

Extract from the Defense Acquisition Guidebook

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### **10.5.2. Technology Maturity and Technology Readiness Assessments**

Technology maturity is a measure of the degree to which proposed critical technologies meet program objectives; and, is a principal element of program risk. A technology readiness assessment examines program concepts, technology requirements, and demonstrated technology capabilities in order to determine technological maturity.

The program manager should identify critical technologies via the Work Breakdown Structure. In order to provide useful technology maturity information to the acquisition review process, technology readiness assessments of critical technologies and identification of Critical Program Information (CPI) must be completed prior to Milestone Decision points B and C.

The DoD Component Science and Technology (S&T) Executive directs the technology readiness assessment and, for Acquisition Category ID and Acquisition Category IAM programs, submits the findings to the CAE who should submit his or her report to the DUSD(S&T) with a recommended technology readiness level (TRL) (or some equivalent assessment) for each critical technology. When the DoD Component S&T Executive submits his or her findings to the CAE, he or she should provide the DUSD(S&T) an information copy of those findings. In cooperation with the DoD Component S&T Executive and the program office, the DUSD(S&T) should evaluate the technology readiness assessment and, if he/she concurs, forward findings to the OIPT leader and DAB. If the DUSD(S&T) does not concur with the technology readiness assessment findings, an independent technology readiness assessment, under the direction of the DUSD(S&T), should be required. A summary table of TRL descriptions, Table 10.5.2.1, follows.

The use of TRLs enables consistent, uniform, discussions of technical maturity across different types of technologies. Decision authorities will consider the recommended TRLs (or some equivalent assessment methodology, e.g., Willoughby templates) when assessing program risk. TRLs are a measure of technical maturity. They do not discuss the probability of occurrence (i.e., the likelihood of attaining required maturity) or the impact of not achieving technology maturity.

Table 10.5.2.1 from the Defense Acquisition Guidebook

<b>Technology Readiness Level</b>	<b>Description</b>
1. Basic principles observed and reported.	Lowest level of technology readiness. Scientific research begins to be translated into applied research and development. Examples might include paper studies of a technology's basic properties.
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 limited to analytic studies.
3. Analytical and experimental critical function and/or characteristic proof of concept.	Active research and development is initiated. This includes analytical studies and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
4. Component and/or breadboard validation in laboratory environment.	Basic technological components are integrated to establish that they will work together. This is relatively "low fidelity" compared to the eventual system. Examples include integration of "ad hoc" hardware in the laboratory.
5. Component and/or breadboard validation in relevant environment.	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment. Examples include "high fidelity" laboratory integration of components.
6. System/subsystem model or prototype demonstration in a relevant environment.	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in simulated operational environment.
7. System prototype demonstration in an operational environment.	Prototype near, or at, planned operational system. Represents a major step up from TRL 6, requiring demonstration of an actual system prototype in an operational environment such as an aircraft, vehicle, or space. Examples include testing the prototype in a test bed aircraft.
8. 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 test and evaluation of the system in its intended weapon system to determine if it meets design specifications.
9. Actual system proven through successful mission operations.	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions.