

Technology Development and Deployment

Making Technology Work for Soldiers

Purpose

To offer some thoughts on improving the management and deployment of technology.

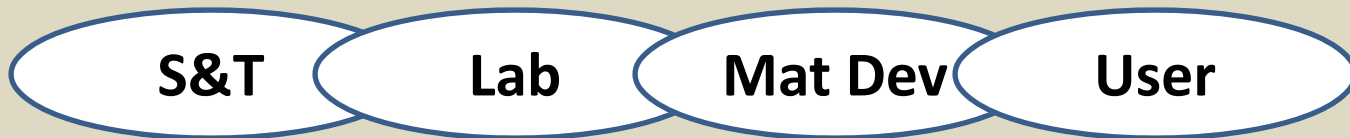
From Laboratory  **Soldiers**

Provocative Statement

New technology development and deployment is too important to be left to technologists.

The Current Process

- A multi-billion dollar enterprise.
- A flood of technology.
- Issues:
 - Relevance
 - Application
 - Digestibility
 - Integratability
 - System and organizational engineering



The Technology Base

- 18 Army Labs
- 9 Research and Development Centers
- 20 DOD Labs
- 33 Labs From Other Government Agencies
- 200 Labs From Industry and Academia

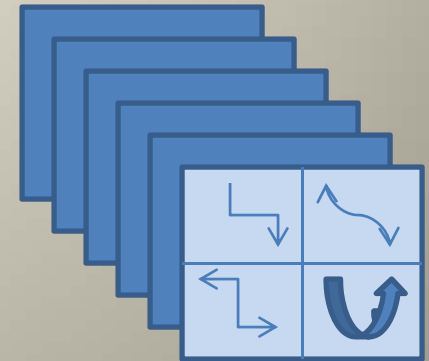
The Material Development Structure

- 11 PEO's
- 69 PM's
- 42 Battle Labs

With Senior Leaders Trying to Figure it all out...and Decide

The Decision Maker Dilemma

- What do I invest in?
- What do I buy?
- What do I deploy?
- How do I know:
 - If the systems are mature?
 - If the structure is ready?
 - If it will improve warfighting capability?



500 Quad Charts

Not Scientists

Not Engineers

Not Technologists

The Current System

Technology Readiness Levels – TRL

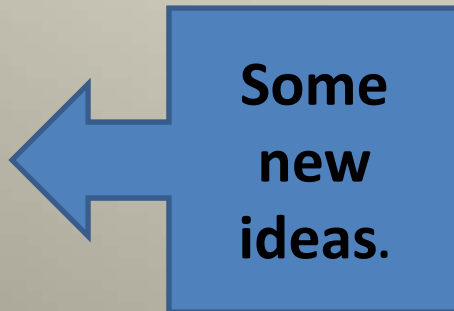
- A great idea!
- A fairly common language for assessing maturity levels of technology.
- A common reference point for technologists and material developers.
- Facilitates “Peer Review” and outside opinions.
- Narrows the problem for non-tech decision makers.
- Insights for:
 - Viability
 - Continued investment
 - Transition
 - Cancellation



But it does not go far enough.

Metrics for Managing the Development Lifecycle




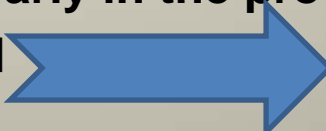
- Need
- JUONS
- TRL
- TRRL
- IRL
- MRL

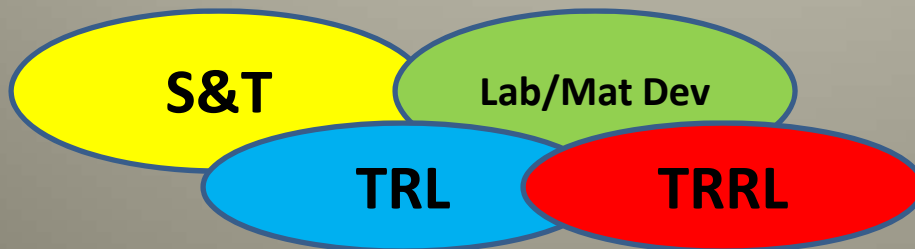


Not about contracting

Not about RFPs

Transition Readiness Level - TRRL

- **Transition – The handoff of technology to another stage of development.**
 - 6.1/6.2  6.3
 - 6.3/6.4  Mat Developer
 - Mat Dev  User
- TRRL applied in conjunction with TRL to assess “transitionability.
- TRRL assessment should begin early in the process.
- Some key issues to be addressed 



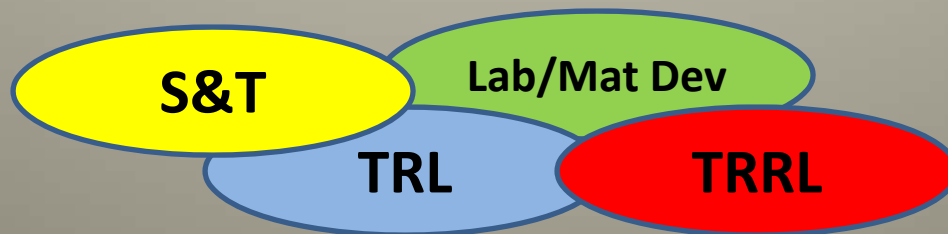
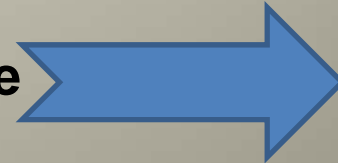
Some Key Questions for Assessing TRRL

- **Given the relative maturity of the technology, is there an agent that can develop it to the next level of maturity?**
- **Is there an agent that wants the technology?**
- **Is there an existing capability/capacity for further development?**
- **Is there a program for financing further development?**
- **Is there a required end state capability that is facilitated by this technology?**
- **Is there a material developer who can build, integrate or insert this technology?**
- **Is there a combat developer who needs/wants it?**
- **How does it fit into the O&O concept of present and future formations that are supported by doctrine?**

Benefits of A TRRL

- Helps synchronize the hand off process.
- Enables better decisions to handoff or...not to handoff.
- Facilitates planning and coordination for transition.
- Enables a better common understanding between leaders and managers inside the technology community and those leaders and managers outside the technology community.
- It integrates development and transition in a rational way.

But...there's more

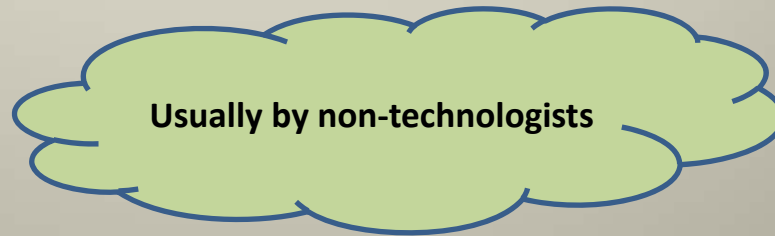


Integration Readiness Level - IRL

“No integration problem is too small to be screwed up.”

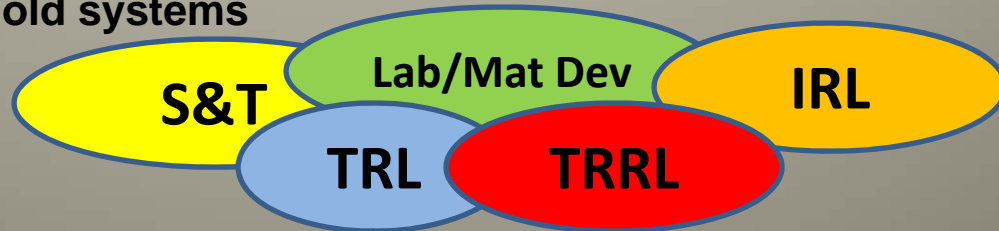
- **Most weapons platforms are now a “system of systems”.**
- **We must understand technology integration in the context of the system. Example: three technologies at TRL 7 does not necessarily = TRL 7 when integrated into a system of systems.**
- **Decisions to insert or integrate technologies drive:**

- Resourcing
- Deployment schedules
- Fielding schedules
- Capability development
- Training plans



- **The only constant is change:**

- New technology
- New systems
- New technology in old systems
- Hardware/software



Some Key Questions for Assessing IRL

- **Is this technology part of a planned system of system?**
- **Is it a technology insertion into an existing system?**
- **What are the other companion technologies?**
- **What is the TRL/TRRL of the companion technologies?**
- **What is the system on which these technologies are to be applied?**
- **What are the systems engineering issues that have to be resolved?**
- **How does this technology affect other sub-systems?**

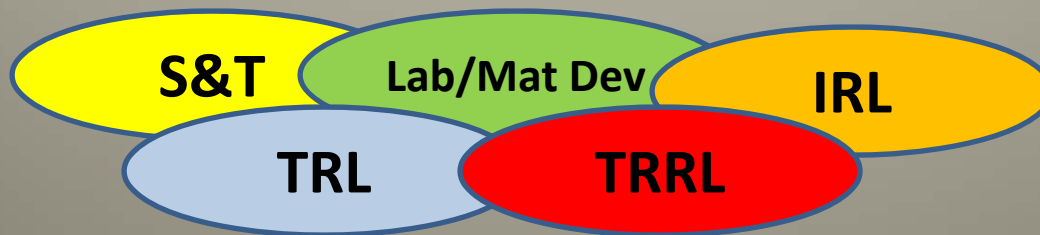
Key Questions For IRL Assessment **(Continued)**

- **Will this technology provide an improved capability or satisfy an objective capability?**
- **Are all of the new technologies necessary to achieve the required objective capabilities?**
- **What cost, performance and schedule tradeoffs are required?**
- **Can we achieve the desired capabilities at a cost we can afford by the time we need them?**
- **What are the alternatives and the risks?**

Benefits of An IRL

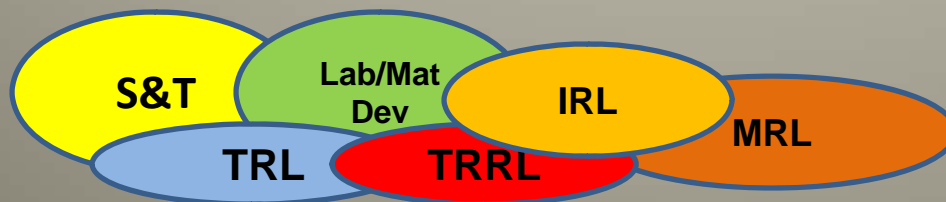
- Requires a comprehensive “system” focus.
- Helps non-tech decision makers understand the complexity of technology development and deployment and make rational decisions.
- Helps ensure that corrective action is taken at the “front end” of the process – less expensive – instead of the “back end” – more expensive.
- Helps decision makers answer the key question: Is this system ready to deploy and perform the mission for which it has been developed?

There's More



Mission Readiness Level - MRL

- MRL is the culmination of the S&T/ Mat Dev/Cbt Dev process.
- Must be applied in the context of the larger management scheme:
TRL/TRRL/IRL/MRL
- Does not focus on technology; focuses on the application of technology.
The objective: make technology work for soldiers.
- Extends the development lifecycle management process to:
 - Logistics
 - Fielding
 - Training
 - Deployment
 - Sustainment
 - Readiness
- Can help non-technology decision makers understand the interrelationship between TRL/TRRL/IRL and fielding and deployment.
- Can help answer the question: Is this technology ready for fielding and will it give us an improved or new capability?



Key Questions For Assessing MRL

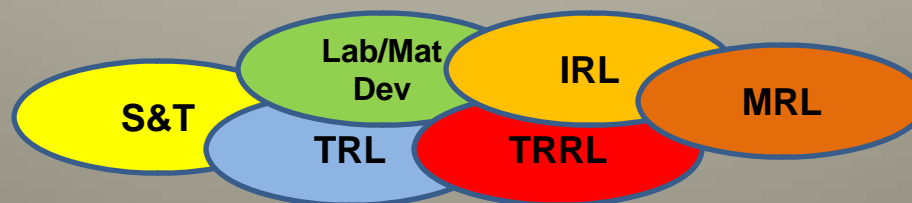
- **What capability are we trying to put into the hands of soldiers?**
- **Is there an operational requirement for this capability in the hands of soldiers?**
- **Is there an O&O concept that addresses and capitalizes on the capability offered?**
- **What is the status of the doctrine that must translate the O&O concept into terms that can be understood and operationalized by commanders and soldiers in the “real world” and the “training environment”?**
- **What is the status of the training aids simulators to facilitate training?**
- **What are the soldier skills required to capitalize on the capabilities of this system?**
- **What is the status of the training base to prepare soldiers to use the new capability: capital facilities, capital equipment and intellectual capital?**

Key Questions for MRL Assessment **(Continued)**

- **Do we have systems in place to assess the readiness and capability of the system we are fielding?**
- **What is the status of tools, test equipment and technical publications associated with the new system or capability?**
- **What is the status of the sustainment base, considering the entire Army logistics chain and external agencies to the Army? Are they ready and capable of supporting this system being fielded?**
- **Has a comprehensive ILS analysis been conducted? What was the result...of each element?**
- **What is the long term resourcing plan for support of this capability?**
- **Has an Army staff “programmatic” manager been assigned?**
- **What Army policies are affected by the deployment of this system?**
- **Are there DOD policies or statutes that may bear on the use of this system?**
- **What are the considerations of joint use, interoperability and coalition operations that must be considered?**

Benefits of An MRL

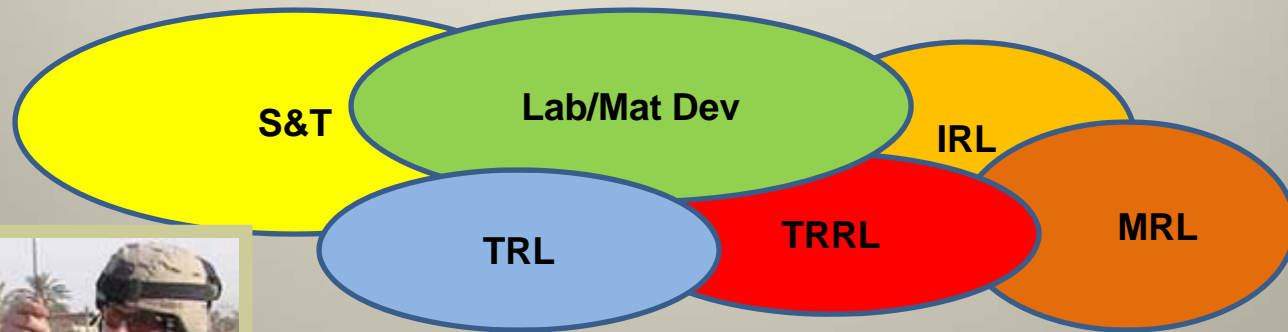
- Ensures fielded capabilities work for soldiers.
- Requires a review and analysis of lifecycle support issues – RMS.
- Ensures mission readiness is a complement to technology development and material development.
- Helps senior decision makers gain a holistic understanding of the process when applied with TRL/TRRL/IRL.
- Helps make a complex process “digestible” for non-tech senior leaders who have to make tough decisions for the Army.
- Can help make sure that critical decisions are “decisions by design” and not “decisions by default”.



Conclusion

- **There are no panaceas to make this extraordinarily complex process less complex.**
- **We must have processes that help us manage complexity more efficiently...and more effectively.**
- **Don't expect the best decisions to come from four hour meetings with 500 quad charts.**
- **The process must be understandable for non-technologists who will make critical decisions about technology deployment and application.**
- **We must have a system that makes sure tough questions are asked and tough decisions are made at every stage of the process.**
- **We better learn to deal with it. We are not going back to the M37 and the M151.**

It is a Complex Process
It Consumes a Lot of Money
Lots of High Rollers Involved



Let's not forget who we are working for.