

Proposal of a Quasi-Experiment for Studying the Effect of Experience on Elicitation Effectiveness

Alejandrina M. Aranda, Oscar Dieste, Natalia Juristo

Universidad Politécnica de Madrid, Facultad de Informática, Campus de Montegancedo, 28660 Boadilla del Monte, Spain

`am.aranda@alumnos.upm.es, {odieste, natalia}@fi.upm.es`

Abstract. We plan to perform a quasi experiment to evaluate the effect of experience on requirements elicitation. Researchers will play the role of customers, whereas participants will perform the role of analysts. Analysts will hold a 60 minute interview and will then be given 25 minutes to write up a report of their findings. Participant effectiveness will be compared with available data series on the effectiveness of novice analysts that we have collected previously.

Keywords. Elicitation, analyst effectiveness, experience, quasi experiment

1 Introduction

One critical success factor in requirements engineering (RE) is having a good analyst [10]. The influence of different analyst characteristics on elicitation effectiveness has been researched empirically [4]. The most commonly examined aspect is experience [1], [7], [8], [9].

Results are controversial, as they tend to contradict RE folklore. Marakas and Elam [7] found that experienced analysts are only marginally better than novices. Pitts and Browne [9] report that analyst experience does not influence the quantity, breadth or depth of the requirements. Niknafs and Berry [8] conclude that experience has a negative influence, that is, experienced subjects are slightly less effective than inexperienced subjects. Finally, Agarwal and Tanniru [1] find that experienced subjects were slightly (but not significantly) better than inexperienced subjects.

We have run several studies as part of this research line, described in Section 2. However, the students that have participated as experimental subjects tend to be rather inexperienced. The aim of the study designed in this proposal, described from Section 3 onwards, is to gather data on subjects, who, like REFSQ'13 participants, are highly experienced. This study will benefit the RE community, as it will help to improve our understanding of the experience/effectiveness relationship. Additionally, we believe that the low effectiveness of expert analysts observed to date is due to factors other than experience, such as problem knowledge or *Einstellung* effects [2]. The proposed study will also examine such possible relationships.

2 Our Previous Studies

We have run three quasi-experiments (which we will call Q07, Q09 and Q11, according to the years in which they were run) with the aim of studying the influence of experience on elicitation process effectiveness. Quasi-experiments are conducted when subjects cannot be randomly assigned to an experimental condition, like subject experience, for example.

We have collected data from a total of 31 Universidad Politécnica de Madrid (UPM) software engineering postgraduate students. In all cases, students acted as analysts, gathering information about a fictional software system. Students used the open interview as an elicitation technique, as this is a straightforward technique for analysts, which is also widely used in practice [11]. Analyst effectiveness was calculated as the percentage of correctly identified and reported problem elements (e.g. concepts, requirements, etc.). Correctness is defined as the correspondence between the elicited problem elements and a gold standard established previously.

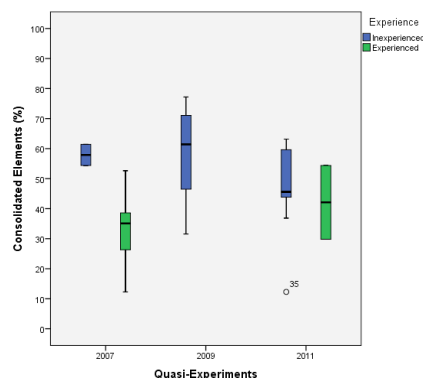


Fig. 1. Historical series of results about the experienced/effectiveness relationship

The student population participating in Q07 was composed of subjects with different levels of experience (from 0 to 6 years in requirements activities). Again the relationship between experience and effectiveness, shown in **Fig. 1**, is contrary to RE folklore and resembles Niknafs et al.'s findings [8].

The experimental population used in Q07 is too small to be able to state for sure that experience has a negative impact. In order to gather more data, we ran replications Q09 and Q11. Unfortunately, the 2007 UPM postgraduate program targeted professionals, whereas students were recruited mostly from graduate courses as of 2008. On this ground, Q09 and Q11 students had hardly any requirements experience, and, consequently, it was not generally possible to compare novices and experts directly. However, we were able to build a data series from Q09 and Q11, which we can supplement with data from other sources. The data series is also illustrated in **Fig. 1**. REFSQ'13 provides a unique opportunity for gathering the data that we require.

3 Description of the Proposed Study

In line with existing literature, the working hypothesis is that *there is no relationship between analyst experience and elicitation process effectiveness* (i.e. novice and expert analysts are equally effective). In order to test this hypothesis, we propose to run a quasi-experiment similar to Q07/Q09/Q11, whose results could be combined with the existing data.

The study is composed of three tasks, as shown in **Fig. 2**. A researcher will play the role of customer, whereas participants will perform the role of analysts. Analysts will study the same software system used in the previous quasi-experiments. The system domain will not be announced until the start of the elicitation session to stop analysts from doing any preparation that might affect their effectiveness.

The quasi-experiment will conclude with a 5-minute questionnaire. This questionnaire will contain questions about participant qualifications and knowledge in order to identify any variables potentially modifying analyst experience and effectiveness.

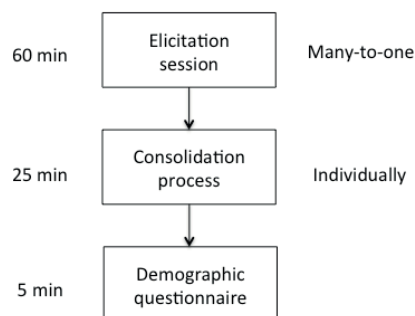


Fig. 2. Quasi experiment's activities for REFSQ'13

There are no restrictions regarding the participants' experience type or level. In order to escalate the quasi-experiment to the large number of attendees to REFSQ'13, the interviews will not be carried out individually (1 role-played customer and 1 analyst), but many-to-one (1 role-played customer and all analysts together). While this elicitation procedure is different than the typical 1:1 interview, it provides valuable data about the analyst's comprehension ability (as opposed to information extraction/capture), which is presumably one of the key factors affecting effectiveness. Furthermore, these data is directly comparable to the Q11 quasi-experiment, which applied a similar methodology.

No special equipment is required for running the quasi-experiment. Preliminary results will be available the day after the quasi-experiment. The data will be mapped out as a box-plot and added to the series illustrated in **Fig. 1**. No information by which specific participants can be identified will be published.

4 Threats to Validity

There are three main threats to the validity of the proposed study: (1) the customer participating in the interview sessions is fictional. Therefore, he will, to some (small or large) extent, be different from real customers; (2) the intended software system is not real; and, finally, (3) elicitation is conducted in a single session with a time limit.

The measures taken to mitigate these threats are: (1) we have carefully studied the target software system and played the role of customers in interview sessions in the context of laboratory experiments using the same system repeated times; (2) the system used during the experiment is based on an existing, real software system; and (3) most of the original system's complexity has been removed to make it easy to understand completely in a short (maximum 1-hour) period.

5 References

1. Agarwal, R., & Tanniru, M. R.: Knowledge Acquisition using Structured Interviewing: An Empirical Investigation. *Journal of Management Information Systems*, 7 (1990) 123 141
2. Anderson, J.: *Cognitive psychology and its implications*. 5th ed. Worth Publishers (1999)
3. Dieste, O., Griman, A., Juristo, N.: Developing Search Strategies for Detecting Relevant Experiments. *Empirical Software Engineering*, 14 (2009) 513 539
4. Dieste, O., & Juristo, N.: Systematic Review and Aggregation of Empirical Studies on Elicitation Techniques. *IEEE Transactions on Software Engineering*, (2011) 304
5. Juristo, N., & Moreno, A. M.: An Adaptation of Experimental Design to the Empirical Validation of Software Engineering Theories. 23rd Annual NASA Software Engineering Workshop (1998)
6. Juristo, N. M. A. M.: *Basics of Software Engineering Experimentation*. Kluwer Academic Publishers (2001)
7. Marakas, G. M., & Elam, J. J.: Semantic Structuring in Analyst and Representation of Facts in Requirements Analysis. *Information Systems Research*, 9 (1998) 37 63
8. Niknafs, A., & Berry, D. M.: The Impact of Domain Knowledge on the Effectiveness of Requirements Idea Generation during Requirements Elicitation. 20th IEEE International Requirements Engineering Conference (RE), (2012) 181 190
9. Pitts, M. G., & Browne, G. J.: Stopping Behavior of Systems Analysts during Information Requirements Elicitation. *Journal of Management Information Systems*, 21 (2004) 203 226
10. Schenk, K. D., Vitalari, N. P., Davis, K. S.: Differences between Novice and Expert Systems Analysts: What do we Know and what do we do? *J. Manage. Inf. Syst.*, 15 (1998) 9 50
11. Zowghi, D., & Coulin, C.: Requirements Elicitation: A Survey of Techniques, Approaches, and Tools. In: Aurum, A. and Wohlin, C. (eds.), pp. 19 46. Springer Berlin Heidelberg (2005)

Submitters' experience: Natalia Juristo has been working in the field of experimentation since 1998 (e.g. [5]). She has written one of the reference books on experimentation in software engineering [6]. Oscar Dieste has been performing experiments in RE since 2007. They are also experienced in systematic reviewing and aggregation (e.g. [3]). Alejandrina Aranda is researching her PhD in RE at the Universidad Politécnica de Madrid.