

Exchange of Requirements and Verification and Validation Data – Implementer Forum based on STEP

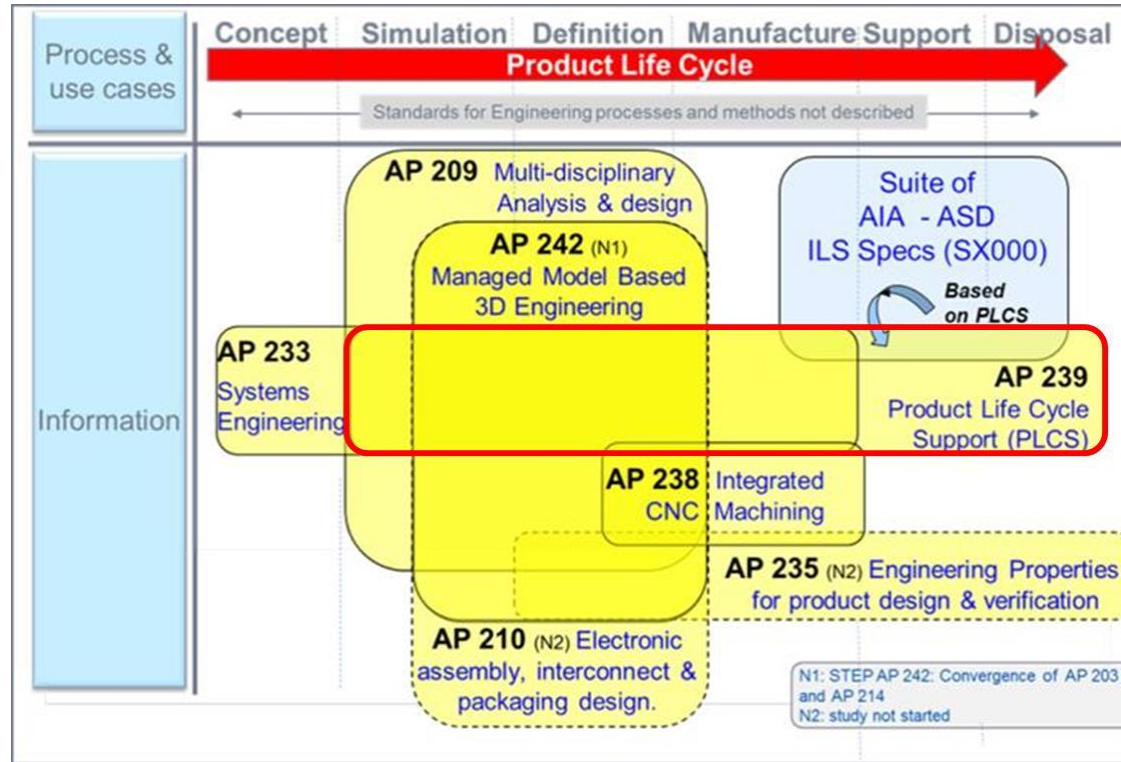
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- ❑ Context, references
- ❑ Scope – objective
- ❑ Overview of the addressed Information model
- ❑ Families of use cases
- ❑ Link with the PDM-IF
- ❑ Main interdependencies
- ❑ Proposed planning of the Implementer Forum for 2019
- ❑ Members of the “User Group”
- ❑ Members of the “Implementer Group”
- ❑ Proposed Resources plan for 2019
- ❑ Next actions

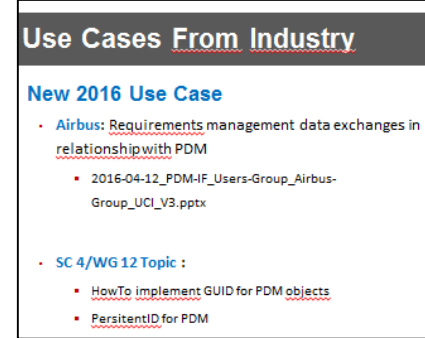
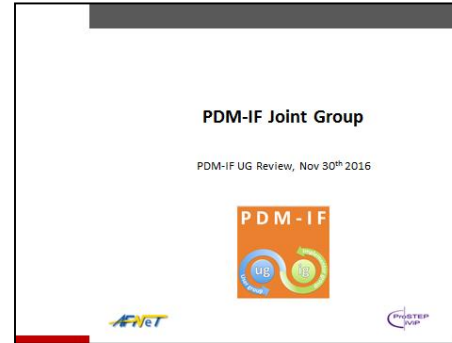
- ReqIF has demonstrated the capability to exchange “text based” requirements between requirement management (RM) tools.
- Progress of STEP Enhanced Architecture:
 - New Core Model proposed (including Requirement CTC, Property CTC, Condition CTC, etc)
 - STEP APs (AP242, AP239, MoSSEC, AP233) Domain Models will be mapped to this Core Model
 - STEP AP242 ed2: covers Requirement Management, Validation and Verification information models
- Several initiatives launched these last 2 years on the exchange and archiving of MBSE data
 - PDES MBSE WG
 - LOTAR MBSE WG
- **Need to investigate the exchange and LT archiving of requirements and V&V data in an MBSE context:**
 - Start with a limited scope: Requirement, V&V - to be enlarged next years to include additional MBSE data
 - Consider exchange of requirements through life-cycle (e.g. MBSE – DMU)
 - STEP as preferred technology (larger scope and life-cycle coverage than ReqIF)

Cartography of the STEP APs



[source: <http://www.ap239.org>]

- Identification of the use case for exchange of requirement management in 2016



- Availability of a STEP “Requirement & V&V” Core Technical Capability (information model and XML schema). To be published first as part of AP42 ed 2 and AP239 ed3 – and potentially in the future edition of AP233 “Systems Engineering”
 - ➔ goal: to ensure the exchange and LTA of the traceability of the R, V&V information
- AFNeT – prostep ivip STEP AP242 Day (17 Oct. 2018, Toulouse)
 - “Opportunities for deployment of AP242 capabilities”
 - “Opportunity to launch the R,V&V Management Implementer Forum as part of the actions to support MBSE interoperability”

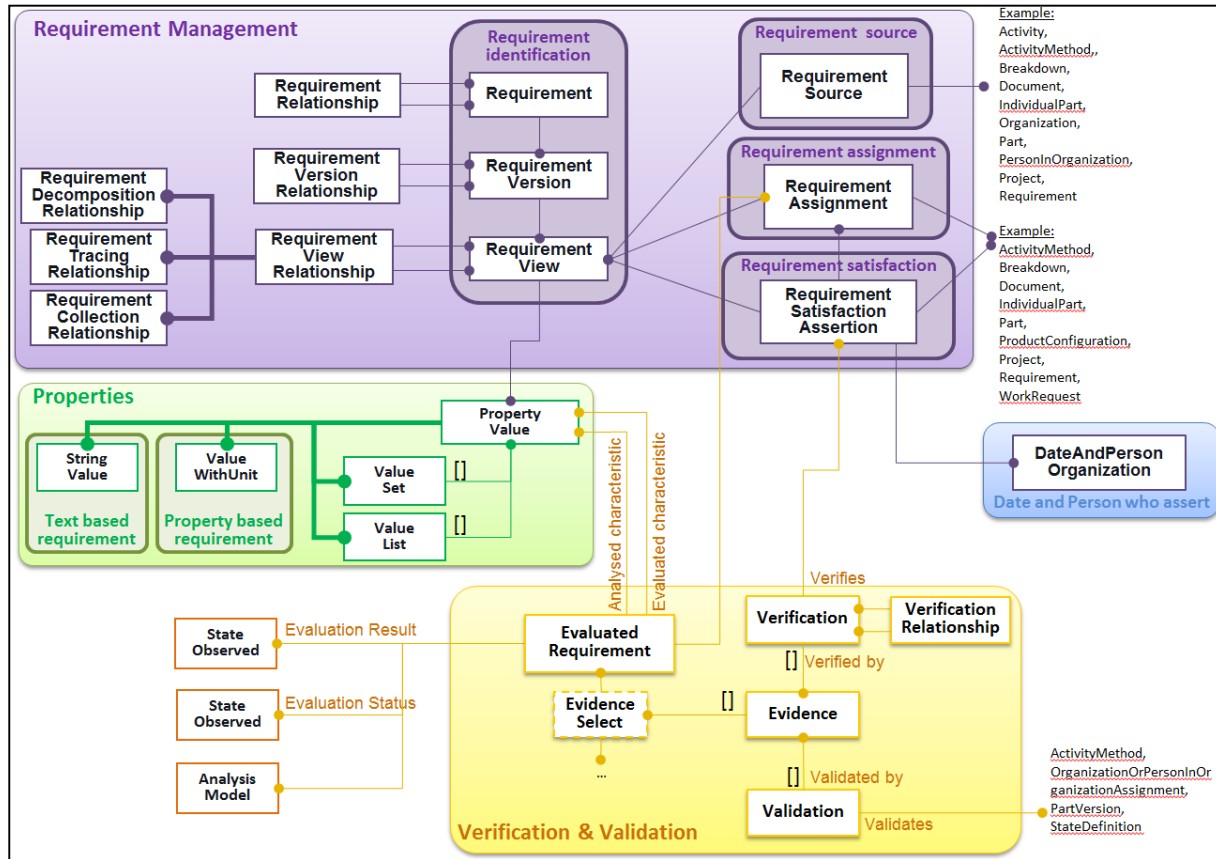
Objectives of the RV&V Implementer Forum

- To speed up the implementation and deployment of Requirement, Val. & Verif. management information based on AP242 ed2 / AP239 ed3
 - Start with RM exchange based on AP242 ed1, “Text based” and “Properties based”
- To define generic use cases for Interoperability of RV&V management information
 - Short term: exchange, LT archiving, visualization, analytics
 - Mid term: web services based on AP242 / AP239
- To prepare representative public tests cases,
- To specify end to end quality control mechanisms
 - validation properties, verification control rules, etc
- To specify recommendations for minimum information to be part of the log files
 - to ease the operational use of AP242 interfaces

Scope of the RV&V Implementer Forum

- Exchange and LT Archiving of Requirement Management information
 - Text based and Property based ← to ease the processing by downstream applications
 - applied to the main PLM objects covered by AP242 – AP209 – AP239 , etc
 - composite design, mechanical design, (electrical design (AP242 ED2), etc
 - PDM: Part, PartVersion, AsIndividual, Breakdown, MaterialDefinition, MattingDefinition, etc
 - With, according to use cases:
 - PDM product structures, breakdown, etc
 - dates and times, P&O, classification, delta changes
 - **External references to other files:** documents, CAD models, PDM datasets, etc
 - **External element references to other AP242 / AP239 files objects**
 - Example of objects of CAD models: PMI, topology and geometry entities, mating relationship, etc
- **Future: > 2020:** Extension of the scope to Validation & Verification traceability U-Cs
Extension to use cases for REST web services based on AP242 / AP1239

Overview of STEP RV&V Information model



Information model shared
between STEP modular APs

- AP209 ed3
- AP233 ed1 “Systems Engineering”
- AP239 ed3 “Product Life Cycle Support”
- AP242 ed2

With a mapping with AP243 “MoSSEC”

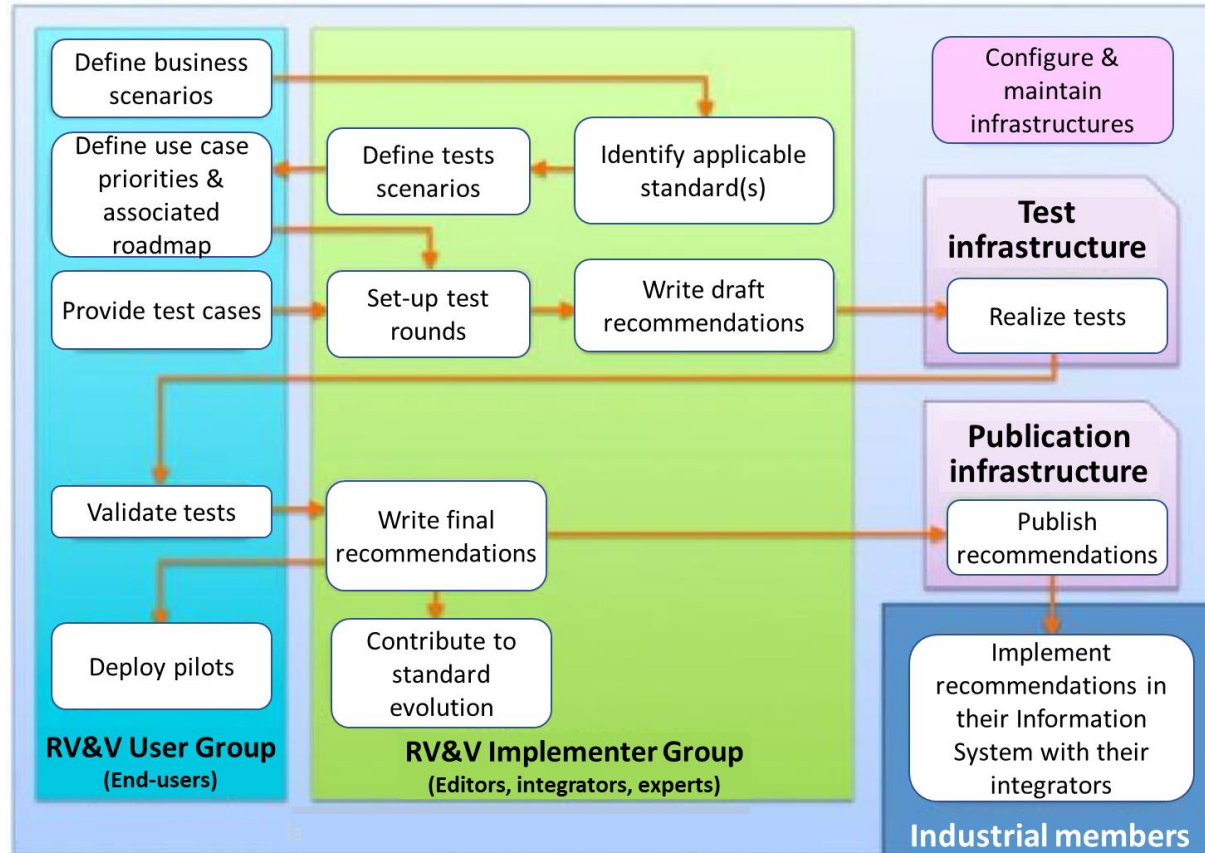
- ❑ **Exchange** of RV&V management information
 - ❖ between OEM and suppliers / partners (bi directional)
- ❑ **Migration** of RV&V management information
 - ❖ Obsolescence of tools
- ❑ **Visualization** of RV&V management information
- ❑ **Export for Analytics** of RV&V management information
- ❑ **LT Archiving** and Retrieval of RV&V management information
- ❑ **Data quality** of RV&V management information stored

- ❑ **RV&V IF will adopt an organisation similar to the PDM-IF**
 - ❖ Organisation and way of working of PDM-IF is described in the [PDM-IF White Paper](#)
 - ❖ PDM-IF website: www.pdm-if.org (not updated)
 - ❖ One User Group and one Implementer Group
 - ❖ Test rounds based on agreed Test Cases

- ❑ **User project leader(s)**
 - ❖ To start: proposal of one project leader, from the manufacturing industry
 - To be extended according to the interests of European, American and Asian industries

- ❑ **Facilitator(s): provided by AFNeT, PDES Inc? (if US partners involved)**
 - ❖ AFNeT: Yves Baudier
 - ❖ To start: initial resource plan: 20 person.day in 2019 (TBC)
 - ❖ Role: development of Rec. Practices, coordination of test rounds, confcalls, etc

RV&V activity flow



Manufacturers trade associations

- ASD, AIA, GIFAS, GALIA, etc

PLM Manufacturers groups

- A&D PLM Action Group,
- etc

Learning associations

- INCOSE (e.g. France: AFIS, etc),
- OMG

Standardization orgs.

- ISO /TC184 /SC4 I- ISO 10303 STEP AP242 / AP239 / AP209 / AP233 (ed2), MoSSEC
- LOTAR MBSE WG, OMG SysML, OSLC?

RV&V Implementer Forum

Standardization associations

- IPDES Inc, AFNeT, (prostep ivip) , etc,

other Implementer Forums

- PDM IF
- CAx IF (Example: Hole and Fasteners)
- Electrical IF (in preparation for start in 2019)

Proposed planning of the RV&V IF for 2019

- Kick-off of the RV&V User Group in April 2019
 - Draft agenda of the Kick-off:
 - Scope, objectives,
 - Way of working, proposed planning, resources management
 - Example of a first use cases and test cases
 - Confirmation of interest by users members
- Monthly confcalls
- Physical meeting as needed: synergy between meetings, to minimize travel costs
- First Test Round: start in June 2019

	2019				2020			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Description of use cases and prioritization for implementation		UC V1			UC V2			
Development and maintenance of recommended practices				RC V1				RC V2
Interoperability testing and associated test rounds		Test Round #1			Test Round #2			
Publication, outreach, coordination and communication								

Members of the RV&V “User Group”

- **Airbus** (confirmed)
- **Dassault Aviation** (confirmed)
- Thales (in progress)
- Safran ?
- Rolls-Royce?
- Naval Industrie?
- Links with the AFNeT – AFIS joined activities
- Galia?
- EDF?
- MoDs in EU (DGA?, UK MoD?, BMVg, etc), EDA?, DoD?, etc
- A&D trade associations in EU: ASD, GIFAS?, BDLI? In America: AIA?

Members of the RV&V “Implementer Group”

- **Dassault Systemes (3DEXP)**
- Core Technologie?
- Datakit
- Eurostep?
- EPM Jotne?
- PTC?
- Siemens PLM?
- IBM (Doors, etc)?
- ARAS?
- Tsystems?
- etc

Draft
to be reviewed

- ❑ **User Group**
 - ❖ Contribution by direct participation of the specialists of the industries
 - ❖ Associated fee: 2 K€ to 5 K€ per company - associations, according to the size – level of involvement

- ❑ **Implementer Group**
 - ❖ Contribution by direct participation of the specialists of the PLM editors and integrators
 - ❖ Associated fee,
 - Large PLM editor: 4 K€
 - Small – medium PLM editor – integrator: 2 K€

- ❑ **Roles of the fees: to fund the facilitators of the STEP associations**
 - ❖ Organization of the confcals and meetings if needed (agenda, minutes)
 - ❖ Organization of the test rounds, validation of the test cases, writing of the recommended practices,
 - ❖ Update of the RV&V web site, etc
 - ❖ Project management

- ❑ Preparation of the RV&V IF user group kick off, to be planned in April 2019
- ❑ Communication to AFIS and AFNeT members: invitation to join
- ❑ Communication to standardization associations and interested groups
 - ❖ PDES Inc, prostep ivip, etc
- ❑ Communication to relevant industries trade associations, etc
 - ❖ GIFAS, ASD SSG, etc
- ❑ Invitation of IT vendors to participate to the RV&V IF “Implementer Group”

Back up slides

Example of use case for exchange of Requirement information

<http://www.asd-ssg.org/systems-modelling-interoperability>



Requirement Management Interoperability



Description of scenario

Name – Exchange process of requirements set between OEM and RSP



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Prerequisite and goal:

The exchange and use of requirements between people within the same enterprise or in the frame of extended enterprises is quite complex because information in expert model is massive and various.

The example requirements are generally stored in different Requirements Management tools. Each tool provides the requirements for a better capturing a set of requirements (Identified and validated information) (Capture, organization, etc.). The requirements' retrieval are either defined through software relations (e.g. Requirements Tools, common standards, etc.) or some European Aerospace and Defence relations (e.g. E-ASD/CCDC for capturing requirements, other tools of defense like WeWork, Doct, Accel, etc.) need to be used as well.

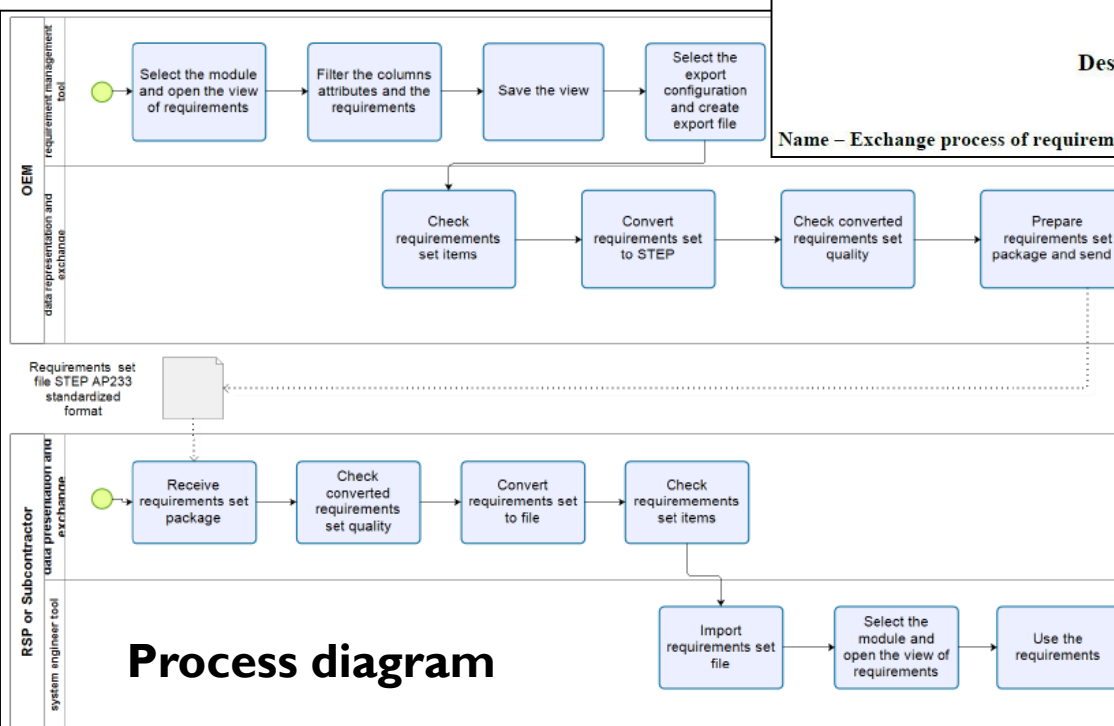
How requirements and exchange of requirements are well understood even if some data models need to be properly defined. This situation shows difficulties to access specific exchange of information between different tools. It requires the development of software for automatic and using the right data. Moreover, if attributes are clearly defined for requirements, they remain used as they are. This is the case for requirements management focusing on the requirements information on the global performance of product. However, the exchange of specific set of requirements attributes that are in several organizations, several issues regarding a consolidated report of data and processes between different tools are required.

The lack of full interoperability for the exchange and management of requirements will allow and facilitate the address this issue. It has become clear the specific definition of a set of requirements performed from a requirements management tool is able to be exchanged from a tool using the Original Equipment Manufacturer - OEM to a central role like a Master partner - RSP. The OEM sends its set of requirements to the RSP. This tool use shared right with information regarding the dependencies and use of requirements. The OEM does not change its requirements with regard to the answer given by the RSP.

Content of use case (global overview)

A request (contract - OEM) needs to open a Requirements Tool with one or more other companies (supplier or RSP) and to get back answers from them in his own tool (Contract).

Note: the process flow can perfectly concern the global overview of the content of exchange of information between OEM and RSP.



Process diagram



Types of information to be exchanged in the Requirement Mangt. AP242 XML public test case

- Examples of information coming from the level 1 requirements file:
- **Identifier:** Unique identifier for the object filled automatically by DOORS RMF
 - **Requirement Version:** Version number of the requirement that enables to manage requirements into configuration.
 - **Requirement Statement:** States an expected behaviour or global performance of the product under consideration.
 - **Working Status:** Current version of the requirement/activity.
 - **Rationale:** Provides the justification and/or the reason for the activity/requirement. The rationale is particularly useful for orphan requirement (i.e. requirement that are not traced to an upper level requirement).

