# Rational Systems and Software Engineering **Symposium**

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### Introduction to Rational Engineering Lifecycle Manager

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#### **Airbus Group at a Glance**

## Airbus | Airbus Defence and Space | Airbus Helicopters





### Airbus Key Challenges for Engineering Lifecycle Management – A380 Example



- Complex Products
- Safety-critical Systems (Certification)



- Geographically distributed engineering teams
- Complex IT infrastructure
- Extended Enterprise



#### The vision, challenges and how to reach the goals

- The Vision (one of many...)
  - Improve collaborative aspects within the life cycle
  - Increase productivity of work and quality of products by reducing costs in terms of time during the engineering and management of products
- Challenges to reach our goal:
  - Traceability, Visibility, Control in the product engineering lifecycle
- How to:
- Integration of Software and Systems Engineering with Product Lifecycle Management tools
- Integration of process and change management into the systems engineering lifecycle



#### Smarter products $\rightarrow$ rising complexity





Project Plans



Requirements



Documents



Electrical & Electronic



Parts



Tests

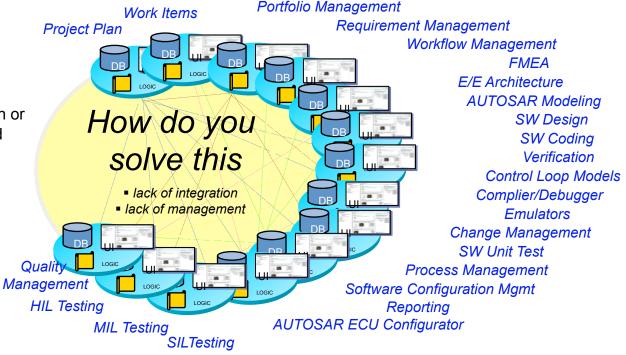




Source Code

# Eng. Environments are highly fragmented The challenge to connect them is increasing exponentially

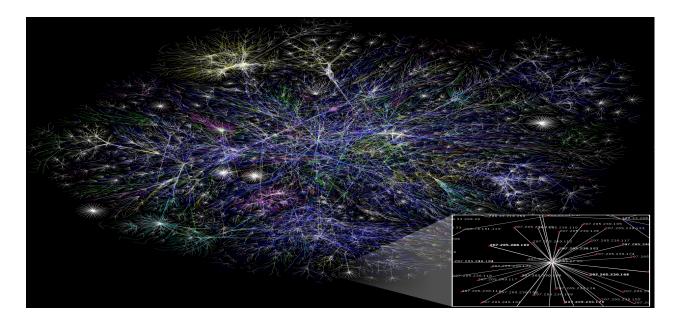
- Traditionally, each tool came with its own
  - UI Web and desktop presentations of views and tasks
  - Logic Workflow, process, search, query, scale, security and collaboration
  - Storage individual files on workstation or servers: how to ensure availability and traceability?
- Resulting in...
  - Brittle/poor integrations
  - Silos everywhere
  - High cost to maintain and administer
  - Low re-use



#### **The Internet**

• A model for a

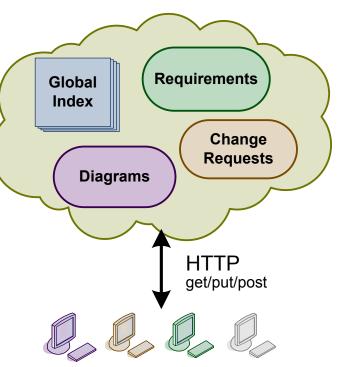
"huge source of data with navigable links" ....already exists





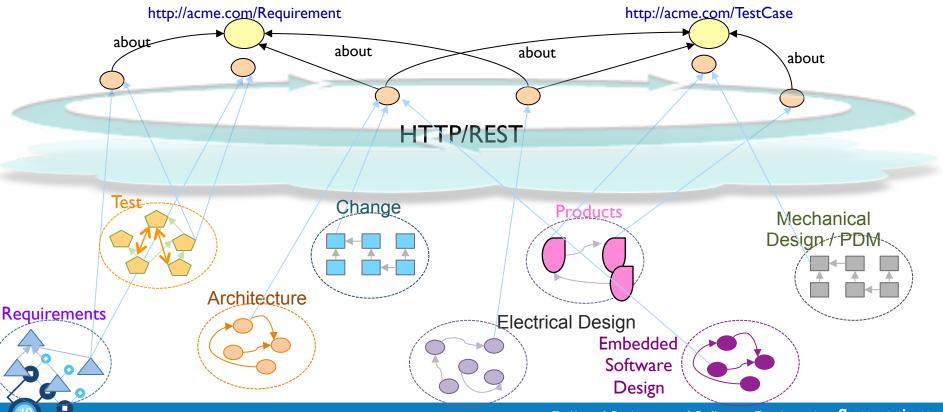
#### What does Internet inspiration mean?

- Data specified independently of tools
- All data are resources with URLs
- Multiple tools access data
- References are embedded URLs
- Resources have representations
- Unprecedented extensibility



## Leveraging the Linked Data concepts of Web Technology...

The Web has proven to be the most scalable, open, and flexible integration technology

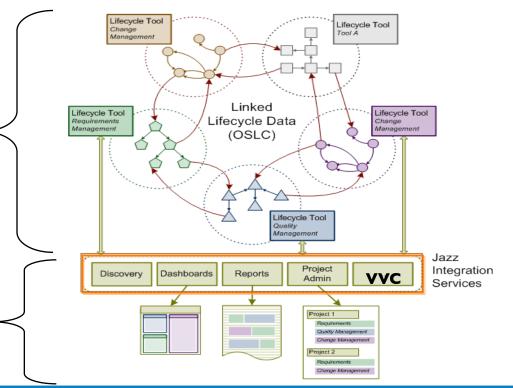


#### The Foundation: Linked Lifecycle Data and OSLC



OSLC = Open Services for Lifecycle Collaboration



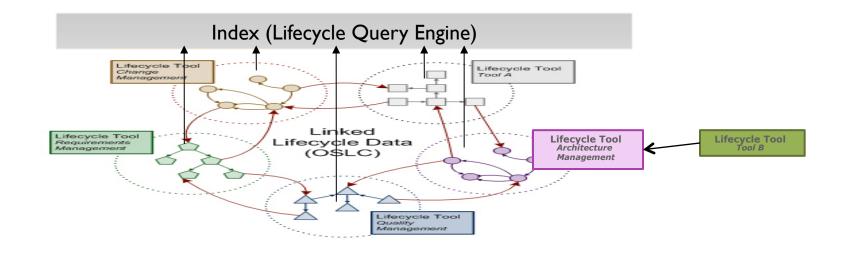


### Linked Lifecycle Data (OSLC)

- Supporting a range of integration patterns
- Sharing lifecycle resources
- Jazz Integration Services & Protocols (Jazz Platform)
  - Defining services for common capabilities like administration,
    reporting, dashboards, etc.

#### **Effective Lifecycle Analysis: Lifecycle Query Engine**

An index of Linked Data is created from domain tools that allows for crossdomain *Lifecycle Queries and Analysis* 



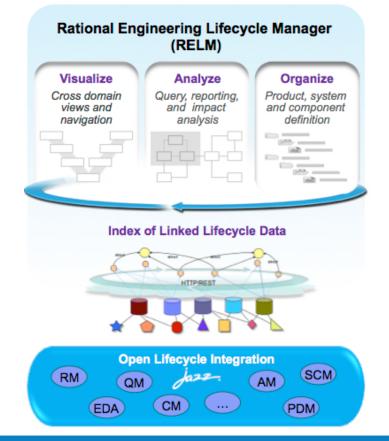
#### **Introducing Rational Engineering Lifecycle Manager**

Uses a Linked Data approach that enables a single source of truth with a federated architecture to provide

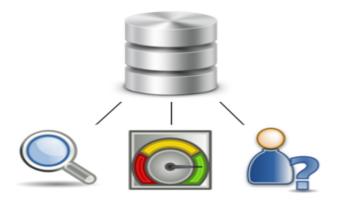
- Visibility across many sources of data
- **Analysis** answer questions using that contextualized information
- **Organization** information in context

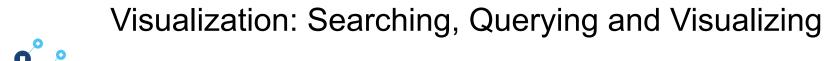
Allows stakeholders to:

- manage growing complexity
- derive knowledge from the available data
- make timely and correct engineering andbusiness decisions



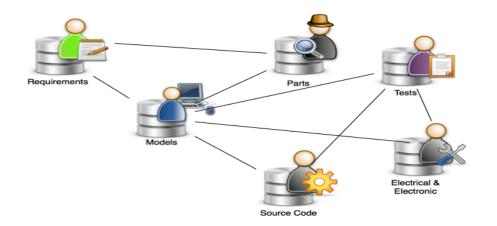
# Rational Engineering Lifecycle Manager (RELM)







# Rational Engineering Lifecycle Manager (RELM)



## Analysis: Managing Impact of Change



# Rational Engineering Lifecycle Manager (RELM)

🖃 🚕 Automated Meter Reader Handheld Receiver (:Geography=EU)
🖓 Antenna - Base Configuration 1.0
🗞 Battery Pack - Base Configuration 1.0
\pm 🚕 Display
💿 🚕 Handheld Software
🚕 Housing
🗞 Keypad - Base Configuration 1.0
🗞 Memory - Base Configuration 1.0
🗞 Power Input - Base Configuration 1.0
🗞 Processor - Base Configuration 1.0
🗞 Speaker - Base Configuration 1.0
🗞 USB Port - Base Configuration 1.0
🖓 Wireless Radio - Base Configuration 1.0

## Organizing Data: Products, Systems, Sub-systems, Capabilities, Components etc

# **Demonstration**

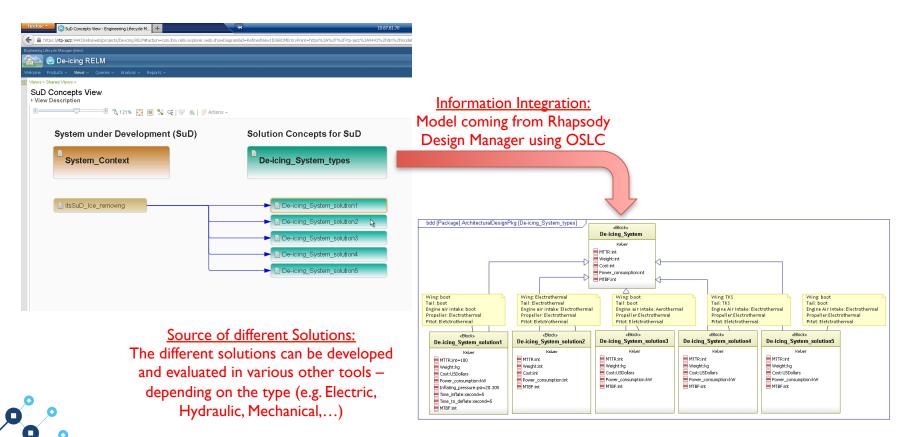


#### **Airbus RELM Dashboard Prototype: Functional View**

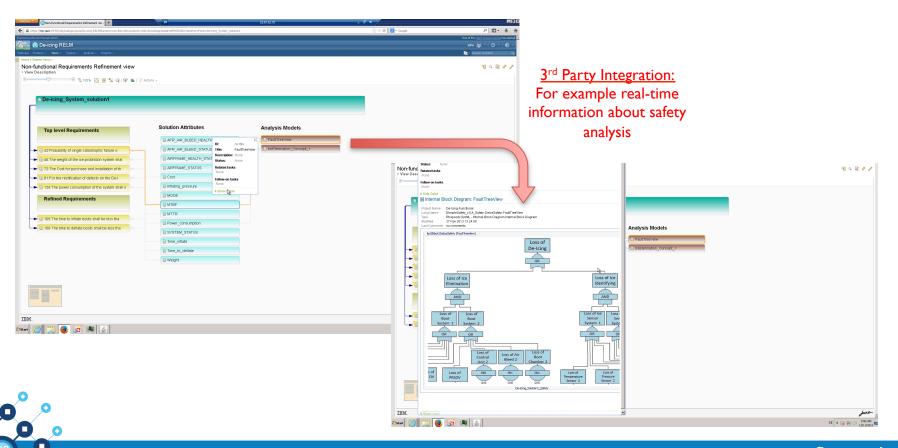
A prototype of a RELM dashboard has been created to visualize various information of an aircraft component in context to other available and related engineering information.

S De-icing RELM			One of the <u>Client Access Licers</u> john 🗥 🗸   🛱
Yrodutts v Views v Quaries v Analysis v Reports v			- Search Artifacts
bared Verss - tional View Description → → → へ SS% 💽 🗃 % 🍳   🌿 🕰   🖉 Actions -			<b>ଏ</b> ରେ ଜିନ୍ଦ୍ର ଅନ୍ତର
Functional Requirements	TopLevel_FunctionalView	System_Context	
28. The system shall provide ice condition informat	Apply_Antl_Icing_Measuremen	8	
29: The system shall provide ice thickness informat	Compute_Cycle_Time	itsAir_Data_System	
a0:The system shall be operated (activated and de-	Compute_Required_Anti_Icing	itsElectrical_Power_Gener	
32: The system shall provide status data (on/off) t	Compute_current_lce_Conditi	its Pilot	
a3: The system shall provide operating mode data (f	Compute_forecasted_ice_Cond		
a7: The ice protection system shall be operated und	Display_current_situation	itsPneumatic_System	
a 40: The airframe ice protection system shall be ope	Display_forecasting_lcing	LitsSuD_Ice_removing	
348: The de/anti icing system shall provide ice prot	Get_Flight_Plan		
a9:The de/anti icing system shall provide ice prot	Get_Weather_Forecast		
50: The de/anti icing system shall provide ice prot	Get_current_Altitude		
51: The de/anti icing system shall provide protecti	Get_current_Speed		
52: The ice-protection system shall prevent ice for	Get_envisaged_Altitude		
33: The ice-protection system shall prevent ice for	Get_envisaged_Route		
34: The ice-protection system shall prevent ice for	Get_envisaged_Speed		
55: The ice-protection system shall prevent ice for	Sense_External_Humidity		
57: The De-Icing Control Unit shall control the de-	Sense_External_Pressure		
59:The system shall detect ice condition.	Sense_External_Temperature		
system shall be able to measure the ice thi	Sense_existing_ice_Thicknes		
e ice protection system shall predict the ic	Start_System		

### **Airbus RELM Interoperability: IBM Tools and Data Integration**



#### Airbus RELM Interoperability: 3<sup>rd</sup> Party Tools and Data Integration



## Thank You.

