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On the Assessment of Preservability: Method and Application

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- Preservability definition
- Hypothesis
- ISO 25010 Qualities
- A Method for Preservability Assessment
- Application of the Method to a Civil Engineering Institution
- Application of the Method to a Civil Engineering Institution - Findings
- Future Work



Preservability Definition

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The degree to which a system, product, or component can be archived for as long as necessary, ensuring its trustworthiness, and redeployed and re-executed according to the expectations, in a future environment, that might potentially be different from the origin



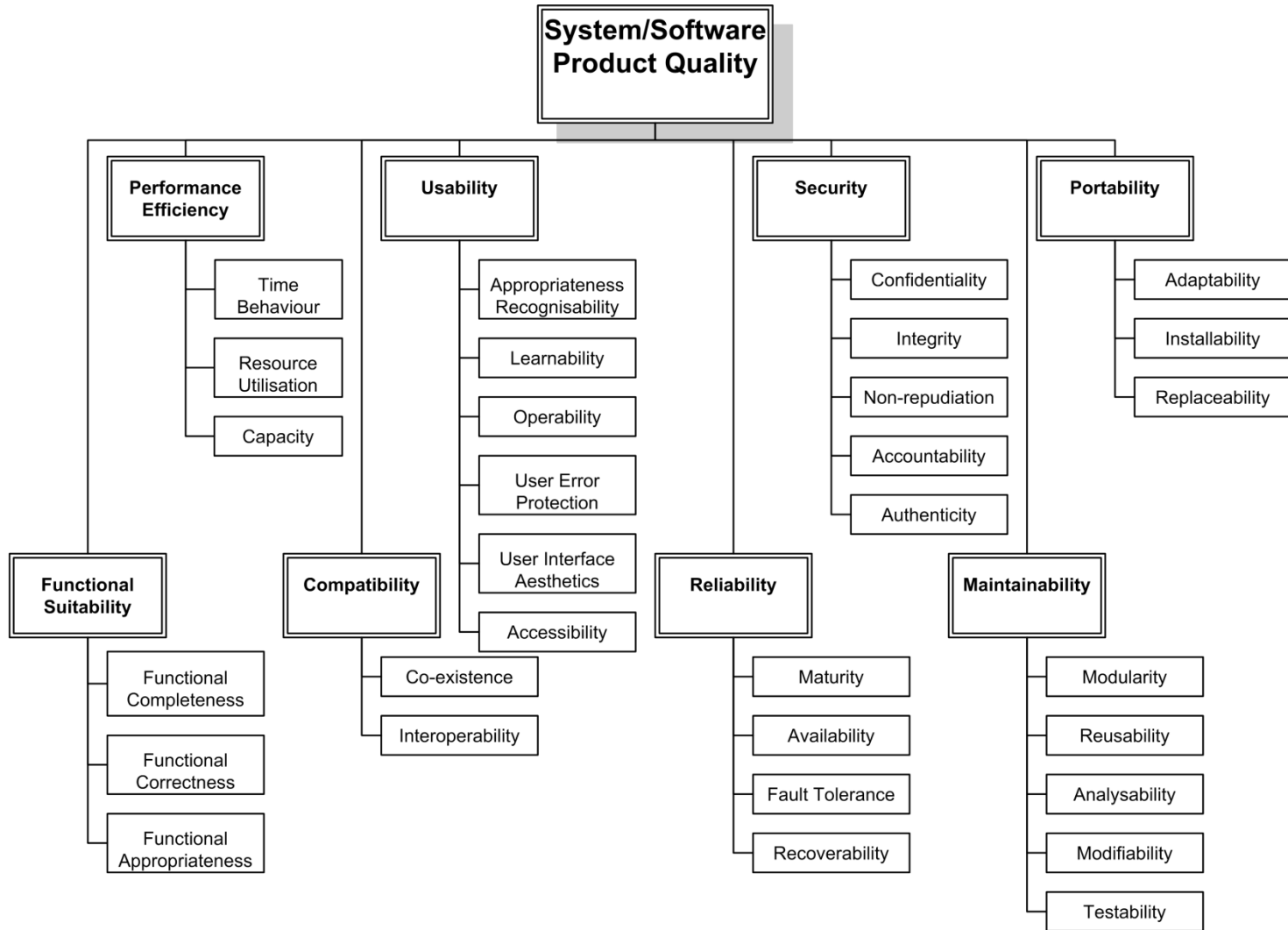


- Preservability is a set of system capabilities originating from a combination of system/software qualities
- The assessment of preservability capabilities of a system should look into:
 - the assessment of the system with respect to the quality characteristics related to preservability capabilities
 - so that those capabilities can be effectively applied in the preservation of the system itself



ISO 25010 Product Quality Model

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- Each of the qualities affects preservability directly
 - *Maintainability, portability and compatibility* can be considered **adaptive** characteristics
 - *Reliability, usability, performance efficiency, and functional suitability* are **usage-oriented** characteristics
 - *Security* is important to ensure trustworthiness of the system and data

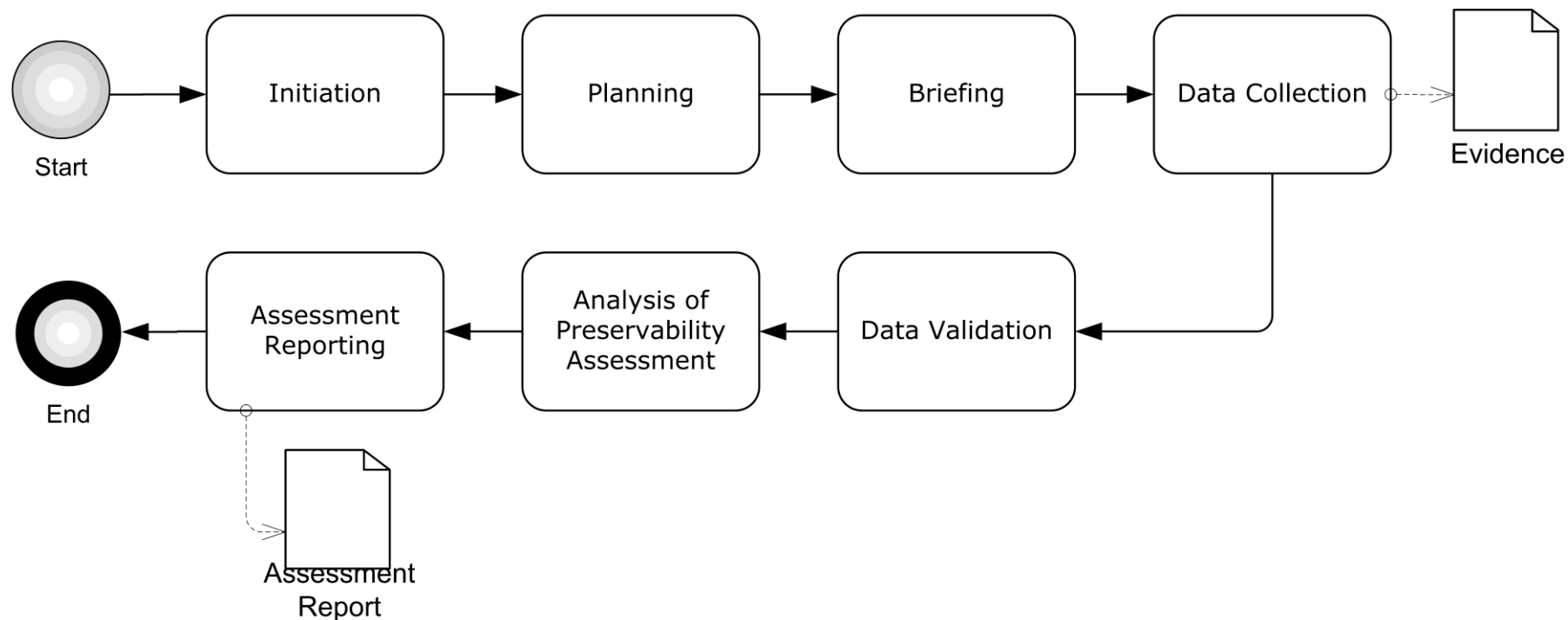


- The relevance of each quality changes from case to case, i.e., is context-dependent
 - An assessment method needs to take this aspect into account
 - No techniques to be used should be definitive or mandatory
- The initial phases of the assessment method should identify and analyse the organisational context of the system
- Any assessment techniques used should be tailored and fit for purpose



A Method for Preservability Assessment

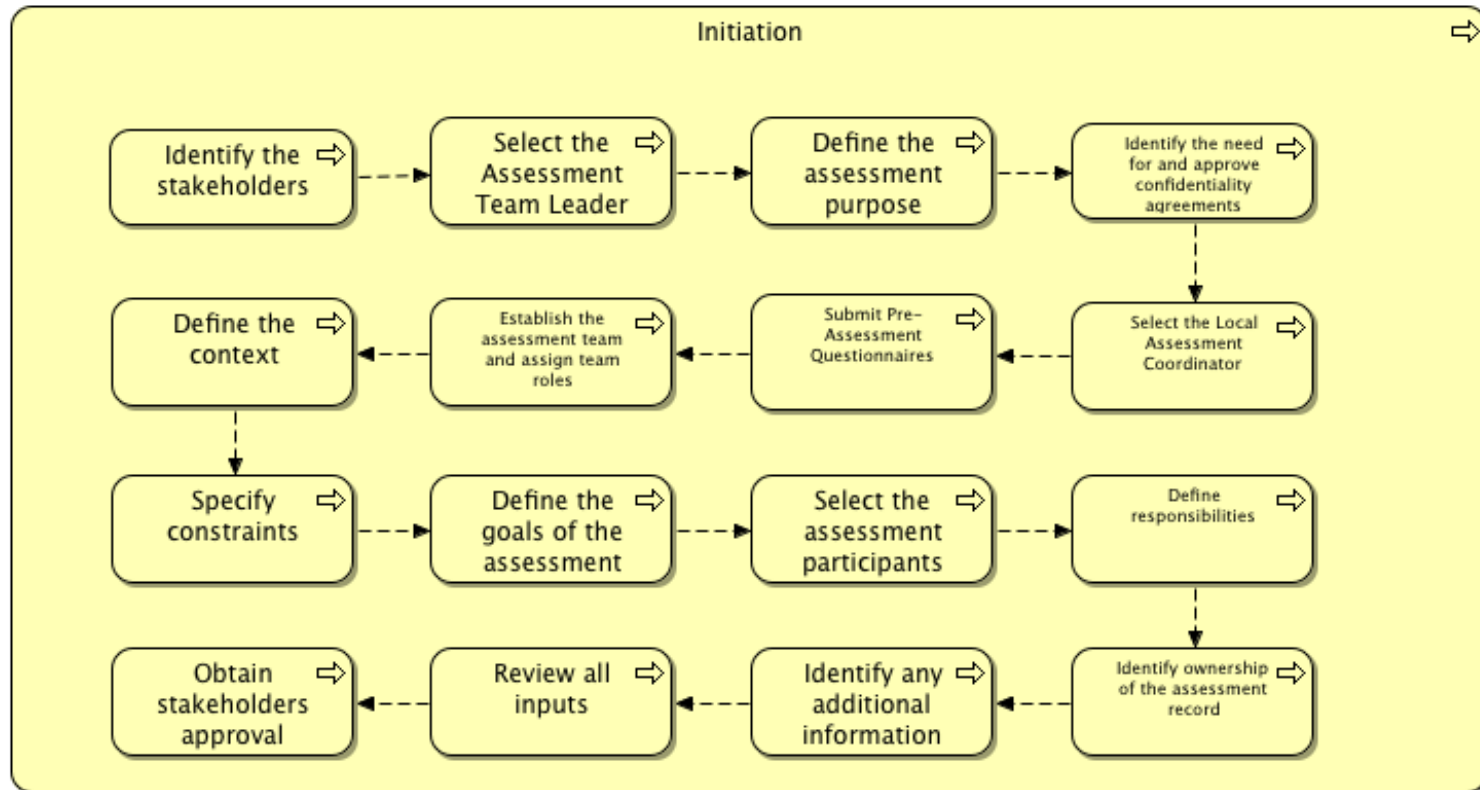
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- Based on ISO 15504

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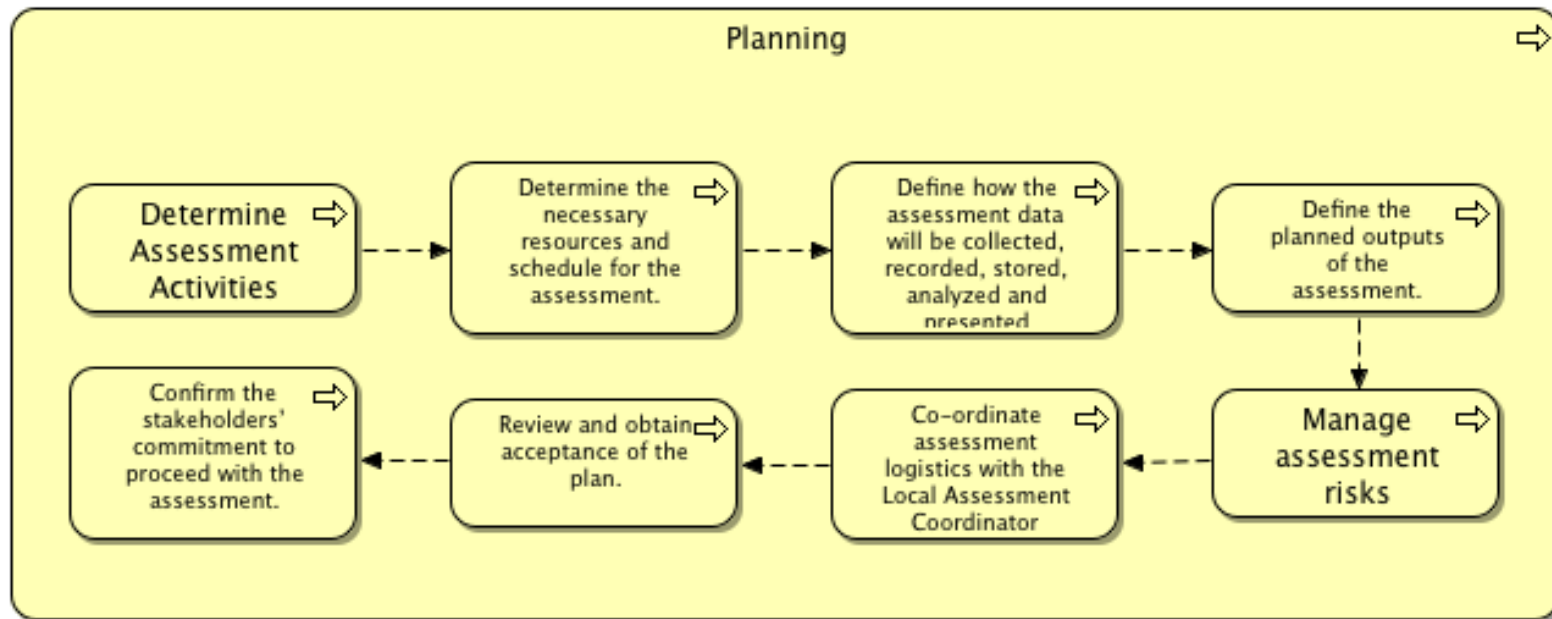


No.	Compatibility	Evidence
C1	Co-Existence	
C1.1	The system has a historic of compatibility errors which can be traced back to components and maintains an (in)compatibilities list. <i>An historic of compatibility errors is very effective to determine the cause of an error as a first attempt, it can be useful to trace errors without much effort. Also, a list of compatibilities and incompatibilities can be used to set up the environment for the system. Example: Two versions of .NET framework installed in the same machine, an outdated driver.</i>	Logs; Compatibility Errors History Document; (In)compatibilities list; Evidence of continuous update of the (in)compatibilities list; Systems Logs; Document containing the history of errors and possible solutions; Existence of Hardware/Software compatibilities list; Evidence that the Hardware/Software compatibilities list is updated and useful.
C1.2	There is a mechanism to check for dependencies of system's components and dependencies errors are analyzed by a support team. <i>A mechanism to check for (external) components used by a system can help in further installations or exceptions handling, also the analysis of dependencies errors is essential to trace the errors and develop fixes. Example: the use of CUDF (ltd) in LINUX Environments, the use of the registry in Windows environments, dynamic library dependency (otool) in MAC OS.</i>	Evidence of previous dependency analysis; Evidence of periodic dependency analysis; Evidence of log analysis for co-existence errors; Logs.

Id	Quality	Chief Information Officer	Head Architect	Head Development	Head IT Operations	Head IT Administration	Service Manager	Information Security Manager	Privacy Officer
C	Compatibility		x	x	x	x	x		
C1	Co-existence		x	x	x	x	x		
C2	Interoperability		x	x	x	x	x		
P	Portability		x	x	x	x	x		
P1	Adaptability		x	x			x		
P2	Installability		x	x	x		x		
P3	Replaceability		x	x	x	x	x		
M	Maintainability		x	x			x		
M1	Modularity		x	x			x		
M2	Reusability		x	x			x		
M3	Analyzability		x	x			x		
M4	Modifiability		x	x			x		
M5	Testability		x	x			x		
S	Security	x	x	x		x	x	x	x
S1	Confidentiality	x	x	x			x	x	x
S2	Integrity		x	x			x	x	x
S3	Non-repudiation	x	x			x		x	x
S4	Accountability	x	x			x		x	x
S5	Authenticity		x					x	x

A Method for Preservability Assessment

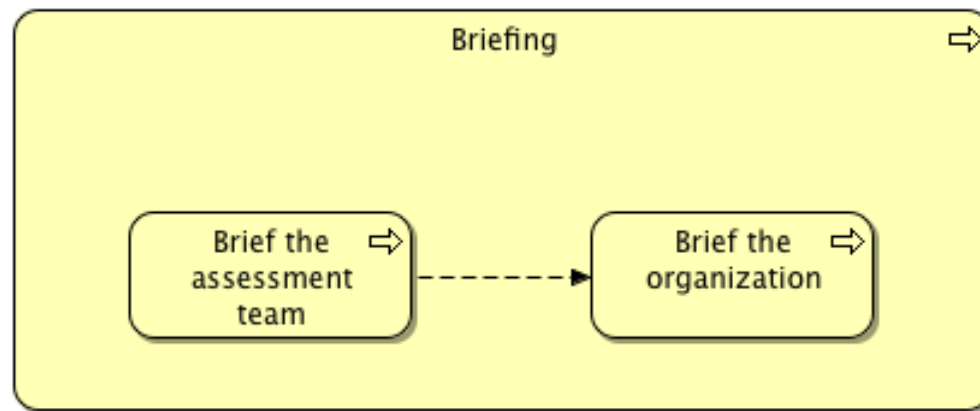
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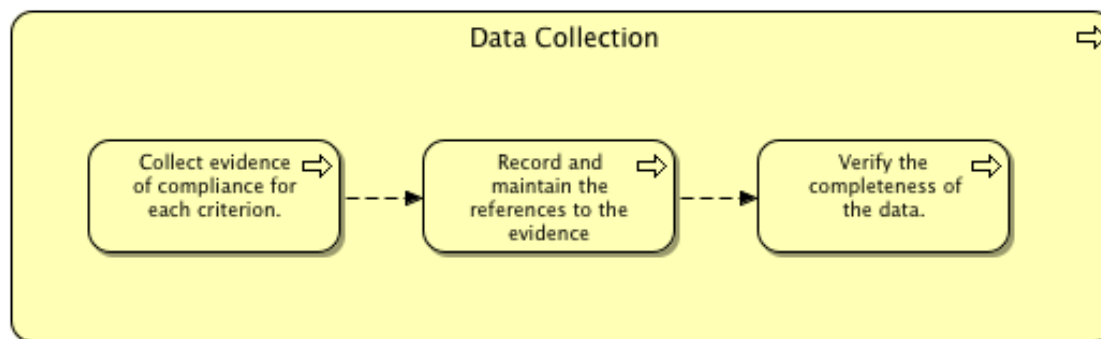
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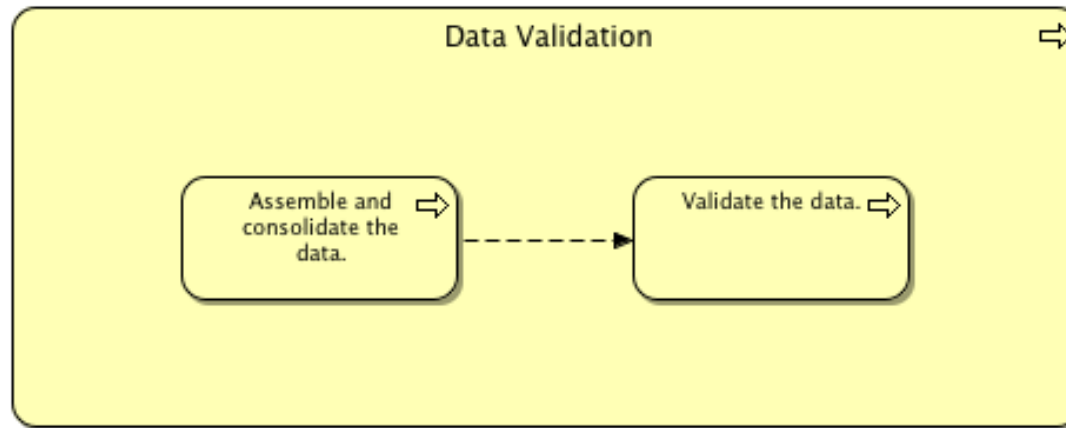
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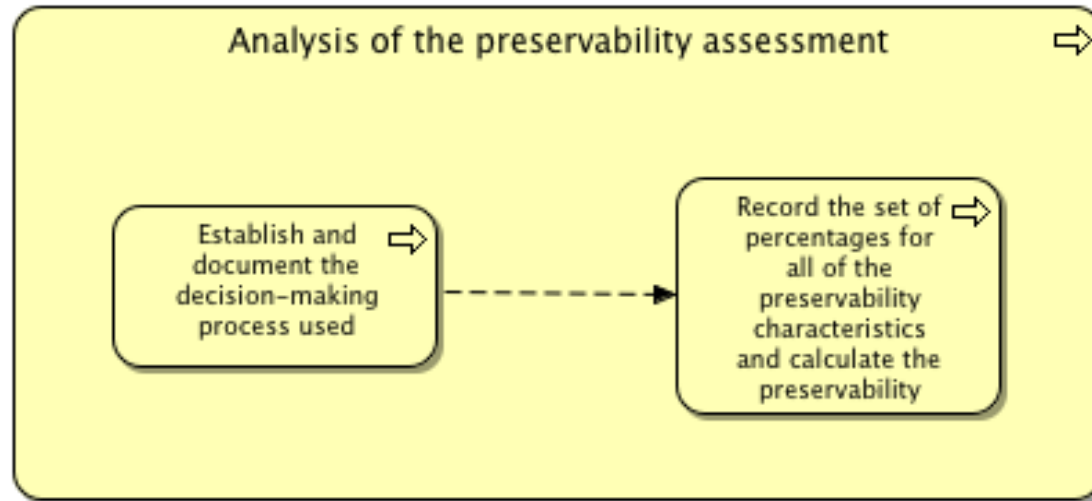
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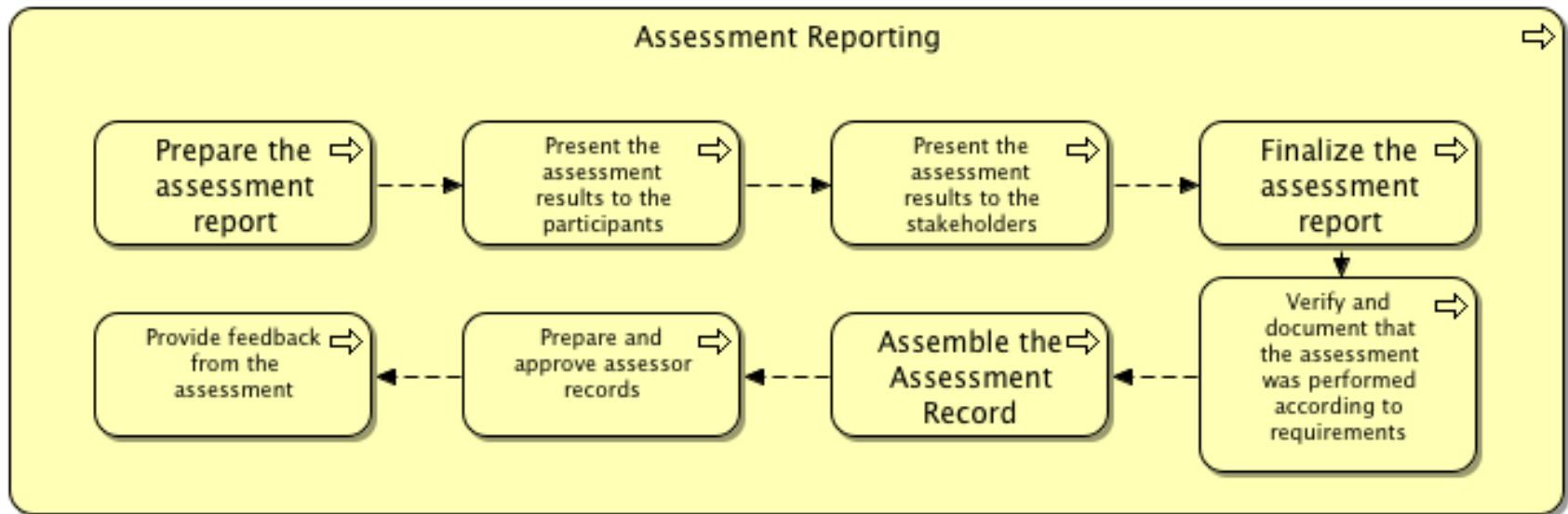
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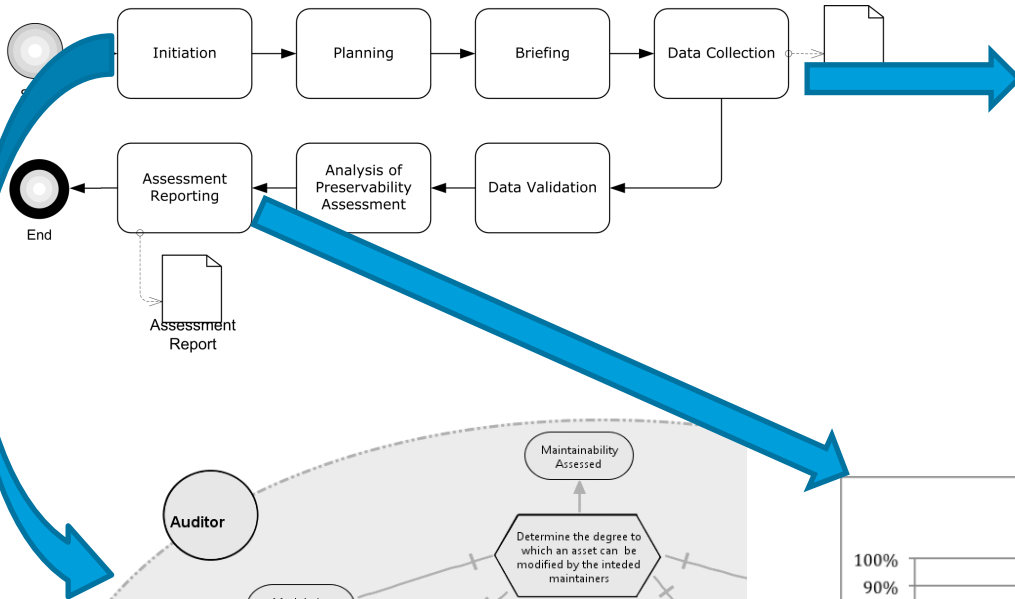


- System for supporting the process of acquiring and managing information captured from sensors installed in dams;
- System objectives:
 - Study the structure behavior and thus prevent any accidents that might happen;
 - Manage the visual inspections, physical models, mathematical models, and technical documents;
 - Provide data analysis tools such as tabular and chart reports and graphical representation of geo-referenced information.

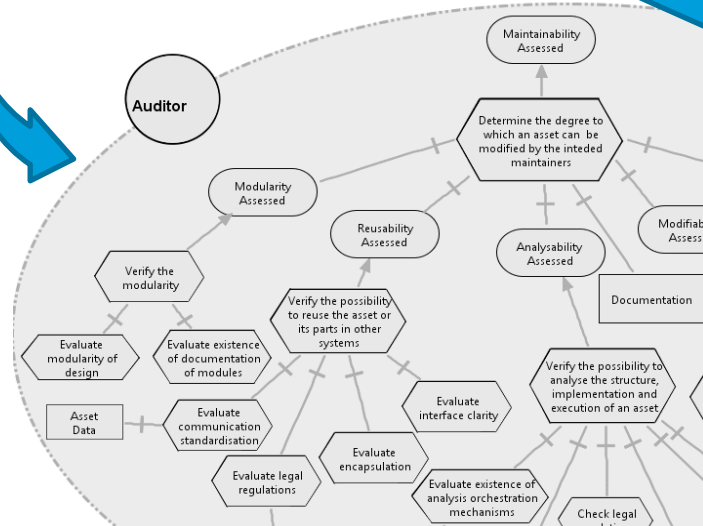


Application of the Method to a Civil Engineering Institution

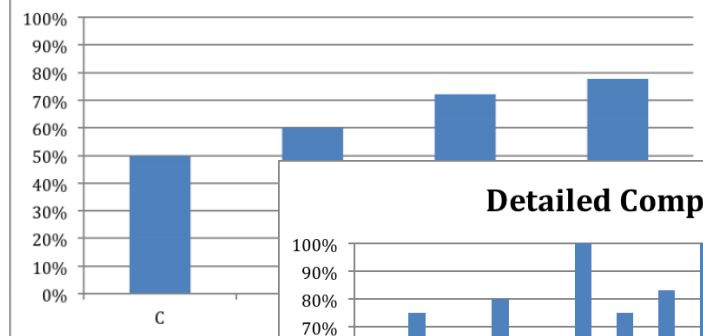
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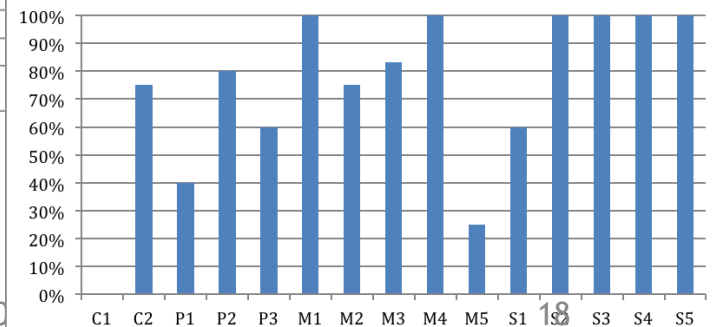
Maintainability		
M1	Modularity The system/product/component has modular design. The architecture and the implementation are modular. Example: Implementation +BS8n with a use of Service Oriented Architecture. The Program uses plug-in mechanism to extend its functionality.	requirements documentation, design documentation, technical documentation. X
M1.2	The coupling between modules is low. The modules co-exist and interchange information between each other, but do not depend critically on each other. Example: The applications within the application server exchange data through the defined interfaces. They don't share or access each other's internal data.	technical documentation X
M2	Reusability The external interfaces of a system/product/component are clearly specified. For example, in case of software the programming API is well specified. All needed methods for working with the system/product/component are available and exposed in a coherent way. Example: In case of software the programming API is well specified.	requirements documentation, design documentation, technical documentation, input data analysis, output data analysis X



Compliance Overview



Detailed Compliance





- **Compatibility**
 - Co-existence information not maintained
 - Use of proprietary communication protocols
- **Portability**
 - Use of proprietary software components
 - Lack of up-to-date installation documentation
 - Lack of information on possible replacements
- **Maintainability**
 - Lack of formalized testing processes
- **Security**
 - Use of encryption mechanisms





- Used a checklist where each criterion has a binary evaluation (yes/no)
 - limited conclusions.
- Evaluation of each criterion in a quantitative/qualitative fashion
- Creation of a **maturity model for preservability** against which the evaluation results would be matched.
 - Only possible after:
 - **Application and validation** of the method and technique used to **several scenarios** which could be used as a benchmark for the creation of the maturity levels.



Thank You!

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