

TECHNOLOGY READINESS LEVELS (TRL)

TRLs are a set of management metrics that enable the assessment of the maturity of a particular technology and the consistent comparison of maturity between different types of technology - all in the context of a specific system, application and operational environment.

Readiness Level	TRL Definition	Commonly Used Engineering / R&D Terms
TRL 1	Basic principles observed and reported	Scientific Research.
TRL 2	Technology concept and/or application formulated	Systems Analyses. Pre-Phase A Studies.
TRL 3	Analytical and experimental critical function and/or characteristic proof-of-concept	Laboratory Experiments.
TRL 4	Component and/or breadboard validation in laboratory environment	Component. Breadboard.
TRL 5	Component and/or breadboard validation in relevant environment	High-Fidelity Breadboard. Brassboard. Engineering Breadboard. Function-Oriented Model.
TRL 6	System/subsystem model or prototype demonstration in a relevant environment (ground or space)	High-Fidelity Laboratory Prototype. Engineering Qualification Model. Subsystem model. Development Model. System Model.
TRL 7	System prototype demonstration in a space environment	System Demonstration.
TRL 8	Actual system completed and "flight qualified" through test and demonstration (ground or space)	Theoretical First Unit. Flight Unit. Flight Spare.
TRL 9	Actual system "flight proven" through successful mission operations	Mission Operations. Flight Qualified Hardware.

Source: ESA's Technology Readiness Levels Handbook for Space Application