Product Quality

Functional Suitability

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Functional Completeness	FCp-1	FCp.1.1	Rate for requirement implementation	X=A/B	A=Number of implemented functionalities B=Number of requirements created during the target period
Functional Correctness	FCr-1	FCr.1.1	Removal rate of serious faults	X=1−A/B	A=Number of remaining serious faults B=Number of serious faults discovered during the target period
Functional Appropriateness	FAp-1	FAp.1.1	Execution rate of system test cases	X=A/B	A=Number of test cases executed during the target period B=Intended number of test cases to be executed during the target period
Functional Appropriateness	FAp-1	FAp.1.2	Degree of conformity with user expectations	X’=Mean value of the user response in X	X=Responses to a user questionnaire related to the degree of conformity with user expectations

Performance Efficiency

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Time behavior		PTb.0.1	Performance of operational efficiency tests	X=A/B	A=Number of tested item types among the following: response time, turnaround/processing time, and throughput rates. B=3
Time behavior	PTb-1	PTb.1.1	Mean response time	X'=Mean value of X among the task group	X=Measurement value of a particular functionality test task
Time behavior	PTb-2	PTb.2.1	Response time ratio between the measured value and the target value	X'=Mean value of X among the task group X=A/B	A=Measurement value of a particular functionality test task B=Target value of such a task
Time behavior	PTb-3	PTb.3.1	Mean turnaround/processing time	X'=Mean value of X among the task group	X= Measurement value of a particular functionality test task
Time behavior	PTb-4	PTb.4.1	Turnaround/processing time ratio between the measured value and the target value	X'=Mean value of X among the task group X=A/B	A= Measurement value of a particular functionality test task B= Target value of such a task

Time behavior	PTb-5	PTb.5.1	Throughput rate ratio between the measured value and the target value	X'= Mean value of X among the task group X=A/B	A= Measurement value of a particular functionality test task B= Target value of such a task
Resource utilization		PRu.0.1	Performance of resource efficiency tests	X=A/B	A=Number of tested item types between the two B=2 (CPU usage rate test, memory usage rate test)
Resource utilization	PRu-1	PRu.1.1	CPU usage rate and the maximum value	X'= Mean value of X among the task group	X=Maximum CPU usage rate during a particular functionality test task
Resource utilization	PRu-2	PRu.2.1	Memory usage rate and the maximum value	X'= Mean value of X among the task group	X=Maximum memory usage value during a particular functionality test task
Capacity		PCa.0.1	Performance of the capacity satisfaction tests	X=0 or 1	X=Simultaneous user access is tested, then 1, otherwise 0
Capacity	PCa-2	PCa.2.1	Achievement rate of the target maximum number of users with simultaneous access	X'= Mean value of X among the task group X=A/B	A= Measurement value of a particular functionality test task B=Target value of such a task

Compatibility

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Co-existence	CCo-1	CCo.1.1	Performance of tests while sharing the environment with other products	X'=Mean value of X between server and client machines X=A/B	A=Type names of software intentionally sharing environment during the tests (security software and other target product) B=2
Interoperability	CIn-1	CIn.1.1	Rate of support for both import/export of file format	X=A/B	A=Number of file formats supporting both import/export B=Number of file extensions used by the product

Usability

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Appropriateness recognizability	UAp-2	UAp.2.1	Rate of functionality described in videos	X=A/B	A=Number of functionality descriptions available in videos B=Number of functionalities
Learnability	ULe-1	ULe.1.1	Rate of functionality described in catalogs	X=A/B	A=Number of functionality descriptions available in catalogs B=Number of functionalities
Learnability	ULe-1	ULe.1.2	Rate of functionality described in manuals	X=A/B	A=Number of functionality descriptions available in manuals B= Number of functionalities
Operability	UOp-6	UOp.6.1	Rate of Undo support	X=A/B	A=Number of functionalities that can be reverted B=Number of functionalities requiring Undo support
User error protection	UEp-1	UEp.1.1	Rate of support for input content validity check	X=A/B	A=Number of functionalities with error messages or warnings among B B=Number of functionalities requiring user input
User interface aesthetics	UIn-1	UIn.1.1	Degree of usability of UI	X'= Mean value of the user response in X	X= Responses to user questionnaire related to the degree of UI usability
Accessibility	UAc-3	UAc.3.1	Rate of functionality accessibility for hearing and visual impairment	X=A/B	A=Number of functionalities accessible for hearing and visual impairment B=Number of functionalities
Accessibility	UAc-4	UAc.4.1	Rate of functionality accessibility for visual impairment	X=A/B	A=Number of functionalities accessible for visual impairment B= Number of functionalities

Accessibility	UAc-5	UAc.5.1	Degree of language support	X=A/B	A=Total weight of support for each language B=Number of supported languages

Reliability

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Maturity	RMa-1	RMa.1.1	Fault removal rate (unit tests)	X=A/B	A=Number of fixes among B B=Number of faults found during the target period
Maturity	RMa-1	RMa.1.2	Fault removal rate (integration tests)	X=A/B	A=Number of fixes among B B= Number of faults found during the target period
Maturity	RMa-1	RMa.1.3	Fault removal rate (system tests)	X=A/B	A= Number of fixes among B B= Number of faults found during the target period
Maturity	RMa-2	RMa.2.1	Rate of achievement towards MTBF	X=C/D	A=Operating hours B=Number of malfunction occurrences C=MTBF measurement value=A/B D=MTBF target value
Maturity	RMa-3	RMa.3.1	Fault discovery rate (unit tests)	X=A/B	A= Number of faults discovered during the target period (measurement value) B=Target number of fault discoveries during the target period
Maturity	RMa-3	RMa.3.2	Fault discovery rate (integration tests)	X=A/B	A=Number of faults discovered during the target period (measurement value) B= Target number of fault discoveries during the target period
Maturity	RMa-3	RMa.3.3	Fault discovery rate (system tests)	X=A/B	A= Number of faults discovered during the target period (measurement value) B= Target number of fault discoveries during the target period

Maturity	RMa-3	RMa.3.4	Fault discovery rate (ticket- based)	X=B/(B-abs(B-A))	A= Number of faults discovered during the target period (measurement value) B=Predicted number of fault discoveries during the target period abs=Absolute value function ※Derive B based on the reliability curve
Maturity	RMa-4	RMa.4.1	Test execution rate (integration tests)	X=A/B	A=Number of executed test cases during the target period B=Target number of executed test cases during the target period
Maturity	RMa-4	RMa.4.2	Test execution rate (system tests)	X=A/B	A=Number of executed test cases during the target period B=Target number of executed test cases during the target period
Availability		RAv.0.1	Performance of operational tests	X=0 or 1	If operational tests were performed, 1, otherwise 0.
Availability	RAv-1	RAv.1.1	Rate of actual operational hours to regulated hours	X=A/B	A=Number of hours in normal conditions during continuous operation B=Predicted number of hours in normal conditions during continuous operation
Availability	RAv-2	RAv.2.1	Rate of system actual downtime to the target	X=(A/B)/C	A=Total hours of system downtime B=Number of times the system went down C=Target mean time of system downtime
Fault tolerance	RFt-1	RFt.1.1	Fault-pattern test case (integration tests)	X=A/B	A=Number of passed cases in B B=Number of fault-pattern test cases during the target period
Fault tolerance	RFt-1	RFt.1.2	Fault-pattern test case (system tests)	X=A/B	A=Number of passed cases in B B=Number of fault-pattern test cases during the target period

Recoverability	RRe-1	RRe.1.1	Rate of the actual system recovery time to the target	X=(A/B)/C	A= Total hours of recovery from a system outage B=Number of system outages C=Target mean recovery time from a system outage

Security

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Confidentiality	SCo-1	SCo.1.1	Rate of data access authority management support	X=A/B	A=Number of items in B with possible access authority management support B=Number of data types
Confidentiality	SCo-2	SCo.2.1	Rate of encryption support	X=A/B	A=Number of items in B with encryption support B=Number of data types
Integrity	SIn-2	SIn.2.1	Rate of data corruption prevention support	X=A/B	A=Number of items in B with corruption prevention functionality support B= Number of data types
Non-repudiation	SNo-1	SNo.1.1	Rate of digital signature support in network paths	X=A/B	A=Number of items in B with a valid digital signature B=Number of communication path types
Accountability	SAc-1	SAc.1.1	Rate of data access log support	X=A/B	A=Number of items in B with access log support B= Number of data types
Authenticity	SAu-1	SAu.1.1	Rate of authentication support using the login functionality	X'=X for Login functionality X=A/B	A=Number of authentication method types supported by the product B=6 types: Fixed password, one-time password, aging password, security token, biometric authentication, decipherable type

Maintainability

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Modularity	MMo-1	MMo.1.1	Degree of coupling among classes	X'= Mean value of X among the class group	X=Degree of coupling (by class)
Modularity	MMo-2	MMo.2.1	Cyclomatic complexity of functions	X'=Mean value of X among the function group	X=Cyclomatic complexity (by function)
Reusability	MRe-1	MRe.1.1	Lack of cohesion among classes	X'= Mean value of X among the class group	X=100-LCOM2 (by class) LCOM2= Using version 2 as a definition for the lack of cohesion Note: LCOM2 takes value between 0 to 100
Analyzability	MAn-1	MAn.1.1	Rate of data access log support	X=A/B	A=Number of items in B with access log support B=Number of data types
Modifiability	MMd-3	MMd.3.1	Fault removal rate (among the ones discovered in unit tests)	X=A/B	A=Number of fixed faults B=Number of discovered faults
Modifiability	MMd-3	MMd.3.2	Fault removal rate (among the ones discovered in integration tests)	X=A/B	A= Number of fixed faults B= Number of discovered faults
Modifiability	MMd-3	MMd.3.3	Fault removal rate (among the ones discovered in system tests)	X=A/B	A= Number of fixed faults B= Number of discovered faults

Testability	MTe-1	MTe.1.1	Execution rate of module unit tests	X=A/B	A=Number of unit tests performed on modules B=Total number of modules

Portability

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Adaptability		PAd.0.1	Performance of multiple environments test	X1=A/B X2=C/B	A=Number of main functionalities already tested in multiple environments B=Number of main functionalities C=Number of main functionalities that passed tests in multiple environments
Installability		PIn.0.1	Performance of installation test	X=0 or 1	If installation tests are performed, 1, otherwise 0
Installability	PIn-1	PIn.1.1	Mean installation time	X'= Mean value of X among the task group X=A/B (Installation time)	A=Measurement value of a particular task B=Target value of such a task
Installability	PIn-2	PIn.2.1	Rate of installer support	X=A/B	A= Installer supporting types among the three below B=3 Types: Web, CD, Setup service

Installability	PIn-2	PIn.2.2	Rate of installation service option support	X'=X in server software X=A/B	A=Supporting installation options among the eight types below B=8 ・All setup information can be removed when uninstalled ・Option to retain setup information in the registry when uninstalled ・Option to retain setup information in the location specified by the user other than the registry when uninstalled ・Support for multiple server setups ・Support for a single server setup ・Root folder can be changed at the destination of installation ・Installer can be stopped in the middle of an operation (without starting over) ・If the environment or necessary software is not setup in advance, a warning is given or installation is not completed
Replaceability	PRe-1	PRe.1.1	Degree of necessity for additional learning	X'=Mean value of the user response in X	X= Responses to user questionnaire related to the user satisfaction

Quality in Use

Effectiveness

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Effectiveness	Ef-1	Ef.1.1	Task completion rate	X=A/B	A=Number of completed tasks B=Total number of tasks
Effectiveness	Ef-3	Ef.3.1	Number of errors per task	X=A/B	A=Number of errors B= Total number of tasks
Effectiveness	Ef-4	Ef.4.1	Rate of tasks with errors	X=A/B	A=Number of tasks with errors B= Total number of tasks
Effectiveness	Ef-5	Ef.5.1	Rate of tester generated errors	X=A/B	A=Number of testers causing errors B=Total number of testers

Efficiency

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Efficiency	Ey-1	Ey.1.1	Mean time to complete tasks	X'= Mean value of the user response for X where X=B−A	A=Start time of a task B=End time of a task
Efficiency	Ey-5	Ey.5.1	Rate of useful actions to the total actions in a task	X'= Mean value of the user response for X where X=A/B	A=Number of necessary actions B=Total number of actions

Satisfaction

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Usefulness	SUs-1	SUs.1.1	Degree of satisfaction for the product	X'= Mean value of the user response in X	X= Response to a user questionnaire related to user satisfaction
Usefulness	SUs-1	SUs.1.2	Net promoter score	X'= Mean value of the user response in X	X=Response to a user questionnaire related to the net promoter score
Usefulness	Sus-2	Sus.2.1	Degree of satisfaction for the functionalities	X'= Mean value of the user response in X	X=Response of the mean satisfaction by a user in the user questionnaire related to satisfaction of each functionality
Trust	STr-1	STr.1.1	Degree of trust	X'= Mean value of the user response in X	X=Response to a user questionnaire related to trust
Pleasure	SPl-1	SPl.1.1	Degree of pleasure	X'= Mean value of the user response in X	X=Response to a user questionnaire related to stress-free use
Pleasure	SCo-1	SCo.1.1	Degree of pleasure	X'= Mean value of the user response in X	X=Response to a user questionnaire related to pleasure

Freedom from Risk

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Economic risk mitigation		REc.0.1	No economic loss	X'= Mean value of the user response in X	X=Response to a user questionnaire related to economic impact
Health and safety risk mitigation		RHe.0.1	No effects on human health and life	X'= Mean value of the user response in X	X=Response to a user questionnaire related to the impact on human health and life
Environmental risk mitigation		REn.0.1	No effects on the environment	X'= Mean value of the user response in X	X=Response to a user questionnaire related to the impact on nature and the social environment

Context Coverage

(Sub)characteristics	SQuaRE	ID	Name	Definition	Details
Context completeness		CCm.0.1	Usage of a product other than for its main purpose	X'= Mean value of the user response in X	X=Response to a user questionnaire related to using a product other than for its main purpose
Flexibility		CFl.0.1	Degree of task completion for product use other than for its main purpose	X'= Mean value of the user response in X	X=Response to a user questionnaire related to task completion for product use other than for its main purpose