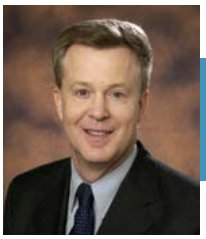
# DOE PROJECT MANAGEMENT NEWS

*Promoting Project Management Excellence*

**September 2023**

## IN THIS ISSUE:





## DIRECTOR'S CORNER

The Department executes some of the most complex projects in the world. A key driver in the complexity of our projects is the technology incorporated into our processes and facilities. Therefore, it is critical that program offices and project teams ensure that critical technology elements (CTEs) are identified early and matured before they are incorporated into the project during construction. DOE Guide 413.3-4A, *Technology Readiness Assessment*, can assist FPDs and program office/project team members involved in conducting Technology Readiness Assessments (TRA) and developing technology maturation plans (TMPs) for their projects.

See the articles on pages 2 and 3 for additional information on the technology readiness assessment process and importance of integrating the technology maturation plan(s) into your project's budget and schedule.

Previous newsletter articles introduced the Integrated Project/Program Management (IP2M) Maturity and Environment Total Risk Rating (METRR) using Earned Value Management Systems (EVMS), a joint research project sponsored by Department of Energy and led by Arizona State University. This research found that the maturity and environment scores resulting from use of the IP2M METRR evaluation process were significantly correlated with the performance of the project being assessed.

You can gain additional insight into the background and use of the IP2M METRR tool and earn Continuous Learning Points, by viewing the Training Snippets discussed on page 6.

The Certification Review Board recently made changes to the Certification Equivalency Guidelines concerning FAC-COR certification and the requirement for an Federal Project Director's project management experience to be "within the past ten years". Learn more about these changes in the article on page 5.

Keep Charging!

# Technology Readiness Assessment—Integration with Project Schedule, Budget, and Risk Management

*Kevin Andersen and Zac West, Office of Project Controls and Policy (PM-30)*

***The purpose of this article is to supplement the Technology Readiness Assessment Guide overview article and explain expectations and rationale for why technology readiness activities need to be incorporated into project schedules and budgets and support risk management***. This aligns technology readiness assessment and maturation within the framework of the Integrated Project/Program Management (IP2M) Maturity and Environment Total Risk Rating (METRR), and primarily within the project management subprocesses of organizing, scheduling, budgeting, and risk management.

***Technology Readiness Assessment (TRA):*** The TRA is a review process to ensure that critical technology elements (CTEs) in a project design have been demonstrated to work as intended before committing to construction. The benefits of using the technology readiness process include providing a structured, criteria-based, and clearly documented assessment. The process also identifies specific actions to reduce risk, assists in comparing candidate technologies, promotes decision-making discipline, and improves technical communication.

The TRA is a tool for assessing program risk and the adequacy of technology maturation planning by the project but does not serve as a project risk assessment. The TRA highlights critical technologies and other potential technology risk areas that may need the program manager/Federal Project Director attention. If you do not plan and budget for the activities needed to manage technology readiness, you create gaps in terms of budget need and schedule which results in an incomplete performance measurement baseline (PMB).

Developing the critical technology elements and planning how to prove the technology is an important component of the project. If a CTE is overlooked and not brought to the requisite maturity, the system performance, program schedule, and cost could be jeopardized. On the other hand, if an overly conservative approach is taken and an excessive number of elements are categorized as critical technologies, resources will be diverted from the few technologies that deserve an intense maturation effort.

Determination of a CTE technology readiness level (TRL) should be conducted by the project as part of early project planning and development.

Technically qualified personnel who are independent of the project team are the resources that must be scheduled to conduct the technology readiness assessment of CTEs. Where technological readiness is a significant concern, TRAs should be considered for alternatives under consideration. These activities completed at least 90 days prior to critical decision (CD) milestones, albeit this needs to be considered holistically for the project. DOE O 413.3B, *Program and Project Management for the Acquisition of Capital Assets,* requires that applicable projects must be assessed prior to CD-1 and CD-2, and prior to CD-3 for any significant critical technology element modification post CD-2.

***Technology Maturation Plan (TMP):*** The purpose of the TMP is to describe planned technology development and engineering activities to mature CTEs that did not receive at least TRL 6 or higher. New technologies are usually subjected to experimentation, refinement, and increasingly realistic testing. Testing should be done in the proper environment and the technology tested should be of an appropriate scale and fidelity. Translating these maturation activities into discrete activities in the integrated master schedule (IMS) and assigning adequate schedule duration and budget are critical to establishing a realistic performance measurement baseline.

As an example, on the Uranium Processing Facility, the integrated project team developed a pilot with full scale model for the melter as the technology was to be changed from the current process. This pilot facility for use with surrogates had a budget over $30 million, but for a multi-billion dollar, project this pilot provided a proof of the new technology early and then became available to train operators and maintenance personnel without nuclear material. If the technology fails, you want to catch it as early in the project as you can to reduce costs to remedy. The budget needed to be captured and the schedule had to be planned to build the pilot facility and run the tests in a way that supported the overall project.

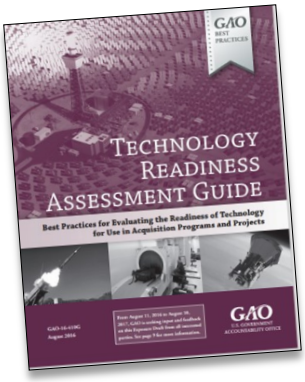
***Conclusion:*** The technology readiness process model consists of the steps of identifying CTEs, assessing the TRL for each element, and developing a TMP. The purpose of the TMP is to describe planned technology development and engineering activities to mature CTEs that did not receive at least TRL 6 or higher. Translating these assessment and maturation activities into discrete activities in the IMS and assigning adequate logic, schedule duration, and budget are critical to establishing a realistic PMB and providing for effective management.

# An Overview of the Technology Readiness Assessment Guide (DOE G 413.3-4A)

*Rick Blaisdell, Office of Project Analysis (PM-20)*

Department of Energy (DOE) Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets*, requires that technical readiness assessments (TRAs) be accomplished for major system projects (MSPs) or first-of-a-kind engineering endeavors. DOE Order 413.3B, hereafter referred to as "the Order," also encourages the completion of TRAs for lower cost projects where new technologies may exist.

Guidance on conducting TRAs can be found in DOE Guide 413.3-4A, *Technology Readiness Assessment Guide*. The Technology Readiness Assessment Guide, hereafter referred to as the "Guide", assists individuals and teams involved in conducting TRAs and developing technology maturation plans (TMPs) for projects subject to the Order. The Guide is designed to assist the integrated project team (IPT) in identifying those elements and processes of technology development required to ensure that a project satisfies its intended purpose in a safe and cost-effective manner that will reduce life cycle costs and produce results that are defensible to expert reviewers. The Guide is currently being updated, and the TRA requirements are also summarized in Appendix C of the Order.




Why are TRAs important in DOE? In March 2007, Government Accountability Office (GAO) issued a report on the results of a review of DOE projects' performance which concluded that DOE's premature application of technologies was a reason for cost growth and schedule extension. GAO published an update to its *Technology Readiness Assessment Guide* (GAO-20-48G) in January 2020, and DOE has adopted the recommendations and practices promulgated by the GAO Guide.

A TRA is an assessment of how far technology development has proceeded based upon documented evidence. It is not a pass/fail exercise and is not intended to provide a value judgment of the technology developers or the technology development program. It is a review process to ensure that critical technologies reflected in a project's design have been demonstrated to work as intended (technology readiness) before committing to construction expenses. TRAs should be conducted by technically qualified personnel who are independent of the project.

A TRA can:

- Identify the gaps in testing, demonstration and knowledge of a technology's current readiness level and the information and steps needed to reach the readiness level required for successful inclusion in the project;
- Identify at-risk technologies that need increased management attention or additional resources for technology development; and
- Increase the transparency of management decisions by identifying key technologies that have been demonstrated to work or by highlighting immature or unproven technologies that might result in increased project risk.

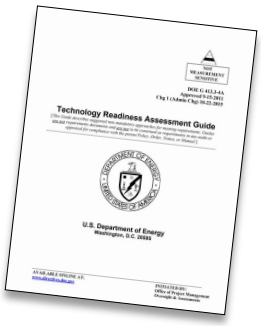
The Guide further explains the three-step Technology Readiness Assessment Process model:

1. **Identifying the critical technology elements (CTEs).** CTEs are at-risk technologies that are essential to the successful operation of the facility and are new or are being applied in new or novel ways.
2. **Assessing the technology readiness level (TRL).** A TRL scale is used for conducting Technology Readiness Assessments. TRL indicates the maturity level of a given technology. Table 4 in the Guide provides a description of each of the nine TRL levels. The TRL scale ranges from 1 (basic principle observed) through 9 (total system used successfully in project operations). TRL is not an indication of the quality of technology implementation in the design. Testing should be done in the proper environment and the technology tested should be of an appropriate scale and fidelity. The 9 TRL levels are shown in the table on page 4 (reference DOE G 413.3-4A Table 4. DOE Technology Readiness Level Scale).
3. **Developing a technology maturation plan (TMP).** If the TRL level for a CTE does not meet the expectation level at each CD level (especially for CD-2, *Approve Performance Baseline,* and later), then a maturity level gap exists that requires further evaluation testing or engineering work in order to bring the immature technology to the appropriate maturity level. The development or revision of a TMP identifies the activities required to bring immature CTEs up to the desired TRL (see section 5.0 of the Guide for more information).

*Continued on Page 4.*

Table 4 in the Guide (reprinted below) provides a summary view of the technology maturation process model and defines each TRL from 1 to 9.

The TRA process can be employed in a variety of situations requiring the determination of the state of technology development. In the realm of project management, TRAs and the resulting TMPs can be used as a project management tool to reduce the technical and cost risks associated with the introduction of new technologies. The TRA process can serve as one of the tools employed in helping to make effective critical decisions, as required by the Order.




The Guide suggests minimum TRL scores for each critical technology item of a project before a critical decision milestone can be achieved.

However, the Order requires (for MSPs or first-of-a-kind engineering endeavors) minimum TRL levels at CD-1, *Approve Alternate Solution and Cost Range*, and CD-2 (see below).

- CD-1: TRL 4
- CD-2: TRL 7

The Order also requires (for MSPs where new critical technologies are being deployed) that TRAs be conducted, and the associated Technology Maturation Plan developed prior to CD-2. In addition, on those projects where a significant critical technology element modification occurs subsequent to CD-2, TRA prior to CD-3 should be conducted.

In conclusion, it is important for the IPT to understand the TRA process, definitions, and objectives in order to help management in making decisions concerning the development and maturation of technology. This will help ensure the IPT can perform its intended mission and help lead to a successful project.

**Table 4. DOE Technology Readiness Level Scale**

| Relative Level of Technology Development | Technology Readiness Level | TRL Definition | Description |
|---|---|---|---|
| System Operations | TRL 9 | Actual system operated over the full range of expected conditions. | Actual operation of the technology in its final form, under the full range of operating conditions. Examples include using the actual system with the full range of wastes. |
| System Commissioning | TRL8 | Actual system completed and qualified through test and demonstration. | Technology has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of true system development. Examples include developmental testing and evaluation of the system with real waste in hot commissioning. |
| | TRL 7 | Full-scale, similar (prototypical) system demonstrated in a relevant environment. | Prototype full scale system. Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in a relevant environment. Examples include testing the prototype in the field with a range of simulants and/or real waste and cold commissioning. |
| Technology Demonstration | TRL 6 | Engineering/pilot-scale, similar (prototypical) system validation in a relevant environment. | Representative engineering scale model or prototype system, which is well beyond the lab scale tested for TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype with real waste and a range of simulants. |
| Technology Development | TRL 5 | Laboratory scale, similar system validation in relevant environment | The basic technological components are integrated so that the system configuration is similar to (matches) the final application in almost all respects. Examples include testing a high-fidelity system in a simulated environment and/or with a range of real waste and simulants. |
| | TRL 4 | Component and/or system validation in laboratory environment | Basic technological components are integrated to establish that the pieces will work together. This is relatively "low fidelity" compared with the eventual system. Examples include integration of "ad hoc" hardware in a laboratory and testing with a range of simulants. |
| Research to Prove Feasibility | TRL 3 | Analytical and experimental critical function and/or characteristic proof of concept | Active research and development is initiated. This includes analytical studies and laboratory scale studies to physically validate the analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative. Components may be tested with simulants. |
| | TRL 2 | Technology concept and/or application formulated | Invention begins. Once basic principles are observed, practical applications can be invented. Applications are speculative, and there may be no proof or detailed analysis to support the assumptions. Examples are still limited to analytic studies. |
| Basic Technology Research | TRL 1 | Basic principles observed and reported | Lowest level of technology readiness. Scientific research begins to be translated into applied research and development (R&D). Examples might include paper studies of a technology's basic properties. |

## FPD Application Changes to Work and Experience (WE) Requirements

*Linda Ott, Director,*
*Professional Development Division (PM-40)*

Certification and Equivalency Guidelines (CEG) provide guidance to Federal Project Director (FPD) applicants on how to complete the competencies based FPD application. The CEG is kept current and updated when necessary to reflect changes in the Department of Energy (DOE) Order 413.3B, *Program and Project Management for the Acquisition of Capital Assets,* and DOE Order 361.1C, *Acquisition Career Management Program*. The FPD application aligns with DOE Order 413.3 to ensure the FPD's roles and responsibilities are addressed in the FPD application. Recently, the Certification Review Board (CRB) adjusted the language for some work and experience (WE) requirements in the CEG, specifically, WEL2.4 and WEL3.3 associated with technical contract monitoring experience, and WEL1.1, WEL2.1, WEL3.1, and WEL3.2, related to experience currency.

For experience related to technical contract monitoring (WEL2.4 and WEL3.3), the CRB removed the requirement for FAC-COR certification. However, the training requirements remain unchanged as an FPD is still required to have an intermediate knowledge of the Contracting Officer's Representative (COR) roles and responsibilities. When FAC-COR certification is required, certification will be addressed by the appropriate Project Management Support Office (PMSO) in coordination with the Contracting Officer.

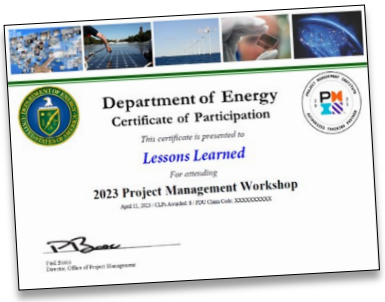
For experience related to the currency of project management experience (WEL1.1, WEL2.1, WEL3.1, and WEL3.2), the CRB removed the requirement that a candidate's experience be within the past ten years. However, it remains the candidate's responsibility to document and discuss their previous experience, including duties, responsibilities, and accomplishments, and how their experience aligns with DOE's critical decision process.

The FPD application in the Employee Self Service (ESS) Project Management Career Development Program (PMCDP) Module has been updated accordingly. Any questions should be directed to the Professional Development Division (PM-40) at linda.ott@hq.doe.gov.

## 2023 Project Management Workshop: Continuous Learning Points (CLPS) and Certificates

In the wake of the Learning Nucleus (LN) outage, the Office of Professional Development (PM-40) has recovered the awarded CLPs and certificate issuance for the 2023 Project Management Workshop. CLPs for Federal participants are recorded in the LN and a certificate of completion for each day is provided in their LN transcript. A consolidated certificate of completion for all three days was emailed to non-federal participants who submitted the CLP request form.

If you have questions or concerns about your 2023 Project Management Workshop CLP award and/or your certificate(s) of completion, please contact Sigmond.Ceaser@hq.doe.gov.




## Congratulations To Our Newly Certified FPDs!

### Level III

**John Catledge (NA)**

**Richard Dasher (NA)**

**Alvin Morrow (NA)**

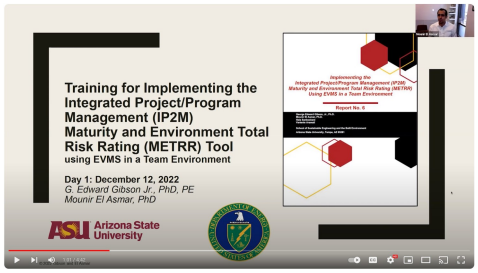
# New Snippet Series:
# IP2M METRR Training of the Month

The Integrated Project/Program Management (IP2M) Maturity and Environment Total Risk Rating (METRR) using earned value management systems (EVMS) is a novel assessment mechanism developed as part of a Department of Energy (DOE)-sponsored joint research study led by Arizona State University that represents nineteen government, industry, and academic organizations. The research team members are 41 individuals with diverse backgrounds including owners, contractors, consultants, and academia. This series of online videos offers insight into the study's findings and available software to facilitate using the IP2M METRR tool.

⇒ Click here to view Introduction to the IP2M METRR (pronounced IP2M meter) tool using EVMS.

**Summary:** This first session introduces the IP2M METRR tool, which is the result of a DOE-sponsored Joint Research Study led by ASU and representing 19 government, industry, and academic organizations.

⇒ Click here to view Overview of the IP2M METRR and its Performance Implications.





**Continuous Learning Points (CLPS):** Reviewing one hour of snippets will equate to one CLP. To receive credit, FPDs can complete a CLP Request Form under the ESS PMCDP menu. All others may send an email (indicating the snippets viewed) through their respective supervisor to DL-PM-40 to receive a certificate with the appropriate CLPs awarded.

You can find additional IP2M METRR Training at the following links:

https://www.energy.gov/projectmanagement/articles/ip2m-metrr-asu-evms-study

OR

https://community.max.gov/display/DOEExternal/PM+EVMS+IP2M+METRR+Training

IP2M METRR Publications can be found at https://ip2m.engineering.asu.edu/publications/.

ASU Arizona State University

## PMCDP FY2023 Training Schedule

The training schedule is posted on PM-MAX. Save the direct link to the Project Management Career Development Program Training Schedule to your favorites: https://community.max.gov/x/BgZcQw

| Course Title | LN Code | Dates | CLPs | Details |
|---|---|---|---|---|
| Project Management Systems and Practices | 001024 | September 11-15, 2023 | 40 | 10:30am-4:30pm ET Webinar Daily |
| Strategic Planning | 001043 | September 19-21, 2023 | 24 | 10:30am-4:30pm ET Webinar Daily |
| Project Management Simulation | 001029 | September 25-29, 2023 | 40 | 10:30am-4:30pm ET Webinar Daily |
| Project Risk Analysis and Management | 001033 | September 25-29, 2023 | 28 | 10:30am-4:30pm ET Webinar Daily |

## FY2024—Quarter 1 Training Schedule

| Course Title | LN Code | Dates | CLPs | Details |
|---|---|---|---|---|
| Scope Management Baseline Development | 001036 | October 10-13, 2023 | 24 | 10:30am-4:30pm ET Webinar Daily |
| Negotiation Strategies and Techniques | 001047 | October 16, 18, 23, 25, 2023 | 24 | 10:30am-4:30pm ET Webinar (Mon/Wed) |
| Monitoring and Controlling During Project Execution | 000450 | October 30-November 3, 2023 | 32 | 10:30am-4:30pm ET Webinar Daily |
| Acquisition Management for Technical Personnel | 000145 | October 31, November 2, November 7, November 9, 2023 | 16 | 12pm-4pm ET Webinar (Tue/Thurs) |
| Managing Contract Changes | 002102 | November 13-16, 2023 | 32 | 10:30am-4:30pm ET Webinar Daily |
| Project Management Systems and Practices | 001024 | December 4-8, 2023 | 40 | 10:30am-4:30pm ET Webinar Daily |
| Project Risk Analysis and Management | 001033 | December 11-15, 2023 | 28 | 10:30am-4:30pm ET Webinar Daily |
| Advanced Risk Management | 001042 | December 11-15, 2023 | 32 | 10:30am-4:30pm ET Webinar Daily |

## FIND UP-TO-DATE INFORMATION AND RESOURCES ANYTIME!

All PMCDP Course Descriptions and Course Materials can be found in the Course Catalog on PM-MAX
Save the direct link to your favorites: **https://community.max.gov/x/UAT3Rw**

Or, download the Interactive Curriculum Map: **https://community.max.gov/x/sQd1Qw**

Have a question, found a bug or glitch in a PMCDP online course, or want to provide feedback? Submit your questions through: **PMCDPOnlineCourseSupport@hq.doe.gov**.

## CONTACT US!

The Office of Project Management welcomes your comments on the Department's policies related to DOE Order 413.3B. Please report errors, omissions, ambiguities, and contradictions to: PMpolicy@hq.doe.gov. Propose improvements to policies at: https://hq.ideascale.com.

If you have technical questions about PARS, such as how to reset your password, please contact the PARS Help Desk at: PARS_Support@Hq.Doe.Gov. And, as always, PARS documentation, Frequently Asked Questions (FAQs) and other helpful information can be found at Support : PARS Support (doe.gov). The current PARS reporting schedule is located on PM-MAX at the following link: https://community.max.gov/x/m4IIY.

Need information to apply for FPD certification? The Certification and Equivalency Guidelines (CEG) can be found here: https://community.max.gov/x/IQd1Qw.

Can't put your finger on a document or information you were told is available on PM-MAX? Looking for information on DOE Project Management? Submit your questions and queries to: PMWebmaster@doe.gov.

## TO REACH THE PROFESSIONAL DEVELOPMENT DIVISION (PM-40) TEAM:

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Sigmond Ceaser — PMCDP Certification and Equivalency Guidelines Lead, PMCDP Curriculum and Content Manager, PMCDP Delivery Platform Advisor, Sigmond.Ceaser@hq.doe.gov

**If you would like to contribute an article to the Newsletter or want to provide feedback, contact the Editor at DL-PM-40.**

## RATE YOUR EXPERIENCE WITH THE PM NEWSLETTER!

Your feedback is valuable to us! Please rate your experience with this edition of the newsletter on a scale of **1 to 5**, rating of 5 stars being highly satisfied and 1 star being highly dissatisfied.

**Click here!**