

Unite Engineering Teams

Open Standards and OSLC

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10 Sept 2014

Smarter products mean that complexity is rising

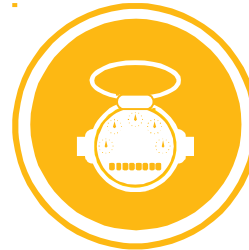
Aerospace and defense

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.



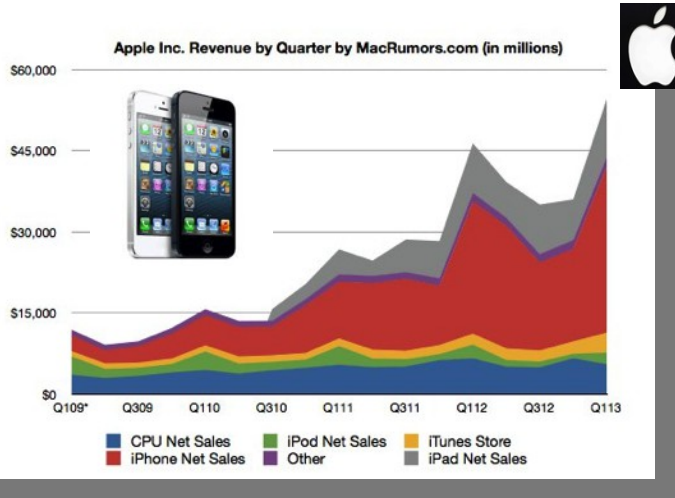
Medical devices

The da Vinci S surgical robotic system:

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



The value of being right has never been greater



Galaxy S - 20 million units
Galaxy S II - 40 million units
Galaxy S III - 50 million units
Samsung Galaxy S IV sales expected to pass 100 million



and the cost of being wrong has never been greater...

THE WALL STREET JOURNAL March 26, 2012
BMW Recalling 1.3 Million Cars To Fix Electrical Flaw



CNNMoney October 10, 2012
A Service of CNN, Fortune & Money

Toyota recalls 7.43 million cars



Bloomberg Jan 28, 2013

Boeing Risks \$5 Billion in Revenue on 787 Probe's Outcome



The New York Times

On 25 May 2012, an uncrewed variant of SpaceX Dragon became the first commercial spacecraft to successfully attach to the International Space Station

First Private Craft Docks With Space Station



"At Apple, we strive to make world-class products that deliver the best experience possible to our customers. With the launch of our new Maps last week, we fell short on this commitment. We are extremely sorry for the frustration this has caused our customers and we are doing everything we can to make Maps better."

Tim Cook
Apple's CEO



Workers across the enterprise, including engineering, spend a lot of time (not) finding information

Knowledge workers spend 15% to 35% of their time searching for information

40% of corporate users report that they cannot find the information they need to do their jobs

50% of most intranet searches are abandoned

90% of the time that knowledge workers spend in creating new reports is recreating information that already exists

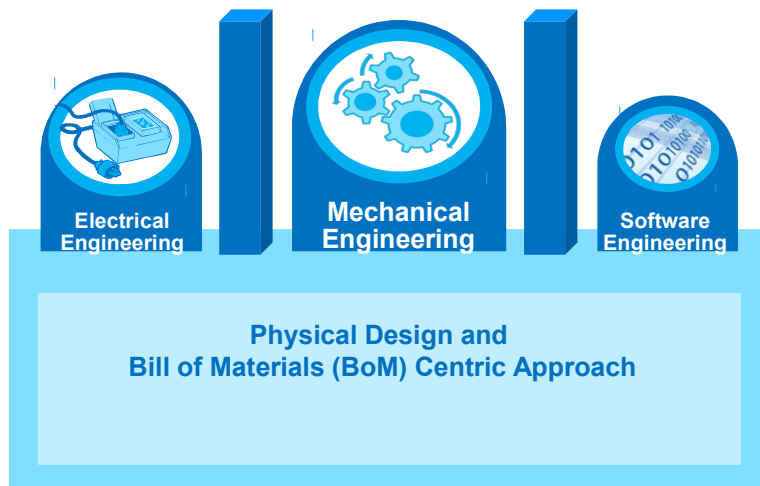
Sources :

<http://www.kmworld.com/Articles/Editorial/Features/The-high-cost-of-not-finding-information-9534.aspx>

Information Gathering in the Electronic Age: The Hidden Cost of the Hunt, The Ridge Group

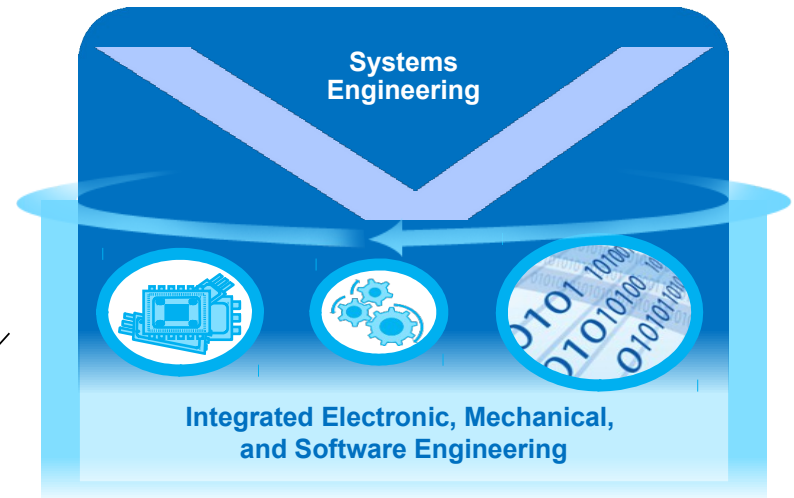
Smarter products won't be developed the same old way

Traditional Product & Systems Development



- Focused on CAD/CAM and BoM
- Slower to react to change
- Silos of engineering disciplines

Next Generation Product & Systems Development



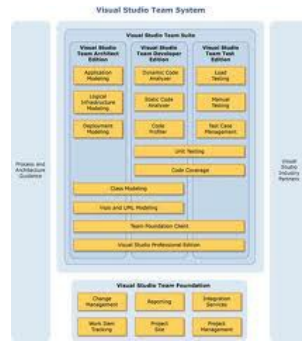
- More focus on software and electronics
- Responsive to change
- Systems engineering methods optimize product designs and engineering collaboration

Need better integration approaches

- Past integration approaches have provided limited choice and coverage.
- Past integration approaches have been disruptive and slow to emerge.

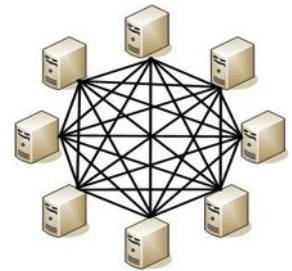
Single repository

“Can I really expect one vendor to provide all the functionality I need? And what about my existing tools?”



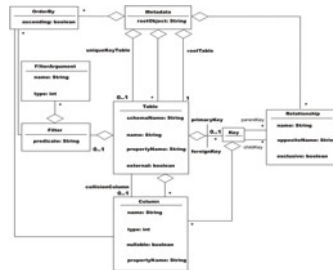
Point-to-point integrations

“How can I ever upgrade one tool without breaking everything else?”



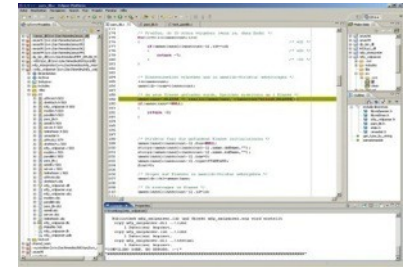
Universal metadata standard

“How did I ever think all those vendors would be able to agree?”



Standard implementations

“Did I really believe that every vendor would rewrite their tools on a single framework?”

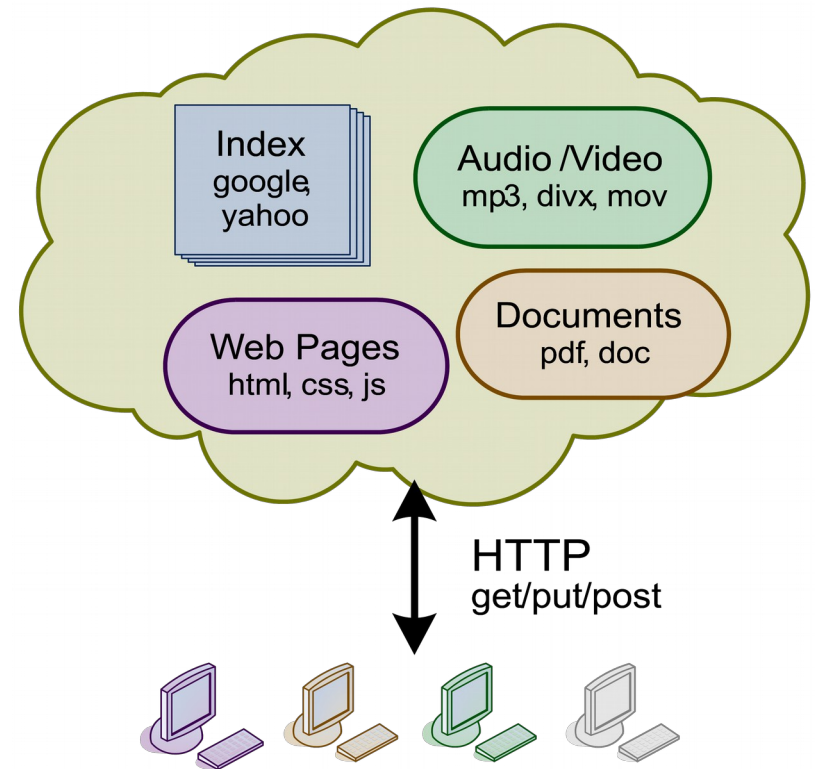


But what is different this time ?



Let's look at something we all know very well ...

- The Internet : distributed and global “data space” of linked documents.
- Enormous content providers
- Simple – adhering to common basic protocols
- Extremely scalable
- Open, Standardized



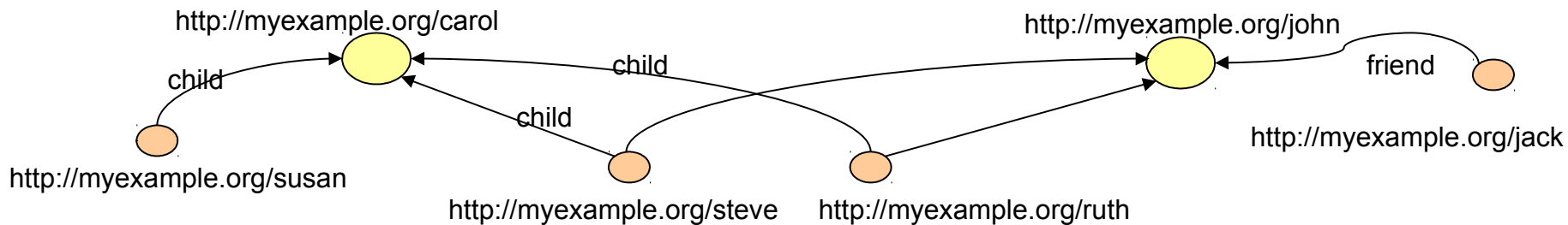
Linked Data



<http://www.w3.org/DesignIssues/LinkedData>

Four simple principles :

1. Use URIs as names for things
2. Use HTTP URIs so that people can look up those names
3. When someone looks up a URI, provide useful information, using standards (e.g. RDF*, SPARQL**, ***REST)
4. Include links to other URIs, so that they can discover more things

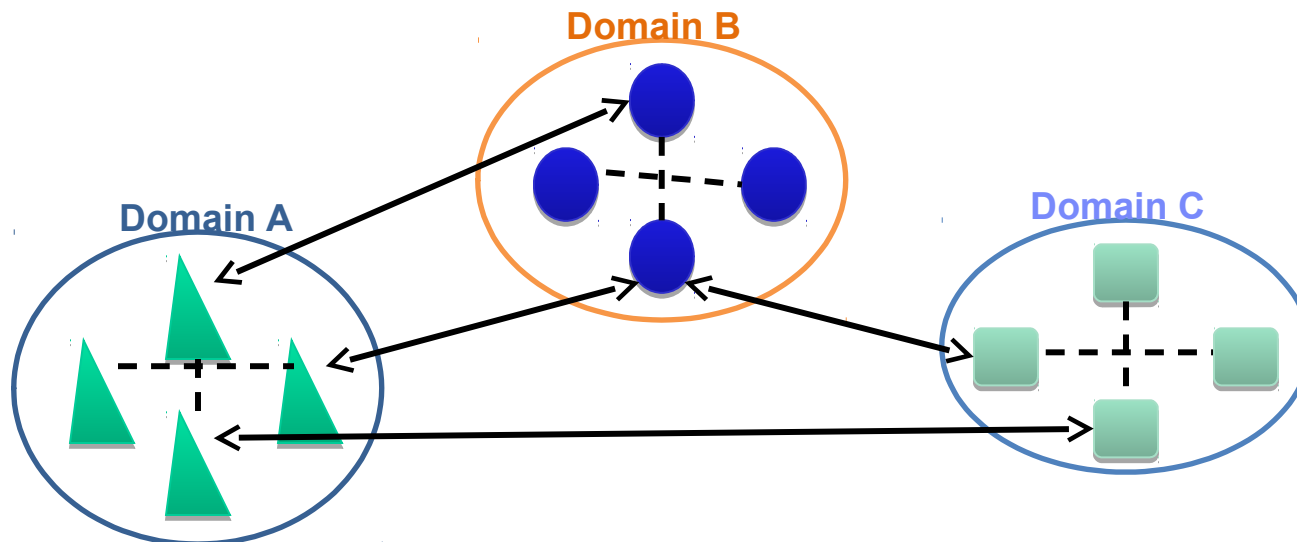
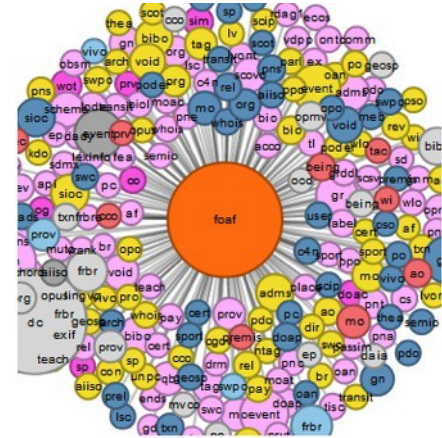


*RDF, the Resource Description Framework provides a generic graph-based data model for describing things, including their relationships with other things.

** SPARQL is a query language able to retrieve and manipulate data stored in RDF format

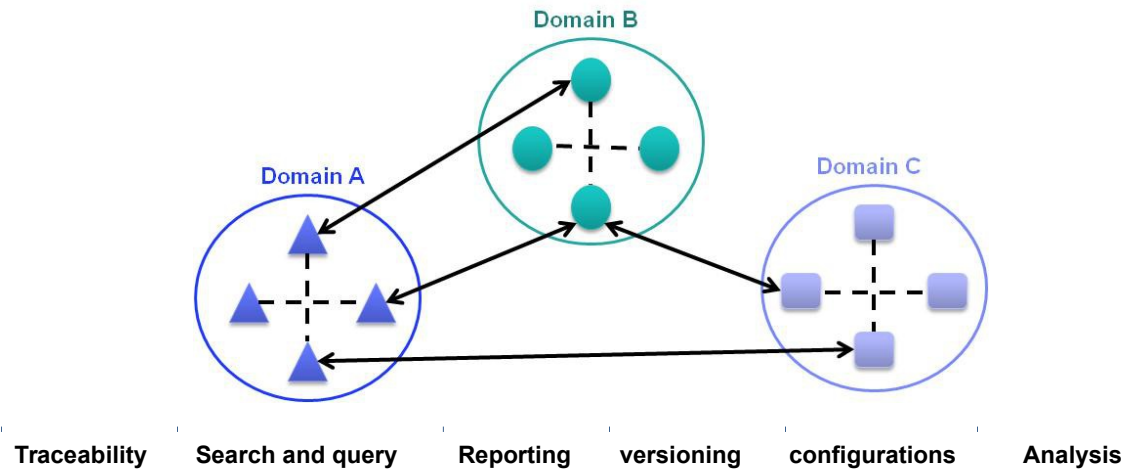
***REST, REpresentational State Transfer (REST) is a style of software architecture for distributed systems where requests and responses are built around the transfer of representations of addressable resources

- Domain is a formal representation of knowledge as a set of concepts within a specific context, and the relationships among those concepts.
- Domain specifications help in unification and standardization of Linked Data sources that are “semantically close”.
 - Prevent duplications
 - Enhance understanding



Integration services

- Linked Data enables variety of “Integration Services”
 - Traceability
 - Search (through indexing)
 - Query
 - Variety of views and analysis techniques
 - Visualizations
 - Impact analysis
 - Cross domain resource management (e.g. versioning)
 - Many more...



Engineering and the Web?



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Engineering environments are highly fragmented

The challenge to connect them is increasing exponentially

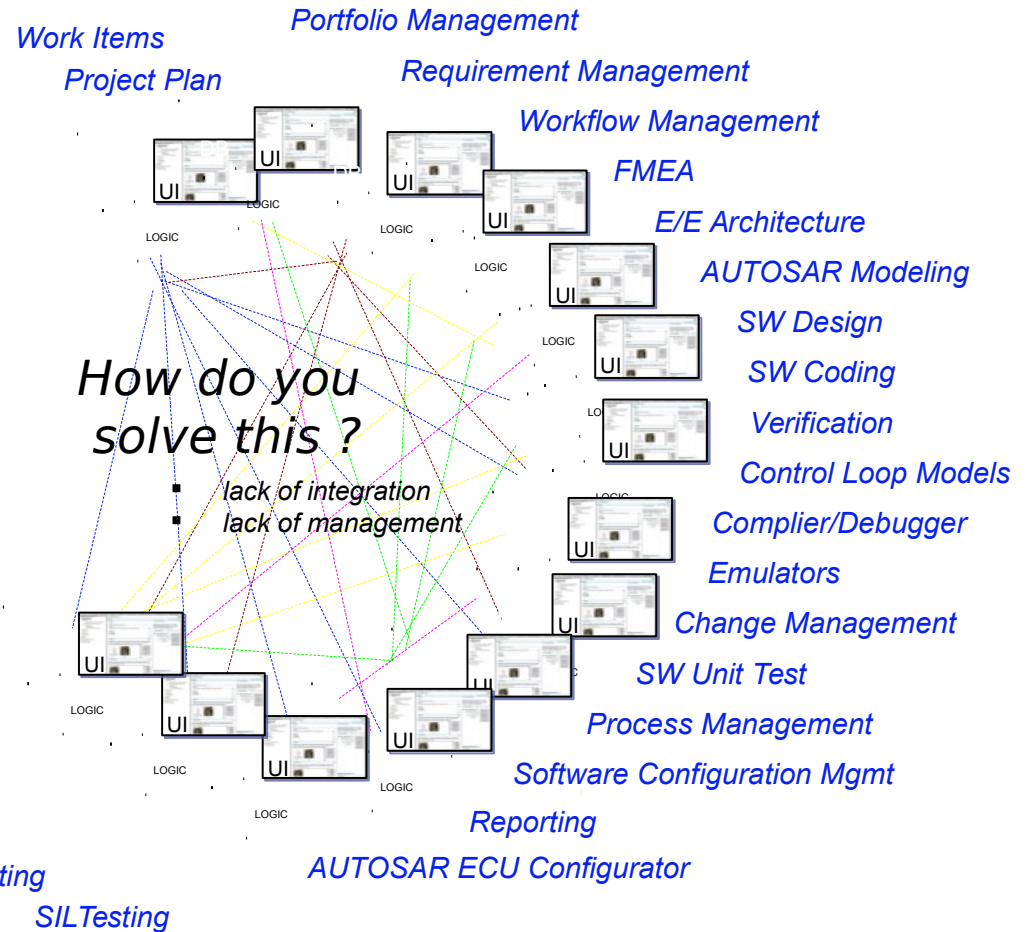
- **Traditionally, each tool came with its own**
 - **UI** - Web and desktop presentations of views and tasks
 - **Logic** – Workflow, process, search, query, scale, security and collaboration
 - **Storage** – individual files on workstation or servers: how to ensure availability and traceability?
-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

Quality
Management

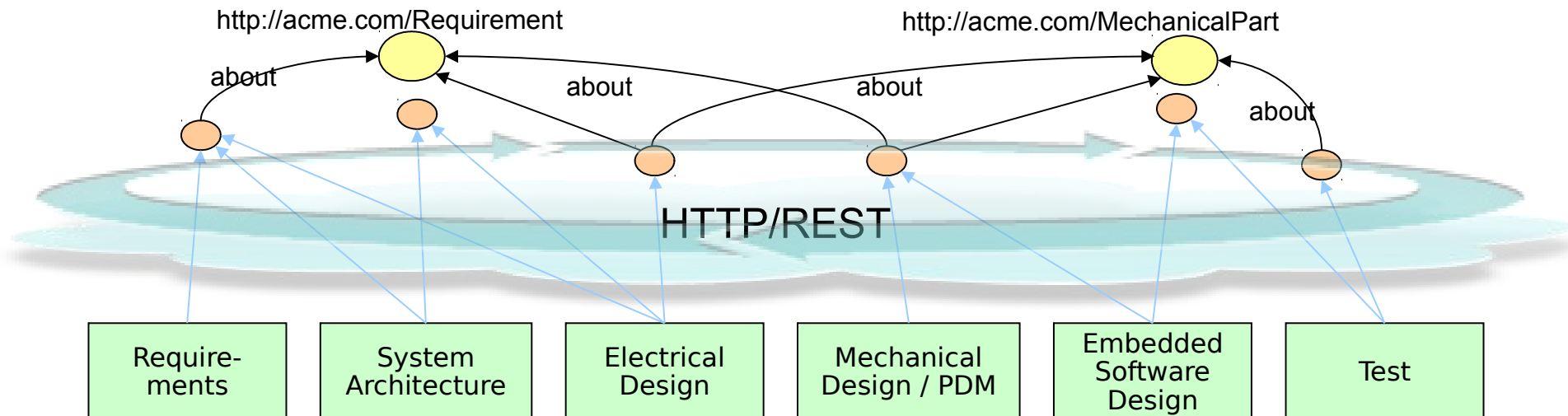
HIL Testing

MIL Testing

SIL Testing

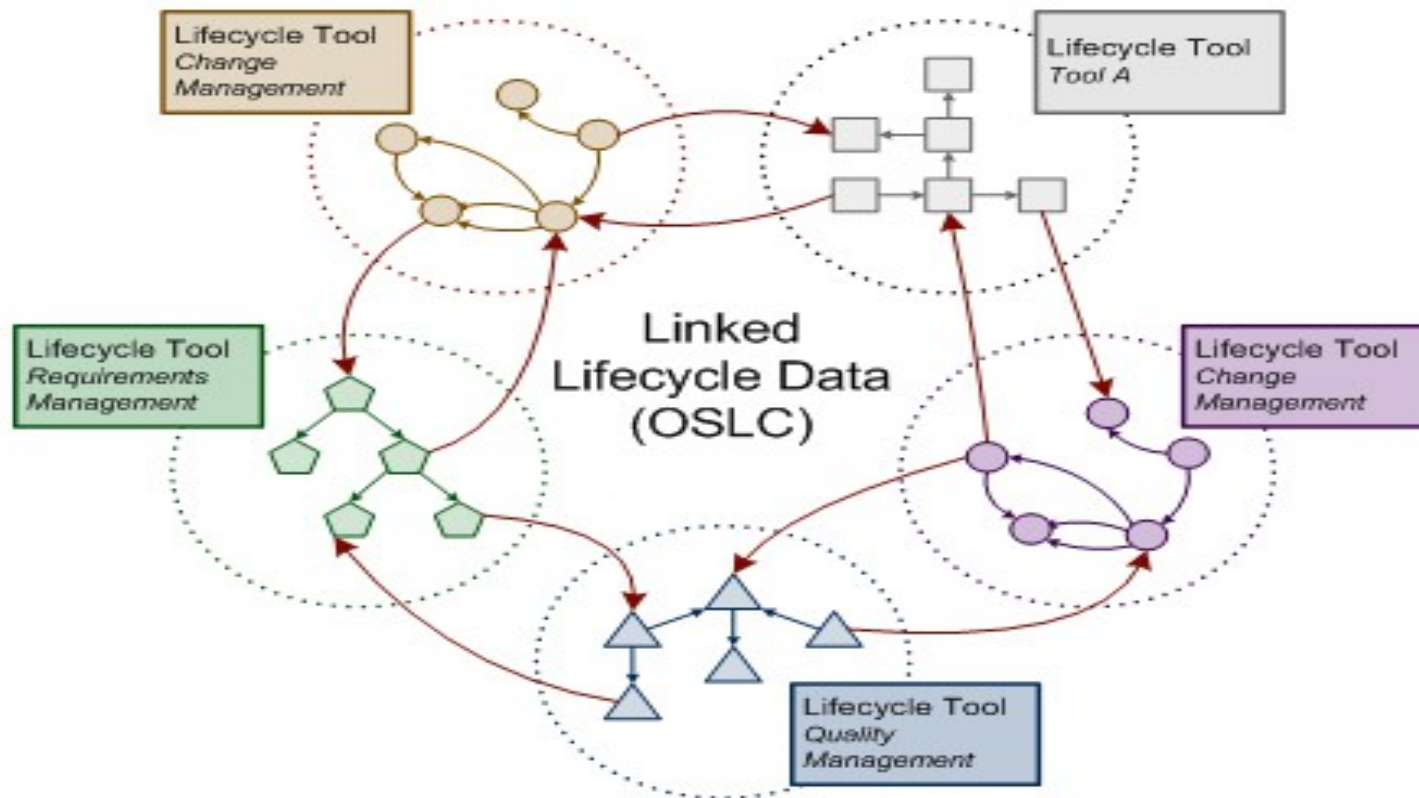


Leveraging the Linked Data concepts of Web Technology



Linking Lifecycle Data via OSLC

Resources from different domain tools are linked together using OSLC



OSLC community

Wide range of
interests,
expertise,
participation

- Vendors, end users, industry consortia
- 40+ organizations have had employees participate in specification development efforts
- Collaborating on solutions for ALM, DevOps, ISM, PLM

Growing list of
implementations
from IBM and
others

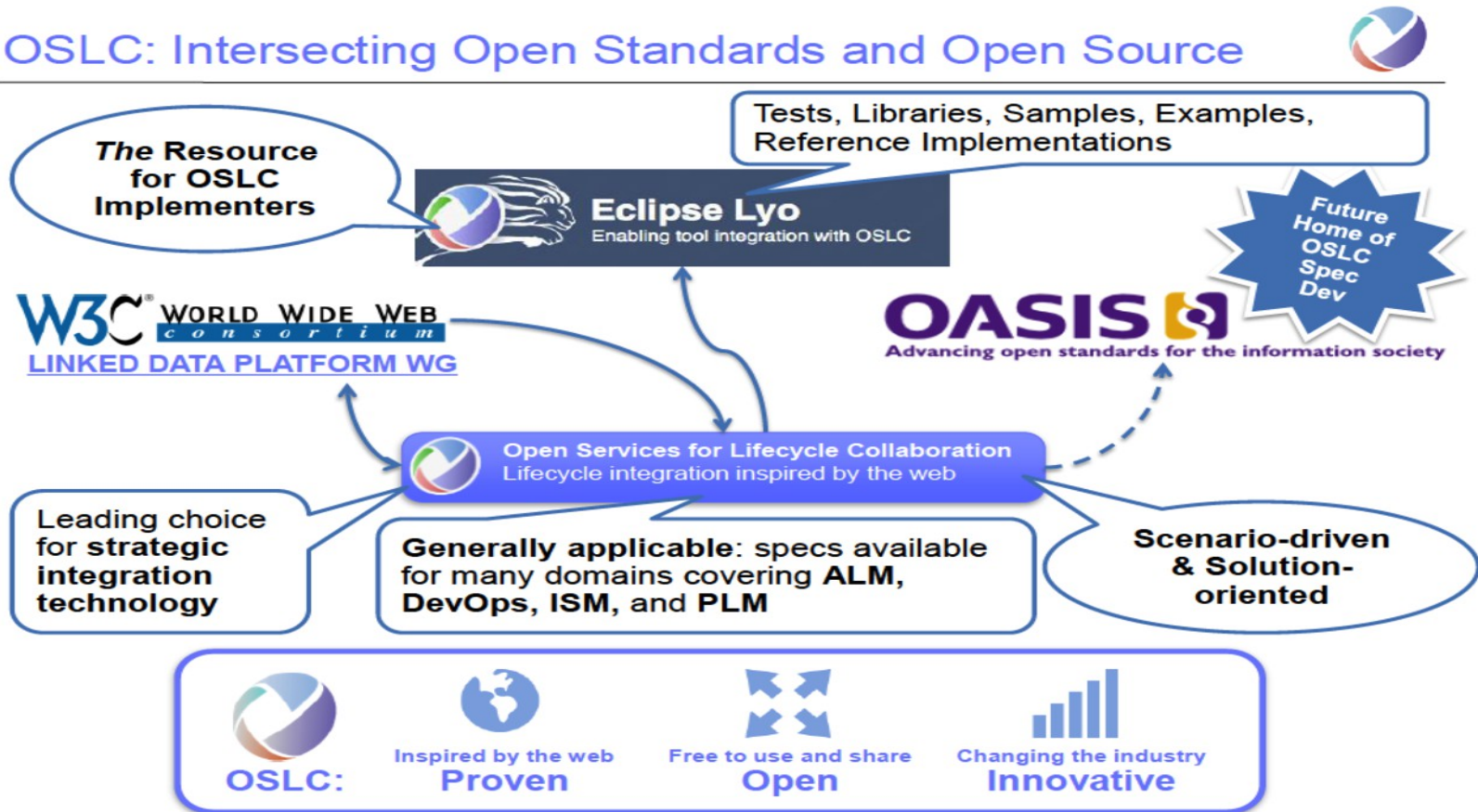
- Implementations from IBM Rational, Oracle, IBM Tivoli and open source
- 3rd party adapters from IBM, Kovair, Tasktop, and open source
- Dozens of end users enabling homegrown tools

Completed and
active
specifications for
many domains

- Change Management, Quality Management, Requirements Management, Asset Management, Architecture Management, Automation
- Product Lifecycle Management, Configuration Management
- Performance Monitoring, Reconciliation

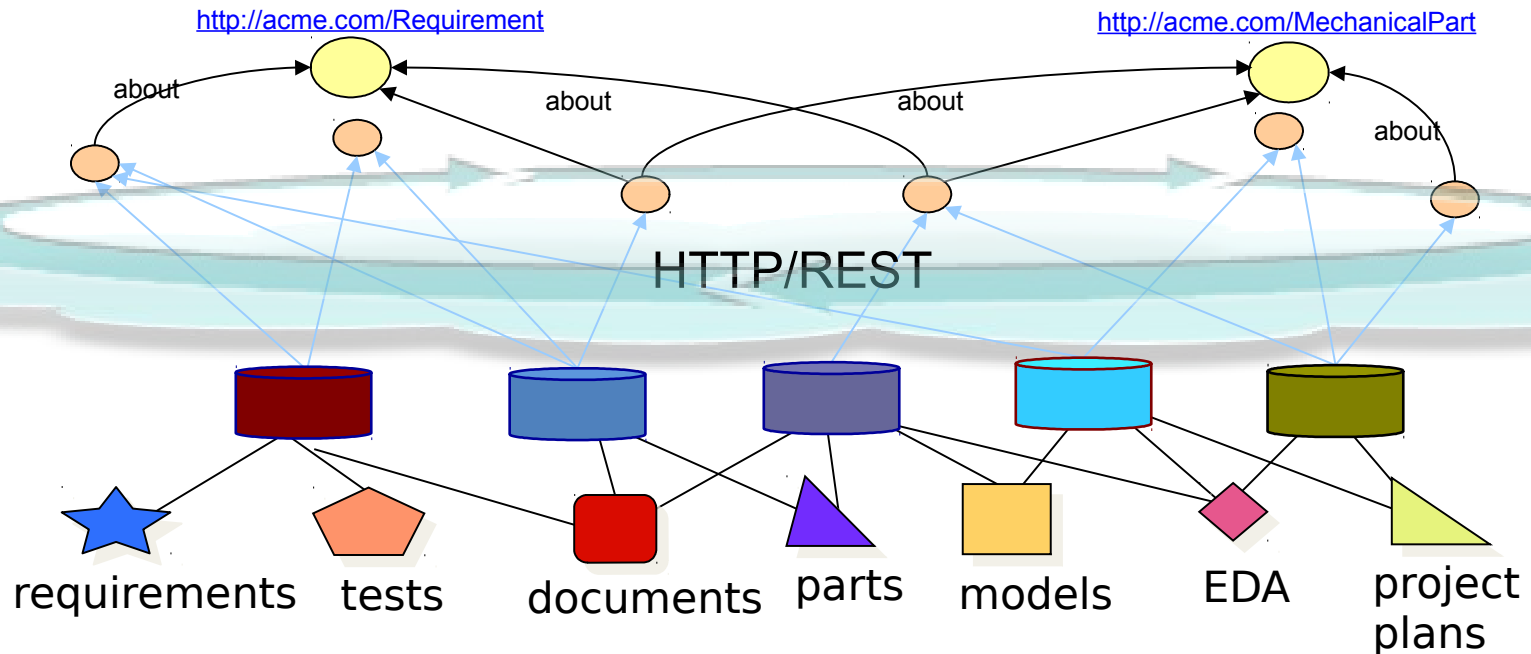
OSLC website at <http://open-services.net>

OSLC: Intersecting Open Standards and Open Source



Smarter development using an Internet inspired architecture

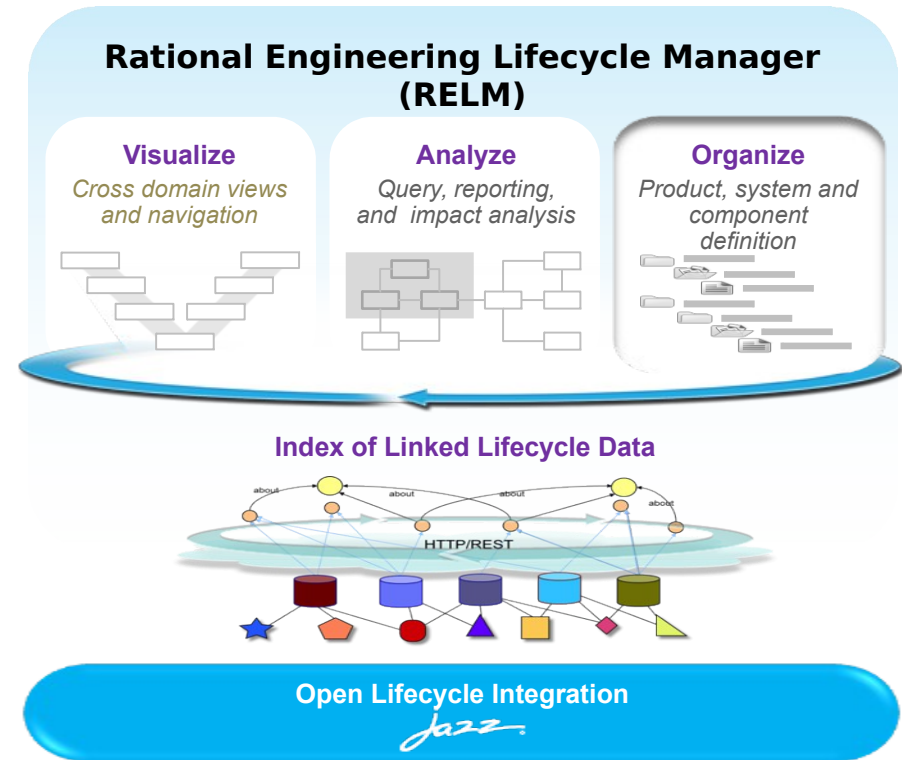
The Web has proven to be the most **scalable**, **open**, and **flexible** integration technology



An Example: Rational Engineering Lifecycle Manager

Extending the Rational solution for systems and software engineering

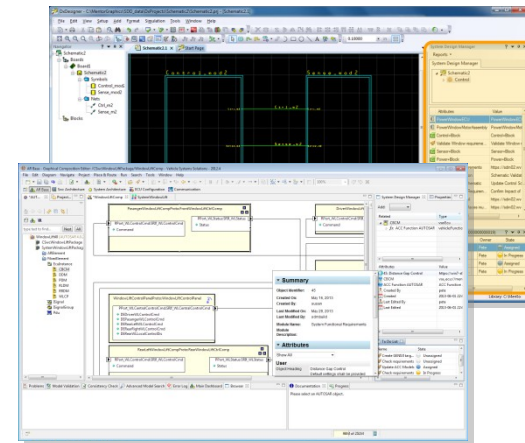
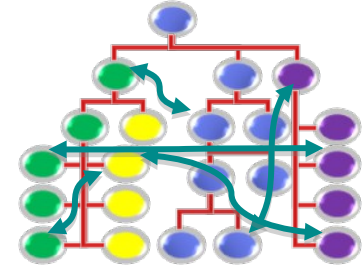
- Uses a Linked Data approach that enables
 - ✓ **Visibility** – across many sources of data
 - ✓ **Organization** – information in context
 - ✓ **Analysis** – answer questions using that contextualized information
- Allows stakeholders to:
 - manage growing complexity
 - derive knowledge from the available data
 - make timely and correct engineering and business decisions



Another Example: Mentor Graphics Context™ SDM

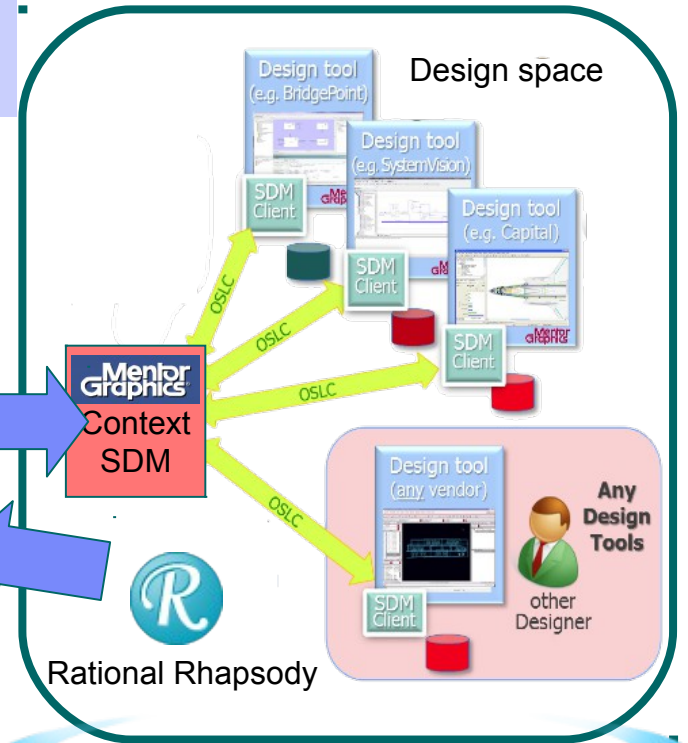
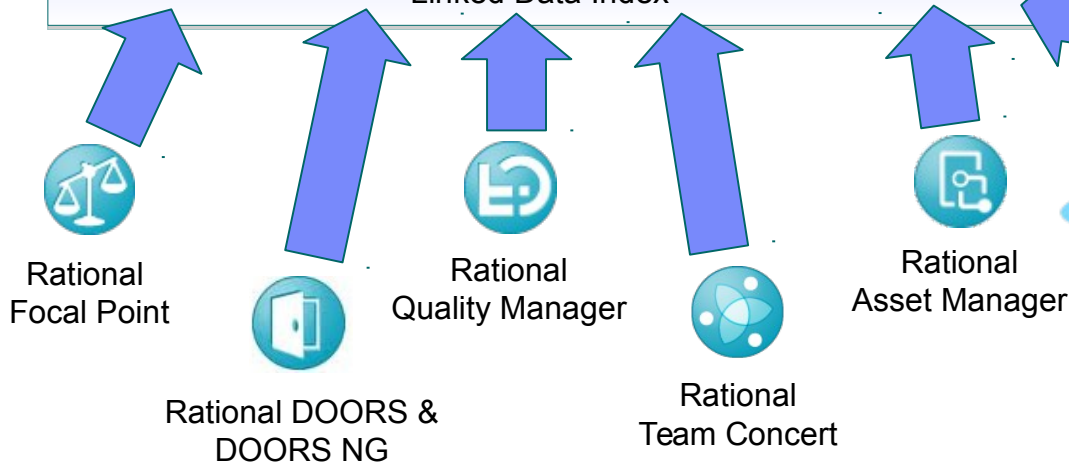
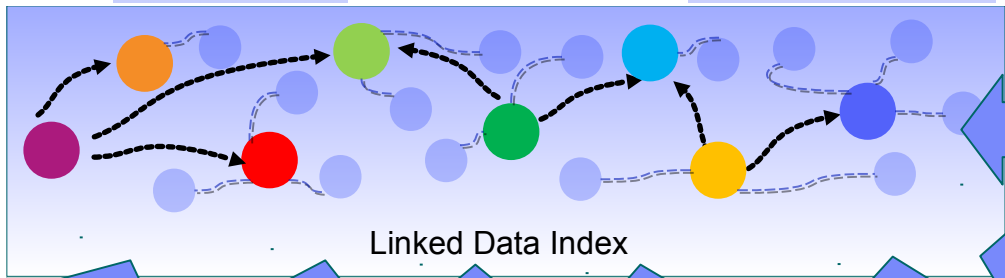
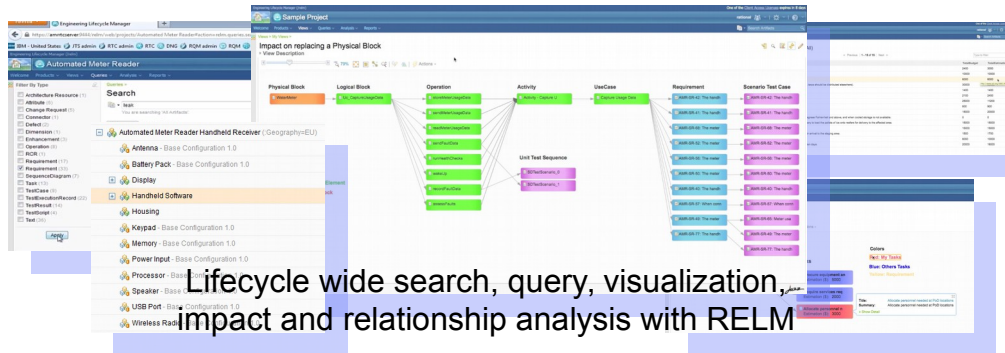
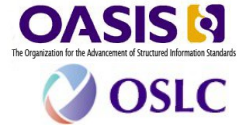
Co-ordinating, managing and automating the E/E Design process

- **An OSLC Portal to manage relationships** between tools throughout design disciplines
 - Coordinate changes across dependencies with workflow support
 - Users can see and interact with artifacts from other engineering disciplines from within their familiar tool environments
- **Enable** product centric traceability, **analytics and reporting**
 - Dynamic real-time visibility of design activity available to all
 - Tight linkage with RELM for lifecycle wide analytics and reporting
 - Support standards compliance needs right through the implementation workflows
- With no disruption to current engineering environments



RELM with Mentor Graphics Context SDM

Extend RELM visibility to include the entire E/E design space



Rational Rhapsody

Manage, co-ordinate and automate the E/E Design Process and activities with Mentor Graphics Context SDM

Smarter Product Development with RELM and Context SDM

Rational software



Rational DOORS



Rational Team Concert



Rational DOORS NG



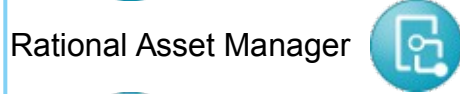
Rational Quality Manager



Rational Rhapsody



Rational Design Manager



Rational Asset Manager



Rational Focal Point

**A core set of data sources
from IBM Rational**

**Mentor
Graphics**



Capital



Volcano



DxDesigner



Expedition



SystemVision

**NATIONAL
INSTRUMENTS**



Bugzilla

MathWorks

**A growing ecosystem of
3rd party data sources**

OASIS

The Organization for the Advancement of Structured Information Standards



OSLC



Eclipse Lyo

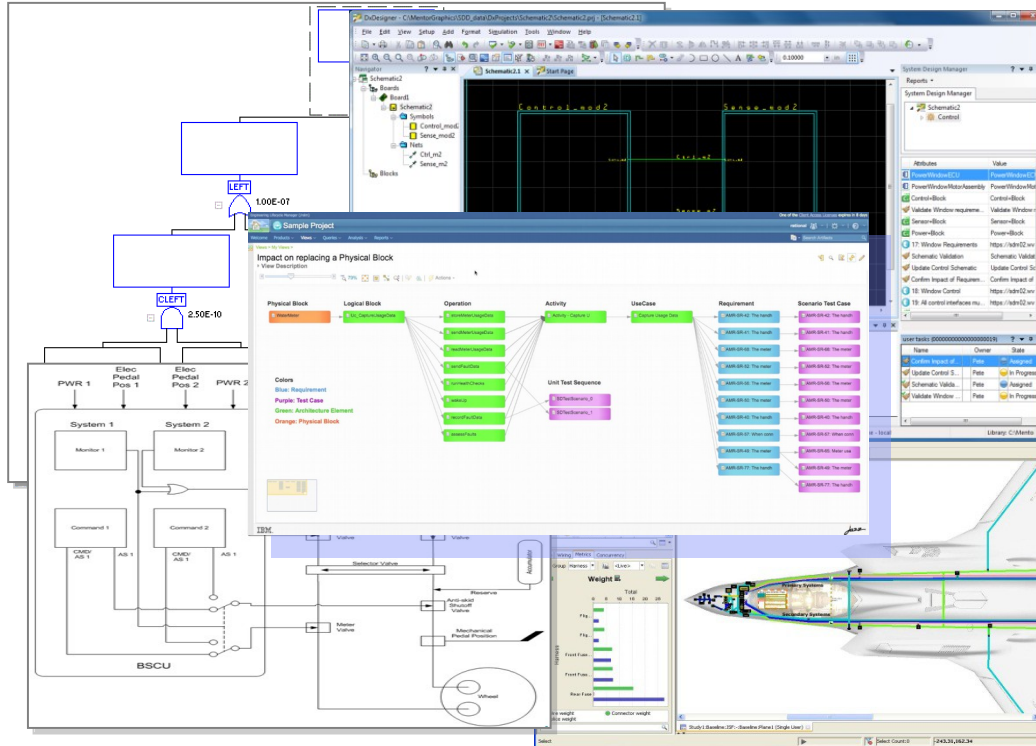
Enabling tool integration with OSLC

eclipse

**Extensible via open
specifications and toolkits**

Open & federated, not proprietary & monolithic

Example Use Case: Aerospace Systems Engineering



Example Scenario

- Sam, the Systems engineer models the system functions and behavior at multiple levels of abstraction using Rhapsody
- Evan, the E/E Engineer creates electrical schematic and harness designs in Mentor Graphics Capital, and links relevant E/E design artifacts to the Rhapsody models using Context SDM
- Because Context SDM exposes E/E artifacts and relationships to RELM, engineers are able to search, query and perform impact analysis from requirements and standards all the way across the lifecycle to E/E implementation.

Additional Examples

“Are we ready to build our new long range variant?”

“Which requirements for the safety analysis are related to tests that failed on their last execution run?”

“Show me everything containing the phrase ‘network’”

“Which open work items are related to requirements, tests or model elements that contain the words ‘fuel control’?”

Thank You!!

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