

APPENDIX A: CHAPTER 21 DEFINITIONS AND ACRONYMS

Only key definitions are listed. See [PD340](#), *Conduct of Engineering for Facility Work*, [SD330](#), *Los Alamos National Laboratory Quality Assurance Program*, and documents referenced therein for additional definitions.

Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
acceptance testing, also known as software validation	The process of exercising or evaluating a system or system component by manual or automated means to ensure that it satisfies the specified requirements, and, to identify differences between expected and actual results in the operating environment. (Ref. NQA-1).
acquired software	Software that is generally supplied through basic procurements, two-party agreements, or other contractual arrangements. Acquired software includes off-the-shelf (OTS) software such as operating systems, database management systems, compilers, software development tools, and commercial calculational software and spreadsheet tools. Downloadable software that is available at no cost to the user (referred to as freeware) is also considered acquired software. (Based on DOE G 414.1-4).
Acquired Non-SSC software	Non-SSC software that is acquired software where the code cannot be changed other than through replacement. This may also be referred to as Read-Only Non-SSC software. Replacement includes replacement with a subsequent software version or upgrade. (Definition developed for this chapter).
baseline	A specification or product that has been formally reviewed and agreed upon, that thereafter serves as the basis for use and further development, and that can be changed only by using an approved change control process. (Ref. NQA-1). Note: See SOFT-GEN-FM01, <i>Software Baseline Form (SWBL)</i> . A software baseline includes the computer program (code and [configuration] data) and the computer program documentation. In layman's terms, one may think of this as the information and computer program files that are needed to run the software for a specific application.
Change - Major computer program change	A change or bug fix that: <ul style="list-style-type: none"> ▪ the Software Responsible Line Manager (SRLM) or computer program supplier designates as a major change, ▪ adds or deletes an ML-1, ML-2 or ML-3 SSC performance function (including set point changes), ▪ modifies ML-1 or ML-2 SSC performance function code, excluding clarifying notes, ▪ adds, deletes or modifies design and/or analysis output values of ML-1, ML-2 or ML-3 calculations, ▪ recodes to another language, or ▪ modifies a significant number of lines of code. Note: A Major OTS computer program change is often indicated with increment increase in version number (e.g., change from version 1 to 2). An evaluation of the software however, is required to determine whether the version release is a major change. Examples: A change from Delta V control system software from version 7.0 to version 8.0. A change that adds code to implement an interlock functional performance requirement that an ML-3 laser system cannot be activated until area doors are locked. A change that modifies code on ML-2 ventilation system backdraft damper so that damper closure does not slam shut and potentially damage the damper assembly. A change in the algorithm or databased used for calculating the water flow rate in an ML-3 fire protection piping system design. A change in coding language from C to C++. A version change where 40% of the lines of code were modified. (Definition developed for this chapter).

Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
Change - Minor computer program change	<p>A change or bug fix that is not a major computer program change but:</p> <ul style="list-style-type: none"> ▪ adds or deletes an ML-4 SSC performance function (including setpoint changes), ▪ modifies ML-3 SSC performance function code, excluding clarifying notes, or ▪ adds, deletes or modifies design and/or analysis output values of ML-4 calculations <p>Note: A minor OTS software change is often indicated with a fractional increase in version number (e.g., 1.1 or 1.01). An evaluation of the software however, is required to determine whether the version release is a minor change.</p> <p>Examples: Add code to implement automatic pump shut-off performance requirement on ML-4 sump low-level alarm. Modify code to fix a coding error on an ML-3 heating/cooling system so that cooling, rather than heating activates at high temperatures. Change the algorithm for calculating the current that flows in an ML-4 electric power system under abnormal conditions. (Definition developed for this chapter).</p>
Change - Less than minor computer program change	<p>A change or bug fix that is not a major or minor computer program change but:</p> <ul style="list-style-type: none"> ▪ adds, deleted and/or modifies ML-4 performance function code, ▪ adds, deletes and/or modifies code that does <u>not</u> modify ML-1, ML-2, ML-3 performance function, or ▪ imparts changes without adding, deleting or modifying design and/or analysis output values (all MLs). <p>Examples: Modify code to increase the ramp time on an ML-4 softstart pump. Install security patch/service pack updates. An OTS software patch that includes a code change to prevent a screen from “freezing” or loading slowly (all MLs). Add/modify code clarifying notes (all MLs). Modify code to produce multiple reporting formats (all MLs). (Definition developed for this chapter).</p>
commercially controlled software	<p>As determined using Form 2033, Safety/Non-Safety Software Determination, Categorization, and Software Risk Level (SRL), software that is not, or will not be safety software or risk significant software. Such software may be acquired (including off the shelf (OTS) software, freeware, or designed software.</p> <p>Examples: Personal productivity software (e.g., Microsoft PowerPoint, Oracle Project Primavera, MS Outlook, etc.); typical business accounting systems, facility personnel comfort temperature control systems. (Based on P1040).</p>
computer program	<p>A combination of computer instructions and data definitions that enables computer hardware to perform computational or control functions. (Ref. NQA-1).</p>
computer program listings	<p>A printout or other human readable display of the source and, sometimes, object statements that make up a computer program. (Ref. ISO/IEC/IEEE 24765).</p>
configuration management	<p>The process of identifying and defining the configuration items in a system (i.e., software and hardware), controlling the release and change of these items throughout the system’s life cycle, and recording and reporting the status of configuration items and change requests. (Ref. NQA-1).</p>
Designed (or developed) software	<p>Software that is designed or developed rather than acquired.</p> <p>Note: Includes the following from DOE G 414.1-4. (a) custom developed software, (b) configurable software, and (c) utility calculation software. (Definition developed for this chapter).</p>
Designed Non-SSC Software	<p>Non-SSC software where the computer program can be changed other than through replacement. Replacement includes replacement with a subsequent software version or upgrade. (Definition developed for this chapter).</p>
Designed SSC Software	<p>SSC software where the computer program can be changed other than through replacement of the computer program and/or the associated SSC. (Definition developed for this chapter).</p>

1 Section SOFT-GEN: General Software Requirements

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Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
Engineering Services Software Coordinator	Individual assigned to maintain the software inventory for ES Division, and to perform other duties as assigned (e.g., per desktop instruction [future]).
error	An error is a condition deviating from an established baseline including deviations from the current approved computer program and its baseline requirements. (Ref. NQA-1). An error is something which requires a software change (major or minor). Examples of errors include (a) if a computer program used for design of a structural member provides incorrect design output, and (b) if a computer program turns on heating instead of cooling at high temperature settings.
freeware	Software that is available for use at no cost or for a nominal, usually voluntary fee. (Ref. Merriam-Webster Dictionary).
major document change	A document change that is not a minor document change. A major document change includes revisions, changes, or modifications to a document (e.g., procedure, work instruction, drawing, etc.) which impact the effective implementation of the requirement(s). (Based on P1020-2).
minor document change	A document change, as defined by the governing document control program, that includes but is not limited to inconsequential editorial corrections, grammatical and spelling changes, organizational name and acronym changes, and similar type changes. (Based on P1020-2).
model	Simplifications of the real world constructed to gain insights into select attributes of a particular physical, biological, economic, engineered, or social system. (Ref. EPA/100K-09/003, <i>Guidance on the Development, Evaluation, and Application of Environmental Models</i> .)
Non-safety software	As determined using Form 2033 , software that is not otherwise determined to be safety software. Non-safety software includes risk significant and commercially controlled software. (Ref. P1040).
Non-SSC software	Software used in design, analysis and/or for administrative control. This software does not physically monitor and/or control SSCs. Examples: Piping system design/analysis software (CAESAR II®), fire protection system design software (SprinkCAD), area lighting calculation software, spreadsheets used to perform structural load calculations, safety analysis software used to perform dispersion modeling, software used to track facility combustible loading, and software used to track Technical Safety Requirement (TSR) implementation. (Definition developed for this chapter).
operating environment	A collection of software, firmware, and hardware elements that provide for the execution of computer programs. (Ref. NQA-1). It is also the location and conditions (environment) where the software will be used or operated to meet its intended function. (Based on P330-8).
Read-Only SSC Software	SSC software where the computer program cannot be changed other than through replacement of the computer program and/or the associated SSC. (It is sometimes referred to as embedded software or firmware; however, for this Chapter, the term Read-Only SSC software is used.) Note: Read-only software includes software where limits and/or set points can be configured (e.g., via keypad entries) without modifying the computer program (code). (Definition developed for this chapter).

Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
Risk Significant software	Software that is, or will be, used for any of the purposes for which safety software is used (see Form 2033), only such purposes are in or for an accelerator, live-fire range, biological hazard facility, explosive hazard facility, or a moderate- or high- hazard chemical facility; or failure of the software would prevent LANL from performing Essential Functions as described in EPP-COOP-006 , <i>LANL COOP [Continuity of Operations] Plan</i> . Commercially controlled software is not risk significant software. (Ref. P1040).
Safety and Hazard Analysis and Design Software (SHADS)	Safety software that is used, or will be used, to classify, design, or analyze nuclear (including radiological) facilities. This software is not part of an SSC, but helps to ensure the proper accident or hazards analysis of nuclear (including radiological) facilities or an SSC that performs a safety function. This is Non-SSC software, safety software, and is categorized as SHADS. (Ref. P1040).
Safety Management and Administrative Controls Software (SMACS)	Safety software that performs, or will perform, a hazard control function in support of nuclear (including radiological) facility radiological Safety Management Programs (SMPs) or TSRs; and/or this is software that performs, or will perform, a control function in support of a nuclear (including radiological) facility necessary to provide adequate protection from nuclear (including radiological) facility radiological hazards. It supports eliminating, limiting, or mitigating nuclear hazards to workers, the public, or the environment as addressed in 10 CFR 830 , 10 CFR 835 , <i>Occupational Radiation Protection</i> , and the Department of Energy Acquisition Regulation (DEAR) Integrated Safety Management System (ISMS) clause 48 CFR 970.5223-1 , <i>Integration of Environment, Safety, and Health into Work Planning and Execution</i> . This is safety software and is categorized as SMACS. (this is a clarification of definition in P1040 r9; r10 expected to include same).
Safety Software	Software that includes any of the following: SSS, SHADS, or SMACS. Both SSC software and Non-SSC software can be safety software. (Ref. P1040).
Safety System Software (SSS)	Safety software for a nuclear (including radiological) facility that performs, or will perform, a safety function as part of an SSC and is cited in either (a) a DOE-approved documented safety analysis, or (b) an approved hazard analysis per DOE P 450.4A , <i>Integrated Safety Management Policy</i> and 48 CFR 970-5223-1 , <i>Integration of Environment, Safety, and Health into Work Planning and Execution</i> . This is SSC software, safety software and is categorized as SSS. Note: References implemented at LANL as described in PD110, <i>Safety Basis</i> . See DOE-approved documented safety analyses at LANL Safety Basis Document Lists (SBDLs) . Analyses include Documented Safety Analyses (DSAs), Preliminary Documented Safety Analyses (PDSAs), Bases for Interim Operations (BIOs) etc. (Based on P1040).
simple and easily understood (Non-SSC) software used in the design of SSCs	Software that satisfies the following criteria: <ul style="list-style-type: none"> a. The software is used in the design of SSCs; b. The results of the computer program can be easily confirmed through hand calculations; c. A person technically qualified in the subject can review and understand the program and the supporting calculations; and, d. The software can be individually verified with each use (e.g., calculation). (Based on NQA-1).
software	Computer programs and associated documentation and data pertaining to [needed for] the operation of a computer system. (Ref. NQA-1).
software approve/approval /approved for use (SWAU)	An approval that constitutes that the software requirements have been satisfied (including installation and operating instructions), and the software is ready to be used in the intended operating environment. (Ref. P1040).

Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
Software Coordinator	Individual(s), designated by division management, providing coordinating and/or administrative functions in support of chapter compliance (e.g., inventory and associated reporting). <i>ES Division has an ES-Div Software Coordinator.</i>
software design requirement	A requirement that impacts or constrains the design of a software system or software system component. (Based on ISO/IEC/IEEE 24765).
software engineering elements	(a) software acquisition method(s) for controlling the acquisition process for software and software services; (b) software engineering method(s) used to manage the software life-cycle activities; (c) application of standards, conventions, and other work practices that support the software life cycle; (d) controls for support software used to develop, operate, and maintain computer programs. (Ref. NQA-1).
Software Owner (SO)	Selected responsibilities from P1040 Rev 9 follow; see others in Ch 21: <ul style="list-style-type: none"> • Provides the software information and Form 2033, Safety/Non-Safety Software Determination, Categorization, and Software Risk Level (SRL) and obtains review and concurrence of the form in accordance with this document. • Reviews and approves the software project planning documentation. • Owns the software and supports the SRLM in complying with the requirements of this document. • Prepares the approval for use documentation that describes the intended use and any associated limitations, access controls, etc., for using the software.
Software Point of Contact (SPOC)	That individual selected by division management to act as software owner for specific software or multiple Non-SCC software programs. Ideally it's the main or super-user of each program, but can be another user or even a single individual for a group or division.

Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
Software Responsible Line Manager (SLRM)	<p>Responsibilities (performs or causes to be performed, from P1040 Rev 9 for Software Owner RLM follow; see others in Ch 21:</p> <ul style="list-style-type: none"> • Manages and maintains software in accordance with this document to ensure it operates as intended. • Determines reasonable probability, software type, software category, and as applicable SRL. • Reviews Form 2033, Safety/Non-Safety Software Determination, Categorization, and Software Risk Level (SRL) for completeness, accuracy and adequacy, and signs Form 2033 indicating concurrence with the software determination, categorization, and as applicable, SRL. • Retains the completed Form 2033 as a record in accordance with the SRLM's records management system. • Identifies, documents, approves, controls, and maintains safety and risk significant software owned by the SRLM that is new software or in-use software at LANL nuclear (including radiological) facilities. • Provides SRLM safety software inventory information and any changes thereto to QPA-IQ. • Transmits the SRLM inventory information to QPA-IQ in accordance with applicable document control protocols, including as required, derivative classification review and marking for sensitive information; retains information as a record. • Applies the appropriate amount of SQA rigor in software planning and implementation. • Reviews and approves the software project planning documentation. • As applicable, acquires software and/or software services. • Except for SQA associated with using the software, is responsible for the SQA of the software. • V&Vs the software. • Identifies and ensures reviews are performed by competent individuals or groups other than those who developed and documented in the original software design (but who may be from the same organization). • Ensures software owning organization personnel managing or working to this document are adequately trained and as required, qualified. • Approves software for use. • Completes in-use tests in the operating environment. • Retires software, including removal of safety software from software inventory.
software tool	<p>A computer program used in the development, testing, analysis or maintenance of a program or its documentation. Examples include vendor-supplier configuration tools, conversion tables, comparators, cross-reference generators, compilers, CASE (Computer-Aided Design Software Engineering) tools, configuration and code management software, decompilers, disassemblers, editors, flowcharters, monitor test case generators, and timing analyzers. (Based on NQA-1).</p>
Software User (SU)	<p>Responsibilities from P1040 Rev 9; see others in Ch 21.</p> <ul style="list-style-type: none"> • Reviews and approves the software project planning documentation. • Applies the appropriate amount of SQA rigor in software planning and implementation. • Reports software errors and problems. • Uses software within software limitations and in accordance with this document. <p>[Note, for SSC software, choose as the SU the individual that best adds value when considering the above role. <i>It may depend on and change whether in design or an operating facility. It may be the responsible engineer (or technician or maintenance in some cases) rather than facility ops personnel.</i>]</p>

Table 21.1-A1 Chapter 21 Definitions	
Item	Definition
Software User Responsible Line Manager (SU RLM)	<p>Selected responsibilities from P1040 Rev 9; see others in Ch 21.</p> <ul style="list-style-type: none"> • Reviews and approves the software project planning documentation. • Approves software for use. • Supports completion of in-use tests in the operating environment. • Ensures software users and software user organization personnel managing or working to this document are adequately trained, and as required, qualified.
SSC software	<p>Software that controls and/or monitors system, structures and components (SSCs) and is running and interacting with its environment in real time. SSC software may be safety or non-safety software.</p> <p><u>Examples:</u> Building Automation Control System (BAS) software, process gas monitoring and control system software, fire alarm control panel (FACP) software, continuous air monitor (CAM) software, seismic switch software, and uninterrupted power supply (UPS) software. (Based on TR. No. 397, <i>Quality Assurance for Software Important to Safety</i>, IAEA, 2000).</p>
support software	<p>Software or a program that aides in the development, maintenance, or use of other software or provides general application-independent capability (Ref. ISO/IEC/IEEE 24765). Support software includes software tools and system software (Ref. NQA-1).</p> <p>Note: SSC and Non-SSC software may have support software.</p>
system software	<p>An element of support software, the computer programs used to provide basic or general functionality and facilitate the operation and maintenance of the application computer program. Examples include lower level software layers, assemblers, interpreters, diagnostics, and utilities. (Based on NQA-1).</p>
test case	<p>A set of test inputs, execution conditions, and expected results developed for a particular objective, such as to exercise a particular program path or to verify compliance with a specific requirement. (Ref. NQA-1).</p>
test plan (Procedure)	<p>A document that describes the approach to be followed for testing a system or component. Typical contents identify the items to be tested, tasks to be performed, and responsibilities for the testing activities. (Ref. NQA-1).</p>
toolbox code	<p>Software that is listed on the DOE Safety Software Quality Assurance Central Registry (Registry). (Ref. P1040).</p>
validation (software)	<p>The process of exercising or evaluating a system or system component by manual or automated means to ensure that it satisfies the specified requirements and to identify differences between expected and actual results in an operating environment (Ref. NQA-1); and providing evidence that the software, and its associated products, satisfies system requirements allocated to software at the end of each life cycle activity, solves the right problem (e.g., correctly models physical laws, implements business rules, uses the proper system assumptions), and satisfies the intended use and user needs (Ref. DOE O 414.1D).</p>
verification	<p>The act of reviewing, inspecting, testing, checking, auditing, or otherwise determining and documenting whether items, processes, services, or documents conform to specified requirements (Ref. NQA-1); and providing objective evidence that the software and its associated products conform to requirements (e.g., for correctness, completeness, consistency, and accuracy) for all life cycle activities during each life cycle process (e.g., acquisition, supply, development, operation, and maintenance); satisfy standards, practices, and conventions during life cycle processes; successfully complete each life cycle activity; and satisfy all the criteria for initiating succeeding life cycle activities (e.g., building the software correctly) (Ref. O 414.1D).</p>

Table 21.1-A2 Chapter 21 Acronyms	
Acroynm ¹	Definition
A	Approve
AFU	Approval for Use
ASCE	American Society of Civil Engineers
AP	Administrative Procedure
ASM	Acquisition Services Management
ASME	American Society of Mechanical Engineers
BAS	Building Automation System
BIO	Basis for Interim Operations
CAM	Continuous Air Monitor
CGD	Commercial Grade Dedication (Dedicated)
CM	Configuration Management
COOP	Continuity of Operations Plan
Cx	Commissioning
D	Develop
DA	Design Authority
DAG	Design Agency
DCF	Design Change Form
DOE	(United States) Department of Energy
DRN	Design Revision Notice
DSA	Documented Safety Analysis
EF	Essential Function
ES	Engineering Services
ES-Div	Engineering Services Division
ESM	Engineering Standards Manual
ESSC	Engineering Services Software Coordinator
FAC-COE	Facility Conduct of Engineering
FACP	Fire Alarm Control Panel
FCR	Field Change Request
FDAR	Facility Design Authority Representative
FDD	Facility Design Description
G	Grade (or Guide)
IEEE	Institute of Electrical and Electronics Engineers
IESL	LANL Institutional Evaluated Supplier List
IWR	Interim Work Request
LANL	Los Alamos National Laboratory
LCxA	LANL Commissioning Authority
ML	Management Level
NA	Not Applicable
NQA-1	ASME NQA-1-2008/NQA-1A-2009 , Quality Assurance Requirements for Nuclear Facility Applications, Part I and Part II
OCIO	Office of Chief Information Officer
O&M	Operations and Maintenance

Table 21.1-A2 Chapter 21 Acronyms	
Acroynm ¹	Definition
OTS	Off the Shelf
PDSA	Preliminary Documented Safety Analysis
PFD	Process Flow Diagram
P&ID	Process and Instrumentation Diagram
POC	Point of Contact
R	Required or review (see context)
RE	Responsible Engineer
RLM	Responsible Line Manager
SB	Safety Basis Division
SBP	Safety Basis Procedure
S/CI	Suspect/Counterfeit Item
SDD	System Design Description
SHADS	Safety and Hazard Analysis Software
SMACS	Safety Management and Administrative Controls Software
SME	Subject Matter Expert
SO	Software Owner
SOO	Sequence of Operations
SOW	Statement of Work
SPOC	Software Point of Contact
SRLM	Software Responsible Line Manager
SSC	Structure, System Component
SSS	Safety System Software
SRL	Software Risk Level
SU	Software User
SWAU	Software Approve (Approval) for Use
SWDD	Software Design Documentation (or Document)
SWBL	Software Baseline
SWDS	Software Data Sheet
SWHA	Software Hazards Analysis
SWID	Software Identification Number
SWNCP	Non-SSC Software Change Package
SWRS	Software Requirements Specification
SWYRS	Software System Requirements Specification
SWTM	Software Traceability Matrix
SWTP	Software Test Plan
SWTR	Software Test Report
TA	Technical Area
UPS	Uninterrupted Power Supply
V&V	Verify and Validate (or verification and validation)

¹ Only key acronyms are listed. See [PD340](#), *Conduct of Engineering for Facility Work* and documents referenced therein for additional meanings.