

NASA SYSTEMS ENGINEERING HANDBOOK - REQUIREMENTS CHECKLIST MAPPING



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C.1 Use of Correct Terms		Implemented?	TRC-Metric	Metric Name
	Shall = requirement	Yes	TRC-M365	Avoid the use of Banned Modal Verbs
	Will = facts or declaration of purpose			
	Should = goal			
C.2 Editorial Checklist				
Personnel Requirement		Implemented?	TRC-Metric	Metric Name
	Use the active, rather than the passive voice. A requirement should state who shall (do, perform, provide, weigh, or other verb) followed by a description of what should be performed.	Yes	TRC-M040	Avoid the use of Passive Voice out of the condition block
Product Requirement		Implemented?	TRC-Metric	Metric Name
	The requirement is in the form “product ABC shall XYZ.” A requirement should state “The product shall” (do, perform, provide, weigh, or other verb) followed by a description of what should be done.	Yes	TRC-M010	Enforce the use of a complete sentence structure
			TRC-M360	Check the number of Modal Verbs
	The requirement uses consistent terminology to refer to the product and its lower-level entities.	Yes	TRC-M050	Determine if the subject is a recognized Agent term
			TRC-M630	Enforce the use of Define Terms by avoiding Synonyms
			TRC-M150	Detect inadequate Unit for a Characteristic
	Complete with tolerances for qualitative/performance values (e.g., less than, greater than or equal to, plus or minus, 3 sigma root sum squares).	Yes	TRC-M520	Force to include tolerance value for the units that required tolerance
			TRC-M525	Ensure tolerance value are within an adequate value range
	Is the requirement free of implementation? (Requirements should state WHAT is needed, NOT HOW to provide it; i.e., state the problem not the solution. Ask, “Why do you need the requirement?” The answer may point to the real requirement.)	Yes	TRC-M490	Avoid stating a solution
	Free of descriptions of operations? (Is this a need the product should satisfy or an activity involving the product? Sentences like “The operator shall...” are almost always operational statements not requirements.)	Partially	TRC-M500	Avoid the use of Flow sentences

C.3 General Goodness Checklist		Implemented?	TRC-Metric	Metric Name
	1. The requirement is grammatically correct.	Partially	TRC-M230	Avoid inadequate grammar structures
	2. The requirement is free of typos, misspellings, and punctuation errors.	Yes	TRC-M240	Avoid Incorrect spelling
			TRC-M260	Review incorrect punctuation
			TRC-M250	Facilitate readability
	3. The requirement complies with the project's template and style rules.	Yes	TRC-M010	Enforce the use of a complete sentence structure
	4. The requirement is stated positively (as opposed to negatively, i.e., "shall not").	Yes	TRC-M285	Avoid the use of Negative Expressions out of the condition block
	5. The use of "To Be Determined" (TBD) values should be minimized. It is better to use a best estimate for a value and mark it "To Be Resolved" (TBR) with the rationale along with what must be done to eliminate the TBR, who is responsible for its elimination, and by when it must be eliminated.	Partially	TRC-M190	Avoid the use of Escape clauses
	6. The requirement is accompanied by an intelligible rationale, including any assumptions. Can you validate (concur with) the assumptions? Assumptions must be confirmed before baselining.	Partially	TRC-M460	Enforce attribute type is not empty
	7. The requirement is located in the proper section of the document (e.g., not in an appendix).	No		

C.4 Requirements Validation Checklist				
	Clarity	Implemented?	TRC-Metric	Metric Name
	1. Are the requirements clear and unambiguous? (Are all aspects of the requirement understandable and not subject to misinterpretation? Is the requirement free from indefinite pronouns (this, these) and ambiguous terms (e.g., "as appropriate," "etc.," "and/or," "but not limited to")?)	Yes	TRC-M130	Avoid the use of Indefinite Articles in front of an Agent
			TRC-M070	Avoid the use of Pronouns to refer to nouns
			TRC-M950	Avoid the use of Vague Terms
			TRC-M545	Avoid the usage of Imprecise Quantifiers applied to a property
			TRC-M560	Avoid the use of Temporal Indefinite keywords out of the condition block
	2. Are the requirements concise and simple?	Yes	TRC-M330	Check the text length by counting words
			TRC-M360	Check the number of Modal Verbs
			TRC-M320	Check the text length by counting paragraphs
			TRC-M340	Control the number of Action Verbs out of the condition block
	3. Do the requirements express only one thought per requirement statement, a standalone statement as opposed to multiple requirements in a single statement, or a paragraph that contains both requirements and rationale?	Yes	TRC-M340	Control the number of Action Verbs out of the condition block
			TRC-M360	Check the number of Modal Verbs
	4. Does the requirement statement have one subject and one predicate?	Yes	TRC-M370	Multiple subject detection
			TRC-M340	Control the number of Action Verbs out of the condition block

	Completeness	Implemented?	TRC-Metric	Metric Name
	1. Are requirements stated as completely as possible? Have all incomplete requirements been captured as TBDs or TBRs and a complete listing of them maintained with the requirements?	Partially	TRC-M190	Avoid the use of Escape clauses
	2. Are any requirements missing? For example have any of the following requirements areas been overlooked: functional, performance, interface, environment (development, manufacturing, test, transport, storage, operations), facility (manufacturing, test, storage, operations), transportation (among areas for manufacturing, assembling, delivery points, within storage facilities, loading), training, personnel, operability, safety, security, appearance and physical characteristics, and design.	Partially	TRC-M940	Ensure all requirements types are part of the specification
	3. Have all assumptions been explicitly stated?	No		
	Compliance	Implemented?	TRC-Metric	Metric Name
	1. Are all requirements at the correct level (e.g., system, segment, element, subsystem)?	Partially	TRC-M055	Detect inappropriate subject at the document level
	2. Are requirements free of implementation specifics? (Requirements should state what is needed, not how to provide it.)	Yes	TRC-M490	Avoid stating a solution
	3. Are requirements free of descriptions of operations? (Don't mix operation with requirements: update the ConOps instead.)	Yes	TRC-M380	Avoid phrases that indicate the purpose
	Consistency			
	1. Are the requirements stated consistently without contradicting themselves or the requirements of related systems?	Partially	TRC-M480	Avoid overlapping among the requirements
			TRC-M160	Avoid mixing up different measurement systems
	2. Is the terminology consistent with the user and sponsor's terminology? With the project glossary?	Yes	TRC-M225	Avoid Unclassified Terms
	3. Is the terminology consistently used through out the document?	Yes	TRC-M580	Avoid the use of unknown acronyms
	4. Are the key terms included in the project's glossary?	Yes	TRC-M590	Avoid the use of unknown abbreviations
	Traceability	Implemented?	TRC-Metric	Metric Name
	1. Are all requirements needed? Is each requirement necessary to meet the parent requirement? Is each requirement a needed function or characteristic? Distinguish between needs and wants. If it is not necessary, it is not a requirement. Ask, "What is the worst that could happen if the requirement was not included?"	No		
	2. Are all requirements (functions, structures, and constraints) bidirectionally traceable to higher level requirements or mission or system-of-interest scope (i.e., need(s), goals, objectives, constraints, or concept of operations)?	No		
	3. Is each requirement stated in such a manner that it can be uniquely referenced (e.g., each requirement is uniquely numbered) in subordinate documents?	Yes	TRC-M930	Ensure requirements are uniquely referenced

	Correctness		Implemented?	TRC-Metric	Metric Name
		1. Is each requirement correct?			
		2. Is each stated assumption correct? Assumptions must be confirmed before the document can be baselined.			
		3. Are the requirements technically feasible?			
	Functionality		Implemented?	TRC-Metric	Metric Name
		1. Are all described functions necessary and together sufficient to meet mission and system goals and objectives?	No		
	Performance		Implemented?	TRC-Metric	Metric Name
		1. Are all required performance specifications and margins listed (e.g., consider timing, throughput, storage size, latency, accuracy and precision)?	Partially	TRC-M545	Avoid the usage of Imprecise Quantifiers applied to a property
				TRC-M530	Confirms the value for a property is within a controlled range
		2. Is each performance requirement realistic?	Yes	TRC-M430	Avoid unachievable Absolutes expressions impossible to verify
				TRC-M140	Ensure Numbers are followed by Units or noun qualifications
		3. Are the tolerances overly tight? Are the tolerances defensible and cost-effective? Ask, "What is the worst thing that could happen if the tolerance was doubled or tripled?"	Yes	TRC-M525	Ensure tolerance value are within an adequate value range
	Interfaces		Implemented?	TRC-Metric	Metric Name
		1. Are all external interfaces clearly defined?	Partially	TRC-M945	SCM PBS completeness
		2. Are all internal interfaces clearly defined?		TRC-M945	SCM PBS completeness
		3. Are all interfaces necessary, sufficient, and consistent with each other?		TRC-M945	SCM PBS completeness
	Maintainability		Implemented?	TRC-Metric	Metric Name
		1. Have the requirements for system maintainability been specified in a measurable, verifiable manner?	Partially	TRC-M140	Ensure Numbers are followed by Units or noun qualifications
				TRC-M540	Avoid the usage of Imprecise Quantifiers
				TRC-M430	Avoid unachievable Absolutes expressions impossible to verify
				TRC-M940	SCM organization completeness
		2. Are requirements written so that ripple effects from changes are minimized (i.e., requirements are as weakly coupled as possible)?	Partially	TRC-M200	Avoid the use of Open-Ended clauses

	Reliability		Implemented?	TRC-Metric	Metric Name
		1. Are clearly defined, measurable, and verifiable reliability requirements specified?			
		2. Are there error detection, reporting, handling, and recovery requirements?			
		3. Are undesired events (e.g., single event upset, data loss or scrambling, operator error) considered and their required responses specified?			
		4. Have assumptions about the intended sequence of functions been stated? Are these sequences required?			
		5. Do these requirements adequately address the survivability after a software or hardware fault of the system from the point of view of hardware, software, operations, personnel and procedures?	No		
	Verifiability/Testability		Implemented?	TRC-Metric	Metric Name
		1. Can the system be tested, demonstrated, inspected, or analyzed to show that it satisfies requirements? Can this be done at the level of the system at which the requirement is stated? Does a means exist to measure the	Partially	TRC-M540	Avoid the usage of Imprecise Quantifiers
				TRC-M430	Avoid unachievable Absolutes expressions impossible to verify
		2. Are the requirements stated precisely to facilitate specification of system test success criteria and requirements?	Yes	TRC-M940	SCM organization completeness
		3. Are the requirements free of unverifiable terms (e.g., flexible, easy, sufficient, safe, ad hoc, adequate, accommodate, user-friendly, usable, when required, if	Yes	TRC-M430	Avoid unachievable Absolutes expressions impossible to verify
				TRC-M950	Avoid the use of Vague Terms
	Data Usage		Implemented?	TRC-Metric	Metric Name
		1. Where applicable, are "don't care" conditions truly "don't care"? ("Don't care" values identify cases when the value of a condition or flag is irrelevant, even though the value may be important for other cases.) Are "don't care" conditions values explicitly stated? (Correct identification of "don't care" values may improve a design's portability.)	No		