

Industrial Data Implementors Forum Charleston, SC

Attendees: J. Auman/ CSU, R/Barra/ PDES, Inc., R. Barry/ Intergraph, T. Briggs/ Intergraph, G. Brunetti/ Fraunhofer IGD, W. Burkett/ PDIT, A. Calvaire/ Simulog, M. Chida/ ECom, T. Fry/ SHIPS, P. Germain-Lacour/ PSA Peugeot Citroen, B. Gischner/ Electric Boat, F. Glantschnig/ AMT Consulting, S. Han/ KAIST, M. Hardwick/ STEP Tools, J. Holmlund/ Lockheed Martin, T. Inouye/ Fujitsu, M. Jones/ AUSDEC, T. Kishinami/ Hokkaido University, C/ Kouchi/ ECom, R. LaFontaine/ Monsel EDM, U. Langbecker/ Germanischer Lloyd, L. Lauro/ Italian Furniture Manufacturers Association, J. Lubell/ NIST, H. Mak/ NRC Canada, J. Mays/ US Navy, L. McKee/ IBM, J. Ranges/ EPM, E. Szmrecsanyi/ DaimlerChrysler, J. Trausch/ Electric Boat, C. Tierney/ General Dynamics, T. Turner/Lloyds Register, T. Ueda/ ECom, J. U'ren/ JPL, R. Wood/ Litton, A. Wasmer/ PDTec, C. Viel/ Renault

Agenda

Introductions

Open Issue Review

The BIG Issues

- AP Interoperability

- Unified PDM Schema

Industry Driven Test Cases- M. Palmer

The BIG Issues (Cont.)

- Modularity

- Solid Model History

- STEP and XML

CAX/PDM Implementors Forum- R. Barra

Shipbuilding Implementors Report (EMSA)- U. Langbecker

Data Dictionaries and LDAP- J. U'ren

Issue Log review- Larry McKee (larrym@us.ibm.com)

At present there are 47 issues with 4 open:

Issue: 036 AP Identities

Open- Big Issue. See discussion later in these minutes.

Issue: 044 Solid Model Construction History

Open- Big Issue. See discussion later in these minutes.

Issue: 046 STEP and XML

Open- See discussion later in these minutes. Will be added to Big Issues List

Issue: 047 Need for New Chair

Martin Hardwick has been proposed by the US. Should be closed on Friday

New Issues:

When will Design Intent/ Parametrics be ready to be implemented?- T. Briggs

This depends on Part 108. Will request an update from Mike Pratt's team at a future meeting.

The Big Issues

AP Interoperability- Larry McKee (larrym@us.ibm.com)

Currently the process to resolve this involves: identifying the focus areas of overlap between APs; isolating specific issues; resolving the issues; testing the resolutions; standardizing the resolutions.

In this process integrated resource changes have been identified as well as AP changes. There will also be part 21 extensions to support AP interoperability to allow multiple schemas and data sections in one file and inter-referencing between data sections. Some of the current techniques exhibited in AP 214 DIS CC6. The interoperability focus areas are the Unified PDM schema and Modules/ Extensions.

Unified PDM Schema- Larry McKee (larrym@us.ibm.com)

The PDM schema goal was presented. The schema itself is an effort to come up with one way for STEP to do PDM. Product Data Management (PDM) is an enabling technology that helps a work group, department, division, or enterprise manage product data and the development process throughout the product life cycle. The schema is available now (see www.pdm-if-org) and has a complete usage guide. It will be standardized in APs (a la AP 214 CC6) and in modules.

Industry Driven Test Cases- M. Palmer (mark.palmer@nist.gov)

SC4 decided in Bordeaux (June/2000) to eliminate the requirement for APs to produce an Abstract Test Suite. This decision was based on the cost/ benefit analysis of the current ATS preparation and the usefulness of the resulting document. SC4 has asked each AP project to deliver test cases to show that their resultant model/ document has been tested for (at least) some useful scope subset.

The concern is that this SC4 decision will result in widely varying submissions by AP projects. There is a need to determine what a useful subset might be (where only a subset is submitted). There are many other issues (e.g. content, style). Mark wanted to be sure the Implementors had a voice in this definition process. Martin Hardwick is to coordinate participation from the forum.

Modules- Larry McKee (larrym@us.ibm.com)

On the PDM modules, the team coordinated with AP214 team on resolution of interoperability issues related to EXPRES rules. There have been three updates issued to the to the PDM modules suite. As part of this effort, the team drafted AP203 Amendment 1 which has passed ISO ballot. This amendment fixes EXPRESS errors in AP203 and incorporates EXPRESS Technical Corrigenda corrections to Parts 41,42, 43, and 44. The near term plans for PDM are to publish a maintenance release of PDM Schema Usage Guide and to submit the PDM suite of modules for ballot as a Technical Specification.

The PDM modules will be used in AP 203 edition 2. What is AP 203 edition 2? AP 203 edition 2 is a new release of the AP to enable interoperability and formally incorporate as many existing SEDS as possible. Interoperability will be enabled by incorporating the changes proposed through the joint PDES, Inc./ ProSTEP PDM schema effort. These changes will actually be done through incorporation of the PDM modules. AP 203 will be the first modular AP in STEP.

The new AP 203 will be very similar to the current AP 203. It will deal with product data management in the configuration-controlled design of mechanical assemblies. Its major capabilities will be product identification, product structure, product properties, engineering change as well as configuration identification and effectivity.

The new 203 will deal with the same types of shape representation as the 1994 203. CSG will be added to this list. The new 203 will also include the functionality just balloted as the color/ layer modules and geometric validation properties. These capabilities are being added since they exist (as hidden options) in most all AP 203 edition 1 translators.

On the Geometric Dimensioning and Tolerancing modules, the team developed two drafts of PDM Properties modules. This made sense since the GDT modules are based on these and the PDM team needed help. In addition the team developed draft GDT suite in PDES, Inc. html format. This work also produced experimental scripts for data-driven module authoring. The near term plans include developing a GDT usage guide for vendors, developing an annotation/presentation module suite based on AP214, validation of GDT modules and harmonization of the GDT modules with FDIS AP214. The main issue here is that CAD vendors do not seem very excited about GDT or annotation implementation.

On the Engineering Analysis modules, a draft of Part 5x 'Mathematical Description' was produced which links Part 50 to the rest of STEP. This was reviewed in Bordeaux and harmonized with Parts 43 and 108. It has been issued as WG12 N605. The Concept of state was harmonized with AP233. The modules have been interpreted on to Part 50 DIS and draft Part 5x. The initial documents are ready for review. The near term plans are to submit first batch of EACM modules for TS ballot and conduct a simultaneous NWI/CD ballot for Part 5x.

Solid Model History- Larry McKee (larrym@us.ibm.com)

Recent accomplishments include publishing the Feature-Based Construction Operations document addressing priority 1 list through Blends (see list below) and developing a draft Implementors' guide that includes the integrated model, a test part, and a Part 21 file.

Priority 1 List: Linear sweeps of sketch (extrusion), Rotational sweep of sketch, Boolean operations (union, diff., intersect.), Blending (including rounding, filleting, etc.), Rigid body transformation (translate, rotate), Generation of feature patterns, and Use of system defined features from a library

Construction history model is an integrated model using these resource structures:

- Part 108 - Parameterization and constraints for explicit geometric product models (SC4/WG12 N526)
- Parametric framework for exchange of geometric product models (SC4/WG12 N441)
- Feature-Based Construction Operations (SC4/WG12 N 589)

The team held a successful workshop at ISO Meeting in Bordeaux (June 29-30) where the draft Implementors' Guide was the key workshop material. There were about 15 participants at workshop (vendors included Dassault, Spatial, Unisys, GSSI). Work is underway to incorporate workshop feedback into the model.

The plan forward is to continue to work with ProSTEP on joint work plan and implementation effort. This will include publishing the Implementors' Guide incorporating workshop decisions and conducting workshop at this ISO meeting (Thu and Fri). The plan is to obtain vendor commitments to begin implementations as part of CAX-IF Round 5J. The main challenges are vendor commitments to implement and resources.

STEP and XML- M. Hardwick (hardwick@steptools.com)

STEP and XML is actually how we put STEP data structures to use on the web. This involves: mapping STEP onto the Web, pursuing Web Content Standardization by influencing and utilizing Web Standards organizations, and conducting Demos, Prototypes and Pilots that validate and show that STEP and the Web work well together.

What is XML? The eXtensible Markup Language (XML) is a subset of SGML (Standard Generalized Markup Language). A Document Type Definition (DTD) defines the structure of XML documents. A DTD is similar to a schema. XML documents contain the data marked with the tags defined in the DTD. An XML document is similar to a Part 21 file in that it is an encoded stream of data. One difference is that

XML files/ documents, like HTML (HyperText Markup Language), can have accompanying style definition that explains how to present the tagged data.

For STEP/XML -the DTD exists and is derived from the EXPRESS schema. Part 28 is an ISO project standardizing mappings from EXPRESS to XML. Part 28 has a number of proposed mappings in it. These are: EXPRESS DTD for schema exchange, EXPRESS/UML/XMI for schema exchange, Late Binding DTD for data exchange, EXPRESS-Typed Early Binding (ETEB), Object Serialization Early Binding (OSEB), and (possibly) Containment Early Binding (CEB). The Express DTD maps all of the syntax in Express to XML tags. EXPRESS/UML/XMI maps a subset of EXPRESS concepts to OMG UML Meta-model Class Diagram concepts for OMG XMI use. Late Binding DTD for data exchange maps EXPRESS simple, defined and entity type instances into XML document. ETEB maps as much of EXPRESS typing into DTD as possible. ETEB instance data is schema specific instance data and is related architecturally to Late Binding DTD for data exchange. OSEB maps EXPRESS into XML that is parallel to programming language constructs (much like SDAI language bindings). The EXPRESS is not visible in the DTD. It can be mapped to the Late Binding via XSLT (eXtensible Style Sheet Transformations). CEB maps a subset of EXPRESS to simple XML using containment. Human readability is considered as is making "STEP" (i.e. APs) simple.

There have been a number of Part 28 EXPRESS/XML Development Workshops (February (ISO), March (PDES, Inc. offsite), April (ISO), May (joint with Nat'l. Shipbuilding Research Program), June (PDES, Inc.)). Significant progress in developing Part 28 Technical Specification has been made. The WG11 convener signed off the Part 28 draft last week.

The interest in XML is huge. The interest in STEP and XML is growing. There are a number of web sites already (see presentation). This list is bound to grow.

CAx/PDM Implementors Forum- R. Barra (barra@aticorp.org)

NOTE: CAx and PDM-IF are joint activities of PDES, Inc. and ProSTEP

Round 4J of CAx-IF (which ended in July) covered: External References (joint with PDM-IF), Geometric Validation Properties, Surfaces, Draughting, and Production Models. Rogerio showed pictures of each of the test cases and presented the composite results.

For the geometrically bound surface model, 73% of the 37 exchanges failed. For the topologically bound surface model, 66% of 79 exchanges were successful. For the external reference tests, 79% of the 29 exchanges were correctly found and 86% of those found were processed correctly. For validation properties, @90% of solid model properties were exchanged correctly. There were problems with assemblies since only 76% of the CG exchanges were correct. For production models: the pulley had 100% for solids and 78% for CG; the oil pan was 100% for solids and CG; the engine pylon was 100% for solids and CG; the pump was 63% for solids and 50% for CG; the intake manifold was unsuccessful (it was a poor model); the mountain bike was @87% for solids and 63% for CG; the suspension was @82% for solids and 75% for CG; the throttle body was 69% for solids and 75% for CG and the compressor was @48% for solids and 25% for CG (poor model again).

Round 4J showed that Geometric Validation Properties is ready for prime time now! There was a significant increase in robustness of geometry transfer overall. There was also a lack of interest/ implementation for associative text (only one try). It is unclear what progress can be made on draughting. For surfaces, improvements were made in the topologically bound area. The agreement is to abandon geometrically bound surfaces. External references had very good results and will be tried again.

Round 5J is in progress and will end in December. It will cover: Associative text; Drafting; Colors / Layers; Validation Properties; External References; Surface model and Production models. Rogerio went through a pictorial gallery of the parts to be tested in round 5J. Rogerio said that requests for additional information on CAx-IF should be sent to Phil Rosche (rosche@aticorp.org).

Rogério went on to describe PDM-IF testing. He showed a graphic indicating how the entire scope of PDM schema 1.1 would be covered by past, current and future rounds. Round 4C ended in July and involved: BMW PRISMA 4.7_3, DaimlerChrysler/debis - GIS V1100.8, Eigner & Partner/CADIM/EDB V2.3, ISS/InSync V2.7.5, ProSTEP (PDM Editor V0.9), and SAP 4.6C. The scope for the round included Supplied Item Identification -- Alias Relationship, Document and File Relationship, Part Structure with External References, Part Structure with External Shape, Geometric Model Structure and CAD File Reference. Rogério showed tables of testing activity by participant and test case.

The results showed: an @80% write and 50% write success for alias identification; an @60% write and @50% read success for document and file relationship; an @85% write and 70% read success for part structure with external references; an 80% write and @35% read success for part structure with external shape. In summary, external reference testing with CAx-IF had excellent results. The participation could be better. A discussion is underway over the future of PDM-IF.

The fifth round of testing will cover: additional part properties (e.g., material, general); external references; several item structure relationships (e.g., make_from, alternate, substitute); security classification and some robustness testing. Rogério said that requests for additional information on PDM-IF should be sent to Phil Rosche (rosche@aticorp.org).

Note: Martin Jones of AUSDEC reported that AUSDEC data exchange results can be found on: <http://www.ausdec.com.au>.

EMSA Shipbuilding Implementors Report- U. Langbecker (lgb@germanlloyd.org)

At the Ship Machinery and Marine Technology Fair in Hamburg, Germany there was a successful industrial seminar on “The Role of Data Standards for Maritime e-Business”. This involved 11 presentations in 2 sessions with 40 participants. There was also a live demonstration of data exchange to increase confidence in tools and STEP technology which used data from a real shipyard design.

The demonstration focused on the exchange of design data between shipyard and classification society to perform various types of analysis (e.g. approval of hull cross sections by rule scantlings and direct calculations). The scope and exchange were based on AP218 and involved: plates, profiles, openings, materials and grouping; principal dimensions, class notation; product structure (assembly view, spatial view); element identification, function (e.g. hull, deck, bulkhead). The participants were: Howaldtswerke-Deutsche Werft (HDW), Lloyds Register, Germanischer Lloyd, Det Norske Veritas (DNV), and NAPA (Naval Architectural Package, Finland).

The scenario was that HDW (using NAPA-Steel) would export data from a real design. They would export the fore ship, a midship section and the whole ship. This would be transferred to classification societies and imported it into various classification systems. Germanischer Lloyd using POSEIDON would import the data and generate an initial plate distribution and cross section as well as perform rule scantlings. Lloyds Register using ShipRight and Hull Condition Monitor would generate FE mesh and perform analysis as well as record condition and maintenance information. DNV using Nauticus Hull would generate cross sections and perform rule scantlings as well as create CAD drawing from 2D a section. The ship used in the demonstration was the Dole Columbia.

The exchanges were successful based on using the AP 218 ARM and EMSA Protocol EP001, an Industry subset of AP 218 “Steel Structures”. Implementation agreements, guidelines, and best practices were used in constructing the demonstration. The demo increased confidence that STEP is capable of exchanging large, complex data models and that activities in different life-cycle phases are supported. More information and details can be found in EMSA News Vol. 7 No. 1 <http://emsa.germanlloyd.org/e-news/>.

Data Dictionaries and LDAP- J. U'ren (James.A.Uren@jpl.nasa.gov)

It can be difficult to communicate relevant information about data dictionaries between applications.

What is needed is a mechanism that can be used to access, publish, update, relate and integrate data dictionaries. The mechanism must be able to span domains and sub-domains e.g. engineering, science & administrative. It must have both manual and automated interfaces and should follow the distributed service model (e.g. DNS (Internet Domain Name Service, x500 Directory, etc.). A potential solution might be to develop a distributed data dictionary service using the Lightweight Directory Access Protocol Internet service protocol and the ISO11179 schema to store vocabulary, data element & schema information.

Why use LDAP? LDAP is the Internet directory standard, widely adopted and implemented by numerous vendors and open source software solutions. It is a relatively simple protocol with a straightforward API where schemas can be easily extended and adapted. LDAP connections can be authenticated (requiring a password or other credentials) and secured through SSL. C, Perl, Java, JavaScript and other APIs are available, making LDAP directory services accessible from virtually any language, platform, or development environment.

Why use ISO11179? It is an established international standard that is widely supported by organizations & government agencies. The standard's flexible use of elements within the schema can be easily implemented in an LDAP directory service.

Jim went on to present lookup, validation and other scenarios. What's next?

- Begin populating the prototype LDAP DD server(s) with real vocabulary, data element and schema sets
- Test various LDAP domain naming conventions
- Test client interface(s) e.g. Perl, JAVA, etc.
- Link LDAP DD servers
- Test cross domain and cross server searching
- Test "wrapping" existing DDs with LDAP (e.g. PDS, DMIE)

A white paper will be published in the fall on the LDAP DD Service discussing architecture and prototype implementation.