

Technology Readiness Levels (TRL)

		Acquisition Interim Guidance (30 May 2003)	<i>Readiness ratings of technologies for non-lethal applications carry the additional requirement of prediction and control of effects on humans</i>	
System Field Test and Operations	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.	Human participation in operational testing, data collection from live fire use
	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.	Human participation in developmental testing
System/Subsystem Development	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.	Human tests in field environment with mature prototype
	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.	Human studies in field environment conducted with prototype system.
Technology Demonstration	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.	Whole animal studies demonstrate weapon effectiveness and safety; limited laboratory human tests underway' human studies of weapon effectiveness in field conditions are proposed
	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.	Bioeffect mechanism accepted by scientific community; animal studies demonstrate dose-response relationships; Long term effects studies concluded; injury/lethality modes identified; laboratory human effects studies proposed
Research to Prove Feasibility	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.	Bioeffect mechanism clearly identified; studies to determine dose-response relationship are underway; studies to identify long term effects underway
	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.	Scientific confidence in bioeffect mechanism is studied; important dose-response parameters are postulated
Basic Technology	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.	Bioeffect mechanism postulated through paper studies or limited clinical experience