



 Drive Results.

Case Study: Using IBM Rational Engineering Lifecycle Manager to Accelerate System Changes

Fabrice Mendes – IBM Rational Engineering Team
Technology

fabrice.mendes@fr.ibm.com

<http://fabricemendes.wordpress.com/>



RUC2014
Rational User Conference



Airbus Group at a Glance

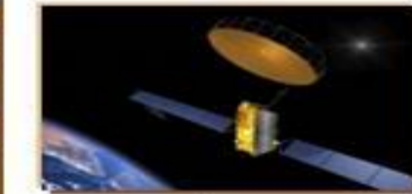
AIRBUS



**AIRBUS
HELICOPTERS**



**AIRBUS
DEFENCE & SPACE**



Airbus Group Employees by country*



* As of December, 2013

<p>AIRBUS</p> <p>Globally leading aircraft manufacturer</p> <ul style="list-style-type: none"> Since 2000, Airbus commercial deliveries grew by 60% Backlog more than doubled in one decade (now equaling 8 years of production) 	<p>AIRBUS HELICOPTERS</p> <p>Leading helicopter manufacturer</p> <ul style="list-style-type: none"> Accounts for 1/3 of the global helicopter fleet Delivered about 4,000 helicopters throughout the past decade 	<p>AIRBUS DEFENCE & SPACE</p> <p>Europe's No.1 defence and space company</p> <ul style="list-style-type: none"> Worldwide, it ranks second for space and is among the top ten defence companies Revenues of approximately €14 billion per year
---	---	---

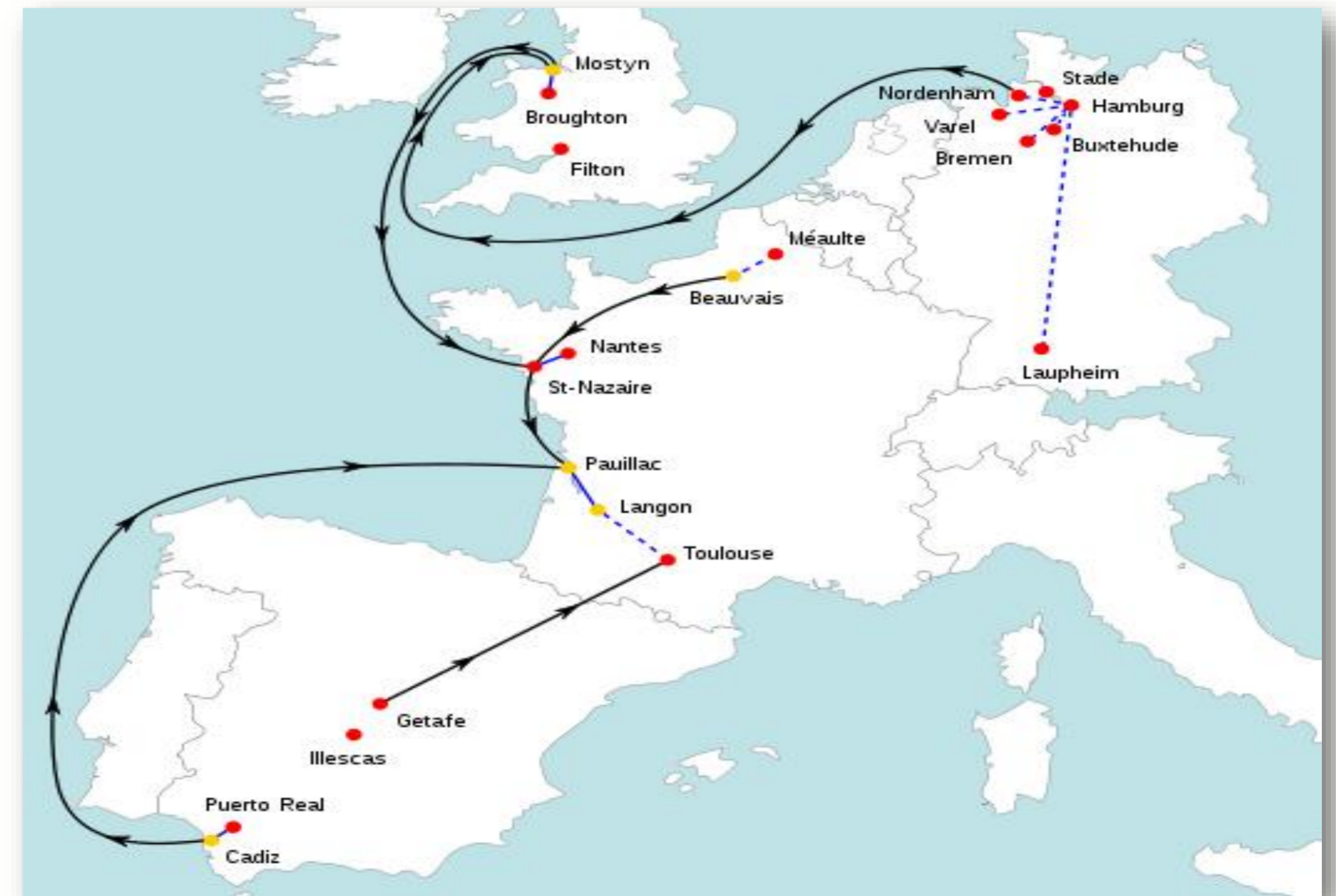


Our Key Challenges for Engineering Lifecycle Management



- Complex Products
- Safety-critical Systems (Certification)

- Geographically distributed engineering teams
- Complex IT infrastructure





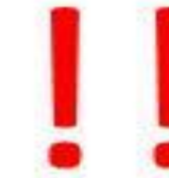
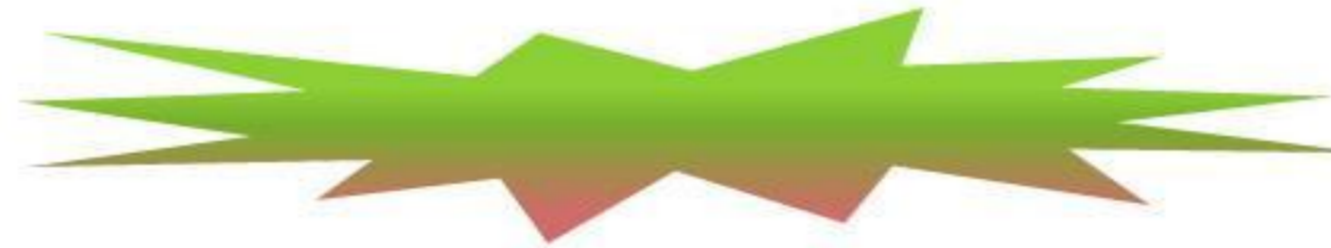
Today's situation at Industrial companies



Industrial Workflows



- *Complex ways of working*
- *Slow to adapt*



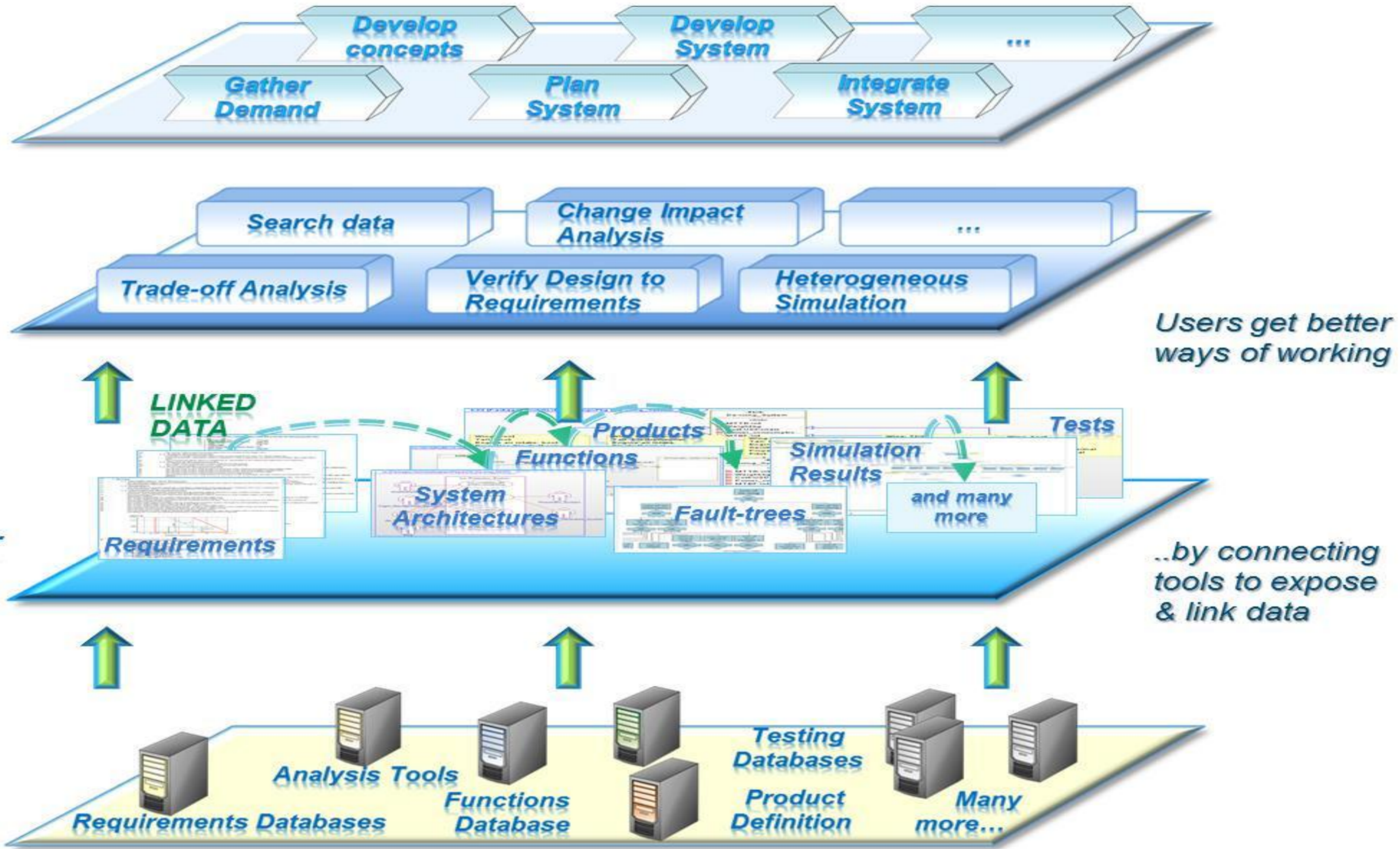
- *Fragmented IT*
- *High manual effort to handle data*

Tool Layer





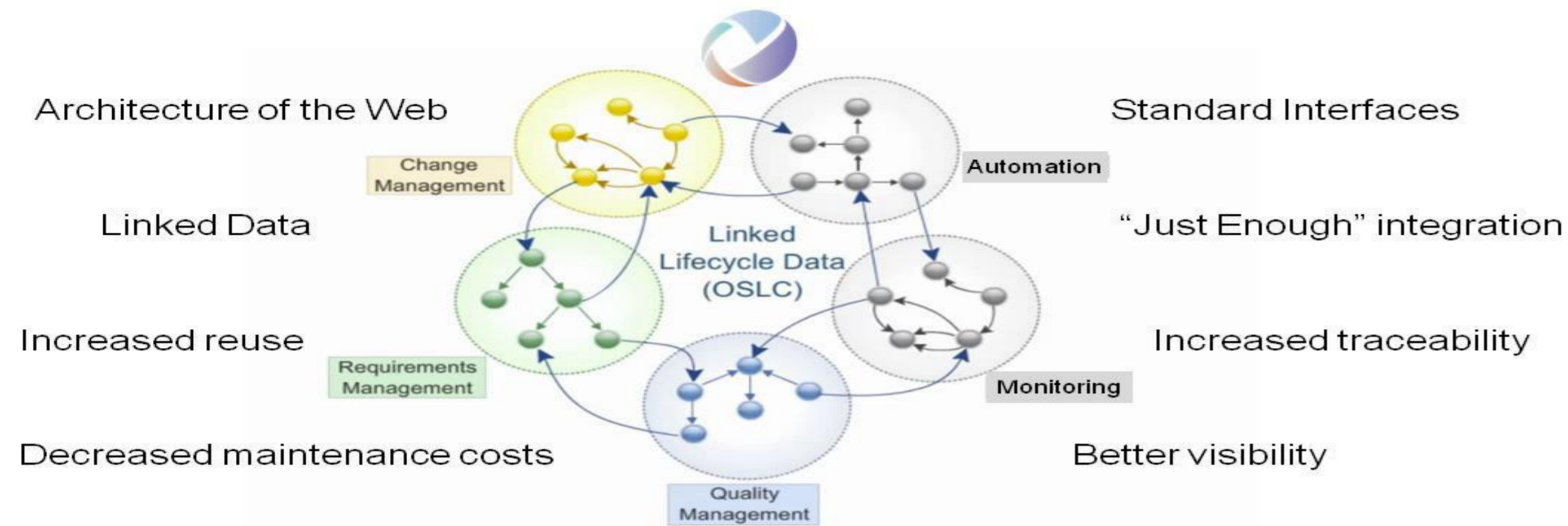
Our Vision





Key Enablers for our Vision

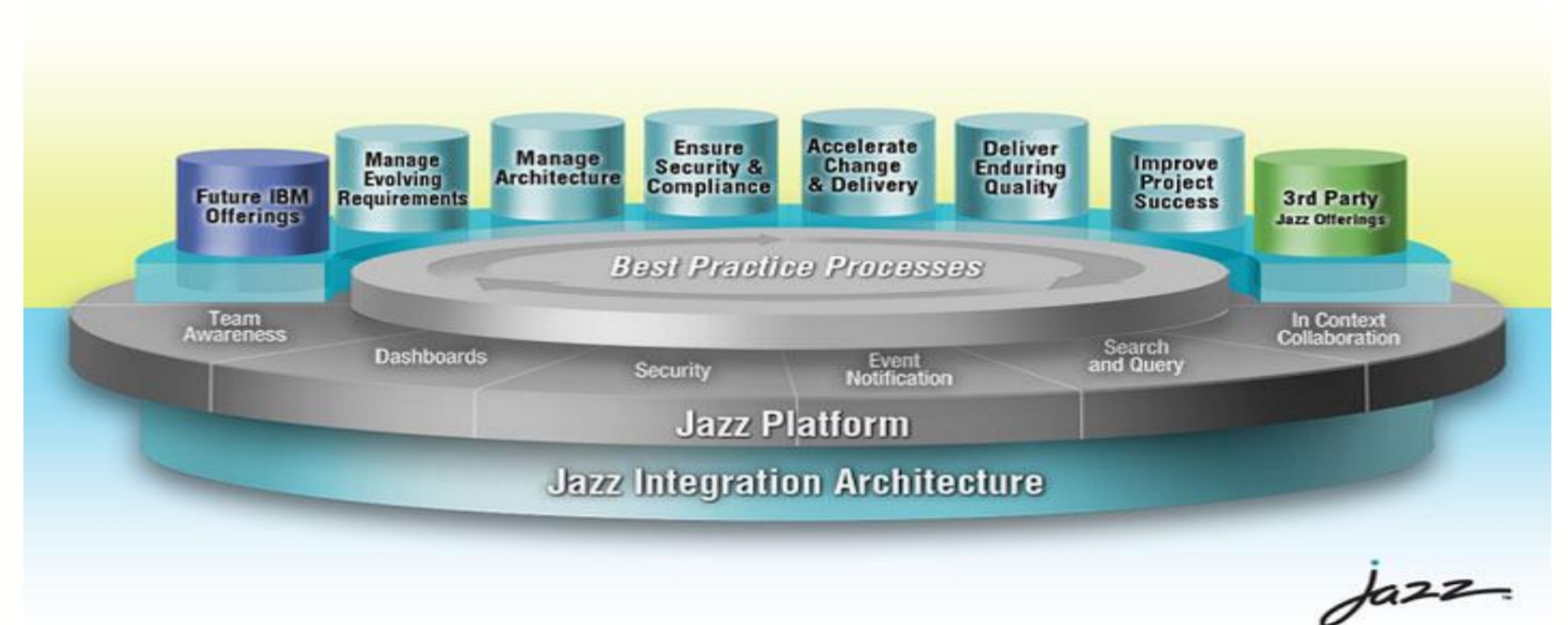
Users can work seamlessly across their tools



- OSLC is an open and scalable approach to lifecycle integration.
- It simplifies key integration scenarios across heterogeneous tools
- www.open-services.net

Linked Data will enable us to access, unlock and understand all engineering information, regardless of source – to enable the right decisions at the right times...

...but,





...but, we cannot solve this alone...

Europe's Embedded Systems Cluster ARTEMIS

Industry:

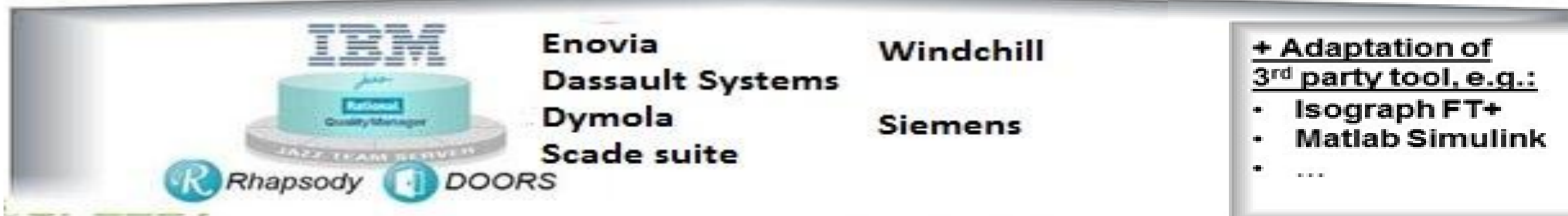
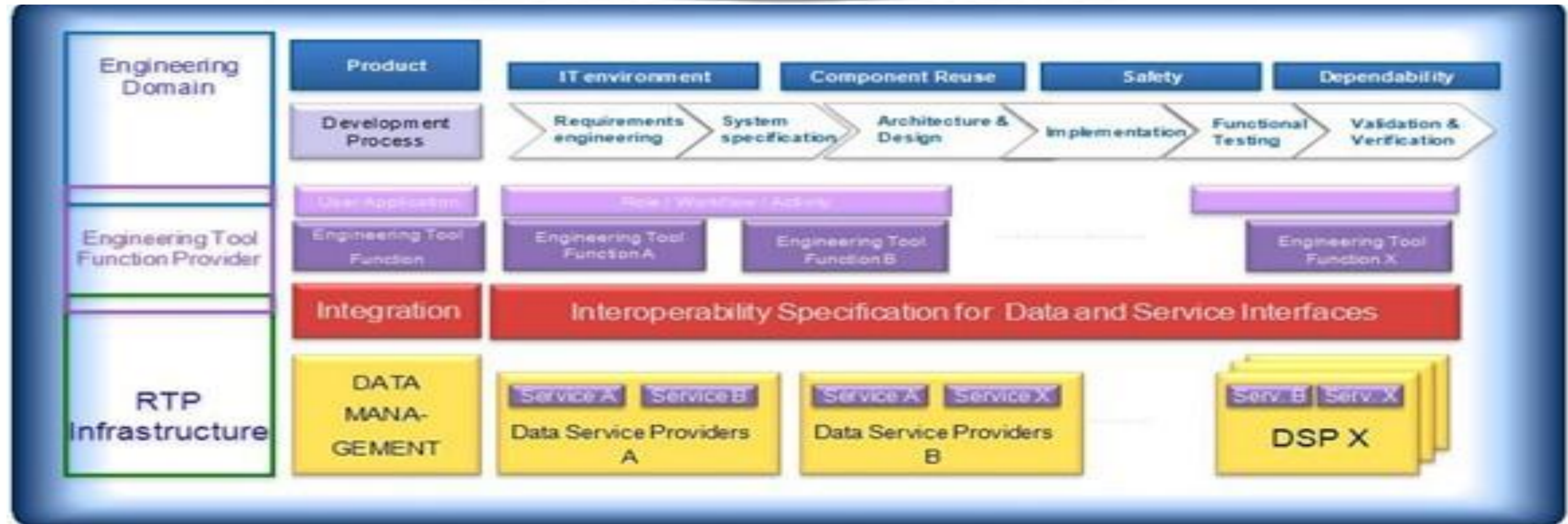
- Transportation and Health Care companies
- Provide Needs for tool interoperability
- Enable specification, design and analysis of complex systems

CRYSTAL Project:

- 80 Partners – 100M USD Budget
- Provide a generic method and tool framework for engineering of complex systems
- Modular and extensible
- High maturity for industrial use
- Based on industry-wide accepted **Interoperability Specification**
- Loose coupling of **process**, **tool** and **data** level to enable application oriented configuration

Tool Vendors:

- Provide modeling and analysis tools
- Provide Integration solutions
- Agree on a common way to realize tool interoperability

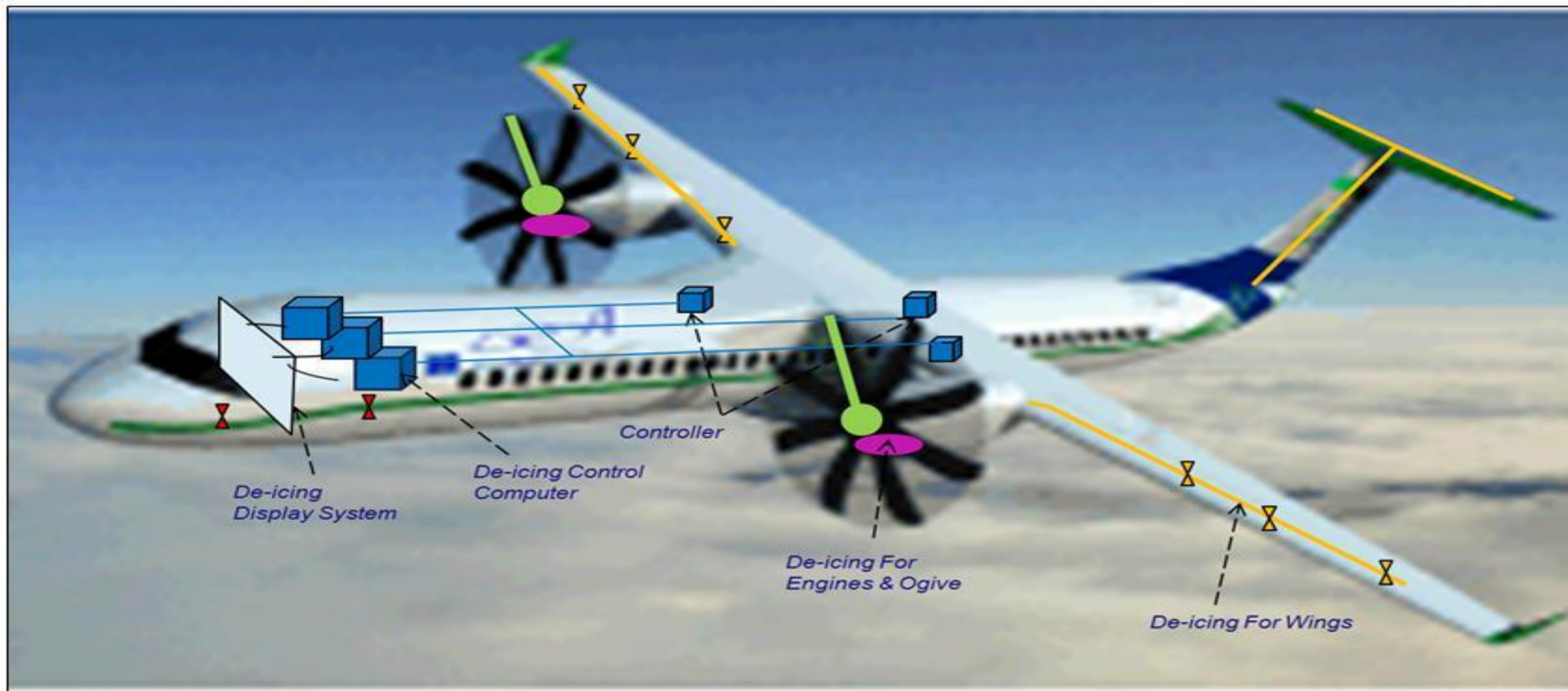




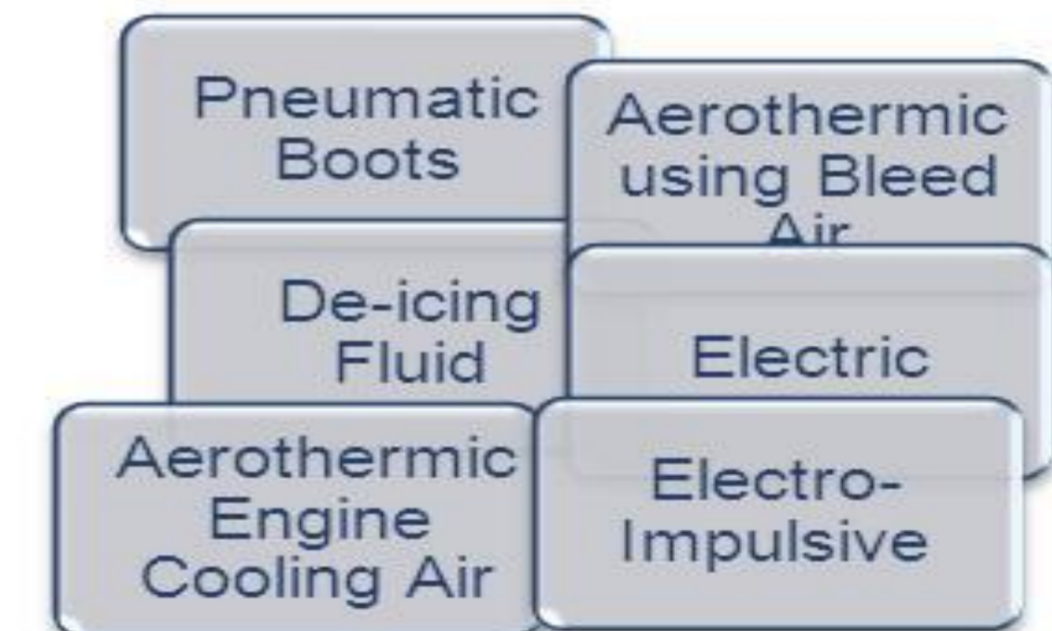
Common Aerospace Case Study

Use Case Objective:

- Definition of De-icing System for Regional Turboprop Aircraft, with:
 - Minimal Cost, Weight, Power Consumption
 - Fulfilling safety constraints
 - Fulfilling functional needs (i.e. keep Aircraft components free-of ice)



Different alternative concepts for De-icing:

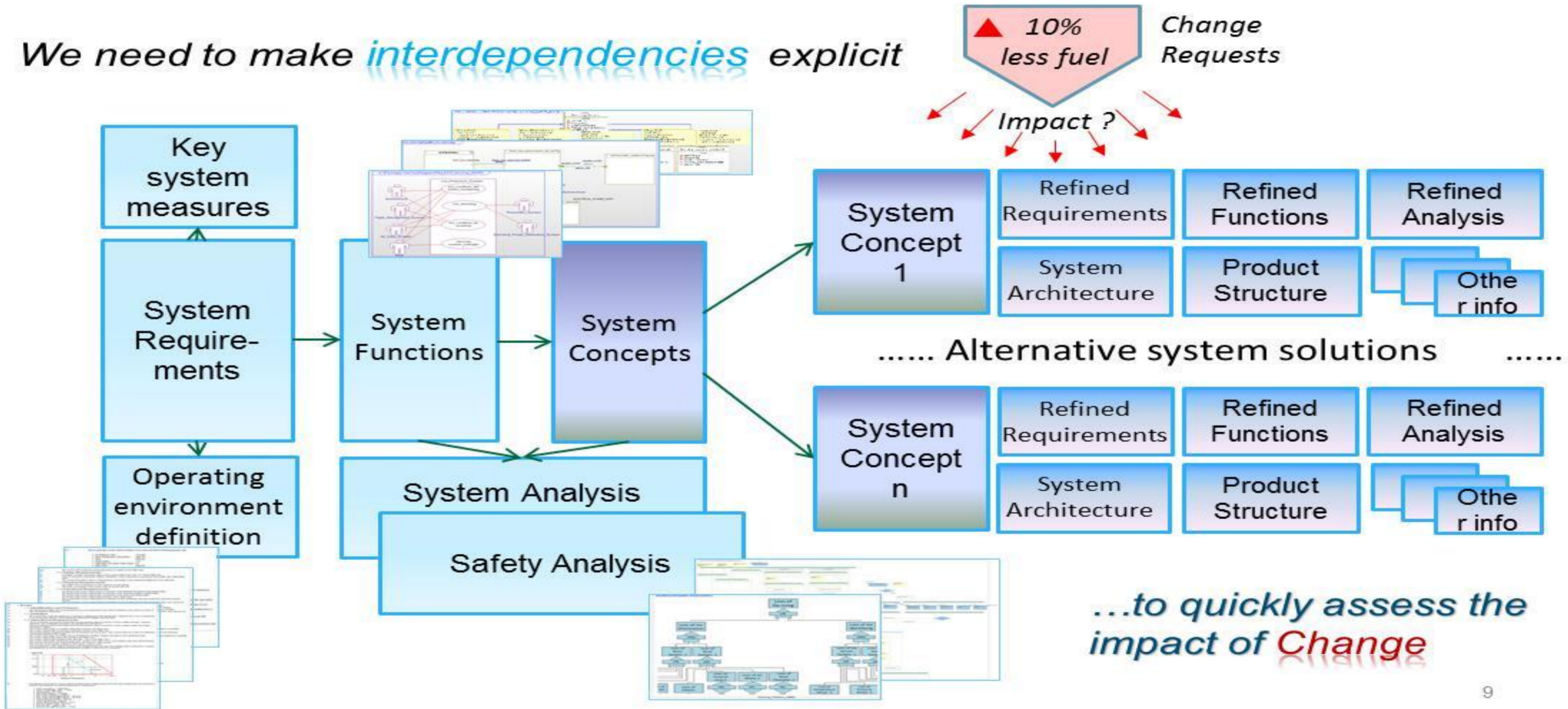


Optimal Solution ?



Change Impact Analysis

We need to make *interdependencies* explicit

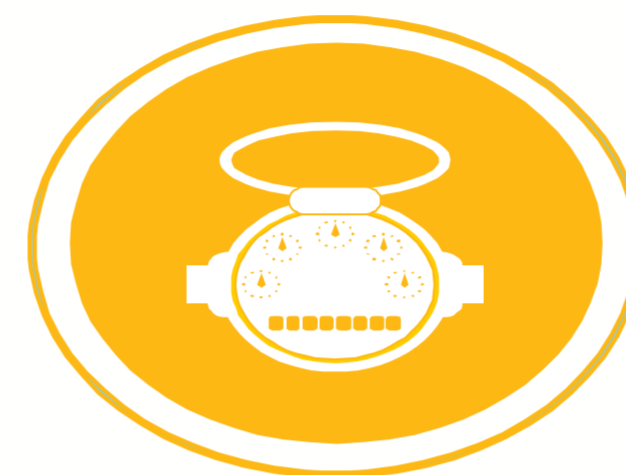


Smarter products mean that complexity is rising



Aerospace and defense

Today's F35 has 10 million lines of code on board, twice the amount on the F-22, another stealth fighter.



Energy and utilities

Smart meters for water utilities will lead to \$29.9 million in sales by 2017 compared with \$10.3 million in 2011.

Automotive

Electronics drives 80 percent of the automotive industry's functional innovation — software is the key to most of it.

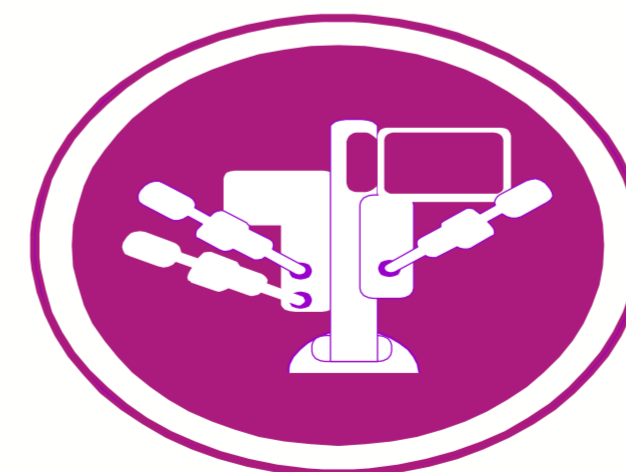


Telecom

Between 2012 - 2016, mobile data traffic will multiply tenfold, with video content acting as the biggest driver.

Electronics

By 2014, 230 million Smart TVs will be installed with 57 million homes watching web-based streams over broadband.



Medical devices

The da Vinci S surgical robotic system:

- 1.4 million lines of code
- Computing power of 7 laptops
- 10,000 individual parts

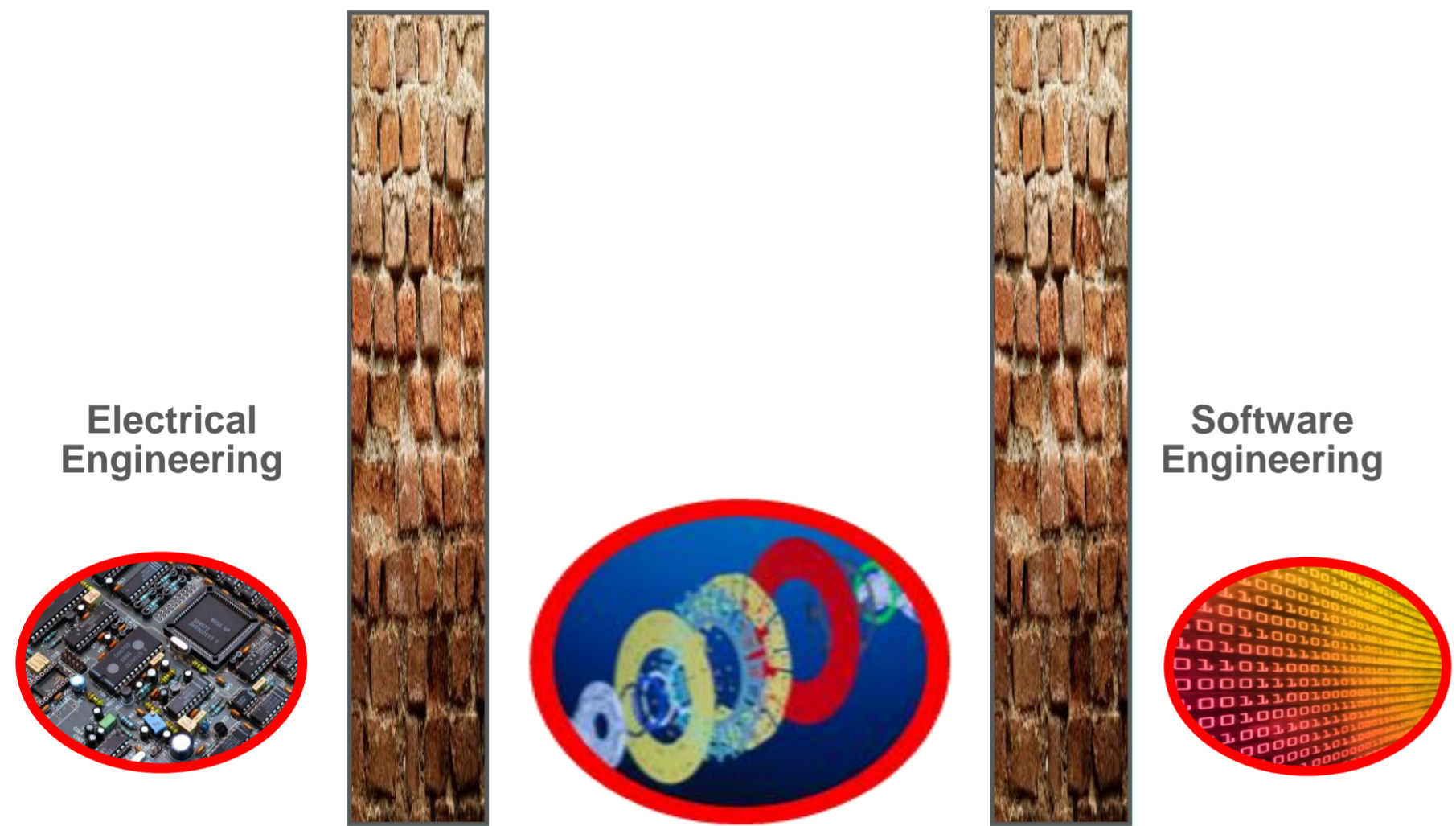
Smarter products require smarter development

Traditional Product & Systems

Development

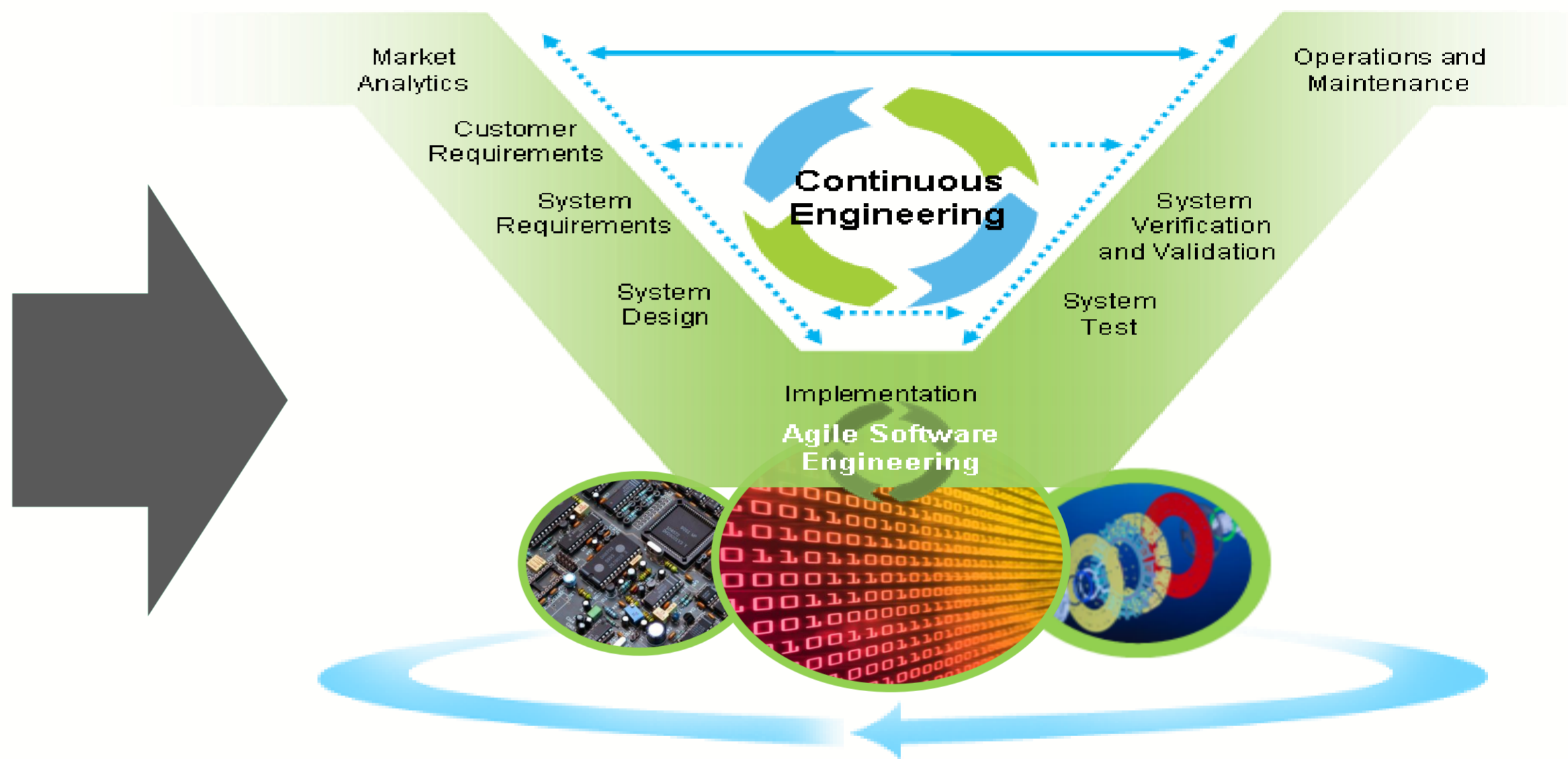
Smarter Product & Systems

Development



Physical Design and Bill of Materials (BoM) Centric Approach

- Silos of engineering disciplines with no connection and visibility of data between disciplines
- Proprietary formats and closed architecture
- Linear, with focus on CAD/CAM and BoM
- Slow to react to change



Integrated Electronic, Mechanical, and Software Engineering

- United engineering teams with access to all engineering information
- Efficiency through strategic re-use and continuous verification
- Systems engineering methods optimize designs and collaboration
- Open standards via Linked Data
- Increased engineering agility



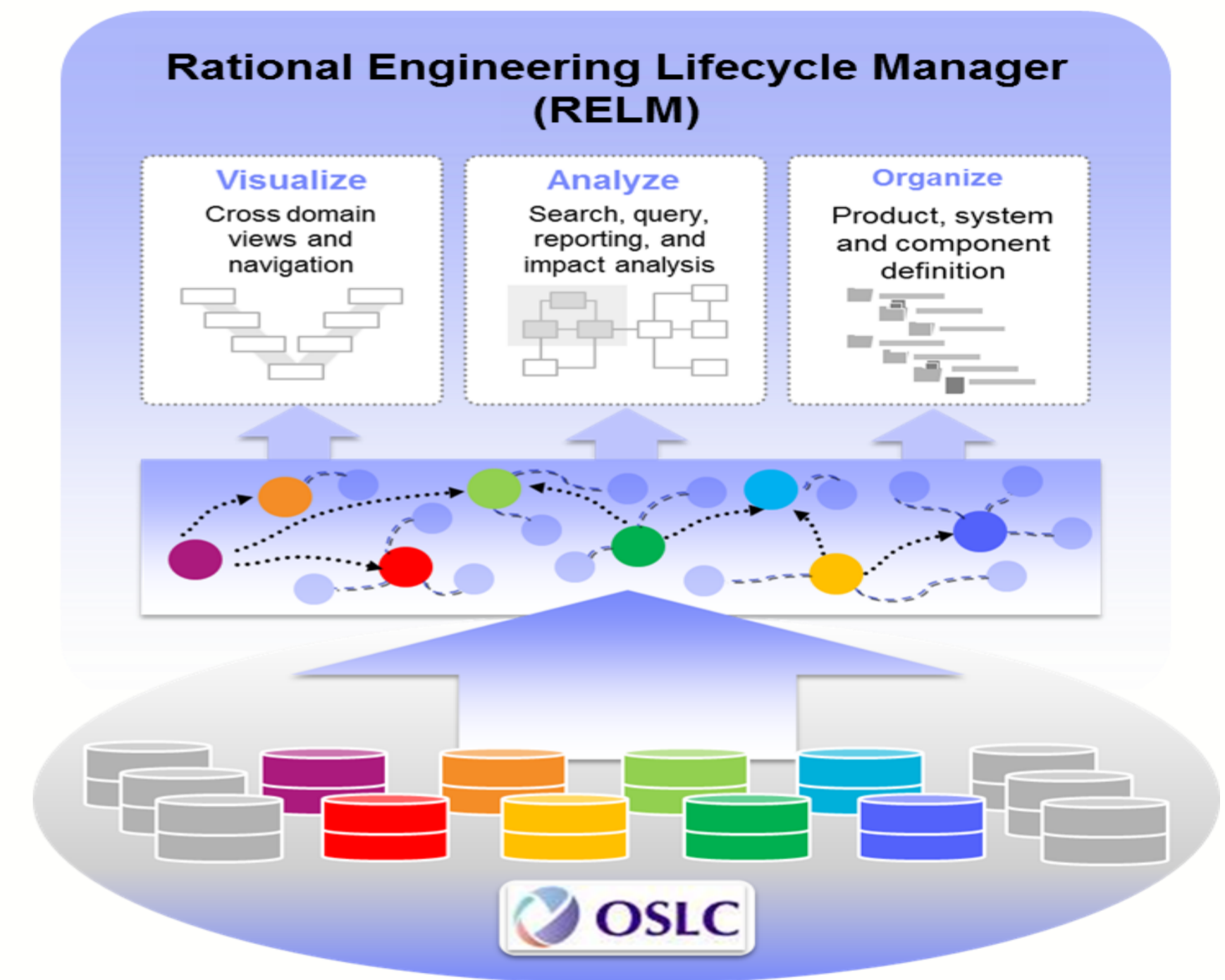
Introducing... Rational Engineering Lifecycle Manager

Extending the Rational solution for systems and software engineering

- Uniting engineering teams through:
 - ✓ **Visibility** – across many engineering disciplines
 - ✓ **Organization** – of information in context
 - ✓ **Analysis** – to answer lifecycle engineering questions

Allows product development teams to:

- Find the right information when it's needed
 - Understand and react to change quickly
 - Gain actionable insights from engineering data
 - Co-ordinate strategic re-use
- With no disruption to current engineering environments

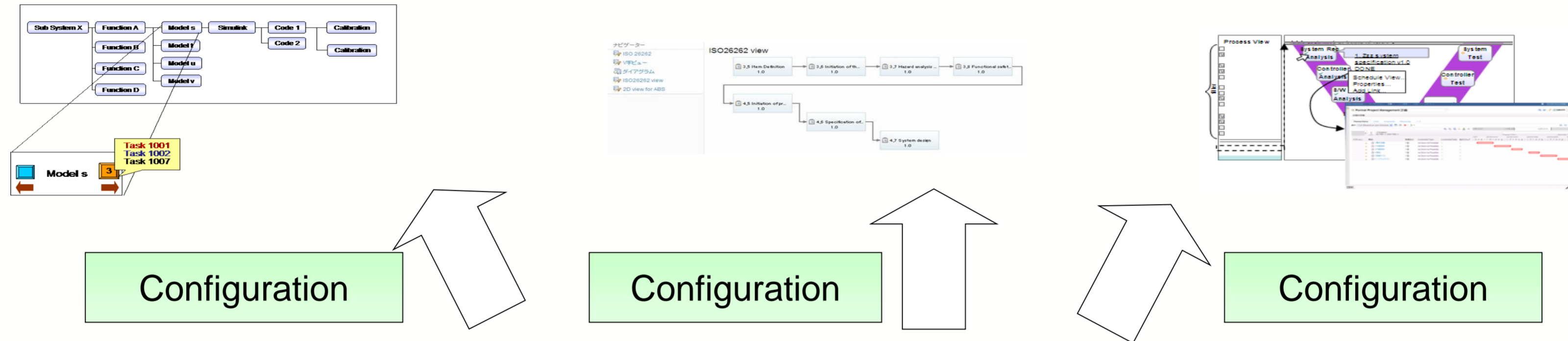


“RELM demonstrates the power of linked data and provides an enterprise a new way to integrate tools and project tasks in one interface.”



IBM Rational Engineering Lifecycle Manager: Lifecycle Query Engine

Views

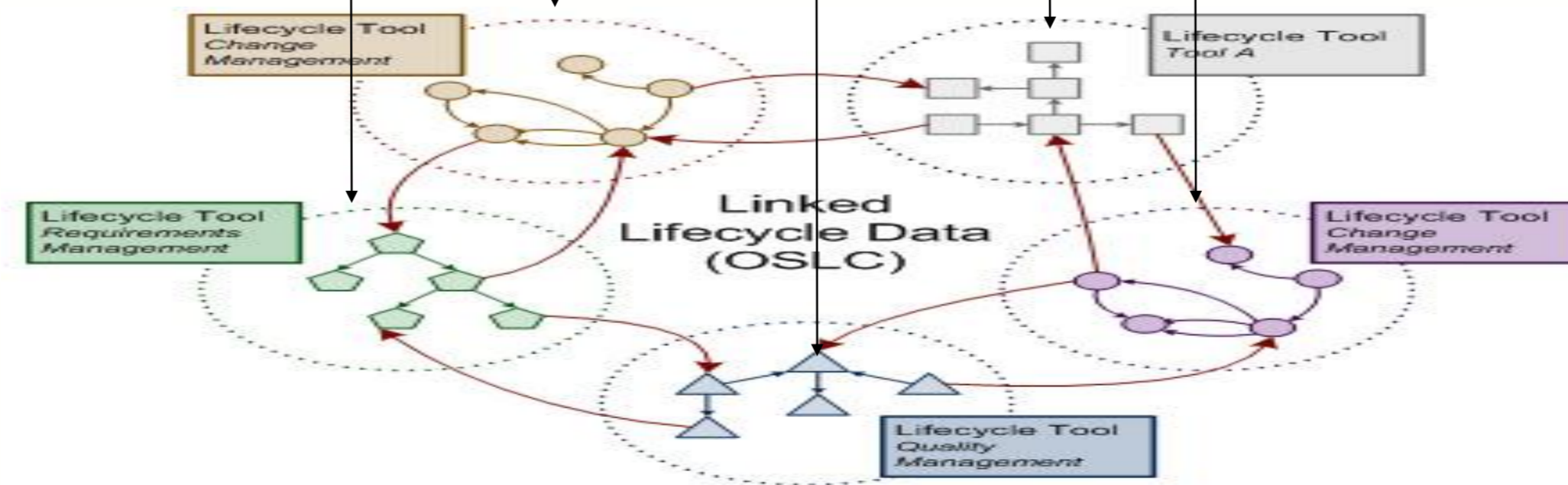


View in Rational Engineering Lifecycle Manager

Query by using SPARQL or full text search









LQE

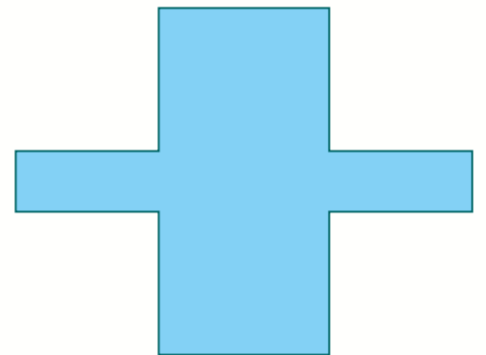
Linked data



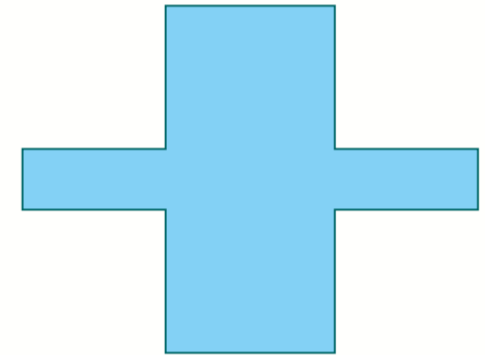


IBM Rational Engineering Lifecycle Manager Data Sources

- Rational DOORS 
-  Rational Team Concert
- Rational DOORS NG 
-  Rational Quality Manager
- Rational Rhapsody 
-  Rational Design Manager
- Rational Asset Manager 
-  Rational Focal Point



Bugzilla



Rational. software

A core set of data sources from IBM Rational

A growing ecosystem of 3rd party data sources

Extensible via open specifications and toolkits

Open & federated, not proprietary & monolithic



Objective:

Demonstrate how RELM leverages on link data for seamless navigation between different IBM engineering applications.

The next video shows:

1 – Navigation from the Overview to the Top Level Functional view to identify from the Top level requirements the linked resources.

2 – Open “Concept View” for a specific Model Element and display the different solution models depending of the different technology.

3 – From the overview:

- opening an analysis view specifically for one solution

- Identify via the linked data, requirements that are linked to specific Model elements, in case those one have to be modified.

4 – Displaying environmental Element for a specific resource and make focus of some 3rd party tools resources.

5 – Test view: For a specific test result, display all related resources.





Objective:

Identify impact of a change request to engineering lifecycle data

The next video shows:

- 1 – Definition of a Change Request (CR) using RTC
- 2 – Link of CR to Source (reason of the CR) and target (main impacted Diagram)
- 3 – RELM view: How would a System Architect discover and analyze the new Change Request:
 - Use of the RELM CR View
 - Go from RELM CR View to the detailed view for the main impacted diagram
- 4 – Use Impact Analysis Diagram.





Objective:

Run a simulation that requires data from different simulation models

- Simulink, Rhapsody, Open Modelica

Scenario:

- Retrieve the power consumption of a De-icing System solution for a flight scenario, and
- Compare this power value with an alternative De-icing solution.

The next video shows how we use RELM:

- 1 – identify the different artefacts involved in the simulation
 - e.g. a Rhapsody model for event-based behavior
 - a Simulink model for the physical behavior of Ice Elimination
 - and Modelica models for determining the creation of Ice
- 2 - Rhapsody with Animation Panel
- 3 - Rhapsody Simulation
 - The Simulation first shows the nominal behavior of the system
 - Then we show dysfunctional behavior





See the videos

01 RELM overview

[https://www.youtube.com/watch?feature=player_embedded
&v=DBQAJGu3BAo](https://www.youtube.com/watch?feature=player_embedded&v=DBQAJGu3BAo)

02 CR process

[https://www.youtube.com/watch?feature=player_embedded
&v=bRnS2Aq-gB8](https://www.youtube.com/watch?feature=player_embedded&v=bRnS2Aq-gB8)

03 – Integrated Simulation

[https://www.youtube.com/watch?feature=player_embedded
&v=msjOWwpOkDI](https://www.youtube.com/watch?feature=player_embedded&v=msjOWwpOkDI)

Change Impact Analysis based on Linked Data

At: <https://www.youtube.com/watch?v=zeFiGSwMsUc>



Questions



Thanks