ATL2 modernization
When MBSE keeps its promises

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RenoATL2 - Context

- **Maritime Patrol Aircraft (MPA) renovation program**
  - Led by DGA for French Navy
  - TSA as a co-contractor with Dassault Aviation

- **TSA perimeter = SSRI / Sub-System Radar & IFF**

- **TUS perimeter = STAN / Acoustic Processing System**
RenoATL2 – SSRI breakdown

Radar Search Master (TSA)

IFF TSA2542 (TCS)

Control & Command

Software subsystems (TSA)

CVI-ICC-PCC (TSA)
RenoATL2 Model Based System Engineering Story line

A classic process rolled out by increments
RenoATL2 Model Based System Engineering Story line
From functional chains to requirements

SA functional chains
SA Functions & exchanges
Requirements

System Context

Customer needs

Dassault PLM

satisfies

SYSTEM BLACK BOX

An efficient functional threesome for a complete and consistent specification

- 6 capabilities
- 198 funct. Chains
- 24 leaf-functions
- 458 funct. exchanges
- 641 requirements
From functional chains to IVV procedures

The functional chain as a starting point of IVV activities
Functional Chains through System Architecture

When the functional threesome has to comply with the architecture...

- 15 leaf components
- 402 leaf-functions
- 1856 funct. exchanges
- 1676 requirements
Let's talk about wiring and network!
RenoATL2 Model Based System Engineering Story line

System Engineering data package
SYSTEM BLACK BOX
SYSTEM GLASS BOX

Sub-System Engineering data package
SUB-SYSTEM BLACK BOX
SUB-SYSTEM GLASS BOX

System delivery
SYSTEM VERIFIED
SYSTEM INTEGRATED

Sub-System delivery
SUB-SYSTEM VERIFIED
SUB-SYSTEM INTEGRATED

SUB-SYSTEM COMPONENTS
System engineering data validation (1/2)

**SYSTEM GLASS BOX**

- All functional exchanges are involved in a functional chain?
- Is there a function not allocated to a sub-system?
- Sub-system interfaces allow to develop its functions at the edge?

**Start System Integration before its development!**
Transition From System to Sub-Systems engineering

A tooled up and iterative extraction
From functional chains to IVV procedures

Same process than System one : writing IVV procedures is a piece of cake !
From need to solution

**SUB-SYSTEM BLACK BOX**

**SA functional chains**

**External Data**

**SUB-SYSTEM GLASS BOX**

**Same process than System one : refine and iterate !**
RenoATL2 Model Based System Engineering Story line

System Engineering data package
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Sub-System Engineering data package
SUB-SYSTEM BLACK BOX
SUB-SYSTEM GLASS BOX

System delivery
SYSTEM VERIFIED
SYSTEM INTEGRATED

Sub-System delivery
SUB-SYSTEM VERIFIED
SUB-SYSTEM INTEGRATED

SUB-SYSTEM COMPONENTS
Transition From Sub-System engineering to development

Sub-system Logical Architecture
Internal Data
LA functions & exchanges
Requirements

SOFTWARE GLASS BOX

SoftArc components skeletons & assembly
Thrift interfaces
Specification documents

Software Implementation INPUTS

Toole up extraction for a strongly consistent set!
Software components implementation and test

Software Implementation INPUTS

- SoftArc components skeletons & assembly
- Thrift interfaces
- Specification documents

READ ONLY input contract

Software Implementation

- SW component implementation
- SW component unitary tests

IVV Test Campaign

- IVV procedures

Conformity Matrix

Modeling facilitates automation
RenoATL2 Model Based System Engineering Story line
System integration

INTEGRATION INPUTS

Modeling facilitates test bench deployment, integration and observability
System verification

**SYSTEM BLACK BOX**

**VERIFICATION INPUTS**

Modeling facilitates work organisation and reporting
Technical event analysis

VERIFICATION INPUTS

Modeling facilitates defects analysis
Lessons learnt (1/2)

What are the keys for success?

- Model shall be at the heart of engineering activities
- Functional chains shall be the keystone of technical activities monitoring
- Transitions between engineering phases / development shall be defined and tooled up
- Do not under estimate activities for process and tools definition
- Integrated coaching
- Trust and Resilience!
Benefits

- A shared feeling of getting engineering activities under control
- Engineering data is easy to share and ready for reuse
- Efficient and natural fight against silos
- Mastering activities brings real serenity
- Modelling can be an easy and cost saving way to work

Way forward

- Share our experience
- Challenge and improve process and tools
Questions

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