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IBM Rational

A&D Trends, Challenges & Systems Engineering Solutions





Global Aerospace and Defense Market Environment

Drivers of Change (Mega-Trends)

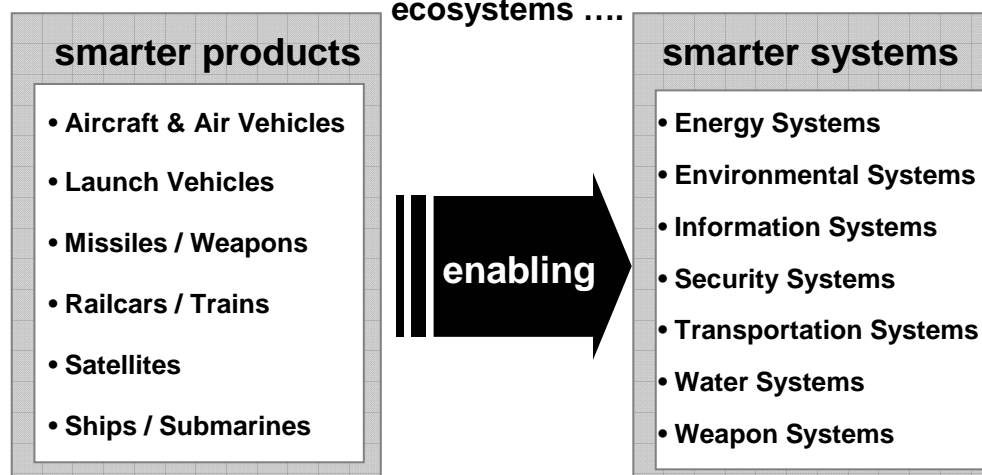


Key A&D Industry Challenges

New Business and Operating models
 Systems of systems and software
 Product to services
 Global integrated enterprise
 Risk and compliance
 Agility and efficiencies
 Visibility and control

Segment health	2009	2010	2011	2012
Commercial/ Regional Aircraft	Red Down Arrow	Yellow Double Arrow	Green Up Arrow	Green Up Arrow
General Aviation Shipments	Red Down Arrow	Red Down Arrow	Yellow Double Arrow	Green Up Arrow
Defense Budgets	Green Up Arrow	Yellow Double Arrow	Red Down Arrow	Red Down Arrow

A&D companies are seeking growth through new business opportunities across multi-industry ecosystems



Defense Industry Trends

Market Dynamics

Mature vendors looking to emerging markets amid mature market defense cuts and fiscal issues

A&D companies moving into adjacent, growth business areas of energy, etc.

Acquisition Reform and Contract changes to Firm Fixed Price vs. Cost Plus

Move to fewer and shorter programs vs. large platforms such as FCS or JSF

Increased demand for UAVs, bringing with it civilian FAA/Safety standards.

Competition from emerging markets

Implications

Commoditization; Rapid technological Innovation in developed markets; Focus on manufacturing in Emerging markets (offsets)

Need to identify and re-use/re-purpose existing IP and skills into profitable new product or service offerings or identify acquisitions such as security

Program Execution needs to become core competency amid increasing complexity. Increased Systems Engineering Capability

Agility in program execution, ability to quickly create product variants to meet specific customer needs.

Adjusting development processes to conform to regulatory requirements

Drive costs down through product line approach and looking to new, innovative product and services for differentiation



Pursuing New Markets

Where can we best compete?

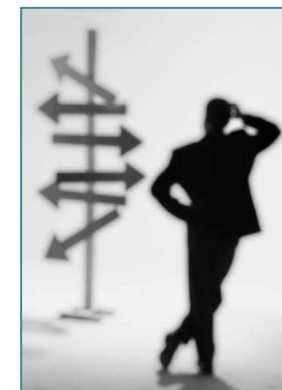
What products do we move forward?

How can I compete against new low-cost competitors and deliver unique, but related solutions to a diverse customer base?

Boeing purchased In Situ, manufacturer of the Scan Eagle UAV. Boeing and In Situ were also cooperating in marketing the Scan Eagle. The acquisition solidified the relationship.



Northrop Grumman purchased the Killer Bee UAV line from Swift Engineering to strengthen position in Tier II UAVs. Northrop Grumman has an extremely strong position in larger UAVs such as the Global Hawk and the Fire Scout.



Textron purchased AAI Corp., manufacturer of the Shadow UAV, in 2007. That acquisition revitalized Textron's position following the Coast Guard decision not to fund further development of its Eagle Eye UAV.



BAE Systems buys Advanced Ceramics Research, a US-based manufacturer of three small UAVs. The purchase gives U.K.-based BAE Systems, a foothold in the U.S. UAV market.

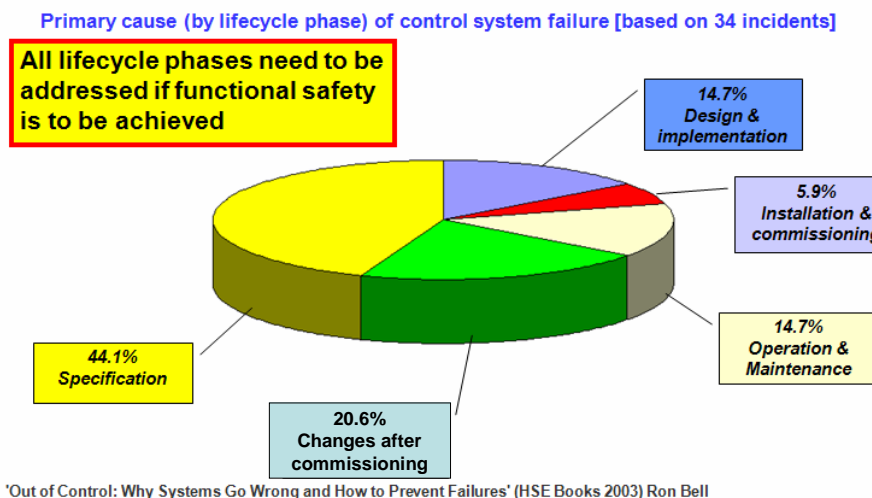


Program Execution and Agility: Defence Systems need to be Affordable, Work Right the First Time and Every Time

DOD maps out plan for acquisition reform and affordability requirements

Jan 03 2011

“**Requirements development**...has been identified as a weakness in the department and has led to cost and schedule overruns on many programs,” Kendall said in the memo. “Requirements development is paramount to successful acquisition outcomes. Gansler also stressed the need for DOD to institutionalize a **rapid acquisition process that uses short acquisition cycles and spiral development.**”

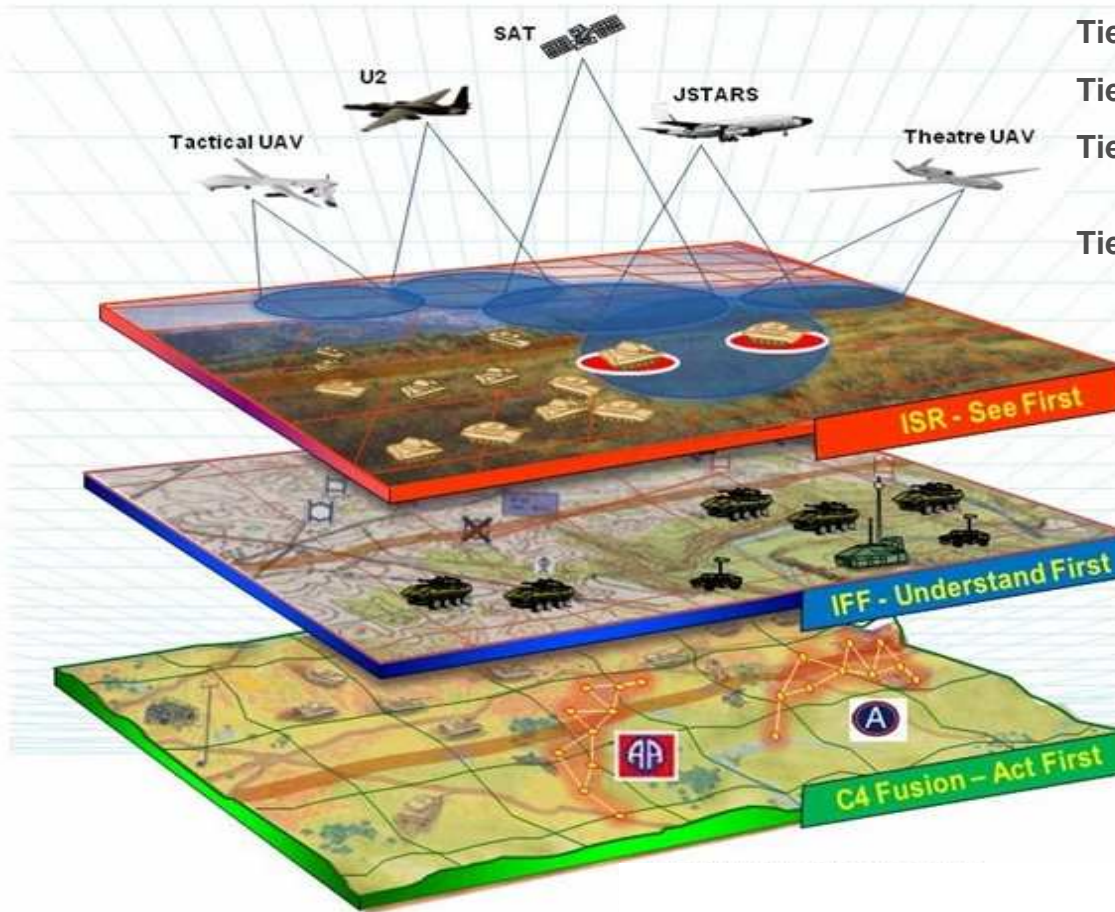


- The DOD is spending nearly \$18 billion¹ annually to develop, acquire, and operate satellites and other space-related systems. Space assets are ubiquitous and diversified in military operations.
- However, almost **every recent major DOD space system acquisition has experienced significant problems that increased costs, delayed schedules, and degraded performance.**

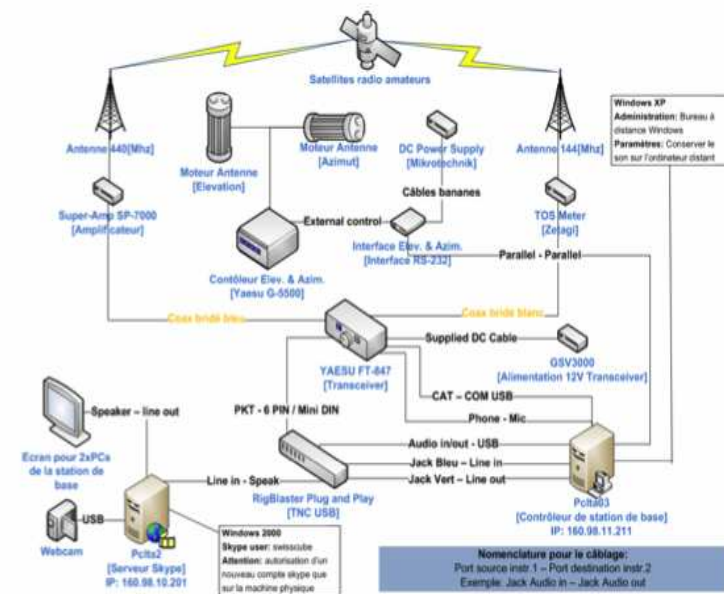
¹ This includes research, development, and testing; and operations and maintenance accounts (GAO-04-253T).



Incremental value is created by global interconnection across products, systems, applications and the Internet

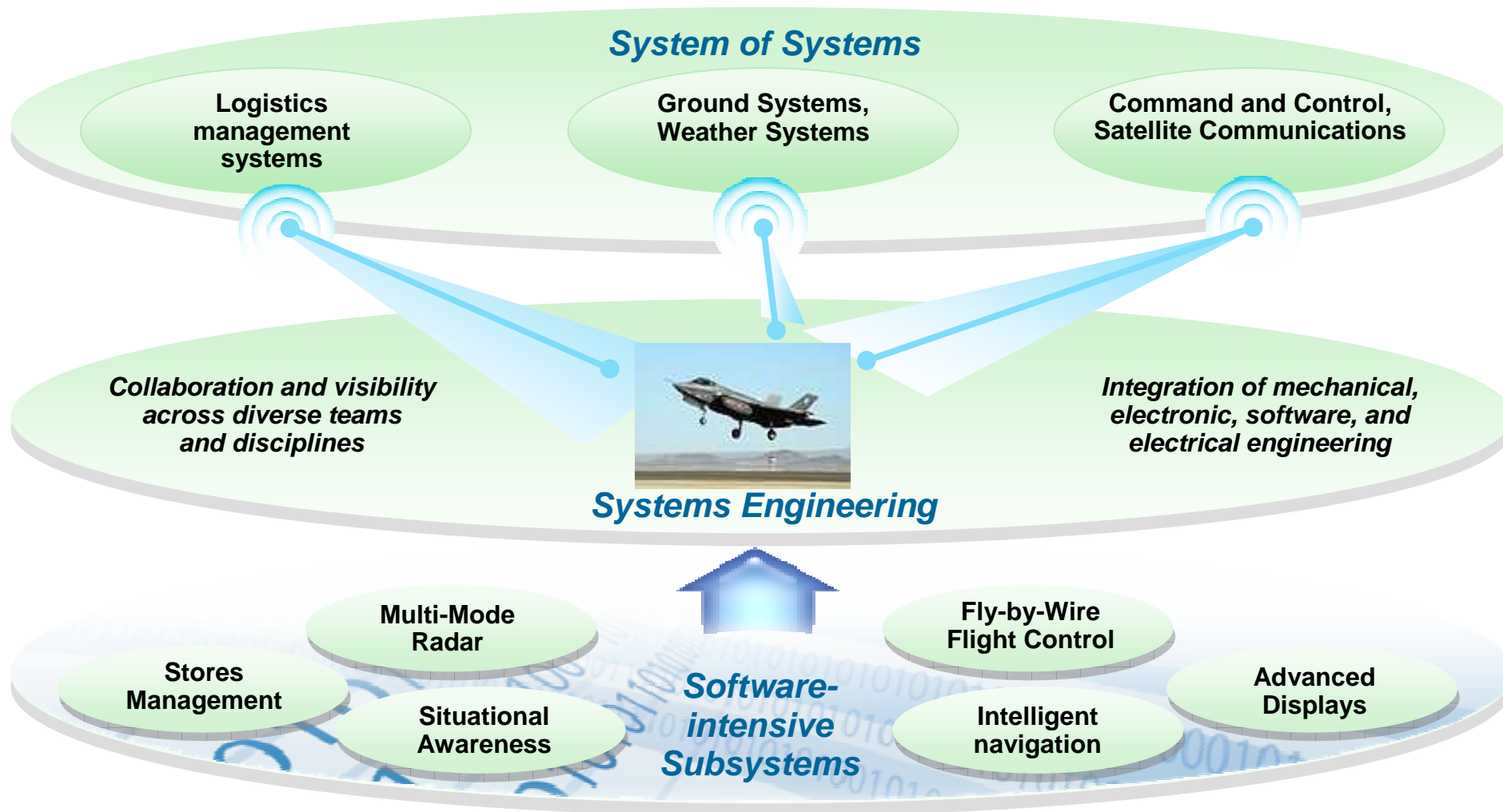


- Tier 0: Small or Micro UAV
- Tier 1: Low altitude, long endurance
- Tier 2: Medium altitude, long endurance (MALE)
- Tier2+: High altitude, long endurance conventional UAV (or HALE UAV)
- Tier 3: High altitude, long endurance low-observable UAV



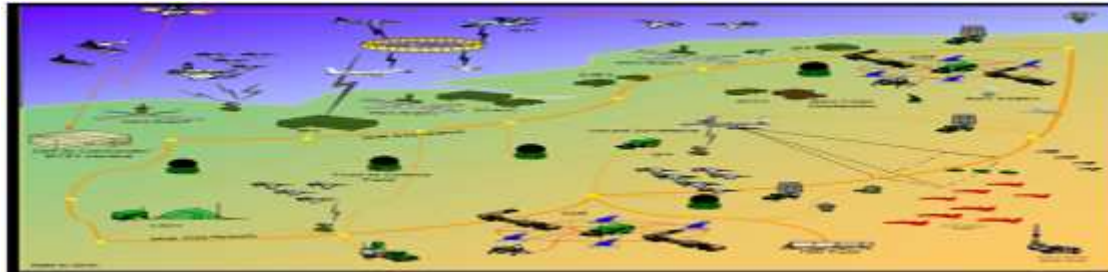
Tying it All Together: Smart Products and Services Example

From sophisticated in-device software, to complex “system of systems” ecosystems, products will continue to get smarter

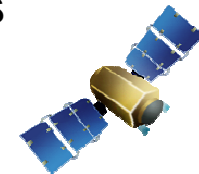


Delivery of smarter products and services will require new investments in software and systems

Connect multiple products and services into a “*system of systems*” to deliver unique value



Leverage *systems engineering* to accelerate time to market, improve quality and reduce costs



Develop a core competency in *software delivery* to produce products that are innovative

Rational Solutions for Systems and Software Engineering

Built on a core product set



Open Services for Lifecycle Collaboration

REQUIREMENTS MANAGEMENT

Manage all system requirements with full traceability across the lifecycle

Rational DOORS

QUALITY MANAGEMENT

Achieve "quality by design" with an integrated, automated testing process

Rational Quality Manager

ARCHITECTURE & DESIGN

Use modeling to validate requirements, architecture and design throughout the development process

Rational Rhapsody

COLLABORATION, PLANNING & CHANGE MANAGEMENT

Collaborate across diverse engineering disciplines and development teams

Rational Team Concert



Integrate



Collaborate



Optimize

Best-of-breed capabilities, integrated on a common platform



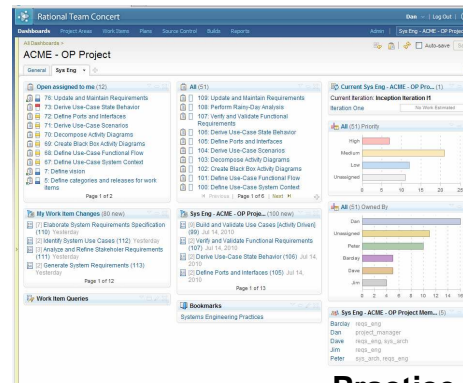
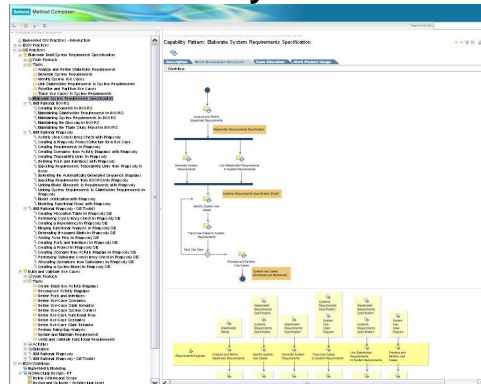


The new Rational A&D Accelerator for Systems and Software Engineering helps to support DO-178B safety critical standard



Learn and check how to use a Practice

A Practice library & tool mentors

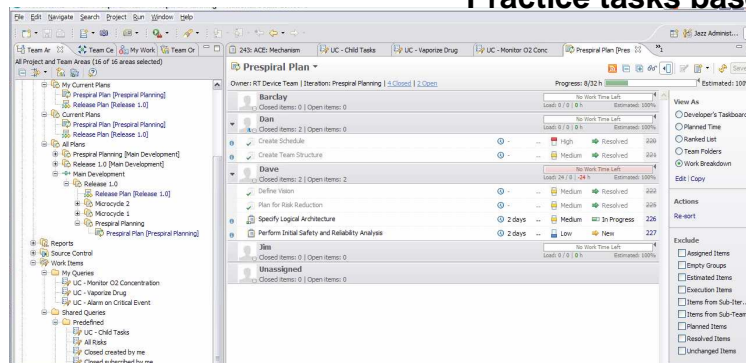


A dashboard in RTC



Check progress Understand tasks and deliverables

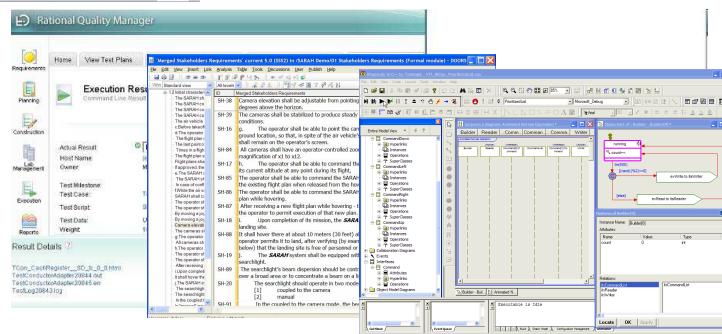
Practice tasks based on work items in RTC



Execute my tasks

Update my tasks

Collaborate with colleagues



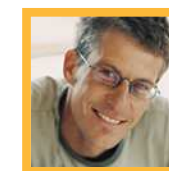
Starting templates

Artifact samples

Tool usage

DOORS

Rhapsody



Summary

- A&D industry challenges are impacting engineering practices
- Our solution for Systems and Software Engineering provides the platform to manage complexity in systems specification, design and development
- IBM's *solution for Systems and Software Engineering* will continue to evolve to address the specific needs of the A&D industry

