Augmenting Current Tools and Processes

to increase the productivity of an engineering team

Bill Chown
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GLOBAL PRODUCT DATA INTEROPERABILITY
SUMMIT
2014

ELYSIUM Parker NORTHROP GRUMMAN BOEING

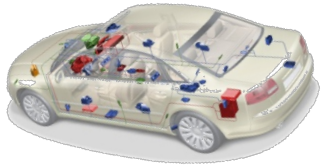
Bill Chown

- **Bill Chown**
  - Product Manager for the System-Level Engineering division at Mentor Graphics, responsible for OSLC-based integrated tool solutions for system design management.
  - Bill has worked as an electronic designer, systems engineer and group leader in both systems and semiconductor companies before joining the EDA vendor community at its inception thirty years ago.
  - He is active in several standards bodies, a board member for the Object Management Group, member of the OASIS OSLC steering committee, a Senior Member of the IEEE, and Secretary of the Cascade Chapter of INCOSE.

System Design Challenges

Dealing with Complexity and Change

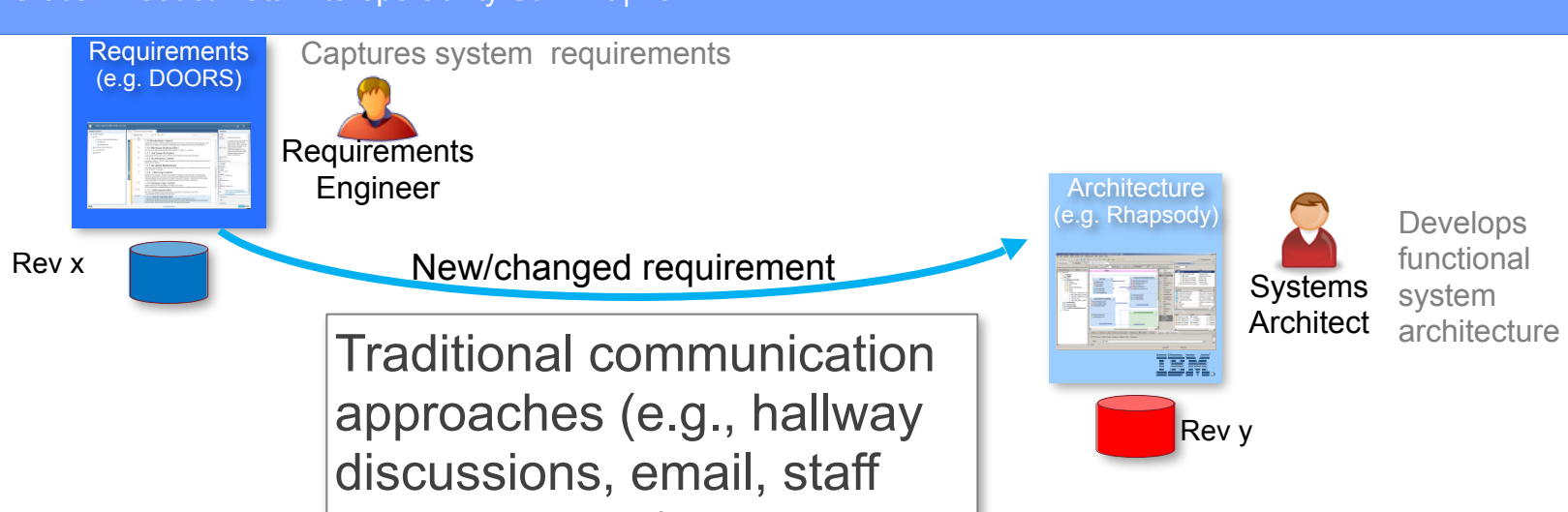
- **Ever increasing and evolving design requirements**
- **Convergence of multiple disciplines in a single system** from requirements through implementation
- **Complicated communication due to** domain-specific tools, file formats, databases, and protocols
- **Inter-divisional or even multi-company supply chains**
- **Literally millions of design artifacts** for even a moderately sized project



A Flow-based Use Case Example for Safety Analysis

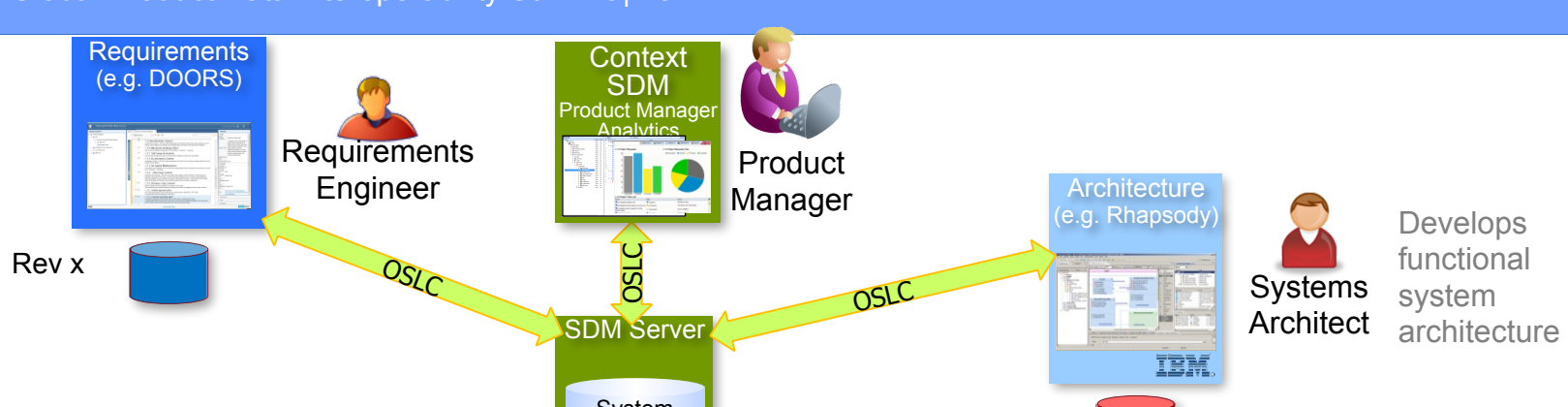
- **Requirements**
  - Typically in “Systems Engineering”
- **System Architecture**
  - Often not the same person[s] in “Systems”
- **Fault Injection Modeling**
  - Representative architecture and hazard simulation
- **Fault Tree Analysis**
  - Traditional logical deductive failure analysis
- **Changes that Permeate Throughout**
  - Demands comprehension of variants across domains

Connecting Across Disciplines



Traditional communication approaches (e.g., hallway discussions, email, staff meetings, etc.)

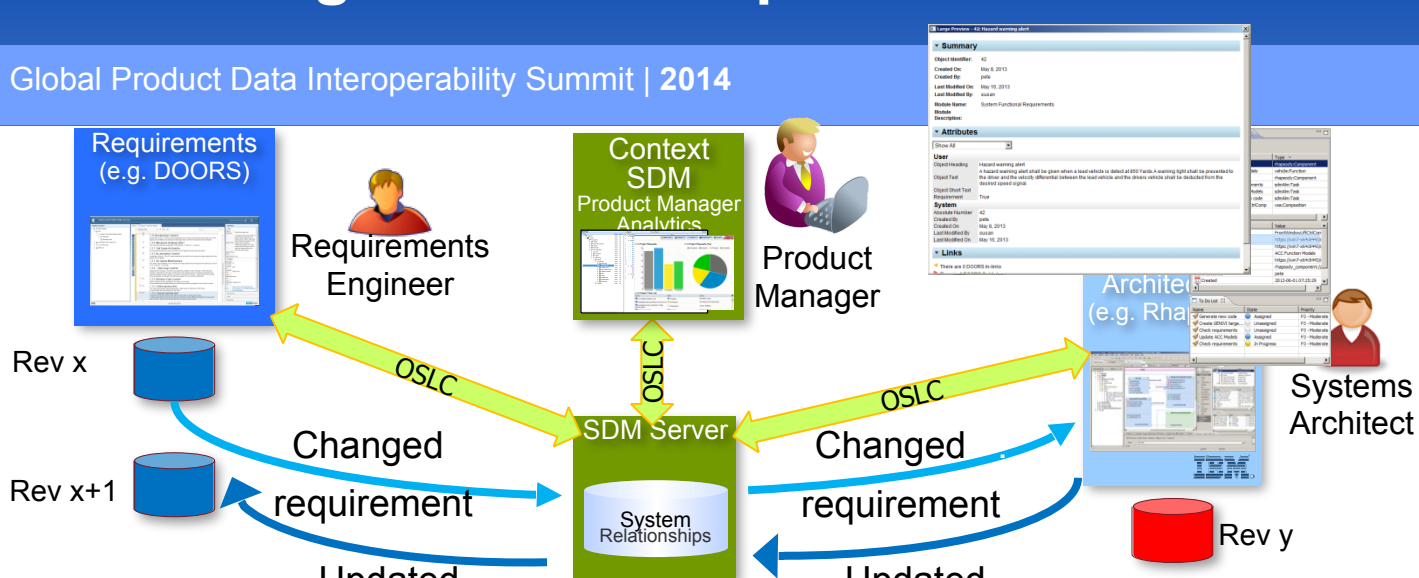
Connecting Across Disciplines



Tool-to-tool communication can automate and integrate

The Context SDM Server acts as a focal point, shares relevant changes, and builds history

Connecting Across Disciplines

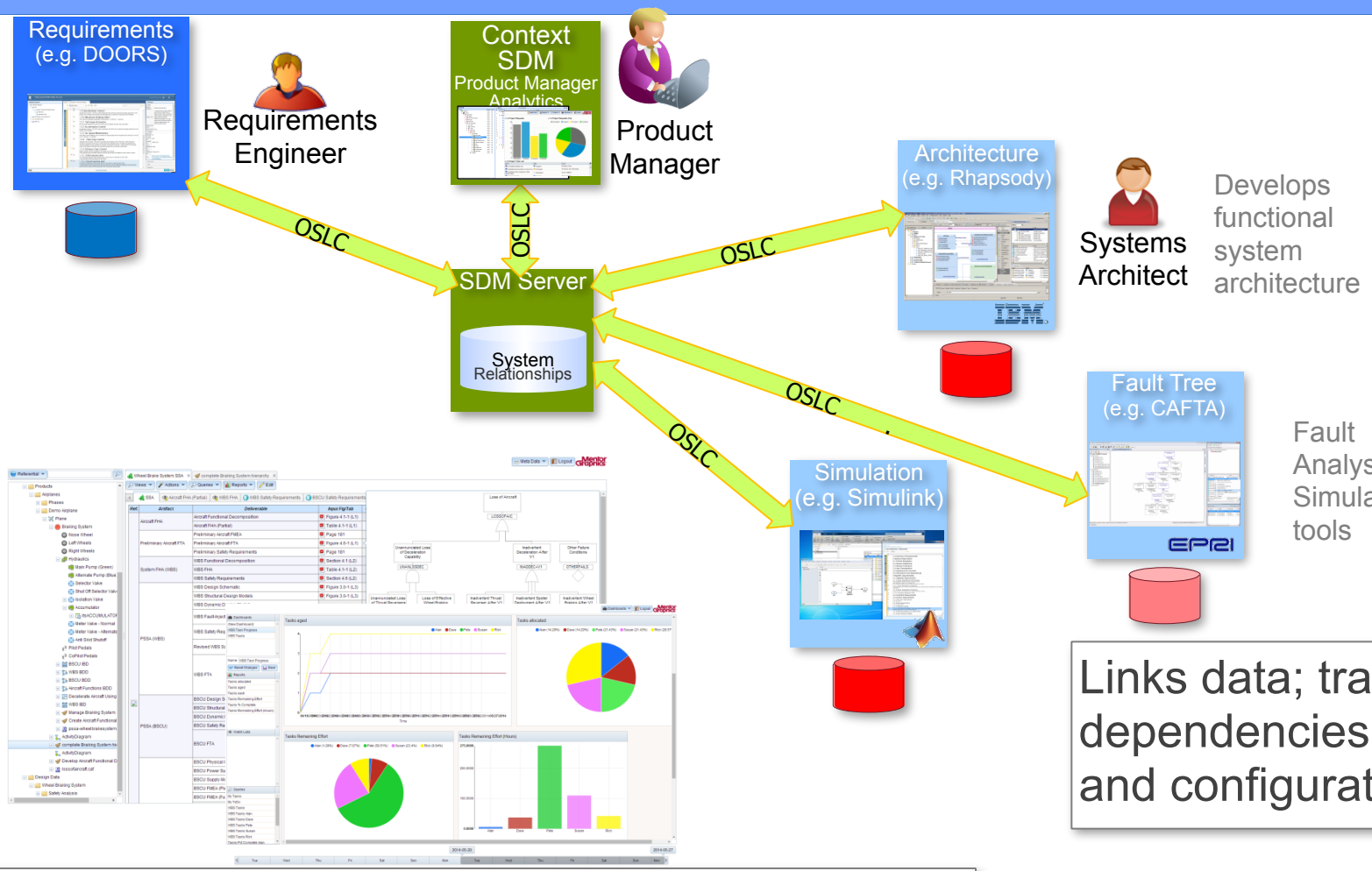


Details shown in the Architecture tool

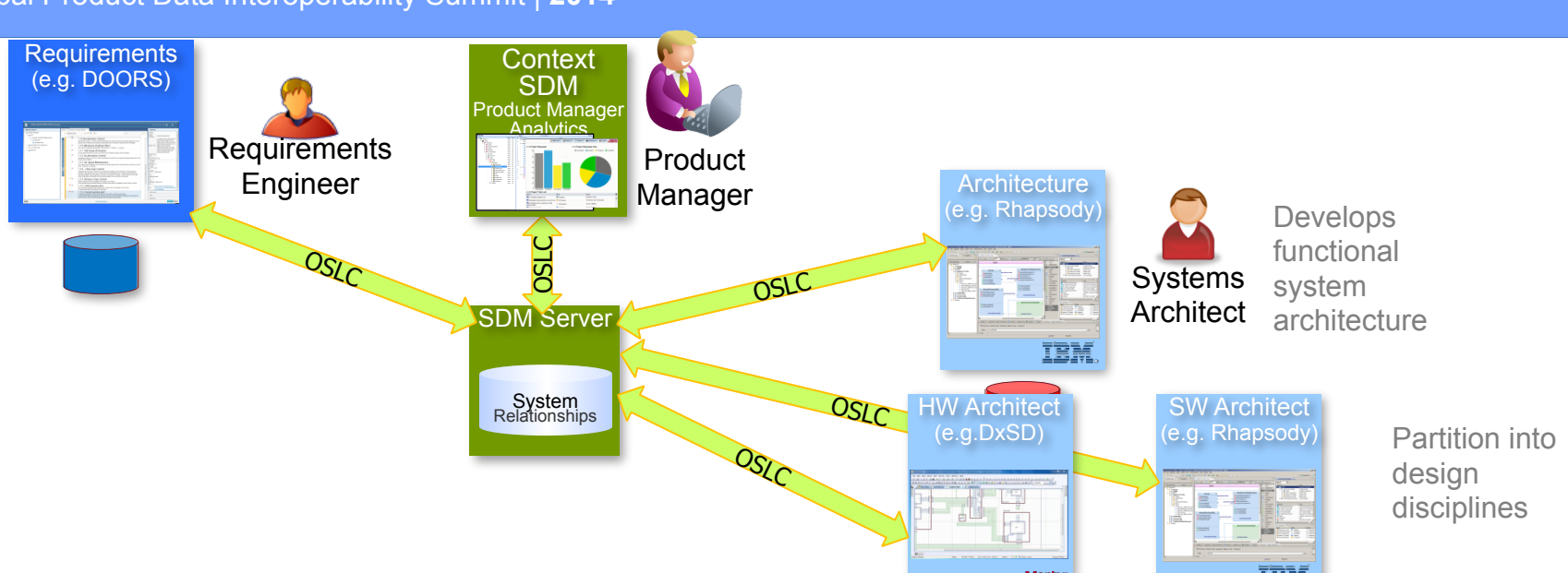
Develops functional system architecture

Incorporates change into architecture

Connecting Across Disciplines



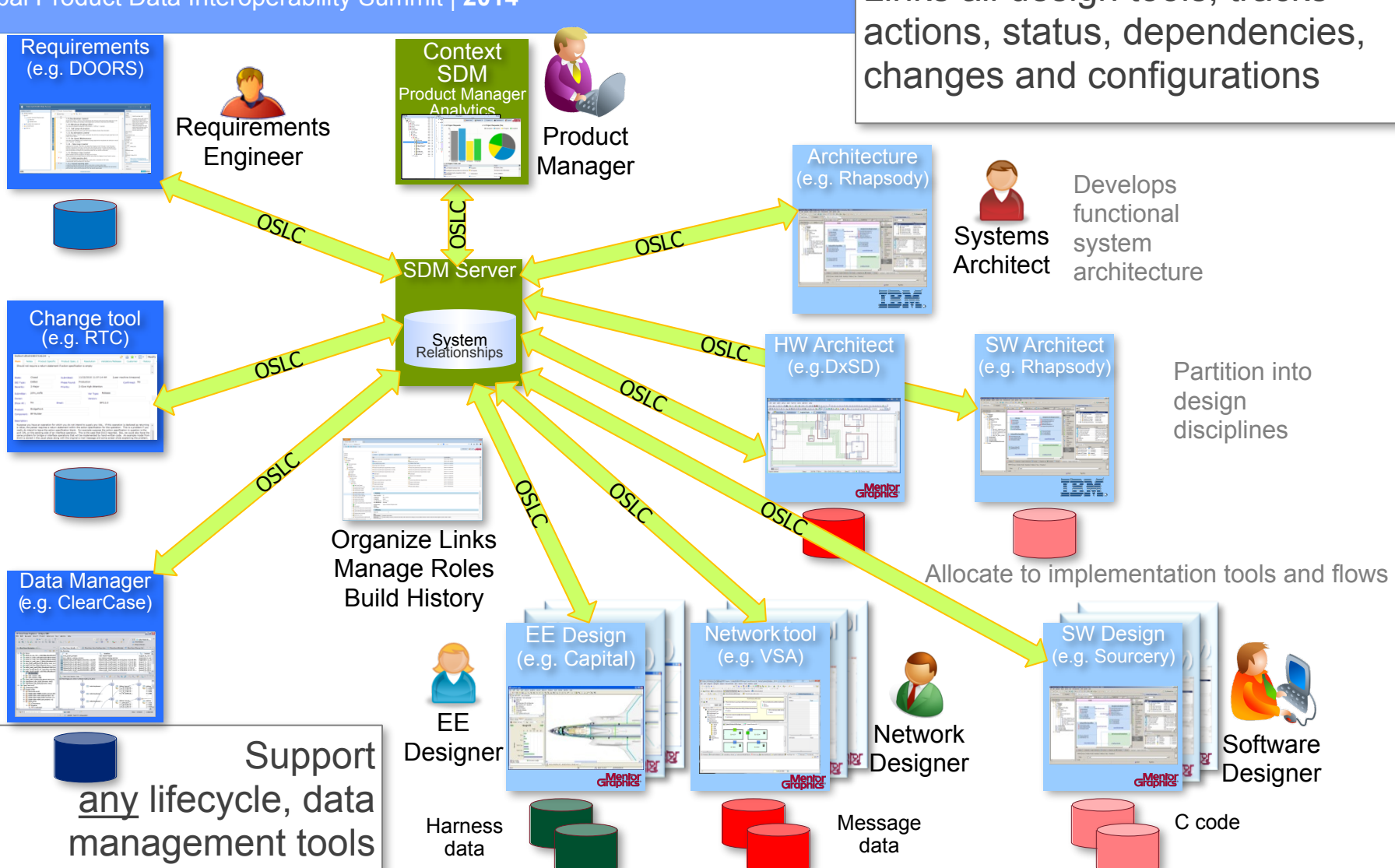
Logical and Physical Architectures



Links data; tracks dependencies, changes and configurations

Logical and Physical Architectures

Links all design tools; tracks actions, status, dependencies, changes and configurations

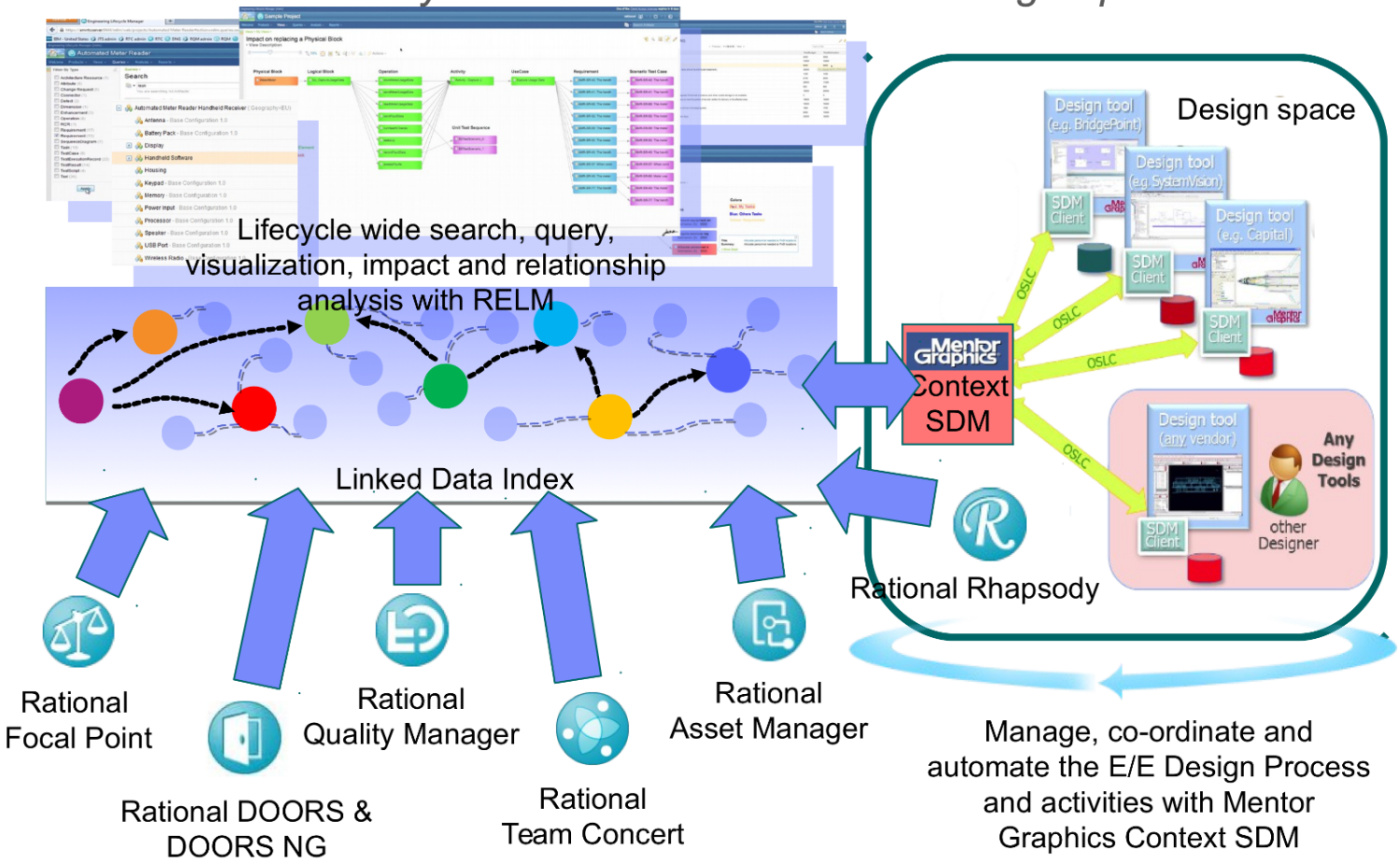


Lifecycle Management for 'Work in Progress'

- **Managing Change**
  - Changing requirements, dependencies, configurations
- **Coordinating Disciplines**
  - Differing schedules, steps, terminology, progress
- **Finding Information**
  - Standards, processes, requirements, dependencies
- **Meeting Standards**
  - Regulatory, process, and corporate needs
- **Proving Process and Traceability**
  - Required by most standards and regulatory bodies
- **Report Status, Standards, Results…**
  - Extracting, abstracting, and organizing information
- **Hand Off to Production**
  - Version & configuration management and tracking

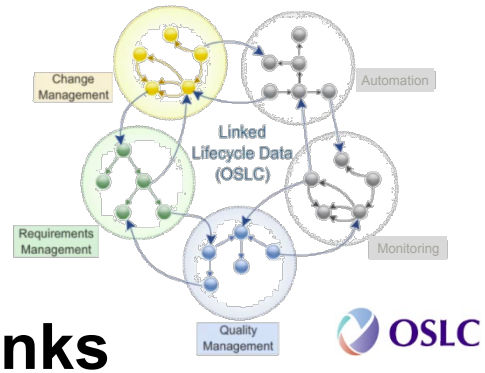
RELM with Mentor Graphics Context SDM

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



Introducing Context™ SDM

- **Management of linked data**
- **Tool-to tool-integration**
- **Standards-based communication**



- **Context Server stores and manages the links**
  - Builds history; enables traceability and reporting
  - Original data remains with original tools and repositories
- **Context SDM plugins augment design tools**
  - Integration available for any Mentor tool
  - Can also support other vendors' or internal design tools

- **Web-based Product Manager accesses data and analytics**
- **OSLC standard connects to other tools**

Scenarios and Use Cases

- **The Project Manager needs …**
  - Visibility and status

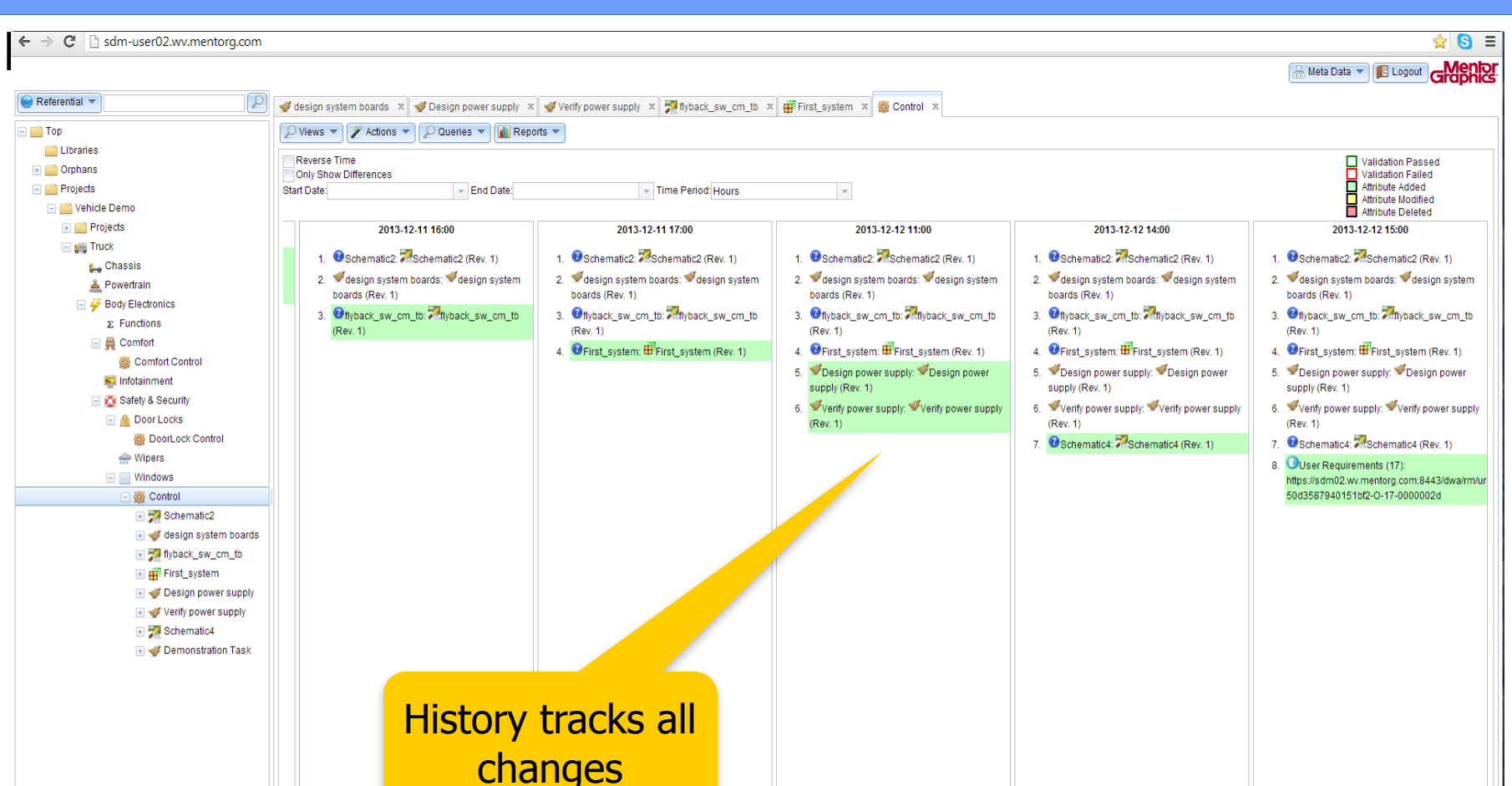
- **Each Designer needs …**
  - Access to relevant information

- **The Safety Analyst needs …**
  - Traceability and auditability

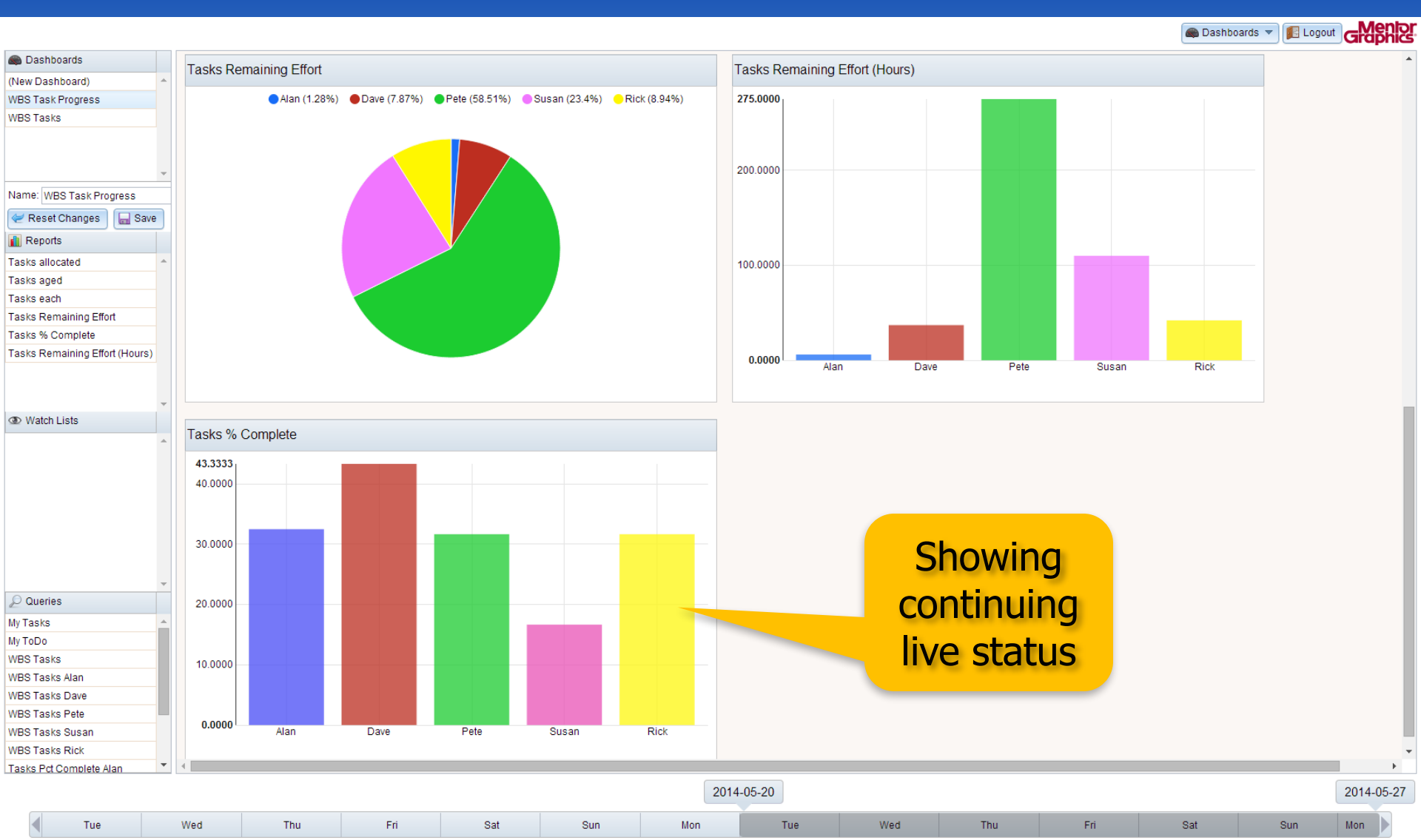
- **The Requirements Engineer needs …**
  - Complete and current data

- **The System Designer needs …**
  - The right product, at the right time

Building Relationships around the Product

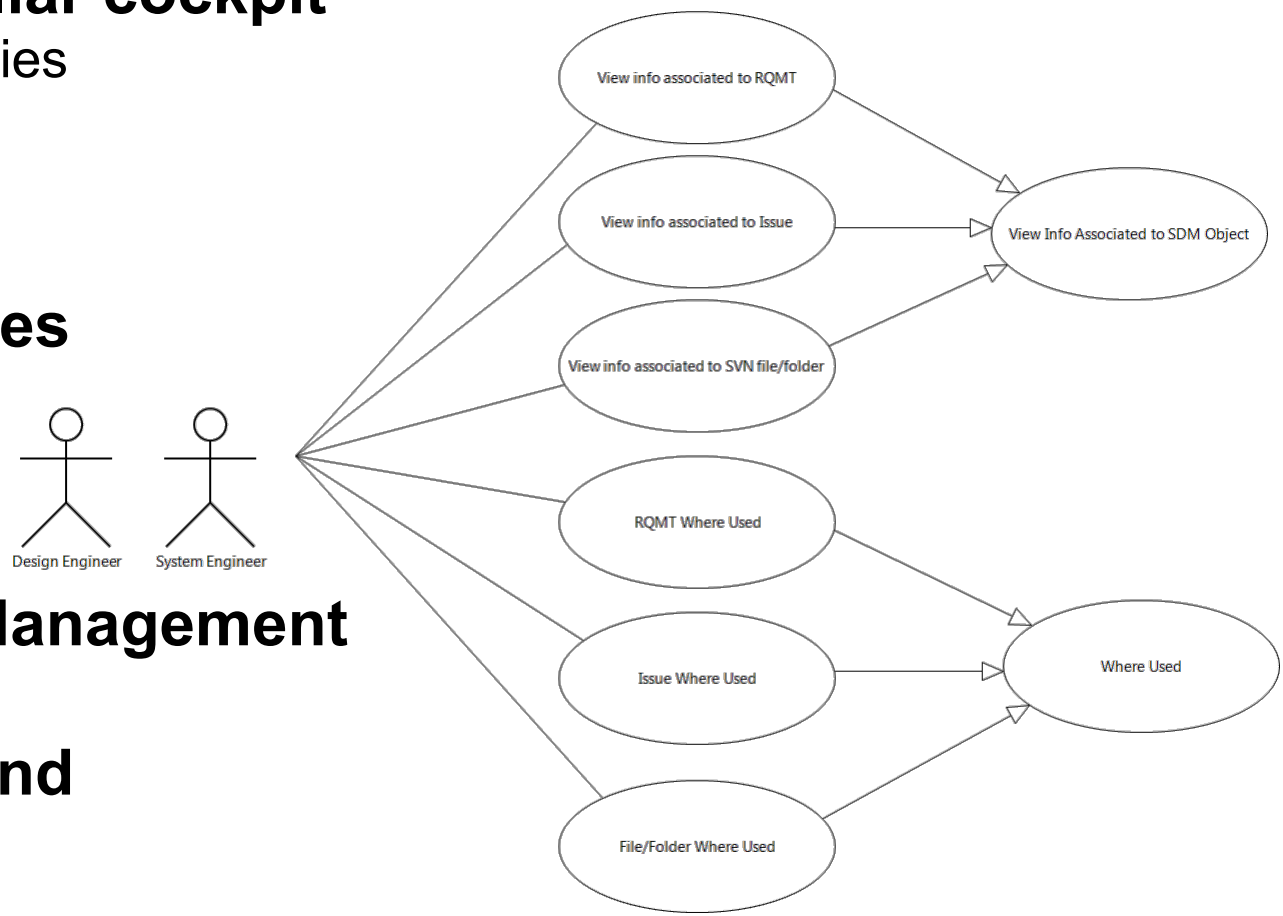
- 

Product Manager – Tracking Resources

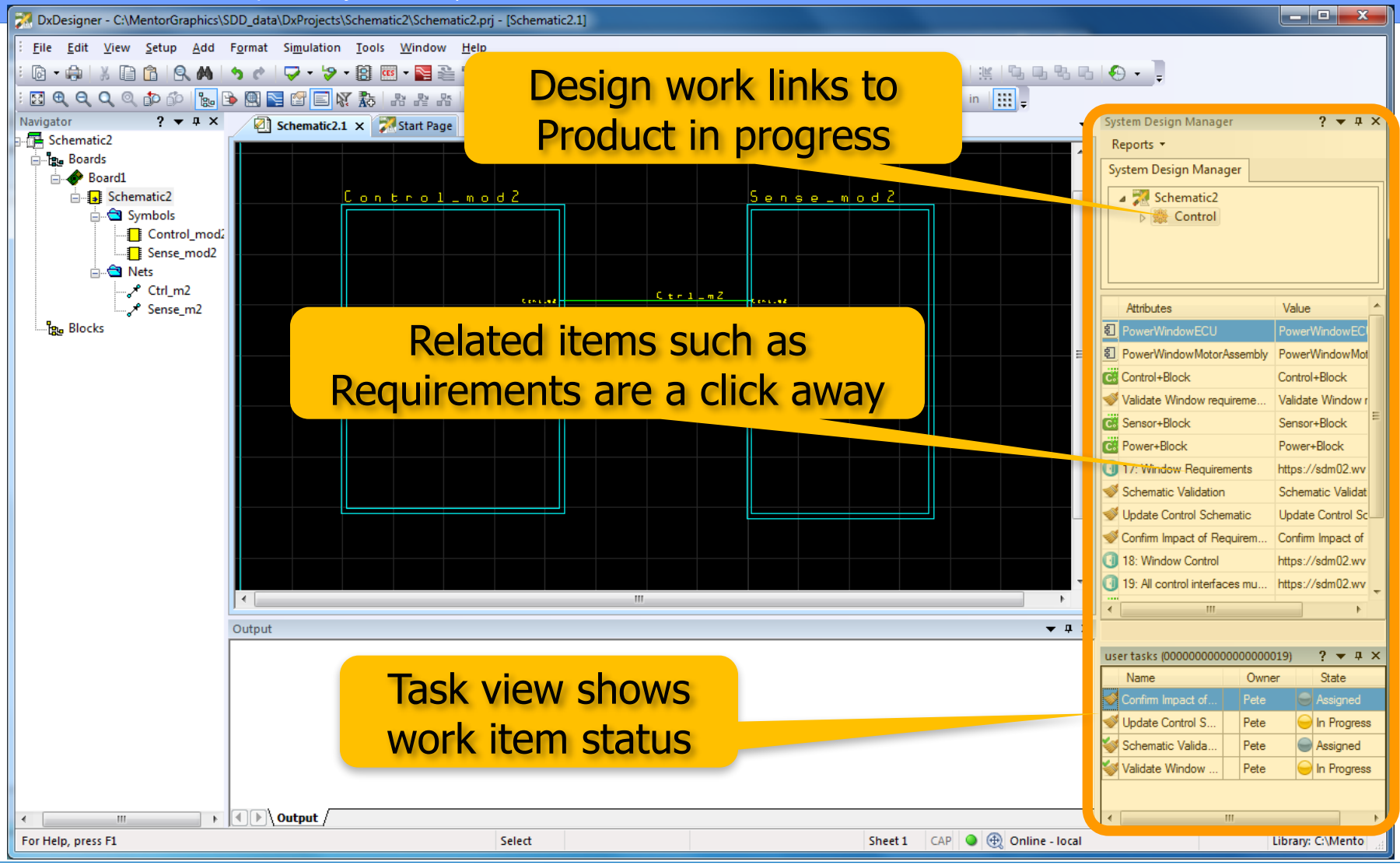


Design Tool Use Cases

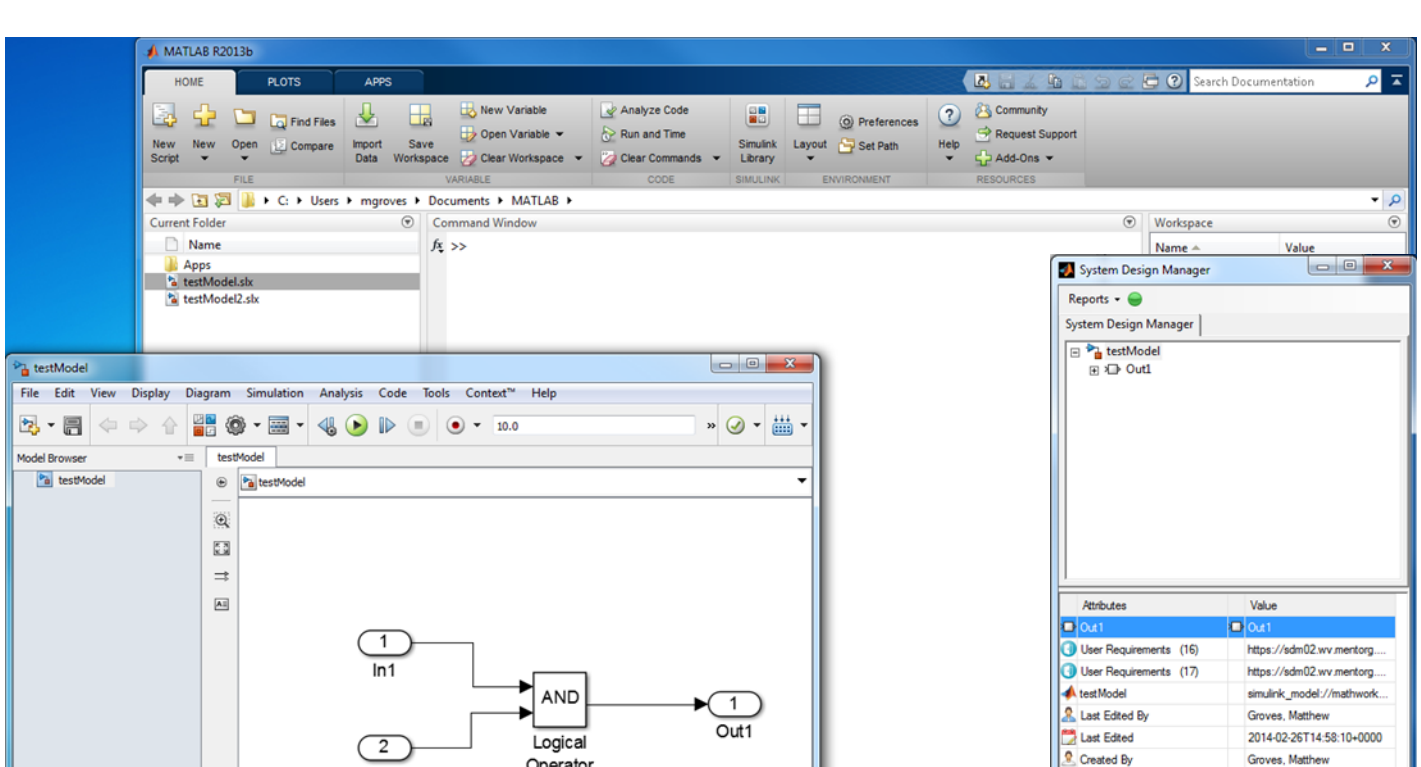
- **Remain in the familiar cockpit**
  - Perform usual activities
  - “Link as you think”
- **Access to all design dependencies**
- **Interactivity with System Lifecycle Management**
- **Immediate status and issue visibility**



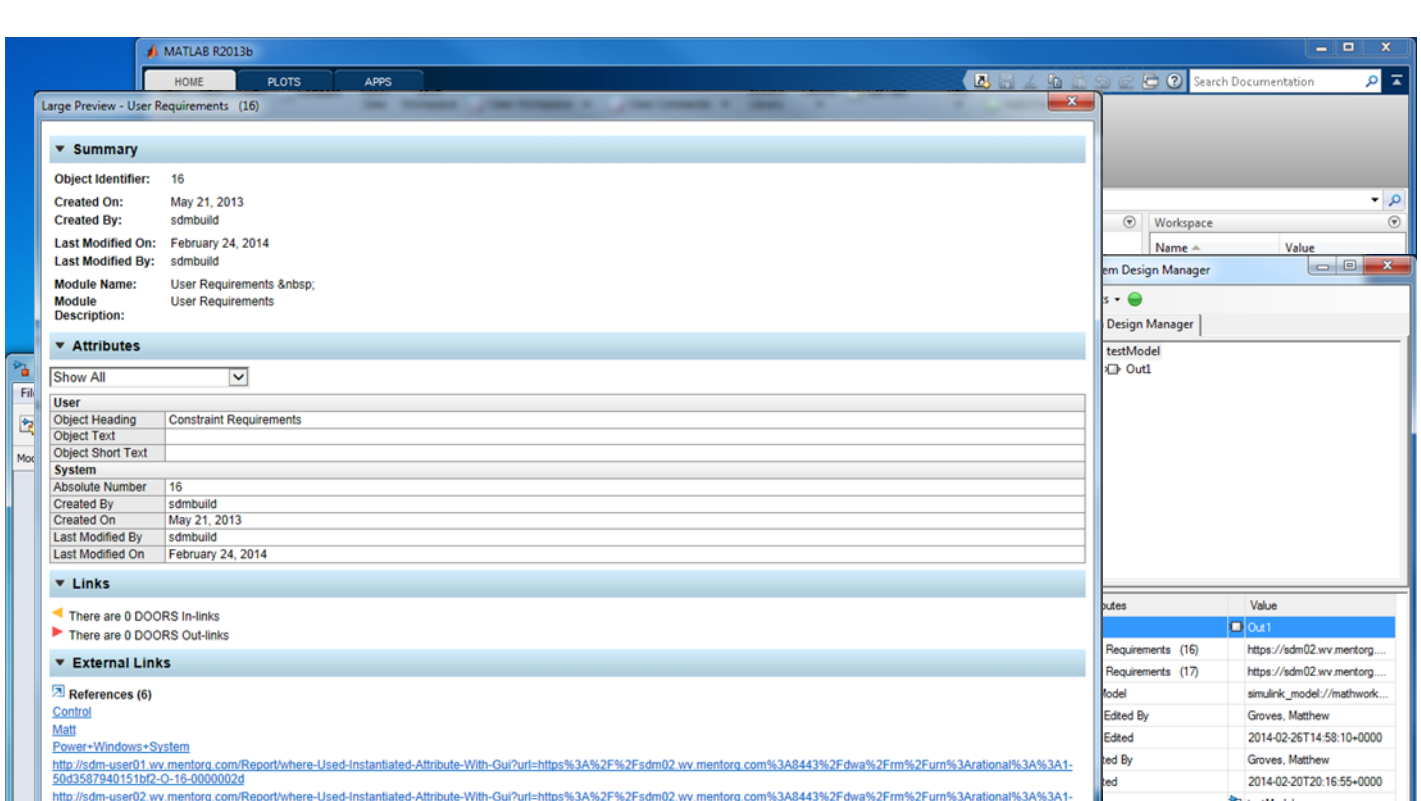
How Does It Look? - Operation inside the Design Tools



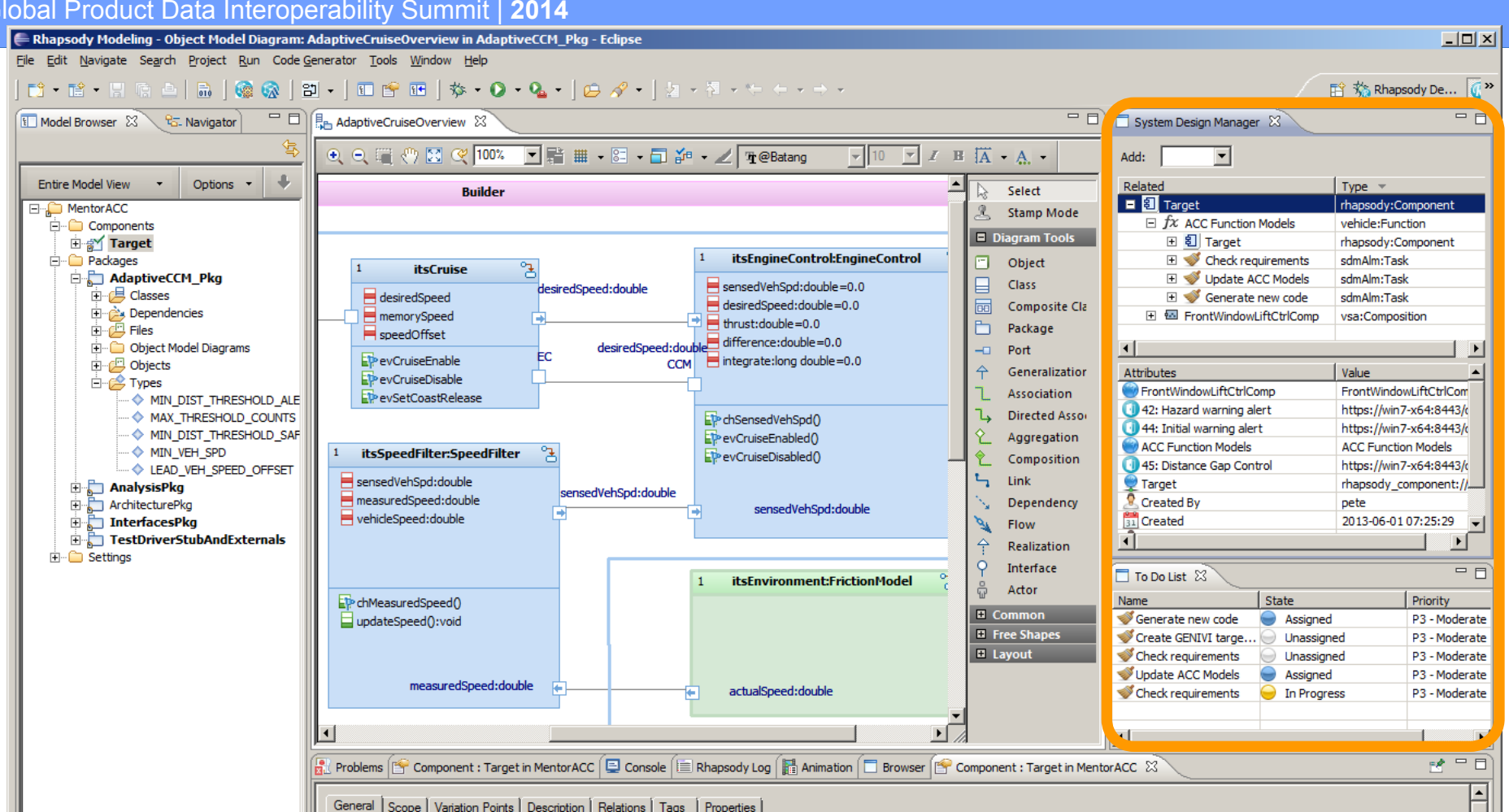
Linking in Simulink



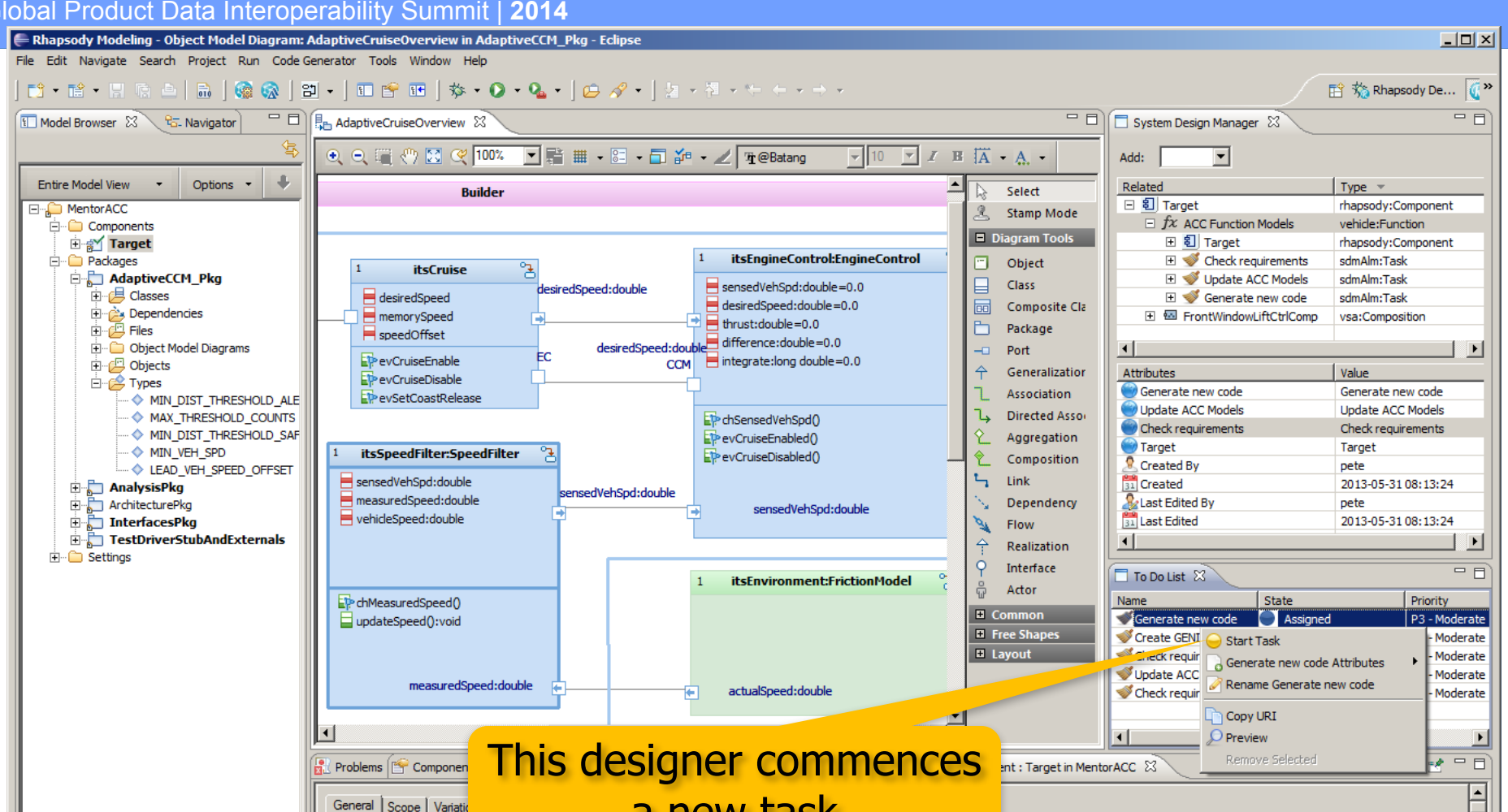
DOORS Access (illustrated in Simulink)



Functional Models in Rhapsody, with Context SDM

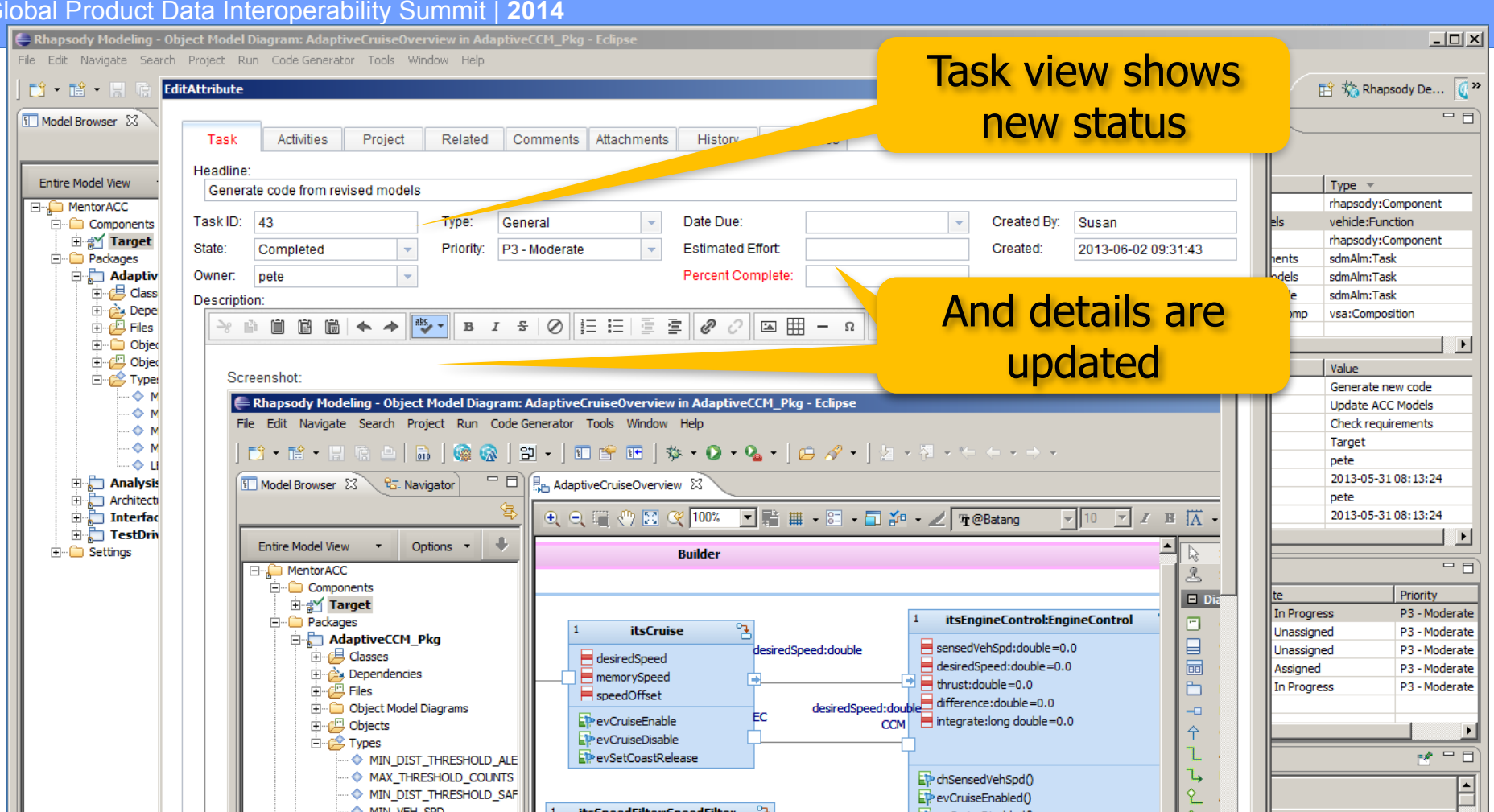


ALM Operation inside the Design Tools

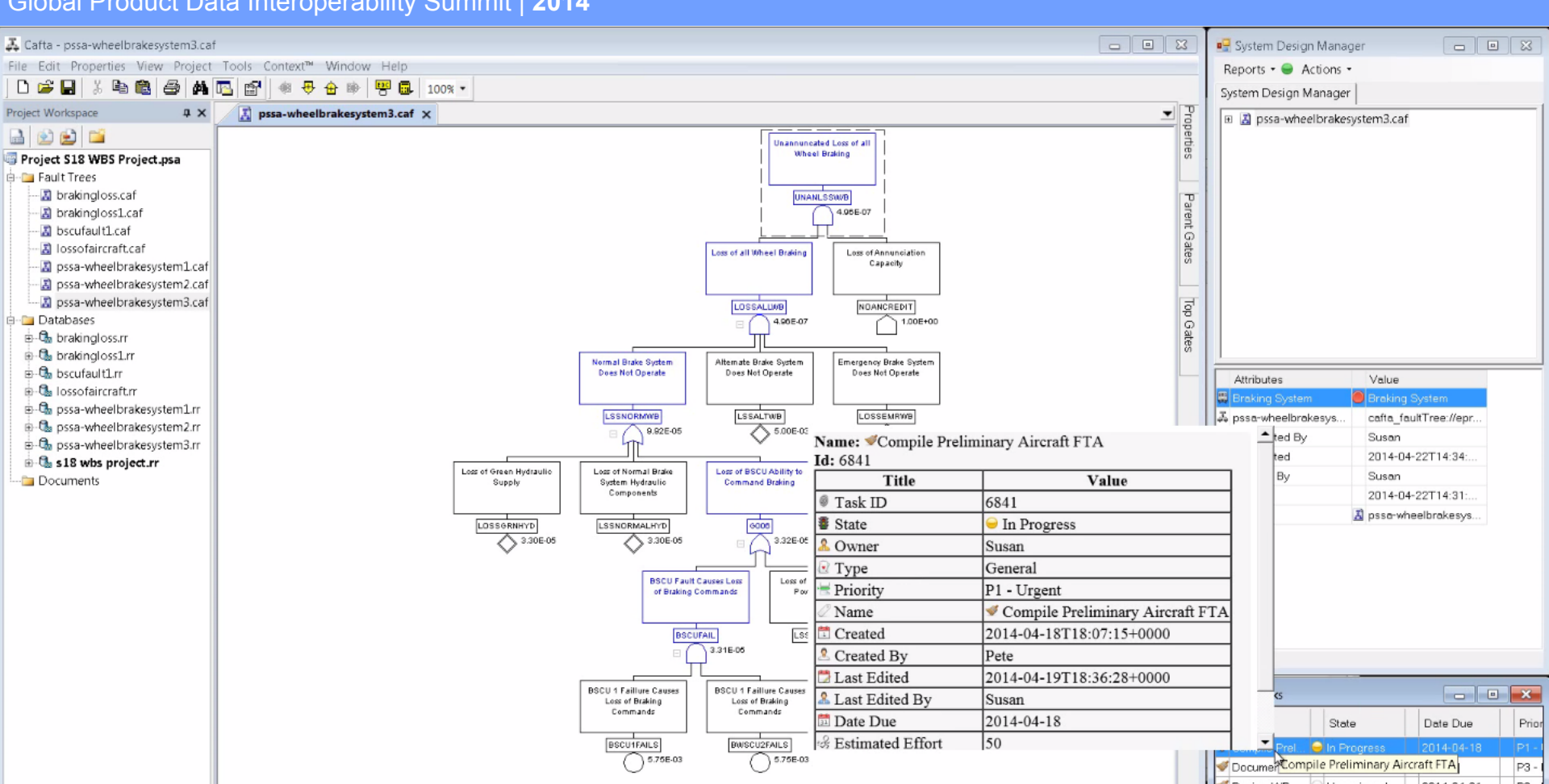


This designer commences a new task

ALM Operation inside the Design Tools



CAFTA Fault Tree Integration



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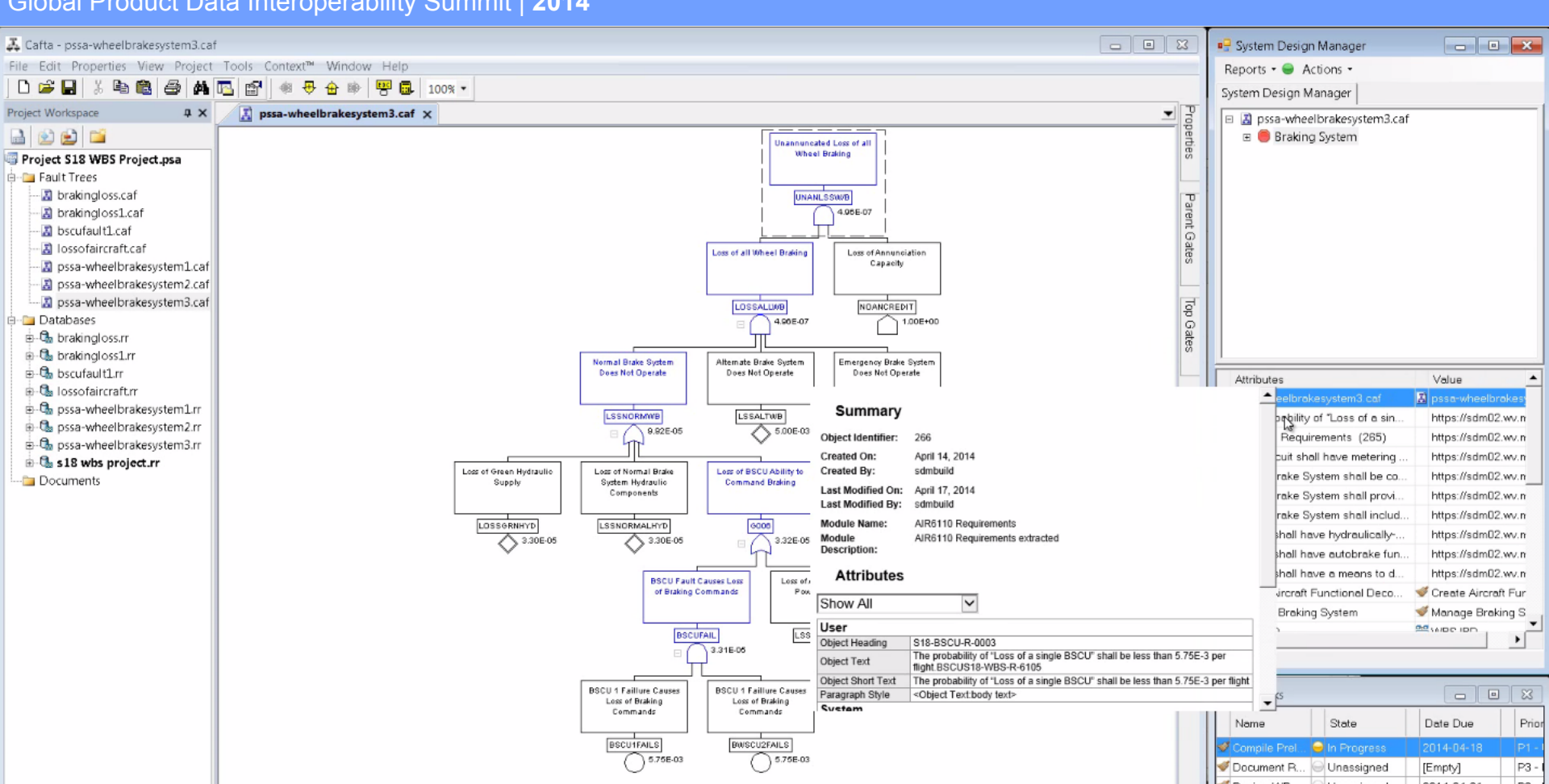
Global Product Data Interoperability Summit | **2014**



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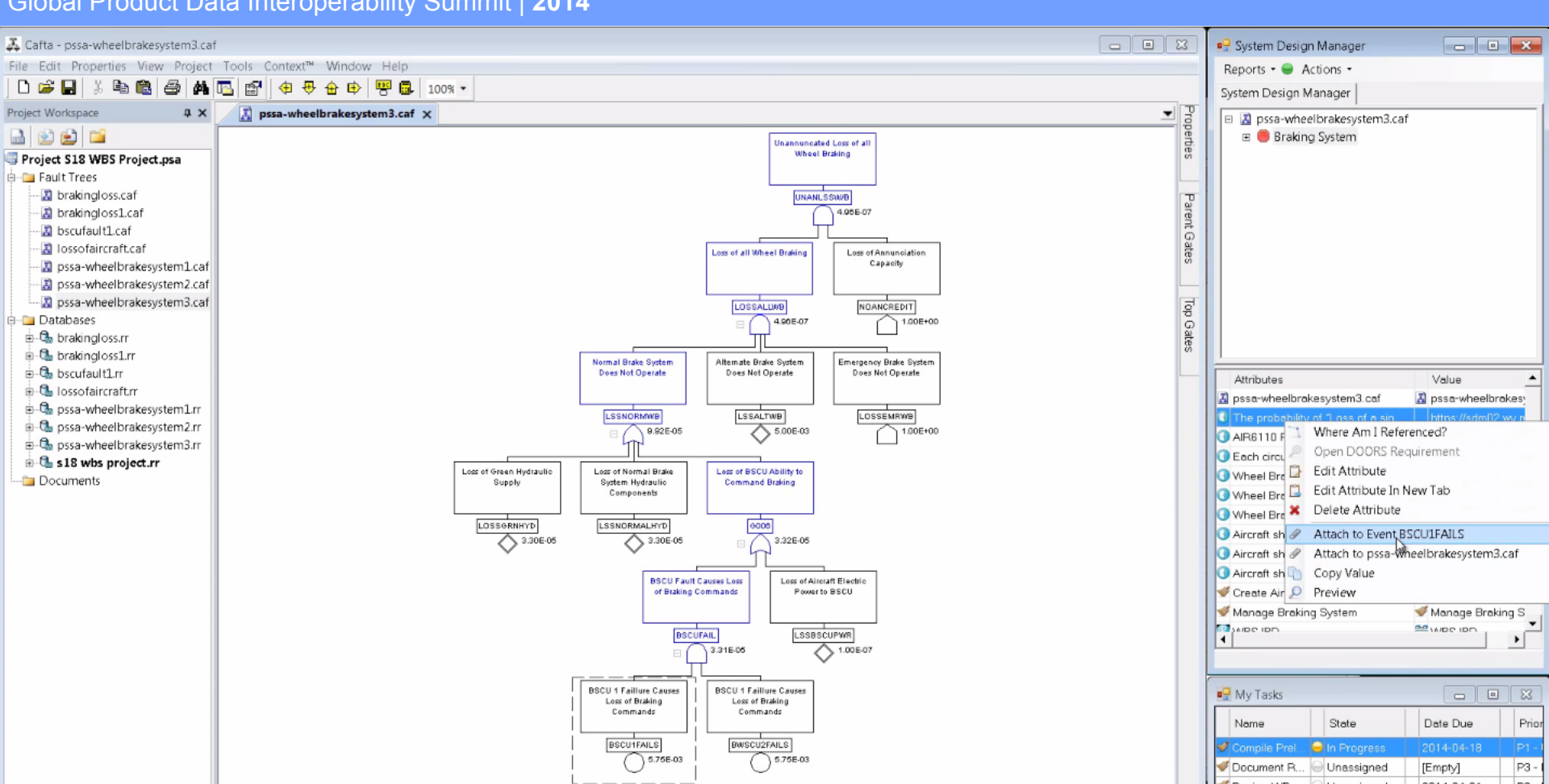

Tabular Analysis

Meta Data | Logout | Mentor Graphics

Referential

- Products
  - Airplanes
    - Phases
    - Demo Airplane
      - Plane
        - Braking System
          - Nose Wheel
          - Left Wheels
          - Right Wheels
          - Hydraulics
            - Main Pump (Green)
            - Alternate Pump (Blue)
            - Selector Valve
            - Shut Off Selector Valv
            - Isolation Valve
            - Accumulator
              - itsACCUMULATOR
            - Meter Valve - Normal
            - Meter Valve - Alternate
            - Anti Skid Shutoff
          - Pilot Pedals
          - CoPilot Pedals
        - BSCU IBD
        - WBS BDD
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        - Aircraft Functions BDD
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    - Wheel Braking System
      - Safety Analysis

Wheel Brake System SSA | complete Braking System hierarchy

Views | Actions | Queries | Reports | Edit

SSA | Aircraft FHA (Partial) | WBS FHA | WBS Safety Requirements | BSCU Safety Requirements

Ref.	Artifact	Deliverable	Input Fig/Tab				
	Aircraft FHA	Aircraft Functional Decomposition	Figure 4.1-1 (L1)				
		Aircraft FHA (Partial)	Table 4.1-1 (L1)				
	Preliminary Aircraft FTA	Preliminary Aircraft FMEA	Page 181				
		Preliminary Aircraft FTA	Figure 4.6-1 (L1)				
		Preliminary Safety Requirements	Page 181				
	System FHA (WBS)	WBS Functional Decomposition	Section 4.1 (L2)				
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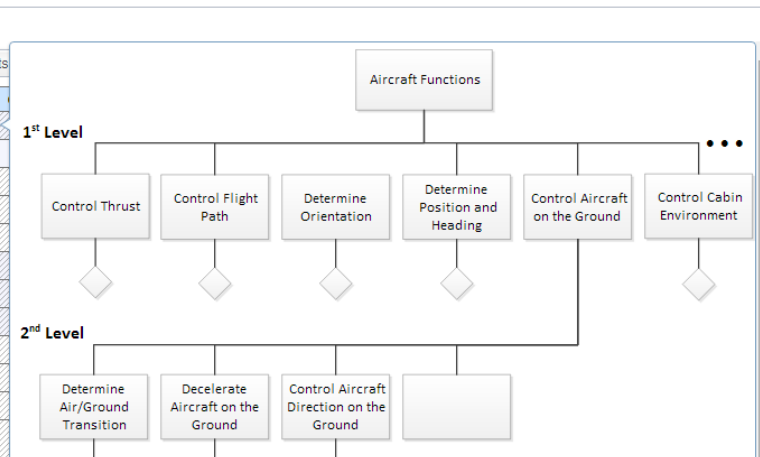

(Aircraft FHA) Aircraft Functions

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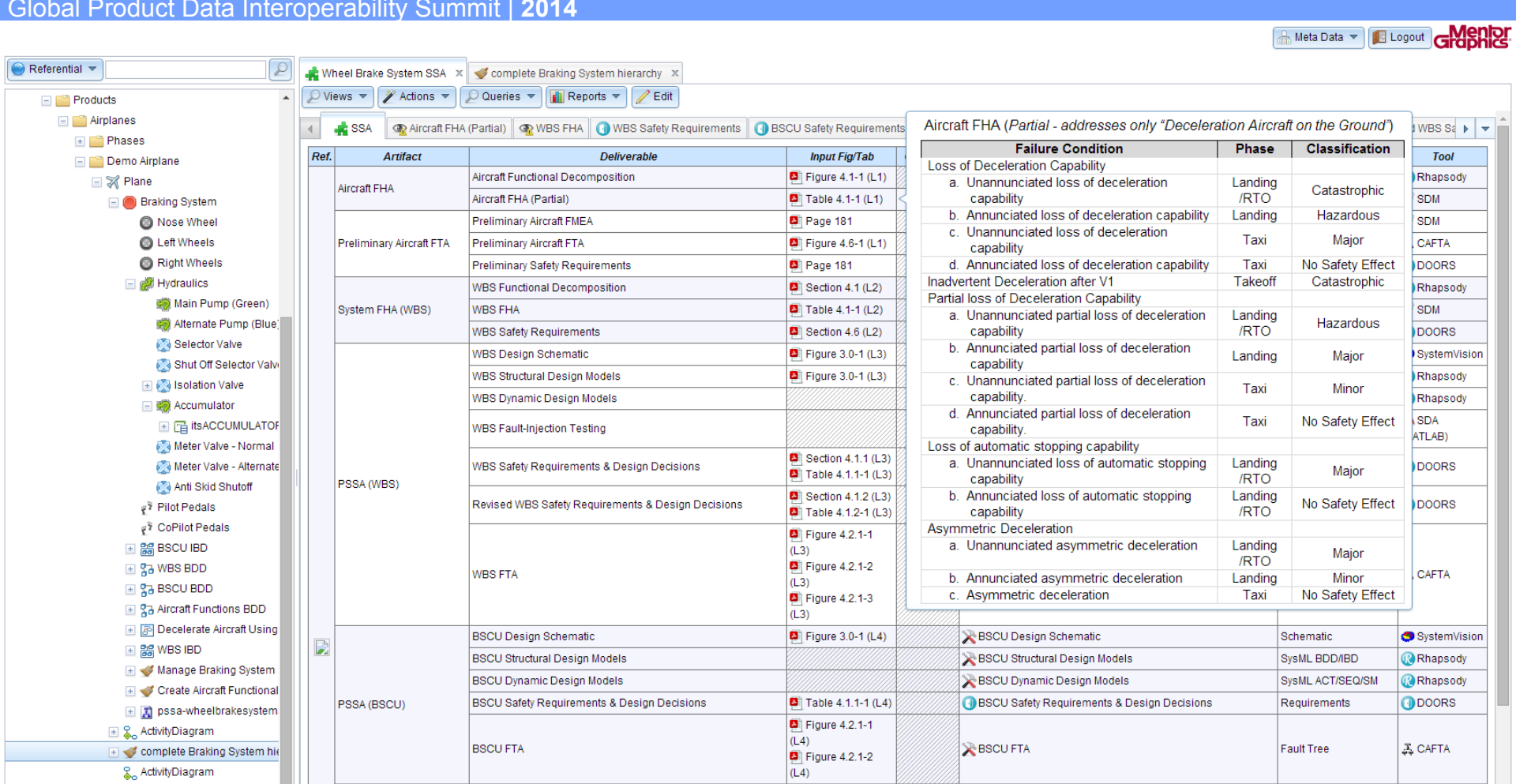
Tabular Analysis



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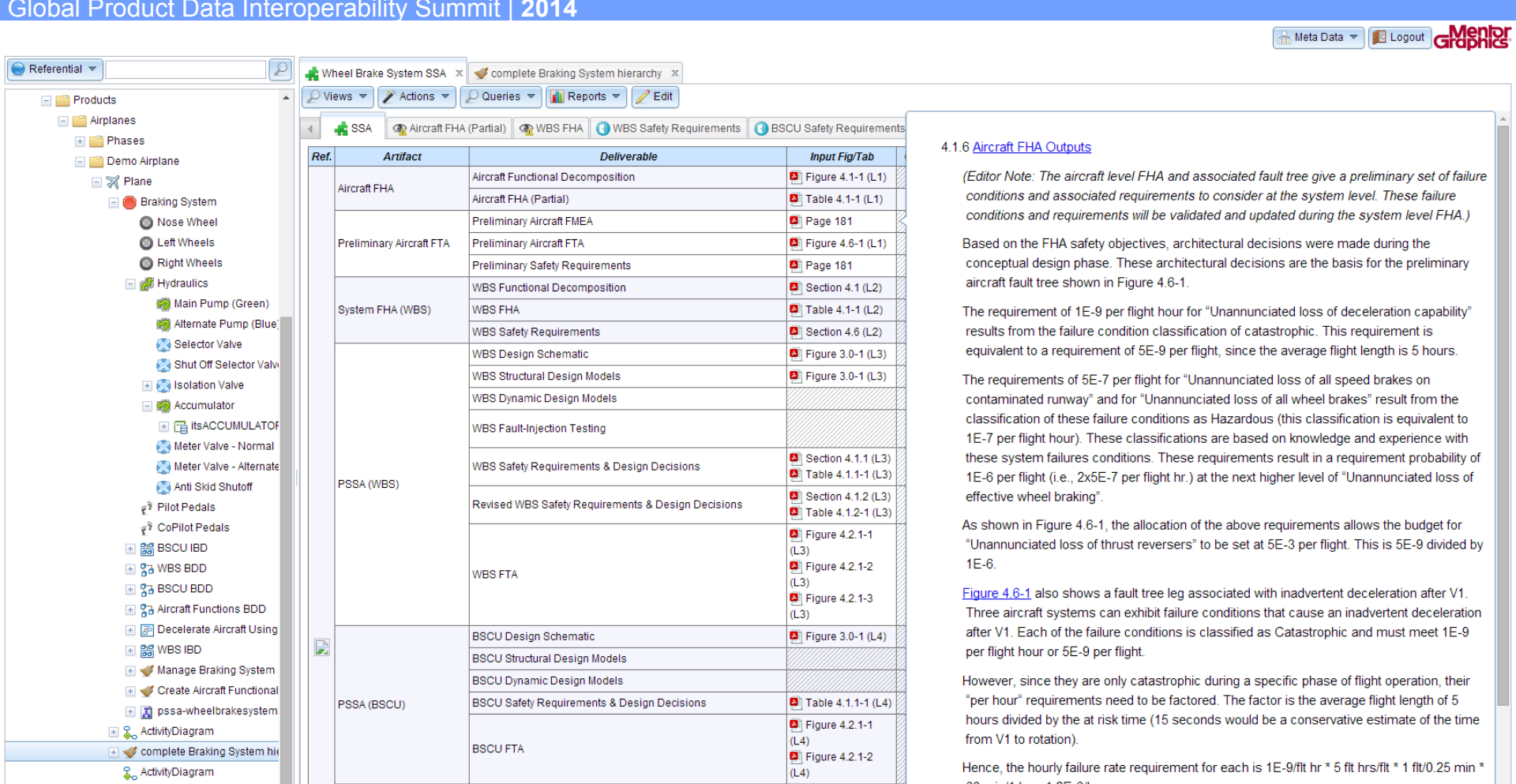

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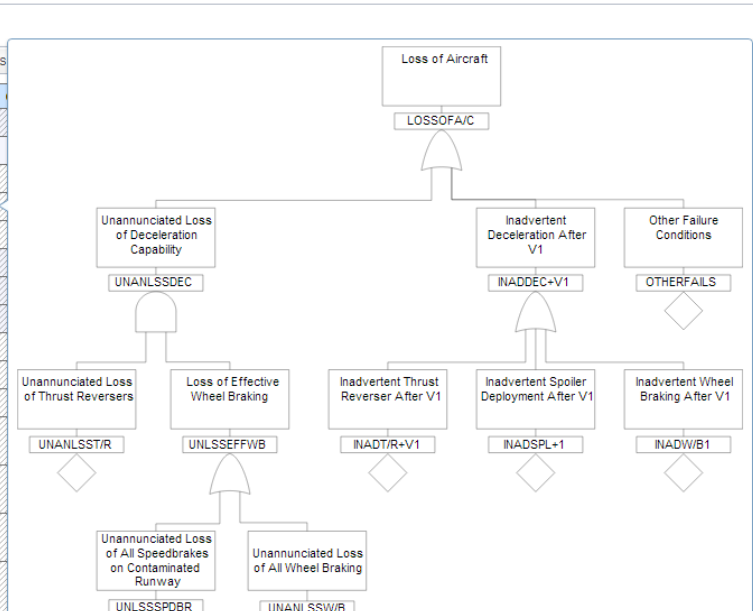

(Aircraft FHA) Preliminary Aircraft Fault Tree

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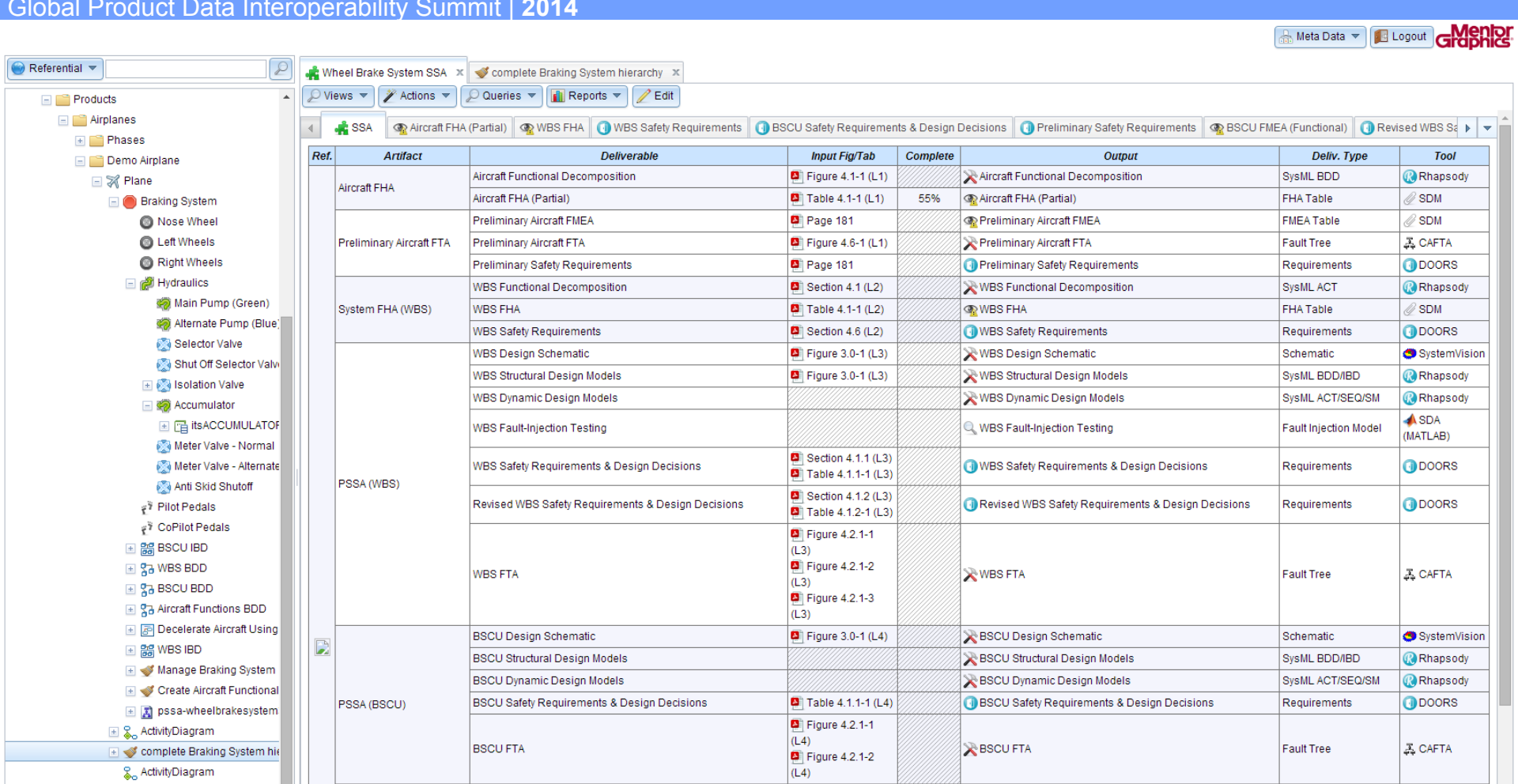
Tabular Analysis



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		WBS Fault-Injection Testing			WBS Fault-Injection Testing	Fault Injection Model	SDA (MATLAB)
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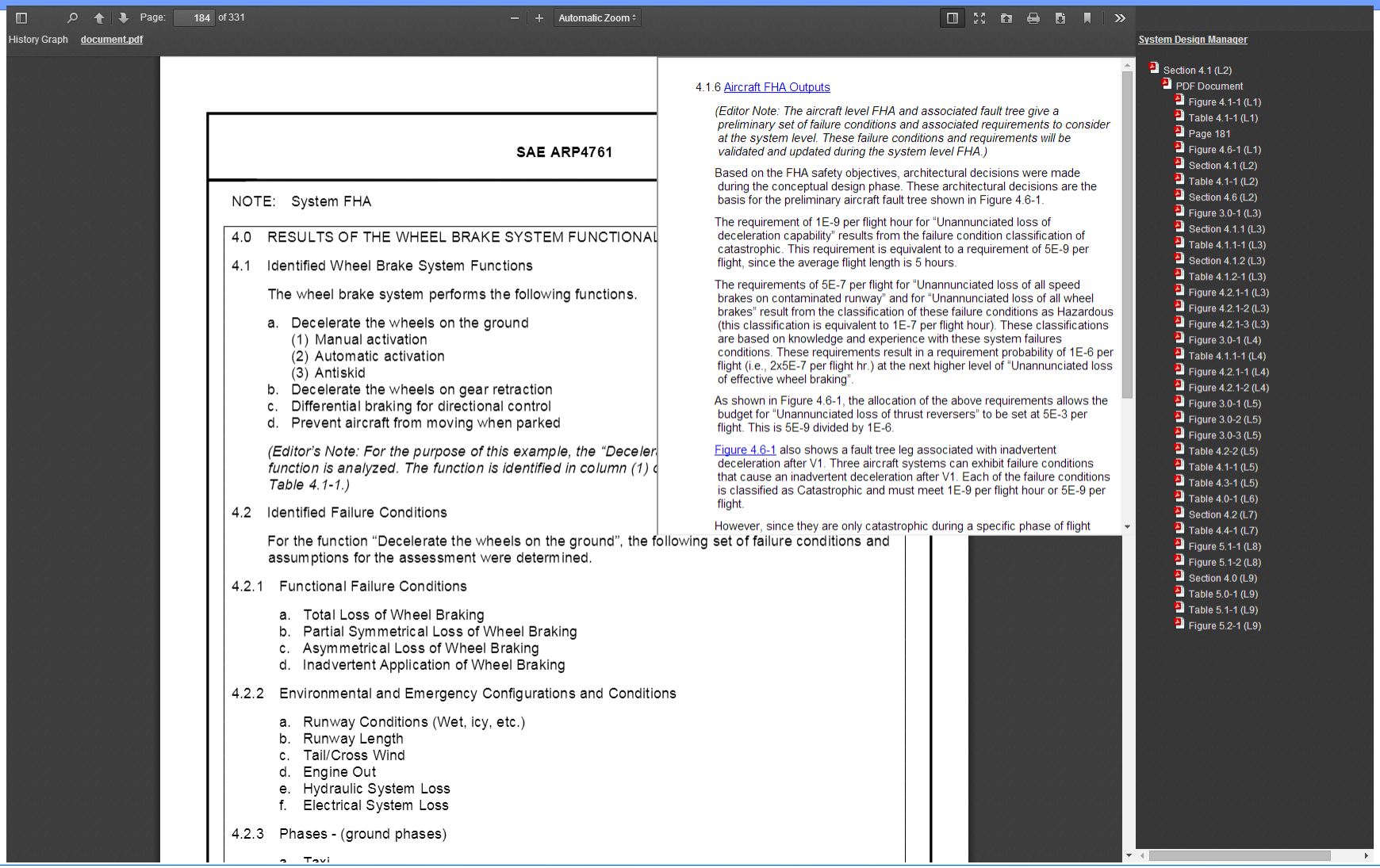
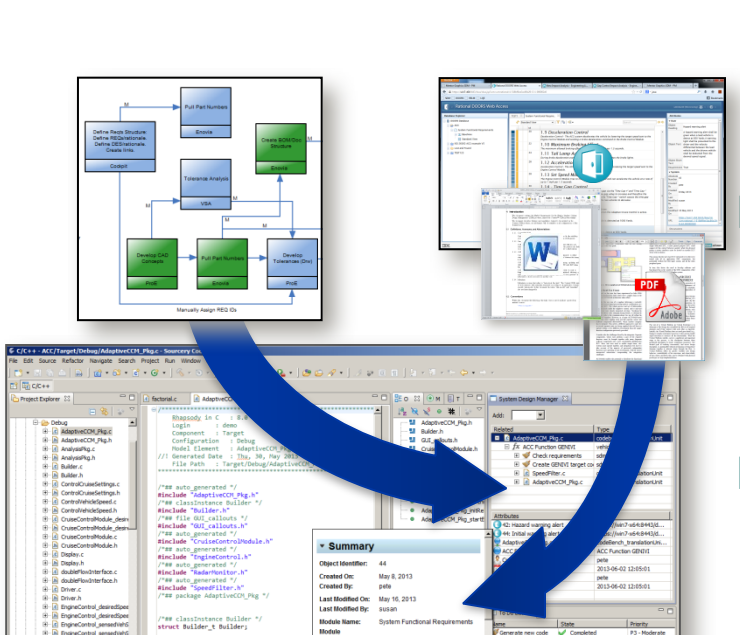
Integral PDF Viewer Adds Interactivity



Context Supports the Users' Daily Tasks

- No walking to the bookshelf

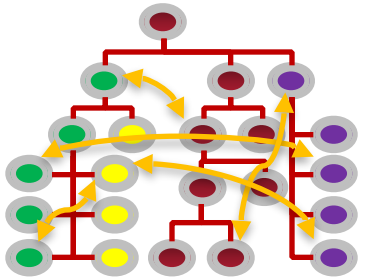
(or heaven forbid - the library) to find the spec, going to the next status meeting to raise the red flag, and then coming back to the design to try to remember where she was



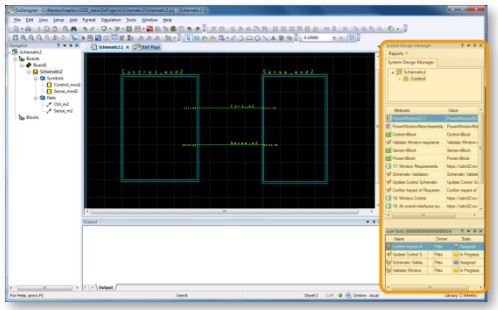
- This really works to make the designer's daily tasks easier, and supports better product management
- It plugs in to what they do today, into the tools they use today, without requiring methodology change

Context SDM – Three Key Capabilities

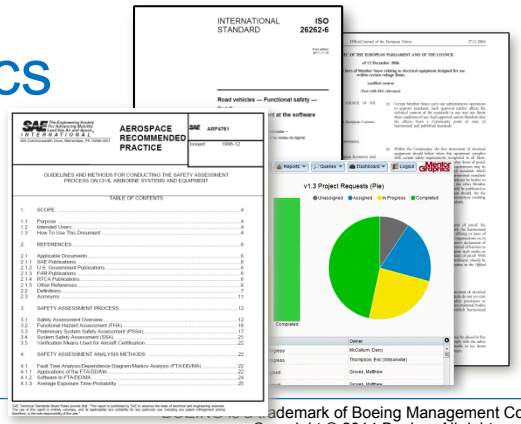
- Manage relationships between tools throughout design disciplines
  - Coordinate changes, dependencies, and impacts
  - Integrate with current tools and flows



- Bring information and interaction to the users where it can be applied directly
  - Sourced from any original repositories
  - Interact with appropriate design tools
  - Maximize usability and efficiency



- Enable product management, tracing, analytics and reporting
  - View or export dynamic data views
  - Standards compliance support



Interoperability

- **Summary**
  - "Integration through Data Exchange"
  - "Design representations and requirements synchronized"
  - Interactive system design management in users' familiar tools
  - Standards-based connection to any* necessary tools

- **Future Directions**
  - Integral templated process support for ARP, etc.
  - Increased automation of repetitive steps
  - A path towards effective Model Driven Safety Analysis

- **For More Information**
  - See us at our Vendor Expo this afternoon – Table 4
  - bill_chown@mentor.com

"any tools": some are easier than others!

Thank You!

go.mentor.com/context

GLOBAL PRODUCT DATA INTEROPERABILITY

SUMMIT

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