

Software Requirement Patterns

–Proposal of Tutorial for RCIS 2013–

Xavier Franch

Universitat Politècnica de Catalunya (UPC)

Barcelona, Spain

I. ABSTRACT

Many recent studies still show how a significant percentage of software projects are out of budget, suffer delays or simply have to be cancelled. One of the most recognized causes for this scenario is the failure in producing a good set of software requirements. Methods for improving the quality of software requirement specifications are therefore needed.

Pattern-based requirements engineering is one of such methods. The definition and use of a software requirements pattern catalogue supports the elicitation, validation, documentation and management of requirements. By designing an appropriate catalogue, an IT organization will have a starting point for the requirements engineering activity reducing the associated costs and producing better requirements.

The tutorial will be organized into two parts. The first part will introduce the foundations on software requirement patterns: concept, metamodel, semantics, classification schemas and processes. The second part will put the theory into practice by analysing and discussing about an existing catalogue of patterns that has been built from the experience gained at real requirement engineering projects, making the tutorial close to practitioners' needs.

The tutorial is addressed to researchers, practitioners and educators in information science, especially requirements engineers. For researchers, an updated state of the art will be exposed, and the presentation will rely on scientific grounds. For practitioners, processes and templates will be shown and a successful case study of pattern-based requirements engineering will be analysed in detail. For educators, the tutorial will provide the basis for developing course material.

Basic knowledge of the requirements engineering discipline, either from the research or the practice, is required.

II. PRESENTER

A. Experience on the topic

The presenter is working on software requirement patterns since 2007 in collaboration with other members of the GESSI group. The first paper was presented in ICCBSS 2008 and since then, he is publishing papers regularly. In 2008, a joint collaboration with the Henry Tudor Public Research Center at Luxembourg (CRPHT) started. CRPHT provided specifications

from real projects that served as a basis for the elaboration of catalogues of requirement patterns. The adequacy of these patterns in real projects is validated with the help of experts from this organization. As the collaboration progressed, new research results have been got and tool support built. Put in numbers, the presenter is co-author of 4 papers in international conferences (ICCBSS'08, RCIS'09, REFSQ'10, SAC'13), 1 book chapter (in Springer Verlag, in print), 1 journal paper (IJISMD'09), 1 tool demo (RE'12, awarded best poster), The RCIS'09 paper was awarded best paper in the conference. Also, he has given an invited talk in the IFIP WG2.9 on the topic.

B. Detailed bio

Xavier Franch

Dept. of Services and Information Systems Engineering

Universitat Politècnica de Catalunya (BarcelonaTech)

Barcelona, Catalunya, Spain

Email: franch@essi.upc.edu

Phone: +34 93 4137891

Web page: <http://www.essi.upc.edu/~franch/>

Xavier Franch is Associate Professor at UPC, Spain. He has published >150 refereed papers in journals like IEEE Software, IST, JSS, SPE, CSI, SoSyM and IJSEKE; and conferences like RCIS, CAiSE, ER, RE, SAC, COMPSAC, ICSR, EASE, REFSQ, ECSA, SEKE and ICCBSS. Other merits:

- Steering Committee membership: CAiSE (from 2012), RE (from 2006), REFSQ (from 2010), iStar workshop (from 2013).
- General Chair: RE 2008.
- Program Chair or co-Chair: CAiSE 2012, REFSQ 2011, CibSE 2010, JISBD 2007, ICCBSS 2006, WER 2003.
- Editorial Board membership: Elsevier IST (from 2012), IJISMD (from 2010).
- Program Board membership: RCIS (2013), CAiSE (2011, 2013), REFSQ (2010-2013).
- Program Committee membership: >100 in conferences like RCIS, CAiSE, ER, RE, SAC, CBSE, REFSQ, SPLC.
- Journal reviewer: regularly in SCI-indexed journals like TSE, TOSEM, IEEE Software, Computer, REJ, EMSE, IEE Proceedings, FGCS, etc. (up to >20).

- Other relevant positions in conferences: Workshop co-chair (CAiSE 2008, 2013). Doctoral Symposium co-chair (RCIS, 2013). Proceedings co-chair (ICCBSS, 2005). Publicity Regional chair (RE, 2004).
- Special issue editor: ISJ (2013), REJ (2012), JSS (2008).
- Workshop organization: iStar (at IDEAS, 2008; CAiSE, 2010; RE, 2011); CMM (CAiSE, 2011); CESI (ICSE, 2013); TwinPeaks (ICSE and RE, 2013); RECOTS (RE, 2003-04); MPEC (ICSE, 2004-05); SOCCER (RE, 2005-06); APLE (SPLC, 2006).
- Keynotes: IEEE RCIS 2012.
- Seminars at the following universities: City, Wien, Ottawa, Linz, Sevilla, Valencia, NTNU, FBK, Wollongong, Toronto, Groningen.
- Tutorials given at IDEAS 2008 and CibSE 2011.
- Other talks: invited at RE'04 (state-of-the-practice talk); IFIP WG 2.9 on Requirements (2009); Dagstuhl seminar (2012). The IFIP talk was about the topic of this tutorial.
- Associate member of the International Requirements Engineering Board (IREB).
- Two awards related to the topic of the tutorial: Best Paper at RCIS 2009, Best Poster at RE 2011.

III. PROPOSAL

A. Description of the topic

Reuse is a fundamental dimension in all information science disciplines, and requirements engineering is not an exception [1]. A good approach to software requirements reuse may help requirement engineers to efficiently elicit, validate and document software requirements and as a consequence, obtain software requirement documents of better quality both in contents and syntax [2].

From the several possible approaches to reuse, we are interested in the adoption of patterns [3]. Software engineering practitioners have adopted the notion of pattern in several contexts, remarkably related with software design (e.g., design patterns and software architectural patterns), but also in other software development phases, both earlier and later. In this tutorial, we provide insights in the use of patterns in the requirements engineering phase, namely Software Requirement Patterns (SRP).

An SRP is a guide for writing a particular type of requirement [4]. There are several perspectives that are fundamental in a proposal of SRPs which will be discussed in the tutorial: theoretical (ontologies, metamodels), methodological (processes around) and organizational (impact, cost analysis).

B. Interest for the RCIS community

The importance of requirements engineering (RE) in information science has been documented from long ago. As far as in 1981, Boehm already mentioned that approximately 60% of all errors in system development projects originate during the phase of requirements engineering [5]. Also the high

cost of fixing requirement errors was stated in that work. Clearly, both characteristics together point out about the convenience of methods and strategies to improve RE practices. SRP fall into this category.

It is worth to mention that the topic of the tutorial is in direct connection with several of the topics listed in the RCIS 2013 call for papers: primarily and mainly, Requirements Engineering; but also Information System Engineering and Knowledge Management.

C. Overall goal and some concrete objectives

Some concrete objectives are:

- Understanding the concept of SRP as proposed in [4] and formalized in [6].
- Mastering the process around SRPs: construction and evolution of catalogue of SRPs, and application in a particular project [7].
- Realizing the difference among functional (domain-dependent) and non-functional (quite domain-independent) requirements concerning SRP definition.
- Having a look to a subset of SRPs as a way to better understand the practical implications of the concept.
- Acquiring proficiency enough to apply SRPs in a particular organizational setting.
- Learning the insights and lessons learned of a large-scale case study of construction of an SRP catalogue.

D. Overview of the structure

The structure then will be:

1. Motivation (5 minutes)
2. Concept of SRP (15 minutes).
3. Structure of SRPs (20 minutes).
4. Classification schemas for SRP catalogues (10 minutes).
5. Analysis of an existing catalogue of SRPs (20 minutes).
6. Processes around SRP catalogues (10 minutes).
7. Discussion and wrap-up (10 minutes).

E. Links to materials

The most influential book on the topic is John Withall's book [4]. Classical Robertson and Robertson's book [2] also has some material of direct interest. A long tradition of papers on software requirement patterns exist in the IEEE RE (<http://requirements-engineering.org/>) and REFSQ (<http://refsq.org/2013/past-conferences/>) conferences. Recently, the Requirement Patterns (RePa, <http://www.utdallas.edu/~supakkul/repa12/>) workshop, satellite at IEEE RE, has been launched, with a good number of contributions and attendees in its two editions.

The tutorial is based on the author's experience, as leader of the GESSI research group at the UPC (<http://www.essi.upc.edu/~gessi/>), on developing a requirement patterns program together with the CITI center at Luxembourg. A dedicated webpage can be found at <http://www.upc.edu/gessi/PABRE/index.html>, presenting details on this collaboration. It includes: a general explanation; the current catalogue of patterns; presentation of the two existing subsystems (pattern management and pattern

application); envisaged collaboration schemas for the use of the catalogue, the method and the tool; list of publications. **All this material will be available to attendees, together with the set of slides.**

REFERENCES

- [1] W. Lam, J. A. McDermid, A. J. Vickers. "Ten Steps towards Systematic Requirements Reuse". REJ 2(2), 1997.
- [2] S. Roberson, J. Robertson. *Mastering the Requirements Process* (2nd ed.). Addison-Wesley, 2006.
- [3] C. Alexander. *The Timeless Way of Building*. Oxford Books, 1979.
- [4] S. Withall. *Software Requirements Patterns*. Microsoft Press, 2007.
- [5] B. Boehm. *Software Engineering Economics*. Prentice Hall, 1981.
- [6] X. Franch et al. "A Metamodel for Software Requirement Patterns". REFSQ 2010.
- [7] S. Renault et al. "PABRE: Pattern-Based Requirements Elicitation". RCIS 2009.