Early Systems Engineering for Tech Base Projects

Richard Swanson

High Performance Technologies, Inc

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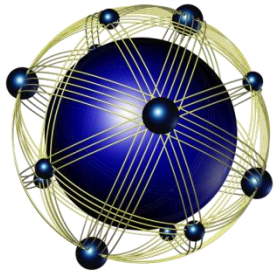


Agenda

- Problems Faced by Tech Base
- Solution Theory
- Solution Implementation
- Solution Benefits
- Project Example
- Lessons Learned – SE for S&T

Problems Faced by Tech Base

- Tech Base Projects can be unsuccessful transitioning their technologies
  - Do no meet current warfighter needs
  - Unsure how to communicate the products usefulness
  - Unable to integrate in to the bigger picture
  - Projects are organized like science projects
    - Focus is on the feature or scientific breakthrough

Solution Theory

- **Improve Development Planning (SE Early)**
  - **Integrate tech base development projects to Capability Gaps**
    - JCIDS CBA artifacts
    - Other “approved” warfighter need sources
    - Specific (larger) program’s required capabilities
  - **Accurate, complete, verifiable alignment of project to DoD needs**

Solution Theory (cont.)

- Apply Requirements Engineering best practices to S&T
  - Discover functional needs to meet Gaps
  - Align technologies that satisfy these functions
  - Provide traceability for assessment & reporting
  - Provide starting point for Performance Requirements

Solution Implementation

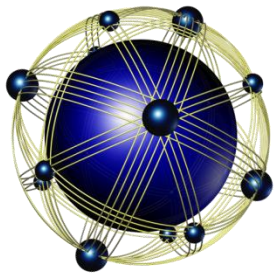
- Warfighter needs as a top level document
- Analyzed the needs to discover technology areas of interest
  - Not a solution
- Performed functional decomposition
- Aligned promising technologies

Captured in a Requirements Database

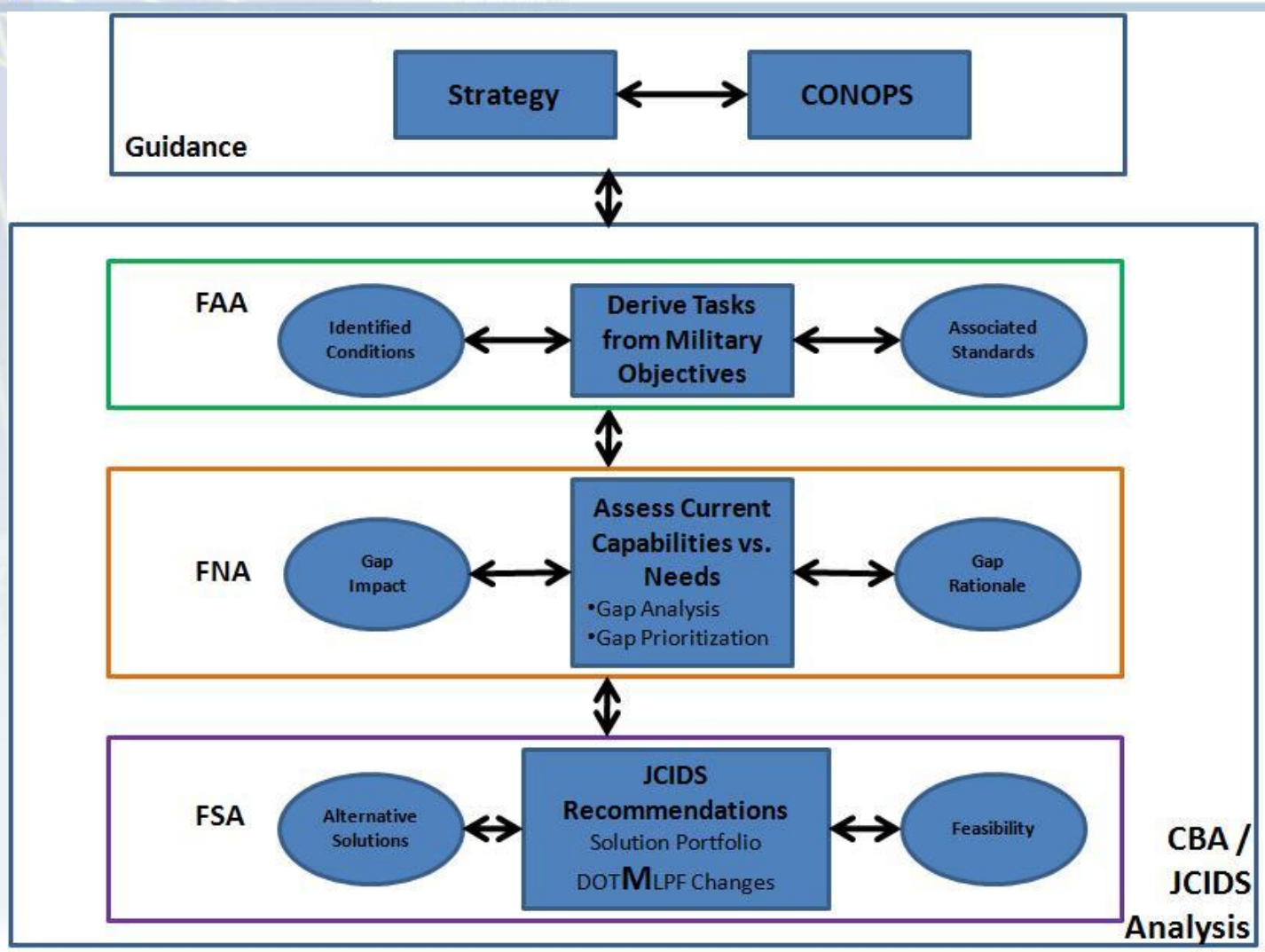
Solution Benefits

- S&T project focused on warfighter need from the beginning
- S&T project leadership able to “sell” themselves as critical technology for closing a Capability Gap
- S&T organizational leadership able to defend the project’s funding
- SE artifacts available for future customers

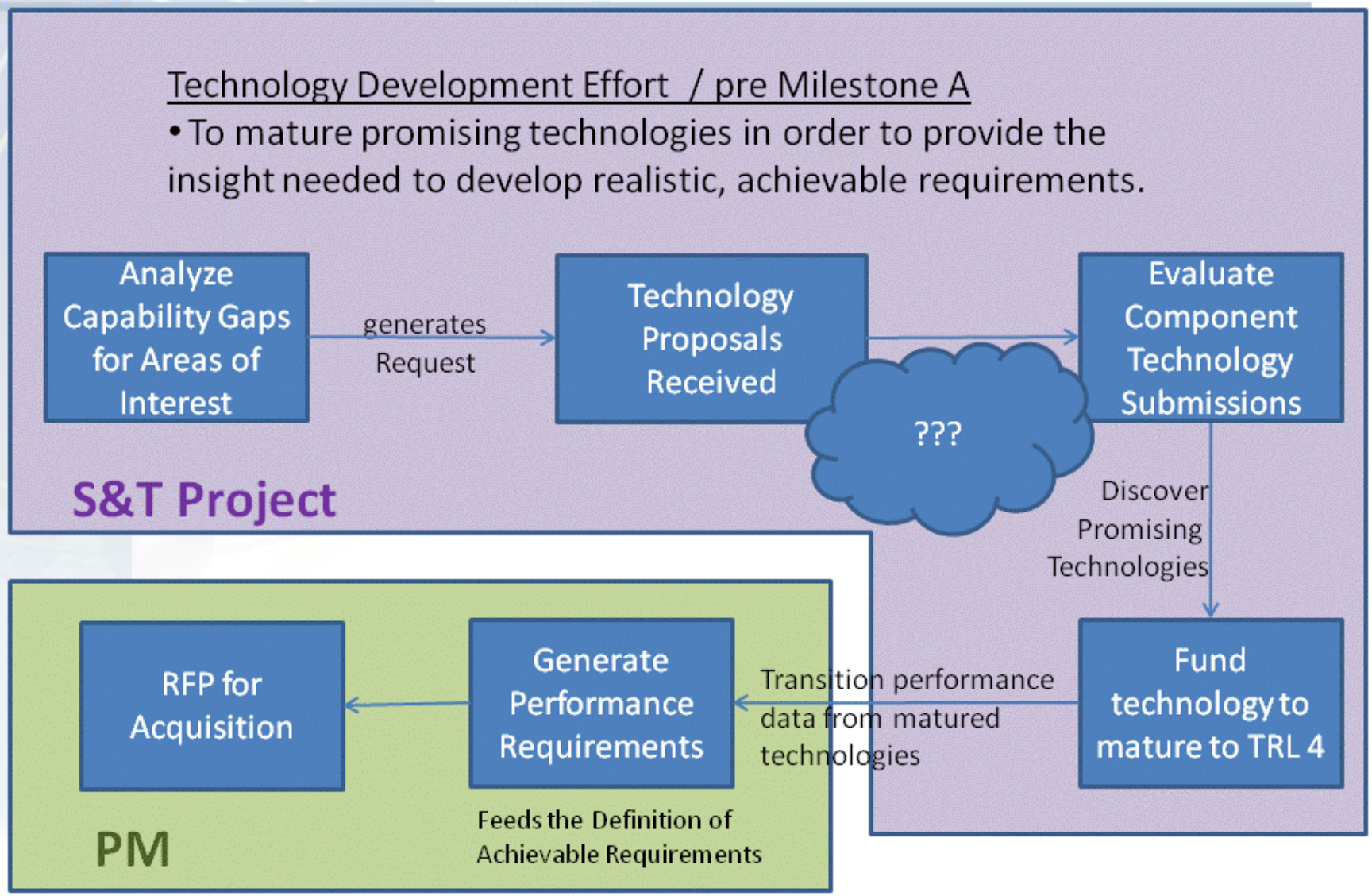
Project Example



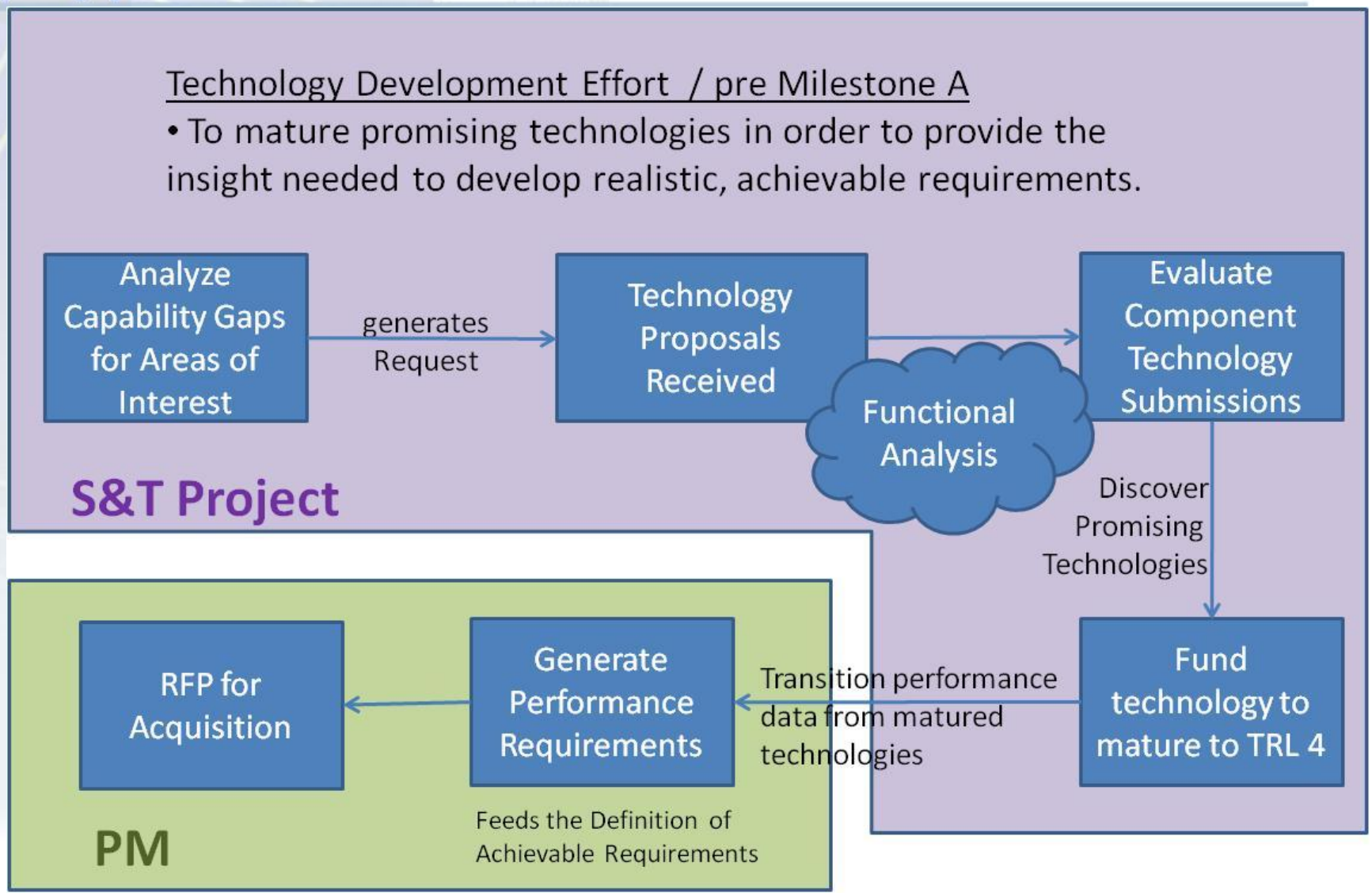
JCIDS CBA process



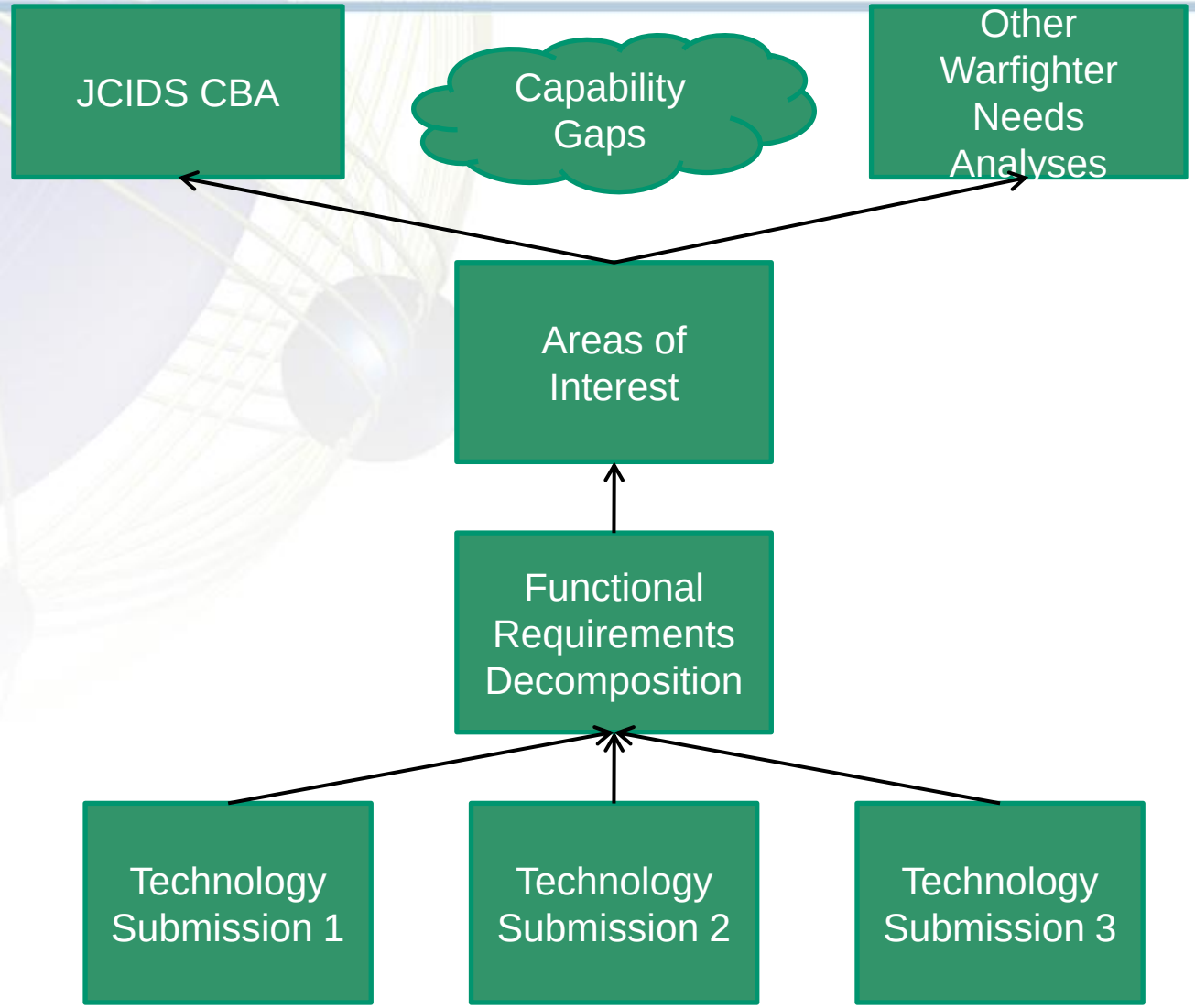
Example


Technology Development Effort / pre Milestone A
• To mature promising technologies in order to provide the insight needed to develop realistic, achievable requirements.
Analyze Capability Gaps for Areas of Interest
generates Request
Technology Proposals Received
???
Evaluate Component Technology Submissions
S&T Project
Discover Promising Technologies
RFP for Acquisition
Generate Performance Requirements
Transition performance data from matured technologies
Fund technology to mature to TRL 4
PM
Feeds the Definition of Achievable Requirements

Example (cont.)



Requirements Trace



Lessons Learned – SE for S&T

- **Just enough, Just in time MBSE**
  - Use MBSE to capture discussions and perform already scheduled tasks
- **Requirements (Capabilities) Capture**
  - Improves Senior Level Leadership Reviews
  - Project Knowledge Captured for Future Iterations
    - ✓ Rationale!
  - Impact Analysis becomes Possible
- **Application of Decision Analysis and Resolution**
  - Defendable Decisions