



Perspectives on SBA

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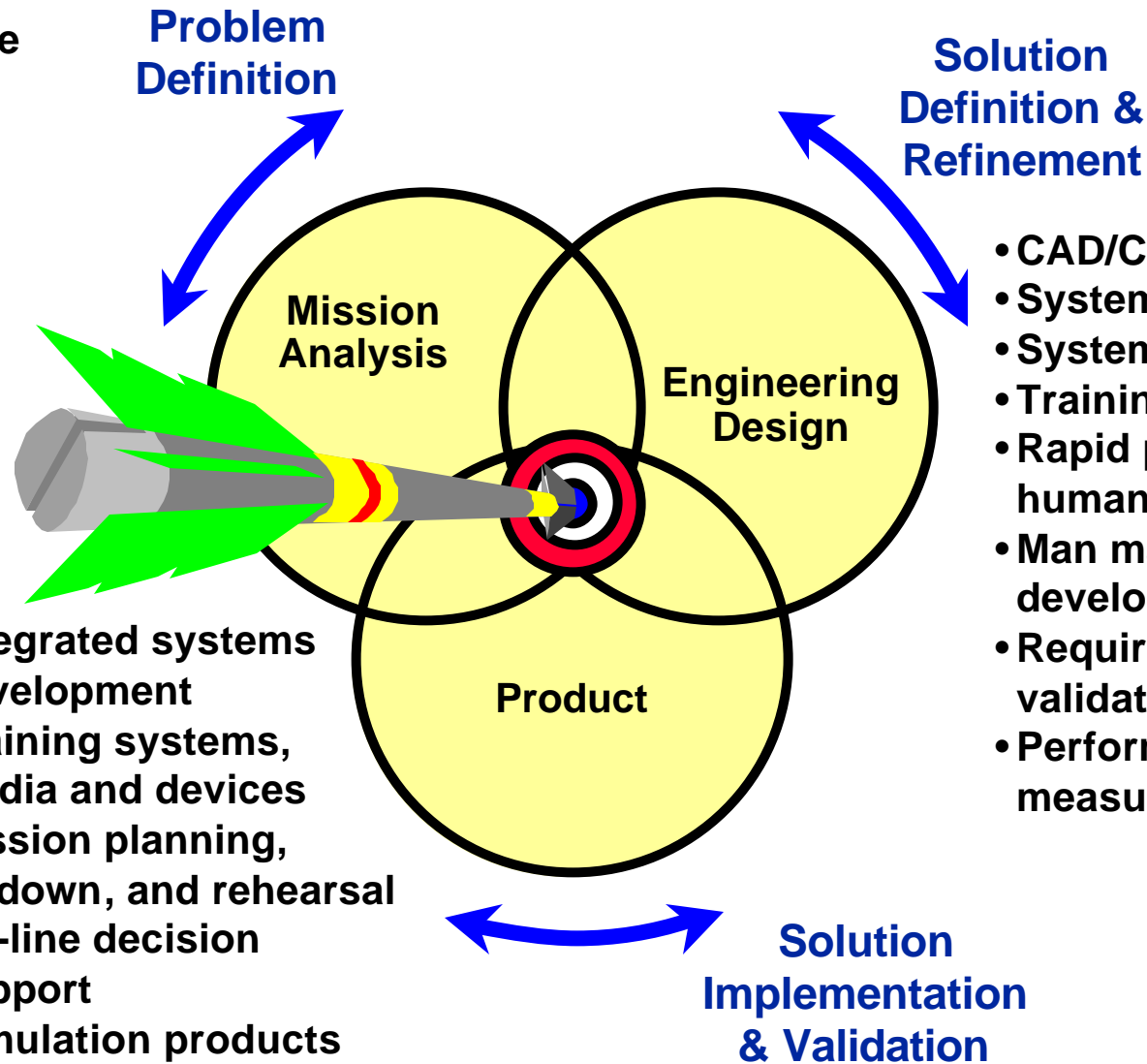
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- **Raytheon, and the defense industry in general, has a successful history collaborating with DoD PMOs applying modeling & simulation technologies on large programs**
 - **Inherent benefits in risk reduction and cost / schedule savings**
 - **Use of AIM-9X missile simulation during developmental flight testing avoided approximately \$110M testing cost**
 - **AIM-9X Modeling and Simulation Team won the NDIA M&S Award, Acquisition Category, April 12, 2001**
 - **Comprehensive modeling & simulation is gaining recognition internally as a “best practice” applicable to all programs**
- **DoD PMOs are embracing life-cycle M&S concepts**
 - **We are seeing a growing expectation for robust model-based analysis on major programs**
 - **Recent program starts, even some “small-ish” ones, are making this explicit**

Modeling & Simulation at Raytheon



- Domain expertise
- Battle labs
- Simulated environment
- Visualization
- Scenario generation
- Validation, performance measurement



- CAD/CAM
- Systems analysis
- Systems modeling
- Training analysis
- Rapid prototyping of human factors
- Man machine interface development
- Requirements validation
- Performance measurement

- Integrated systems development
- Training systems, media and devices
- Mission planning, laydown, and rehearsal
- On-line decision support
- Simulation products

Modeling & Simulation ROI

Continuing squeeze on company resources

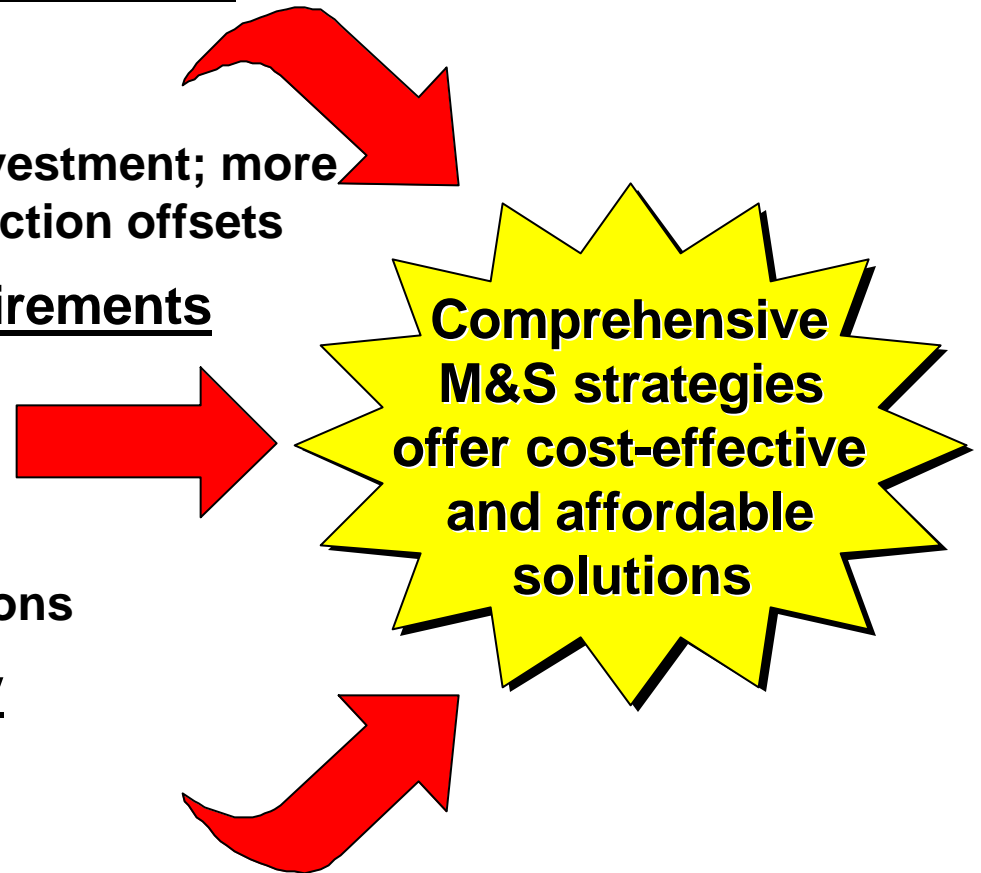
- Emphasis on “lean” execution
- Competition for funds
- Need to carefully examine every investment; more “opportunities” to invest w/o production offsets

More demanding operational requirements

- New DoD programs are complex
 - Earlier industry involvement
 - Increased systems complexity
 - Demand for *jointness* by customers
- Widely disbursed company operations

More available technical capability

- Communications
- Computers
- Software technology
- Displays / human-machine / embedded interfaces
- Data storage and management

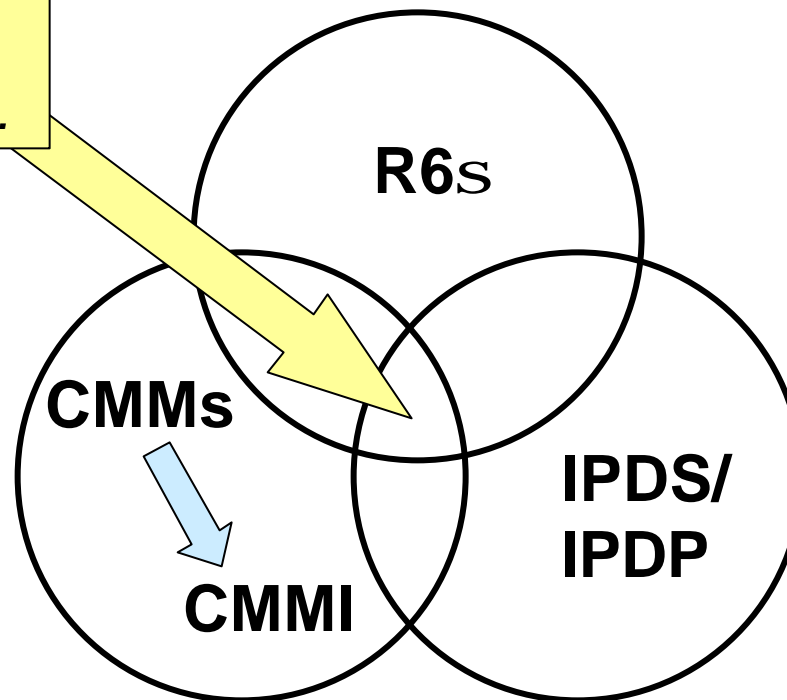


M&S Does Not Equal SBA



Raytheon programs integrate R6s, IPDS/IPDP, and CMMI into their plans.

The various CMMs, and now CMMI, provide guidance for creating, measuring, managing, and improving specific processes within Raytheon's IPDS / IPDP framework.



Raytheon Six Sigma (R6s) is our business strategy. It guides the application of the various CMMs (and now CMMI) in the context of Raytheon's IPDS / IPDP to deliver value to customers and to understand and integrate industry standards and best practices.

DoD's SBA vision fits well with the philosophy and techniques of R6s.

Raytheon's Integrated Product Development System (IPDS) & Integrated Product Development Process (IPDP) provide a complete set of best practices for product development and integrates them according to program requirements through a just-in-time tailoring process.

A focus on customer value and process improvement is equally critical

Simulation-Based Engineering



- Raytheon has an “SBA-friendly” corporate engineering culture
- Aspects of the SBA vision already exist within Raytheon
 - Collaboration
 - Use of CRADAs and other contractual collaboration mechanisms
 - Inter-networking w/ customer sites (DREN) and internally (ORION)
 - Integrated Digital Environment (IDE) solutions are being implemented
 - Reusable models and simulations
 - Missile Simulation Architecture / Framework
 - Tiger reconfigurable military vehicle simulation (COTS)
 - Interoperation
 - BroadCAST: Interactive interoperation between constructive and virtual Army M&S environments
 - Integrated Systems TestBed (ISTB): framework for distributed M&S
- If institutionalizing SBA were just a question of engineering feasibility, Raytheon would be well on its way

- **Multiple communities (Industry + DoD) are required to collaborate to effectively implement the SBA vision:**
 - **Mission Analysis + Engineering + Training + Financial + Program Management / Acquisition + Test and Evaluation + Logistics**

No precedence is implied by this ordering!
- **SBA requires agreement on a common basis for interoperoperation and (re-)use of each other's products and data**
 - **Software reuse hasn't (yet) been ingrained in the business model**
 - **The software engineers have been pursuing this goal for the CASE tool domain for 15+ years, with limited success**
 - **Proprietary single vendor and small "islands" of vendor-to-vendor custom solutions are the rule**
- **The intellectual and financial resources necessary to achieve critical mass in SBA have yet to be brought together**

Barriers to the SBA Vision



- **SBA implementation is currently unique within each Service, and at times within individual PMOs**
 - **Reduces ability to amortize infrastructure investments**
 - **Incompatible approaches levied by different PMOs and system primes on subsystem vendors will be unacceptable**
 - **SBA infrastructure is not equally affordable in every PMO**
 - **Commonality is needed for a cost-effective acquisition process for both DoD and Industry**
- **Even were we to achieve the “holy grail” of interoperability, barriers and uncertainty remain**
 - **Competitive barriers**
 - **Industry lacks the ability and incentive to share proprietary data**
 - **Implementation schedule and cost**
 - **We lack a mature understanding of the real effort to achieve a robust linkage of models across the product lifecycle**
 - **Enforceable policies and program funding**

- SBA assumes that both DoD and Industry will share a *clear* and *consistent vision* and engage in a willing *partnership* to implement that vision
 - Raytheon is ready to work with our customers to get there
- We will continue to invest in SBA technology and processes
 - We intend to be more than just responsive to RFP requirements
 - We desire a corporate SBA strategy leading to a common framework for responsiveness to ALL programs of interest
- Criteria for the *Win-Win situation* that we all seek:
 - Industry and DoD on a common path to SBA implementation
 - Industry and DoD roles clearly defined and articulated
 - DoD / Services / PMOs adequately funded to execute their inherent responsibilities