



Characterizing the “Science of System Integration”

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Systems Integration

- “The Science of System Integration” focuses on how SE organizations
 - plan for, impact, execute, and learn from systems integration activities.
- In particular, the science of systems integration emphasizes
 - architecting and designing for integration,
 - estimating and planning integration tasks,
 - discussing state of the practice in complex system integration...
- for both
 - computer intensive systems (e.g. command & control systems, IT systems, and “systems of systems”), and
 - technology intensive systems (e.g. advanced radar or communications systems).

Two forms of Integration

This theme embraces both **technology integration** & **product integration**.

- **Technology integration** alludes to evaluating how new technologies impact existing systems, how differing technologies can work together in new systems, and how subsystem interfaces are established from a technological perspective.
- **Product integration** alludes to the integration of components into products, and the subsequent integration of products into enterprises. This can include defining tasks, schedules, metrics, scenarios, criteria, and simulations necessary for effective integration.

Science

- The use of the word “**Science**” in the mini-conference theme implies the use of analytical and quantitative methods and process control.
 - This is essential for repeatable system integration.

Hypothetical Examples of the “Science of System Integration”

Technology Integration

- Integrating a new technology into an existing product/product line
- Use of predictive techniques to assess effectiveness of integrating a product into the customer’s enterprise

Product Integration

- Planning a hierarchy of integration activities, leading to top level system integration & acceptance
- Adapting a system architecture to accommodate rapid or reliable system integration
 - designing a system to optimize system integration cost & schedule
- Predicting and measuring the effort required for system integration
- Techniques for identifying, resolving, and preventing systems integration issues
 - use of a systems engineering model in establishing integration scenarios & objectives
 - use of simulations to extend the completeness and augment the feasibility of the system integration