

Industrial Data Implementors Forum Bordeaux, France

Attendees: B. Anderson/PDES, Inc., P. Brorson/ Share Space, F. Chambolle/ PSA Citroen, M. Christison/ UK DLO, F. Ebata/ CTI Engineering, S. Frechette/ NIST, S. Gillies/ CanSTEP, B. Gischner/ Electric Boat, G. Graves/PDES, Inc., S. Han/ KAIST, M. Iwami/ Japan Construction Information Center, Z. Junfeng/ China National Institute of Standardization, R. Klass/DaimlerChrysler, C. Kouchi/ECOM, H. Kumano/ Toshiba, G. Liutkus/ LKSOFT, N. Mizoguchi/DAITEC, F. Feru/Aerospatiale, M. Mizuta/ DAITEC, R. Nerke/ Siemens, Y. Nishiki/ Fukui, A. Ohtaka/Cadceus, M. Pratt/NIST, S. Reah/ UK DLO, Y. Risbud/ Geometric Software Solutions, H. Satoh/ ECOM, H. Somemiya/ ECOM, S. Sugiyama/ Autodesk, E. Szmrecsanyi/ AIAG, T. Tanaka/ Nissan, Y. Ueno/ Kumagai Gumi, K. Ueyama/ CTI Engineering, M. Van Koetsveld/CIM Architects, C. Viel/ GOSET, M. West/ Shell, R. Wood/ Litton, S. Yoo/ Inha University, L. McKee/ IBM

Agenda

Introductions

Open Issue Review- L. McKee

The BIG Issues- L. McKee

AP Interoperability

Unified PDM Schema

Modularity

Upwards Compatibility

Solid Model History- B. Anderson

ISO 15926 and ISO 10303- M. West

Shipbuilding Implementors Report- R. Wood/B. Gischner

CAX/PDM Implementors Forum- L. McKee

Express-X and XML- M. Maier

Drafting Demonstrations- W. Haas/Y. Manchu

Issue Log review- Larry McKee

Issue: 004 ARM vs AIM- Refer- Propose this be referred to QC as an AP mapping issue

Issue: 016 Polyline- Needs Exploder Discussion. Discuss 16 via exploder and resolve. Note- has been discussed and closed subsequent to Bordeaux meeting.

Issue: 028 Processor Usage Closed- provided as guidance to CAX-IF and put in Knowledge Base.

Issue: 036 AP Identities- Open- Big Issue

Issue: 044 Solid Model Construction History- Open- Big Issue

Issue: 045 STEP File Meta Data

Proposal is to forward to WG11/Quality and close.

New Issues:

Need new Chair –L. McKee- Currently accepting volunteers as current chair is moving to a more IBM internal role. The requirements are a 3 year commitment. A person with a good sense of humor and tenacity. The time requirement is 10-15 person days per year. The funding requirement is \$10K (USD) travel per year.

STEP and XML- A. Peltzman How should these relate? What happens to SDAI? Would like to request a briefing in Charleston on Part 28 from WG11.

The Big Issues

AP Interoperability- Larry McKee

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

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 and has a complete usage guide. It will be standardized in APs (a la AP 214 CC6) and in modules. There are currently 39 defined modules. They can be divided into blobs. There are Foundation modules (FMs) like Date/ Time/ Organization/ Product/ etc. There are also Application Modules (AMs) like Part/ Document/ File Identification; Assemblies/ Relations; Part to Part/ Part to Document/ Part to File, etc; Engineering Change and Configuration Identification/ Effectivity.

It should be noted that AP 203 and the PDM schema are not identical or upwardly compatible. THIS IS NOT NEW NEWS. We knew (and said) at the outset that AP interoperability would require changes. PDES, Inc. plans to make converters available for current users of AP 203 (see charts for details).

Upwards Compatibility- Larry McKee

The story here is very good. The current 40 series new editions, 40 series TCs and the Part 21 amendment are all upwards compatible from a physical file perspective.

Solid Model History- Bill Anderson

There have been productive meetings with CAD vendors and team members at PDES, Inc. Offsite. There were vendor representatives from Dassault, SDRC, UG, Autodesk, and Spatial. The team discussed vendor responses to questions of access to history information. A modeling approach was presented and discussed for vendor feedback. The Dassault and SDRC representatives believe that construction history exchange is feasible with current modeling approach.

The team has published Feature-Based Construction Operations document. There is a workshop with vendors at ISO Parametrics Meeting this week. There was a successful ISO Parametrics Workshop at NIST May 15-17. The team has stabilized the models and determined scope of initial implementation. The team is building a Part 21 file for a test part.

In the near term the plan is to complete the EXPRESS corrections to ISO document on history-based modeling. The model has been in a state of change. The plan to complete in the very near term. This will be followed by publishing an Implementors' Guide. This will include an integrated schema using latest AP203, Part 108 (Parametrization and Constraints on Geometry), Feature-Based Construction Operations, Framework for History-Based Models, and Part 42 Ed. 2.

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. There is a desire to add CSG to this list. This is complicated since the CSG capability supported by AIC 515 has been judged by CAD vendors to be insufficient. There is a query out to see if the full Part 42 capability on CSG is a better fit. Christophe Viel stated that it is important that the new 203 include support for CSG as this has been a clear customer requirement. The plan is to do all possible to support this.

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.

ISO 15926 and ISO 10303- M. West

Why is 15926 needed? Data integration is required amongst: many systems and many organizations. There is a need for life-time data management which includes history as well as current state. This covers design, construction, operations and maintenance. This would deal with data sheets rather than drawings. It would focus on one off products.

There are a number of dimensions to data integration. Data must be integrated through the life cycle of the product. Data must be integrated through the internal organization. Data must also be integrated through the supply chain. These are but 3 of the dimensions of the problem. There is also the issue of data turnover. One organization designs and fabricates the plant while a separate organization must operate the plant.

Why not use STEP for this? Its focus is too product centric. It is primarily for point to point data exchange (to an empty system). It is a snapshot view of context dependent exchange. It does not support well: incremental update, change audit, restricted extensibility. The data structure (presently) allows only upwards compatible changes. This produces complex workarounds for defects.

In short, STEP (at present) is too constrained. What is needed is an architecture based on a generic framework. It should support a multi-dimensional hierarchy of subtypes and supertypes. All (but one) entity types are a subtype of at least one other. It must not be industry or discipline specific. There should be a core model based on a number of key templates based on associations. The reference data library should comprise a set of standard classes and other reference data. The users configure the templates to specific purposes. These can be industry and discipline specific. There can also be equipment templates which define key data for different equipment types.

The basis of the framework is an application object which can represent an individual or a class of individual. The individual can have many dimensions. An application object can be classified by an associated class. Individuals can be composed into collections or assemblies.

The reference data library would contain generic types of equipment (pump, valve, pipe, vessel) and standard equipment types. Standard here means the specification is standardized and there are multiple suppliers (e.g. nuts, bolts, pipes). It can hold manufacturer's models as well as materials of construction.

The status of 15926 is that it has passed its CD Ballot for 2 parts: Part 1: Overview and fundamental principles and Part 2: Data model - This Part is harmonised with AP221 ARM. There are working drafts in preparation for a register for a reference data library which shall include an administrative standard, a technical standard, a description of the initial content and a business case. The hope is to have a DIS ballot for parts 1&2 by end 2000 and a CD Ballot for the register parts by end 2000.

See the slides for descriptions of related implementation projects, corporate internal developments,

Shipbuilding Implementors Report- R. Wood

Ron Wood presented the Shipbuilding Implementors report. He began with some history of US Shipbuilding Product Data Exchange which began with NIDDESC and IGES and moved through DARPA MariSTEP into the current project ESTEP (which is the Evolution of STEP).

MariSTEP developed prototype translators to exchange data between diverse shipyard environments using STEP Shipbuilding Application Protocols (APs). The participants exchanged detailed design product model data based on Application Reference Model (ARM). They coordinated with ISO STEP Ship Team to identify and resolve implementation and ARM schema issues for: AP 215 Ship Arrangements, AP 216 Ship Moulded Forms, AP 217 Ship Piping, and AP 218 Ship Structure. The program ran August 1996 to December 2000.

The MariSTEP / MariSPRITE schemas were documented as NSRP Version 2 Application Protocols (APs) NSRP 0429 Ship Structures AP involved MariSTEP AP 215 Ship Arrangements, MariSTEP AP 216 Ship Moulded Forms and MariSPRITE AP 218 Ship Structures. NSRP 0424 Ship Piping AP utilized MariSTEP AP 217 Ship Piping. The MariSPRITE schema is result of harmonization effort between European STEP implementation project Seasprite and MariSTEP. This enables Europe / US exchange of shipbuilding product model data. It has been successfully implemented and demonstrated at the ISO meeting in New Orleans, 11/99.

The ESTEP project phase 1 ran from September 1999 to May 2000 with phase 2 running from May 2000 to August 2003. The tasks involved are: 1) structural translator development, 2) prototype piping translator development and 3) ISO STEP Coordination & Modularization.

In task 1, a decision to implement complete vs subsetted Application Interpreted Models (AIM) was made. These complete sets are AP216 CC4 Moulded form geometry as a surface representation, AP218 CC1 Early design and class approval, and AP218 CC2 Detailed design. The Shipyard/ CAD system pairs are: NASSCO/ TRIBON, Avondale/ Intergraph, EB/ CATIA, ABS/SAFEHULL, and Ingalls/CATIA.

AP AP216 and AP218 are both under development within ISO TC184 SC4 WG3 T23. There is a plan to initiate CD ballot by summer 2000. The AIM long forms were partly incomplete and did not compile error-free. The AIM long forms were extracted from the latest working drafts. The compilation was done using three EXPRESS tools: STEP Tools, EPM, and ProSTEP. Corrections were made as necessary and fed back into the ISO process. As a result, it was found that several entities were referenced in the mapping tables but not in the long form. This caused modification and addition of missing global rules. There are some issues left w/r to referencing of types in WHERE rules.

The initial approach to use current versions resources and AICs lead to several compilation problems especially with geometry AICs. A change to 2nd edition of IRs resolved most of the problems. In addition to the AP longforms, a few problems were found with the P4x. In part 42 - ENTITY surface_of_revolution has an incomplete DERIVE clause. In Part 44, there is a reference to a non existing EXPRESS function relatives_of_product_definitions in schema product_property_representation_schema referenced by schema configuration_management_schema. This function has been removed from product_property_representation_schema in edition 2. Both problems were raised as SEDS issues. The ISE Structural Schemas for Moulded Forms and Structural Translators (AP 216 & 218) were delivered March 2000. This includes report and final versions of structural schemas including edition 2 versions of IRs.

ESTEP Task 4.2 Prototype Piping Translator Development has to decide which STEP AP should be implemented- AP217 - Ship Piping or AP227 - Plant Spatial Configuration. The decision was based on both technical and business considerations. A 2 phase ballot process was developed to guide technical considerations. The business considerations were discussed extensively. A final vote held for preference of each team member. Despite the attempt at a formal process, decision is subjective.

Use of AP 217 is good since it utilizes Ship Common Model (SCM) and building blocks which facilitates interoperability with AP215, AP216, AP218, and PLIB. Also can use lessons learned from MariSTEP AP217 implementations. It meets the shipbuilding requirements for fabrication and manufacturing. It supports Globally Unambiguous Identifiers (GUID) for external referencing and the Application Reference Model (ARM) is in EXPRESS.

Using 227 is good since it is an International Standard (IS). There are several commercial implementations including Dassault for CATIA. The Application Interpreted Model (AIM) and schema are finished and stable. An ISO New Work Item will expand the scope for 2nd Edition. CAD vendors will support this standard before new Shipbuilding APs. There are also more people to share development costs and HVAC will be added to the AP.

ESTEP will implement AP227 Edition 2. The shipbuilding requirements have been identified and will be incorporated into the AP. ESTEP is cooperating with Process Plant participants to develop Edition 2 of AP227. Selected representatives from ESTEP to participate in AP227 Development: B. Gischner (EB), B. Kassel (NSWCCD), D. Martin (NASSCO), R. Wood (Litton Ship Systems). The new editor of AP227 is Dr. B. Gischner who will oversee incorporation of shipbuilding requirements into edition 2 of the document. HVAC will be added to Edition 2 and B. Kassel will lead HVAC development efforts.

AP 227- Plant Spatial Configuration has a detailed description of piping systems with placeholders for HVAC & Cableway Systems. It has been implemented by several process plant vendors: Dassault, Bentley and CADCentre. A usage guide for AP227 for ship piping systems is in work. A preliminary version was developed by CTC and issued in November 1999. It provides examples of using AP227 for shipbuilding. The final version is to be issued by September 2000. The EXPRESS ARM for AP227 will assist usage by shipbuilders and could be used for XML Implementations. It will be extended to cover: piping prefabrication and inspection information, piping installation and commissioning information, HVAC, pipe and HVAC flow analysis, linkage to structural systems, hanger and support details, cable tray details, catalog referencing and improved configuration management.

ESTEP Task 4.3- ISO STEP Coordination & Modularization- Under modularization will examine the current status of ISO modularization efforts. The will be analysis of modularization plans and determine impact to shipbuilding AP's and Plib as well as an assessment of impact to ESTEP translators. This task will analyze replacing CM building blocks with STEP common product structure configuration management (PDM). Under ISO Coordination, the team will stay informed on ISO activities and their impact on ESTEP by attending ISO meetings. Lead the development of AP 215 and AP 227 towards ISO approval process. Support the development of AP 216 and AP 218 towards ISO approval process. The team will also provide feedback from ESTEP tasks 4.1 and 4.2 to ISO.

CAX/PDM Implementors Forum- L. McKee

The third rounds of testing for the joint PDES, Inc./ProSTEP CAX and PDM Implementor Forums (IF) have concluded. The scope, participants, issues, and summary results of each round of testing were reviewed. All CAX-IF vendors processed the eight production models. Results from this round of testing show that validation properties is ready for use, while further testing is needed to improve geometry exchange. Limited interest was shown in drafting. The new process for collection and evaluation of test data combined with the issue resolution process is helping to improve the quality of test results.

In the third round of PDM-IF testing, several pre-processors did not export either some or all of the prescribed constructs. A discrepancy in the value comparison analyzer was also encountered. The next round of IF testing (which ends in July) will be a common PDM-CAD test campaign. This round will exam geometric model support by PDM processors; product structure with external geometric reference by CAD processors; geometrical relationships with transformation; shape aspect support; and concepts for alias data handling.

As of February 4, 2000, 4 CAD vendors had passed certification for ISO 10303-203 CC6a. These are: AutoCAD Mechanical Desktop Version 4, CATIA 4.2.2, Theorem Solutions CADD5 5, Unigraphics V16

SolidWorks 2000. Please contact the vendors or USPro for additional details.

Express-X and XML- M. Maier

Markus Maier from PDTEC provided a demonstration of a using Express-X and XML. See the slides for additional details. There are no detailed minutes as it was a demo.

Drafting Demonstrations- W. Haas/Y. Manchu

Team SCADEC provided presentations with an integrated demonstration on the Standard for CAD Data Exchange for Construction (SCADEC). See the slides for additional details. There are no detailed minutes as it was a demo.

Wolfgang Haas of Haas and Partner provided a presentation with an integrated demonstration on the STEP Construction Drawing Subset (STEP-CDS) See the slides for additional details. There are no detailed minutes as it was a demo.