



SYSTEMS ENGINEERING and DESIGN STEP ON A PAGE



ISO 10303 Standard for the Exchange of Product model data (STEP)

Organizations and industries all over the world have problems exchanging product model data. These exchanges can be between design, analysis, or manufacturing systems. Industry collaborators have developed a suite of standards in the Organization for International Standardization (ISO) to exchange neutral product model data. It is the **ST**andard for the **EX**change of **P**roduct model data (STEP). The STEP development community is working to ensure these standards support international product model exchange requirements.

Systems Engineering and Design Product Model Data Exchange

The systems engineering community is participating to ensure that their product model data can be exchanged to support product model driven system design processes. “*Systems engineering is an interdisciplinary collaborative approach to derive, evolve, and verify a life cycle balanced system solution that satisfies customer expectations and meets public acceptability*” (IEEE 1220-1984). Industry is pursuing a neutral exchange format for systems engineering data because:

- systems are more complex (number of interfaces and multi-discipline)
- tools are proliferating and they are more complex
- multi-company collaboration is increasing and
- data exchange between systems engineering applications/organizations is not simple.

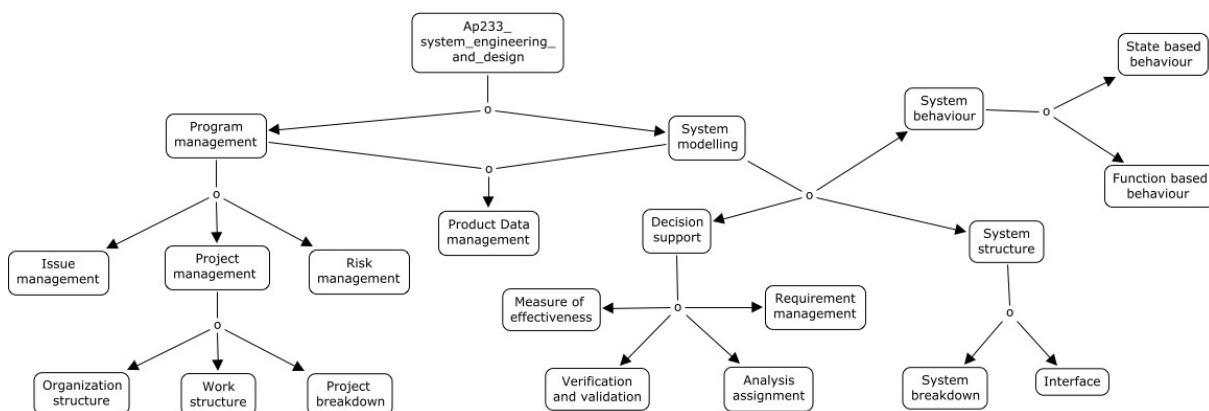
The complete problem spans:

- Stakeholder Needs
- Requirements
- The Enterprise and Competitors
- Concept
- Design
- Design Optimization by Trade Studies
- Design Validation and Verification
- Manufacture
- Product Validation and Verification
- Test
- Maintenance
- Disposal
- Training and Support
- Cost and Schedule
- Program Management

ISO 10303 AP 233 Systems Engineering and Design

Application Protocol (APs) parts address specific products and processes. AP 233 is addressing Systems Engineering and Design using a combination of modules the systems engineering team has developed and modules that other teams have developed. The scope of AP 233 includes:

- System behaviour
- System structure
- System modelling
- Decision support
- Requirements, analysis, trade studies
- Program and project management
- Verification and validation
- Risk management
- Issue management

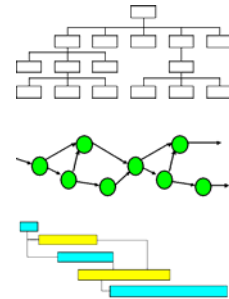


This STEP AP for the systems engineering community divides into System Modeling and Program Management capabilities with an organization layout approximated as above. At the next lower level of detail (not shown) capabilities are massively networked together. Networking enables a full information management and traceability capability. Provision is also provided for the utilization of reference data and interfacing to decision-making analysis capabilities. Harmonization with other STEP AP's is insured by a 70% reuse of core STEP foundational modules.

Program Management Capabilities

The boxes above identify information modeling capabilities provided by AP233 modules and lines show usage connectivity. The following list approximates how system engineering program management needs map to AP233 module capability:

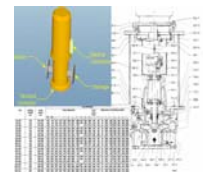
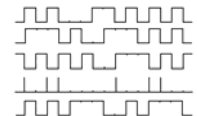
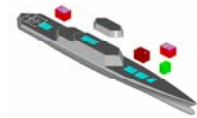
- Issues map to Issue management;
- Organization structure maps to Organization structure;
- Project breakdown maps to Project breakdown;
- Project management information maps to Project management;
- Project management resource information maps to Project management resource information;
- Risk maps to Risk management;
- Schedule maps to Project breakdown;
- Work breakdown information maps to Work structure.
- Configuration management and product data management (of program information) maps in a complex manner to capabilities in Product data management.



System Modelling Capabilities

The following list approximates how system engineering system modelling needs map to AP233 module capability:

- Requirements map to Requirement management;
- Allocation of requirements to system elements map to Requirement management;
- Measures of effectiveness and trade studies map to capability under Decision support;
- Interface to analysis maps to capabilities under Decision support;
- Function based behaviour maps to Function based behaviour under System behaviour;
- State based behaviour maps to State based behaviour under System behaviour;
- System hierarchies for the design system, the realized system and all interfaces map to capabilities under System structure.
- Configuration management and product data management (of modeling information) maps in a complex manner to capabilities in Product data management .



Summary

The STEP APs capture data on components and systems to improve computer sensible sharing of important product information. Additional ISO 10303 AP 233 Systems Engineering and Design information is at:

TC 184/SC 4 On-Line Information Service for STEP and PLIB - <http://www.tc184-sc4.org/>
 International Council on Systems Engineering (INCOSSE) - <http://www.incose.org/>
 ISO 10303 AP 233 Development - http://www.ap233.org/ap233-public-information/ap233-cd/ap233_SC4-CD_build%28070509%29.zip/view