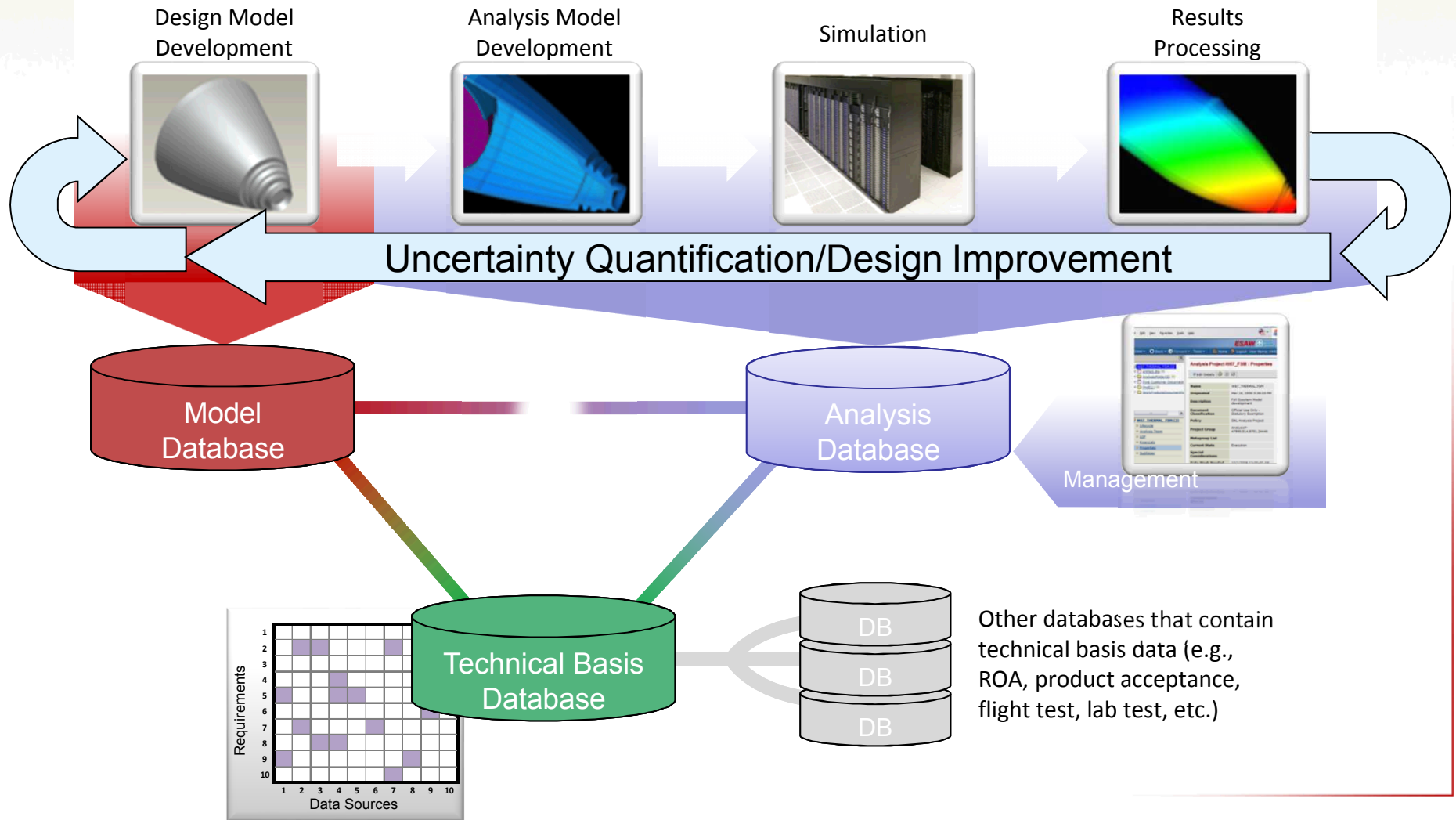


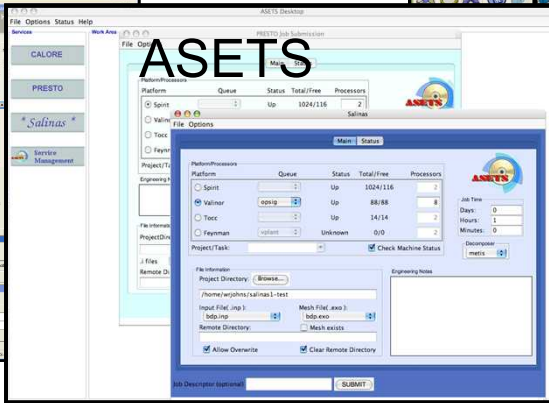
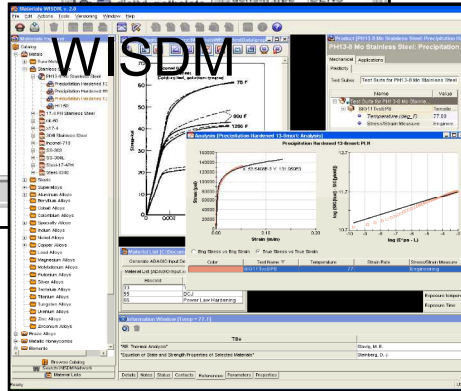
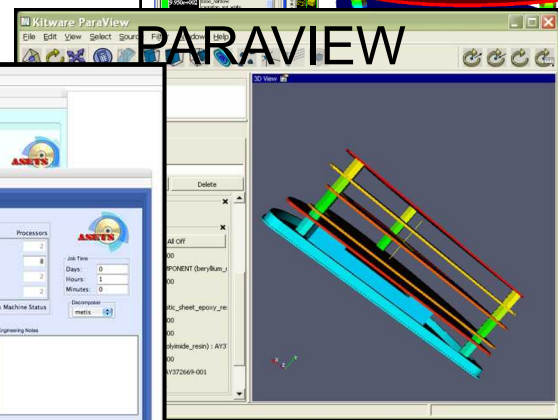
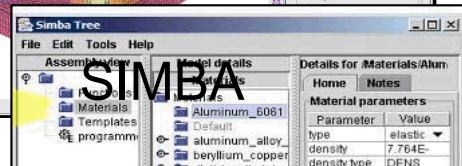
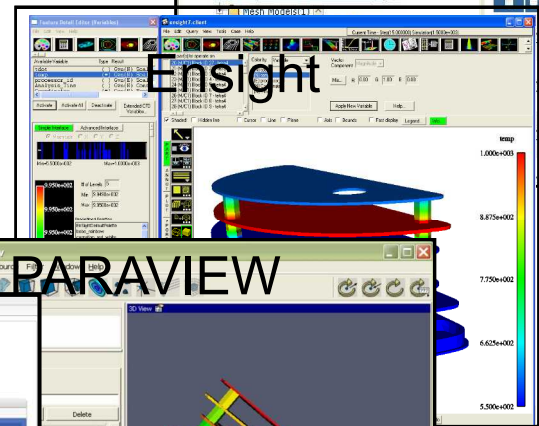
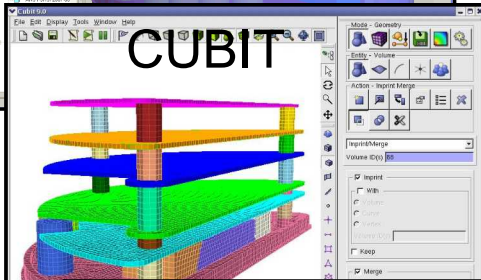
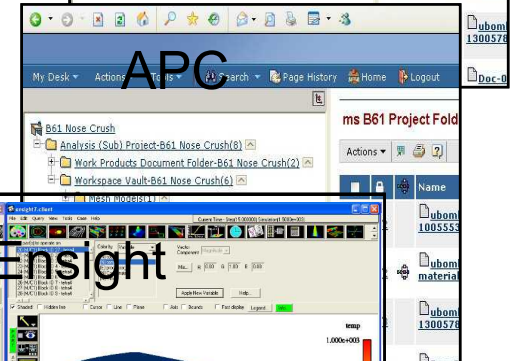
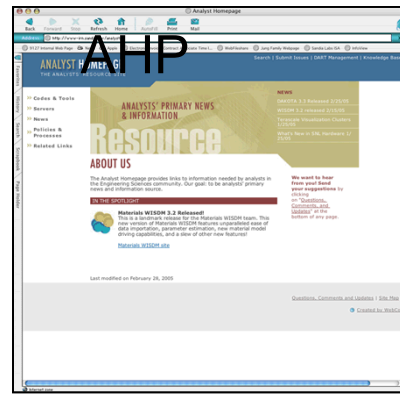
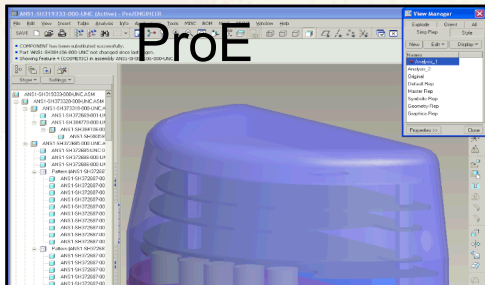
INCORPORATING WORKFLOW FOR V&V/UQ IN THE SANDIA ANALYSIS WORKBENCH

Robert L. Clay
Sandia National Laboratories
rlclay@sandia.gov

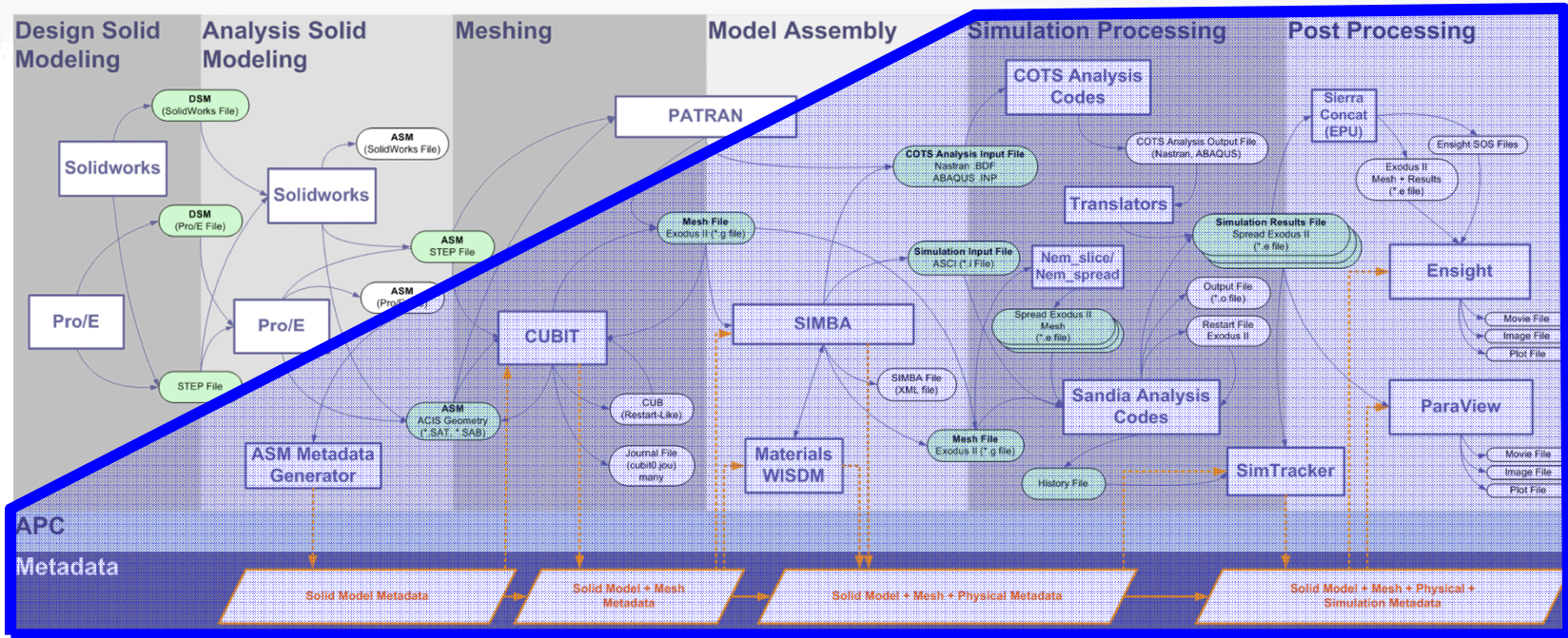
Support the Design-To-Analysis process, capturing data in context



Pre-2010 – Federated Toolkit for Design through Analysis



SAGA by Fact & Heart



Sandia Analysis Workbench

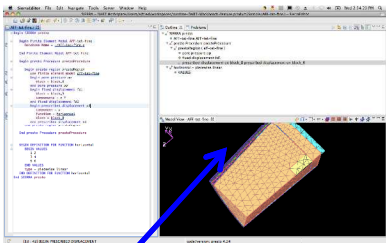
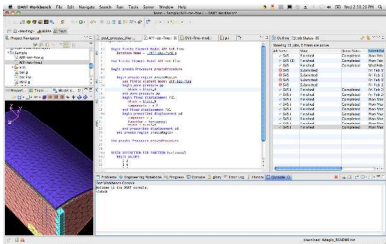
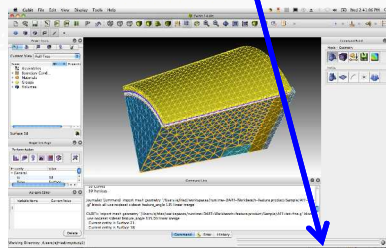
- The analysis process involves many (stove-piped) tools that generate a large number of artifacts, which must be managed by the analyst.
- Vision: an integrated environment for these tools

SAW provides a unified view of distributed enterprise resources on the desktop

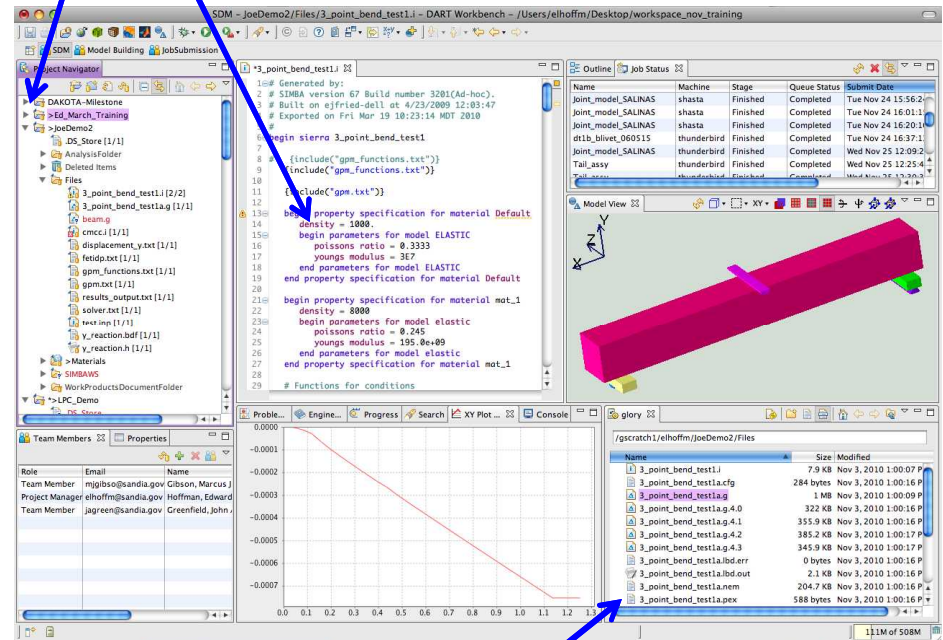
Simulation Data Management

Model Assembly

Job Management



Multiple applications and tools combined into one, streamlining work and drastically reducing complexity

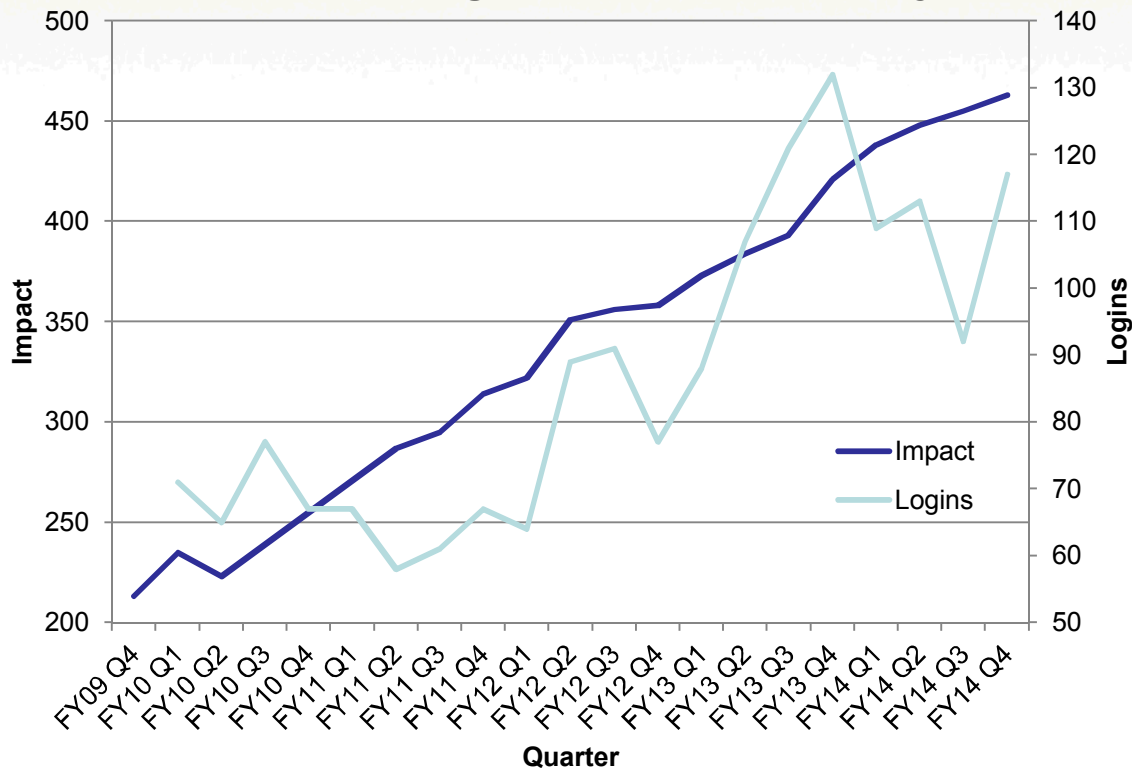


Teaming

Distributed File Management & Viz

Metrics show widespread adoption of SAW

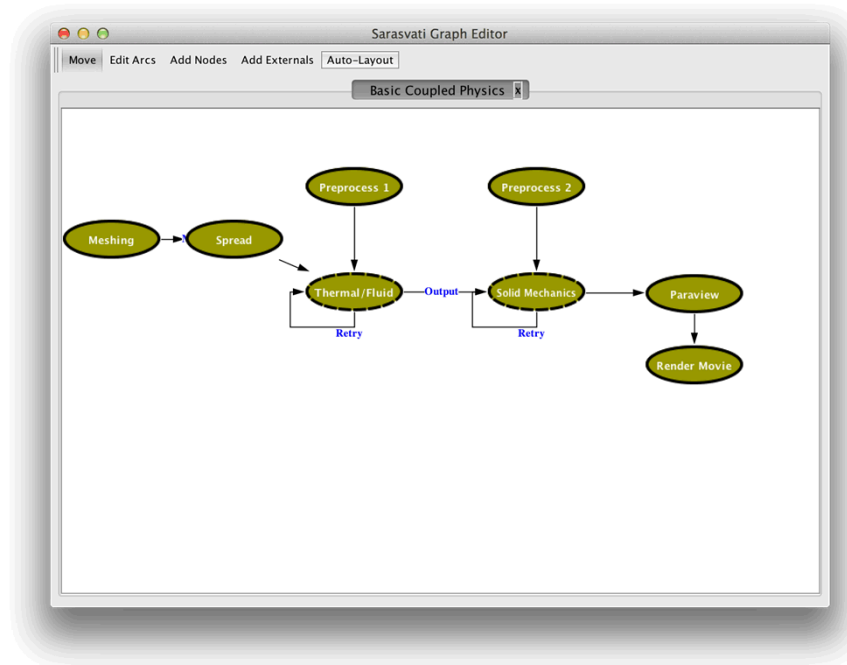
SAW Usage Metrics (Quarterly)



“Impact” represents staff who own data in our repositories
“Logins” are unique users of our data management service

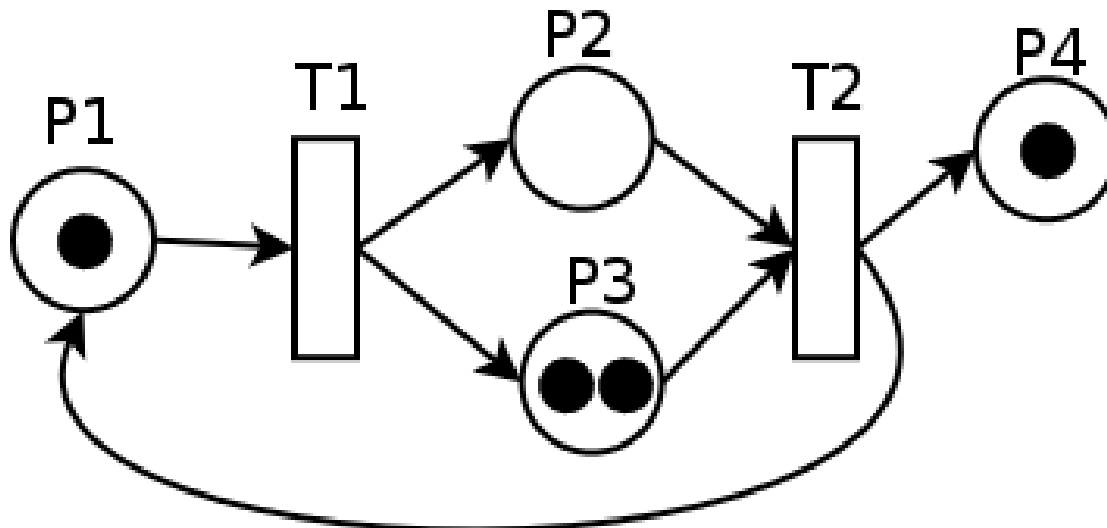
Adding Automated Workflow

- Workflow: a graph of connected nodes
 - Nodes represent activities
 - Arcs represent transitions, and may specify data interchange
 - There is a start and end node, and the start node may have preconditions



V&V of Workflows

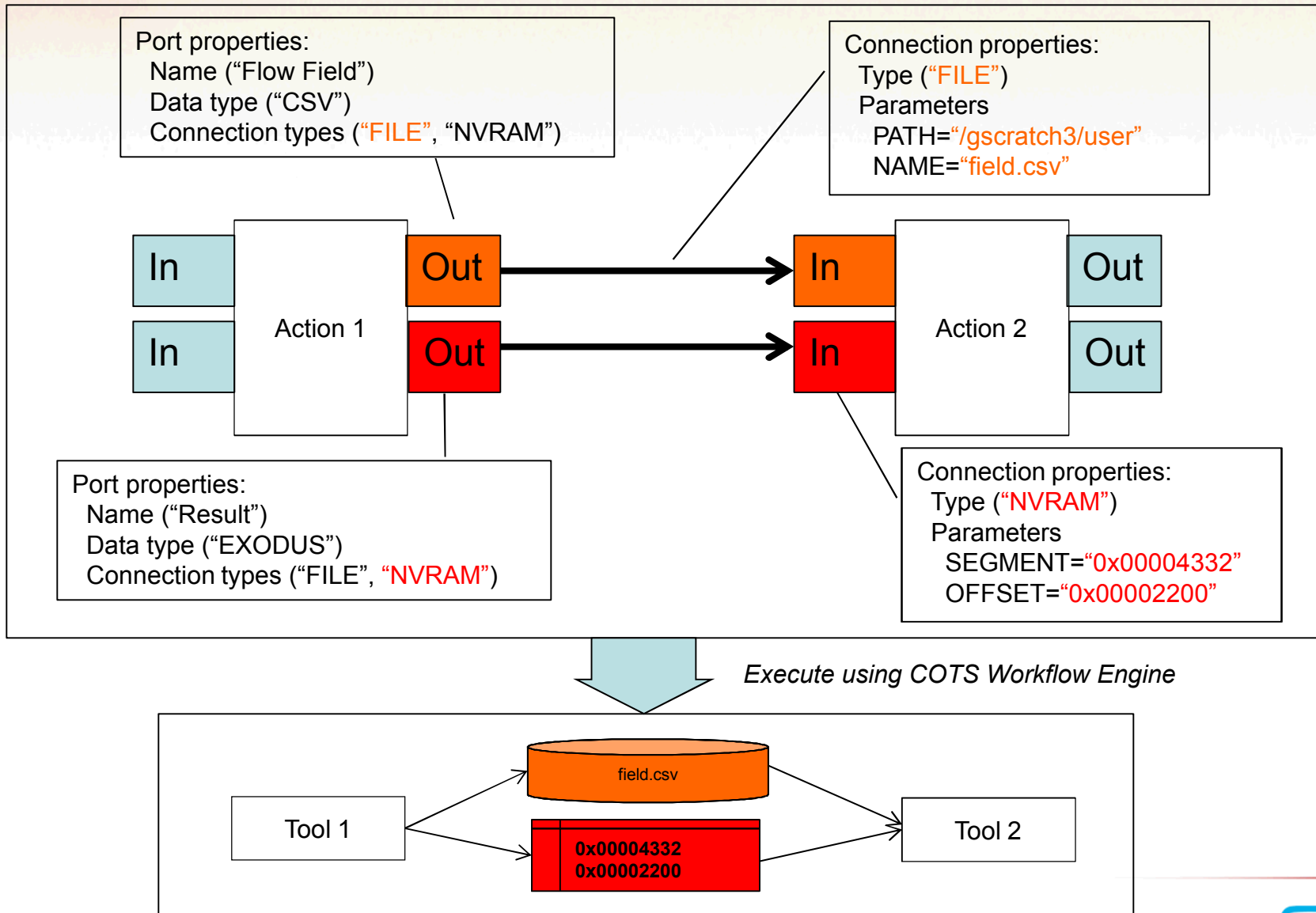
- Complicated workflows are difficult to formally understand
 - Workflows may be converted to Petri Nets and formally proven
 - Provable workflows are an important aspect of V&V



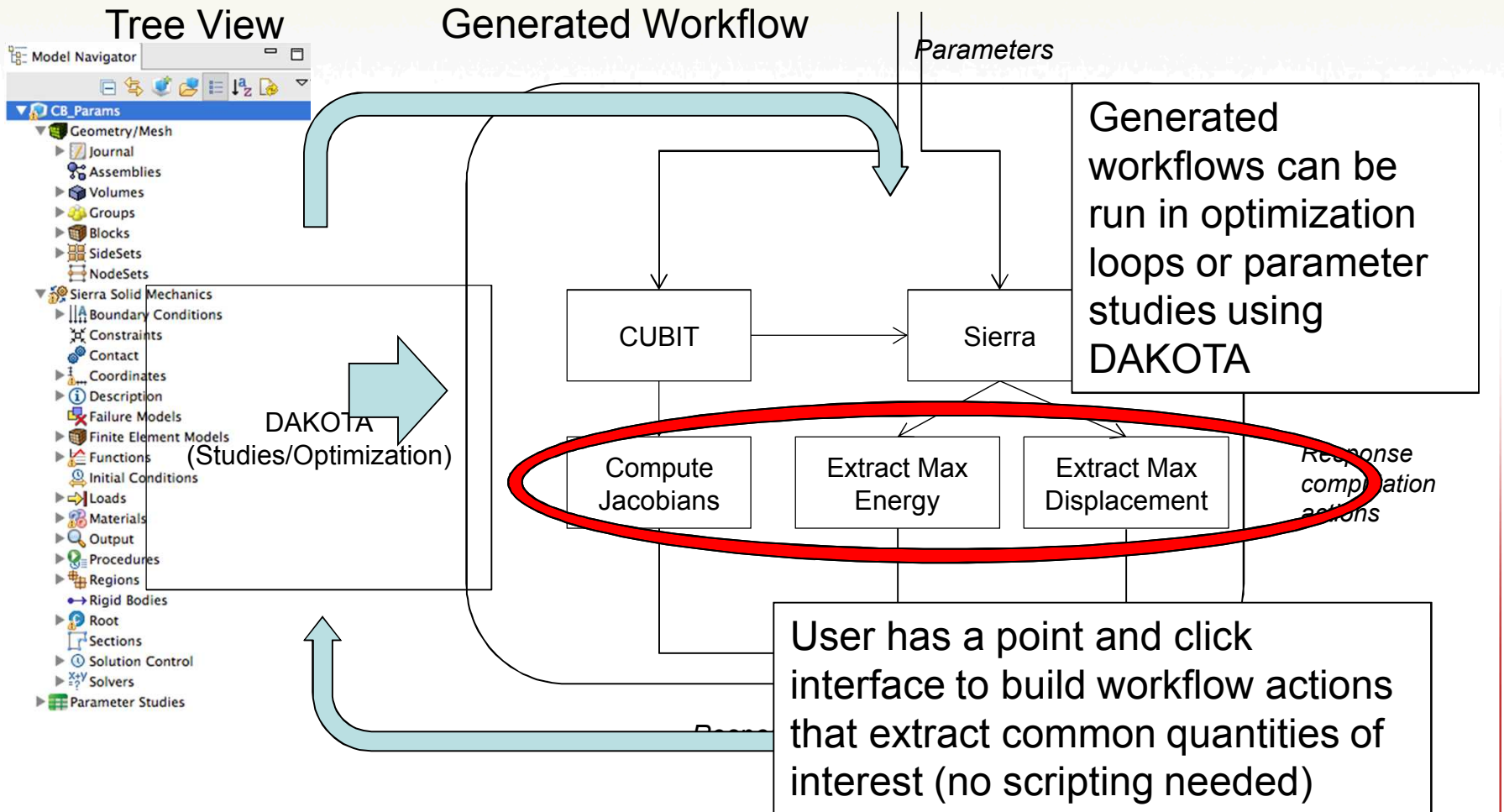
Workflow Execution

- **Creates an auditable document trail**
 - It is possible to data-mine workflows to ensure compliance as well as to identify opportunities for process improvement
 - Outputs may be captured and traceably related
- **Re-execute at any time**
 - Increased speed and reliability
 - Perform V&V sub-tasks when a prerequisite changes
- **May become sub-workflows**

Proposed Scalable Workflow Architecture Directly Connects HPC Codes Using Available Comms



Current Status: Automatic Workflow Generation



Acknowledgements

- Ernest Friedman-Hill (PI)
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- Marcus Gibson
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