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# NASA Procedural Requirements

**NPR 7150.2**  
Effective Date: September 27, 2004  
Expiration Date: September 27, 2009

**COMPLIANCE IS MANDATORY**

[Printable Format \(PDF\)](#)

Request Notification of Change (NASA Only)

**Subject: NASA Software Engineering Requirements**

**Responsible Office: Office of the Chief Engineer**

| [TOC](#) | [Preface](#) | [Chapter1](#) | [Chapter2](#) | [Chapter3](#) | [Chapter4](#) | [Chapter5](#) | [Chapter6](#) | [AppendixA](#) | [AppendixB](#) | [AppendixC](#) | [AppendixD](#) | [ALL](#) |

## APPENDIX D: Requirements Mapping Matrix

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				Class A	Class B	Class C	Class D	Class E	Class F	Class G	Class H
<b>Training</b>	<i>Software engineering training</i>	100	NASA Chief Engineer & Center Training Org.	X	X	X	X	X	X	X	X
	<i>Software training plan</i>	101	Each Center	X	X	X	X	X	X	X	X
<b>SW Document-ation Requirements</b>	<i>SW Development/Mgt. Plan</i>	102	Project	X	X	P (Center)	P (Center)		X (not OTS)	P (Center)	
	<i>SW Configuration Mgt. Plan</i>	103	Project	X	P (Center)	P (Center)	P (Center)		X	P (Center)	
	<i>SW Test Plan</i>	104	Project	X	X	P (Center)	P (Center)		X	P (Center)	
	<i>SW Maintenance Plan</i>	105	Project	X	P (Center)				X	P (Center)	
	<i>SW Assurance Plan</i>	106	Project	X	X				X	P (Center)	
	<i>Center SW Training Plan</i>	107	Center	X (1 plan per center)	F(Center)	X (1 plan per center)	X (1 plan per center)	P(Center)			
	<i>Center SW Engineering Improve Plan</i>	108	Center	X (1 plan per center)	F(Center)	X (1 plan per center)	X (1 plan per center)	P(Center)			
	<i>SW Requirements Spec.</i>	109	Project	X	X	P (Center)	P (Center)		X	X	
	<i>SW Data Dictionary</i>	110	Project	X	P (Center)				X (not OTS)	X (not OTS)	
	<i>SW Design Description</i>	111	Project	X	X	P (Center)	P (Center)		X (not OTS)	X (not OTS)	
	<i>Interface Design Description</i>	112	Project	X	X	P (Center)			X (not OTS)	X (not OTS)	
	<i>SW Change Request/ Problem Report</i>	113	Project	X	X	P (Center)			X (not OTS)	X (not OTS)	
	<i>SW Test Procedures</i>	114	Project	X	X	P (Center)			X	X	
	<i>SW Users Manual</i>	115	Project	X	X				X (not OTS)	X (not OTS)	
	<i>SW Version Description</i>	116	Project	X	X	P (Center)	P (Center)		X (not OTS)	X (not OTS)	
<i>SW Metrics Report</i>	117	Project	X	X	P (Center)			X (not OTS)	X (not OTS)		
<i>SW Test Report</i>	118	Project	X	X	P (Center)			X	P (Center)		
<i>SW Inspection/Peer Review</i>	119	Project	X	P (Center)				X (not OTS)	P (Center)		
<b>Tailoring of Requirements</b>	<i>Alternate requirement request</i>	120	Center	X	X	X	X	X	X	X	X
	<i>Document approved alternate requirements</i>	121	Center	X	X	X	X	X	X	X	X
<b>Expertise of Warrant Authority</b>	<i>Non-IT &amp; Non Business</i>	122	NASA Chief Engineer & Chief Software Mission Assurance Officer	X	X	X	X	X			
	<i>IT infrastructure &amp; Business</i>	123	CIO						X	X	X
<b>Compliance</b>	<i>Direction for Warrant Authority</i>	124	ITA Warrant Authority	X	X	X	X	X	X	X	X
	<i>Compliance Matrix</i>	125	Project	X	X	X	X	X	X	X	X
	<i>Considerations for Waivers</i>	126	ITA Warrant Authority	X	X	X	X	X	X	X	X
	<i>Review of "P(Center)"</i>	127	ITA Warrant Authority	X	X	X	X	X	X	X	X
	<i>Compliance Records</i>	128	ITA Warrant Authority	X	X	X	X	X	X	X	X
	<i>Check compliance</i>	129	NASA Chief Engineer	X	X	X	X	X	X	X	X

\* See Requirement in NPR for full description

Light Grey shaded box indicates that the requirement cannot be waived by the project via the ITA (see Chapter 6)

Dark Grey shaded box indicates that the responsibility for that requirement is not at the project level

X - Project is required to meet the requirement as written

X (not OTS) - Project is required to meet except for off-the-shelf software

P (Center) - Per Center defined process

P (project) - As defined in the project or software development plan

Blank Space - Project is not required to meet the requirement

Note 1 - The scope of this requirement is contained in the source NPD or NPR

Note 2 - This requirement can only be waived by the OSMA ITA

Note 3 - For Class B software, in lieu of a CMMI/CMM certification by a developer, the project will conduct a software capability evaluation in the seven process area listed in SWE-032 and mitigate any risk, if deficient.

				Class A	Class B	Class C	Class D	Class E	Class F	Class G	Class H
<b>SW Requirements Development</b>	Document	49	Project	X	X	X	X	P (Center)	X	X	
	SW requirements	50	Project	X	X	X	X		X	X	
	Flow-down & derived req	51	Project	X	X	X			X (not OTS)	P (Center)	
	Bi-directional trace	52	Project	X	X				X (not OTS)	P (Center)	
<b>SW Requirements Management</b>	Manage req. change	53	Project	X	X	X	X	P (Center)	X	X	
	Corrective action	54	Project	X	X				X	X	
	Requirements Validation	55	Project	X	X	X			X	X	
<b>SW Design</b>	Document design	56	Project	X	X	P (Center)			X (not OTS)	X (not OTS)	
	Architecture	57	Project	X	X	P (Center)	P (Center)		X (not OTS)	X (not OTS)	
	Detailed design	58	Project	X	X				X (not OTS)	X (not OTS)	
	Bi-directional trace	59	Project	X	X				X (not OTS)	X (not OTS)	
<b>SW Implementation</b>	Design -> code	60	Project	X	X	X	X		X (not OTS)	X (not OTS)	
	Coding standards	61	Project	X	X				X (not OTS)	X (not OTS)	
	Unit test	62	Project	X	X	X	P (Center)	P (Center)	X (not OTS)	X (not OTS)	
	Version Description	63	Project	X	X	P (Center)	X		X (not OTS)	X (not OTS)	
	Maintain Traceability	64	Project	X	X				X (not OTS)	X (not OTS)	
<b>SW Testing</b>	Plan, procedures, reports	65	Project	X	X	X	P (Center)		X	P (Center)	
	Perform testing	66	Project	X	X	X	X		X	P (Center)	
	Test for compliance	67	Project	X	X	X			X	P (Center)	
	Evaluate test results	68	Project	X	X	X	X		X	P (Center)	
	Doc. defect & track	69	Project	X	X	X	P (Center)		X	P (Center)	
	Models, simulations, tools	70	Project	X	X				X	P (Center)	
	Update plans & procedures	71	Project	X	X	X			X	P (Center)	
	Maintain Traceability	72	Project	X	X	X	X		X	P (Center)	
Platform or Hi-Fidelity sim	73	Project	X	X	X			X	P (Center)		
<b>SW Operations, Maintenance, and Retirement</b>	Document maint. plans	74	Project	X	X	X			X	P (Center)	
	Plan ops., maint. & retirement	75	Project	X	X	X			X	P (Center)	
	Implement plans	76	Project	X	X	X			X	P (Center)	
	Deliver software product	77	Project	X	X	X	X	P (Center)	X	X	
	As-built documentation	78	Project	X	X				X (not OTS)	X (not OTS)	
<b>SW Configuration Management</b>	Develop CM plan	79	Project	X	X	X	X		X	P (Center)	
	Track & evaluate changes	80	Project	X	X	X	P (Center)		X	P (Center)	
	Identify sw configuration items	81	Project	X	X	X	P (Center)		X	P (Center)	P (Center)
	Authorizing Changes	82	Project	X	X				X	P (Center)	P (Center)
	Maintain records	83	Project	X	X	X			X	P (Center)	P (Center)
	Configuration audits	84	Project	X	X				X	P (Center)	
	Implement procedures	85	Project	X	X	X	P (Center)	P (Center)	X	P (Center)	P (Center)
<b>Risk Management</b>	Continuous risk management	86	Project	X	X				X	P (Center)	
<b>Peer Reviews</b>	Requirements & Test Plans	87	Project	X	X	P (Center)			X (not OTS)	P (Center)	
	Checklist, criteria, & tracking	88	Project	X	X	P (Center)			X (not OTS)	P (Center)	
	Basic measurements	89	Project	X	X				X (not OTS)	P (Center)	
<b>SW Measurement</b>	Objectives	90	Project	X	X	X			X (not OTS)	P (Center)	
	SW measurement areas	91	Project	X	X	P (Center)			X (not OTS)	P (Center)	
	Collection & storage	92	Project	X	X	X			X (not OTS)	P (Center)	
	Analyze data	93	Project	X	X	P (Center)			X (not OTS)	P (Center)	
	Report analysis	94	Project	X	X	P (Center)			X (not OTS)	P (Center)	
	SW measurement system	95	Each Mission Directorate	X	X	X			X	X	
	Objectives & Procedures	96	Each Mission Directorate	X	X	X			X	X	
Report results	97	Each Mission Directorate	X	X	X			X	X		
<b>Best Practices</b>	Agency process asset library	98	NASA Chief Engineer	X	X	X	X	X	X	X	X
	Identify applicable practices	99	Each Center	X	X	X	X	X	X	X	X

Section of NPR	Requirement Descriptor*	SWE Requirement #	Responsibility	Class A	Class B	Class C	Class D	Class E	Class F	Class G	Class H
Preface	Effective Date	1	General	X	X	X	X	X	X	X	X
Organizational Capability	Agency SW Initiative	2	NASA Chief Engineer	X	X	X	X	X	X	X	X
	Center Plan	3	Each Center	X	X	X	X	P (Center)	X	X	P (Center)
	Benchmark	4	NASA Chief Engineer	X	X	X	X	X	X	X	X
	SW Processes	5	Each Center	X	X	X	X	P (Center)	X	X	P (Center)
	List of Agency's programs & projects containing software	6	NASA Chief Engineer & Chief Software Mission Assurance Officer	X	X	X	X		X	X	
	Compliance with Laws, Policies & Requirements	SW Disclosures	7	Project	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Export Control		8	Project	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
External Release		9	Project	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Security		10	Project	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Disabilities		11	Project	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
Disabilities		12	Project	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1	Note 1
SW Life Cycle Planning	SW Plan	13	Project	X	X	X	P (Center)	P (Center)	X	P (Center)	
	Execute Plan	14	Project	X	X	X	X	P (Center)	X	P (Center)	
	Cost Estimation	15	Project	X	X	X	P (Center)	P (Center)	X	P (Center)	
	Schedule	16	Project	X	X	X	P (Center)		X	P (Center)	
	Training	17	Project	X	X	X			X	P (Center)	
	Reviews	18	Project	X	X	X	X		X	P (Center)	
	Life Cycle	19	Project	X	X	X	P (Center)		X (not OTS)	P (Center)	
	SW Classification	20	Project	X	X	X	X	X	X	X	X
	SW Classification changes	21	Project	X	X	X	X	X	X	X	X
	SW Assurance	22	Project	X (Note 2)	X (Note 2)	P (project)			X	X	
	SW Safety	23	Project	X	X	X	X	X	X	X	X
	Plan Tracking	24	Project	X	X	X	P (Center)		X	P (Center)	
	Connective Action	25	Project	X	X	X			X	P (Center)	
	Changes	26	Project	X	X	X			X	P (Center)	
Off The Shelf (OTS) SW	COTS, GOTS, MOTS	27	Project	X	X	X			X	P (Center)	
Verification & Validation	Verification planning	28	Project	X	X	X	P (Center)		X	P (Center)	
	Validation planning	29	Project	X	X	X	P (Center)		X	P (Center)	
	Verification results	30	Project	X	X	X	X		X	P (Center)	
	Validation results	31	Project	X	X	X	X		X	P (Center)	
Project Formulation	CMM L3 or CMMI L2	32	Project	X	X (Note 3)	P (Center)					
	Options for Acquisition	33	Project	X	X	X	X		X	X	
	Acceptance Criteria	34	Project	X	X	X	P (Center)		X	X	
	Supplier Selection	35	Project	X	X	X			X	X	P (Center)
	SW processes & tasks	36	Project	X	X	X	P (Center)		X (not OTS)	P (Center)	
	Milestone	37	Project	X	X	X	P (Center)		X (not OTS)	P (Center)	
	Acquisition planning	38	Project	X	X	X	P (Center)		X (not OTS)	P (Center)	
Government Insight	Insight into test	39	Project	X	X	P (Center)	P (Center)		X	P (Center)	
	Electronic access	40	Project	X	X	P (Center)			X	P (Center)	
	Open source	41	Project	X	X	P (Center)			X	P (Center)	
	Source code access	42	Project	X	X	P (Center)			X	P (Center)	
Supplier Monitoring	Track change request	43	Project	X	X	P (Center)			X	P (Center)	
	SW measurement data	44	Project	X	X	X	P (Center)		X	P (Center)	
	Joint audits	45	Project	X	X	X			X	P (Center)	
	SW schedule	46	Project	X	X	X	X		X	P (Center)	
	Traceability data	47	Project	X	X	P (Center)			X	P (Center)	
	Solicitation	48	Project	X	X	X	P (Center)		X	P (Center)	

[| TOC | Preface | Chapter1 | Chapter2 | Chapter3 | Chapter4 | Chapter5 | Chapter6 | AppendixA | AppendixB | AppendixC | AppendixD | ALL |](#)

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