry composition - The syntax of the composition notation system resembles LISP or SCHEME languages, but is not as rigorous nor as powerful (parameters, local variables, etc.).

Proposed Solution Transform the notation system into a real language. It appears that the Language Based approaches which offere a Design Lanuage are particularly well adapted to this type of issue. In order to achieve this, the system notation containing the implicit notation keywords would need to be formalized, using a pure and dynamic paradigm linke a programming language. Among other things, the iteration structures which are so important to AEC (duplications for example) would be directly integrated into the language as well as would the parametric mechanisms.
This would allow the easy definition of higher-level mathematical/computer objects. For example, the type matrix via initialization functions (intialization of a matrix of rotation around an axis, of a translation matrix, of a scale modification matrix . . .), to gether with matrix product functions would allow kinematic manipulations or the construction of dynamic architectural objects.
In any event, the "notation system" can and should be extended to a true design language with a classical syntax that could be either imperative, functional or logical. A functional approach would be very close to reality of the AEC field, allowing extensions or natural connections towards an object oriented description.

Resolution To be considered . . .

Issue Number	**I - 385**			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Regarding geometry composition - graphical construction functions are not supported. For point, line and plane, these would include:
- intersections between
- distance between
- line passing through
- line parallel to
- plance passing through

Used in the context of parameterization, these would allow the specification of geometric constraints which would simplify the development of complex geometric objects, while allowing their description.

Proposed Solution Consider how to include these in IFC

Resolution To be considered . . .

Issue Number	**I - 386**			**Issue Date**	5/14/96
Author	Rotge, J.F.	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Pre-Final (		

Issue Description Regarding the current range of geometric shapes - it appears that the choice of these shapes stems from the STEP standards. These standards cover the needs of mechanical CAD systems. However, in the case of AEC, other geometrical shapes can be encountered (e.g. ruled surfaces).

Proposed Solution Consider how to include shapes beyond those defined in STEP - e.g. ruled surfaces.

Resolution To be considered . . .

Issue Number	**I - 387**			**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	See	**Status**	Resolved
Schema		**Version**	R1.0 - Pre-Final (		

Issue Description 1.3.2 Scope of this document, page 1-3, 3. IFC Object Model Class Definitions
Sometimes the term core model and sometimes the term model core is used.

Proposed Solution Please use it consistently either core model or model core.

Resolution Agreed

Action #	1	***Assignee***	See	***Status***	Incomplete	***Resolved in Version***	R2.X - Beta

Make consistent in the Model Guide

Issue Number ***I - 388*** ***Issue Date*** 5/30/96

Author	Haas, Wolfgang	***Owner***	See	***Status***	Resolved
Schema		***Version***	R1.0 - Pre-Final (		

Issue Description 1.3.2, 4. IFC Data Model
This section states that EXPRESS is the international standard for the definition of data exchange models.

Proposed Solution Actually, EXPRESS is "a language to specify product information to be represented" (as quoted from STEP part 1, clause 3.2 Fundamental principles). It can be implemented as an exchange file but also as a shared data base. Otherwise it would not be reasonable to use it as the language for defining IFC.

Resolution We stand corrected.

Correct the wording.

Action #	1	***Assignee***	See	***Status***	Incomplete	***Resolved in Version***	R2.X - Beta

Correct the wording.

Issue Number ***I - 389*** ***Issue Date*** 5/30/96

Author	Haas, Wolfgang	***Owner***	See	***Status***	Resolved
Schema		***Version***	R1.0 - Pre-Final (		

Issue Description 1.3.2, 5. Resource Schemata
Before the bullet points start a sentence should be added to connect the bullet points with the preceding text such as: "The schemata cover the following areas".

Proposed Solution In clause 5 there are no schemata - they are as EXPRESS-G in clause 4. Schema has a well defined meaning in the STEP arena. There exist EXPRESS keywords SCHEMA and END_SCHEMA as reserved words which allow to structure EXPRESS models. If we want to align our efforts with STEP developments it would be useful to adopt their terminology.

Resolution We stand corrected.

Correct the wording.

Action #	1	***Assignee***	See	***Status***	Incomplete	***Resolved in Version***	R2.X - Beta

Correct the wording.

Issue Number ***I - 390*** ***Issue Date*** 5/30/96

Author	Haas, Wolfgang	***Owner***	See	***Status***	Resolved
Schema		***Version***	R1.0 - Pre-Final (		

Issue Description 1.3.2, 6. IFC Standard Interface Definitions
A statement is missing that exchange file format will by based on STEP part 21.

Proposed Solution This can be incorporated in this clause or as a separate clause.

Resolution This has been resolved in subsequent versions of the documents.

Issue Number	**I - 391**			**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	See	**Status**	Unresolved
Schema		**Version**	R1.0 - Pre-Final (		

Issue Description 1.3.2, 7. Usage Scenario Test cases
I like simple models but - is the ATLAS building model as shown on page 7-5 not too simple? It is just a collection of boxes. Do the building elements such as walls have openings or are the window openings just free space surrounded by elements. Our 225 test cases are by far more complex.

Proposed Solution Use a more complex building to test cases.

Resolution Agreed as a goal, but we need to find the resources to prepare such a data set. Can the 225 test cases be used?

Issue Number	**I - 392**			**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	Wix	**Status**	Resolved
Schema		**Version**	R1.0 - Pre-Final (		

Issue Description IFC Data Model, page 4.1
According to my current understanding the strategy for developing IFC was to develop the domain models by domain experts first, hand them to integration which has the responsibility to integrate them i. e. to make them consistent with other domain models in such a way that they all together make up a consistent "thing". Accepting this, a core model is not necessarily something which we need for this purpose. Did we ever discuss whether or not we need such a core model? If yes, what is it's scope, what should it cover and where are the borders to the domain models? As it currently is, it cuts deep into areas of domain models. This really needs clarification.

Proposed Solution Clearly define the scope for the core model.

Resolution Agreed

Action # 0 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.X - Beta
Develop and incorporate a scope statement for the core portions of the model

Issue Number	**I - 393**			**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.0 - Pre-Final (		

Issue Description 4.1.1.1 Project/Product/Process/Resource..., page 4-3
Attríbute HasParts of entity IfcProductObject points to IfcProductObject (to itself). The line to the connector indicates that it is mandatory, the line which leaves the page connector indicated that it is optional.

Proposed Solution Please make consistent. Page connector is not necessary in this case.

Resolution This has been corrected in later versions of the documentation

Issue Number	**I - 394**			**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExtention	**Version**	R1.0 - Pre-Final (		

Issue Description 4.1.1.2 Element/Spaces/Components, page 4-4
Take this as an example for cross checking of an abstract supertype between clauses 3, 4 and 5. The entity IfcElement is an abstract supertype which means that it will not be instanciated. So according to my understanding there is no need to define an interface for it such as the one provided in clause 3.2.1.17, page 3-53. . The next higher supertype is IfcProductObject. On page 3-53 it has interfaces
- I_ProductObject (why this repetition of the entity name?)

- I_RefGeomOvert (is this spelled correctly?) which is not an attribute of the entity IfcProductObject - where does it come from?
- I_HasBoundingBox which obviously is related to the optional attribute BoundingBox of entity IfcProductObject. Why was name changed ("Has" inserted)?
Entity IfcProductObject has much more attributes then the ones given in the interface. Is there a method which ones will be considered in the interface and which ones not?
One last remark concerning this entity: It has attribute PlacementRelSite which indicates that it or its subtypes for example beams and columns will be placed relative to the site. This is definitively not the case. A site may consist of more than one building. Building elements such as beams and columns are at least placed with respect to the local coordinate system of the building if not of a building section.

Proposed Solution Please correct spelling mistake on page 3-53
If an interface is defined it should be consistent with the attributes it has and the ones inherited by supertypes. If I look up in clause 3.2.1.17 its own attributes PlacementRelSite and PurchaseDate do not show up.
Placement should be generalized -- not only to site.

Resolution 1) TL to respond to questions.
2) Placement was generalized in the next release.

Action # 0 ***Assignee*** Liebich ***Status*** Complete ***Resolved in Version*** R1.0 - Final

TL to respond to questions.

Issue Number ***I - 395*** ***Issue Date*** 5/30/96

Author Haas, Wolfgang ***Owner*** See ***Status*** Resolved

Schema ***Version*** R1.0 - Pre-Final (

Issue Description Now let me inspect an entity which is not an abstract supertype. Let me pick the entity IfcRoof.
4.1.1.15 Wall/Roof/Floor/BuiltIn/Ceiling, page 4-17
Does the entity IfcRoof really belong in the core model or is this not part of the architectural model. Who created this entity? When I look out of my window I see plenty of roofs, all of them different to what is described by this entity. Let me start by showing all attributes belonging to this entity including the ones inherited by supertypes.
Attributes of entity „IfcRoof“ including attributes inherited from supertypes.

Entity	Attribute	Mand./Opt.	Cardinality
IfcRoof	RoofType	mandatory	
IfcLayeredElement	IfcMateriallayers	mandatory	
	TotalLength	mandatory	
	TotalAreaPerSide	mandatory	
	TotalVolume	mandatory	
	Width	mandatory	
	StartHeigths	mandatory	L[1:?]
	EndHeigths	mandatory	L[1:?]
	ElementPath	mandatory	L[1:?]
	RefPoints	mandatory	L[2:?]
	HasFaces	mandatory	L[2:?]
	FireRating	optional	
	FireRatingReq	optional	
	SeparatesSpaces	optional	S[0:?]
IfcBuildingElement	ConnectionPorts	mandatory	L[0:?]
	Connections	mandatory	L[0:?]
? IfcAssembledElement	RefPath	mandatory	L[1:?]
	AssemElementType	mandatory	
? IfcElement	PlacementRelSite	mandatory	
	PurchaseDate	mandatory	
? IfcProduct	PlacementRelSite	mandatory	
	HasParts	mandatory	S[0:?]
	BoundingBox	optional	
	ExAttributeSets	optional	S[1:?]
	ProductCost	optional	

? IfcProjectObjectt	ID	mandatory	
	ObjOwner	mandatory	
	ResultOf	optional	S[1:?]
	ControlledBy	optional	S[1:?]
	Classification	optional	

According to my understanding a roof consists of a roof structure and a roof covering. The roof structure may be for example a truss. The roof covering may consist of different sections - if you think of hip roofs or gable roofs - each of which may be layered. I cannot detect this structure in the roof entity as it is.

Proposed Solution There are several inconsistencies.
1) There are two attributes PlacementRelSite. Please omit one.
2) From entity IfcLayeredElement ElementPath and RefPoints are inherited. It was not clear to me whether these entities describe one layer or all layers of the layered element, in our case the roof. Pictures such as the picture on bottom of page 3-93 are indicating that one layer is described but is this really a roof? At least this should be clarified.
3) From entity IfcAssembledElement attribute RefPath is inherited. If I look at the interface clause 3.2.1.25, page 3-65 only attribute RefPath shows up. Is this attribute ElementPath from entity IfcLayeredElement or attribute RefPath from entity IfcAssembledElement?
I leave it to someone else to check consistency between the attributes and the interfaces of other entities provided in clause 3. and move to another point.

Resolution 1) resolved
2) resolved
3) resolved

Issue Number	**I - 396**			**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Resolved
Schema		**Version**	R1.0 - Pre-Final (		

Issue Description Now let me continue with some more general remarks concerning what is called explicit, implicit and parametric Geometry. They are mostly in line with remarks provided by J.F. Rotge and L. Daniel.
"Explicit and implicit geometry"
It was already stated that the terms explicit and implicit have precise meanings in the context of geometry with or without computers. Let me start with "implicit geometry".
In the context of IFC it mostly uses and combines sweeps. A typical example is the geometry of IfcRoof as shown on pages 3-92 and 3-93. It is a sequence of rectangles defined at reference points and extruded linearly between them. Reference points are located on a reference path. The way this is described is ambiguous.
 - It is not declared what happens when a reference path has a corner. How is the box extruded around the corner? Is it just a union of the two extruded segments? Obviously not. So additional information must be provided.
 - Reference points are described independently of reference path. So they might not be on the reference path. A better way would be to point to a segment of the reference path i. e. something like a trimmed curve and provide a parameter u which allows to calculate the cartesian coordinates of the reference point.
 - The definition of implicit geometry of IfcRoof depends on the sequence of reference points and rectangles described by attributes Thickness, StartHeights and EndHeights. This provides two heights for each inner point of the reference path and allows for discontinuities of heights at reference points. However this is not what the picture on top of page 3-93 indicates. My proposal would be to model the extrusion sections as entities and combine them using CSG operators (union, difference, intersection) to make up IfcRoof shape representation.
Three final remarks concerning pages 3-92 and 3-93.
 - The axis of the coordinate system shown in the picture on top of page 3-92 do not join in one common point, the origin.
 - The coordinate system (Reference Geometry placement) shown on top of page 3-92 is a left handed one, all others on pages 3-92 and 3-93 are right handed ones. One should stick to one type of coordinate systems.
 - In the picture at the bottom of page 3-93 a vertical line is missing at the end of the first extrusion segment.

Extrusions as the ones used to represent the shape of IfcRoof are very simple - only a rectangle is extruded and the pictures show only straight lines as extrusion path. As soon as we have more general extrusion paths such as space curves we also have to define how the orientation of the extruded face - we still assume that it does not change its shape when it is extruded - changes along the path. This is missing in IFC v. 0.94.
If the extruded face changes its shape along the path the problem becomes even more complicated. We might also create self intersecting objects.
Let me now switch to "explicit geometry"
There is chapter 4.1.6.1 which deals with explicit shape representation. It is a basically a subset of STEP AP225, conformance class 1 and part 42 and only deals with facetted b-rep. That is why it does not include edges and vertices as topological elements but only the polyloop. It's content of topology is sufficient to describe faceted b-reps. Higher conformance classes of AP225 include all topology entities to describe b-reps with curved edges and faces. It also includes sweeps and solids of revolution.
As it is currently included, those parts of AP225 are missing which deal with CSG like operations. In AP225 ARM we have additions and subtractions which are equivalent to CSG operators union and difference. So the only thing which would be missing would be intersection. We did not include intersection at the ARM level of AP225 for the following reasons:
- At an ARM level we only found the requirement to add or to subtract parts or components. We for example add a bracket to a column or subtract a window opening from a wall.
- Any intersection can be represented as a sequence of two differences.
- At the AIM level we will have all CSG operators.

Now let me comment page by page.

Proposed Solution Included in the text above . . .

Resolution This has been mostly resolved, however, the Implicit/Explict terminology remains in one section of the Model Guide. This should be edited by a specialist in geometry.

Action #	1	**Assignee**	Liebich	**Status**	Incomplete	**Resolved in Version**	R2.X - Beta

locate and work with a geometry expert to edit the geometry section of the model guide.

Issue Number	**I - 397**	**Issue Date**	5/30/96
Author	Haas, Wolfgang	**Owner**	Liebich
Status	Resolved		
Schema		**Version**	R1.0 - Pre-Final (

Issue Description Other edits in the "Geometry" sections of the documentation:
Page 4-89
- There is no AP 42 and no AP 41, there are only Parts 42 and 41. Please correct all entity names accordingly.
- Entity name IfcOrientedVertex is bastard of geometry and topology. Orientation as meant in this entity is a geometric element and the entity does not have a vertex as attribute but a cartesian point. What it actually does is to define a local coordinate system as an axis placement and that is why we have in part 42 several axis_placement entities for different coordinate spaces and shapes. This entity deserves a better name. My recommendation would be to take what is in part 42 - entity names and attributes.
- AP42_direction is not the same as entity direction of part 42. In part 42 the list is L[2:3] to allow to use it in 2D and 3D coordinate space. The entity is AP225 ARM direction entity because we always define our elements in 3D space.

Page 4-91
- Entity AP42_cartesian_point is not as defined in part 42. There the attribute coordinates is a List [1:3] to allow to use this entity in different coordinate spaces.

Page 4-92
- Entity AP42_faceted_brep is not as defined in part 42. There the entity has no attributes. The attribute outer is inherited from supertype manifold_solid_brep.
- In both, part 42 and AP225 faceted is written with one t. Please correct entity names.

Page 4-93
- Entity AP42_line is not as defined in part 42. Attribute names should be pnt and dir.
- Heading text is misleading. Please omit "/Polyline w/Arc".

Page 4-94
- Why do we need IfcReal? EXPRESS already provides simple data type REAL.

Proposed Solution Included in the text above . . .

Resolution Mostly resolved, but one final check should be done.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.X - Beta

Insure that all of these have been resolved.

Issue Number I - 398 **Issue Date** 5/30/96

Author Haas, Wolfgang **Owner** Liebich **Status** Resolved

Schema **Version** R1.0 - Pre-Final (

Issue Description Other edits in the "Geometry" sections of the documentation:

Page 4-95, page 5-11, page 8-34
- None of the entities is of a topological nature. They are all geometry entities. So please change name of select type on page 4.1.6.6 and Titel of clause 4.1.6.7.
- Points and curves are well covered by STEP part 42. This document has been extensively reviewed by experts. So there will be only few bugs remaining in this document. I highly recommend to use it.
- If I cross check with page 8-34, it becomes clear that cartesian points are meant. There are no entities 2D point and 3D point in part 42. Entity point of part 42 is a supertype of several point entities such as cartesian_point, point_on_curve and point_on_surface. Points on curves will for example be needed when we create civil engineering objects such as axis of highways. There locations are frequently defined as points on axis i. e. curves.
- On page 5-11 the name point - yet another name - appears. This should be made consistent.
- Same with curves. Please just take what is in part 42.

Page 5-18, 5-19
Here we have another definition of explicit geometry as in chapter 4.1.6. In chapter 4.1.6 one gets the impression that explicit geometry is basically b-rep with all necessary geometry and topology. In clause 5.4.4 all entities of clause 4.1.6 are missing.
One gets the impression that explicit geometry is CSG, based on an extended set of CSG primitives such as trimmed elements. One important ingredient is however missing - the CSG operators. Based on what is currently in clause 5.4.4 one cannot create complex shapes by combining CSG primitives. One can for example not cut a window opening in a wall.
If we add the extruded primitives to the explicit primitives of clause 5.4.4 then we also cover implicit geometry with the advantage that we will hopefully have CSG operators to combine the primitives to make up shape representations of building elements. One other detail caught my attention.
- Reducing torus has a name as geometric surface. It is called cyclide. Cyclides are well investigated by computational geometry experts. They are for example used for blending circular cylinders when they join a plate non perpendicular.

Proposed Solution Included in the text above . . .

Resolution Mostly resolved, but one final check should be done.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.X - Beta

Insure that all of these have been resolved.

Issue Number I - 399 **Issue Date** 5/30/96

Author Haas, Wolfgang **Owner** See **Status** Resolved

Schema **Version** R1.0 - Pre-Final (

Issue Description 4.1.1.23 Connectors, page 4-25
Connectivity belongs to topology and on this page we mix terminology. Entity IfcFaceConnector is right but the attribute ConnEdge of entity IfcEdgeConnector should point at something like IfcEdge and not at IfcCurve which is a geometric element. Entity IfcPointConnector should be renamed to IfcVertexConnector, attribute ConnPoint to ConnVertex and IfcPoint3D to something like IfcVertex.
This is not my main point. If one wants to build up this kind of connectivity one needs the corresponding faces, edges and vertices explicitly. Most of them are not there in CSG or sweep

related data structures. In a CSG representation of Block one can reference none of the 6 faces and in a sweep representation one can only reference the face which will be extruded. All other faces become only explicitly available when the corresponding b-rep structures are created. The same is true for edges and vertices. So we need both types of geometry, what we currently call implicit and what we currently call explicit. I do not see explicit as fall back solution when implicit is not possible.

Proposed Solution Included in the text above . . .

Resolution Resolved.

Issue Number	***I - 400***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExtention	***Version***	R1.0 - Final		

Issue Description My 1st major concern is the missing of entity for building sections (e.g. IfcBuildingSection). For example, a building could have 2 sections which are connected by interior stairs. The 2nd storey of each section for example can be different, e.g. different elevations. As far as I remember, in BCCM there is indeed an entity called BuildingSection. I guess you (and the rest of the model group) must be aware of this issue and have already thought about it and decided not to use building sections in IFC.

Proposed Solution Restore IfcBuildingSection or please explain the reasons why we don't have IfcBuildingSection, or suggestions on how to deal with the situation I just described.

Resolution We did discuss this at some length and decided that the IfcZone was functionally equivolent to the BuildingSection. However, your example about the differing floor heights of two sections of the 2nd floor is an interesting one. The BuildingSection as defined before did not handle this, but we _could_ define a base height for each section rather than for a storey. This is better left to R1.5. Thanks for the input.

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R2.X - Beta

Assess if this is possible in R2.0.
Make appropriate change or provide explanation.

Issue Number	***I - 401***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R1.0 - Final		

Issue Description Page 3-127, IfcRelSequence, attribute "Precedes" data type "Set [1:n] Ref [IfcProcessObject]"

Proposed Solution Shouldn't be a "set" since this doesn't work with the one value of the "LagValue" and "LinkType". Also, the attribute name of "Succeeds" and "Precedes" should be "Succeed" and "Precede".

Resolution I am not a construction management type of guy, but I believe that the LagValue and LinkType is for the "Succeeds" relationship (for which there is only one. Therefore, the Lag and Link for the set would be defined in the related IfcProcessObjects in the "Precedes" set. Does this make sense with your CM hat on?
Resolved in later releases

Issue Number	***I - 402***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	See	***Status***	Resolved
Schema	IfcFacilitiesMgmtDomain	***Version***	R1.0 - Final		

Issue Description Page 5-49, section Facilities Management, all the use of the "InsertionPoint" and "OrientationAngle" in many of the "Att_"s is incorrect.

The reasons are: 1) not consistent with the use of IfcPlacement in other classes; 2) doesn't use IfcPlacement so not efficient; 3) they should not be defined at this level, that is the level of each attribute set.

Proposed Solution Placement information should be at upper level such as IfcFurnitre and IfcEquipment or upper. In fact, since IfcElement has gotten the "PlacementRelTo" and "RelativePlacement"(page 5-19), they don't need to be re-defined at any lower level at all. Please consider to eliminate all the "InsertionPoint" and "OrientationAngle" attributes from all the attribute sets defined in FM extension such as "Att_Chair", "Att_Computer", and so on

Resolution Yes, I agree that these attributes are redundant, but did not want to remove them until you agreed. In the rush to complete the spec on the weekend of 13-Feb, I could not call you to confirm, and so left them in.
I believe that I can fix these for the next printing.
Corrected in R1.5

Issue Number	***I - 403***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	See	***Status***	Resolved
Schema		***Version***	R1.0 - Final		

Issue Description A. Page 2-3, paragraph: "Note that the Layered Model Architecture diagram below:", 2nd bullet, "Boxes using dashed lines, =85".

B. Page 3-22, IfcOwnerID, attribute OwningUser's data type should be Ref. [IfcActor], rather than [IfcActor]?

C. Page 3-29, IfcCompositeCurve, attribute "SegmentCount", "ClosedCurve", and "SelfIntersect", data types, missing "Ifc-" prefix? Same as page 3-32 IfcPolyLine and page 3-33 IfcDirection.

D. Page 3-47, IfcProject, attribute "HasProjectObjects" data type "Set [0:n] IfcProjectObject" should be "Set [0:n] Ref. IfcProjectObject"?

E. Page 3-87, IfcManufacturedElement, attribute "OperatingWeight" and "ShippingWeight", data type IfcReal, but no units.

F. page 3-119, IfcWorkTask, attribute "TaskCost", data type "Ref [IfcCost]", don't quite understand why use reference [Ref.] here?

G. Page 3-133, IfcProgrammeGroup and IfcSpaceProgramme, all attributes are the same except the class name.

H. Page 3-141, Att_SpaceInventory seems rather incomplete and premature..

Proposed Solution A. The boxing style used for Explicit/Implicit Geometry seems to be conflict with what is said here. Also, don't see any italic text at all.

B. Shouldn't they be [IfcActor]?

C. Add the "Ifc" prefix.

D. I think we should use reference here.

E. These need units

F. Please explain.

G. This doesn't sound efficient and I don't feel comfortable with it.

H. Please consider holding on the Att_SpaceInventory for Release 1.0. Not only because the space inventory concept is important to FM, but also we are defining a complete entity for Space Inventory in Release 2.0.

Resolution A. good catch. I lost the italics during the paste of this Visio

diagram.   The Explicit and Implicit is right, and it isn't clear that the general grometry is in the enclosing box. Will have to make it more clear next time.
B. I agree. I can change this for the next printing.
C.good catch!
D. yes. you are right!
E. The units for these and many other attributes is set by the UnitsInContext associated with the Project Object. This sets the units for all the attributes in the project. In R1.5, we will have a UnitsInContext for the whole project, but will also allow an override for a particular attribute or object.
F. I would tend to agree with you. This would be better contained within the WorkTask. Will do for the next printing.
G. This is a cut and paste error. See page 5-30 for the REAL definition of IfcProgrammeGroup.
H. Are you asking to remove it from R1.0 or "holding on" to it, as in, to keep it in R1.0 ??

ALL RESOLVED IN R1.5

Issue Number	***I - 404***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R1.0 - Final		

Issue Description

A. The use of I_ResourceUse is not quite right: first, consider this example. One activity needs 5 resource objects, so in the attribute "Resources" list, there are 5 items each referencing an IfcResourceObject. However, in some cases, the information about the "ResourceQuantity" and "ResourceDuration" is not available or not needed to be defined. In this case, the number of items in the "ResourceQuantity" or "ResourceDuration" lists (i.e. list of IfcReal) will not end up with 5. This will cause serious problems when retrieving information about resource usage. Second,
this method doesn't allow or it is not convenient to define common attributes on information about each Resource Ussage, e.g. the cost of each resource ussage. I think this is an ideal case of using objectified relationship between an worktask and a resource object.

Proposed Solution

I would propose the
following models:

```
ENTITY IfcWorkTask;
  (* all attributes defined except those for I_ResourceUse*)
  ResourceUses: optional SET [1:N] IfcResourceUse;  (*take references*)
END_ENTITY;

ENTITY IfcResourceUse;
   Usedby: IfcWorkTask (or IfcProcessObject); (*take reference*)
   Resource: IfcResourceObject; (*take reference*)
   Quantity: IfcReal;
   Duration: IfcReal; (* or IfcTimeMeasure)
   Cost: IfcCost;
   ResourceUseAlternatives: IfcString;
END_ENTITY;
```

Resolution

RS: I am "forcing" the application to fill in the ResourceQuantity and Duration. This value may be set to zero where it does not make sense. For example: 100 board feet of 2x4 studs would not require a duration. In this case, the duration should be set to zero so that the indicies across the 3 lists remain consistent. This is probably a better alternative. We simply were looking to minimize the number of classes we were adding to the model at that point.
I will forward (w/ cc to you) this alternative suggestion for consideration in R1.5. Why did you add cost when there will be cost associated with the ResourceObjects?
MC: I think that Kevin is right that this should be a single object instead of using parallel lists (i.e. Resources LIST[1:N], ResourceQuantity LIST[1:N], ResourceDuration[1:N].) Combining them into a single

object makes their relationship explicit whereas the relationship among parallel lists is not obvious.

Regarding his original objection though, I had always assumed that an entry would be made in each list (Resources, ResourceQuantity, and ResourceDuration) whether one was required or not, thus keeping the 3 lists always in synch. After all, the objectified object will have entries for Quantity and Duration whether they are needed or not.

I had assumed that the cost of a resource usage would be a product of the ResourceQuantity, ResourceDuration and the cost in the ResourceObject. However, having Cost inside IfcResourceUse, would provide a good way of overriding an implied calculated cost. After all, it is very common to have a lump-sum cost that is not the result of a calculation.

As a side note, the exchange diagrams still show ResourceDuration as a single IfcReal instead of a list of IfcReals. If we stay with our current scheme for 1.5, at least this problem should be resolved.

RESOLVED IN R1.5

Issue Number	***I - 405***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R1.0 - Final		

Issue Description The type of information as in the I_Schedule can also be needed in other entities, such as IfcWorkgroup, IfcProject, IfcProcessObject, a plan, a schedule, etc.. Thus, it would be more efficient to have a separate entity or attribute set to represent the time schedule information.

Proposed Solution I would propose an attribute set as follows:

```
TYPE Att_ScheduleData;
  ScheduledStart: IfcDate;
  ScheduledFinish: IfcDate;
  ActualStart: IfcDate;
  ActualFinish: IfcDate;
  EarlyStart: IfcDate;
  EarlyFinish: IfcDate;
  LateStart: IfcDate;
  LateFinish: IfcDate;
  Duration: IfcReal (or IfcTimeDuration, or IfcTimeMeasure);
  TotalFloat: IfcReal (or IfcTimeDuration, or IfcTimeMeasure);
  RemainingTime: IfcReal (or IfcTimeDuration, or IfcTimeMeasure);
END_TYPE;
```

And, IfcProject, IfcProcessObject, IfcWorkgroup, and IfcWorkTask all have an attribute (or reference to) of Att_ScheduleData.

Resolution RS: this is an interesting suggestion. However, I think that some of these things will have this through it's inclusion in WorkTask -- for example WorkGroup does through it's inclusion in included WorkTasks -- unless you are suggesting EarlyStart/LastStart, etc. for the entire group (as sort of summation of the scheduling information for all of the included WorkTasks). There are no other ProcessObjects right now, so I don't know if it would be good or bad. Similarly for Project, are you suggesting summary schedule information in such an associated AttributeSet?

MC: I agree that schedule information belongs together in one object.

RESOLVED IN A LATER RELEASE

Issue Number	***I - 406***			***Issue Date***	3/10/97
Author	Yu, Kevin	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R1.0 - Final		

Issue Description	It is a little hard for me to understand why the IfcCost information doesn't start from the IfcProcessObject level, or even IfcProjectObject level. To me, IfcResourceObject, IfcProcessObject, and IfcProductObject should all have an IfcCost. I understand some IfcControlObject doesn't have a cost.
Proposed Solution	Please change or explain
Resolution	RS: it seems to me that I have made this same case before and I cannot recall the rationale behind leaving it out now. I will take a look and have to followup with you. MC: The IfcResourceObject does have a cost, called ResourceCost. The IfcWorkTask object also has a cost, called TaskCost. It is easy to understand the meaning of these costs. The NA estimating committee has had a hard time deciding on the usage of ProductCost inside of IfcProductObject. The problem is that the meaning of the cost is undefined. Is it the cost of the product and all of its components? Does it include the installation cost? Is it total cost impact? Defining a cost without a context or a specific meaning, at this level, doesn't make sense to me. It also doesn't make sense to assign a single cost, since many cost views may be needed. The NA estimating committee is going to suggest that for the 2.0 model, in some a high level object (perhaps IfcProjectObject), we reference a set of IfcCostScheduleElements (and possibly a set of IfcCostSchedules). Referencing an element of a cost schedule, instead of a lone cost, gives the cost context and meaning. Resolved in a later release.

Issue Number	***I - 407***			**Issue Date**	3/12/97
Author	Grobler, Francois	**Owner**	Yu	**Status**	Resolved
Schema	IfcProcessExtention	**Version**	R1.0 - Final		

Issue Description	After many years of hard work the US Army Corps of Engineers in conjunction with collaborating software vendors have officially adopted a set of data exchange standards for construction scheduling information. Scheduling packages used on Corps construction contracts are now required to exchange files in the standard format (viola--interoperability of scheduling packages! Who said IAI cornered the market on interoperability). I believe most of the serious scheduling software vendors (in the US), like Primavera, have committed to this standard. The standards were rooted in information requirements rather than object analysis but will be an excellent starting point for the definition of the Ifc_Schedule attribute set.
Proposed Solution	I also strongly urge that the IAI model should embrace the standard so that future IFC-based packages can exchange scheduling data with existing packages. CERL's Bill East (whom I copied in this message) is the mover behind these standards. Perhaps you have information you wish to add, Bill.
Resolution	To be considered. Resolved by K.Yu in R2.0

Issue Number	***I - 408***			**Issue Date**	3/12/97
Author	Grobler, Francois	**Owner**	Yu	**Status**	Resolved
Schema	IfcProcessExtention	**Version**	R1.0 - Final		

Issue Description The example of the Ifc_Schedule attribute set provided in this thread (I'm not sure by whom) represents a good "traditional" CPM approach to scheduling.

Proposed Solution I want to urge an expanded vision of scheduling objects which can serve not only traditional CPM, but also constraint-based reasoning about scheduling, etc. Let's think about the construction worker checking his/her "wrist watch" computer for a list of things to do today (perhaps a list for his personal robot assistant), or to explore the impact of a contemplated change. I know that sort of thing is not immediately possible, but acknowledging those possibilities in the process of creating the IFC may allow the IFC to nurture the germs of more advanced approaches, rather than institutionalizing old paradigms.

Resolution To be considered.

Resolved by K.Yu in R2.0

Issue Number	***I - 409***			***Issue Date***	3/12/97
Author	Grobler, Francois	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R1.0 - Final		

Issue Description Regarding the modeling of resources, linking, etc.

Proposed Solution You may want to consider an atomic unit of construction which includes the smallest amount of material, labor, equipment and material use OF CURRENT INTEREST). Such a unit (which may be sub-divided if a new interest requires it) does the required linking. In my thesis I have argued for such a fundamental unit of construction which is in essence an abstract Largest Common Denominator for views of labor, material, and equipment. This unit is transparent to the user and is used by the software to calculate different views correctly.

Resolution To be considered.

Resolved by K.Yu in R2.0

Issue Number	***I - 410***			***Issue Date***	4/25/97
Author	Cole, Mike	***Owner***	Wix	***Status***	Resolved
Schema	IfcPropertyResource	***Version***	R1.0 - Final		

Issue Description In the IfcCost diagram IfcCostAddition has Purpose typed as a REAL, and AttValue typed as a STRING. I believe this is backwards.

Proposed Solution Reverse them

Resolution Agreed

Action # 1 ***Assignee*** Wix ***Status*** Complete ***Resolved in Version*** R1.5 - Final

change types as resolved

Issue Number	***I - 411***			***Issue Date***	4/25/97
Author	Cole, Mike	***Owner***	Wix	***Status***	Resolved
Schema	All Schemata	***Version***	R1.0 - Final		

Issue Description I do not see any reference to the IfcWork objects, the IfcResource objects and the IfcCostSchedule objects. Will they be available soon?

Proposed Solution Clarify how these concepts are handled.

Resolution Work task related items will be added to the process schema. IfcResource is in the Kernel. We have not really done much with it in this release. CostSchedule related objects can be found in the IfcDocumentExtension schema.

Action # 1 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R1.5 - Final

Add documentation introducing these concepts into Model Guide.

Issue Number ***I - 412*** ***Issue Date*** 4/25/97

Author Shulga, Nikolay ***Owner*** Liebich ***Status*** Resolved

Schema IfcMeasureResource ***Version*** R1.0 - Final

Issue Description Looks like now we have IfcWhateverMeasure which is REAL and IfcWhateverMeasureWithUnit which is REAL with unit attached. Geometry entities use the first one. Did I get it right?

Proposed Solution Clarify in the documentation

Resolution Resolution to be documented by T.Liebich

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R1.5 - Final

Send response to Nikolay

Issue Number ***I - 413*** ***Issue Date*** 4/25/97

Author Shulga, Nikolay ***Owner*** See ***Status*** Unresolved

Schema IfcGeometryResource ***Version*** R1.0 - Final

Issue Description I am having REAL trouble with the concept of explicit vs implicit geometry. There is no such thing as implicit geometry. If you can draw it, it is explicit. If you can't draw it, it doesn't exist. I don't like the word implicit ever since my Fortran IV days. (as in DO = 1 instead DO I=1,..)

On less philosophical level - At the end, you have to build the geometric entities - whether they started as explicit or not. The difference is that for explicit geometry well-known and agreed upon definitions are used (this is a cylinder; this is a block...). For implicit geometry, we agree that eg given a path within a wall entity, we extrude it along straight line by a certain distance. The only difference between this and explicit extruded volume is that the latter is well-defined - and probably handled by most systems already - hereas the former will be interpreted by each application to its best understanding of what the wall is. As a free gift, you get potential problems of explicit geometry not being in synch with implicit, etc.
....
It seems that my email on the implicit vs explicit was interpreted as a proposal to exclude certain types of shape representation. Which isn't the case. What I am proposing is treating all kinds of shape representation the same - as geometry. That implies certain criteria wrt unambiguity, etc.

The way the implicit geometry is now, it can be misinterpreted easily - much the same way a collection of wireframes representing a solid in DXF is misinterpreted on a daily basis now (see Mike's email for gory details)

Proposed Solution To be more specific.

Take both implicit and explicit geometry data out of the wall, etc. entity. On the higher level (building_element?), put in a reference to shape_representation. Derive from shape_representation:

shape_rep_1 (need a descriptive name) which has what is now called explicit geometry in IFC
shape_rep_2 which has a profile - to communicate eg floor layouts.
shape_rep_3 - same as _2 + list of heights, to communicate what's currently communicated.

That will require a new geometric entity - call it idealized_wall_shape or whatever, consisting of profile + list of heights. It will be subject to the same criteria the rest of geometry is, thus greatly reducing the possibility of misinterpretation. Eg, we'll have to spell out that it doesn't self-intersect, etc.

Resolution James Forester (JF): If I understand your proposal, shape_rep_1 is used to reference an 'explicit' shape for the wall, which could be defined using the current IFC 'explicit' constructs. This would consist of the 3D wall geometry located somewhere in space. (OK so far, but I don't see how this differs from the current wall's reference to an explicit geometry represenation).

NS: The difference is that all geometry is treated the same.

JF: Shape_rep_2 is used to reference a 'profile'. Do you mean by profile the 2-d epresentation, eg the 'outline of the wall' on a floorplan or a wall topology? In either case, these are defined using 'explicit' constructs?

NS: Yes, I mean 2d. These are defined using whatever geometric entity which is suitable. (forget implicit vs explicit). That was thrown in as an example of something we may need a year down the road, the way the schema is now the changes we'll have to make to accomodate this will break backward-compatibility - or become a kludge.

JF: shape_rep_3 starts to get interesting, because here you are trying to assign a generalized set of paramaters eg heights to a wall. This sounds alot like the current IFC's 'implicit' approach with the wall's attributes driving the geometry.

NS: No. I am assigning parameters, as you call it, not to wall but to its shape. I am trying to define a geometric shape here more or less the same way it is done in "implicit" IFC geometry; but - this is an independent geometric entity, with its own definition, consistency rules, etc. which are lacking in the current version. It is clearly marked as geometric shape. Anybody should be able to reconstruct the shape given the profile+heights data and the definition. I am not even sure we need to introduce a new entity, eg STEP geomery has quite a lot of things like that already. To me that whole implicit business looks like an extremely, how should I put it, naive (no offence meant, but I can't find a better word) attempt to do what's already been done elsewhere.

JF: I am concerned that trying to formalize the shape_rep_?'s to encompass all geometries is an unacheivable goal for two reasons. 1) The number of potential formal representations is very large,

NS: We don't need to incorporate all shapes; in fact, we don't have to represent anything which isn't - in some form - represented today. We do need to clearly define what's there already. We already have
path+heights, it's just that its meaning isn't defined clearly. Shape is a property of an object, it can be expressed using very different means - from very dumb to very smart. But it is still geometry, dumb or smart. It should be treated as such.

JF: and 2) There would still arise cases where ambiguity is unavoidable. IMHO, it seems that we would end up in the same place we've started from!

NS: - by IFC v. 3.0 ......, somebody needs a way to exchange data pertinent to his - entirely new - field. IFCs, if sturctured the way they are now, will have to be changed in a non-backward-compatible manner. If they are changed the way I am proposing, they will stay backward-compatible - we'll create a shape_rep_4 which adresses new needs.

Richard See: If I am understanding your suggestions correctly, then I believe we on a consensus track with the improvements to shape representation for R1.5 as follows:

1. "Take both implicit and explicit geometry data out of the wall, etc. entity. On the higher level (building_element?), put in a reference to shape_representation." --> this was done in R1.5 to allow multiple geometry representations -- so elements now include a list of such refererences

2. "Derive from shape_representation:
shape_rep_1 - (need a descriptive name) which has what is now called explicit geometry in IFC,
shape_rep_2 - has a profile - to communicate eg floor layouts,
shape_rep_3 - same as _2 + list of heights, to communicate what's currently communicated."

This is slightly different than the current track, but similar. We are providing certain types of shape representation (as you suggest), which may be used by elements (for representation). Over time we will insure that these 'shape_rep' types are unambiguous -- with a lot of help from implementers. You may argue that these 'shape_rep' types need one more level of structure -- maybe so, let's discuss it.

3. One of the reasons for these improvements in R1.5 was to insure the type of backward compatibility for which you argue.

Jeffrey Wix (JDW): Use of the term 'implicit' was chosen simply to identify it as being different to 'explicit'. Reference to Fowlers Common English Usage ... shows that we should interpret the word as meaning 'implied'. That is exactly what an exchange of implicit geometry is; the actual geometry is implied by the exchange and it is up to the receiving system to construct the explicit geometry using its internal capabilities i.e. the sending system implies the geometry and the receiving system has to interpret the data according to its own capabilities.

Wolfang Haas (WH): To balance Jeff's comments I would nevertheless like to quote Oxford dictionary which states under implicit "suggested though not plainly expressed" and in the same paragraph for explicit "unquestioning".

NS: Tell me how this is different from

```
#10 = cartesian_point(10, 10, 10);
#20 = cartesian_point(20, 20, 20);
#30 = polyline (#10, #20);
```

The receiveing system is expected to construct a polyline out of it. The only difference is that polyline is well defined, whereas IAI' so-called 'implicit' is wide open to misinterpretation - indeed, not even present in the geometry schema.

JDW: As a quick example, lets take a FlatOvalDuct entity which has a nominal size of 500 wide and 300 deep and is manufactured according to HVCA DW142 (or whatever the latest standard might be called). We might imply this duct using something like:-

```
 #40 = FlatOvalDuct(500,300,'HVCA DW142',#30)
```

NS: Or we can point to FlatToOvalShape(500, 300, #30), which is a generic geometric entity useful outside of duct and is well-defined in the geometry schema - self-intersection, parametrization, etc. taken care of and anybody can look it up. That way two entirely different apps are more likely to end up with similar idea of the shape of HVCA DW142 (or whatever...)

Assuming we have a system at the other end which knows about DW142 [in this case], and assuming that the positioning of the duct profile relative to the sweep polyline is fixed [let's say it is in this case], this is enough to be reconstructive, tells an estimator quite a lot etc. It's also more compact than describing the duct explicitly.

Implicit, as well as explicit, should be about providing a sufficient description of the element which is going to use it rather than being about the geometry itself.

JDW: You say that the idea is open to misinterpretation. The question is, do you (or anyone else for that matter0 think it worth while to attempt to provide a facility which can help to reduce file sizes AND make life easier for the non CAD vendors (of whom there are many more than CAD vendors)

NS: Yes, and

1) I don't think the idea of implicit geometry as it is now in IFC 1.5 is going to do it
2) I am proposing an alternative approach which is IMO a better one. I don't think the idea itself is bad - its implementation in IFCs is.

JDW: There are some very real advantages in doing this:

1. As has been indicated, the size of an exchange file falls dramatically

NS: This is a matter of using an appropriate data structures rather that calling them implicit.

JDW: Yes; it's not only a matter of using appropriate data structure but how we use them. Every model using geometry has to decide how it wants to use it since it is the application model which decides the exchange. If it is a problem with the term implicit (which I almost sense is the case), can we come up with a better term which enables us to maintain the conceptual idea of attribute driven geometry. My view follows that of Shakespeare 'a rose by any other name shall smell so sweet'

JDW: 2. A receiving system can do the interpretation according to its own abilities. If it wants to interpret data in 2-d, it can even though there is sufficient for interpretation in a 3-d representation.

NS: Yes. It is also free to misinterpret it. A standard is defined by what's NOT IN it a lot more than by what's In it.

JDW: No disagreement there. So the qustion is, how can we tighten things up to minimise misinterpretation?

NS: See above. Move it to geometry schema, define appropriate geometric entities, put in appropriate constraints. (eg, wall path can't self-intersect). Describe how you interpret wall path + set of heights, etc. In short, treat it as geometry - with proper respect. You don't do that, it will bite us - s/w developers. Ask DXF vic.. er, experts. Mike expressed it very well. ...

Take out both explicit and implicit attributes out of wall, etc. entities. Replace these with a pointer to shape representation entity at eg building_element level (or a list of shape_rep, if you want to support alternative shape representations, eg your 'implicit' vs dumb 3D vs wireframe, we can talk about it if we agree on the general idea).

Subtype shape_representation to reflect the intelligence level of the underlying geometry.

Move square_to_oval, path_with_heights etc. to the geometry schema and constrain them so that the resulting geometry is well defined.

JDW: 3. It means a lot less searching in files for relevant data by non CAD vendors.

(>>>>>> At this point Nicolay and Jeff intend to drink cans of Vodka in order to see the world much clearer, but I skipped this.... From my experience, Malt Whiskey works as well :-) (Rasso))

JDW: The fact that this appraoch works has been demonstrated lots of times, ...

In developing ideas of implicit exchange, there are some important facts to be
kept in mind:-

a) Limitations are not placed on ability to incorporate explicit geometry. An
object may possess both implicit and explicit representations for exchange as
well as a bounding box.
b) Implicit geometry will work only with prismatic shapes which can be
extruded.
Presently, it cannot deal even with pseudo prismatic shapes which have
regularly
varying changes in cross section.
c) Therefore, not everything is suitable for representation by implicit
geometry

(according to circumstances).

NS: I'd like to generalize that statement - different kinds of geometry are needed fro different kinds of things. What should be common about all of them -

1) hard to misinterpret which is ensured by them defined in the geometry context and treated with proper respect.

JDW: We're still agreeing; did I do something wrong?
...
I would contend that the explicit representation (of whatever degree of explicitness is required) exists within the sending and receiving systems. It does not need to exist within an exchange file which is simply acting as a transport mechanism between real world representations. Thus, explicitness is a quality of representation and not of definition.
...

NS: The choice of representation to use needs to be determined by the anticipated target receiver. If it is a visualization requirement, use explicit exchange; if its cost estimating, use implict exchange wherever possible.

JDW: In developing the implicit schema, the effort has been to continue use of part 42 constructs; thereby maintaining consistency between implict and explict ideas.

NS: Note that Part 42 doesn't distinguish between the two.

JDW: And still more agreement. Part 42 doesn't make a distinction but it doesn't stop others from making a distinction in terms of how they want to use it.

NS: No and that's on purpose, but it is still well-defined geomery. Every piece of it (well, except for some parameter space curve issues and we are getting this straight now). That's what I would like to see in IFCs.

WH: STEP part 42 does not use the terms implicit and explicit but well understood and established terminology such as

- b-rep
- CSG
- solid of linear extrusion
- solid of revolution.

So part 42 and AP 225 cover what is meant with implicit geometry in IFC. Using these terms has the advantage that people know what is meant and advantages and disadvanatges of the different types of shape representations can be discussed in a rational way.

Richard Junge (RJ): I totally do not understand this 'geometry' stuff going on again. It seems the usual three to four month are over again since the last email chat.

A little bit more then two years ago we have stated that we need not only 'explicit' geometry. We had a discussion about parametric geometry and Wolfgang, to the astonishment of not few of us, declared he is in favour for parametric geo. He did not use it for two reasons:

1). He simply could not use it in STEP for 225 because the resources where not avaible. (if reading your last mail right, you now are saying P.42 covers it?)

Wolfgang Haas: "Helas" - with all respect - another long lasting misunderstanding? probably again due to loose use of terminolgy.

1. November 1993 I gave a more than 60 slide presentation to STEP B&C group consisting of contemprary architecture to explain why a purely parametric (whatever this means in this context) approach does not cover the complexity of building design.

2. Right from its beginning AP225 covered all kinds of shape representation available in Part 42. So it covers what is called "explicit" and "implict" within IAI. Unfortunately the term "explicit shape representation" in AP225 and "explicit geometry" have different meanings. So I frequently encounter IAI people which tell me when they become aware who I am "Oh - you are the guy whose AP is
only about explicit geometry i. e. b-rep - but we need implicit geometry". I increasingly get the impression that the misinformation is spread out by intend! As Nikolay stated geometry is geometry. Based on my experience with IAI I would today choose a different title for AP225.

3. In the "Sydney edition" of AP225 of February 1995 we had introduced a type of shape representation which we called "standard based definition". The intend was to allow to describe standard products such as rolled steel products by giving the name of the cross section for example "I80" its lenght and location. We could so avoid to exchange the shape of these elements as for example extrusions or b-reps. Underlying assumption is that for example "I80" is implemented identically in sending and receiving system. This extension was done together with the interpretation team of STEP which map the ARM to the AIM. They encouraged us to do this extension. So this has always been possible in STEP.

Richard - do you really think that industries engaged actively in STEP would tolerated that such a common product as rolled steel which is used in aiplanes, cars, ships, buildings etc. could not be exchanged by giving its name and parameters?

In the case of AP225 the B&C group decided that this is a backdoor to parametrics and out of scope of AP225 - so we took "standard based definition" out of AP225. To make it clear - this was not our (AP225 team) decision, it was the decision of the B&C group which we had to accept. This is all "yesterdays snow".

4. Parametrics in the context of CAD and CAD-data exchange (or product model data exchange) is more than just the definition of products by a set of parameters assuming that both sending and receiving systems have implemented it in the same way. Parametrics also covers the exchange of the methods of the sending system which derive for example the shape of the element from the given set of parameters. This enables the receiving system to derive - to stay in the example - the shape of this element as it was created in the sending system although the receiving system initially did not have this capability. Part 42 and EXPRESS currently have limitations in this area. The capability of
derived attributes is not enough to fully cover these requirements. However these extensions are in an advanced stage of development in STEP.

5. Unfortunately STEP B&C group never avctively reviewed and commented part 42. I was the only person of the group to look at it in detail and to propose extensions such as additional CSG primives, extended extrusion capabilities and a simpler way to represent facetted b-reps to better satisfy requirements of B&C industry.

6. Geometry is not a religion but a science, a branch of mathematics with well established terminology which allow people familiar with it to communicate with each other with no or minimal misunderstandings. Much of the geometry discussions and confusion in IAI originates from the fact that this ignored. Nikolay already described what happens when geometry experts look at IAI geometry.

7. Our (AP225 team) approach has always been, that different types of shapes with different complexity require different description methods such as CSG, sweeps, b-reps etc. So it is reasonable to provide the complete range of these methods in a structured way, i. e. conformance classes to enable their application when appropriate.

RJ: 2). It is too huge an effort to unify the different parametric approaches implemented in CAD software today and that he wanted a result in a shorter time and less resources. The discussion let to the point where we stated that we should not go for a 'full and complex geometry world'. This was where 'simple parametrics' was born, e.g. a wall described by parameters as length, width and height. We all know that even this is not so easy as it may sound. Some of you may remember some pages I presented to show exactly the 'complexity of a solid wall. Then we had the discusssion on how to name what we wanted. There was and no one was happy with that no other short and grippy name as 'implicit geometry'. We all know it's not a good name, their is no help in dictionaries and nobody so far came with a better name. So what is this discussion periodicly exhuming the same carcass again and again good for? Too much time?

Resolution:

1) Use fo the term "implicit" to be phased out and replaced by "Attribute Driven"
2) TL to seek editing for Model Guide section for Geometry by geometry expert.

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Final

Secure editing of the Model Guide section for geometry by geometry expert.

Action # 2 **Assignee** See **Status** Incomplete **Resolved in Version** R2.X - Beta

Integrate revised geometry section into next release of the Model Guide (as document editor)

Issue Number I - 414 **Issue Date** 4/25/97

Author	Shulga, Nikolay	**Owner**	See	**Status**	Unresolved
Schema	All Schemata	**Version**	R1.0 - Final		

Issue Description These pdf files are a pain to go through - no links between different pictures.

Proposed Solution none proposed.

Resolution Does NS know of a way to create such links?

Is there a way that we can create 'hot links' between EXG diagrams (or the PDF versions) ??

None that we know of to date?

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Final

Find out if NS knows of a way to do this

Issue Number	**I - 415**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	See	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description There is no principal difference between extrusion along straight line and extrusion along circular arc. There should be a generic extrusion - along arbitrary type curve.

Proposed Solution replace these with STEP Part 42 swept_surface; if found desirable,
subtype into

surface_of_linear_extrusion
surface_of_arc_extrusion
etc.

Advantages:
- more general
- better compatibility with existing standards.

Wolfgang Haas:
Extrusions along nonlinear paths can lead to problems of self intersecting shapes. Assuming that a sending system would not create such a thing is dangerous. This should at least be studied in more detail.

Resolution Resolution to be documented by T.Liebich

Issue Number	**I - 416**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description What is IfcParaRectangle?

Proposed Solution question

Resolution TL to respond

Resolution to be documented here by T.Liebich

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Final

Respond to NS

Issue Number	**I - 417**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description I don't see the need for IfcExplicitElementShape vsIfcExplicit ComponentShape vs ExplicitSiteShape. Geometry shouldn't care if it is a site shape or building shape or element shape - the AEC-related entity pointing to this shape should carry the semantics.

Proposed Solution Use shape_representation to group representation_items
A representation_item can be a mapped_item which can point to another

shape_representation. This has been invented and proven already, what's the point of using a different schema.

Advantages:
- more general
- better compatibility with existing standards.

Resolution Resolution to be documented here by T.Liebich

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R1.5 - Final

TL to work with NS to implement agreed solution

Issue Number ***I - 418*** **Issue Date** 4/25/97

Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description FacetedBrep

I have to think more about it, but at the first glance the proposed representation does not look too different from the regular b-rep. Mechanical CAD vendors have been trying to get the b-rep data exchange right for a few years now, with not that much success. Basically, a b-rep constructed with precision 1e-5 will cause all sorts of trouble in a system operating with tolerance 1e-6 (eg ACIS). A solution for a general case is unknown as of today. To put it simple, this is one huge can of worms.

Proposed Solution Perefrably, defer the inclusion of b-rep in the model until the picture clears up a little. As a minimum, give it a second thought.

Resolution Wolfgang Haas: We know that b-reps may represent accuracy problems due to different accuracy-"epsilons" in different systems. This is especially true for b-reps with curved surfaces. However if you use the entity "polyloop" to represent faces of facetted b-rep's one can avoid "edge curves" which may not be on neighboring faces. The problem you may then encounter in the case of facetted b-reps is that not all points of the polyloop necessarily are on a plane. According to our experience this can be overcome. We can discuss this in more detail in San Diego.

Wolfgang Haas:
Even in cost planning b-reps have advantages since they allow to compute quantities easily using standard math routines based on Gauss Integral sentence.

Richard See:
We have acknowledged the value of explicit shape. Indeed, we have said that we cannot do without it! (and have made use of AP225 constructs). However, in addition, we choose to use parameterized (or 'attribute driven') geometry where it works well because of the resulting efficiency (as outlined by Jeff) and the opportunity for non-CAD applications to derive information from it which they have not been able to do with b-rep explicit shape (apparently "Gauss Integral sentence" is not commonly known).

Wolfgang Haas:
This does not answer my question and the paragraph is quoted out of context. We are all trying to satisfy AEC requirements.

The question is why this misleading new terminology was invented? Definitively not by STEP!

To take out ambiguity and become a clearer picture what is meant with the terms explicit, implicit and parametric in IAI, let us make in San Diege the following table consisting of four colunns as follows:

Column 1: Gemetric element definition
Column 2: Explicit
Column 3: Implicit
Column 4: Parametric

Exanmples:
Circle, radius and center: Explicit?
Circle, three points: Implicit?
B-rep: Explicit
Linear Extrusion: Explicit?, Implicit?
etc.

Hopefully we can then close the issue.

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R1.5 - Final

Implement the agreed solution

Issue Number ***I - 419*** ***Issue Date*** 4/25/97

Author Shulga, Nikolay ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.0 - Final

Issue Description IfcGeometryItem seems to have a dimension attribute. A typical drawing including some 2000 lines would therefore use up 1999 useless data pieces. All such data should be put into context type of entity, same as units. The same attribute in Part 42 geometric_representation_item has that attr as derived.

Proposed Solution Eliminate the dimension attribute from IfcGeometryItem and add a referenced context entity that includes dimension

Resolution Resolution to be documented here by T.Liebich

Issue Number ***I - 420*** ***Issue Date*** 4/25/97

Author Shulga, Nikolay ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.0 - Final

Issue Description Point is not an IfcGeometryItem, why?

Proposed Solution Subtype it from IfcGeometryItem

Resolution Resolution to be documented here by T.Liebich

Issue Number ***I - 421*** ***Issue Date*** 4/25/97

Author Shulga, Nikolay ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R1.0 - Final

Issue Description Are there any types of point besides IfcCartesianPoint? Do we need them?

Proposed Solution none given

Resolution Resolution to be documented here by T.Liebich

Issue Number ***I - 422*** ***Issue Date*** 4/25/97

Author Shulga, Nikolay ***Owner*** Liebich ***Status*** Resolved

Schema All Schemata ***Version*** R1.0 - Final

Issue Description Conic sections: we have ellipse and circle, do we need parabola?

Proposed Solution none given

Resolution Resolution to be documented here by T.Liebich

Issue Number ***I - 423*** ***Issue Date*** 4/25/97

Author	Shulga, Nikolay	**Owner**	See	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description IfcPlacement is still screwed up - has three axis explicitly specified. This is a bad idea.

Proposed Solution Replace with Part 42 Placement. It has the following attributes(Express defs truncated):

ENTITY placement
  location: cartesian_point
...
// used to define eg cylinder or torus axis; if axis isn't set, use [0;0;1]

ENTITY axis1_placement
axis :OPTIONAL direction
...

// 2-d coord system; one axis and location is sufficient. If axis attribute isn't set,
// use [0;1] for x and [1;0] for y

ENTITY axis2_placement2d SUBTYPE of (placement)
ref_direction: OPTIONAL direction
...

ENTITY axis2_placement3d SUBTYPE of (placement)
axis :OPTIONAL direction (default is [0;0;1])
ref_direction: OPTIONAL direction (default is [1;0;0])

Advantages:

More compact; unambigous; already handled in every major CAD system with STEP capability.

Resolution Resolution to be documented here by T.Liebich

Issue Number	**I - 424**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	Wix	**Status**	Resolved
Schema	IfcMeasureResource	**Version**	R1.0 - Final		

Issue Description Seems to be pulled more or less intact from Part 43. Is this the case, if not what are the changes.

Proposed Solution

Resolution J.Wix to respond to question with an explanation.

Action # 1	**Assignee** Wix	**Status** Incomplete	**Resolved in Version** R1.5 - Final
	Respond to NS		

Issue Number	**I - 425**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	Drogemuller	**Status**	Unresolved
Schema	IfcUtilityResource	**Version**	R1.0 - Final		

Issue Description IfcHistory: shouldn't its attributes data be in an entity called eg IfcHistoricEvent, and ifcHistory be a list of these?

Proposed Solution Add an entity called eg IfcHistoricEvent and make IfcHistory a list of these.

Resolution to be considered

Resolution to be documented here by R.Drogemuller

Issue Number	**I - 426**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExtention	**Version**	R1.0 - Final		

Issue Description [IfcProductExt.pdf]
Why are these entities in a separate schema?

Proposed Solution None provided.

Resolution T.Liebich to send explanation.

Issue Number	**I - 427**			**Issue Date**	9/18/97
Author	Cole, Mike	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description Implicit/Explicit Geometry - I have written software that gleans dimensional information from CAD files that contained points, acs, polylines, faces, wireframes, etc. that were combined together to visually represent objects. It is never easy, and in some cases is nearly impossible.

When people at the IAI started talking about representing object geometry in parametric form I was ecstatic. I could finally derive surface areas, volumes, perimeters, weights, etc. without having to search through all of the geometric components, trying to decipher their relationships to the object and each other.

I don't care if it is called Implicit, Parametric, or whatever. The intent should be to describe the geometry of an object in ways that are easily understood and manipulated by the users of that object. I understand this is a significant burden on the CAD vendors, but geometry whose primary intent is visualization is not of much use to object modelers. To have a useful object model, we must continue to pursue this type of geometry.

Proposed Solution Insure that geometric properties (e.g. dimensions, areas, volume) are accessible to all classes of applications.

Resolution To be considered . . .

Issue Number	**I - 428**			**Issue Date**	9/18/97
Author	Muigg, Peter	**Owner**	Liebich	**Status**	Unresolved
Schema	All Schemata	**Version**	R1.0 - Final		

Issue Description Implicit/Explicit Geometry - So, as the word "implicit" is the opposite of "explicit" in a lingual sense, one may come to the conclusion that by using "implicit" geometry instead of "explicit", the problem mentioned above is being resolved in a way that every vendor must use a consistent way to describe an object. That is how I understood it originally when I argued for "implicit" in favor of "explicit".

But this does not seem to be the case. When you look at the EXG's of "IfcImplGeometryItem" and compare it with "IfcExplGeometryItem" there really is no difference in terms of "freedom to choose", it is the same thing coming in two different flavors.

Regarding Implicit/Explicit Geometry - So, as Nikolay already mentioned, we do in fact agree that the real problem is that in the new schema the way object geometry is defined is ambiguous, we are just having difficulties with the terminology.

How can we resolve this? Richard See is right in reminding us that we should have thought about this earlier, but we also have to bear in mind that IFC 1.5 is going to be the first version that will be supported by applications shipped to customers and this is sort of a "point of no return" because of "upward compatibility" issues. So we better get this sorted out now or it will haunt us forever!

Proposed Solution In IFC 1.0, there have been a number of objects with a similar geometry definition. Walls, beams, columns, buildings etc. were all described by some kind of extruded polyline. In order to "simplify" this, the definition of these objects has been "harmonized" and instead of repeatedly describing an extruded polyline for each object, a common description through an "implicit geometry" item has been introduced. This is the problem, I think.

So, the only way to resolve this seems to be to go back to the definition in IFC 1.0, maybe introduce something of an IFC_Extrusion to avoid duplication, and make it one of the parameters in the description of the objects mentioned above.

NS: You mean something like

#10 = wall('brick wall', (#15),...); // the second parameter points to shape_rep
#15 = shape_representation_representing_what_used_to_be_ifc_implicit((#20));
#20 = ifc_extrusion(#30, (10,20,10)); // first parameter points to path, the second is a list of heights
#30 = polyline((#40,#50,#60)); // polyline references cartesian points
#40 = cartesian_point(10,10,10);
....
Where ifc_extrusion is defined in the geometry schema? That's more or less what I am asking for.

Resolution To be considered . . .

Issue Number	**I - 429**			**Issue Date**	4/25/97
Author	Muigg, Peter	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description After a great deal of email conversation, it appears that the terms 'Implicit' and 'Parametric', when applied to geometry, are misunderstood and imprecise. Many of us have argued for the benefits of an increasingly parameterized approach to geometry.
Note: I have deliberately used "parameterized" and not "parametric" to avoid a confusion of terms. Maybe we should "invent" a new term that does not sound as similar as "parameterized" and "parametric", like we did with "Exchange Classes" as opposed to "Conformance Classes" in a similar situation.

Proposed Solution I am not very good in inventing terms, but I would like to suggest the term "Exchange Parameters" (EP for short) and get rid of both "Implicit" and "Parametric" that is haunting us (I hope that the term "Exchange Parameter" is not used inside STEP already and means something completely different). Explicit Geometry will still be needed for objects that do not have Exchange Parameters defined yet and for cases where EP's won't do the job to describe a special type of wall, for example. The problem that in cases where both EG and EP are both used has already been resolved by introducing a flag that indicates wheter or not the Exchange Parameters describe the object exactly or are only an approximation.

The idea behind this is, as both Nikolay and I have already mentioned, to constantly refine the EP's to cover more variants of a specific object type as we move forward with IFC, so that some day will no longer need explicit geometry at all.

Resolution To be considered . . .

Issue Number	**I - 430**			**Issue Date**	4/25/97
Author	La Porta, John	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description I agree that if the geometry of the object is fairly simple (ie. made only from standard primitives and polygons), then there is not much difference in extracting information from either the implicit or explicit representations. In simple cases, the representations are not that different.

However, what happens when the geometry becomes very complex? For example, take a piece of HVAC duct work that starts with a cross section of a square 1ft. by 1ft. and ends 1ft. later with the cross sections of a circle 1ft. in diameter. I am sure that the CAD people have a way to draw such an object, but the explicit representation would be quite complex. From the standpoint of analysis, I have no interest in the exact geometric morphing that occurs. All I want to know is that it starts as 1x1 square, and ends as 1ft diameter circle. Later I will want to match this object to a part in a catalog. Again, I will have no interest in the explicit transformation. I think there are definite cases when the explicit representation will be too complex to be useful for the non-graphic applications.

Proposed Solution Insure that it is possible to represent "explicit transformations" of geometry, without necessarily requiring explicit shape representation.

Resolution To be considered . . .

Issue Number	**I - 431**			**Issue Date**	4/25/97
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description 1) Terminology is not in line with established terminology in computational geometry.
The terms "implicit, explicit and parametric" have completely different established meaning in the computational geometry community. This can be easily checked by looking in standard text books about this topic.
2) Geometry as laid down in IFC is ambigous and loose.

Proposed Solution 1) Revise geometry terminology to be in line with established norms. Eliminate the use of "implicit, explicit and parametric" OR modify the use of these terms with established norms
2) Further develop the geometry sections of the IFC documentation - making them more rigorous and unambiguous.

Resolution To be considered . . .

Issue Number	**I - 432**			**Issue Date**	4/25/97
Author	Shulga, Nikolay	**Owner**	Liebich	**Status**	Resolved
Schema	All Schemata	**Version**	R1.0 - Final		

Issue Description A lot of people indicated a need to distinguish 'dumb' geometry (eg, representation of wall shape by a collection of blocks) and 'smart' geometry (eg representation of the same wall shape by a path and a collection of heights). Which is where IAI 'imlicit'/'explicit' came from. Implicit/explicit/parametric are not good terms as they mean something different for the rest of the world (not only STEP! STEP simply follows the rest of the world). Note that my terms - 'smart'/'dumb' are no better, for some apps collections of blocks may be 'smart' whereas path+heights may be dumb. It seems that the only classification of these shape representations may be by intended use; fundamentally all these are within the same class of geometry.

Proposed Solution I proposed taking out 'implicit' parameters out of wall, etc. entities and replacing these as well as the reference to the explicit shape with one parameter - a list of entities subtyped from shape_representation. That doesn't seem to raise violent objections either. We then restrict these subtypes to take only the specified types of geometric entities. For now, I see a few such subtypes(I am not good at naming things, feel free to propose better names):

csg_based_shape_representation - may have only csg entites such asblocks, cylinder, etc.
wireframe_based_shape_representation - may only have trimmed surfacesand wires
advanced_shape_representation - may only have 'IAI implicit" entities
2d_shape_representation - use 2-d profiles to communicate floor plans (if needed)
... other types to be added in the future as needed.

To represent a shape currently represented as path+heights, we introduce new geometric entity - I'll call it shape_defined_by_path_and_heights for the lack of better word. I believe something like that was available in IFC 1.0 (extrusionPath?). The same applies to oval-to-square example cited by Jeff. We have to make sure the definition is geometrically sound.

Resolution Resolution to be documented here by T.Liebich

Issue Number I - 433 **Issue Date** 4/25/97

Author Shulga, Nikolay **Owner** Liebich **Status** Resolved

Schema IfcGeometryResource **Version** R1.0 - Final

Issue Description Question: how we compute eg wall path? Answer: if the wall references advanced_shape_representation, get it from there - if needed (I think it is), we'll introduce a derived parameter "path " in the wall entity and write a rule to extract it. If the wall references eg wireframe only, we have a few options. 1) give up 2) write up a rule to compute the path (eg, assume the first n lines to be it and tell all wireframe-level apps to output it that way) 3) discuss it further - quite a few people here have a lot of painful experience gained while making sense of DXF.

Proposed Solution Use conformance classes to indicate what application exports advanced_shape_representation, what doesn't so that the end user knows what level of intelligence (s)he can exchange.

If we agree on this, I can undertake putting geometry 'IAI implict' into Express code. I will need help identifying other entities with implicit geometry and some other things. I should be able to put it together before San-Diego; we can discuss it there. But I would to have an agreement before I start spending time on that.

Resolution Resolution to be documented here by T.Liebich

Issue Number I - 434 **Issue Date** 4/30/97

Author Tarandi, Vaino **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.0 - Final

Issue Description Conceptual Model:
- The classes in the Core seem to be a random break down into levels of classes. A traditional building element could, e.g. depending on construction method and material choice, be a profiled, a layered, a manufactured or a filling element!
- From (ABS)IfcElement down to its parts the division into the subclasses is very doubtful. The AssembledElement subclass IfcWindow could also be seen as a Manufactured- Element. Why classify after manufacturing method or shape as in the case of Profiled Element?
- What is a surface object like paint? Is it a CoveringElement or a LayeredElement?
- My suggestion is that the conceptual schema is cleaned up and made much smaller using common constructs with attributes to define classification and fundamental shapes like profiled and layered.
- A generic construct should have the type and function on a high level class. ”If I say that this product is functioning as a column, it is.” In this case the product fulfils the requirements of a column and is connected to the column element occurrence. In the same way an arbitrary shape with implicit or explicit shape can be connected.
- In this first version only a hand full of classes are defined, but still there should have been a place for all objects to be put into. Now there is for example only window and door as sub classes of (ABS)FillingElement. Objects like "Panels with doors and windows" and "Window-doors" have no place.
- The subclass IfcEquipment has Access- and SupplySpaceRequired as attributes. This is good, but this is valid also for most of the other classes! It should be placed higher up in the structure.
- For the class Ceiling the implicit geometry seem to be missing! Typically this class uses polygons as reference geometry.

Proposed Solution In the text above

Resolution Considered in R1.5 and R2.0

Issue Number I - 435 **Issue Date** 4/30/97

Author Tarandi, Vaino **Owner** See **Status** Resolved

Schema All Schemata **Version** R1.0 - Final

Issue Description Object Types:
- This is a mixture of explicit classes like window and door on one hand and type definitions on the other. The GenericType is re-defining the class and the SpecificType is then specialising it.

This may then conflict with the classification on the ProjectObject class.
 - The use of types in the IFC model can make defined classes on the lowest level, like Window, unnecessary. A generic class definition like BuildingElement could with a TypeDefinition like Att_WindowFixed define the same occurrences. (geometry and shape definition structures have to be adjusted also)
 - Multiple sets of SharedAttributes and OccurrenceAttributes ought to be supported to make it possible to use modularised sets of attributes. E.g. locks and fittings are often defined as types and re-used by different types of doors.

Proposed Solution Included above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 436**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	See	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description GEOMETRY AND SHAPE:
 - Multiple Explicit_element_shapes ought to be supported to create more complex structures
 - The use of different levels of the explicit geometry defined in AP225 for spaces compared to elements is unnecessary. It only makes the model more complicated!
 - The semantics of the sets of implicit geometry connected to an object, e.g. windows and doors, must be taken away. It is OK to have multiple implicit geometries connected to an instance for the purpose of modelling a complex shape, but they must not have another meaning than that of a shape that is part of the shape of the object on that level.
 - The construct of MaterialLayerSet which can be connected to a LayeredElement is similar to the multiple implicit geometry structure construct. Semantics are introduced on the wrong level of object break down.
 - If there is a need for identifying parts of an object like a door, then the conceptual schema has to support that. One solution is to have a generic construct on (ABS)IfcElement where the part of construct is defined. These parts can then be given meaning through attributes and also have implicit and explicit geometry added on their level.
 - It is important to be able to mix implicit and explicit shape for different classes depending on the demands from the user. Different applications need different levels of abstraction and detailing.
 - Where is the segment concept? If it is still in the model, why is it needed?
 - The bounding box concept is OK, but how is the box placed in relation to the shape of the object itself? In the case of a beam the placement is in the centre line for the implicit / explicit geometry and the same placement is used for the bounding box, which is asymmetric!

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 437**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R1.0 - Final		

Issue Description Quantities:
 - To be able to calculate the material and work resources there is a need for a QuantityObject connected to AssembledElement or even better to Element level. This Quantity object can store the derived or calculated value according to the measuring rule which is applied to the building element class. The quantity_type, e.g. gross_area, the unit, e.g. m2 and the value, e.g. 120.00 are the attributes of QuantityObject.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 438**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Resolved

Schema	IfcProductExtention	**Version**	R1.0 - Final

Issue Description Openings:
 - To be useful for quantity take off purposes the openings should have explicit attribute information about area. The same could of course be expressed through the GenericType definition, e.g. hole 600 x 200 is one type and hole 800 x 1000 is another.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 439**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	Wix	**Status**	Resolved
Schema	IfcClassificationResource	**Version**	R1.0 - Final		

Issue Description Classification:
 - There is an apparent risk for contradictions as both Classification and TypeDefinition can be defined using the same or different classification tables and in different ways.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 440**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExtention	**Version**	R1.0 - Final		

Issue Description Element Containers:
 - The IFC model should support multiple IfcElementContainers for an IfcElement. That would enable some alternative sortings for construction planning purposes.
 - As a location can be part of a building storey this has to be supported, perhaps through the IfcZone.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 441**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Resolved
Schema	IfcProductExtention	**Version**	R1.0 - Final		

Issue Description Connection:
 - This is a very important construct and should have logical connection type as subclass and also attribute sets attached

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 442**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	See	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.0 - Final		

Issue Description 2D Geometry:
 - This is important to support. Symbolic explicit 2D graphics, i.e. graphics which can not be derived automatically from 3D representations, will be demanded for a long time. The receiver of a window object and its 3D representation might want to present it on a drawing in combination with other objects.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 443**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.0 - Final		

Issue Description Cost:
The content and intension of this has to be clarified.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 444**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	Yu	**Status**	Resolved
Schema	IfcProcessExtention	**Version**	R1.0 - Final		

Issue Description Process:
- Only through connecting recipes to the building element the resources and the activities to produce the resulting element can be defined. The level of the building element part is missing. For some classes like IfcLayeredElement the parts can be derived through the semantically incorrect attached MaterialLayerSet, see comment about Geometry and Shape.
- For the contractor, at least in Sweden, the part of the building element is corresponding to the artefacts for production planning and cost estimation. They are the production results to which resources are connected. First after that the activities are attached. In the IFC conceptual schema there is no support for this way of working.
- Recipes, for the attachment of resources to building elements and enabling activities to be defined, should be possible to attach also to TypeDefinition and not only to the occurrence it self.
- Material resources like supplier components (Windows, fans, slabs etc.) should be directly related to the element (preferably to the element part if there is one). Now only the worktask ((activity)process) is connected to the element directly!
- The construct (concept) of functional unit, i.e. the building element like a Door and its corresponding technical solution, i.e. the physical resource like a door ABC from Swedoor is missing.

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 445**			**Issue Date**	4/30/97
Author	Tarandi, Vaino	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R1.0 - Final		

Issue Description Diagrams:
IfcCore
Diagram 2
- Should be (INV)ActsInSystem S[0:?]

Diagram 8
- IfcOpeningElement is missing the OpeningType attribute and corresponding entity

Diagram 18
- Should be (INV)UsedInWorkTasks S[0:?]

Diagram 23
- The references to 21,1 (20), 21,2 (20) and 21,3 (20) should be 23,1 (21), 23,2 (21) and 23,3 (21)

Diagram 25
- IfcAttEnum is missing

Proposed Solution Included above

Resolution Considered in R1.5 and R2.0

Issue Number	***I - 446***			***Issue Date***	9/14/97
Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcGeometryResource	***Version***	R1.5 - Beta		

Issue Description

2 General Lay Out.
2.1 EXPRESS in text with Semantic Definitions
The document would become better readable if the EXPRESS would be included in the "semantic definitions". So one has to put several documents on the table to clearly understand what is meant.
2.2 Mathematical Formulas
Word has an editor for mathematical formulas. Please use it. In mathematical formulas   is better than lambda.
2.3 Consistent Representation of Attribute Names in Text
In IfcPlane there is a line
x= Position.P[1],
in STEP Part 42 it looks like
x= position.p[1],
which is not too different.
The similar statement in IfcEllipse is
x= Placement.Axes[1]
which is inconsistent with both, STEP and your own way to do it in IfcPlane. So please whatever way you prefer, make it consistent within IFC.

I stopped looking at this kind of issues at this point.

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	***I - 447***			***Issue Date***	9/14/97
Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcGeometryResource	***Version***	R1.5 - Beta		

Issue Description

3 Schema Overview
3.1 First Paragraph
 - This enumeration of items is incomplete and misleading. Please look at the Scope statement of part 42 to get an impression how such an enumeration of subjects should look like.
 - Points and directions are for example missing
 - Although the term geometric model is not defined in Ifc my understanding is, that it is not restricted to three dimensional solids. In IFC any kind of IfcGeometricRepresentationItem can be used to describe shapes.
 - The definition of conics in part 42 is not only defined parametrically. Please check the corresponding sections in Part 42. I will comment this in more detail in a later section.
3.2 Second paragraph, last sentence
This sentence (.............containing end user semantics) is not correct. End user semantics would be length of a wall, heigth of a column, thickness of a slab etc. Nothing of this kind is there. Attribute names are of the same nature (radius, x, y, etc.) as the attribute names used in IfcGeometryResource.
3.3 Explicit Geometry
 - The two sentences describing explicit geometry claim to be definitions i. e. "explanation of the exact meaning of a word" (Webster dictionary for everyday use).
 - According to the definition explicit geometry is "a geometric representation solely using distinct spatial points to describe geometry", only the IFC classes IfcCartesianPoint, IfcPolyline and IfcPolyLoop belong to explicit geometry.
 - A cube defined by eight points contains a lot of "implicit" information. If it is for example exchanged in this way, the receiving system has to figure out the 12 edges and 6 faces. So its definition by eight points alone is an implicit one.

- IfcShapeRepResource contains an entity IfcExplicitShapeRep. The attribute Items of this entity point to the entity IfcGeometricRepresentationItem which is a supertype of among others IfcSolidModel and IfcBoundingBox. According to this an IfcExplicitShapeRep can be among others
  - an IfcExtrudedAreaSolid,
  - an IfcRevolvedAreaSolid
  - an IfcFacetedBrep and
  - an IfcBoundingBox.

Is there a difference in meaning of the word explicit in explicit geometry and explicit shape representation? Does explicit shape representation also cover parts of attribute driven geometry?

- Does for example IfcExtrudedAreaSolid belong to explicit or attribute driven geometry?

3.4 Attribute Driven Geometry

The definition "A geometric representation driven by attributes" covers any kind of geometry, for example a circle which is "driven" by its attributes position and radius. The definition is also not in line with the description given two paragraphs above containing the wording "end-user`s semantics."

If one really wants to distinguish the two types of geometry (which I do not support) it would be worth while changing the name to something like "advanced sweeps" which gives some impression of what is actually meant and change the definition accordingly.

3.5 Some General Remarks

At this point I stopped since I wanted to look at some entity descriptions too. The rest of the section is probably of similar nature but this remains to be verified. One additional point captured my attention because it was so obvious. A building box is characterized as a "octahedral boundary element". This sounds scientific but is simply wrong. An octahedron belongs to the family of regular polyhedra i. e. polyhedra with congruent faces. An octahedron consists of 8 faces (not of six as the box). Closer to intended meaning would be hexahedron which is a cube i. e. the special case of a box.

How can the section be improved? My proposal would be to look at the corresponding parts of STEP part 42, i. e. Introduction, Scope, Definitions, Symbols, Abbreviations etc. and use those parts which are relevant to IFC. I would also get rid of the artificial and misleading distinction between explicit and attribute driven geometry.

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number ***I - 448*** ***Issue Date*** 9/14/97

Author Haas, Wolfgang ***Owner*** Liebich ***Status*** Unresolved

Schema IfcGeometryResource ***Version*** R1.5 - Beta

Issue Description

4 IfcConic

I used this entity and its subtypes to check how STEP part 42 was incorporated into IFC geometry

4.1 Second sentence of corresponding entity description in Part 42 and related subjects

The second sentence of the description of the conic entity of part 42, which refers to the fact that conics are defined in intrinsic geometric terms, is omitted. This sentence is meaningful and should not be omitted. Conics get "special treatment" in part 42. This is described at first in clause 4.2.3 Parametrisation of analytic curves and surfaces. There it says:

"Each curve on surface specified here has a defined parametrisation. In some instances the definitions are in parametric terms. In others, the conic curves and elementary surfaces, the definitions are in geometric terms.

In the latter case a placement coordinate system is used to define the parametrisation. The geometric definitions contain some, but not all, of the data required for this. The relevant data to define this placement coordinate system is contained in the axis2_placement associated with the individual curve and surface entities."

In this piece of text the term "placement coordinate system" is important to unambiguously understand what is meant. It is defined in clause 3.1.19 as follows:

"placement coordinate system: a rectangular Cartesian coordinate system associated with the placement of a geometric entity in space, used to describe the interpretation of the attributes and to associate a unique parametrisation with curve and surface entities."

So the term placement coordinate system is used in a very specific way which can only be understood if the definition is provided.

IFC uses this term too but does not provide the definition. So within IFC this term is undefined i. e. open to interpretation. The text according to clause 4.2.3 of STEP Part 42 is missing too.

4.2 Second and third sentence in IFC

Only minor changes have been made. I would not use the wording "two or three dimensional placement" but "IfcAxis2Placement" similar to Part 42. However this is not so important. More important is that the term "placement coordinate system" appears without being defined. So ambiguity is there.
4.3 Attribute "position"
Only the first sentence of the corresponding definition of Part 42 is provided. The second sentence which is "Further details of the interpretation of this attribute are given for the individual subtypes." Is missing. Again this is important information which was omitted.

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 449**			**Issue Date**	9/14/97
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.5 - Beta		

Issue Description 5 circle and IfcCircle, ellipse and IfcEllipse
In both Ifc entities only roughly the first half of the definitions are taken from Part 42. The parts starting with the ranges of the parametrisation and describing the placement coordinate system including pictures and providing information concerning the placement coordinate system, parametrisation, the sense of the circle or ellipse are missing.
Well - I don`t know how to comment this without causing again substantial "turbulences". One can certainly not cut and paste entities and text fragments out of Part 42 without considering and understanding its context.
One can always argue that the complete and correct information is provided in Part 42 and that implementers talk to each other and so remove ambiguity in implementations. Is this what we are looking for in IFC?

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 450**			**Issue Date**	9/14/97
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.5 - Beta		

Issue Description 6 IfcSweptAreaSolid and subtypes
I would have used the topological equivalents of Part 42 i. e. swept_face_solid, extruded_face_solid and revolved_face_solid. The extruded_face_solid allows you to get around the entities related to curve_bounded_surface and describe a planar extruded face for example by a plane and a polyloop. This will cover most of the practical cases in a simple form.

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	**I - 451**			**Issue Date**	9/14/97
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcGeometryResource	**Version**	R1.5 - Beta		

Issue Description 7 IfcAttributeDrivenRepresentationItem
I only shortly looked at it. My impression was that since the entity IfcAttributeDrivenPathDef which has currently no attributes is required to define IfcAtt.......Solid, attribute driven geometry (i. e. "implicit geometry") is not available in IFC 1.5 and so will not be implemented. I might be wrong. Nevertheless some observations:
 - The mathematics of sweeping is more delicate and demanding than it might seem at a first glance. Usually there is no closed form mathematical description of the surface bounding the swept volume. Resulting volume could have self intersections. These sentences have been quoted from existing literature. So they are a little bit more than just my humble opinion.
 - Please use the terms sweep and extrusion consistently.

- Where do Csg solids and boolean trees belong to? They are available in Part 42. Do they belong to explicit geometry? When you start implementing plumbing they will be required.
- The word morphing has fixed meaning in animation. I will send you an example. Click at it and you will find out what morphing means in this context.
- Same with torsion. It has precise meaning in geometry. So be careful not to use it with different meaning.

Proposed Solution Included in the text above . . .

Resolution Considered in R1.5 and R2.0

Issue Number	***I - 452***			***Issue Date***	9/24/97
Author	Haiat, Jean Claude	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Beta		

Issue Description The current geometry for IfcWall is too limited.

Proposed Solution We must be able to model Walls with the following characteristics in IFC.

1. Top and bottom sloped along path
2. Top and bottom sloped perpendicular to path

Resolution Resolved in R1.5 and again in R1.5.1

Issue Number	***I - 453***			***Issue Date***	10/13/97
Author	Haiat, Jean Claude	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R1.5 - Beta		

Issue Description Wall connections in the Beta release are too limited.

Proposed Solution We must be able to model the following connection types in R1.5:

1) Perpendicular "L" connections
2) Non perpendicular "L" connections
3) Perpendicular "T" connections
4) Non perpendicular "T" connections
5) Perpendicular "X" connections
6) Non perpendicular "X" connections
7) connections with more than 2 walls

Resolution Resolved in R1.5.1

Issue Number	***I - 454***			***Issue Date***	2/26/98
Author	Haas, Wolfgang	***Owner***	See	***Status***	Resolved
Schema		***Version***	R1.5 - Final		

Issue Description 2 Arrangement of Files on CD ROM.
When I was looking out for the EXPRESS-G diagrams I looked at first under directory Printable_Documents and could not find anything. They are currently under Directory Online_Documents although they are .pdf files i. e. printable documents.

Proposed Solution Please move to Printable_Documents.

Resolution Resolved in R2.0

Issue Number	***I - 455***			***Issue Date***	2/26/98
Author	Haas, Wolfgang	***Owner***	See	***Status***	Resolved
Schema		***Version***	R1.5 - Final		

Issue Description 3 Volume 1
I did not look at it at all. Only one aspect caught my attention. Obviously IFEF0 will not be used to create process or activity diagrams. Is this a closed issue or can this be changed?

Proposed Solution Please consider using IDEFO for process diagrams. This is an international standard.

Resolution Prototyped in FM-1 project of R3.0. Considered for broader adoption in R4.0

Issue Number	***I - 456***			**Issue Date**	2/26/98
Author	Haas, Wolfgang	**Owner**	See	**Status**	Resolved
Schema		**Version**	R1.5 - Final		

Issue Description 4 Volume 2
I only went through the table of contents and stopped where an item caught my attention.
4.1 Chapter 4.1 Specialized Views of the IFC Model
The term "view" has a specific meaning in data modeling. It describes how a user sees the portion of a data base, he is interested in. In ANSI SPARC architecture it is frequently named "external view". What is described here are implementation forms of conceptual data models.
4.2 Chapter 5.2.1.3, first paragraph, last sentence.
The sentence "This must be a conformal mapping allowing unambiguous mapping from ARM to integrated resources and vice-versa" is wrong and misleading.
- The term "conformal mapping" has a well defined meaning as a mapping which preserves angles. Some mappings which map geometric elements from the surface of a sphere to a plane are characterized as conformal mapping. This term is inadequate and out of scope of the context of the section.
- An ARM is usually not fully attributed for example an ARM only has an entity such as facetted_b_rep or conic and all attributes are missing since it is clear that during so called interpretation one would get the attributes. However in the AIM to ARM mapping pointers from these attributes would point to nowhere in the ARM.

Proposed Solution 4.1 - Please change wording.
4.2 - Please correct it.
My proposal would be to either skip this last sentence or expand it. Another proposal would be to use simple, "humble" terms and avoid pseudo scientific terminology. There is quite a risk to use inadequate terms such as "octahedral boundary element" please look at my last review of geometry.

Resolution 4.1 - I think we should allow for other interpretations of "view" than the "specific meaning in data modeling."

4.2 - This has been corrected for R2.X. Sorry that I did not catch it for R2.0.

Action #	1	**Assignee**	See	**Status**	Complete	**Resolved in Version**	R2.X - Beta

Remove the offending sentence regarding "Conformal mapping"

Issue Number	***I - 457***			**Issue Date**	2/26/98
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Resolved
Schema		**Version**	R1.5 - Final		

Issue Description 5 Volume 3
5.1 Some editorial observations
5.1.1 Frames of tables of Attributes and Relationships
There is no common style how to handle this. Some tables have frames, others do not have frames and sometimes only the headings of tables have frames. The thickness of the lines of frames varies.
5.1.2 Equations
Sometimes equations show up, sometimes only placeholders as for example on page 36. Obviously nobody had looked at the .pdf document. Even if one only rushes through the document this immediately catches ones eyes.
5.1.3 Arrow heads in figures
Quite different styles of arrow heads such as two lines, solid and 3D can be encountered.

5.1.4 Z-axis in picture of bounding box.
Please move the representation of the z' axis in a way that x', y' and z' join in one point.
5.2 Some technical observations
I only looked a selected parts of Geometry. This review is again very superficial.
5.2.1 IfcRectangleProfileDef.
This entity and its supertype changed from 1.5 prebeta to 1.5. Now there is no longer an attribute of the supertype which describes the boundary curve of the cross section and is migrated down to its subtypes.
Now there are only attributes Xdim and Ydim describing the two dimensions of the rectangle. The boundary is provided as an derived attribute which is an IfcPolyline.
Well -- this approach has advantages and disadvantages. The advantage is that you the size of the exchange file is reduced. This disadvantage is that one losses the capability to write generic code which works on the supertype level and calculates for example cross sectional values. In this approach attributes such as Xdim and Ydim would be derived attributes for the specific cross section.
This brings up the issue of indirect referencing because you might want to reference a point or line or face of the created shape for example to associate a specific surface condition to a face. This issue has not yet been addressed in IFC.
5.2.2 General remarks
There is much more to review in the Geometry part, for example the artificial separation of attribute driven geometry and explicit geometry. Just some questions.
- What are the differences between IfcExtrudedAreaSolid and IfcAttDrivenSolid to characterize one as explicit Geometry and the other as attribute driven Geometry?
- Would it not be more consistent to create a supertype swept_solid and underneath the different suptypes for extrusions and revolutions and get rid of the artificial distinction between explicit and attdriven geometric elements?
- Would it not be appropriate to split the geometry schema into three schemas for geometry, topology and geometric model similar to part 42 of STEP?
- Why is IfcCompositeCurveSegment a subtype of IfcGeometricRepresentationItem. You so get the attribute DIM twice, once as an inherited attribute and one as the dito inherited attribute of IfcCurve as attribute ParentCurve of entity IfcCompositeCurveSegment.
- Etc., etc. (to be added later).

Proposed Solution

5.1.1 - A common style guide would be beneficial.
5.1.2 - Insure page layout does not drop equations
5.1.3 - This is not so important but nevertheless should be fixed in Version 2.0 document.
5.1.4 - Please move the representation of the z' axis in a way that x', y' and z' join in one point.
5.2.1 - Anyway -- the current approach assumes a certain numbering of the points of the polyline and this should be documented and made clear in clause 4.62.
5.2.2 - Please answer questions.

Resolution

5.1.1 - Good point. We will work on establishing better documentation standards in this area for R2.X
5.1.2/5.1.3/5.1.4/5.2.1 - Hopefully we did better in R2.0
5.2.2 - TL to follow up.

Action #	1	**Assignee**	Liebich	**Status**	Incomplete	**Resolved in Version**	R2.X - Beta

Follow up on these questions.

Issue Number	**I - 458**			**Issue Date**	5/5/98
Author	Monceyron, Jean-Luc	**Owner**	Liebich	**Status**	Resolved
Schema	All Schemata	**Version**	R1.5 - Final		

Issue Description

EXPRESS PARSING ERRORS
****

```
// Issue with WR2: validation always returns False
// IfcMaterial type is not a selection item of IfcMaterialSelect select type

ENTITY IfcColumn
 SUBTYPE OF (IfcBuildingElement);
   GenericType : IfcColumnTypeEnum;
 WHERE
   WR1: SIZEOF(QUERY( Temp <* SELF\IfcObject.TypeDefinitions |
         NOT(Temp.TypedClass = 'IfcColumn'))) = 0;
   WR2: 'IFC150FINAL.IFCMATERIAL' IN TYPEOF(SELF\IfcBuildingElement.HasMaterial);
END_ENTITY;

TYPE IfcMaterialSelect = SELECT (
   IfcMaterialLayerSet
  ,IfcMaterialList);
 END_TYPE
```

****

```
// Issue with WR2: validation always returns False
// IfcMaterial type is not a selection item of IfcMaterialSelect select type

ENTITY IfcBeam
 SUBTYPE OF (IfcBuildingElement);
   GenericType : IfcBeamTypeEnum;
 WHERE
   WR1: SIZEOF(QUERY( Temp <* SELF\IfcObject.TypeDefinitions |
         NOT(Temp.TypedClass = 'IfcBeam'))) = 0;
   WR2: 'IFC150FINAL.IFCMATERIAL' IN TYPEOF(SELF\IfcBuildingElement.HasMaterial);
END_ENTITY;

TYPE IfcMaterialSelect = SELECT (
   IfcMaterialLayerSet
  ,IfcMaterialList);
 END_TYPE
```

****

```
ENTITY IfcAttDrivenMorphedExtrudedSegment
 SUBTYPE OF (IfcAttDrivenExtrudedSegment);
   EndProfileDef   : IfcAttDrivenProfileDef;
 DERIVE
   EndSweptArea    : IfcCurveBoundedPlane
                := IfcProfileIntoArea(EndProfileDef);
 WHERE
   WR1: TYPEOF(SELF\IfcAttDrivenExtrudedSegment.ProfileDef) = TYPEOF(EndProfileDef);
   WR2: NOT('IFC150FINAL.IFCARBITRARYPROFILEDEF' IN
TYPEOF(SELF\IfcAttDrivenRevolvedSegment.ProfileDef));
   WR3: SELF\IfcAttDrivenExtrudedSegment.ProfileDef.Position.P[1] =
EndProfileDef.Position.P[1];
END_ENTITY;
```

An issue with WR2 : IfcAttDrivenRevolvedSegment is not a subtype of
IfcAttDrivenMorphedExtrudedSegment
Thus, specification SELF\IfcAttDrivenRevolvedSegment.ProfileDef is wrong.
A guess could be : SELF\IfcAttDrivenExtrudedSegment.ProfileDef

****

```
ENTITY IfcAttDrivenMorphedExtrudedSegment
 SUBTYPE OF (IfcAttDrivenExtrudedSegment);
   EndProfileDef   : IfcAttDrivenProfileDef;
 DERIVE
   EndSweptArea    : IfcCurveBoundedPlane
                := IfcProfileIntoArea(EndProfileDef);
 WHERE
   WR1: TYPEOF(SELF\IfcAttDrivenExtrudedSegment.ProfileDef) = TYPEOF(EndProfileDef);
   WR2: NOT('IFC150FINAL.IFCARBITRARYPROFILEDEF' IN
TYPEOF(SELF\IfcAttDrivenRevolvedSegment.ProfileDef));
```

```
   WR3: SELF\IfcAttDrivenExtrudedSegment.ProfileDef.Position.P[1] =
EndProfileDef.Position.P[1];
END_ENTITY;
```

An issue with WR3: is at stake to test equality between two instances of IfcDirection ? Should we test an equality member to member or an equality of directions - with a geometric meaning ?

The same kind of problem is encoutered with entity IfcAttDrivenExtrudedSolid

```
ENTITY IfcAttDrivenExtrudedSolid
 SUPERTYPE OF (ONEOF (
   IfcAttDrivenClippedExtrudedSolid))
 SUBTYPE OF (IfcSolidModel);
   Segments       : LIST [1:?] OF IfcAttDrivenExtrudedSegment;
 DERIVE
   Path           : IfcPolyline := IfcExtrusionPath(SELF);
 WHERE
   WR1: SIZEOF(QUERY( Temp <* Segments | Temp.Position.Axis <>
Segments[1].Position.Axis)) = 0;
END_ENTITY;
```

****

```
ENTITY IfcAttDrivenRevolvedSegment
 SUPERTYPE OF
(ONEOF(IfcAttDrivenMorphedRevolvedSegment,IfcAttDrivenTaperedRevolvedSegment))
 SUBTYPE OF (IfcRevolvedAreaSolid);
   Position       : IfcAxis2Placement3D;
   StartAngle      : IfcPlaneAngleMeasure;
   ProfileDef      : IfcAttDrivenProfileDef;
 DERIVE
   SELF\IfcSweptAreaSolid.SweptArea : IfcCurveBoundedPlane
                := IfcProfileIntoArea(ProfileDef);
 INVERSE
   PartOfSolid     : IfcAttDrivenRevolvedSolid FOR Segments;
 WHERE
   WR1: SELF\IfcRevolvedAreaSolid.Axis.Location.Coordinates[3] = 0;
END_ENTITY;
```

Issue with WR1: third element of Coordinates may not exist as
Coordinates : LIST [1:3] OF IfcLengthMeasure

****

```
ENTITY IfcArbitraryProfileDef
 SUBTYPE OF (IfcAttDrivenProfileDef);
   CurveForSurface : IfcBoundedCurve;
 WHERE
   WR1: (('IFC150FINAL.IFCPOLYLINE' IN
          TYPEOF(CurveForSurface)) AND (CurveForSurface.Dim = 2))
        OR
        (('IFC150FINAL.IFCTRIMMEDCURVE' IN
          TYPEOF(CurveForSurface)) AND (CurveForSurface.Dim = 2))
        OR
        (('IFC150FINAL.IFCCOMPOSITECURVE' IN
          TYPEOF(CurveForSurface)) AND (CurveForSurface.Dim = 2));
END_ENTITY;
```

issue with WR1 : attribute Dim is not defined at the level of IfcBoundedCurve but within each subtype of IfcBoundedCurv.

```
ENTITY IfcRelContains
 SUBTYPE OF (IfcRelationship1toN);
    RelationshipType       : IfcContainmentTypeEnum;
    ContainedOrReferenced  : BOOLEAN;
 WHERE
    WR1: ((RelationshipType = ProjectContainer) AND
          ('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)))
         XOR (RelationshipType <> ProjectContainer);
    WR2: ((RelationshipType = SiteContainer) AND
          ('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN
TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> SiteContainer);
    WR3: ((RelationshipType = BuildingContainer) AND
          ('IFC150FINAL.IFCBUILDING' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> BuildingContainer);
    WR4: ((RelationshipType = BuildingStoreyContainer) AND
          ('IFC150FINAL.IFCBUILDINGSTOREY' IN
TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)) AND
          NOT('IFC150FINAL.IFCBUILDING' IN
TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> BuildingStoreyContainer);
    WR5: ((RelationshipType = SpaceContainer) AND
          ('IFC150FINAL.IFCSPACE' IN TYPEOF(SELF\IfcRelationship1toN.RelatingObject)) AND
          NOT('IFC150FINAL.IFCPROJECT' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCSITE' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)) AND
          NOT('IFC150FINAL.IFCBUILDING' IN TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))
AND
          NOT('IFC150FINAL.IFCBUILDINGSTOREY' IN
TYPEOF(SELF\IfcRelationship1toN.RelatedObjects)))
         XOR (RelationshipType <> SpaceContainer);
END_ENTITY;
```

Issue : the type ofSELF\IfcRelationship1toN.RelatedObjects is a list of IfcObject
(TYPEOF(SELF\IfcRelationship1toN.RelatedObjects))=LIST)
and then the test will fail

****

Proposed Solution Fix them

Resolution Agreed - resolved for R2.0

Issue Number	***I - 459***			***Issue Date***	5/5/98
Author	Los, Robert	***Owner***	Liebich	***Status***	Resolved
Schema	All Schemata	***Version***	R1.5 - Final		

Issue Description EXPRESS COMPILER ERRORS:

```
> ----- Errors and warning in Ifc150_Final_Express_LF.exp -----
> ENTITY IfcRevolvedAreaSolid
> In the assignment of derived attribute AxisLine, the entity
> constructor
> of supertype IfcCurve is missing.
>
```

```
> FUNCTION IfcCircleProfileIntoCurve
> In the assignment of local variable Circle, the constructor of
> supertype
>
> IfcCurve is missing.
> In the assignment of local variable ResCurve, the constructor of
> supertype IfcCurve is missing.
>
> FUNCTION IfcRectangleProfileIntoCurve
> In the assignment of local variable ResCurve, the constructors of
> supertype IfcBoundedCurve and IfcCurve are missing.
>
> FUNCTION IfcTrapeziumProfileIntoCurve
> In the declaration of local variable TempPoint, the constructor of
> supertype IfcPoint is missing.
> In the assignment of local variable ResCurve, the constructors of
> supertype IfcBoundedCurve and IfcCurve are missing.
>
> FUNCTION IfcPointTranslation
> In the assignment of local variable Point, the constructor of
> supertype
>
> IfcPoint is missing.
>
> FUNCTION IfcRevolutionPath
> In the declaration of local variable Circle, the constructor of
> supertype IfcCurve is missing.
> In the assignment of local variable Path, the constructor of
> supertype
> IfcCurve is missing.
>
> FUNCTION IfcProfileIntoArea
> In the assignment of local variable ResSurface, the constructor of
> supertype IfcPoint is missing.
>
> ENTITY IfcExtrudedAreaSolid
> The supertype clause to entity IfcAttDrivenExtrudedSegment is missing.
> (Warning)
>
> ----- Error in IfcDocumentExtension.exp -----
> In REFERENCE clause to schema IfcKernel are IfcProduct and IfcControl
> missing.
>
> ----- Error in IfcKernel.exp -----
> In REFERENCE clause to schema IfcUtilityResource are
> IfcProjectTeamRegistry and IfcProjectAppRegistry missing.
>
> ----- Error in IfcModelingAidExtension.exp -----
> In REFERENCE clause to schema IfcGeometryResource is IfcBoundedCurve
> missing.
>
> ----- Error in IfcProcessExtension.exp -----
> In REFERENCE clause to schema IfcPropertyResource is IfcDateTimeSelect
> missing.
>
> ----- Errors in IfcProductExtension.exp -----
> In USE clause to schema IfcKernel is IfcControl missing.
> In REFERENCE clause to schema IfcMeasureResource is
> IfcPositiveLengthMeasure missing.
>
> ----- Error in IfcUtilityResource.exp -----
> In REFERENCE clause to schema IfcMeasureResource is IfcMeasureValue
> missing.
> ----- end -----
```

Proposed Solution Fix them!

Resolution Resolved in R2.0

Issue Number	***I - 460***			**Issue Date**	5/10/98
Author	Liebich	**Owner**	Wix	**Status**	Resolved
Schema	IfcMeasureResource	**Version**	R1.5 - Final		

Issue Description I doesn't look like there's any wayto include IfcBoolean, IfcInteger, IfcReal and IfcString types within property
sets right now!

Proposed Solution Shouldn't these be included in the IfcMeasureValue SELECT
TYPE so that they can be accessed from within Property Sets via
IfcSimpleProperty?

Resolution Agreed. Resolved in R1.5.1

Issue Number	***I - 461***			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	Yu	**Status**	Resolved
Schema	IfcProcessExtention	**Version**	R1.5 - Final		

Issue Description 1.Material, Product and Resource Classification
It is unclear when to use IfcMaterial, IfcProduct, or IfcResource for materials used in construction. IfcMaterial is a "substance that can be used to form elements" but it has no cost. IfcProduct is described as objects "incorporated" into a project. IfcResource is defined as "anything which assists in the process of building construction but which is not embodied in the final product". It is unclear which of these objects to use for materials during the estimating process. Some difficult examples:
- Gravel
- Scaffolding

Proposed Solution PM Group to review immediately to see what object modifications (if any) are required. Any changes would be implemented in Release 2.0

Resolution Resolved in R2.0

Issue Number	***I - 462***			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Final		

Issue Description 2. Resources Don’t Have Costs

MSC: This is what 1.5 has for IfcResource:
2. Resources Don’t Have Costs
Release 1.0 supported costs and other attributes for IfcResourceObject. This disappeared in Release 1.5.

"Attribute and Relationship Definitions
Inherited Classes
IfcRoot
IfcObject
No attributes and no Formal Propositions are defined at this level."
Clearly, something is missing!
There is no Type, Description, Cost, or UnitOfCost measure as there was in the 1.0 IfcResourceObject.

Proposed Solution We need to add Description and Cost to the object for 1.5. In fact, Cost has been added in the 2.0 model. Since IfcCost contains a UnitCostBasis, there is not need for a unit measure on the IfcResource.

I think we should also add a Type (labor, equipment or resource) for 1.5, even though we may need to remove it in 2.0. It seems that the 2.0 modeler intends for IfcResource to be something that selects an IfcPerson, IfcLaborGroup, IfcEquipment, IfcEqipmentGroup, or IfcMaterial, so the type would then become redundant. I am only guessing about the intent here, since IfcResource in the 2.0 alpha has errors. (see below)

```
ENTITY IfcResource
   ABSTRACT SUPERTYPE
   SUBTYPE OF (IfcObject);
        SpecificationSelection : LIST [0:?] OF IfcSpecificationRequirement;
        IfcCost.TotalCost : OPTIONAL IfcCost;
END_ENTITY;
```

I don't think IfcSpecificaitonRequirement belongs here.
Also, I see no reference to an IfcResource or an IfcRelResourceUse from an IfcProcess or an IfcWorkTask (or anywhere else). So how is an IfcResource ever used? I believe IfcProcess should have a relationship attribute that looks something like this:

```
   UsesResources     Reference    Ref[0:?]    IfcRelResourceUse
```

I have specified [0:?] because IfcRelResourceUse is a 1to1 (process to resource) relationship, and 1.5 has no way to group resources.

IfcRelResourceUse also has a problem. It relates an IfcProcess to an IfcResource, along with a list of ResourceQuantities and a ResourceDuration. We are not sure why there is a list of ResourceQuantities. I think it is a mistake, and it should be a single Real.

Resolution Agreed and resolved in R2.0

Issue Number	**I - 463**			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R1.5 - Final		

Issue Description 3. Resource Nesting
Nesting of resources (IfcResource) is required in a number of situations. The most common of these is Crews. Estimating is frequently done using Crews, which are an assembly of equipment and labor resources. IfcResource inherits group membership (PartOfGroup) from IfcObject, but this is unusable because the assembly needs all the properties of a resource.

Proposed Solution Fix in Release 2.0 or 3.0

Resolution Resolved in R2.0 with general purpose nesting relationship.

Issue Number	**I - 464**			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	Yu	**Status**	Resolved
Schema	IfcProcessExtention	**Version**	R1.5 - Final		

Issue Description 4. Work Task Nesting
Nesting of work tasks (IfcWorkTask) is very common in the estimating process. Releases 1.0 and 1.5 offer IfcWorkGroup to accommodate that but this is unsatisfactory. Multiple level nesting is required and the collection object must have all the attributes of IfcWorkTask and should be usable anywhere that IfcWorkTask can be used. The solution appears to be to add support for a Relationship1ToN within IfcWorkTask with the member objects limited to other IfcWorkTask objects.

Proposed Solution Add for R2.0

Resolution Resolved in R2.0 with general purpose nesting relationship.

Issue Number	**I - 465**			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	See	**Status**	Unresolved

Schema		**Version**	R1.5 - Final

Issue Description

5. Types vs. Instances
The issue was initially raised with two examples. The first was the use of estimating standards (the production rate for a wall) vs. the actual object ("Wall along line B-B"). This issue is addressed below under "External Libraries". The second example was estimating resources ("Carpenter") vs. the actual resource used ("Joe Blow"). In this case, the difference is between a "requirement" and a "supply". Our preliminary discussion led us to believe that this is broad issue. Any product (IfcProduct) which is purchased rather than created from a process, and any resource (IfcResource) will need to support information about the planned usage and the actual objects required during the construction process. This transition from the planned unit specified by the architect to the actual unit (with serial number, warranty etc.) used by the facility manager does not appear to be addressed in the model. The PM-1 project will need to address this for Release 3.0. Their handling should follow the general handling of this issue through out the model.
This may be addressed by the use of TypeDefinition properties and OccuranceProperties, but that assumes that the only difference between a requirement and a supply is additional property values. Resource allocation in the estimating process would be a good example for testing this premise.

Proposed Solution Alert the Specification Task Force to this as a wider issue. Add as a part of PM-1 in Release 3.0

Resolution to be resolved.

Issue Number	**I - 466**			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	Yu	**Status**	Resolved
Schema	IfcCostResource	**Version**	R1.5 - Final		

Issue Description

6. Nested Cost Calculations
With the nesting of resources and work tasks discussed above, a clear procedure for calculating the total cost of nested objects is required. In some cases the parent object contains an estimated cost which includes the child objects. In other cases, the parent cost should be added to the cost of child objects. There are also combinations where the parent cost includes the cost of some of the child objects. The current model provides no clear mechanism for these cases.

Proposed Solution Fix in Release 2.0

Resolution Resolved in R2.0 with general purpose nesting relationship.

Issue Number	**I - 467**			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	See	**Status**	Unresolved
Schema	IfcPropertyResource	**Version**	R1.5 - Final		

Issue Description

7.External Libraries
Release 1.5 provides support for storing the estimated cost for a project, but does not address the storage of standard costs, productivity rates, etc. This is not addressed by the use of both TypeDefinition properties and OccuranceProperties. The effective use of standards is a critical part of the estimating process. The issue of external information is currently being addressed by the XM-1 External Libraries project.

Proposed Solution Work with the XM-1 project team to develop solutions for estimating and scheduling.

Resolution To be resolved.

Issue Number	**I - 468**			**Issue Date**	6/20/98
Author	NA PM team	**Owner**	Wix	**Status**	Resolved
Schema	IfcCostResource	**Version**	R1.5 - Final		

Issue Description

8. Expand Cost Types
Currently, an IfcCost can be of one of the following cost types defined by IfcCostTypeEnum.
LaborCost

The cost of human resources.
MaterialCost
The cost of materials purchased (or sold)
PlantCost
The cost for items of equipment rented or purchased for use on this project but which will not be embodied within the final product.
PreliminariesCost
Costs that describe work associated with a project but which do not form part of the completed product e.g. temporary construction works.
PrimeCost
A cost which is an amount to be included for work or services to be executed by a nominated actor.
ProvisionalCost
A cost which is included for work that is foreseen but cannot be accurately specified at the time of costing.
BillOfMaterialsCost
A composite cost which is to be included within a formal bill of materials.

Proposed Solution When I did my implementation, I didn't know which one to use, since the cost was a mixture of Labor, Equipment, and Materials. I propose we add the following cost types. (Your suggestions on this would be appreciated.)
Estimated Cost
A cost that is used to represent the estimated cost impact of an object or process. It may include other cost types in its CostComponents.
Budgeted Cost
A cost that is used to represent the budget to be expended for an object or process. It may include other cost types in its CostComponents.
Fuel Cost
The cost of fuel used by equipment. This may be a CostComponent of a PlantCost.

Resolution Resolved in R2.0

Issue Number	***I - 469***			***Issue Date***	6/30/98
Author	Steinmann, Rasso	***Owner***	Liebich	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R1.5 - Final		

Issue Description See the paper entitled "Urgent Issues for final IFC 1.5 add on" for more details and diagrams. These are urgent issues from the IAI-International Implementation Committee, which have to be recognized in the add on for the final IFC 1.5 release:

1 Introduction
IFC 1.5 is a great result of the work done by the members of our STF-team. However, in some parts it does not meet the current situation on the market and therefore has to be adjusted. The most important goal of IFCs is to facilitate data exchange with applications which are currently available on the market. The development of IFCs is industry and not research-driven. Even though we implementers, and especially I myself, are very open for new innovations and research approaches, these aspects have to step back, when they cannot be achieved with reasonable efforts while implementing products for the market with IFC support.

One of the most urgent issues, where this is the case, is the current geometry definition of walls in IFCs. It turned out, that due to the way how the geometry for walls is defined it costs a huge amount of resources in implementation, for which nobody can take responsibility any longer. Therefore the definition must be changed immediately!

This is even more important, as the current definition does not only cost tremendous and unnecessary implementation resources, but also leads to a situation, that we will be unable to exchange a lot of standard cases with IFC 1.5. In the interest of our (software vendor's) customers we have to make an input, with which this can be avoided. Our customers will beat us, the vendors, not anybody else in IAI , if IFC-exchange does not meet their expectations.

The second issue in this document covers the current set of properties for doors and windows in IFC 1.5.

Just in case, we implementers have to hear again the argument, that IFCs are end-user driven, and that implementers do not know what end-users need and therefore cannot say anything, I want to point to the fact, that the AEC vendors, who are on the market and members of this committee, have been very successful on the market, because they are end-user driven and obviously did meet the expectations and requirements from the end-users. We will not accept this argument any longer. It is the other way round: form this experienced group of implementers one can get a condensed image of what end-users need. IAI should use this experience and opportunity more seriously in future.

2 Current IFCWall definition
2.1 Current Geometry definition
Currently geometry for IFCWalls are defined as a shape which is extruded along a horizontal axis.

The argument for this decision always was, that with this also spread footing walls can be defined. After the experience we made during implementation it clearly came up, that spread footing walls are semantically something else, than the walls which are typically used for buildings. Therefore, if it is the intention to support spread footing walls with IFCs, a new entity has to be introduced for this case. For this case also the current geometry definition can be accepted. However, the normal standard IFCWall definition has to meet the 98% of cases of walls, which are used in buildings and not the 2% cases of spread footing walls.
2.2 Problems with current geometry definition
One of the recent examples, the Small Bank from AEC-show-Scenario A, clearly showed us the unsolvable problems we run into with the current definition. The current definition is perfect, as long as walls meet in a 90? angle but fails in the case, when walls meet in any other angle. As this happens quite often we have to find a solution. We cannot tell our customers, that this common case is not covered in IFC 1.5. the following detail shall show the problem:

(diagram)

That's how walls should be intersected with each other in this detail.

However, strictly and correct use of current IFC1.5 definition allows us only the following solution:

(diagram)

It is clear, that no end-user will accept this.

With some good will of an implementer the solution could look like this (in his application, not in the IFC-file):

(diagram)

But still, this is not acceptable by our end-users, they would be shocked.

The next problem is, if an implementer uses an algorithm to fit the walls together by himself, he is automatically and unwillingly changing the original volume of a wall. Now our end-users will be very angry and involve their lawyers, because wrong quantities of material means, that they lose money!!! The volume, which is represented by the geometry must always fit with the quantities used in cost estimating software, because these quantities will be derived from the geometry. I know, that at least European end-users are very precise at this point.

Also, a wall and it's shape and volume is owned by the one, who has designed it. He also carries the responsibility for it. IFC data-exchange will never be accepted, if an user has to fear, that his design intend was changed by an algorithm of an application which reads the data he sent around.

Following a set of examples how the design intend could have looked like and must be saved through IFC data exchange. But at the moment every application is free to interpret the situation and solve and change it as it likes.

(diagram)

Following now the input which will help us to avoid all these problems.

3 New IFCWall geometry definition
During the week at the AEC-systems show we implementers had discussions about this issue and found out, that none of the current active applications represents walls in the way, IFC 1.5 does it. We also do not know any application, which does it in the way of current IFC 1.5. For obvious good reasons, all applications represent standard walls in their internal data structure in the same way as they are built in reality: from bottom up. This point was raised repeatedly in former implementer's meetings, already, also form French implementers like Batisoft (who were not in Chicago), but was continuously ignored by STF.

Now we have to tear the emergency break and have to insist, that geometry definition in IFC 1.5 has to look like as follows:
Instead of extruding a shape along a horizontal axis it has to be extruded along a vertical axis.

(diagram)

This is the same way, how IFCFloor is specified already. So the necessary change in the IFC schema should not be dramatically.

This way also gives us the possibility to easily expand the definition of walls to cases, where the ground and upper side of a wall are not horizontally and even not parallel to each other and with this will be very flexible in all 3 Dimensions:

Here are the more detailed results from our discussions in Chicago:
1. The shape for IFCWall has to be extruded vertically instead of horizontally
2. IFC should provide a standard wall, which is based on a rectangle in the ground-view
3. IFC should provide a special wall, which is based on a polygon in the ground-view
4. IFC wall should provide a list of "Sub"walls. This list can contain either standard walls or special (polygon-based) walls, but no mixture of it.
5. If IFC1.5 still wants to support spread footing walls, a new entity has to be introduced. In this case not a rectangle should be extruded (as it is the case, today) but a polygon.

If it is, due to time and resource constraints, too complicated to differentiate between the proposed standard wall (based on horizontal rectangle) and the special wall (based on horizontal polygon) the more general case for walls based on horizontal polygon should be chosen and realized in IFC 1.5, similar as it is realized for floors, already.
4 Property Set Definition for door and window
This issue can be handled very shortly:
Currently there exists a property set for doors and windows, which contains, almost 200 parameters. Nobody of the implementers had had the time and could be motivated to look at this list in detail, knowing, that no application is able to support this huge amount of properties.

Probably this list is not wrong, but unfortunately absolutely oversized. Here obviously we are facing a huge gap between what may be desirable in future (but this is research) and what does meet the current situation on the market.

The input to STF is: downsize it dramatically to a reasonable size, then the implementers will visit it again. Don't throw away what is filtered out, but keep this for future use.

Proposed Solution 5 Conclusion

Please, STF, check also again the minutes from the last international implementer's meeting in Berkley, where you'll find some other decisions and inputs, which have to be respected in order to avoid more difficulties.

Please understand this as a constructive input and not as a general critic for STF-work. We all recognize the work which was done by STF. However, with this special experience we have now the strong feeling, that obviously the implementers were not included deep enough into the specification process of IFCs. Important comments from this group had had not enough weight and were ignored.

In order to avoid emergency brakes like these in future we have to find new organizational ways. I'm offering voluntarily work to visit STF meetings in future (I will not be able to visit all of them, but that's also not necessary), in order to be able to communicate future IFC developments much earlier to the implementer's committee as it is the case, today. Of course, STF has to respect inputs from implementers also more seriously, as it was the case in the past.

Resolution While R1.5 did include a solution for 'trimming' walls in any direction using clipping half-spaces, we understand that this 'solids' type functionality is not possible for many implementers. Therefore, we will work to find another way.
A compromise approach using a intersection clipping curve was agreed and implemented in R1.5.1

Issue Number	***I - 470***			***Issue Date***	1/15/99
Author	Karlshøj, Jan	***Owner***	Hietanen	***Status***	Resolved
Schema	IfcFacilitiesMgmtDomain	***Version***	R2.0 - Beta		

Issue Description Pset_MaintenanceType
Why does this property include Thickness, hanging height etc ?

Proposed Solution None

Resolution Resolved: agreed, this was an error and has been fixed. Also, this has been promoted to a class (subtype of IfcPropertyDefinition). We all need a list of such promoted Psets.

Action # 1 ***Assignee*** Hietanen ***Status*** Incomplete ***Resolved in Version***

JH to send all a list of subtypes for IfcPropertyDefinition

Issue Number	***I - 471***			***Issue Date***	1/15/99
Author	Karlshøj, Jan	***Owner***	Yu	***Status***	Resolved
Schema	IfcFacilitiesMgmtDomain	***Version***	R2.0 - Beta		

Issue Description IfcMaintenanceRecord
I miss maintenance period so I can calculate the next maintance from the previous one.

Proposed Solution None

Resolution Resolved: Maintenance duration, standard duration, requried period, and maitenance dates and history all modeled through IfcMaintenanceRecord and IfcMaintenanceType.

Issue Number	***I - 472***			***Issue Date***	1/15/99
Author	Salsbury, Tim	***Owner***	Forester	***Status***	Resolved
Schema	IfcHVACDomain	***Version***	R2.0 - Beta		

Issue Description web documentation missing enumerations
for example:
IfcTerminalBoxTypeEnum -enumerations not listed only VAV IfcEquipmentTypeEnum - missing enumerations only 2, motor and window cleaning
IfcDamperSizingMethodTypeEnum - missing enumerations
+many more missing enumeration listings

Proposed Solution add enumerations

Resolution Resolved: fixed in Beta3 - Added enumerators for IfcAirTerminalBoxTypeEnum. IfcEquipmentTypeEnum is defined in the IfcSharedBldgServiceElements Schema, with a new class for containing the remaining equipment from R1.5.1 that participates as IfcDistributionEquipment using the IfcDistributionEquipmentTypeEnum enumeration.The other missing enumerations have been added in R2.0 Beta 3.

Issue Number	***I - 473***			***Issue Date***	1/15/99
Author	Salsbury, Tim	***Owner***	Forester	***Status***	Resolved
Schema	IfcSharedBldgServiceElem	***Version***	R2.0 - Beta		

Issue Description could not find property sets from R1.5 in HTML docs
example: HeatExchanger

Proposed Solution include R1.5 psets

Resolution Resolved: fixed in Beta3 - All R1.5 Property sets were included in the documentation. Not sure why they’re not showing up!

Issue Number	***I - 474***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Wix	***Status***	Deferred to R3.0
Schema	IfcClassificationResource	***Version***	R2.0 - Beta		

Issue Description Representation of Project-specific Classification Systems
Project-specific classification or coding schemes are created on projects (e.g., cost accounts, work breakdown structures, activity numbers, etc.). These are required for estimating, scheduling, and many other places, and should be represented within the IFC model. The existing IfcClassificationResource schema can apparently represent references to external classification systems, but cannot be used to represent the classification system itself.

Proposed Solution Define classes for representing a classification system. These might include the following:
IfcClassificationSystem: Describes the classification system, reference to the definition of the notational system used, and optional references to all classifications within the system (i.e., the classification system might include a table of all allowable values, such as a list of cost accounts set up for a project, or it might simply define a coding scheme that can be used for assigning numbers to items, like schedule activity numbers). The definitions of the notational system would be similar to the existing classification notation and facet classes, except that they would define the format and semantics of the notations and facets, rather than the values for a specific classification item.
IfcClassification: Add an optional reference to a IfcClassificationSystem, and a description of this specific classification (the existing "description" attribute IfcClassification apparently describes the classification system, not the specific classification class or item).
If the existing classification resource is intended to exclude classification or coding schemes such as cost accounts codes, work breakdown structures, etc., then a similar resource schema needs to be defined to represent these things.

Resolution Deferred to R3: This issue should be dealt with at the same time as the proposed overhaul of the classification model when it will be moved from being a separate schema to being defined externally. The mechanism will then work as fpr Property sets generally when you can have a ‘typed’ Classification which is a published reference or an ‘extension’ Classification which would allow the establishment of project specific cost codes etc.

Issue Number	***I - 475***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	See	***Status***	Resolved
Schema	IfcDocumentResource	***Version***	R2.0 - Beta		

Issue Description Descriptive Attributes for Cost Elements
Cost Elements are used to represent line items in estimates or budgets. To do so, they require attributes such as account codes (this may be satisfied through the classification system

reference inherited from IfcControl), and descriptive fields. An existing descriptive field "ContextDescription" is not defined, so it is not clear if this field is intended to be used for a general description of this item, or if it is intended to describe contextual information for cost.

Proposed Solution Add "description" attribute to IfcCostElement, and/or defined the attribute "Context Description". Add one or more coding numbers if this is not satisfied by the classification system reference inherited from IfcControl.

Resolution Resolved: ‘Description’ attribute added. Notes provided.

Issue Number	***I - 476***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	See	***Status***	Resolved
Schema	IfcDocumentResource	***Version***	R2.0 - Beta		

Issue Description Cost schedules must describe the context in which the listed cost elements are meaningful. The only attribute that can concurrently be used for this is "DocumentPurpose" inherited from IfcDocument. Additional attributes should be added to IfcCostSchedule. Alternatively, additional attributes should be added to IfcDocument, since these could be generalized to be general document management attributes

Proposed Solution Add attributes such as "Scope", "Purpose", "IntendedUse", etc. to IfcCostSchedule or IfcDocument.

Resolution Resolved: We will add "Scope", "Purpose", "IntendedUse" into IfcDocumentReference.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version***

RS to include these -- Complete: no comments

Issue Number	***I - 477***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	See	***Status***	Resolved
Schema	IfcDocumentResource	***Version***	R2.0 - Beta		

Issue Description Costs of IfcRelUsesResources
The costs of things are represented by the IfcRelCostsObjects relationship from IfcCostElement to IfcObject. However, this misses the cost of the use of the specific resource for a specific proces

Proposed Solution Allow IfcRelCostsObjects to relate IfcCostElements to either IfcObjects or IfcRelUsesResource. Remove the relationship from IfcRelUsesResource to IfcCost (all costs should be modeled through an IfcCostElement via IfcRelCostsObjects , not directly as an IfcCost).

Resolution Resolved: 1) Relation ‘ResourceUseCost’ now pointing to IfcCostElement, not directly to IfcCost. The suggested direct relation between two relationship objects (IfcRelCostsObjects to IfcRelUsesResources) is not supported by the IFC Architecture

Issue Number	***I - 478***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Liebich	***Status***	Deferred to R3.0
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description Process Actor Roles
The model should be able to represent specific roles that actors play on processes. E.g., for a specific process, users should be able to determine who was a designer, the general contractor, the subcontractor, the inspector, etc. this is suggested by, but not fully specified by, the participants overall role attribute.

Proposed Solution Add an IfcRelParticipantRole class that objectifies the existing "PerformedBy" relationship between IfcProcess and IfcActorSelect, which has an attribute that defines the role (IfcRoleTypeEnum) of the participant on this process.

Resolution Deferred to R3: IfcActor and IfcRelParticipantRole will be added to IfcKernel in R3. Add an IfcRelParticipantRole class that objectifies the existing "PerformedBy" relationship between

IfcProcess and IfcActorSelect, which has an attribute that defines the role (IfcRoleTypeEnum) of the participant on this process.

Issue Number	***I - 479***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Liebich	***Status***	Declined
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description Objects Should Reference Cost Elements
Objects should contain the reference to the IfcRelCostsObjects that associate them with costs, so that the costs of any object can be identified.

Proposed Solution Add an inverse relationship from IfcObject to associated IfcRelCostsObjects.

Resolution Declined: Inverse relaionships are implicit in the model in any case, even without being declared. A declaration should be done, if the default inverse [0:?] is further constraint. In the paricular case it would lead to a violation of the IFC architecture (references up in the hierachy) and was therefore omited.

Issue Number	***I - 480***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Yu	***Status***	Resolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description Expanded Process-Product Relationship
Process are related to the products that they operate on (input or output) through IfcRelProcessedProducts. However, processes can operate on things other than products, and can operate in ways other than input and output. For example, it many be common defined processes during estimating or scheduling that describe design tasks (resulting in documents), procurement tasks (resulting in construction materials), planning tasks (resulting in processes), etc. Furthermore, the ways in which process can operate on something might include "installs", "finishes", "transports", "removes", etc. (these operation types are currently used in 4D CAD simulation/visualization applications).

Proposed Solution Rename IfcRelProcessesProducts to IfcRelProcessOperatesOn. Allow it to relate IfcProcess to IfcObject. Rename "InOrOut" attribute to "OperationType" (selection enum). An IfcProcess should be able to define any number of IfcRelProcessOperatesOn relationships, since it may carryout different types of operations on different types of things.

Resolution Resolved: 1) Very good suggestion to increase the usefulness of the IfcProcess. 2) As suggested, the IfcRelProcessOperatesOn relates an IfcProcess with many IfcObjects and has an Operation Type attribute (STRING – since we cannot 'close' the enum at this point).

Action #	1	***Assignee***	Yu	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

KY to consider - isn't IfcRelUsesResource a specialization (subtype) of IfcRelProcessOperatesOn?

Issue Number	***I - 481***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	See	***Status***	Resolved
Schema	IfcDocumentResource	***Version***	R2.0 - Beta		

Issue Description Quantity for IfcCostSchedule Needs Units
The quantity attribute IfcCostSchedule is given as a number. This needs to be associated with the units of measurement for the quantity

Proposed Solution Make quantity referred to a measurement that includes units, or add another attribute to indicate the units used for measuring the quantity.

Resolution Resolved: the attribute type changed to IfcMeasureWithUnit to IfcCostElement. (IfcCostSchedule doesn't have such attribute.)

Action #	1	***Assignee***	Yu	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

KY to insure this has been done

Issue Number	***I - 482***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description Quantity and Productivity Attributes for IfcProcess
Processes can be associated with some measure of the quantity of work to be done and of the productivity rate assumed in carrying out the work. These are used for estimating, scheduling, etc.

Proposed Solution Add optional attributes to represent the quantity and productivity (including units) of the process.

Resolution Resolved: 1) a generic processed quantity has been added (IfcMeasureWithUnit) to the IfcRelProcessOperatesOn to further specify for with objects (products, resources, etc.) the quantity is assumed - OperatedQuantity.

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

TL add "productivity" to IfcProcess

Issue Number	***I - 483***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description Quantity for IfcRelUsesResource Needs Units
The "ResourceQuantity" attribute IfcRelUsesResource is given as a number. This needs to be associated with the units of measurement for the quantity

Proposed Solution Make quantity referred to a measurement that includes units, or add another attribute to indicate the units used for measuring the quantity.

Resolution Resolved: Change data type to IfcMeasureWithUnit to allow for various measurements, e.g. pieces, tons, meter, square meter, cubic meter, etc.

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

TL to make change

Issue Number	***I - 484***			***Issue Date***	1/15/99
Author	Froese, Thomas	***Owner***	Liebich	***Status***	Resolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description Conversion/Productivity Attributes for IfcRelUsesResource
An attribute can describe the conversion of the quantity of resources into the quantity of the associated process. This can represent either a conversion rate or a productivity rate. For example, the process might be "Construct Concrete Column (include forming)," with a quantity expressed as 2.0 m3 of concrete. Associated resources might include form plywood (measured in m2), carpenters (measured in WorkerHours), and concrete (measured in m3). The conversion/productivity rates associated with the IfcRelUsesResource objects for these resources might then be respectively 3.0 m2 plywood per m3 of column, 1.5 WorkerHours of Carpenters per m3 of column (a productivity rate), 1.03 m3 concrete per m3 of column (reflects waste factor). These types of rates can be found in existing estimating software.

Proposed Solution Add a conversion/productivity conversion rate to IfcRelUsesResource (including units).

Resolution Resolved – a new attribute added using IfcMeasureWithUnit..

Action # 0 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

TL to make change.

Issue Number ***I - 485*** ***Issue Date*** 1/15/99

Author Froese, Thomas ***Owner*** Liebich ***Status*** Resolved

Schema IfcKernel ***Version*** R2.0 - Beta

Issue Description Definition/Interpretation of IfcResource
Many things that might be used as resources on projects might also need to be modeled as "Things" for other purposes (e.g., labor is also modeled as people and organizations, construction materials are also modeled as design materials, construction equipment might also be modeled as temporary products, etc.). To accommodate this, IfcResource should be interpreted as the representation of "the use of a thing as a resource on a project", and this may be associated with another object representing the thing itself.

Proposed Solution Modify the definition of IfcResource to include the following ideas:
- IfcResource represents the use of a thing as a resource on a project. Examples of types of things that can be used as resources include labour, construction equipment, construction materials, building components, information, etc. IfcResource contains the information needed to represent the costs, schedule, and other impacts from the use of the thing, but it is not intended to model the general properties of the thing itself.
- If other properties of the thing are not needed, then IfcResource alone is sufficient to represent the thing for the purposes of the project. If other properties of the thing do need to be modelled, then IfcResource can link to an object that represents the thing. For example, construction equipment such as earth-moving vehicles or tools are not currently modeled within the IFC's. For the purpose of estimating and scheduling, these can be represented using IfcResource alone. If they are modeled explicitly in the future (e.g. as part of a construction equipment management schema) then the IfcResource objects can be linked to the objects that model the equipment. Things that might be used as resources, but which are already modeled in other places in the IFC's, include physical products, people and organizations, and materials.
- An IfcResource can represent either a specific thing or a type of a thing. It can contain a reference to both if they are modelled as separate objects.
- IfcResources are not necessarily temporary as stated in the current definition (e.g., construction materials).
- Add relationship from IfcResource to objects that represent both types of things that are being used as resources, and occurances of things that are being used as resources.

Resolution Resolved -- new definition is complete, KY to pass it over toTL.

Action # 0 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

TL to update definition for IfcResource from KY
[[The IfcResource represents the use of a thing as a resource to aid in the process of building construction. Examples of types of things that can be used as resources include labour, construction equipment, construction materials, building components, information, etc. They may vary between different stages in a project lifecycle. For instance, during the design stage, computer software may be considered to be resource for design since its use may be limited in terms of time and there may be a particular cost associated with its use on a particular project.
IfcResource contains the information needed to represent the costs, schedule, and other impacts from the use of the thing, but it is not intended to model the general properties of the thing itself. The linkage, which should be optional, of things to IfcResource (i.e. the relationship from subtypes of IfcResource to IfcProduct or its subtypes). Thus there are two basic intended use of IfcResource. First, if the attributes of the thing are not needed for the purpose of instantiation of IfcResource, or the types of things are not explicitly modeled in IFCs yet, the optional linkage doesn’t have to be established in the system. That is, the attributes of IfcResource (or its subtypes) along are sufficient to represent the use of the thing as resource for the purpose of the project. For example, construction equipment such as earth-moving vehicles or tools are not currently modeled within the IFC's. For the purpose of estimating and scheduling, these can be represented using IfcResource alone. Second, if the attributes of the thing are needed for the use of IfcResource objects, and they are modeled explicitly as objects (e.g. classes or properties), then the IfcResource instances can be linked to the instances of the type of the things being referenced. Things that might be

used as resources and that are already modeled in the IFCs include physical products, people and organizations, and materials.
The use of IfcResource may be limited to one process or for processes relating to one product or they may encompass many processes undertaken on many products.
The IfcResource is defined in the Kernel layer in IFCs but will be reused and specialized in other schemas.]]

Issue Number **I - 486** **Issue Date** 1/15/99

Author Froese, Thomas **Owner** Liebich **Status** Unresolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description Generalization of Crews
Crews typically consist of groups of labour resources, possibly with associated equipment. However, crews can also be defined to include associated materials (particularly common supplies). Thus generalize crew nesting to allow any resources to be nested (already defined through nesting relationship inherited from IfcObject).

Proposed Solution None

Resolution Resolved: allow crew to contain IfcResource using IfcRelContain. Changed name of IfcResourceGroup.

Action # 1 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final

KY to implement for R2 final

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL to do the following in IfcResource:
'INV SELF\IfcObject.IsContainedBy.RequiredInCrew: SET [1:?] OF IfcRelCrewResourceContainsResources"
"Where' rule: this resource is in RelatedObjects of IfcRelCrewResourceContainsResources

Issue Number **I - 487** **Issue Date** 1/15/99

Author Froese, Thomas **Owner** Liebich **Status** Resolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description Generalization of IfcResource
Applications that represent resources generally make little if any distinction between the type of resource. Therefore, the attributes associated with different types of resources should be kept as generic is possible. The specific subtypes of IfcResource might then restrict the allowable values for some of these attributes if necessary, or some of the subtypes may not even be needed.

Proposed Solution Add the following attributes to IfcResource:
- ResourceConsumption: indicates how the resource is consumed during use (selection enum of consumed, partially consumed, occupied, partially occupied, not occupied)
- BaseUnit: the basic unit for quantifying this type of resource.

Remove the following attributes from the following classes:
- IfcProductResource: ResourceProduct (generalized to IfcResource, ThingUsedAsResource), ResourceRole (generalized to IfcResource, ResourceConsumption)
- IfcConstructionEquipmentResource: Model and Manufacturer (generalized to IfcResource, Description); PartOfCrew (generalized to IfcResource, Nesting)
- IfcLaborResource: Title, SkillSet and TaskDescription (generalize to IfcResource, Description); HourlyWage (cability already exists through IfcRelCostObject relationship inherited from IfcObject), PartOfCrew (generalized to IfcResource, Nesting)
- IfcCrewResource: Generalized as IfcResource (with nesting relationship)
- IfcConstructionMaterialResource: BaseUnit (generalized to IfcResource, BaseUnit), PurchasePrices and ReferencePrices (cability already exists through IfcRelCostObject relationship inherited from IfcObject), MaterialProducts (generalized to IfcResource, ThingUsedAsResource)

Resolution Resolved: mostly as recommended.

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

TL to add some attributes and a WR (from KY)

Action # 2 ***Assignee*** Yu ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KY to resolve changes to subtypes of IfcResource

Issue Number ***I - 488*** ***Issue Date*** 1/15/99

Author	Froese, Thomas	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcMaterialResource	***Version***	R2.0 - Beta		

Issue Description Relate Materials to Construction Materials
The materials in the IfcMaterialResource schema are represented from the perspective of design properties. However, these can overlap extensively with materials planning, procurement, and management issues, in which materials are represented by IfcConstructionMaterialResource. For example, the design properties of the materials are used in identifying suppliers, materials ordering information, appropriate installation methods and testing procedures, etc. There should be some type of linkage between IfcMaterial to IfcConstructionMate

Proposed Solution IfcConstructionMaterialResource references IfcMaterial (by refining the linkage from an IfcResource to the types of things that are being used as resources).

Resolution Resolved: A new attribute DesignMaterial: SET [1:0] Ref. IfcMaterialSelect will be added.

Action # 0 ***Assignee*** Yu ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KY to implement

Issue Number ***I - 489*** ***Issue Date*** 1/15/99

Author	Froese, Thomas	***Owner***	See	***Status***	Resolved
Schema	IfcDocumentResource	***Version***	R2.0 - Beta		

Issue Description Unify Treatment of Project Documents
At present, references to project documents that are not modeled within the project model are represented as IfcProjectDocumentReference. Several project documents that are modeled are treated as subtypes of IfcControl (IfcBudget, IfcProjectOrder, IfcWorkPlan, etc.), while another similar document is modeled as a subtype of IfcDocument (IfcCostSchedule). Finally, the concept of a document might also be used to represent specific structures or formats (e.g., as HTML structures a document) as opposed to representing the semantics and use of a specific type of document (e.g., contracts, schedules, etc.).
Not withstanding the argument that IFC models may remove the need for many traditional "documents" on projects, project documents will continue to be a vital role in projects for quite some time to come. Many things that are being modeled in the IFC's, such as estimates, budgets, schedules, work orders, etc., are clearly "project documents". Furthermore, these things all require document management attributes (such as authors, creation dates, versions, etc.).
The distinction between documents that are modeled within the IFC's and references to documents that are not modeled within the IFC's does not seem useful; there could easily be references to external physical documents (e.g., a contract change order) that are at the same time modeled within the IFC's. There should be a single IfcDocument entity that contains basic document mangement attributes and that can optionally reference an external document. This same class can also model the specific content of specific types of documents through subclasses.

Proposed Solution Use IfcDocument instead of IfcProjectDocumentReference.
Make the following entities subtypes of IfcDocument: IfcProjectPlan, IfcApproval, IfcProjectOrder, and IfcWorkPlan
Add the following attributes to IfcDocument:
- DocumentID. An indentifier for the document, given by the user. STRING
- DocumentTitle. Title of the document. STRING.
- Description. General description of the document. STRING
- PreparedBy. Authors/Creators of Document. SET [0:?] OF IfcActorSelect.

- DocumentOwner. Index into ProjectTeamRegistry - identifying the team member who "owns" this document. Zero indicates no owner has been specified. IfcActorSelect
- Revision. Document revision designation. STRING
- CreationDate. Date of creation of document. IfcDateTimeSelect.
- DateOfRevision. Date and time stamp when this revision was registered. IfcDateAndTime
- DocumentType. Indicates the type of the document. IfcRegisteredDocumentType
- Classification. Reference to the access information for classified information. IfcClassificationList.
- Project: The project that this document relates to. IfcProject
- DocumentPurpose. Description of the intented purpose/context of the document. STRING
- Documents. Contains the relationship that associates this document to one or many objects. SET [0:1] OF IfcRelDocuments
- Location. URL, pathname or physical location of the document. STRING
- DocSectionReference. Optional reference to a section within the document. STRING
- Distribution. Persons or organizations that are to receive the document.
- DocumentAccess: Authorizations and security for individuals/groups to access the document. (for Add, Modify, View, Delete, Copy, Recalculate, etc.)

Resolution

Resolved: Main issue discussed = do we define documents in IFC or reference them? Are the models we DO include really the documents, or representations which may be PRESENTED IN documents? Conclusion: IFC captures models and representations that are 'presented' in documents. Therefore, DocumentReference is really what we have. We don't really want to capture 'Documents' in IFC. One way to see this request is for more attributes on DocumentReference.

Agreed resolution: (see also, issue #517

1. Move the IfcDocumentReference schema down to the Resource layer (renamed IfcDocumentResource). Subtype IfcDocumentReference from IfcProperty.

2. Change IfcCostSchedule ? IfcCostRepresentation (like ShapeRep) and subtype from IfcRepresentation (like ShapeRep) (in the IfcRepresentationResource (Resources level).

3. Add most of the recommended attributes (see exceptions below) to IfcDocumentReference. Exceptions: Classification (it was decided that classification of referenced documents should wait until R3), Project (this is already covered, in that document references will be contained in an IfcProject container), Documents (Implementers were strongly opposed to including such an "implied backpointer"), Distribution (it was decided that workflow and routing issues should wait until R3).

4. Enable 'representations' to reference documents in which they are presented (through the "ReferencedDocuments" attribute inherited from IfcObject).

5. ProjectPlan, WorkPlan, Approval, WorkOrder will all remain subtypes of IfcControl, and reference documents in which they are presented through the "ReferencedDocuments" attribute inherited from IfcObject.

6. Open issues: a) some documents present controls (e.g. ProjectPlan, WorkPlan, Approval, WorkOrder. -- need to resolve "what" can be presented in referenced documents and "how" such relationships are captured. b) Since both Document References and Representations are at the Resource level, there is no way to relate an occurrence of of a Rep to an occurrence of DocumentReference (sent email to KY/TL on 22-Jan).

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Final

RS to do 1 and 3 (above) – Complete: Note exceptions in resolution

Action # 2 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

TL to do 4 (above)

Action # 3 ***Assignee*** Yu ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KY to do 2 and 5 (above)

Action # 4 ***Assignee*** See ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

RS to enter 5 (above) as a new issue, deferred to R3

Issue Number I - 490 ***Issue Date*** 1/15/99

Author Froese, Thomas ***Owner*** Yu ***Status*** Resolved

Schema IfcProcessExtention ***Version*** R2.0 - Beta

Issue Description ProjectPlan is a Collection of Documents
The concept of a project plan relates to the collection of project documents. The plan itself is also a project document. The collection of planning documents should be generalized so that an arbitrary set of documents can be included. The object nesting relationship inherited from IfcObject many accommodate this.

Proposed Solution Make IfcProjectPlan a subtype of IfcDocument. Possibly use Nesting relationship inherited from IfcObject to collect a set of documents into a project plan. Allow an arbitrary collection of documents within the project plan.

Resolution Resolved: IfcProjectPlan has been renamed to IfcCMDocPackage, which is a subtype of IfcControl with a reference to IfcDocumentReference.

Action # 1 ***Assignee*** Yu ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KY to insure completion

Issue Number ***I - 491*** ***Issue Date*** 1/15/99

Author Froese, Thomas ***Owner*** Yu ***Status*** Resolved

Schema IfcProcessExtention ***Version*** R2.0 - Beta

Issue Description IfcScheduleData renamed to IfcScheduleElement
IfcScheduleData is not a precise name for this class

Proposed Solution Rename IfcScheduleData to IfcWorkScheduleElement (which distinguishes work schedules from other types of schedules, and is parrallel to the similar concept of IfcCostElement)

Resolution Resolved: agreed to the assertions. The model has been modified to reflect the idea. The model doesn’t look at exactly the same as suggested, but accomplishes the same thing.

Issue Number ***I - 492*** ***Issue Date*** 1/15/99

Author Froese, Thomas ***Owner*** See ***Status*** Resolved

Schema IfcProcessExtention ***Version*** R2.0 - Beta

Issue Description Revisions to IfcWorkPlan
A work plan is a project document and should be a subclass of IfcDocument.
A work plan is associated with the collection of work tasks, which can be organized into a nested hierarchy. The same work tasks might be organized into a different hierarchy as part of a different work plan for a different purpose (e.g. one for estimating and one for scheduling). Therefore, a work plan should be associated with the collection of work tasks, a root work task (the top level node in the hierarchy of work tasks), and with the collection of work task nesting relationships that organizes the work tasks for this particular work plan.
A work plan is associated with a work schedule (to be defined in R3.0) but not with a IfcScheduleData object.

Proposed Solution Make IfcWorkPlan a subtype of IfcDocument.
Add relationship to a root IfcWorkTask and to a collection of IfcRelNestsProcesses
Remove "SchedulingInfo" attribute

Resolution Resolved: WorkPlan is actually a control, since it limits or defines portions of the project. However, it is also presented in documents. Therefore, relationships to those documents should must be possible. This can be done through the " ReferencedDocuments " attribute inherited from IfcObject (see actions on issue #517).

Action # 1 ***Assignee*** Yu ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KY to insure this is possible

Issue Number ***I - 493*** ***Issue Date*** 1/15/99

Author Froese, Thomas ***Owner*** See ***Status*** Unresolved

Schema	IfcProcessExtention	**Version**	R2.0 - Beta

Issue Description Revisions to IfcWorkTask
Work tasks can be associated with more than one WBS, these can be handled through IfcProcesses relationships to IfcClassification.
WorkTaskCosts can be handled through the relationship to IfcRelCostObjects inherited from IfcObject.
A work task can be associated with more than one work plan and with more than one schedulingInfo object.

Proposed Solution Remove "WBS" and "WorkTaskCost" attributes.
"WorkPlan" Attribute cardinality should be 0 to n.
"ScheduleInfo" attribute should be set 0 to n of IfcWorkScheduleElement.

Resolution Not resolved: for the 'WBS', if we use the IfcClassification from IfcProcess, it will involved the instantiation of at least 4 classes (IfcClassificationList, IfcClassification, IfcClassificationNotation, IfcNotationFacet) just to create a WBS. I'd rather not to do it in my implementation for now, and I doubt if it is a good way. For now, I'd rather to keep it simple. I have made a list of string for WBS, and a list of string for the name of source for that WBS system. 2 lists should contain the same number of items in order. We'll re-visit this issue in R3.0.
For 'work plan' and 'schedule info', it is agreed and changes made accordingly.
For the costs, the problem is that currently IfcObject doesn't have a reference to IfcRelCostObjects, which makes IfcRelCostObjects not much useful to get cost information from objects. This is an open issue for TL..

Action # 1 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final
KY to implement what is described above

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final
TL and KY to resolve the IfcRelCostObjects issue.

Action # 3 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final
TL and KY to resolve the IfcRelCostObjects issue.

Issue Number ***I - 494*** **Issue Date** 1/15/99

Author	Froese, Thomas	**Owner**	Yu	**Status**	Resolved
Schema	IfcProjectMgmtExtension	**Version**	R2.0 - Beta		

Issue Description Budget Should be a Type of Cost Schedule
A budget is a type of a cost schedule.

Proposed Solution Remove class IfcBudget or make it a subtype of IfcCostSchedule

Resolution Resolved: IfcBudget is a subtype of IfcCostRepresentation (renamed from IfcCostSchedule).

Action # 1 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final
KY to implement

Issue Number ***I - 495*** **Issue Date** 1/15/99

Author	Froese, Thomas	**Owner**	Yu	**Status**	Resolved
Schema	IfcConstructionMgmtDomai	**Version**	R2.0 - Beta		

Issue Description Domain Mis-named
Of the cost estimating domain is mis-named. All of the classes defined in this domain applied equally to scheduling and other project management domains.

Proposed Solution Rename IfcCostEstimatingDomain to IfcProjectManagementDomain or something else.

Resolution Resolved: agreed. IfcProjectMgmtExtension is already used at interoperability layer with the purpose of holding classes common for both CM and FM

I will rename IfcCostEstimatingDomain to IfcConstructionMgmtDomain in parallel with IfcFacilicitesMgmtDomain.

Action # 1 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final

KY to implement

Issue Number **I - 496** **Issue Date** 1/15/99

Author Froese, Thomas **Owner** Yu **Status** Resolved

Schema IfcConstructionMgmtDomai **Version** R2.0 - Beta

Issue Description Add Subcontract (procured) resource
Another type of common construction resource is a subcontract. This can be defined the same as the other sub-types of IfcResource.

Proposed Solution Create IfcSubcontractRes as sub-type of IfcResource.

Resolution Resolved: Agreed and new class added.

Issue Number **I - 497** **Issue Date** 1/15/99

Author Hitchcock, Rob **Owner** Forester **Status** Resolved

Schema IfcConstraintExtension **Version** R2.0 - Beta

Issue Description The IfcConstraint, IfcObjective, IfcMetric, and IfcMetricBenchmark subclasses of IfcControl are missing from the Object Hierarchy in IFC_R2_Beta_ClassHierarchy.xls. Also, the new relationship classes IfcRelAggregatesConstraints and IfcRelRelatesConstraints that have been defined for these classes are missing. I understand that these relationship classes do not yet have valid superclasses, making it difficult to show them in the hierarchy.

Proposed Solution Add these new subclasses to the object hierarchy spreadsheet.

Resolution Resolved: Jiri should check the hierarchy xls. Relationship classes are fixed. The IfcConstraint, IfcObjective IfcMetric and IfcMetricBenchmark will be updated in the object hierarchy chart. The relationship classes' supertypes have been corrected.

Action # 1 **Assignee** Hietanen **Status** Complete **Resolved in Version** R2.0 - Final

JH to check the Hierarchy XLS file

Action # 2 **Assignee** Adachi **Status** Complete **Resolved in Version** R2.0 - Final

YA to check the Hierarchy diagram

Issue Number **I - 498** **Issue Date** 1/15/99

Author Hitchcock, Rob **Owner** Forester **Status** Resolved

Schema IfcConstraintExtension **Version** R2.0 - Beta

Issue Description The enumerated values of IfcConstraintRelationshipEnum used in the new class IfcRelRelatesConstraints need descriptive definitions.

Proposed Solution I propose the following definitions for the two primary enumeration values:
Rationale: This form of a constraint relationship is meant to document the rationale behind design decisions. This relationship may be interpreted as "the Related Objects have been selected in the attempt to achieve the Related Constraint."
Intent: I suggest that this value be renamed ExpectedPerformance. This form of a constraint relationship is meant to indicate the expected performance of a related object. This relationship may be interpreted as "the Related Object is expected to perform according to the Related Constraint."

Resolution Resolved: The above modifications have been incorporated into the R2.0 Beta 3 of IfcConstraintExtension schema.

Issue Number	**I - 499**			**Issue Date**	1/15/99
Author	Hitchcock, Rob	**Owner**	Forester	**Status**	Resolved
Schema	IfcConstraintExtension	**Version**	R2.0 - Beta		

Issue Description The enumerated values of IfcMetricDataTypeEnum used in the new class IfcMetric need descriptive definitions that clearly indicate their intended use. This list should be reviewed for completeness and the appropriateness of its values and their names. For example, I am not sure that Table and Graph are the most expressive names for their data types.

Proposed Solution I propose the following definitions for the data type enumeration values:
- Scalar: A single value data type.
- Vector: A one-dimensional array/list data type.
- TimeSeries: A one-dimensional array/list of data values with timestamps.
- Table: A two-dimensional array data type, most commonly used to store two-dimensional graph values.
- Graph: A three-dimensional array data type, most commonly used to store three-dimensional graph values.
- Distribution: A one-dimensional array/list data type, containing values that form a distribution population.

Resolution Resolved: The above changes have been incorporated into R2.0 Beta 3. However, no changes were made to the enumerated names.

Issue Number	**I - 500**			**Issue Date**	9/18/97
Author	Hitchcock, Rob	**Owner**	Forester	**Status**	Resolved
Schema	IfcConstraintExtension	**Version**	R2.0 - Beta		

Issue Description I am not convinced that both of the IfcBenchmarkEnum and IfcValueRelationEnum enumerations used in the new class IfcMetricBenchmark are needed. Also, I think that descriptive definitions are needed for each value that clearly indicate their intended use. In particular, the direction in which comparisons are intended to be made is not clear.

Proposed Solution I suggest that the enumerated values of these two enumerations could be combined into a single enumeration. I propose the following values and definitions:
- GreaterThan: Result Values should be greater than the Benchmark.
- GreaterThanOrEqualTo: Result Values should be greater than or equal to the Benchmark.
- LessThan: Result Values should be less than the Benchmark.
- LessThanOrEqualTo: Result Values should be less than or equal to the Benchmark.
- EqualTo: Result Values should be equal to the Benchmark.
- NotEqualTo: Result Values should not be equal to the Benchmark.
- TargetWithTolerance: Result Values should be within the specified tolerance of the Benchmark target value.
- Range: Result Values should not be within the upper and lower bounds of the Benchmark range.

Resolution Resolved: I agree that these two enumerations should be combined into the IfcBenchmarkEnum enumeration with simplifications and suggested descriptions.

Issue Number	**I - 501**			**Issue Date**	1/15/99
Author	Hitchcock, Rob	**Owner**	Forester	**Status**	Resolved
Schema	IfcConstraintExtension	**Version**	R2.0 - Beta		

Issue Description The IfcMetric and IfcMetricBenchmark classes have a Values attribute which is defined as a list of IfcMetricValueSelect which may be either IfcMeasureWithUnit or IfcTable. While the IfcMetric and IfcMetricBenchmark classes have an attribute named Source, inherited from IfcConstraint, that documents the source of each defined metric, there is no way to document the possibly different sources of data contained in each of the multiple IfcMetricValueSelect items in a Values list.

Proposed Solution I am not sure how to handle this other than to add a parallel list of ValueSources (list of IfcString?) to IfcMetric. I am open to suggestions here.

Resolution Resolved: To accommodate this situation, a new data type has been introduced called

IfcMetricValue which combines the source, datatype and value attributes from IfcMetric.

Action #	1	***Assignee***	Forester	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

JF to implement

Issue Number	***I - 502***			***Issue Date***	1/15/99
Author	Lahtela, Hannu	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcSharedBldgElements	***Version***	R2.0 - Beta		

Issue Description

To be able to calculate gross-areas and net-areas etc.., walls have to be one of the following types:
- Exterior wall
- Interior wall
- Bearing Interior wall

see. IFCWall is a type of SOLIDWALL, LAYEREDWALL or ELEMENTEDWALL

Proposed Solution None

Resolution Yet to be resolved

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final

TL to propose a resolution

Issue Number	***I - 503***			***Issue Date***	1/15/99
Author	Lahtela, Hannu	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcMaterialResource	***Version***	R2.0 - Beta		

Issue Description

IFCMaterial have to have lamda-value. U-value is calculated from IFCMaterialLayerSet, based on the lamda-value and thickness of each materials. I think, it has to be done this way, because e.g. in case of the SmallBank 'exterior'walls are fragmented by columns and because of that we have to calculate conduction thru columns and because columns can be of arbitrary shape, U-value of each columns depends of its' azimuth.

Proposed Solution None

Resolution

Resolved: The definition for IfcMaterial has been modified for R2.0 to allow run-time addition of prpoerties. This will allow applications to add whatever values are necessary for their domain.

Issue Number	***I - 504***			***Issue Date***	1/15/99
Author	Lahtela, Hannu	***Owner***	Liebich	***Status***	Resolved
Schema	IfcProductExtention	***Version***	R2.0 - Beta		

Issue Description

Storeys must have names. In case of our software(SMOG) We edit one storey at time. Now I'm able to get a set of storeys, but I don't know what is what…hhmmm... except browsing z-coordinate of each storey.

Proposed Solution None

Resolution

Resolved: Storeys have the attributes since IFC 2.0 Beta, i.e. a SpaceReference (number of space, such as 1OG-013), and a SpaceName (Meeting Room).

Issue Number	***I - 505***			***Issue Date***	1/15/99
Author	Lahtela, Hannu	***Owner***	Forester	***Status***	Unresolved
Schema	IfcHVACDomain	***Version***	R2.0 - Beta		

Issue Description

I have to save Thermal results of space(TotalHeatloss, TotalHeatGain, Exhaust AirFlowRate and SupplyAirFlowRate) using extented SpaceElementInformation PropertySet. To me it seems to be (lets say) too sophisticated. Because of that at this phase I'm using SimplePropertySets

Proposed Solution None

Resolution Not resolved: Need to work through harmonization of all thermal related Psets

Action # 1 **Assignee** Forester **Status** Incomplete **Resolved in Version** R2.0 - Final

JF/TL – related to SpatialExtension

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

JF/TL – related to SpatialExtension

Issue Number **I - 506** **Issue Date** 1/15/99

Author Lahtela, Hannu **Owner** Liebich **Status** Unresolved

Schema IfcSharedBldgElements **Version** R2.0 - Beta

Issue Description Windows/Frames
I'll be happy if I can get following information from IFC-file
Case Window:
- Product Name
- Number of glasses
- Glass thickness
- Fill gas
- Beam radiation transmittance(Tsol)
- Solar heat gain coefficient(SHGC)
- Visible light transmittance(Tvis)
– (U-value)
Case Frame:
- Product Name
– Material
– Width
- (U-value)

I think that extented thermal propertyset information should be saved to IFCProduct (or something like that). IFCWindows has to have an optional relation to IFCProduct, instead that each instance of windows have an Extented Thermal Propertyset.

Proposed Solution None

Resolution Not resolved: TL is still working on this

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL to propose a resolution

Issue Number **I - 507** **Issue Date** 1/15/99

Author Lahtela, Hannu **Owner** Liebich **Status** Resolved

Schema IfcSharedBldgElements **Version** R2.0 - Beta

Issue Description Walls has to have azimuth-value. At least thermal simulation need this value and 'building element designers' need the value. The value is needed to draw materials of walls also.

Proposed Solution None

Resolution Resolved: Added for R2

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL to insure

Issue Number **I - 508** **Issue Date** 1/15/99

Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcRepresentationResource	**Version**	R2.0 - Beta		

Issue Description Drawing representation should be possible to relate to the IfcObjects. This could be done according to the ISO STEP AP202. As graphical representation still is very important in the construction industry this is important and could eliminate the use of dxf and other non standard formats.

Proposed Solution None

Resolution Deferred to R3: Deferred for consideration in R? The use of drawing information (graphical presentations) within IFC would be a major enhancement, that can only be done within a project for a new IFC Release, not in reaction to an issue.

Issue Number I - 509 **Issue Date** 1/15/99

Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description Construction classification is very little considered when structuring the core. The ISO 12006-2 “Classification of Information in the Construction Industry” should be followed.

See also the diagrams in this issues document.

Construction Results (not IfcProduct), Construction Process and Construction Resource with one of the subclasses being Construction Products (like windows and doors) should be separate concepts in the schema. Today the IfcResource “product” is referencing the IfcProduct, indicating that an IfcProduct can be used as a resource for another IfcProduct. This is wrong, as IfcProduct, according to ISO Classification, should be considered as a functional result of activities. E.g. a window as IfcProduct is including the activities to put the manufacturers window as IfcResource.IfcProductResource in place. These are two very different concepts!

Proposed Solution None

Resolution Deferred to R3: Deferred for consideration in R? To be discussed during the Standing Conference of Groups interested in IT in Construction Industry (Vancouver)

Issue Number I - 510 **Issue Date** 1/15/99

Author	Tarandi, Vaino	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description The P_sets are too detailed. They are not in accordance with national practice, like in the Swedish classification. As the subclasses of IfcBuildingElements are not following any national classification it is a bad strategy to even detail them using the P_sets for enumerations of them.

Proposed Solution None

Resolution Resolved: Psets aligned with national standards can be achieved through use of UserDefined (extension) Psets . IFC supports multiple classifications systems.

Issue Number I - 511 **Issue Date** 1/15/99

Author	Tarandi, Vaino	**Owner**	Wix	**Status**	Deferred to R3.0
Schema	IfcActorResource	**Version**	R2.0 - Beta		

Issue Description It is difficult to accept that things like IfcPerson and IfcOrganisation should be viewed as IfcProperties. They should be viewed more like an Agent/Actor subclass under IfcObject!

Proposed Solution None

Resolution Deferred to R3: See also resolution to Issue #478

Issue Number	**I - 512**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description The Ifc schema is not stringent when using types and occurrences. For IfcProduct one can understand that the physical occurrences are the objects. For IfcResource it is stated that here the “type” of resource are the objects, like “carpenterhours”! Then the relation IfcResourceUse instantiates the occurrences like 20 hours of the type carpenterhours. One solution could be to have a subclassing of IfcObject into Type and Occurrence where Occurrence then is subclassed into TypedOccurrence which has the relation “of type” to Type.

(See also the diagrams in this issues paper)

This construct would enable the use of types and occurrences for e.g. IfcBuildingElements which then could be either a type, like a type window with standard characteristics, or an occurrence of that window type.

Proposed Solution None

Resolution Deferred to R3: This valid suggestion should be considered for long-term improvements of IFC, and finds its way into the IFC Meta-Model. It will not be possible to make the changes already within R2.0.

Issue Number	**I - 513**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	Wix	**Status**	Unresolved
Schema	IfcCostResource	**Version**	R2.0 - Beta		

Issue Description diagram 1
A cost with UnitCostBasis is related to IfcMeasureWithUnit, which has a ValueComponent and an UnitComponent. If e.g. the cost is related to gross vertical area there must be one component for “vertical” and one for “gross”. It could be named something like UnitRule.

Proposed Solution None

Resolution Yet to be resolved

Action # 1 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.0 - Final

JW & KY to work it out

Action # 2 **Assignee** Yu **Status** Incomplete **Resolved in Version**

JW & KY to work it out

Issue Number	**I - 514**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Deferred to R4.0
Schema	IfcGeometryResource	**Version**	R2.0 - Beta		

Issue Description diagram 3
As part 42 of ISO STEP is revised, this schema should also be modified accordingly. The Clothoide curve should be incorporated for the coming road schemata.

Proposed Solution None

Resolution Deferred to R4: We should include a clothoide, when the 2nd edition of Part 42 has been finalized and when a project (e.g. CI-1) will demand such geometry.

Issue Number	**I - 515**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	Drogemuller	**Status**	Resolved
Schema	IfcMaterialResource	**Version**	R2.0 - Beta		

Issue Description	diagram 1 See my comments for Ifc1.5.1!
Proposed Solution	None
Resolution	Resolved: Done

Issue Number	**I - 516**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description	diagram 3 Why is IfcCharacteristics incorporated? IfcManufactureInformation should be placed in relation to Resources/Products, IfcOccupant should be placed in relation to Agent/Actor, and the rest could also be placed in more suitable places.
Proposed Solution	None
Resolution	Resolved: 1) IfcCharacteristics and IfcPropertySet have been harmononized. IfcCharacteristics is removed and the general IfcProperty allows for both, dynamically defined properties (IfcPropertySet) and statically defined properties (formally IfcCharacteristic). 2) for IfcOccupant, see resolution on issue #478

Issue Number	**I - 517**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	See	**Status**	Deferred to R3.0
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description	diagram 3 There should be a generic construct for the break down into parts of objects in the IFC schema. The parts should be defined by classification and geometry and properties should be given in the same way as for the higher level objects. In the Door case the classes of the parts are hard coded in the schema. This is far to deep into classification. See my comments for Ifc1.5.1! A door in Norway is not including the same parts as a door in UK! Why try to hard code it in a schema when there is no common understanding between countries for the classification?
Proposed Solution	None
Resolution	Deferred to R3: This is too large an issue to complete in time for R2.

Issue Number	**I - 518**			**Issue Date**	1/15/99
Author	Tarandi, Vaino	**Owner**	See	**Status**	Resolved
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description	diagram 5 Roof is not on the same level as building elements like columns and beams. It belongs to another aggregate type of subclass of IfcPoduct like IfcBuilding and IfcBuildingStorey. It is an aggregate and is made up of parts on IfcBuildingElement level. It is a “system” like the structure, the enclosing system, the foundation etc. IfcRoofSlab should not be a class of its own. There are no such classes in e.g. Swedish classification. A slab is a slab, but different types could be applied!
Proposed Solution	None
Resolution	Resolved: 1) disagree that Roof is at the same level as building and Building Storey. 2) any IfcBuildingElement can be an assembly of component IfcBuildingElement's. IfcRoof is constrained to be such an assembly by WR61. 3) agree that "a slab is a slab", but we will not be able to generalize this until R3.

Action #	1	**Assignee**	See	**Status**	Complete	**Resolved in Version**	R2.0 - Final

RS to add generatlization of "Slab" to the to R3 list. Complete: made new issue #530 – deferred to R3.

***Issue Number* I - 519** *Issue Date* 1/15/99

Author	Tarandi, Vaino	***Owner***	Forester	***Status***	Resolved
Schema	IfcSharedBldgElements	***Version***	R2.0 - Beta		

Issue Description diagram 1
The use of networks for distribution systems, roads etc. should be supported in the schema in coming releases. Thus constructs in the current version should be in line with such ideas.

Proposed Solution None

Resolution Resolved: We agree.

Action # 1 ***Assignee*** Forester ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

JF to implement

***Issue Number* I - 520** *Issue Date* 1/15/99

Author	Tarandi, Vaino	***Owner***	See	***Status***	Resolved
Schema	IfcArchitectureDomain	***Version***	R2.0 - Beta		

Issue Description diagram 2
IfcStair is broken down into too detailed hard coded classes. There is no common classification support for this. The parts like IfcStairStep are treated differently in most countries.

Proposed Solution None

Resolution Resolved: Will eliminate StairStep. StairFlight will be the lowest level component.

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Final

RS to implement. – Complete: StairStep attributes added to StairFlight

***Issue Number* I - 521** *Issue Date* 1/15/99

Author	Tarandi, Vaino	***Owner***	Yu	***Status***	Resolved
Schema	IfcConstructionMgmtDomai	***Version***	R2.0 - Beta		

Issue Description diagram 1
Why is there a specific cost “HourlyWage” for IfcLaborResource when Cost is a generic property for all IfcObjects? The IfcCrewResource is also an odd construct as there are other generic grouping mechanisms to use. Relating several Actors/Agents like persons to a group would enable this view of Crew. In the European project CONCUR where Swedish, Finnish, Dutch and UK members of IAI are participating there are proposals for constructs in this domain that could be used as input in this discussion.

Proposed Solution None

Resolution Resolved: HourlyWage is no longer needed in IfcLaborResource because it is covered by the attribute UnitCost in the supertype IfcResource.

***Issue Number* I - 522** *Issue Date* 1/15/99

Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description IfcGeometricRepresentationItem and IfcTopologicalRepresentationItem
There are differences compared to STEP. In STEP these entities are subtypes (ANDOR) of the Part 43 entity representation_item. First the entity representation_item has an attribute name which is missing. Secondly I do not see how they work together to represent shapes. To illustrate this - I did not find how the topological entities apart from IfcClosedShell are referenced from other entities to represent shapes.

Proposed Solution Currently I cannot propose a solution. I first would like to know the rationale behind this approach.

Then I can propose a solution. So – please explain.

Resolution Resolved: 1) rejected - The general modeling rules for IFC disallow the use of ANDOR. Therefore multiple disjunct subtypes have to be defined. 2) declined - The name attribute is omited intentionally for not having the overhead of a STRING at each point, direction, etc. 3) resolved - The newly introduced IfcProductDefinitionTopology relates the topological items to the product.

Issue Number	***I - 523***			***Issue Date***	1/15/99
Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description IFC IfcTopologicalRepresentationItem, HTML definitions
In the text, referring to the corresponding page of STEP part 42, the page number is missing

Proposed Solution None

Resolution Resolved: 1.) Resolved: Page number 129 added.

Issue Number	***I - 524***			***Issue Date***	1/15/99
Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description IFC IfcTopologicalRepresentationItem, EXPRESS-G
- The text in the diagram still says that path has not been incorporated. It has been incorporated.
- The page connectors to the entity IfcClosedShell are wrong. They come form page 7 and instead of “6,9” it should be “6,4”

Proposed Solution correct text

Resolution Resolved: Page connectors corrected. Text deleted.

Issue Number	***I - 525***			***Issue Date***	1/15/99
Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Deferred to R3.0
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description IFC IfcPolyLoop
The corresponding supertype loop is missing. This has the consequence that the attribute Bound of the entity IfcFaceBound points directly to IfcPolyLoop and not to loop as in the corresponding STEP entity. So there are incompatibilities with STEP here. This is also a general issue, to adopt related supertypes from STEP too and to use the subtype pruning mechanism to constrain the set of subtypes to the required ones. One advantage would be that one must not change the attributes of entities which point to subtypes when a supertype is inserted.

Proposed Solution Add supertype loop, change attribute Bound of IfcFaceBound to point to loop.

Resolution Deferred to R3: 1) Agreed: The mechanism (subtype pruning) has been used when incorporating Part 42 into IFC. The loop was unfortunately forgotten. 2). deferred to R3: no change in Geometry should be made (upward/downward compatibility) therefore change should not be made in 2.0 but at a later point.

Issue Number	***I - 526***			***Issue Date***	1/15/99
Author	Haas, Wolfgang	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description IfcVertex, IfcEdge, IfcOrientedEdge, IfcPath
I could not find any entity in the EXPRESS-G which points to one these entities apart from internal pointers. They seem to live in “splendid isolation”.

Proposed Solution Please check whether I am right.

Resolution Resolved: An IfcTopologyRepresentation has been added that enables the use of topological representation items to define the underlying topology in networks.

Issue Number	**I - 527**			**Issue Date**	1/15/99
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R2.0 - Beta		

Issue Description IfcOrientedEdge, EXPRESS-G
There is no attribute orientation which enables to compute the derived attributes. In the class definitions it shows up.

Proposed Solution Add attribute to EXPRESS-G

Resolution Resolved: EXG updated.

Issue Number	**I - 528**			**Issue Date**	1/15/99
Author	Haas, Wolfgang	**Owner**	Liebich	**Status**	Resolved
Schema	IfcGeometryResource	**Version**	R2.0 - Beta		

Issue Description IfcCsgSolid
The EXPRESS-G says that operands may be IfcSolidModels and the EXPRESS-G gives no text with indications of any constaints concerning the allowed subtypes of IfcSolidModel. The Class semantic definitions state constraints which indirectly exclude the IfcAttDriven.... entities. Is this actually intended? Are there corresponding global where rules? Or is this just a bug in the text?

Proposed Solution Please clarify.

Resolution Resolved: The exclusion of the attribute driven geometry items from the CSG solid is intended. The semantic definitions at IfcCsgSolid and IfcBooleanResult have been updated and a WHERE rule included.

Issue Number	**I - 529**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description Difficulties in distinguishing between different line types (dashed vs. solid lines) which makes it impossible to identify optional attributes/ relationships.
This seems to be a technical problem related to how the modelling software (FirstSTEP XG) handles graphics (not fully Windows GDI compliant), which in turn makes it unsuitable for direct PDF-generation using Adobe PDFWriter (the procedure we assume is followed now).

Proposed Solution We propose following procedures for generating EXPRESS-G schemata in PDF-format:
1. From FirstSTEP XG print the schema pages to files in Postscript format (note: a PS-printer driver must be installed).
2. Generate the PDF-files from the Postscript files using Adobe Acrobat Distiller.
According to our experience this works. This has been tested it with following program versions: FirstSTEP XG ver. 2.0, Adobe Acrobat Distiller 3.01, Adobe Acrobat PDFWriter 3.02

Resolution Resolved: Good advice. Thank you for working out the workaround

Action #	1	**Assignee**	See	**Status**	Complete	**Resolved in Version**	R2.0 - Final

) RS to use this workaround in final documentation process -- until a better software tool is adopted

Issue Number	**I - 530**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description There are a number of free-text comments referring to changes made in IFC 1.5 & 1.5.1 which are not applicable to IFC 2.0 anymore.

Proposed Solution Remove outdated comments

Resolution Resolved :

Action #	1	***Assignee***	See	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					
Action #	2	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					
Action #	3	***Assignee***	Forester	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					
Action #	4	***Assignee***	Wix	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					
Action #	5	***Assignee***	Yu	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					
Action #	6	***Assignee***	Karstila	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					
Action #	7	***Assignee***	Hyvarinen	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
		All to remove these from EXG and DOC files					

Issue Number	***I - 531***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	See	***Status***	Deferred to R3.0
Schema	All Schemata	***Version***	R2.0 - Beta		

Issue Description The way of directly referencing simple types (INTEGER, STRING, BOOLEAN, etc.) does not necessarily reveal the semantic meaning of the attribute. This applies specially in all non-resource schemata.

Proposed Solution Change references to simple types in all non-resource schemata to defined types (e.g. IfcText, IfcLabel, etc.) to enforce better semantics.
ANDOR: Define rules in the Modelling Guide for usage of simple/defined types.

Resolution Defer to 3.0. Consider the appropriate schema in which to place these supporting defined types.

Issue Number	***I - 532***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	See	***Status***	Resolved
Schema	All Schemata	***Version***	R2.0 - Beta		

Issue Description The naming and use of some attributes of type BOOLEAN / LOGICAL makes it hard to understand which value denotes which state. Examples:
– IfcSpaceBoundary.PhysicalOrVirtual
– IfcRelProcessesProducts.InOrOut
– IfcRelContains.ContainedOrReferenced
These are explained in the Object Model Ref but the semantics should be clear straight from the model.

Proposed Solution Change attribute value types to enumerations stating explicitly the states.
OR: Rename attributes to more clearly denote the logical state

Resolution Resolved: Will rename all Boolean and Logical attributes and properties (Psets) to use the naming convention ? ThisNotThat

Action # 1 ***Assignee*** Hietanen ***Status*** Complete ***Resolved in Version*** R2.0 - Final

JH to generate a list of all Boolean and Logical attributes and Properties

-- Complete by: RS (except "SameSenseAsBaseCurve" on IfcGridAxis)

Action # 2 ***Assignee*** _All ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

All to change these names as appropriate

Issue Number ***I - 533*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Wix ***Status*** Deferred to R3.0

Schema All Schemata ***Version*** R2.0 - Beta

Issue Description The current Modelling Guide states that, for an aggregation that may be empty, cardinality zero to many will be used instead of optional 1 to many. There may be reasons for this rule that we are not aware of, but consider suggestion to change SET[0:?] to OPTIONAL SET[1:?] based on following arguments
- Using optional would make it more visible (dashed line) in EXPRESS-G what is mandatory and what is not
- Using optional it would be explicit in the Part 21 exchange file what values have not been instantiated, because there would be a $ as a value instead of ()
- In SDAI there is a function that can be used for directly querying if a value is set or not. Under the current rule one has to access the aggregate and look “inside” it if there are zero members in it
- The optionality may also bee needed when defining exchange sets (or similar) of the future for certification testing, so that certain model subsets can be implemented without proving a “dummy slot” for SET [1:?] attributes that are never populated

Proposed Solution Change all occurrences of optional aggregates, e.g. SET[0:?] to OPTIONAL SET[1:?].

Resolution Deferred to R3: Will query implementers and make this change in the modeling rules if they don't scream

Action # 1 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R3.0 - Alpha

JW to issue question to implementers and update the modeling rules as appropriate.

Issue Number ***I - 534*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** See ***Status*** Resolved

Schema All Schemata ***Version*** R2.0 - Beta

Issue Description A separate generic class for assemblies would be useful especially in early design stages before any detailed elements have been specified. It would e.g. represent, as separate objects, collections of elements not yet designed. This class would have its own shape representation. A data exchange scenario can be foreseen where there is a need for these kinds of objects;
An example: Structual design where an assebly object could be a frame that consists of a number of beams and columns

Proposed Solution For consideration: Add separate generic class IfcAssembly or similar to the relevant schema.

Resolution Resolved: Suggested accepted, a generic IfcElementAssembly was added as subtype of IfcElement, with the possibility to contain shape and other properties.

Action # 1 ***Assignee*** _All ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

ALL – any subtypes of IfcBuildingElement that are intended as Assemblies, should be subtyped from IfcElementAssembly.

-- Completed by: RS

Issue Number ***I - 535*** ***Issue Date*** 1/15/99

Author	Karstila, Kari	**Owner**	Liebich	**Status**	Resolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description There are a number of registry classes, e.g. IfcProjectMaterialRegistry, IfcProjectAppRegistry. Although IfcProject have only one reference each for these nothing prevents a user from instantiating the registries multiple times as such. There may also be a need to exchange, for instance, material registries unconnected to specific projects (e.g. as a kind of templates or libraries). How are these distinguished or identified under such circumstances?

Proposed Solution Add attributes Identifier and OPTIONAL Description to all registry type classes.

Resolution Resolved: IfcRegistry will be eliminated (RD). ProjectTeamMembers, RegisteredApplications, ProjectMaterials on IfcProject will be made into LIST [0:?] OF UNIQUE Xxx. ProjectEnums will be added to IfcProject (LIST) (TL).

Action # 1 **Assignee** Drogemuller **Status** Incomplete **Resolved in Version** R2.0 - Final

RD to remove IfcRegistry

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL to change ProjectTeamMembers, RegisteredApplications, ProjectMaterials on IfcProject will be made into LIST [0:?] OF UNIQUE Xxx.

Action # 0 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL to add "ProjectEnums" to IfcProject (see proposal by JF).

Issue Number	***I - 536***			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description How are the decompositions to be implemented, e.g. IfcRelContains? There are attributes RelatedObject and RelatingObjects L[1:?]. Two different kinds of implementations have been around (e.g. in ACS demo files): For a specific object with decomposed or contained objects
1. only one relationship object IfcRelContains is instantiated and all contained objects are included in the RelatingObjects aggregation;
OR
2. several relationship objects IfcRelContains are instantiated, one for each individual contained object, thus giving only one element in the RelatingObjects aggregation of each relationship object.
The second alternative seems to be against the original intention, but the model itself does not restrict this

Proposed Solution There is a clear need for Guidelines on how to implement decompositions to ensure a uniform way of doing it
OR:
Add rules to the schemata to constrain the use of containment relationship to the intended.

Resolution Yet to be resolved

Issue Number	***I - 537***			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Resolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description It would in certain circumstances be helpful to have a generic optional name/label type attribute in all objects. This would, for example, aid in providing sensible labels of objects for users e.g. in software GUIs for applications navigating in an instantiated model, be useful in ad-hoc queries, etc.

Proposed Solution For consideration: add attribute OPTIONAL Name : IfcLabel (of type STRING) to IfcRoot

Resolution Resolved: An optional Label::STRING has been added to the IfcRoot

IFC Issues and Resolutions Database

Issue Number	**I - 538**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Drogemuller	**Status**	Unresolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description The use of attribute names with the calc-prefix is unclear. Are there any rules for this in the Modelling Guide?
OR
Today we cannot imagine all various sort of (future) applications and how they create and handle data; therefore we cannot know always if an attribute value is calculated or given by user etc.

Proposed Solution Add rules for usage of attribute names with calc-prefix to the Modelling Guide (if not already included)
OR
Give up the use of calc-prefix

Resolution Not resolved: Work on relating this to the Dirty Bit solution (JW, RD).

Action #	1	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

JW to insure usage rules are covered in Modeling Guide

Action #	2	**Assignee**	See	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

RS to add documentation to explain this in the Object Model Guide

Issue Number	**I - 539**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Resolved
Schema		**Version**	R2.0 - Beta		

Issue Description All indirect referencing using, for instance, unique id attribute value should be changed to real object references, because the present way blurs the semantics and prevents sensible navigation in instantiated models using, for example, SDAI implementations.

Proposed Solution Change all indirect referencing using, for instance, unique id attribute value to real object references.

Resolution Resolved: Agreed

Action #	1	**Assignee**	_All	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

ALL - remove any object references of data type IfcObjectReference, integer, etc. and replace with relationship to the referenced objects.

-- Completed by: RS

Issue Number	**I - 540**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Resolved
Schema		**Version**	R2.0 - Beta		

Issue Description There are may be several parallel ways of representing a number of properties (e.g. cost, actor, shape, etc.) which may lead into a number of different ways to interpret the model, thus leading to incompatible sofware.

Proposed Solution Possible corrective actions:
– reduce redundancy in the model
– provide comprehensive examples of how to correctly use the model
– implementors (documented) agreements on model usage

Resolution Resolved: This is an overall advice kind of feeback -- cannot be resolved in any one schema -- must be discussed by the group. Need a specific list of what things are redundant.

Action # 1 ***Assignee*** Karstila ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KK to look for 5 most obvious redundancies

Action # 2 ***Assignee*** Bazjanac, Vl ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

VB to look for 5 redundancies in documentation

Action # 3 ***Assignee*** Steinmann, ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

RSt to complete documentation of Implementer Agmts.

Action # 4 ***Assignee*** See ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

RS to move " comprehensive examples of how to correctly use the model" to the R3 projects list. – Complete 19-Feb-99

Action # 5 ***Assignee*** Steinmann, ***Status*** Incomplete ***Resolved in Version***

RSt to insure development - first version of Implementation Guide

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Issue Number ***I - 541*** ***Issue Date*** 1/15/99

Author Serén, Kalle ***Owner*** Drogemuller ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R2.0 - Beta

Issue Description IfcObjectSelectionSet
What is the purpose of IfcObjectSelectionSet? It is referenced in IfcDocumentExtensions. IfcDocumentReference but the meaning is unclear. How does this concept differ from IfcGroup?

Proposed Solution Clarify semantics. Check possible overlaps with existing entities, e.g. IfcGroup.

Resolution Resolved: Deleting IfcObjectSelectionSet

Action # 1 ***Assignee*** Drogemuller ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

RD to remove

Issue Number ***I - 542*** ***Issue Date*** 1/15/99

Author Serén, Kalle ***Owner*** Drogemuller ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R2.0 - Beta

Issue Description IfcObjectSelectionSet
The way of referencing the object in the set indirectly through a set of IfcGloballyUniqueID seems odd. Why not reference IfcObject directly? This would model the semantics better.

Proposed Solution Change attribute Objects L[0:?] to reference IfcObject directly.
This may be against the referencing rules between the layers of the IFC model; consider however the relaxing the rules in special cases, when the rules lead to very difficult situations

Resolution Resolved: Deleting IfcObjectSelectionSet

Issue Number ***I - 543*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Drogemuller ***Status*** Resolved

Schema IfcUtilityResource ***Version*** R2.0 - Beta

Issue Description IfcObjectSelectionSet
Attribute SelectionSetName should be unique for unambiguous identification. Should also be of defined type to better reveal semant

Proposed Solution Change attribute SelectionSetName to be UNIQUE

Resolution Resolved: Deleting IfcObjectSelectionSet

Issue Number	***I - 544***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcUtilityResource	***Version***	R2.0 - Beta		

Issue Description IfcAuditTrail
Constraint on attribute Transactions restricting AuditTrailLength to 1 does not apply in rel. 2.0 according to class semantic definition in Object Model Ref, p. 123.

Proposed Solution Remove remark and constraint indicator from EXPRESS-G diagram. Remove also WHERE rule WR1 from Object Model Ref, p. 124.

Resolution Resolved: limit removed

Issue Number	***I - 545***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcUtilityResource	***Version***	R2.0 - Beta		

Issue Description IfcAuditTrail
In class IfcAuditTrail the way of referencing actors, users and application indirectly through INTEGERs corresponding to index (of an element in an aggregate attribute of another entity) in various register objects seems odd, and very poorly represent the real semantics. Why not reference the objects directly? This would model the semantics better.

Proposed Solution Change references to IfcActorSelect and IfcRegisteredApplication directly

Resolution Resovled: Remove all integer references to other objects

Action # 1 ***Assignee*** _All ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

All schema owners -- implement.

-- Complted by: RS (19-Feb-99)

Issue Number	***I - 546***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcUtilityResource	***Version***	R2.0 - Beta		

Issue Description IfcOwnerHistory
In class IfcOwnerHistory the way of referencing actors, users and application indirectly through INTEGERs corresponding to index in various register objects seems odd. Why not reference the objects directly? This would model the semantics better.

Proposed Solution Change references to IfcActorSelect and IfcRegisteredApplication directly.

Resolution Resolved: Remove all integer references to other objects.

Issue Number	***I - 547***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcUtilityResource	***Version***	R2.0 - Beta		

Issue Description IfcTransaction
In class IfcTransaction the way of referencing actors, users and application indirectly through INTEGERs corresponding to index in various register objects seems odd. Why not reference the objects directly? This would model the semantics better

Proposed Solution Change references to IfcActorSelect and IfcRegisteredApplication directly

Resolution Resolved: Remove all integer references to other objects

Issue Number	***I - 548***	***Issue Date***	1/15/99

Author	Karstila, Kari	***Owner***	Karstila	***Status***	Resolved
Schema	IfcDateTimeResource	***Version***	R2.0 - Beta		

Issue Description IfcTimeStamp seems to be twice in the EXPRESS-G (with different base type !)

Proposed Solution Remove IfcTimeStamp = REAL

Resolution Resolved: Will be done for Pre-Final

Action # 1 ***Assignee*** Karstila ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KK to implement

Issue Number I - 549 ***Issue Date*** 1/15/99

Author	Karstila, Kari	***Owner***	See	***Status***	Deferred to R3.0
Schema	IfcMeasureResource	***Version***	R2.0 - Beta		

Issue Description A number of attribute datatypes are directly simple datatypes, which would better be defined types

Proposed Solution Change the name kind-of attribute datatypes into TYPE label = STRING; END_TYPE;

Resolution Deferred to R3: Agreed, but deferred due to time constraints on R2

Issue Number I - 550 ***Issue Date*** 1/15/99

Author	Karstila, Kari	***Owner***	Liebich	***Status***	Resolved
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description A number of attribute names in geometry resources are difficult to understand and they are often abbreviated in a random manner.

Proposed Solution Just a note – no corrective actions proposed. (We know these originate from the STEP Integrated Resources)

Resolution Resolved: we are aware of the problem but gave a higher priority to the compatibility to Part 42

Issue Number I - 551 ***Issue Date*** 1/15/99

Author	Karstila, Kari	***Owner***	Liebich	***Status***	Declined
Schema	IfcGeometryResource	***Version***	R2.0 - Beta		

Issue Description IfcBoundingBox
Our interpretation is that the orientation of an bounding box comes from the orientation of corresponding product. Is it really so that a bounding box representation cannot have an orientation different from the product it represents? We can imagine situations where this is not the case; and it would be easier for simple applications to just provide visualization of bounded boxes without considering at all the relationships between the boxes and products

Proposed Solution For consideration: Add optional attribute Orientation (: IfcDirection) to IfcBoundingBox.

Resolution Declined: Bounding Box had an own orientation in R1.5, but this was deleted in R1.5.1 on request from the implementation group. A bounding box is seen by them as just lower-left and upper-right point in the object coordinate system (as now defined).

Issue Number I - 552 ***Issue Date*** 1/15/99

Author	Serén, Kalle	***Owner***	See	***Status***	Resolved
Schema	IfcPropertyResource	***Version***	R2.0 - Beta		

Issue Description IfcReferencedProperty
IfcReferencedProperty presented in EXPRESS-G schema does not exist in neither Object Model Ref nor lexical EXPRESS

Proposed Solution Either add entity to lexical EXPRESS and Object Model Ref or remove it from EXPRESS-G.

Resolution Resolved: This class has been eliminated.

Issue Number	**I - 553**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Resolved
Schema	IfcRepresentationResource	**Version**	R2.0 - Beta		

Issue Description IfcrepresentationContext
IfcRepresentationContext.ProjectId attribute name is misleading (leads to think of an id of the project)

Proposed Solution Change to id (or contextId)

Resolution Resolved: Renamed to GlobalId

Issue Number	**I - 554**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	See	**Status**	Resolved
Schema	IfcMaterialResource	**Version**	R2.0 - Beta		

Issue Description IfcMaterialFinish
Entity IfcMaterialFinish is completely missing from EXPRESS-G.

Proposed Solution Add to EXPRESS-G.

Resolution Resolved: agreed.

Action #	1	**Assignee**	Drogemuller	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

RD to implement

Issue Number	**I - 555**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	Drogemuller	**Status**	Resolved
Schema	IfcMaterialResource	**Version**	R2.0 - Beta		

Issue Description IfcMaterialFinish
Attribute type unspecified: BidirectionalScatteringDistribution both in lexical EXPRESS and Object Model Ref

Proposed Solution Specify attribute type

Resolution Resolved: Vlado provided additional information to be added to model

Action #	1	**Assignee**	Drogemuller	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

RD to implement

Issue Number	**I - 556**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	Drogemuller	**Status**	Resolved
Schema	IfcMaterialResource	**Version**	R2.0 - Beta		

Issue Description IfcMaterial
A number of attributes are missing from the EXPRESS-G schema.

Proposed Solution Add attributes to EXPRESS-G

Resolution Resolved: agreed

Action #	1	**Assignee**	Drogemuller	**Status**	Incomplete	**Resolved in Version**	

RD to implement

Issue Number	***I - 557***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	Drogemuller	***Status***	Resolved
Schema	IfcMaterialResource	***Version***	R2.0 - Beta		

Issue Description IfcProjectMaterialRegistry
IfcProjectMaterialRegistry doesn't have any identification or name. It is possible to instantiate a number of IfcProjectMaterialRegistries within a data exchange file without a "handle" to them (although only one would be assigned to the project). Consider also exchanging information only about baseline materials, then some identification, name and source would be needed.

Proposed Solution Add an identification, a name and optional source for IfcProjectMaterialRegistry

Resolution Resolved: Object deleted

Issue Number	***I - 558***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	Drogemuller	***Status***	Deferred to R3.0
Schema	IfcMaterialResource	***Version***	R2.0 - Beta		

Issue Description A number of attribute datatypes are directly simple datatypes, which could express the semantics better as defined types

Proposed Solution Change the name kind-of attribute datatypes into TYPE label = STRING; END_TYPE;

Resolution Deferred to R3: Not enough time to do this well for R2.

Issue Number	***I - 559***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	Wix	***Status***	Resolved
Schema	IfcCostResource	***Version***	R2.0 - Beta		

Issue Description IfcCost
Attributes BaseCostValue and FinalCostValue directly reference simple type REAL. It would be semantically clearer if a defined type would be used for these

Proposed Solution Redefine attributes BaseCostValue and FinalCostValue to defined type, e.g. IfcMonetaryMeasure (add this type to IfcMeasureResource).

Resolution Resolved: Done. Added IfcMonetaryMeasure (type: REAL) to the Measure Schema. . Attributes BaseCostValue and FinalCostValue now reference IfcMonetaryMeasure

Action # 1 ***Assignee*** Wix ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

) JW to pass CurrencyEnum to KK for inclusion in IfcMeasureResource

Issue Number	***I - 560***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	See	***Status***	Resolved
Schema	IfcCostResource	***Version***	R2.0 - Beta		

Issue Description IfcCostModifier
Attribute name CostValue does not seem to be semantically correct because it denotes a value that can be a percentage also (cf. IfcCostOperatorEnum). A better name would be, for example, ModifierValue.

Proposed Solution Rename attribute CostValue to ModifierValue

Resolution Resolved: Changed attribute name as suggested but as plural since values can be a list

Issue Number	***I - 561***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	Wix	***Status***	Resolved
Schema	IfcActorResource	***Version***	R2.0 - Beta		

Issue Description IfcActorRole
Attribute Name in IfcActorRole does not reveal the semantics

Proposed Solution Rename attribute to, for example, RoleType

Resolution Resolved: done as requested. Also, user defined roles will be supported through an attribute UserDefinedRole (STRING).

Action #	1	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final
		JW to implement					

Issue Number	**I - 562**	**Issue Date**	1/15/99

Author	Karstila, Kari	**Owner**	Wix	**Status**	Resolved
Schema	IfcActorResource	**Version**	R2.0 - Beta		

Issue Description IfcActorRole
Typo in IfcRoleEnum referenced by IfcActorRole. It should be IfcRoleTypeEnum.

Proposed Solution Correct typo.

Resolution Resolved: done as requested.

Issue Number	**I - 563**	**Issue Date**	1/15/99

Author	Karstila, Kari	**Owner**	Wix	**Status**	Deferred to R3.0
Schema	IfcActorResource	**Version**	R2.0 - Beta		

Issue Description IfcActorRole
Attribute Description in IfcActorRole references simple type STRING directly. A reference to a defined type would better reveal the semantics, e.g. IfcText.

Proposed Solution Redefine attribute type to defined type instead of simple type.

Resolution Defer to R3: Left as is for Release 2 pending a broader discussion on use of defined data types within R3

Issue Number	**I - 564**	**Issue Date**	1/15/99

Author	Karstila, Kari	**Owner**	Wix	**Status**	Resolved
Schema	IfcActorResource	**Version**	R2.0 - Beta		

Issue Description IfcAddress
Although the attribute AddressLines covers the basic need for flexibly specifying addresses according to varying international local customs, there may be a need to separately specify P.O.Box data (cf. STEP integrated resources).

Proposed Solution Add optional PostalBox attribute

Resolution Resolved: done as requested

Issue Number	**I - 565**	**Issue Date**	1/15/99

Author	Karstila, Kari	**Owner**	Wix	**Status**	Resolved
Schema	IfcActorResource	**Version**	R2.0 - Beta		

Issue Description IfcAddress
Attribute name WWWHomePage does not express the intended semantics. If the intension is to carry the Universal Resource Locator address of the Person's/ Organisation's Home Page some other attribute name would seem appropriate.

Proposed Solution Rename attribute to, for example, WWWHomePageURL

Resolution Resolved: done as requested.

Issue Number	**I - 566**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Wix	**Status**	Deferred to R3.0
Schema	IfcActorResource	**Version**	R2.0 - Beta		

Issue Description New Class
A new class may be needed for grouping persons and/or organizations. This would be useful, for example, for assigning space programs through IfcSpaceProgramGroup to specific oganizational group (current model semantics does not work as intended, see also Issue for IfcSpaceProgramGroup. GroupAssignment in IfcArchitectureDomain)

Proposed Solution For consideration: Add new class IfcOrganizationalGroup for grouping arbitrary organizational subgroups with attribute for naming/labelling identification of group

Resolution Deferred to R3: This will be resolved by the resolution to issue #478

Issue Number	**I - 567**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Karstila	**Status**	Resolved
Schema	IfcDateTimeResource	**Version**	R2.0 - Beta		

Issue Description IfcLocalTime
For practical reasons it would convenient be declare the Zone attribute optional so that no time offsets would have to be included in instantiated models in, for example, domestic projects concerning contractors from only one country (or only from one time zone like Finland and Greece).

Proposed Solution Make attribute Zone optional.

Resolution Resolved: done as requested

Issue Number	**I - 568**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description IfcObject
According to Object Model Reference and lexical EXPRESS the attribute OccurrenceProperties does not exist anymore; still its presented in EXPRESS-G schema

Proposed Solution Remove from OccurrenceProperties EXPRESS-G

Resolution Resolved: Done as requested

Issue Number	**I - 569**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description IfcCharacteristic
In EXPRESS-G this entity is denoted ABSTRACT (and it has no own specific attributes so that makes sense). However, it is not denoted ABSTRACT in lexical EXPRESS.

Proposed Solution Add ABSTRACT specification to entity in lexical EXPRESS

Resolution Resolved: Done as requested

Issue Number	**I - 570**			**Issue Date**	1/15/99
Author	Serén, Kalle	**Owner**	Liebich	**Status**	Resolved
Schema	IfcKernel	**Version**	R2.0 - Beta		

Issue Description IfcRelDocuments
According to Object Model Ref and lexical EXPRESS this entity should be a subtype of IfcRelationship. This is not indicated in EXPRESS-G.

Proposed Solution Add subtype of IfcRelationship specification to EXPRESS-G

Resolution Resolved: Done as requested

Issue Number ***I - 571*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Liebich ***Status*** Resolved

Schema IfcKernel ***Version*** R2.0 - Beta

Issue Description IfcDocument
IfcDocument seems to have very limited properties (actually Document purpose only); however a number of generic, often used properties (title, source, …) can be imagined

Proposed Solution Consider expanding the IfcDocument properties

Resolution Resolved: See resolution in issue #489.

Issue Number ***I - 572*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Liebich ***Status*** Resolved

Schema IfcKernel ***Version*** R2.0 - Beta

Issue Description IfcRelContains
The datatype Boolean of ContainedOrReferenced property doesn't provide immediate understanding of the meaning of the values True or False

Proposed Solution Change the datatype to an enumeration datatype with values Containment / Reference

Resolution Resolved: Agreed after intense communication (bribery)

Issue Number ***I - 573*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Liebich ***Status*** Resolved

Schema IfcKernel ***Version*** R2.0 - Beta

Issue Description It is difficult to get an overall picture of the decomposition hiearchy of an instantiated IFC model (there is possibly various interpretations of that ?)

Proposed Solution Somewhere in the documentation there should be a description and an example of of the main decomposition hierarchy of the project model all the way down to low level elements through IfcRelContains, IfcRelAssemblesElements etc.)

Resolution Deferred to R3: propose to include this in proposed Core refinement project.

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version***

TL to add this to the list for R3 Core Refinements

Issue Number ***I - 574*** ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Liebich ***Status*** Resolved

Schema ***Version*** R2.0 - Beta

Issue Description IfcSpaceBoundary
The datatype Boolean of .InternalOrExternal and PhysicalOrVirtual properties doesn't provide immediate understanding of the meaning of the value True or False

Proposed Solution Change the datatypes to an enumeration datatypes with values Internal/External and Physical / Virtual. Perhaps the names of the attributes also could be changed ?

Resolution Resolved: as proposed

Action #	1	***Assignee***	Liebich	***Status***	Incomplete	***Resolved in Version***	
			TL to implement				

Issue Number	***I - 575***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R2.0 - Beta		

Issue Description IfcRelNestsProcesses
Entity completely missing from EXPRESS-G schema.

Proposed Solution Add entity IfcRelNestsProcesses to EXPRESS-G

Resolution Resolved: done as requested

Issue Number	***I - 576***			***Issue Date***	1/15/99
Author	Serén, Kalle	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R2.0 - Beta		

Issue Description IfcProjectPlans
Typo in attribute name PurcheseOrders, should be PurchaseOrders

Proposed Solution Correct typo.

Resolution Resolved: as requested

Action #	1	***Assignee***	Yu	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
			KY to implement				

Issue Number	***I - 577***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R2.0 - Beta		

Issue Description IfcWorkTask
Attribute name WBS is not very expressive and in-line with the semantics definition

Proposed Solution Change to WBSCode ?
Perhaps the semantics definition could also be elaborated

Resolution Resolved: as requested

Action #	1	***Assignee***	Yu	***Status***	Incomplete	***Resolved in Version***	
			KY to implement				

Issue Number	***I - 578***			***Issue Date***	1/15/99
Author	Karstila, Kari	***Owner***	Yu	***Status***	Resolved
Schema	IfcProcessExtention	***Version***	R2.0 - Beta		

Issue Description IfcProjectPlan
Typo in attribute CostEstimates

Proposed Solution Correct typo.

Resolution Resolved: as requested.

Action #	1	***Assignee***	Yu	***Status***	Incomplete	***Resolved in Version***	R2.0 - Final
			KY to implement				

Issue Number	**I - 579**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Hyvarinen	**Status**	Deferred to R3.0
Schema	IfcConstraintExtension	**Version**	R2.0 - Beta		

Issue Description IfcConstraint
Attributes Description, Name and Source reference simple type STRING directly. A reference to defined types would better reveal the semantics, e.g. IfcText, IfcLabel.

Proposed Solution Redefine attribute type to defined type instead of simple type.

Resolution Deferred to R3: see also issue #531

Issue Number	**I - 580**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Hyvarinen	**Status**	Resolved
Schema	IfcConstraintExtension	**Version**	R2.0 - Beta		

Issue Description Use from clause
The USE FROM clause in lexical EXPRESS reference non-existent IfcRelationship1to1. In EXPRESS-G the correct reference IfcRelationship is used.

Proposed Solution Correct USE FROM Clause in lexical EXPRESS

Resolution Resolved: as requested

Action # 1 **Assignee** Forester **Status** Incomplete **Resolved in Version** R2.0 - Final

JF to implement

Issue Number	**I - 581**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Liebich	**Status**	Resolved
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description How is the decomposition of IfcCurtainWall into its IfcCurtainWallElements represented ? Via IfcRelAssemblesElements ?

Proposed Solution Provide guidance in the documentation

Resolution Resolved: as proposed

Issue Number	**I - 582**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Liebich	**Status**	Resolved
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description The semantics of IfcRelJoinsElements.WaterProofing : LOGICAL cannot be understood from the EXPRESS/EXPRESS-G

Proposed Solution Change to .WaterProofingRequired or something ?

Resolution Resolved: as proposed

Issue Number	**I - 583**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcSharedSpatialElements	**Version**	R2.0 - Beta		

Issue Description IfcOccupant.OccupantName attribute has a misleading name, since it is actually an object reference to IfcActorSelect entity, not a name : STRING

Proposed Solution Change attribute name to TheOccupant or something ???

Resolution Deferred to R3: This will be resolved together with the resolution for issue #478

Issue Number	**I - 584**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Deferred to R3.0
Schema	IfcArchitectureDomain	**Version**	R2.0 - Beta		

Issue Description IfcSpaceProgramGroup
The current model semantics for attribute GroupAssignment does not seem to work as intended: it refences one IfcActorSelect which leaves the actual suborganizational grouping open.
(see Issue for IfcOrganizationalGroup in IfcActorResource).

Proposed Solution For consideration: Add new class IfcOrganizationalGroup in IfcActorResource. Put GroupAssignment to point to that

Resolution Deferred to R3: This will be resolved together with the resolution for issue #478

Issue Number	**I - 585**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Deferred to R3.0
Schema	IfcArchitectureDomain	**Version**	R2.0 - Beta		

Issue Description IfcSpaceProgramGroup
Attribute GroupRole references simple type STRING directly. A reference to a defined type would better reveal the semantics, e.g. IfcLabel.

Proposed Solution Redefine attribute type to defined type instead of simple type

Resolution Deferred to R3: this will be resolved by the resolution to #531

Issue Number	**I - 586**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Deferred to R3.0
Schema	IfcArchitectureDomain	**Version**	R2.0 - Beta		

Issue Description IfcSpaceProgram
Attribute SpaceName references simple type STRING directly. A reference to a defined type would better reveal the semantics, e.g. IfcLabel.

Proposed Solution Redefine attribute type to defined type instead of simple type

Resolution Deferred to R3: (same as #585) this will be resolved by the resolution to #531.

Issue Number	**I - 587**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Resolved
Schema	IfcArchitectureDomain	**Version**	R2.0 - Beta		

Issue Description IfcSpaceProgram
The semantics of the IfcSpaceProgram is a bit unclear. Is it inteted to record the space requirements in the inception stage? What is the extent and scope of a space program?

Proposed Solution Clarify in the Object Model Ref.

Resolution Resolved: It provides the space requirement before design -- but can also be modified through the life of the building (e.g. changed by the facilities management department as new tenants move in and remodel). Expanded definition now in the Reference Manual section for this class

Action # 1 **Assignee** See **Status** Complete **Resolved in Version** R2.0 - Final

RS to implement. – Complete (2-Feb-99).

Issue Number	**I - 588**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	See	**Status**	Resolved

Schema IfcArchitectureDomain ***Version*** R2.0 - Beta

Issue Description IfcSpaceProgram
Is the intension that always at least one IfcSpace is instantiated when an IfcSpaceProgram is instantiated (attribute ProgramForSpaces is not optional). What if no spaces are defined yet when a space program is being specified?

Proposed Solution Clarify in the Object Model Ref. or make ProgramForSpaces optional

Resolution Resolved: Yes, at least one IfcSpace should correspond to each program. At the client brief stage, this space may not have much definition, only a cube with the appropriate area and default height. Then, during the design stages, it will take a 'designed' shape

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Issue Number I - 589 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** See ***Status*** Resolved

Schema IfcArchitectureDomain ***Version*** R2.0 - Beta

Issue Description IfcStairFlight
The model states that a stair flight connects at most 2 floors. Can we be sure that this will always be case – what if someone invents a stair flight that connects several (i.e. more than two) floors. Or the other way round, is it necessary to constraint the upper index to 2 ?

Proposed Solution Just a philosofical note ;-)
Consider implications.

Resolution Resolved: Yes, I believe this is correct, since there must be a landing or floor where a flight connects. By definition, if the stair continues beyond this landing or floor, it begins a new flight. I could imagine only an extreme case -- where each stair step is wide enough to function as a landing -- where it might be possible to do as you say. But in that case, I would argue that the one that connects to the floor must be modeled as a landing.

Issue Number I - 590 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** See ***Status*** Resolved

Schema IfcArchitectureDomain ***Version*** R2.0 - Beta

Issue Description Several classes
There are several attribute names with a calc_-prefix. In other places in the model where the calc-prefix is used there is no underscore.

Proposed Solution Remove underscore and specify in Modelling Guidelines the usage of the calc-prefix (if not yet included).

Resolution Resolved: Okay, if I am the odd-ball, I will conform. Removing all "_" characters between "calc" and the actual attribute name. Done in Beta-3

Issue Number I - 591 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** See ***Status*** Unresolved

Schema IfcArchitectureDomain ***Version*** R2.0 - Beta

Issue Description IfcBuiltInAccessory
The class IfcBuiltInAccessory is presented on two different pages in EXPRESS-G. The first is incomplete regarding attributes.

Proposed Solution Change first occurrence of class IfcBuiltInAccessory to page reference to second occurrence of it (p. 4).

Resolution Resolved: Good catch! Done in Beta-3

Issue Number I - 592 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** See ***Status*** Resolved

Schema IfcArchitectureDomain ***Version*** R2.0 - Beta

Issue Description IfcCounterOrShelfEnum
In both EXPRESS-G and lexical EXPRESS: typo in name of enumeration IfcCounterOrShelfTypeEnum (vs. IfcCouterOrShelfTypeEnum).

Proposed Solution Correct typo.

Resolution Resolved: Good catch! Done in Beta-3

Issue Number I - 593 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Yu ***Status*** Resolved

Schema IfcConstructionMgmtDomai ***Version*** R2.0 - Beta

Issue Description IfcCrewResource
The naming of inverse attribute of HasEquipmentResources, i.e. PartOfCrew seems odd – can equipment be part of a crew?

Proposed Solution Rename inverse attribute to, for example, AssignedToCrew(s).

Resolution Resolved: A construction crew type does usually include an equipment type. This is a requirement from CE-1. This INV relationship has been promopted to IfcResource anyway using general contains model. Done in Beta-3.

Issue Number I - 594 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Yu ***Status*** Resolved

Schema IfcConstructionMgmtDomai ***Version*** R2.0 - Beta

Issue Description IfcProductResource & IfcConstructionMaterialResourse
Both IfcProductResource and IfcConstructionMaterialResource reference IfcProduct. Which are the instantiable subclasses to be used? Is the intention to use Psets?

Proposed Solution Check semantics and add necessary subclasses or clarify usage.

Resolution Resolved: it is intended that both mentioned classes point to IfcProduct for difrrerent purposes. That is both are needed. It was not intended to use psets. Will improve the documentation

Action # 1 ***Assignee*** Yu ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KY to implement

Issue Number I - 595 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Yu ***Status*** Resolved

Schema IfcConstructionMgmtDomai ***Version*** R2.0 - Beta

Issue Description IfcConstructionZoneAggregationProduct
The value of attribute IsZoneOrAggregation is set to be of value BOOLEAN. Which state is denoted by TRUE? This is explained on the Object Model Ref but the semantics should be clear from the model itself

Proposed Solution Rename the attribute to semantically correspond to the value type.
OR: use an enumeration as value type explicitly stating the possible values.

Resolution Resolved: agreed! Has been changed to ZoneNotAggregation with a Bool type. Done in Beta-3

Issue Number I - 596 ***Issue Date*** 1/15/99

Author Karstila, Kari ***Owner*** Yu ***Status*** Deferred to R3.0

Schema IfcConstructionMgmtDomai ***Version*** R2.0 - Beta

Issue Description General
Several occurrences of attributes directly referencing simple types (STRING). This is semantically

unclear.

Proposed Solution Use defined types instead of simple types to clarify semantics.

Resolution Deferred to R3: see resolution to issue #531.

Issue Number	**I - 597**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Yu	**Status**	Resolved
Schema	IfcConstructionMgmtDomai	**Version**	R2.0 - Beta		

Issue Description IfcOccupancyPlan
The containment of IfcOccupancyActivity in IfcOccupancyPlan is unclear. Is this achieved through IfcRelContains?

Proposed Solution Describe the semantics more clearly in the Object Model Reference

Resolution Resolved: agree that is missing. It is handled through explicit relationship 'ScheduleElements' of IfcOccupancySchedule (renamed from IfcOccupancyPlan).

Action # 1 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final

) KY to implement

Issue Number	**I - 598**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Yu	**Status**	Resolved
Schema		**Version**	R2.0 - Beta		

Issue Description IfcOccupancyPlan
How is IfcOccupancyPlan intended to be instantiated? As one instance per moved individual IfcActorSelect or as one instance for all IfcActorSelect's. If the former what represents the composite plan of occupancy moves, IfcGroup?

Proposed Solution Provide clarification in the Object Model Reference

Resolution Resolved: It is for the latter case as described. It should be cleared now.

Action # 1 **Assignee** Yu **Status** Incomplete **Resolved in Version**

KY to implement

Issue Number	**I - 599**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Yu	**Status**	Resolved
Schema	IfcFacilitiesMgmtDomain	**Version**	R2.0 - Beta		

Issue Description IfcWorkInteraction
Shouldn't Relationship be indicated in the class name?

Proposed Solution Rename IfcWorkInteraction to IfcRelWorkInteraction

Resolution Resolved: Agreed and changed made in Beta-3

Issue Number	**I - 600**			**Issue Date**	1/15/99
Author	Lahtela, Hannu	**Owner**	Forester	**Status**	Unresolved
Schema		**Version**	R2.0 - Beta		

Issue Description How on earth we are able to maintain all the information in one IFC-file in future ?
As I said above the files consist only minimum(or let's say basic) elements of storey. In future there will be BS1-BSn elements plus sundry psets among other things. I'm not so surprised if someone supplies with an IFC-file which size is 0.5 GB or more(note gigabytes). In fact the project with ventilation ductwork raises the file sizes ten-folds.
The project indicated clearly that we cannot work the way we are doing in IAI-demonstrations. In

practice we are forced to save storeys to different outputs and we may have to separate BS things from ARCH outputs too for the following reasons:
1. the model is too huge to keep on hanging on the memory.
2. Generally there might be more that one designers editing the building model simultaneously.

Proposed Solution None

Resolution Not yet resolved

Action #	1	**Assignee**	Forester	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

JF to work out and propose a resolution

Issue Number	**I - 601**			**Issue Date**	1/15/99
Author	Liebich, Thomsa	**Owner**	Karstila	**Status**	Declined
Schema	IfcDateTimeResource	**Version**	R2.0 - Beta		

Issue Description IfcYearNumber
The current definition of the IfcYearNumber defined data type does not give any contraints on using either a 2 or 4 digit integer for the year. In light of the Y2K bug, we should require 4 digits for year number.

Proposed Solution Add it to specification, and indicate the addition as being "on-top" to the originally used specification from ISO 10303-41.

Resolution Declined: Add in the documentation to use the Gregorian calendar system. Reference ISO 8???.

Issue Number	**I - 602**			**Issue Date**	1/15/99
Author	Liebich, Thomsa	**Owner**	Wix	**Status**	Unresolved
Schema	IfcMeasureResource	**Version**	R2.0 - Beta		

Issue Description IfcCurrencyTypeEnum
Make sure that the new Euro has been added to the enumaration.

Proposed Solution Check and add, if not yet included

Resolution Resolved: agreed

Action #	1	**Assignee**	Wix	**Status**	Incomplete	**Resolved in Version**	R2.0 - Final

JW to implement

Issue Number	**I - 603**			**Issue Date**	1/15/99
Author	German FM group	**Owner**	See	**Status**	Deferred to R3.0
Schema		**Version**	R2.0 - Beta		

Issue Description Containment/Reference Hiearchy
The current containment relationship (IfcRelContains) provides for a strict hierarchy (Project -> Site -> Building -> BuildingStorey -> Space). Often, particularly in FM, hierachies are needed up to 9 levels, where the descriptor of each level can not be pre-declared. A similar flexible structure is needed in IFC.

Proposed Solution Check whether current definition of IfcRelContains and IfcGroup/IfcZone already provide for such a flexible structure. If not, preserve the strict hierachy for physical containment (nested co-ordinate systems) but allow for orthogonal, very flexible logical structures that can be created as needed by the various projects.

Resolution Deferred to R3: will be done as part of proposed Core refinement project

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Issue Number	**I - 604**			**Issue Date**	1/15/99
Author	German FM group	**Owner**	See	**Status**	Resolved

Schema ***Version*** R2.0 - Beta

Issue Description Pre-declared generic types of classes (TypeEnum's for leaf-node classes)
Current definition of Generic Types does not fit (and can probably never fit) for each regional circumstances. Example: IfcZoneTypeEnum (Thermal, Daylighting, Equipment) is far to restricted. Zones can be CleaningZone, CostZone, Department, StreetSector, and whatever - a complete list can not be built into IFC.

Proposed Solution Make GenericType to a STRING data type, that allows for user defined types.

Resolution Resolved: This was resolved in the second Pset telecon. Compromise as documented by TL. Will keep "PredefinedType" and add an optional "UserDefinedType" (String) to allow customization. I must admit to having second thoughts about this, and I know that others have too. But if it is not raised again in the SFO meetings, we should live with the compromise for R2. Discussed again in SFO – will revisit this in R3.

Action # 1 ***Assignee*** See ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

RS to add new issue to revisit this decision in R3 (e.g. whether to use a single attribute of type string for both purposes).

Issue Number I - 605 ***Issue Date*** 1/15/99

Author Liebich, Thomsa ***Owner*** Liebich ***Status*** Resolved

Schema IfcSharedSpatialElements ***Version*** R2.0 - Beta

Issue Description Assignment of Coverings to Spaces
Currently Covering (as wall claddings) are assigned to building elements (IfcRelCoversBldgElements). Often, perticularly in FM, wall (and other) finishes are accessed by the space.

Proposed Solution Provide a mechanism that assigns a relationship between Space and Coving through the intervening class IfcSpaceBoundary.

Resolution Resolved: agreed

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

TL to implement

Issue Number I - 606 ***Issue Date*** 1/15/99

Author Liebich, Thomsa ***Owner*** See ***Status*** Resolved

Schema IfcDocumentResource ***Version*** R2.0 - Beta

Issue Description STEP defines some concepts similar to those proposed in this schema. We should try an be consistent/compatible with these.

Proposed Solution Please see ISO-10303-41, p. 54ff for the following:
- document_typ
- documen
- document_usage_constrain
- product_definition_with_associated_document

Resolution Resolved: agreed

Action # 1 ***Assignee*** See ***Status*** Complete ***Resolved in Version*** R2.0 - Final

RS to consult P41. – Complete (19-Feb-99)

Issue Number I - 607 ***Issue Date*** 1/15/99

Author Liebich, Thomsa ***Owner*** See ***Status*** Resolved

Schema IfcDocumentResource ***Version*** R2.0 - Beta

Issue Description Document objects should really be considered resources (not unique to the IFC model).

Proposed Solution Consider moving this schema down to the Resource Layer

Resolution Resolved: Change this schema to IfcDocumentResource, subtyping IfcDocumentReference from IfcProperty

Action # 1 ***Assignee*** See ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

RS to change the schema to Resource level. – Complete (11-Feb-99)

Action # 2 ***Assignee*** _All ***Status*** Incomplete ***Resolved in Version***

all to update their references.

-- Completed by: RS (12-Feb-99)

Action # 3 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version***

TL to eliminate the IfcRelDocuments relationship with a simple attribute on IfcObject, LIST[0:?] OF ReferencedDocuments (data type: IfcDocumentReference)

Issue Number ***I - 608*** ***Issue Date*** 1/15/99

Author Hietanen, Jiri ***Owner*** Karstila ***Status*** Resolved

Schema IfcMeasureResource ***Version*** R2.0 - Beta

Issue Description change in IfcSiUnit - derived attribute Dimensions deleted

Proposed Solution bring back as it was in 1.5.1.

Resolution Resolved: agreed

Action # 1 ***Assignee*** Karstila ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

KK to implement

Issue Number ***I - 609*** ***Issue Date*** 1/15/99

Author Hietanen, Jiri ***Owner*** Liebich ***Status*** Resolved

Schema IfcGeometryResource ***Version*** R2.0 - Beta

Issue Description in IfcCompositeCurveSegment - UsingCurves: was SET, now BAG

Proposed Solution change back to SET (as agreed with implementers - in STEP it is BAG)

Resolution Resolved: changed back to SET in the Beta3

Issue Number ***I - 610*** ***Issue Date*** 1/15/99

Author Forester, Jim ***Owner*** Liebich ***Status*** Unresolved

Schema IfcSharedSpatialElements ***Version*** R2.0 - Beta

Issue Description In some cases, there is no way to find out which openings are aligned with IfcSpaceBoundaries.

Proposed Solution None

Resolution Not resolved:

Action # 1 ***Assignee*** Liebich ***Status*** Incomplete ***Resolved in Version*** R2.0 - Final

JF and TL to work on this and propose resolution

Action # 2 ***Assignee*** Forester ***Status*** Incomplete ***Resolved in Version***

JF and TL to work on this and propose resolution

Issue Number	**I - 611**			**Issue Date**	1/15/99
Author	Forester, Jim	**Owner**	See	**Status**	Unresolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description Cross domain properties are mixed in our Psets. Therefore, if ownership is protected by an application, users may not be allowed to change property values applicable to their domain.

Proposed Solution Warn implementers (in docs.) to exclude Psets from ownership protection.

Resolution Not resolved

Action # 1 **Assignee** Forester **Status** Incomplete **Resolved in Version** R2.0 - Final

JF, TL, RS, KY to work on this and propose a resolution

Action # 2 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

JF, TL, RS, KY to work on this and propose a resolution

Action # 3 **Assignee** See **Status** Incomplete **Resolved in Version** R2.0 - Final

JF, TL, RS, KY to work on this and propose a resolution

Action # 4 **Assignee** Yu **Status** Incomplete **Resolved in Version** R2.0 - Final

JF, TL, RS, KY to work on this and propose a resolution

Issue Number	**I - 612**			**Issue Date**	1/15/99
Author	Liebich, Thomsa	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description There is no common definition of properties in the model (especially in Psets).

Proposed Solution We need to define a dictionary of properties/attributes/?? for IFC – a Lexicon of sorts.

Resolution Deferred to R3: This is major and much too large for the R2 timeframe remaining.

Issue Number	**I - 613**			**Issue Date**	1/15/99
Author	Karstila, Kari	**Owner**	Karstila	**Status**	Declined
Schema	IfcDateTimeResource	**Version**	R2.0 - Beta		

Issue Description Shouldn't the minute component attribute of IfcLocalTime be mandatory since it is normal to express time with minutes.

Proposed Solution Make it mandatory.

Resolution Declined: to keep it compatible with STEP part 41

Issue Number	**I - 614**			**Issue Date**	1/15/99
Author	Liebich, Thomsa	**Owner**	Wix	**Status**	Resolved
Schema	IfcCostResource	**Version**	R2.0 - Beta		

Issue Description Now that the IfcMonetaryMesure has been moved to the IfcMeasureResource, IfcCurrencyEnum (which it references) is in a different schema (still in IfcCost Reource).

Proposed Solution Move IfcCurrencyEnum into IfcMeasureResource

Resolution Resolved: as requested

Action # 1 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.0 - Final

JW to add geography for each currency

Action # 2 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.0 - Final

JW to separate from Cost and pass over to KK

Action # 3 **Assignee** Karstila **Status** Incomplete **Resolved in Version** R2.0 - Final

KK to integrate into Measure resource

Issue Number I - 615 **Issue Date** 1/15/99

Author Liebich, Thomsa **Owner** Hyvarinen **Status** Unresolved

Schema IfcMeasureResource **Version** R2.0 - Beta

Issue Description Adding the proposed long list of new derived measure types to the MeasureSelect is problematic for implementers (we have heard).

Proposed Solution Let's use the measure types in STEP P41 and all others should be derived.

Resolution Not resolved

Action # 1 **Assignee** Karstila **Status** Incomplete **Resolved in Version** R2.0 - Final

KK and JW to work on this and propose a resolution

Issue Number I - 616 **Issue Date** 1/15/99

Author See, Richard **Owner** See **Status** Deferred to R3.0

Schema IfcSharedBldgElements **Version** R2.0 - Beta

Issue Description Like Ramps and Stairs, curtain walls and roof elements are only dealt with by architects (of the current domains). I have been told by two reviewers – they don't understand why these were moved into SharedBldgElements.

Proposed Solution Move these elements back to the IfcArchitecture schema.
Note: this relates to the issue about whether we really have a 4 layer model

Resolution Deferred to R3: philisophical discussion

Issue Number I - 617 **Issue Date** 1/15/99

Author See, Richard **Owner** See **Status** Resolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description We agreed that IfcExternalPropertySet would be named IfcExtensionPropertySet during the 12-Jan-99 STF telecon

Proposed Solution Change it.

Resolution Resolved: will be done

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL. to implement

Issue Number I - 618 **Issue Date** 1/15/99

Author Liebich, Thomsa **Owner** See **Status** Unresolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description Re: issue #482: IfcProcess.Productivity – how does it relates to the productivity in the IfcRelUsesResources or IfcRelProcessOperatesOn.

Proposed Solution None

Resolution Not resolved: Xxx

Action # 1 **Assignee** Liebich **Status** Incomplete **Resolved in Version** R2.0 - Final

TL and KY to resolve this

Action # 2 **Assignee** Wix **Status** Incomplete **Resolved in Version** R2.0 - Final

TL and KY to resolve this

Issue Number ***I - 619*** **Issue Date** 1/15/99

Author	See, Richard	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description I can understand the reason you would move the WindowTypes enum over to IfcWindowPanel (so that you can combine different types to form multi-type windows). However, you should probably tidy up (define) the Types for IfcWindow -- or eliminate the PredefinedType there. For Doors (Door panels), I don't think this works. That is, I have never seen a combination swing and sliding door -- and there is no difference between a SingleSwing door panel and a DoubleSwing door panel.

Proposed Solution Either move these types back over to IfcDoor or redefine them such that they work for door panels. Also decide what (if any) Door and Window types will be predefined.

Resolution Not resolved: Xxx

Issue Number ***I - 620*** **Issue Date** 1/15/99

Author	Tarandi, Vaino	**Owner**	Liebich	**Status**	Deferred to R3.0
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description Separated from Issue #518 – a slab is a slab – IfcRoofSlab should be generalized

Proposed Solution Generalize IfcRoofSlab to an IfcSlab that can be used for a roof slab, a floor slab, a walkway slab, etc.

Resolution Deferred to R3: This cannot be accomplished in time for R2, so it will be done in R3.

Issue Number ***I - 621*** **Issue Date** 1/15/99

Author	Karstila, Kari	**Owner**	See	**Status**	Unresolved
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description Carried over from issue # 540 -- There are may be several parallel ways of representing a number of properties (e.g. cost, actor, shape, etc.) which may lead into a number of different ways to interpret the model, thus leading to incompatible sofware.

Proposed Solution Provide comprehensive examples of how to correctly use the model

Resolution Not resolved: Xxx

Issue Number ***I - 622*** **Issue Date** 1/15/99

Author	Liebich, Thomsa	**Owner**	See	**Status**	Deferred to R3.0
Schema	All Schemata	**Version**	R2.0 - Beta		

Issue Description Carried over from issue #604 – consider eliminating the PreDefinedType attributes on all 'typed' leaf classes – in favor of the string attribute now used for UserDefinedType (at IfcObject level). Issue here is the disconnect between the dynamic parts of the model and the static parts of the model.

Proposed Solution None

Resolution Deferred to R3.0: Xxx

Issue Number	**I - 623**			**Issue Date**	1/15/99
Author	Wix, Jeffrey	**Owner**	See	**Status**	Deferred to R3.0
Schema	IfcPropertyResource	**Version**	R2.0 - Beta		

Issue Description 1) Looking in detail at the Library Reverence property, I note that the way in which it would be possible to have multiple Library References assigned to an object is to define a Property Set in which the properties are all Library References. This could be termed Pset_LibraryReference. For R2 rather than change anything at present, it should be possible to do this via an Extension Property Set. As we progress to R3 however, it might be better to think about this as a non-typed, specified Property Set with specific guidance to implementers on how it should be used. I don't think we need to do anything about this at present but it may be useful to log it as an issued or R3.
2) It might be useful to have an inverse on the LibraryReference > Library relation such that a Library is referenced by a (set of) one or many Library References.

Proposed Solution None

Resolution Deferred to R3.0: Xxx

Issue Number	**I - 624**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	Hyvarinen	**Status**	Unresolved
Schema	IfcMeasureResource	**Version**	R2.0 - Beta		

Issue Description IfcPositiveLengthMeasure, IfcPositivePlaneAngleMeasure, IfcPositiveRatioMeasure : WHERE rules are not formatted properly. Is Jiri having a problem with his tool or is the error in the spreadsheet file.

Proposed Solution None

Resolution Not resolved: Xxx

Issue Number	**I - 625**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	See	**Status**	Unresolved
Schema		**Version**	R2.0 - Beta		

Issue Description 1) Spec V3: Formatting issues
2) Spec V3: Para 2.3.6.3, horizontal line hides tex
3) Spec V3: Editorial issue
4) IfcActorResource: Multiple classes,– “see type” for base types is meaningless
5) IfcClassificationResource: Multiple classes,– “see type” for base types is meaningless
6) IfcClassificationResource: IfcClassificationList– How do priorities work? Is 1 high or low? What is the range if any?
7) IfcCostResource: Multiple classes,– “see type” for base types is meaningles
8) IfcCostResource: Type IfcCostTypeEnum – do we need to add “Overhead” to the enumeration?
9) IfcCostResource: Handling costs as REAL is not semantically meaningfu
10) IfcCostResource: Specify order of modifiers IfcCost – CostModifiers. In which order are the modifiers applied? This is not commutative. For example if we (addvalue 20)) (multiplyvalue 1.1)
(100 + 20) * 1.1 = 13
(100 * 1.1) + 20 = 13
11) IfcCostResource: IfcCost – CostComponents, what operation is performed on list items. Assume addition.
12) IfcDateTimeResource: Type IfcDayInMonthNumber is not constrained 0=< Day =< 3
13) IfcDateTimeResource: Type IfcHourInDay is not constrained 0=< hour < 2
14) IfcDateTimeResource: Type IfcMinuteInHour is not constrained 0=< Minute < 6
15) IfcDateTimeResource: Type IfcMonthInYearNumber is not constrained 1 =< Month =< 1
16) IfcDateTimeResource: Type IfcSecondInMinute is not constrained 0.0 =< Minute < 60.
17) IfcDateTimeResource: Class IfcCalendarDate – a formula exists that constrains the day in

the month
18) IfcDateTimeResource: Class IfcCoordinatedUniversalTimeOffset – the semantic description of “Ahead” is confusing.

Proposed Solution 1) Add page break at the start of each schema. Consistently add horizontal lines between individual TYPE, SELECT and ENTITY definitions
2) Just fix it!!!
3) Page 3 para 1.3.1 On providing three things in the IF
4) Define appropriate man & max values
5) Define appropriate man & max value
6) Provide semantic description of prioritie
7) Define appropriate man & max value
8) Add “overhead” to enum if not catered for else where
9) Either handle as INTEGER in basic unit of currency (ie cents or pence) or as a REAL to the appropriate number of decimal places.
10) Specify order of modifier
11) Specify mathematical operatio
12) Just do i
13) Just do i
14) Just do i
15) Just do i
16) Just do i
17) Just do i
18) Refine definitio

Resolution Not resolved: Xxx

Issue Number I - 626 **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Karstila **Status** Unresolved

Schema IfcMeasureResource **Version** R2.0 - Beta

Issue Description Several types should be constrained to be > 0 : IfcAmountOfSubstanceMeasure, IfcAreaMeasure, IfcLengthMeasure, IfcLuminousIntensityMeasure, IfcMassDensityMeasure, IfcMassMeasure, IfcPerCentMeasure, IfcVolumeMeasure

Proposed Solution Some of these have been defined so as to be compatible with STEP. Does this apply to all of them?

Resolution Not resolved: Xxx

Issue Number I - 627 **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Karstila **Status** Unresolved

Schema IfcMeasureResource **Version** R2.0 - Beta

Issue Description IfcThermalAdmittanceMeasure : needs semantic definition

Proposed Solution Just do it.

Resolution Not resolved: Xxx

Issue Number I - 628 **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Karstila **Status** Unresolved

Schema IfcMeasureResource **Version** R2.0 - Beta

Issue Description IfcTimeDurationMeasure is of type REAL. What are the units? If they are selected by the user where are the units stored?

Proposed Solution None

Resolution Not resolved: Xxx

Issue Number	**I - 629**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	Karstila	**Status**	Unresolved
Schema	IfcMeasureResource	**Version**	R2.0 - Beta		

Issue Description IfcTimeMeasure is of type REAL. What are the units? If they are selected by the user where are the units stored?

Proposed Solution None

Resolution Not resolved: Xxx

Issue Number	**I - 630**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	Karstila	**Status**	Unresolved
Schema	IfcMeasureResource	**Version**	R2.0 - Beta		

Issue Description IfcThermodynamicTemperatureMeasure is of type REAL. What are the units? If they are selected by the user where are the units stored?

Proposed Solution None

Resolution Not resolved: Xxx

Issue Number	**I - 631**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	Karstila	**Status**	Unresolved
Schema	IfcMeasureResource	**Version**	R2.0 - Beta		

Issue Description IfcContextDependentUnit and IfcConversionBasedUnit – the notes shows : … may be called \parts” …, \inch”, \foot”, \inch”

Proposed Solution Change to “parts”, etc

Resolution Not resolved: Xxx

Issue Number	**I - 632**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	See	**Status**	Unresolved
Schema	IfcPropertyResource	**Version**	R2.0 - Beta		

Issue Description Schema overview text shows: Another motivation for defining a “Type” of an Element is to establish a use or purpose for the element that requires a that a standard set of Properties be defined for each occurrence.

Proposed Solution None

Resolution Yet to be documented

Issue Number	**I - 633**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	See	**Status**	Unresolved
Schema	IfcPropertyResource	**Version**	R2.0 - Beta		

Issue Description IfcSimpleProperty – Semantic definition says: “It definition of simple properties,”

Proposed Solution Change to “It is a definition of simple properties,”

Resolution Not resolved: Xxx

Issue Number	**I - 634**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	See	**Status**	Unresolved

Schema IfcDocumentResource **Version** R2.0 - Beta

Issue Description IfcDocumentReference, attributes DocumentType and DocumentOwner state" Zero indicates no type has been specified". This is not good Express.

Proposed Solution Replace with "?" (the NULL indicator)

Resolution Not resolved: Xxx

Issue Number *I - 635* **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Liebich **Status** Unresolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description Can we have a clear distinction between the purpose and use of IfcCharacteristic and Property sets. I assume that the "characteristic" information is passed in the property sets of this entity anyway.
Resolution: Distinction please

Proposed Solution None

Resolution Not resolved: Xxx

Issue Number *I - 636* **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Liebich **Status** Unresolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description IfcModellingAid, semantic definition "An IfcModelingAid provides the general concept for constructs that support the creation of design artifact, in particular its geometric form. They are part of the project information set, but not part of the artifact itself. Most common example of a modeling aid are the local placement and the design grid."
English needs clarifyin

Proposed Solution Subsitute : "An IfcModelingAid provides the general concept for constructs that support the creation of a design artifact, in particular its geometric form. They are part of the project information set, but are not part of the artifact itself. The most common examples of a modeling aid are the local placement and the design grid."

Resolution Not resolved: Xxx

Issue Number *I - 637* **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Liebich **Status** Unresolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description IfcProcess, IfcProduct, IfcResource : Do not understand the NOTE to "Classification"

Proposed Solution Explain

Resolution Not resolved: Xxx

Issue Number *I - 638* **Issue Date** 1/15/99

Author Drogemuller, Robin **Owner** Liebich **Status** Unresolved

Schema IfcKernel **Version** R2.0 - Beta

Issue Description IfcProject, GenericType – value of "Building" does not exist in IfcProjectTypeEnum. IfcProjectTypeEnum only contains the value "NotDefined"

Proposed Solution Add values to IfcProjectTypeEnum

Resolution Not resolved: Xxx

Issue Number ***I - 639*** ***Issue Date*** 1/15/99

Author	Drogemuller, Robin	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description IfcProxy, class semantic definition : “Such a mechanism allows to round trip data that is part of the project but not necessarily part of the IFC model.”

Proposed Solution Change to “Such a mechanism allows data that is part of the project but not part of the IFC model to be handled in round trip file exchange between applications.”

Resolution Not resolved: Xxx

Issue Number ***I - 640*** ***Issue Date*** 1/15/99

Author	Drogemuller, Robin	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description IfcRelGroups, WR1 : Change “with” to “which”

Proposed Solution Just do it.

Resolution Not resolved: Xxx

Issue Number ***I - 641*** ***Issue Date*** 1/15/99

Author	Drogemuller, Robin	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description IfcRelationship, RelatedIsDependent and RelatingIsDependent attribute descriptions both contain the term “equal righted”.

Proposed Solution Suggest changing to “are dependent or not”. Does this capture the semantics?

Resolution Not resolved: Xxx

Issue Number ***I - 642*** ***Issue Date*** 1/15/99

Author	Drogemuller, Robin	***Owner***	Liebich	***Status***	Unresolved
Schema	IfcKernel	***Version***	R2.0 - Beta		

Issue Description mis-typing of “wolrd” for “world”

Proposed Solution Just do it.

Resolution Not resolved: Xxx

Issue Number ***I - 643*** ***Issue Date*** 1/15/99

Author	Drogemuller, Robin	***Owner***	See	***Status***	Unresolved
Schema	IfcModelingAidExtension	***Version***	R2.0 - Beta		

Issue Description IfcGridLevel, should attribute “GridLevelName” be UNIQUE?

Proposed Solution Comment please

Resolution Not resolved: Xxx

Issue Number ***I - 644*** ***Issue Date*** 1/15/99

Author	Drogemuller, Robin	***Owner***	See	***Status***	Unresolved
Schema	IfcModelingAidExtension	***Version***	R2.0 - Beta		

Issue Description IfcLightSource : Geometry Use Def refers to “IfcLuminaire” instead of “IfcLightSource”

Proposed Solution Just do it.

Resolution Not resolved: Xxx

Issue Number	**I - 645**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	See	**Status**	Unresolved
Schema	IfcModelingAidExtension	**Version**	R2.0 - Beta		

Issue Description Change references to R1.5 to R2.0 where appropriate

Proposed Solution Just do it.

Resolution Not resolved: Xxx

Issue Number	**I - 646**			**Issue Date**	1/15/99
Author	Drogemuller, Robin	**Owner**	See	**Status**	Unresolved
Schema	IfcModelingAidExtension	**Version**	R2.0 - Beta		

Issue Description IfcReferenceGeometryAid, default for Localplacement is “@0,0,0”

Proposed Solution Change to 0,0,0

Resolution Not resolved: Xxx

Issue Number	**I - 647**			**Issue Date**	1/15/99
Author	Adachi, Yoshi	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description IfcWindowPanel has not any super classes in the repository

Proposed Solution Just fix it.
IfcWindowPanel inherits from IfcBuildingElement

Resolution Not resolved: Xxx

Issue Number	**I - 648**			**Issue Date**	1/15/99
Author	Adachi, Yoshi	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcSharedSpatialElements	**Version**	R2.0 - Beta		

Issue Description IfcSpaceUseCase has not any super classes in the repository.

Proposed Solution Just fix it.
IfcSpaceUseCase inherites IfcPropertyDefinitio

Resolution Not resolved: Xxx

Issue Number	**I - 649**			**Issue Date**	1/15/99
Author	Adachi, Yoshi	**Owner**	See	**Status**	Unresolved
Schema		**Version**	R2.0 - Beta		

Issue Description IfcWindowPanel and IfcSpaceUseCase have not any super classes in the diagram is an error.

Proposed Solution Just fix it.
See also Issue number #647, 648

Resolution Not resolved: Xxx

Issue Number	**I - 650**			**Issue Date**	1/15/99
Author	Adachi, Yoshi	**Owner**	Liebich	**Status**	Unresolved
Schema	IfcSharedBldgElements	**Version**	R2.0 - Beta		

Issue Description The relationship between IfcDoor, IfcDoorPanel and IfcDoorLining, as well as IfcWindow, respectively.

Proposed Solution Provide guidance in the documentaion.
In addition to this, we have to clear following tow items
Object life time guidance of IfcDoor/Window, Panel, Lining: Can Panel and Lining exist itself without a IfcDoor/Window instance?
The constraints between IfcOpeningElement and IfcDoor/Window. Can IfcOpeningElement relate to panel or lining directly?
See also Issue number #112(IFC R2.0 Beta Issue List)

Resolution Not resolved: Xxx