Online Questionnaire: Using a Pattern Catalogue in Requirements Engineering Activities

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Abstract. This paper presents a proposal of online questionnaire whose main goals are: to know current requirements engineering practices related with essential aspects for the definition of requirement patterns and to analyze the current and potential use of patterns in industry. The target audience of the questionnaire is any practitioner or academic with different levels of experience on requirement engineering.

Keywords: Requirement engineering practices, Requirement engineering problems, Requirement reuse; Requirement Patterns.

1 Introduction. Research Questions

Background. Requirements reuse has been proposed as a key asset for requirement engineers to efficiently elicit, validate and document software requirements and as a consequence, obtain software requirement specifications (SRS) of better quality through more effective engineering processes [1].

Context. In the PABRE framework [2][3], the GESSI@UPC and SSI@TUDOR groups have adopted software requirement patterns (SRP) as approach to reuse [4]. PABRE includes a catalogue composed of 29 Non-Functional SRP (NF-SRP) and 37 [5] Non-Technical SRP (NT-SRP) [6]. The purpose of the catalogue is to suit the needs of the requirements elicitation and documentation processes carried out by TUDOR and associated IT consultants. Although the experience so far has been satisfactory overall, we have not had the chance yet to conduct any survey due to lack of population. We consider this type of research essential at the current moment of investigation.

Goal. Using GQM, the goal of our online questionnaire can be defined as follows: to analyze (purpose) the benefits of the use of SRP (issue) in the requirements elicitation and documentation activities (object) from the perspective of requirements engineering researchers and practitioners (viewpoint). The survey will not focus specifically in the PABRE catalogue, to make the proposal more appealing to the community and results more generalizable.

Research Questions. We operationalize the goal into 3 research questions (RQ):

- RQ1: What type of non-functional and non-technical requirements (NFR, NTR respectively) are more critical in a requirements reuse context? Rationale: we have observed that NFR and NTR appearing in SRS produced by TUDOR and associ-
ated IT consultants are recurrent. We expect this situation to occur in other contexts and, under this hypothesis, we want to know which types are critical.

- **RQ2**: Is requirements reuse a usual practice in current RE processes? *Rationale*: we need to know how fundamental the problem of reuse is for the respondent, and which reuse strategies are currently in place. This knowledge will help to contextualize the rest of information gathered in the interview.

- **RQ3**: Could the existence of a catalogue of SRP help improving the effectiveness of requirement elicitation and documentation? *Rationale*: using the catalogue, requirements are usually not built from scratch; instead, the catalogue yields to a process that guides the engineer by giving recommendations suggesting information, etc. Likewise, a high-quality catalogue is expected to include SRP templates that have been designed by using a uniform style, a glossary, and determining properties like dependencies upon other SRP. We expect these characteristics to have a positive effect on the elicitation processes conducted and the SRS produced.

## 2 Questionnaire Design

In general, the questionnaire will offer multi-choice questions, using a 5-value Likert scale when qualitative answers are required, and will be composed of six parts (see Fig. 1). The first three parts will be used to know the context and experience of the respondents, and general aspects about requirements engineering practices and problems they came across. The other three parts are respectively related to the three research questions.

**Context and Work Experience.** The first one will include the usual questions about the context and experience of the respondent to filter and group participants during analysis. The questions to the participants will change depending on where his/her experience as requirements engineer comes from. Specifically, we will distinguish among (see Fig.2): Industry or academy with a significant experience in industry projects; Academy with some knowledge of industry practices; Academy without any exposure to industry.
Requirements Engineering Practices. The second part will characterise the general aspects and requirement engineering practices of projects in which the respondents have been involved (including language used to express requirements).

Requirements Engineering Problems. The third part will try to state the commonality of different problems during elicitation and specification processes of projects where the respondents have been involved (contradictory needs, ambiguity, lack of traceability,…).

Observations on Requirements. The questions in this part will be the base for answering RQ1.
- How recurrent are NFR&NTR in the projects conducted by respondents?
- For a given classification schema based on the ISO 25010 quality model with some NTR categories added from our own catalogues, we will ask how often do they appear in their projects. The respondent will be allowed to add additional categories if s/he considers there is any missing.
- According to the classification schema, which are the 3 types of NFR&NTR that are more challenging to deal with? Which ones are the most prioritary?

Reuse during Requirements Engineering. For answering RQ2, we will ask a few general questions:
- How recurrent are requirements from one project to other?
- Is requirement reuse currently seen as a challenge in RE processes?
- How is requirements reuse implemented in the respondents’ projects?

Reuse through Patterns. In case of RQ3 we will ask about the benefits that requirements reuse through SRP could bring to companies and possible barriers to adoption. Some questions will be:
- Which of the problems observed in elicitation and specification could be ameliorated by the existence of an SRP catalogue?
- What would be necessary in order to provide such a benefit (e.g., tool support, training, well-defined method)?
- What would be the most important barriers to the successful adoption of such approach?
Before finishing the questionnaire, the respondents will be able to state any clarification or comment about his/her answers or the questionnaire, and also to ask the feedback about the questionnaire results analysis being sent to them.

3 Venues of Publicity and Intended Procedure

**Availability.** The online questionnaire will be available as a LimeSurvey. It will be installed in the GESSI@UPC server and accessible through the PABRE website [4]. It will be open for REFSQ’13, and remain accessible a few weeks after the conference to get late responses and allow some ripple effect from REFSQ’13 attendees.

**Resources.** Assuming there will be WiFi connection available, no extra resources are required. It would be nice to have some workstation in the coffee-break area available for attendees answering the different questionnaires that may be offered.

**Publicity.** Before the conference, in addition to REFSQ’13 publicity, we plan to make publicity using our local networks and selected (to avoid spam) distribution lists like re-online. We will intensively use our own resources (GESSI twitter, @gessi_upc; GESSI LinkedIn group; GESSI and PABRE webpages). We will provide the organization with some publicity pack, both digital and on print (e.g., a bookmark). We will prepare a poster to announce the questionnaire at the coffee-break space if the organization allows so.

**Data analysis.** We will apply descriptive statistics and content analysis (for questions with results in free text). Other techniques we plan to apply are: correlation analysis; and cluster analysis. Analysis will be done by the full set of authors.

**Results.** We commit to offer an overview of the results during the conference at the slot requested by organizers. A detailed analysis will be published as technical report in GESSI@UPC and announced to the community using the same channels as for publicity. Complete results will be sent to the participants.

4 Participation Subjects and Benefits

**Subjects.** The questionnaire will be open to all participants in REFSQ’13, both researchers and practitioners. We assume that all of them have good knowledge about requirements elicitation and documentation. There is no maximum number of participants. For the minimum, we think that 40 participants in the conference (that may lead to over 30 valid results) would be admissible, since we plan to distribute the questionnaire in the community after REFSQ’13 to get more responses. It is important to know that the best paper award in REFSQ’12 went to a research paper based on observations made from a questionnaire with 39 responses, which points out that our target can be considered appropriate in the context.
**Benefits.** As far as we know, this will be the first survey centered in requirements reuse conducted in the RE community. For the REFSQ’13 community, a benefit is that the partial results will be drafted and presented at the end of the conference, and a research report will be published with a detailed analysis once the study finishes. Individual participants may benefit as part of this community. Also, we will license the detailed statistics of the individual questions to who may be interested under a Creative Commons Licence. Also, we will offer them the possibility of duplicating the LimeSurvey space for participants that want to replicate the study themselves.

5 **Threats to validity and mitigation actions**

We focus on the risk we consider more likely to occur.

*Varied profile of attendees.* REFSQ attendees may be practitioners or researchers. Having two profiles so radically different is a risk in the sense that questions may be inappropriate for one type. To mitigate this risk, we will refine the questions outline in Section 2 differently when it is required. As an opportunity, we may consider a fourth RQ meaning: are expectations that researchers have on SRP fulfilled in reality? Going further, the nature of companies, research centres and projects may be very different and jeopardise generalization of results. At the extreme, quantitative analysis may become difficult and may require accompanying qualitative reasoning.

*Willingness to participate.* REFSQ’13 attendees have usually lot of networking and activities to do and a threat is that they do not find the moment to fill the questionnaire. Mitigation actions are: networking ourselves; bringing hardcopies to allow attendees to answer outside the REFSQ’13 premises; asking REFSQ’13 organization for support to publicity (e.g., whiteboards to post questionnaire announcements).

*Questionnaire design.* As any online questionnaire, participants could misunderstand some of the questions or values suggested as answers, miss values as answers in multiple-answer questions or find the questionnaire too heavy to be answered. We will mitigate these threats by: accompanying the questions with a glossary of terms accessible through hyperlinks; adding whenever necessary text fields for clarification or adding missing values; exhaustively pilot the questionnaire to ensure it does not take more than 30 minutes so that respondents do not give up; order an English revision by a native speaker.

*External validity.* Since participants in our questionnaire are not selected randomly it is not possible to warrant that its results correspond with good confidence to the results that would be obtained conducting the same survey to the whole RE population. Mitigating this risk (inherent to any survey ran during REFSQ) needs some time in order to replicate the survey in other contexts and then check if it happens.
6 Past Empirical Studies Performed

The GESSI@UPC’s paper authors have well-proven abilities in conducting empirical research. Results have been published in different venues, including REFSQ. The topics and the research instruments are manifold, as can be seen in Table 1.

Table 1. Empirical research in which GESSI@UPC’s authors have been involved.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Instrument</th>
<th>Venue</th>
<th>Collaboration with</th>
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<tr>
<td>Information quality in OTS selection</td>
<td>Questionnaire</td>
<td>ICCBSS’08</td>
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<tr>
<td>Challenges in OSS industry</td>
<td>Interviews</td>
<td>OSS’09</td>
<td>NTNU</td>
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<td>Interviews</td>
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<td>Interviews</td>
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<td>NTNU, U. Lund, U. København</td>
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<td>Questionnaire</td>
<td>REFSQ’10</td>
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<tr>
<td>How architects deal with NFRs</td>
<td>Interviews</td>
<td>RE’12</td>
<td>INRIA</td>
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Acknowledgements. This work has been partially supported by the Spanish project TIN 2010-19130-C02-01

References

4. PABRE website, http://www.upc.edu/gessi/PABRE/Patterns.html