THE VALUE OF PERFORMANCE.

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Industry Executives Panel

How Has Effective Systems Engineering Benefited Our Defense Programs

NDIA Systems Engineering Conference

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Northrop Grumman Corporation

Security Needs Overlap

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Assure U.S. Military Dominance

Secure the Commons

Confront Irregular Challenges

Solving the most challenging, **complex** problems and delivering innovative and affordable solutions that make our world safer

Increased Complexity in Today's Systems

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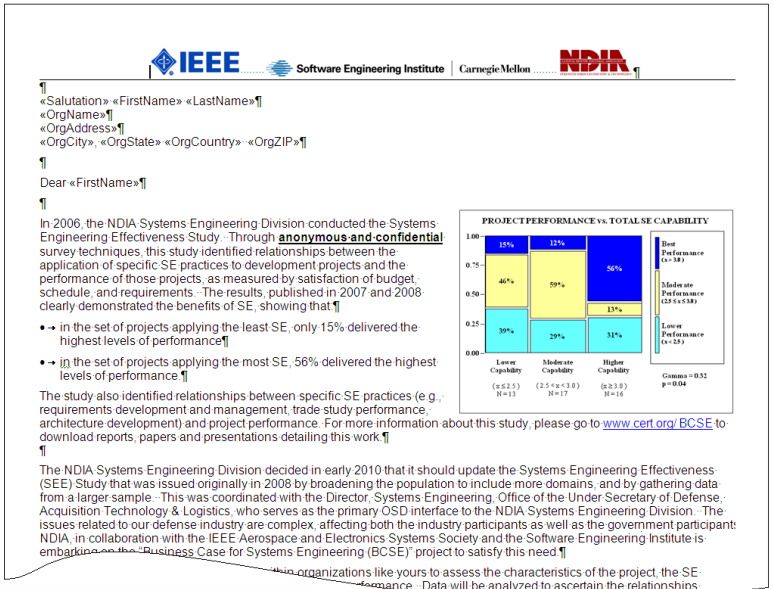
- Changing environment and threats
- "Do More With Less"
- More emphasis on multi-mission capability, adaptability and resiliency
- Results in increased complexity in functional architecture and resulting physical solution
- Systems have complex interfaces with numerous components
- An example has been the increase of the electronics footprint
- Demand for effective systems engineering practice

Systems Engineering Effectiveness Study

Systems Engineering Best Practices

- IPT-Based Capability
- Systems Engineering Mgmt Planning
- Monitoring and Control
- Risk Management
- Requirements Development and Mgmt
- Trade Studies
- Product Architecture
- Technical Solution
- Product Integration
- Verification
- Validation
- Configuration Management



IEEE Software Engineering Institute | Carnegie Mellon NDIA

«Salutation» «FirstName» «LastName»
«OrgName»
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Dear «FirstName»

In 2006, the NDIA Systems Engineering Division conducted the Systems Engineering Effectiveness Study. Through **anonymous and confidential** survey techniques, this study identified relationships between the application of specific SE practices to development projects and the performance of those projects, as measured by satisfaction of budget, schedule, and requirements. The results, published in 2007 and 2008 clearly demonstrated the benefits of SE, showing that:

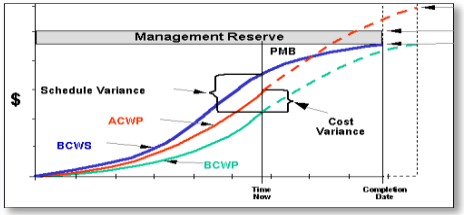
- In the set of projects applying the least SE, only 15% delivered the highest levels of performance
- In the set of projects applying the most SE, 56% delivered the highest levels of performance

PROJECT PERFORMANCE vs. TOTAL SE CAPABILITY

The study also identified relationships between specific SE practices (e.g., requirements development and management, trade study performance, architecture development) and project performance. For more information about this study, please go to www.cert.org/BCSE to download reports, papers and presentations detailing this work.

The NDIA Systems Engineering Division decided in early 2010 that it should update the Systems Engineering Effectiveness (SEE) Study that was issued originally in 2008 by broadening the population to include more domains, and by gathering data from a larger sample. This was coordinated with the Director, Systems Engineering, Office of the Under Secretary of Defense, Acquisition Technology & Logistics, who serves as the primary OSD interface to the NDIA Systems Engineering Division. The issues related to our defense industry are complex, affecting both the industry participants as well as the government participants. NDIA, in collaboration with the IEEE Aerospace and Electronics Systems Society and the Software Engineering Institute is embarking on the "Business Case for Systems Engineering (BCSE)" project to satisfy this need.

...thin organizations like yours to assess the characteristics of the project, the SE ...formance. Data will be analyzed to ascertain the relationships ...data security and confidentiality...



Higher SE Effectiveness Improves Cost, Schedule, Technical Performance

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Configuration Management – Mission Success!

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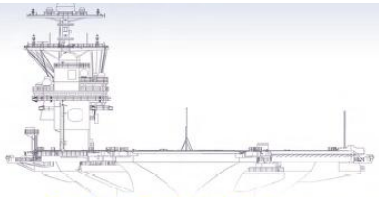
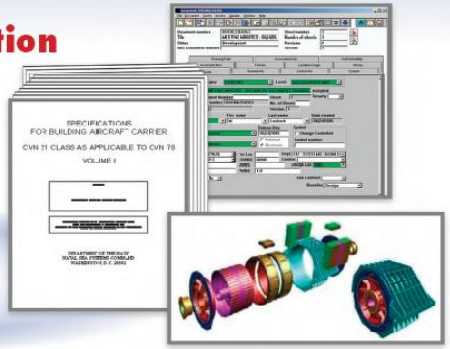


Carrier Conception

1 Configuration Identification

– What are your configurable products?

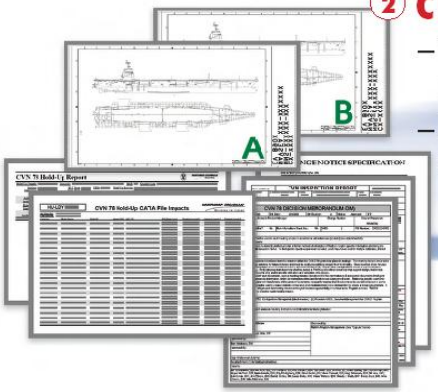
– Where are your configurable products managed?



2 Change Control

– What changes your configurable products and how do you control them?

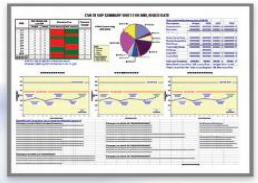
– How do you communicate changes to your stakeholders?



3 Status Accounting

– What is your current configuration?

– What changes are planned or were made?



4 Validation & Verification

– Did you design to your requirements?

– Did you build what was designed?

Carrier Completion

Ensuring Baseline Integrity throughout the Program Life Cycle

Innovation for Affordability

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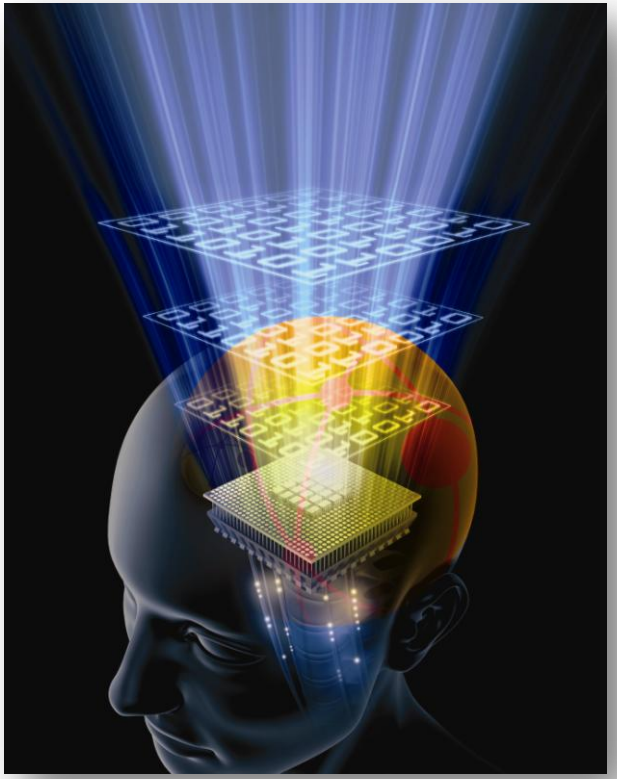
- Encouraging diversity of thought (alternative approaches to problem solving on a fundamental level)
- Approaching systems engineering with adaptability and resiliency in mind
- Creating an open innovation environment
- Leverage re-use through model-based practices
- Concept^{1st}



Creative Systems Engineering is Critical for Affordability

Satisfying the Mission…

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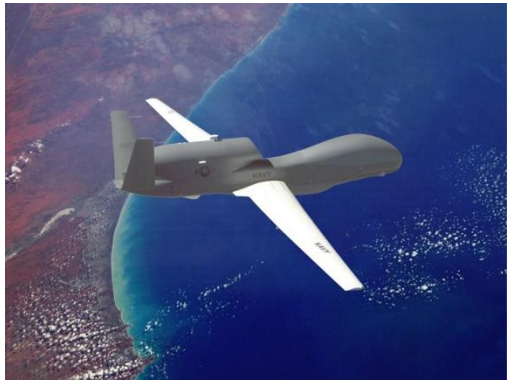





…Requires Effective Systems Engineering

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