**Value-Driven Incremental Development**

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The original document contains color images.
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**Integrating Architecture Analysis and Assurance With Development**

**Objective**
Investigate how quality attribute requirement allocation and dependency analysis inform incremental development and assurance through managing rework during development.

**Solution Approach**
- Collect quality attribute requirements using architecture-tactics questionnaires
- Create models for deployment view augmented with partitioning and fault-tolerance information
- Generate an experiment environment where models can be seamlessly exchanged
- Apply modifiability and fault-propagation metrics
- Validate that augmenting with fault-tolerance information provides information about propagating rework
- Validate whether incremental-assurance information can be contained within architecture changes

**Selected FY14 Results**
- Improved rework analysis by making architectural dependency information (e.g., fault-propagation dependencies) available to developers during architecture modeling and development
- Eliminative argumentation defined as a core concept that is a basis for arguing confidence and in establishing the theory of confidence
- Incremental evolution of quality attribute requirement allocation using architecture tactics-based data collection occurs through small refinements and ratcheting of response measures. Empirical studies and surveys with organizations revealed architectural rework occurs in such context and can be managed by better quantification of technical debt.

**Multi-Dimensional Analysis Drives Increment Value Assessment**

**Architecting for Incremental Assurance**
What are the assurance implications of a release decision?

**Quality Attribute Allocation**
How do we break architectural features into increments; what measures are needed to make good release decisions?

**Collaborators**
Carnegie Mellon University, Clemson University, University of British Columbia, University of Pennsylvania, DoD and industry partners

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