

# Requirements Engineering Research and Long Term Digital Preservation

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## ABSTRACT

Different approaches for requirements engineering exist. Their success is related to the application domain, among other factors. In the context of long term digital preservation, a solution-oriented view on requirements engineering is mainly used, where requirements are regarded as solution specifications. Research on requirements engineering is in the context of long term digital preservation scarce, and more efforts should be placed to advance this area. The scope of this paper is to briefly present current research challenges on requirements engineering in the context of long term digital preservation.

## Categories and Subject Descriptors

D.2. [Software Engineering]: Requirements/ Specifications.

## Keywords

Requirements engineering, digital preservation information system, long term digital preservation.

## 1. INTRODUCTION

The degree to which a software system meets the purpose for which it was intended reflects the system's success [1]. Identifying a system's goal and stakeholders is part of the requirements elicitation process – often considered the initial activity of the requirements engineering process.

Requirements engineering comprises activities such as: requirements elicitation, requirements modeling and analysis, requirements negotiation, requirements documentation, and requirements traceability and validation. In the context of long term digital preservation, several challenges need to be addressed for each activity. For example, challenges during requirements elicitation phase refer to: difficulty to validate functional and non-functional requirements (e.g., due to the very long life-time of a

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preservation system and preservation period), changing requirements over time, data heterogeneity [2].

In the context of long term digital preservation, a solution-oriented view on requirements engineering is mainly used, where requirements are regarded as solution specifications. Research on requirements engineering, in the context of long term digital preservation (LTDP) is scarce. More efforts should be allocated in pursuing research on requirements engineering in the context of LTDP information systems, e.g., to improve problem and solution analysis.

The scope of this paper is to briefly present current research challenges on requirements engineering in the context of long term digital preservation.

The rest of this article is organized as follows. The next section briefly introduces the concept of requirements engineering. Requirements engineering challenges for long term digital preservation information systems are briefly introduced in Section 3. The article concluded with a section addressing the needs for further research.

## 2. REQUIREMENTS ENGINEERING

According to [3], requirements engineering (RE), as a branch of software engineering, is concerned with software systems' real-world goals, functions and constraints and the relationship(s) of these factors, specification of software behavior and their evolution. As emphasized in [1], RE is a human-centered multi-disciplinary process (e.g., drawing upon several disciplines, such as: computer science, system theory).

Although there is no general acceptance of RE phases or activities, some activities are fundamental to all RE processes [4]:

- *Elicitation*. During the elicitation phase, system requirements are discovered and sources of information about the system are identified.
- *Analysis*. During this phase, ill-defined and overlapping requirements are determined.
- *Validation* of requirements, e.g., against stakeholder's needs.
- *Negotiation*.
- *Documentation* of requirements, e.g., so that stakeholders and software developers can understand the requirements identified.
- *Management*, in order to control requirements changes.

### 3. REQUIREMENTS ENGINEERING CHALLENGES AND LONG TERM DIGITAL PRESERVATION INFORMATION SYSTEMS

Research on requirements engineering in the context of LTDP is scarce. More effort should be allocated to pursue research on requirements engineering targeting information systems ensuring long term preservation of digital data, e.g., to improve problem and solution analysis.

As emphasized in [2], for requirements elicitation, commonly used approaches in the context of digital preservation are: the questionnaire (e.g., CASPAR FP6 project [5]) and internal surveys and interviews (e.g., KEEP FP7 project [6]). Such methods allowed the identification of system requirements, but they have several limitations, as discussed in [2]: difficulty to integrate different interpretations and goals into a single requirement, lack of standardized approaches to structure the information received through interviews.

For the on-going ENSURE FP7 project (<http://ensure-fp7.eu>) which draws on use cases from the financial, health-care and clinical trials domain, a use-case scenario approach was preferred, e.g., to reflect the tasks the stakeholders will need to perform with the ENSURE preservation system [2]. This was combined with traditional elicitation approaches [7][8].

Challenges in requirements engineering in the context of digital preservation systems that should be addressed refer to:

- Development of methodologies, conceptual frameworks and tools adequate to elicit requirements for information systems ensuring long term preservation of digital data.
- Risk assessment in requirements engineering
- Management of resources, taking into consideration the long lifetime of a preservation information system and changing requirements.

### 4. CONCLUSIONS AND FUTURE WORK

Although different approaches for requirements engineering (RE) exist, research on RE in the context of long term digital preservation is scarce. Advancement in this area is important, e.g., to improve problem and solution analysis, ensure information systems' success.

In this article, current research challenges on requirements engineering in the context of long term digital preservation have been briefly presented. Future research will focus on the development of a conceptual framework for requirements elicitation for information systems ensuring long term preservation of digital data.

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