Thoughts on Interoperability

Briefing to the
Naval Interoperability Workshop

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Interoperability is what we say we want when it is least in evidence

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Purpose

- Workshop
  - Identify courses of action for the Department of the Navy to address issues of Interoperability and Integration within the DoN acquisition process
- Briefing
  - Share thoughts and discuss factors that should be considered when identifying courses of action

Outline

- Vocabulary
- Mythology
- Challenges
- Recommendations

Vocabulary

- “Interoperability” or “Capability”?
  - We often use the word “interoperability”, when what we mean is “capability”
  - “Interoperability” is a the outcome of “capability” provided by an ensemble
  - “Capability” is easily measured
- “Integration” or “Interfacing”?
  - In usage, these terms are often interchangable, but in execution are very different

Vocabulary *(cont.)*

- "Integration" or "Engineering"?
  - Integration is possible when two or more well-characterized components must be combined, through well-defined and controlled interfaces, to build some larger construct
- We are in the business of using a disciplined system *engineering* process to design, develop, field, and maintain warfighting *capability*
  - Integration and interfacing are necessary actions
  - Interoperability is an intended consequence

Mythology

- Government can't (shouldn't?) lead engineering efforts
- Industry knows what the government needs or wants
- Industry only does what the Government says
- The Government can issue *independent* performance specifications for two or more devices and expect those devices to work together to accomplish an arbitrary (often unspecified) mission
- Shortcuts are shorter (cheaper, better, …)
- Saying it's so, makes it so

Mythology *(cont.)*

- Demonstration-based acquisition is a substitute for a disciplined, requirements-based, system engineering approach
  - Better
  - Faster
  - Cheaper
  - More responsive to warfighter's needs
- System engineering *happens*
- I'm okay…you're okay…so, we're okay *together*, right?

It’s high jump, not limbo

It’s closer to football (or soccer) than golf

The *old* math

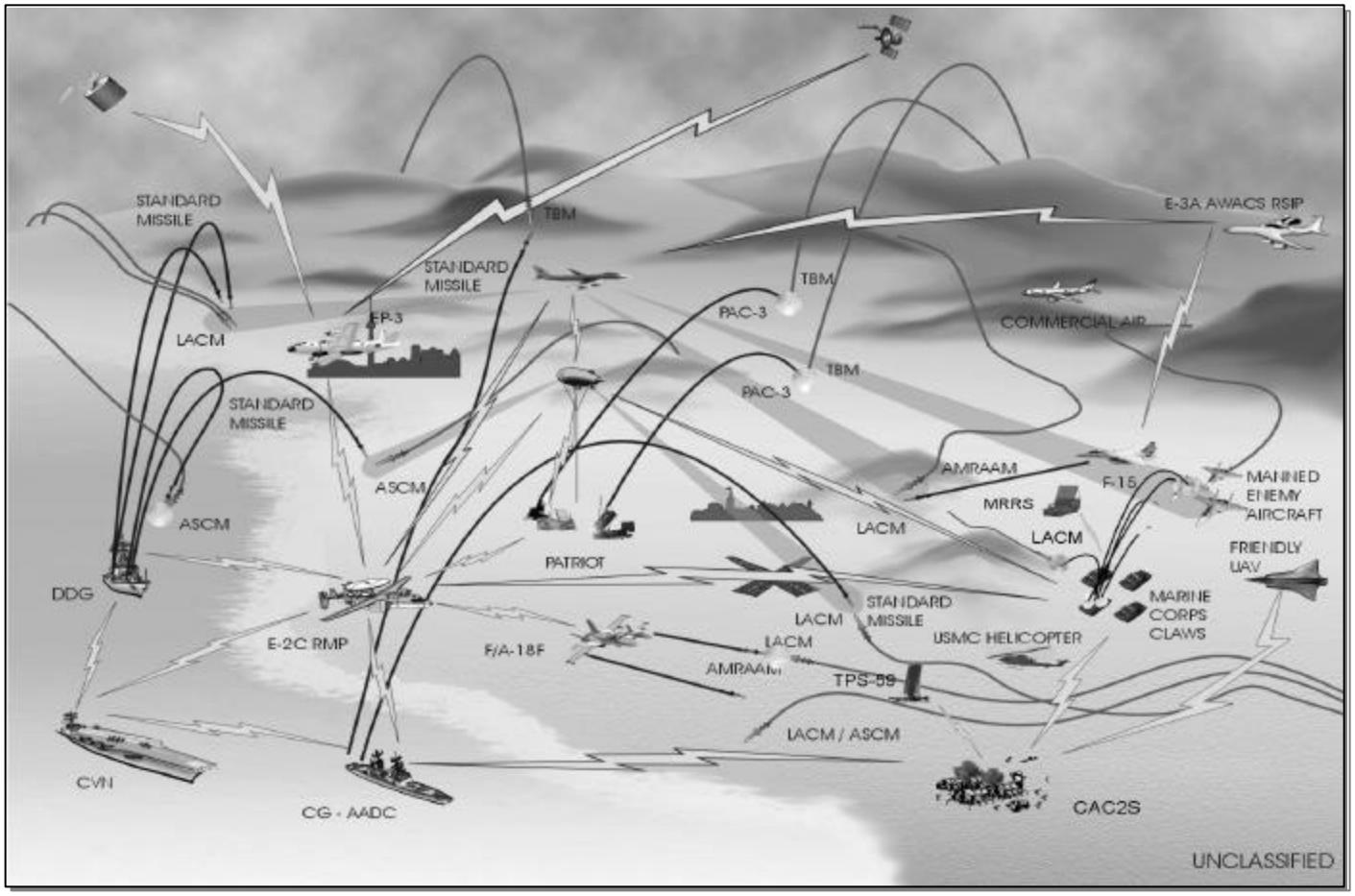
Functionality (requirements-driven)
+ Robust implementation (availability)
+ Connectivity
+ Trained operators
+ Resources (dollars and people)

Warfighting capability

Capability shortfalls -- causes

- Physics of the operating environment
- Mission-based system requirements shortfalls
  - Availability of individual systems and equipment
  - Design or implementation within individual units or in the interfaces between them:
    - Adequate specifications but poor implementation (program “bugs”)
    - Ambiguous specifications that are interpreted differently
    - Specifications that are silent or improperly stated
- Shortfalls in tactics, techniques and procedures (TTP) and training

Operating environment



What is the system?

Challenges

- Architecture
  - How does it all fit together?
  - Must be able to objectively assess good ideas in context
- Lack of understanding that interface requirements are really requirements
- Government and industry have inherently different objectives and motivating factors
  - While comforting, the assumption that our interests are aligned is dangerously naïve, incorrect, and doomed to failure
  - Corporate America has no responsibility for the common defense
  - Government has no responsibility for turning a profit

Challenges *(cont.)*

- Familiarity breeds contempt
  - Government and industry have a *business* relationship, not a *social* relationship
- Demographics of the government workforce, desire to shrink the government bureaucracy, the relentless march of technology, and competition with the private sector for scarce human resources have conspired to reduce the number of people who are competent to lead the engineering and fielding of complex systems to dangerously low levels
  - Emphasis on engineering *leadership*
  - Career path clearly identified?
  - Life-long training and re-training?

Challenges *(cont.)*

- Our contracts appear to lack the level of detail to communicate the expectations of the government
- Contract definition shortfalls are compounded by inability to verify compliance
- Partnership relationship makes exercise of contractual remedies unpleasant
- Relationship of Award Fee and product quality (as measured in the field) is sometimes unclear
- Crisis management isn't

Recommendations

- Understand the destination
  - Detailed model of the desired end state
  - Characterize the operating environment
  - Understand the “partials”
  - Make informed trades and decisions
  - Design for success
    - Pay attention to availability and usability
- Demand quality
  - Don’t be amazed when it works – be amazed when it doesn’t
- Incentivize to meet requirements
  - Objectively reward performance

Recommendations *(cont.)*

- Test wisely
  - Recognize that testing is not a substitute for engineering
- Independent verification and validation
  - Start with the requirement/specification
  - Build the right system
  - Build the system right