National Defense Center for Energy and Environment

Technology Roadmaps for Effective Req'ts Mgmt and Successful Technology Transition

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Using (Technology) Roadmaps in the Army Installation & Environment (I&E) Communities

- **Army I&E communities recently collaborated to revise Force Operating Capability (FOC)-08-04 "Mission-Ready, Sustainable, and Resilient Installations" for TRADOC PAM 525-66.**
  - To better account for installation end-users' needs in the areas of sustainability, readiness, and quality of life.
  - Recent research on joint and Army concepts, policy, and guidance related to installations and Army Transformation was incorporated in the revised FOC.

Project Objectives

- **Develop capability needs-based planning tools to support future combat development.**

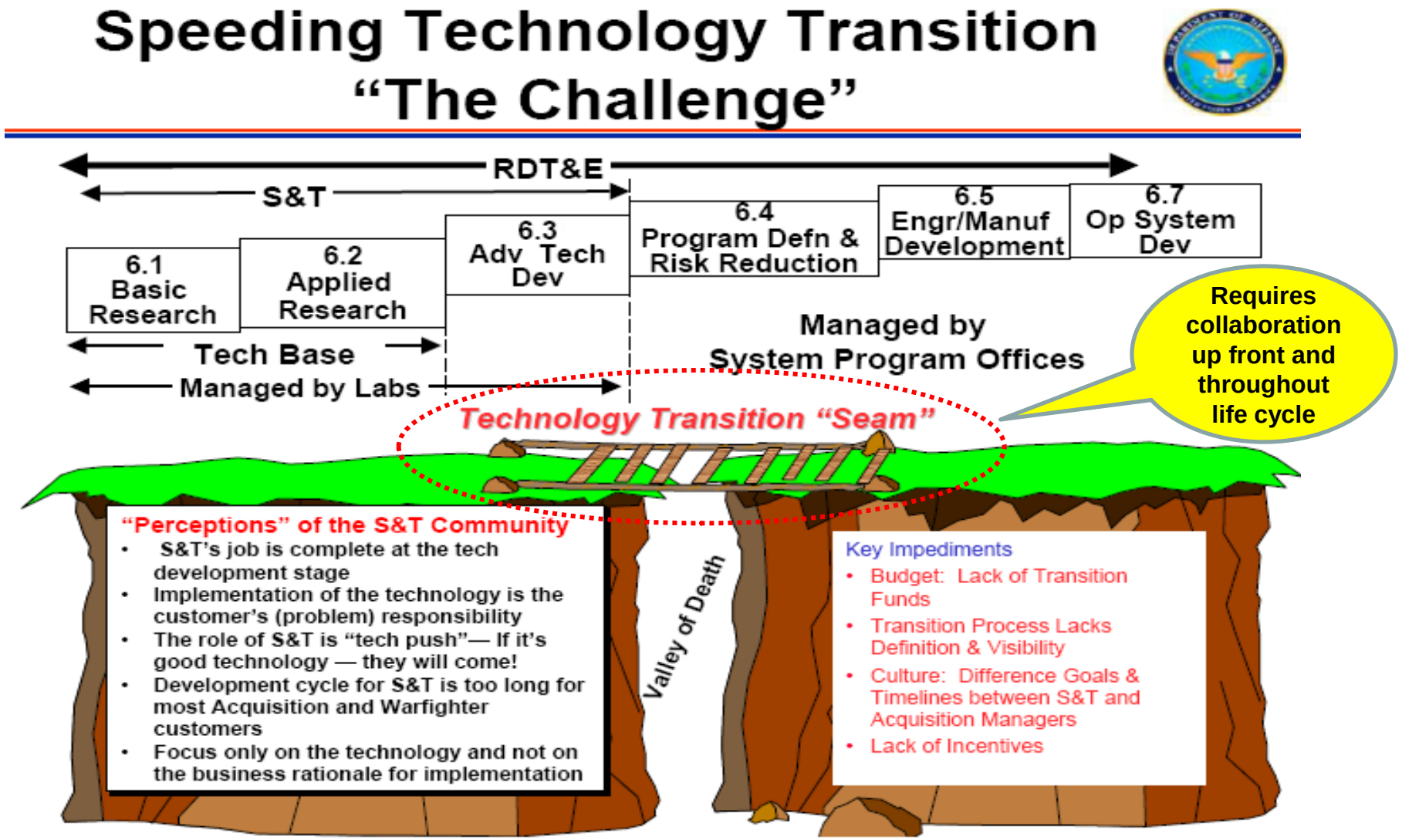
1. ***Capability Needs Roadmap*** (and process) that most effectively captures and plans for installation end-users' most critical future capability needs.

2. ***Technology Portfolio*** (and readiness assessment methodology) with detailed capabilities and performance variables of technologies that stakeholders are planning to invest in.

3. ***<u>Composite</u> "Capability Needs-Technology Portfolio" Roadmap*** showcasing the most promising solutions (e.g., maximum number of installations using them or planning to integrate them) and which technologies are being planned for by the Army I&E community to satisfy the highest priority capability needs.

Recommended Technology Transition Plans to Stakeholders

The Challenge



What is the Valley of Death?

- ✓ **Have a promising technology.**
- ✓ **Fulfills a real capability need.**
- ✓ **Looks good in the lab.**
- ✓ **Planned resources (6.4) are minimal to help facilitate technology transition.**
- ✓ **Never transitions to field use or deployment.**

Steps to Take to Help Overcome the Valley of Death

1. Confirm the Capability Need Up Front

- **It is vital that a defined need for a proposed new solution be specifically defined up front, before technical work is initiated.**

- **Evaluate:**
  - **What has been tried in the past?**
  - **What are the performance, schedule, cost, and reliability requirements to satisfy the capability need?**

- **Focus on higher-priority, more critical capability needs.**

2. Secure a Serious Stakeholder

- **Innovation work should not be done in a vacuum.**
- **Identify a specific, real-world person who:**
  - Has a personal interest in finding a solution.
  - Understands the capability needs / requirements.
  - Ideally will commit to adoption, if successful.
- **Create "capability needs pull" versus "technology push."**
- **Find a "CHAMPION" for the solution/technology.**

3. Confirm Stakeholders Have Resources

- **Make sure that interested stakeholders have the funding (planned) or can tap into other resources that will be needed to:**
  - Mature the technology.
  - Validate its performance against standards.
  - Provide acquisition funding to buy the product.

- **Consider all costs likely to be incurred:**
  - Lab/field testing & validation.
  - Production options, including equipment.
  - Replacement, training, and maintenance costs.

4. Assess Total Life Cycle Cost Benefits

- **Include an economic analysis in your planning.**
  - A cost-benefit analysis using reliable data in readily understandable methods can be powerful support for adopting new solutions.

- **Understand side-by-side costs.**

- **Consider other cost considerations:**
  - Environmental benefits
  - Conversion costs (training, etc.)
  - Maintenance costs

5. Conduct Up Front Technology Transition Planning

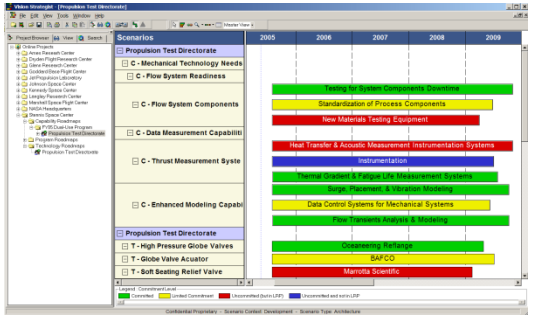
- **Incorporate tech transition planning early in the technology identification, funding, and validation process.**
- **Technology transition planning is <u>not</u> something you "do at the end of the project."**
- **Ensure planned resources are aligned with the procurement cycle.**

6. Define an Exit Strategy Up Front

- **Plan for success – but be prepared for failure.**
- **Define specific exit criteria up front.**
- **When a successful outcome becomes more unlikely, "pulling the plug" is defined.**
- **Assures that funds and effort are not expended beyond the point where further testing or analysis would be productive.**

7. Consider the Use of Roadmaps

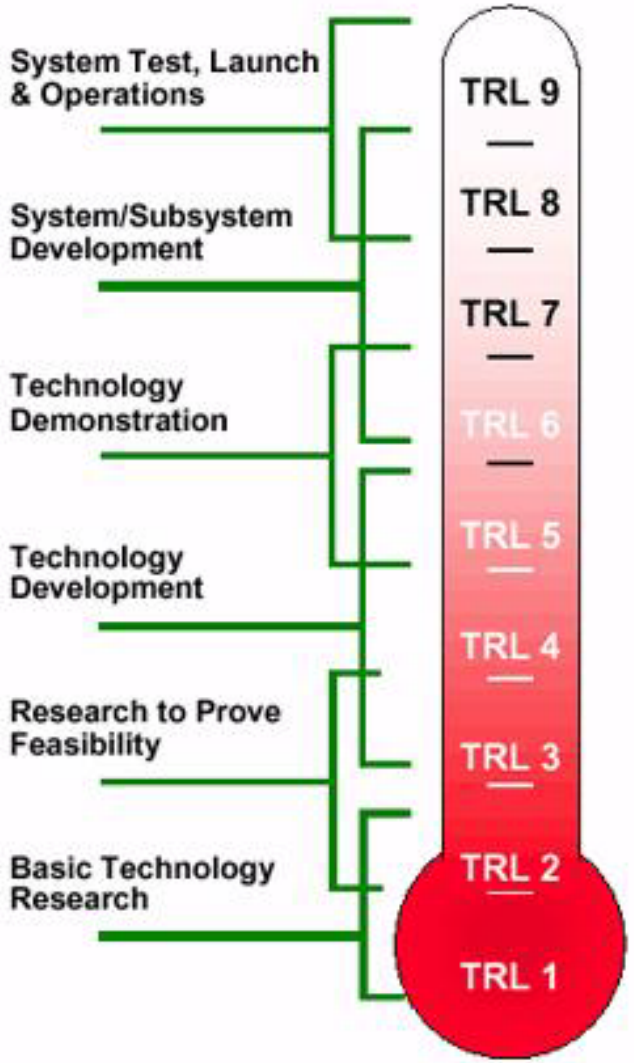
- **Strategically plan capability needs and requirements.**
- **Identify candidate technologies, systems, devices and processes that could provide innovative solutions to those needs.**
- **Identify “technology gaps” where no emerging solutions show promise, allowing Research & Development (R&D) funding to be targeted at those areas to create solutions.**



8. Conduct Technology Scouting

- **Do not automatically pursue technical solutions. See what other candidate solutions are out there.**
- **Investigate alternative solutions, systems, and processes with an unbiased eye.**
- **Utilize available information-gathering tools to investigate:**
  - Where research is underway.
  - What COTS/GOTS solutions may exist.
  - What patents or Phase II SBIR technologies exist.

9. Readiness Assessment Methodology



Uses of Technology Readiness Levels

The primary purpose of using TRLs is to help management in making decisions concerning the development and transitioning of technology.

Advantages include:

- ✓Provides a common understanding of technology status
- ✓Risk management
- ✓Used to make decisions concerning technology funding
- ✓Used to make decisions concerning transition of technology

9. Readiness Assessment Methodology *(cont.)*
Other Readiness Levels

Manufacturing Readiness Level (MRL)

- Measures the readiness of the production system to manufacture the technology being developed. (For example, technologies at TRLs 1 and 2 are too immature--the lowest MRL is associated with TRL 3.)

Programmatic Readiness Level (PRL)

- Questions to measure some program management concerns, such as Customer Focus and Program Documentation. Usually concern only the gov't PM.

TRL Calculator:

- Used to measure individual technical, manufacturing, and programmatic readiness levels for a technology, with an overall TRL that rolls all three measurements into one composite rating.

Integration Readiness Level (IRL)

- Indicates the isolated maturity of a technology, not whether it will fit or work in a specific system or operational environment.

System Readiness Level (SRL)

- Integrates individual systems or extensive elements of a system into its full operating system.

10. Communicate, Communicate, Communicate

- **Identifying, validating, and prioritizing capability needs involves various stakeholders and a disciplined practice for representing the end user.**
- **Scouting for, evaluating, testing and deploying new solutions and technologies involve a broad variety of people, offices, and agencies.**
- **Effective and frequent communication between these parties is essential to assure timely, documented, targeted, and actionable information.**
- **Assure everyone knows his/her role, responsibilities, and deliverables.**

Project Planned Outcomes

- **Leverage the progress from the revised FOC to further integrate this community of practice.**
- **Establish a more viable Army I&E combat developer's role for representing the end-user's needs.**
- **Provide Army I&E leadership with a visualization of capability needs and the candidate solutions to satisfy them.**
- **Promote technology standards for maximum use.**
- **Recommend Technology Transition Plans to stakeholders.**
- **Help facilitate "what if" scenarios should a technology development schedule or Army program management schedule get accelerated or delayed.**
- **Ensure the technologies the Army is planning to invest in remain aligned with its evolving mission, new strategies, and emerging new capability needs.**

Primary Outcome

The warfighter is provided the right Technology… at the right place… at the right time.

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