Requirements Elicitation: A Look at the Future through the Lenses of the Past

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***Abstract*—Requirements elicitation is the initial step of the requirements engineering process and aims at gathering all the relevant requirements through the direct or indirect interactions between requirements analysts and stakeholders. Even if the requirements elicitation problem is not new and has been approached many times over the years, it is still considered one of the most challenging of the requirements engineering process. In the proposed presentation, we aim at analyzing the journey of the research on requirements elicitation through the 25 years of the Requirements Engineering conference not only by considering the different proposed approaches and their evolution, but also by evaluating the role of requirements elicitation in the conference. Moreover, we will present the lessons learnt during this analysis and will use them as a starting point to present the current trends and outline possible future directions.**

I. Overview

Over the decades, the importance of requirements elicitation has been widely recognized. Indeed, this initial phase of the requirements engineering process is crucial to gather the information and data needed to specify the relevant requirements. Errors in this phase could be transferred in the subsequent phases of the software development and compromise the overall process or increase the cost of the development. In practice, elicitation is a very difficult activity, often underestimated and little understood [1]. During the past 24 years of the IEEE International Conference on Requirements Engineering (RE), many ideas have been proposed to target the challenges of requirements elicitation. However, the problem is far away from being considered solved and many interesting issues still need to be addressed. In the proposed presentation, we will analyze the research done in the last 25 years by showing the role of elicitation research in the requirements community with respect to other requirements-related research topics (Section II), and by explaining the trends in the research on elicitation (Section III). Then, we will analyze and present some current trends and possible future directions in the field (Section IV). Finally, we will present the lessons learnt during this analysis (Section V).

II. The share of requirements elicitation

Even though the importance of requirements elicitation has been widely recognized, over the years only a limited attention has been devoted to this important problem. Figures 1 and 2 show the frequency of different requirements engineering related terms, including elicitation, in the abstracts and the keywords of the papers presented in the last 24 editions of the RE conference. From a quick analysis, it is possible to notice that *elicitation* has not been as popular as other topics, but there has always been attention on it (i.e., at least a paper on elicitation has been presented at each edition), and this attention has been increasing in the last couple of years.

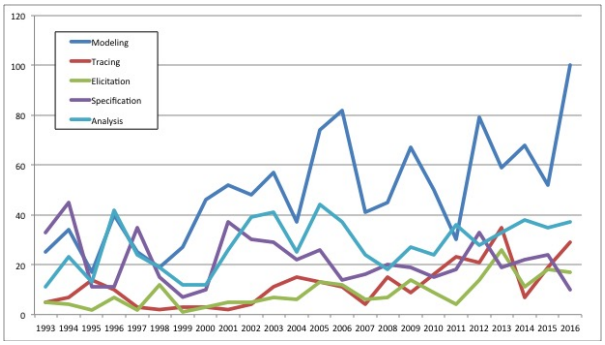

Fig. 1. Frequency of different requirements engineering related terms in the abstracts of RE papers.

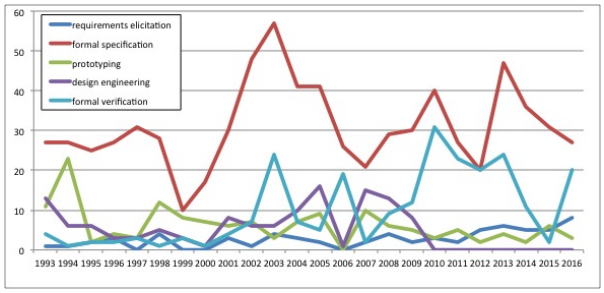

Fig. 2. Frequency of different requirements engineering related keywords in the keywords of RE papers.

In the presentation, we will show further and more accurate analyses on the share of research topics at the conference, including also cross-terms analysis.

III. 25 years of Requirements Elicitation

Different aspects of requirements elicitation have been considered over the last two decades. In the proposed presentation, we plan to show the main trends and contributions that were presented at the RE conference. Indeed, from an initial analysis, we were able to identify interesting trends and changes over the time. A short preview of our findings is reported below.

2332-6441/17 $31.00 © 2017 IEEE
DOI 10.1109/RE.2017.35

In the first edition of the conference in 1993, social issues and ethnography were dominant topics. These topics became less popular in the subsequent editions, since it was recognized that these techniques are not suitable for fast, ever changing, contexts, and adaptations were suggested. For example, in 1999, ethnography was revised and integrated with modeling approaches to deal with the issue of time.

In 1993, the need for computer-based *tools* for elicitation [2] was also highlighted. The call for tools was immediately answered (and has been continuously answered since then) with several tool papers. One of the first attempts of having a tool as a support for the elicitation phase was presented in 1994 [1].

Especially starting from 2003, a lot of attention has been given on investigating how elicitation is performed in the field. Observations and interviews have been used to understand the elicitation practice, and case studies on the practice of some techniques have been presented. Moreover, over the years, it has been recognized that each requirements process is different [3], so many papers describing project- specific or stakeholder-specific solutions have been proposed. This trend is still active and examples of applications vary from the elicitation of requirements for medical devices to the gathering of data from children. Notice that often ad-hoc solutions combines different techniques by trying to exploit each of them (consider [4] for a comparison among techniques). A specific technique needs to be applied when the focus of the elicitation are new ideas and creativity. This field has been deeply analyzed, starting from [5] in which the use of creativity workshops and scenarios has been introduced, through the mini tutorial on creativity proposed in 2010, to the tool proposed to "create" requirements in [6].

Besides general complete approaches, specific topics related to the elicitation problem have been also studied for years. For example, the role of ambiguity during communication and elicitation has been tackled first in [7], and has been then considered again in recent years. Analogously, the role of domain knowledge has been actively considered (e.g., [8]).

IV. Current Trends and Future Directions

The overview of the last two decades of research has allowed us to identify the current open problems and existing patterns, and, consequently, to better introduce the current trends in requirements elicitation and the possible future directions. A quick overview can be found in the reminder of this section.

One of the main current trends, in accordance with the current interest on big data, is to elicit requirements from large set of collective data. Part of this trend is the idea of using online store reviews as an elicitation source. In this case, the problem is that these reviews contain mixed information, which does not include only requirements. In [9], the authors suggested that this information can be automatically classified and this opens a lot of possibilities to the use of online reviews. Similarly, the widespread access to technology has suggested to include large groups of people in the elicitation process and the need to develop models to make the process feasible [10]. Distribution and collaboration can be also exploited through collaborative tools (e.g., [11]).

A different direction already emerging in other areas of software engineering is to use new technologies to augment the information that the analyst can access to during the elicitation process. Possible directions rely on the use of biofeedback, video and audio analysis.

V. Lessons Learnt and Final Remarks

In the last part of the talk, we will discuss the lessons learnt during the analysis of the last 25 years of research in requirements elicitation and how they can be applied to guide the next steps of the research in requirements elicitation. In [12], lack of tools and technical support and inertia have been recognized as the three main causes of the distance between research and industry. This seems to suggest that the consistent interest in developing tools based on current technologies to support the elicitation process is the right direction to follow. However, the time and effort required to develop a usable tool and the needed support might not be feasible in practice for a research team. Moreover, since elicitation is a discipline which requires a lot of human skills, best practices could be taught with simple trainings, which might be sufficient in the general case and be also the successful approach to interrupt the inertia within companies.

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