

SYMPOSIUM ON BUILDING BLOCKS FOR FUTURE SPACE EXPLORATION AND  
DEVELOPMENT (D3)

Space Technology and System Management Practices and Tools (4)

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APPLICATION OF TECHNOLOGY READINESS LEVELS (TRLs) IN CHINA AEROSPACE  
PROJECTS**Abstract**

To effectively assess and manage the maturation of innovative technologies is critical to the success of new system development. Technology readiness levels (TRLs) were created by NASA in mid 1970s as a discipline-independent metric for assessing and communicating the maturity of critical technologies for potential applications. The detailed definition of the 9 levels in TRLs as well as its examples was articulated in 1995, and since then, TRLs have been broadly used in numerous organizations in America and other countries.

Care should be paid to the use of TRLs in their practice. Two problems were found in recent application of TRLs in China advanced aerospace projects. One is that an accurate assessment of a technology is difficult to implement from the definition of TRLs. To solve this problem, we extract three characteristics on the basis of TRL definition and use them to characterize the maturation of a technology, i.e., the technology configuration, integration, and VV environment. The “configuration” describes the state of the technology, including critical functions/characteristics, precision, size and scale, etc. The “integration” indicates components, modules, sub-systems and systems. The “VV environment” involves laboratory, relevant and operational environments. Using these three-dimensional characteristics in the assessment of the technology, its maturity level is easy to be analyzed and thus an accurate assessment is enabled.

The other problem concerned is the diversity of technologies in TRL assessments. The traditional definition and description of TRLs works well for equipment technologies (that have a final form of device and/or product) but not for non-equipment technologies (that usually involves a form of data and/or mathematical models). Therefore, we develop a special TRL checklist for assessment of critical non-equipment technologies according to their maturation features. Unlike the TRL checklist of equipment technologies, this checklist emphasizes the maturation of non-equipment technologies through the indirect validation by components/subsystems/systems that the technology will be used in.

To conclude, efforts are made to improve the easy-implementation and accuracy of TRLs by using three-dimensional characteristics to evaluate the maturity level. Also, a TRL checklist is established to effectively assess critical non-equipment technologies in advanced system development. This work improves the application of TRL approach in China aerospace projects.