

Managing Research Projects Beyond Cost and Schedule

Federal management of research, development, test, and evaluation (RDT&E) projects predominantly focuses on tracking budget and timelines. While important, these two measures are insufficient for ensuring the successful completion and transition of research gains into follow-on operational usage. A multi-dimensional framework that manages the execution and technical readiness of a project, as well as customer commitment, is required to ensure a project's ultimate success.

A Case for Action

Providing management oversight on RDT&E projects is difficult, especially within the federal government. Project activity is usually cutting-edge and executed by individuals with deep and specialized technical knowledge. Federal program managers, while technically gifted, are often generalists in nature and have to understand a variety of different technology issues at a moderate depth. This reality, combined with the complex federal budget process, often leads these managers to focus on budget and timeline advancement as the primary metrics when tracking the progress of their projects. Absent a systematic approach to easily track technical progress and customer engagement, projects can often be considered "successful" even if they don't actually meet development and/or transition targets.

Understanding the Problem

The concept of "Technology Readiness Levels" (TRLs), which provide a common language for describing and quantifying a technology's maturity and its readiness for integration into larger systems, has been gaining popularity within the DoD, numerous other federal agencies, and the private sector. Even the GAO's August 2016 *Technology Readiness Assessment Guide* relies heavily on the TRL concept.

While definitely beneficial, TRLs don't account for the other half of the necessary framework: customer commitment. Without actively managing this aspect of research, even projects that are strong technical successes will often do little more than take up space on a shelf. To overcome this gap, MITRE has been developing a new concept, "Transition Commitment Levels" (TCLs), to help measure a customer's commitment maturity and risk, in much the same way that TRLs measure technology maturity and risk.

Comparing TRL and TCL levels within an individual project can provide a quick and easily understood assessment of a project's standing; plotting multiple TRL-TCL assessments will provide the same type of insight for multiple-project programs.

Stage	TCL Descriptions	TCL
Internal Discovery and Enterprise Commitment	Internal program/R&D commitment	1
	Internal portfolio commitment	2
External Sponsor/Customer Commitment	Sponsor/customer interaction and awareness	3
	Sponsor/customer commitment and active support	4
Operational Pilot	Sponsor/customer commitment to pilot	5
	Sponsor/customer execution of operational pilot	6
Operational	Sponsor/customer commitment to acquisition	7
	Mission impact realized	8
	Impact scaled out	9

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This framework also introduces the concept of “guardrails” that can be applied to projects or programs to help management balance investment in maturing the technology against the effort required to develop commitment through sponsor engagement. Projects within the guardrails are at higher risk of failure, and their future plans will need to be assessed and likely adjusted.

The TRL/TCL framework integrates both the technical and transitional aspects of a project, drawing attention to all the components needed for successful transformational innovation and providing a well-defined, optimal path to completion. Projects that deviate substantially from this path may require further scrutiny and evaluation.

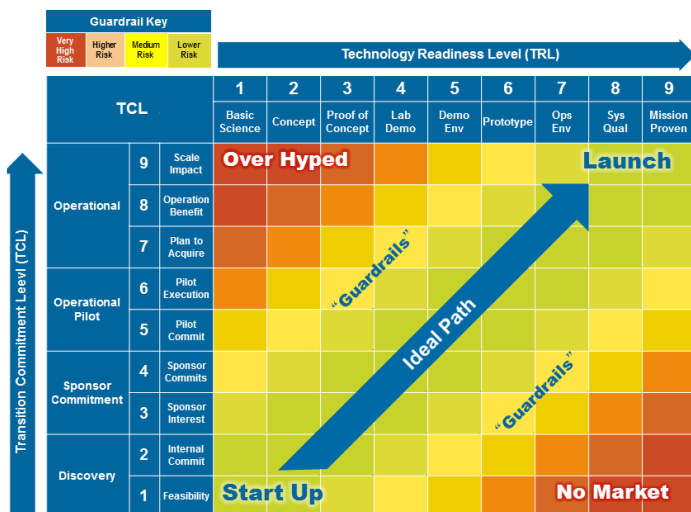
used sensors and analytics to provide situational awareness of airplane traffic on the ground. What originated as an initial lab idea (TRL 1 and TCL 1) evolved into an operational assessment at Teterboro airport in N.J. that led to a plan to transition into regular operations (TRL 7 and TCL 7). Throughout the project, TRLs and TCLs were regularly measured to ensure that proper progression was being achieved.

The 2008 concept of Google Health was to centralize personal health information. Such a collection could have enabled improved health outcomes for individuals and the general population, but it was retired in 2011. The key reasons cited for its retirement were unclear customer value, little engagement with healthcare practitioners, and policy disconnects with insurance providers.

Areas of Opportunity for the New Administration and Agency Leaders

While the concept of TCLs, and the TCL-TRL matrix, are still in their infancy, they have already proven beneficial for a number of projects. Federal agencies can begin to use the concept as a part of their management approach for individual projects and multi-project programs, as well as contribute to the concept’s maturation in a manner similar to the prior evolution of TRLs. The Office of Science and Technology Policy and OMB, in their oversight roles, can quickly look at a program’s TCL-TRL matrix to understand its status (and multi-year evolution), utilizing a powerful new tool to accompany their existing fiscal and temporal assessments.

For further ideas about applying the guidance in this paper to your agency’s particular needs, contact federaltransition@mitre.org.



The use of this framework has already been instrumental in a project to develop low-cost surface awareness for small-to-medium U.S. airports, where existing solutions for larger airports were cost-prohibitive. The FAA and MITRE undertook an R&D effort to develop a new concept that described airport runways as a series of connected blocks and