

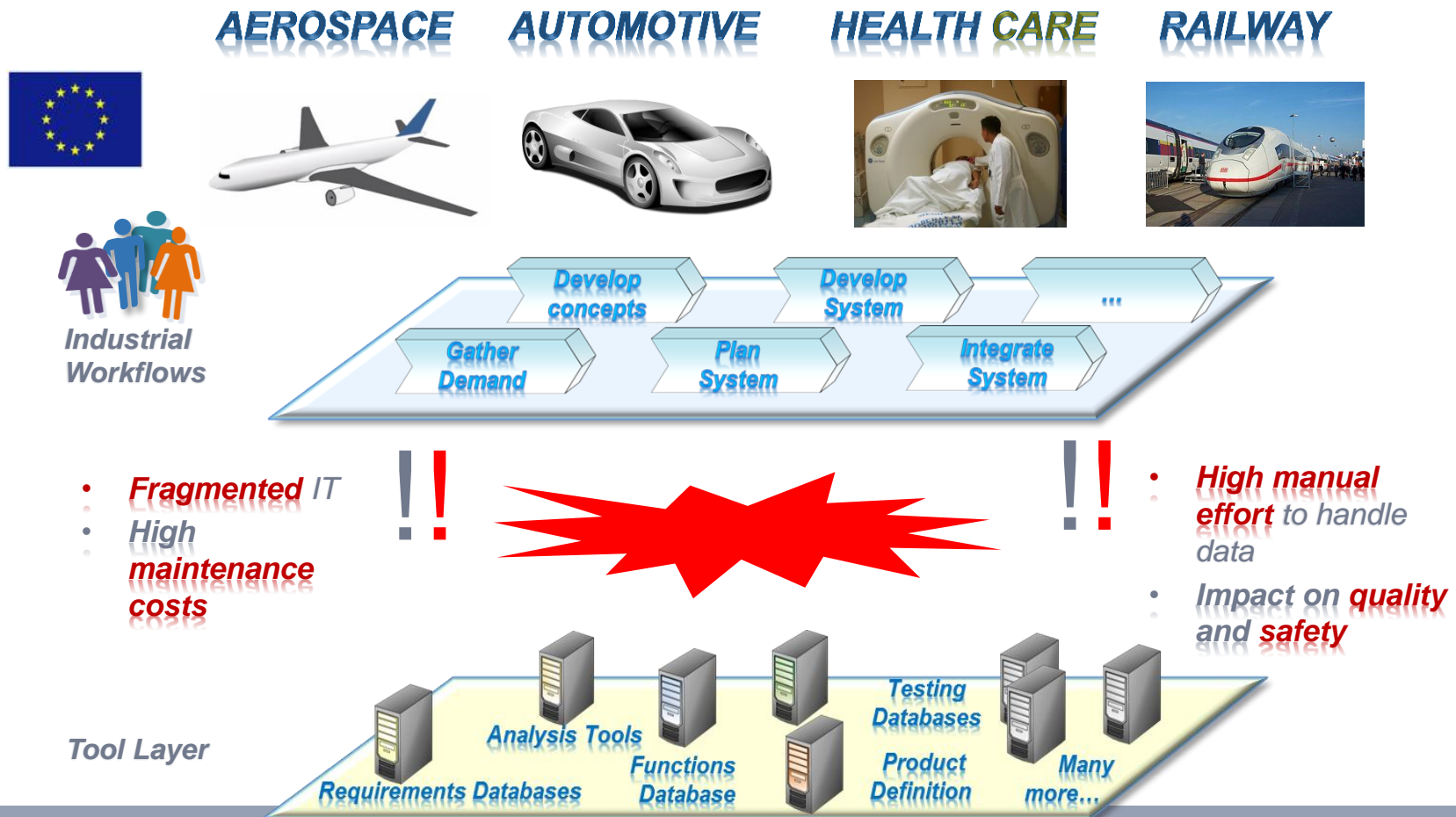
CRYSTAL

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A/C Systems Methods & Tools



CRYSTAL Seamless Life-Cycle Collaboration for Safety-Critical Systems Engineering

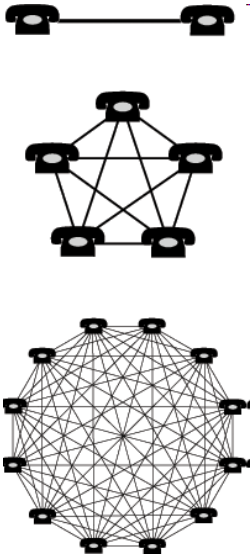
Today's situation at industrial companies





The tool-integration problem

Point-to-point
Integrations
don't scale



Creating new
integrations is
unpredictable

Monocultures
lock you in



Past choices
restrict present
action and
future vision

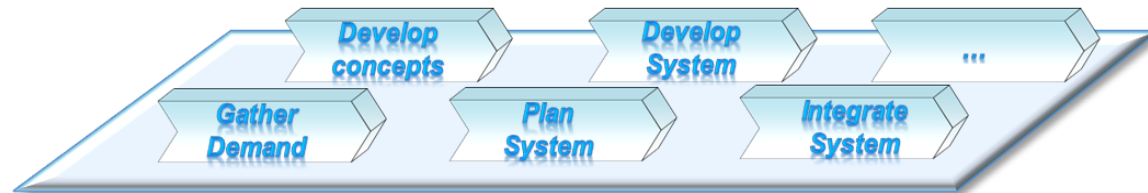
Maintenance, management,
and change costs go up over time



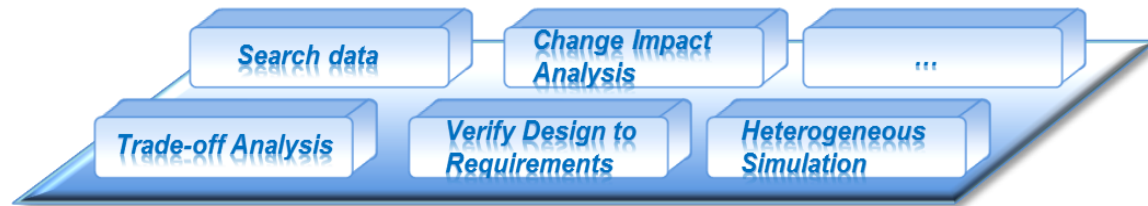
Ongoing and unexpected
costs drain resources



The CRYSTAL Vision

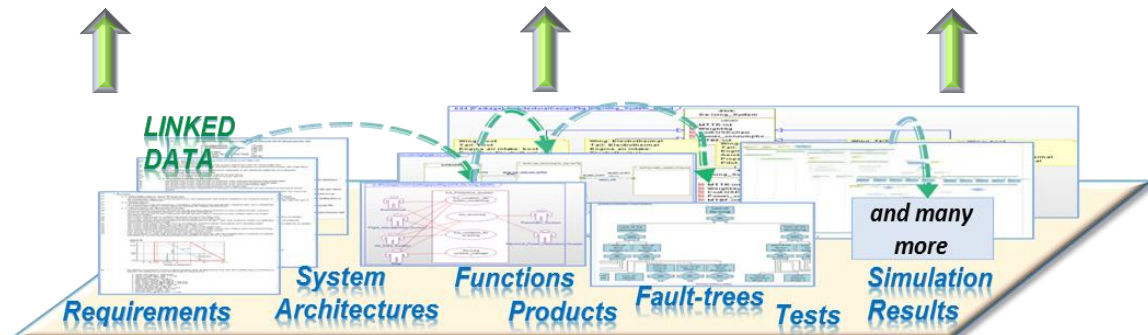


Enable New Engineering Methods



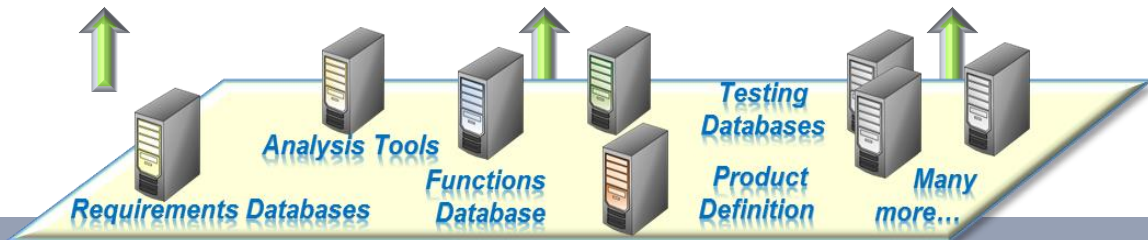
Users get better ways of working

Open Integration Platform



- **Standardized Interoperability Specification**
- **Connect tools to expose & link data**
- **OSLC**

Tool layer





CRYSTAL has the critical mass to generate impact

BE	
NL	
SE	
DE	
CZ	
AT	
IT	
ES	
FR	
UK	

- ▶ 70 partners from 10 countries
- ▶ €82M budget
- ▶ European key players from different industrial domains
- ▶ Large companies developing embedded systems act as **technology users** and case providers
- ▶ Large tool providers, SMEs and researchers as **technology providers**

Airbus motivation in CRYSTAL project

The **objective** of Airbus involvement in this project is:

- to promote interoperability standard between tools by supporting definition and implementation of IOS
- to validate the connection between models from different tools (functional, multi-physics, safety,...) using the operability standard defined on selected use cases

- **Benefits**

- Facilitate tool connections to support data exchange
- Ensure consistency of data between all the views (functional, safety,...).

Interoperability standard

Proposal to use existing standards:

- OSLC (Open Services for Lifecycle Collaboration):

<http://open-services.net/>



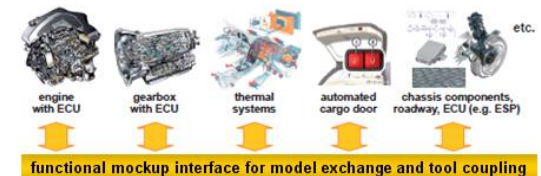
standardized services to enable easier and more effective integrations between tools

How ? By providing standard services that can be used from outside the tool to launch a service (i.e. “open a file”) or to have access to data inside the tool (using linked data concept)

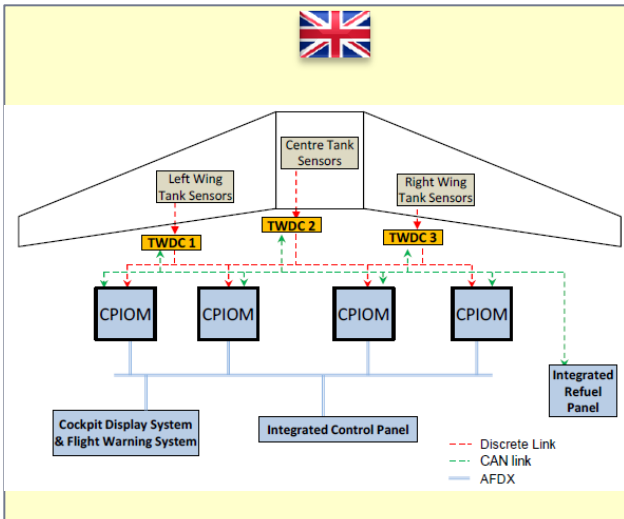
- FMI (Functional Mock-up Interface) : co-simulation standard

<https://www.fmi-standard.org/start>

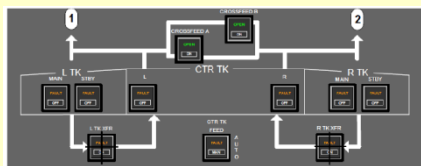
Capability to connect heterogeneous models
(i.e. control model and physics model) and execute a co-simulation



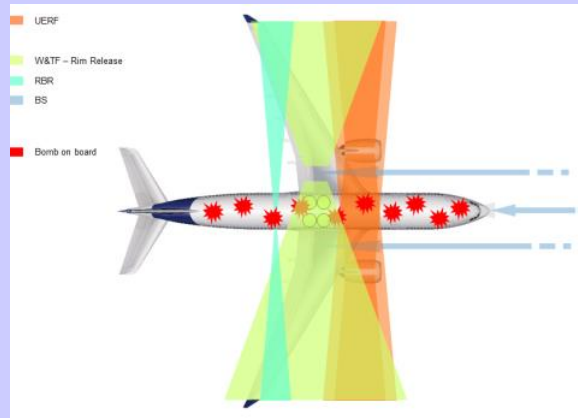
Assessment of standard on Airbus use cases



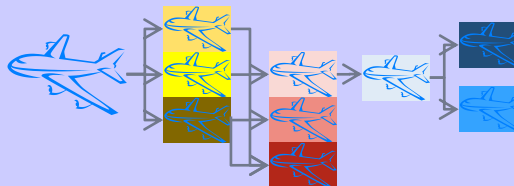
- The Airbus-UK use case targets the safety assessment of the Engine Feed function.



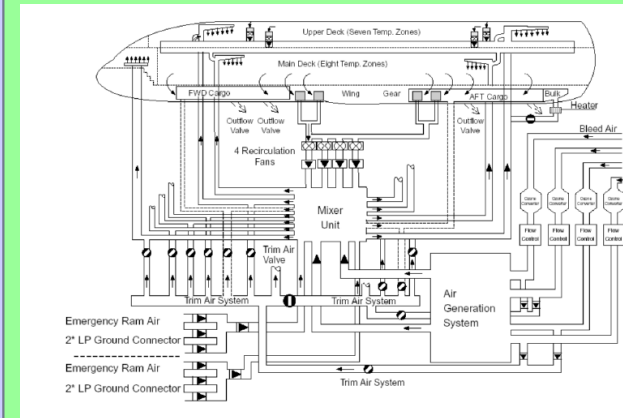
Fuel Management Risk Analysis



- The Airbus-FR use case improve the current Airbus Safety assessment process



Safety Analysis

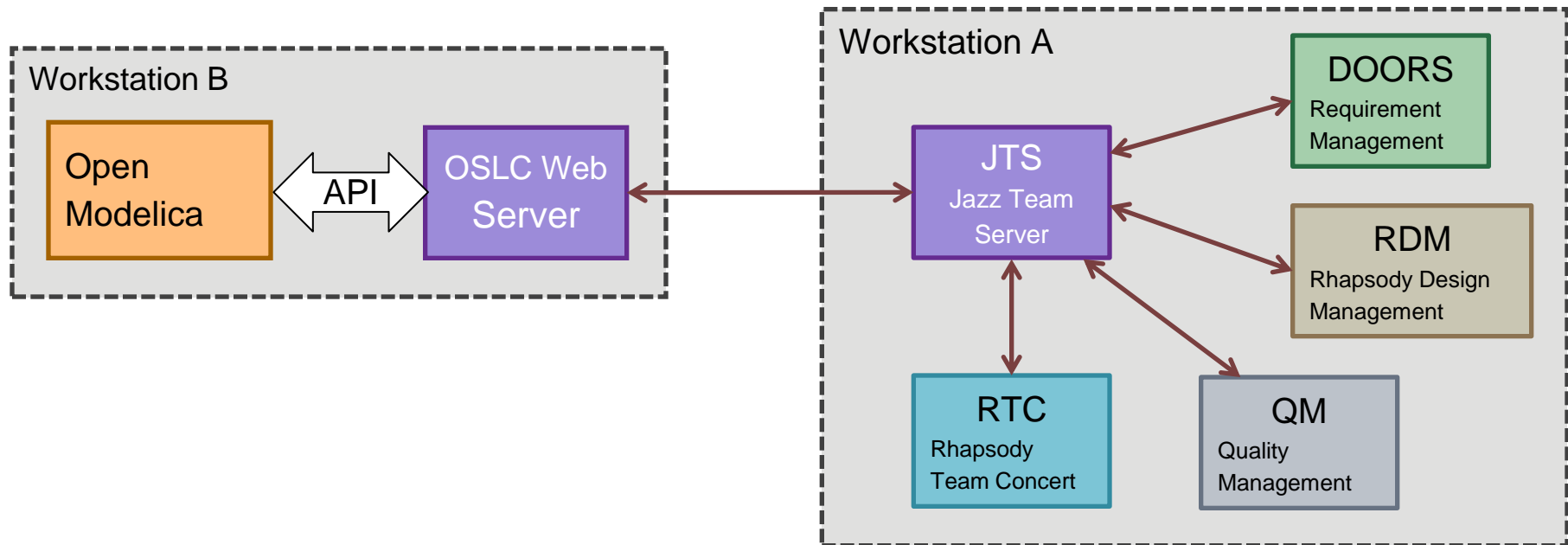


- The Airbus-DE use case targets the design and safety analysis of the Ventilation Control System (VCS)

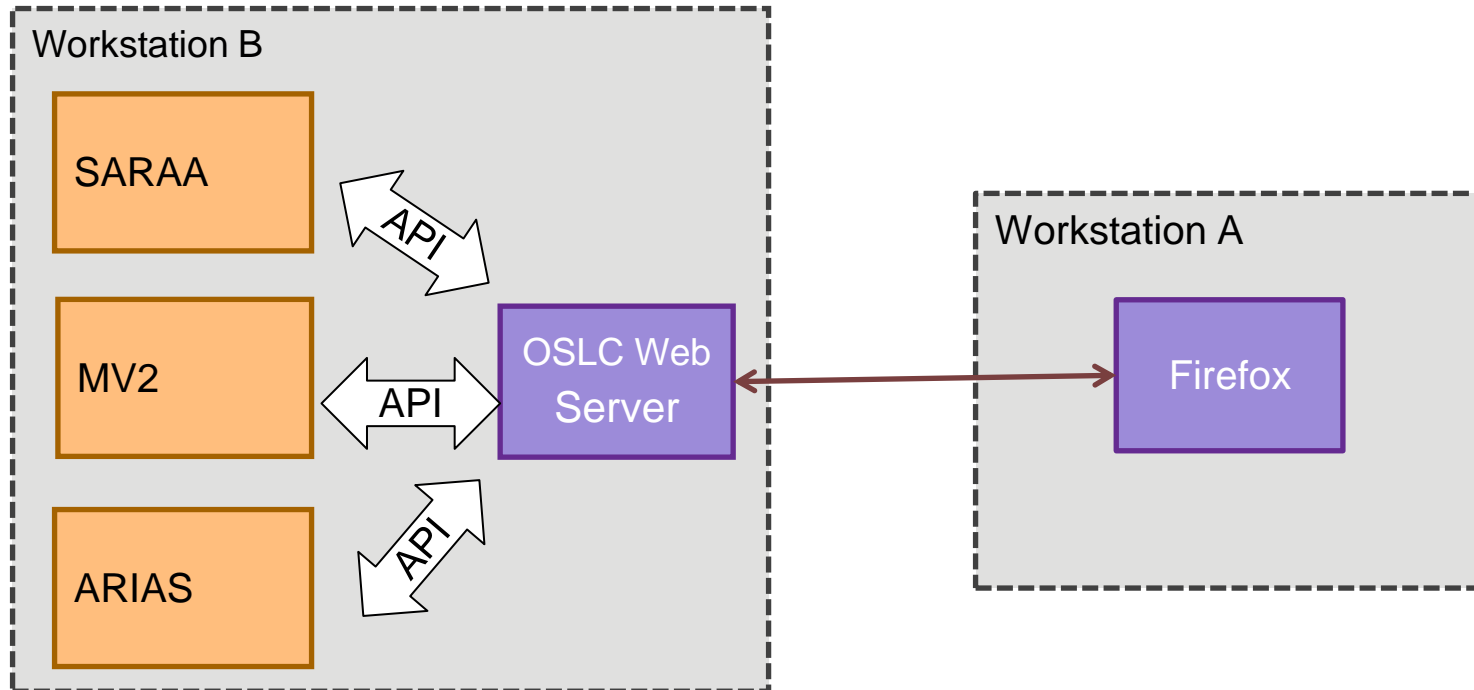


System design and safety analysis

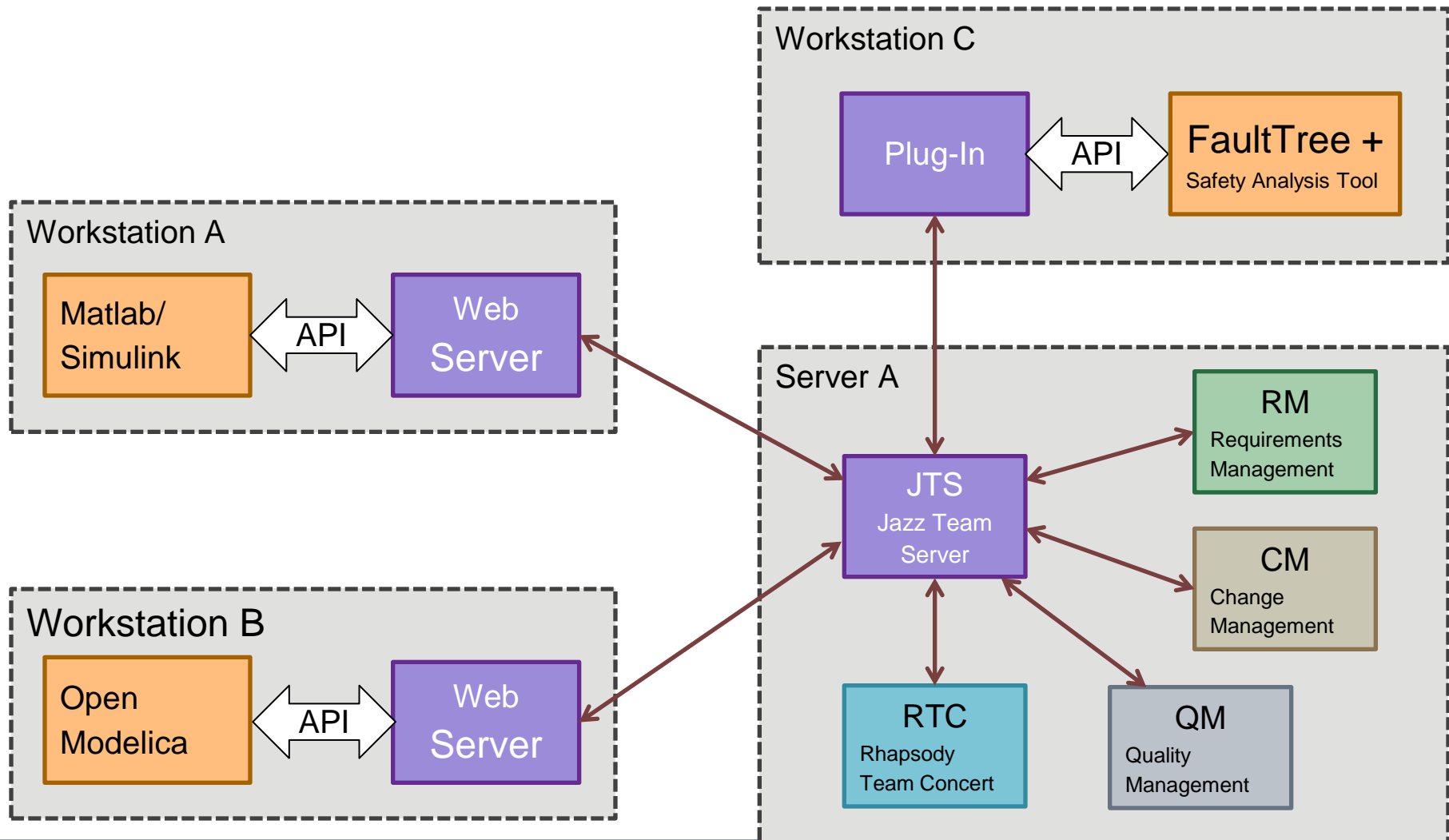
Fuel System Use case interoperability concept



Airbus France Safety Use case interoperability concept



VCS use case interoperability concepts



Status on Airbus use cases

- Tool demonstrators in progress for the 3 use cases
- Tool-chain environment installed
 - In UK : IBM Jazz, DOORS, Simulink, OpenModelica, RAMSES, SARAA, MV2
 - In Germany : IBM Jazz, Simulink, FT+, OpenModelica
 - In France : SARAA, RAMSES, ARIAS, MV2
- Target for first demonstrator: March 2015
- First feedback : IBM JAZZ platform maturity needs to be improved, and slows down the setting-up of UK and German use cases
- First assessment of the standards is expected by March 2015