Understanding the Soft Skills that Industry Wants from Requirements Engineers: a Focus Group Study

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Abstract. [Context/Motivation] Research on the professional occupation of Requirements Engineering (RE) in Europe and Latin America indicated soft skills are the very important when companies search for specialists to employ. A very long list of soft skills came out as a result of prior research, with proficiency in English being the Number One skill. **[Question/problem]** To what extent however are these skills deemed critical in doing RE, and also in making hiring decisions in RE, and why? Which skills are to be ranked higher in regard to hiring decision, and which – lower? We want to compare results based on analyses of job ads with practitioners' perceptions in real-life organizations. **[Principal ideas/results]** This live study proposal includes two focus groups with REFSQ practitioners from industry, to understand the soft skills perceived by practitioners as the most important. Each focus group is planned to include 6 to 8 persons. Then, we will use coding as the data analysis technique. **[Expected Contribution]** The study is confirmatory in nature. It is expected to reveal an overlap and possible discrepancies between published analyses of job ads, and real-life experiences of practitioners in organizations.

Keywords: Requirements engineering practice; RE job market; requirements engineer; RE career; job ad; confirmatory study.

1   Research Problem, Motivation and Relevance

Recent empirical studies [1,2,3] on the competencies and skills demanded by industry from requirements engineers as presented in job advertisements (also known as job ads), collectively concluded that companies today are on the hunt for professionals who excel in soft skills. Collectively, these studies founds that in contrast to technical skills ("hard skills"), such as expertise of RE methods, tools and processes, soft skills form a much longer list, vary a lot in terms of understanding their meanings, and seem to be country-specific. For example, Herrmann's 2013 study [1] identified 14 soft skills. And compared to a study in the Netherlands [3] and Latin America [1],

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the list of soft skills demanded on the German RE job market were partly overlapping (see Table 1) but differed in their ranking of importance.

Table 1. Soft skills over country and year

Rank.	Competency/attitude		Identified in Germany (2013)	Identified in the Netherlands (2015)	Identified in Brazil and Mexico (2017)
1	Language	Native	√	√	/
		English	√	√	√/
		Others	/	√	/
2	Capacity for teamwork		√	√	√
3	Communication skills		√	√	√
4	Analytical skills		√	√	/
6	Analytical thinking		/	/	√
6	Sense of responsibility		√	√	**/**
7	Commitment		√	√	/
8	Self-confidence		√	√	√
9	Result orientation		√	√	/
10	Flexibility		√	√	√
11	Customer orientation		√	√	/
12	Willingness to travel		√	√	√
13	Conceptual skills		√	√	**/**
14	Self-organization		√	√	√
15	Visionary/Innovator		/	√	√
16	Passionate		/	√	√
17	Confidentiality		/	/	√
18	Convince		/	/	√
19	Empathy with users		/	/	√

Moreover, while the individual rankings of soft skills based on importance in these studies [1,2,3] do vary, the studies all concur on proficiency in English as the most frequently mentioned soft skill in job ads. Is this indeed the case in real life? Do the ranked soft skills according to the published analyses of job ads, reflect what practitioners consider important when making hiring decisions or assignment decisions in a project? Are there other soft skills critical to hiring decisions next to those that are announced in job ads? As the occupational studies in RE report very little on these questions, we felt motivated to initiate empirical research to understand those soft skills that practitioners perceive to be critical for hiring decisions. Comparing how practitioners reason about soft skills and about their importance sheds light into the extent to which job ads reflect the real market priorities in terms of soft skills. Moreover, our motivation also grows from the fact that the insights of all those studies resulted out of analyzing publically available RE job advertisements (so-called job-ads) in the respective countries of these studies' authors. Based on qualitative analysis applied on the text description of RE jobs, the authors distilled soft skills − next to

RE-specific tasks, skills and competencies (which however are outside the scope of this proposal). While text descriptions of job ads form collections of valuable data, they show only part of what a business perceives important for their requirements engineers to master. For example, a job ad may well be composed by an Human Resources (HR) manager based on past job ads available in her/his organization for similar roles. Or a job ad may have been consciously designed to generate responses from a wide range of audiences. In either case, a job ad can −only to an extent, make explicit all those subtle aspects of a candidate that matter for making a hiring, a promotion or an assignment decision. Plus, the requested soft skills may be specific to the different RE positions (e.g. responsibilities of business analysts versus data analysts versus systems analysts) provided by different companies (e.g. and at different locations). Therefore, we think that an empirical study with practitioners that collects their perceptions and experiences from real life practice is an important addition to existing studies on job-ads.

1.1. Implications for Practice and Research

Insights from practitioners' experiences will be valuable for both research and practice. RE researchers will know how the methods they create or enhance, match the profiles of those working in the field and what educational foundation is needed so that requirements engineers start using the proposed methods in their contexts. Next, RE teachers will be informed on those soft skills that matter most for hiring decisions and may consider them for inclusion in their courses through the design of specific exercises and assignments. Moreover, certification organizations of practitioners in RE might consider including these skills in their portfolio of educational course offerings. Practitioners will gain awareness of whether or not the job ads coming out of their companies send the right message to the potential applicants and helps filtering the qualified candidates. Also, this awareness could possibly make practitioners consider talking to their HR officers the next time they get involved in a hiring process.

2 Research Goal, Research Questions and Overall Empirical Research Process

The purpose of this REFSQ live study is to evaluate - from the perspective of RE practitioners in companies, (1) the list of soft skills that resulted from prior job ads analyses [1,2,3], and (2) the association of the soft skills resulting from these analyses to a specific ranking. Our focus group study represents an early assessment exercise in which we set out to clarify three questions:

RQ1. *Are the soft skills reported in the RE job ads-based studies something that practitioners observe to be important in doing RE in practice?*

RQ2. *If RE practitioners do consider a soft skill to be important, then how they would rank it according to its criticality?*

RQ3. *Why do RE practitioners consider those soft skill important?*

RQ1 and RQ2 will indicate possible discrepancies between what is reported in job ads studies [1,2,3] and what happens in real life as per the practitioners working in the field. RQ3 would shed light into any perceived relationship that could possibly exist between the soft skills and the specific application domains, or the specific RE-roles, e.g. business analysts, data analysts, systems analysts (that – in large organizations, would focus primarily on business process requirements, data and information requirements, and systems requirements, respectively [4]).

To answer these questions, we propose a research process including two focus groups. We chose the focus group (FG) research method because of the following: (1) it is a suitable technique for an inquiry like ours, e.g. obtaining initial, qualitative feedback on new concepts and helping clarify findings that resulted from using other methods, and (2) it is well-known for its cost-effectiveness [5], which was essential in this first validity evaluation, as we wanted to collect a concentrated set of observations in a short time span. Our choice for two groups reflects our objective to have a group of local (Dutch) practitioners and a group of international practitioners. We assume that using two groups could help us gain insights that would allow us to compare outcomes from the two groups and find out commonalities and variation based on country-specific contextual aspects.

The planning steps in our focus group study will implement the FG guidelines of Krueger and Cassay [6]. Below, we describe the research process.

2.1 Participants Characteristics and Recruitment

Our research questions drove our choices in composing the focus groups. We plan to include practicing RE professionals interested in exploring similar questions from their companies' perspectives. We will deploy a purposive sampling approach to selecting these focus group participants. Our selection criterion will be the following: they had all been in charge of RE in at least one project. We do not mean professionnals responsible for project management tasks or development tasks, who read requirements, or stakeholders who sign requirements.

We plan to approach the practitioners individually and solicit their participation knowing that they will attend REFSQ. The practitioners for the Dutch FG would be composed of frequent conference goers from the RE circle in the Netherlands. These practitioners are usually partners in the research projects of Dutch universities and are willing to work with researchers in explorations of industry-relevant research topics such as ours. An example is Eltjo Poort, a practitioner from CGI, who also published a paper at REFSQ (2013).

The practitioners of the international focus group will be chosen among frequent REFSQ conference goers (such as Frank Houdek, Kim Lauenroth, and Sarah Gregory) and those who will be industry speakers at REFSQ 18.

Incentive for participation: The results of the study will be shared with all participants. We consider our live study as one giving them the opportunity to have a conversation with fellows and learn from each other regarding an aspect of their work life that so far has been outside the central topics included in professional conferences.

2.2   Data Collection and data analysis techniques

The focus groups will produce qualitative verbal data. We will audio-record the conversations and will transcribe them verbatim by using an independent transcribing services company. The subsequent data analysis will use the Saldana's coding techniques[14].

2.3   Execution

Our FG execution plan involves the following:

Before the FG: The first researcher will ensure each practitioner is familiar with the goal of the study and the practical setting of the focus group. To address any possible question regarding practitioners' participation, the first author will make a phone call with each practitioner before the conference. The researchers will generate a list of the soft skills that were collectively resulting from the previously published studies [1,2,3,4]. For the execution of each focus group, we will allocate specific roles to each researcher. We envision two moderators (Daneva and Herrmann) and two assistants (Wang and Condori-Fernandez) to take notes. The moderators will share responsibilities and areas of discussion. Each FG would have its own "official" moderator, with the second moderator one staying in the background and available to help if needed in the generation of the probing questions. The "official" moderator of the Dutch FG would be Daneva, and of the international FG – would be Herrmann. The two assistants will listen attentively and keep notes. Moreover, this study will involve audio recording of the FG sessions. All participants will be kindly asked to read the statements of our consent form and sign it. The form will be distributed by the two assistants.

During the FG: We plan for 2 focus group sessions. Each one will have a duration of 60 minutes. Because the focus groups require a small number of practitioners, they do not need to be scheduled as parallel meetings occupying one time slot in the REFSQ program. It might be more practical to have one focus group in the morning and one in the afternoon – based on the availability of the practitioners. The 60 minutes of each FG will be spent as presented in Table 2. (Please note that Table 2 shows our execution if the two FG sessions happen at different times throughout the day. In case of parallel execution of the two FG sessions, each FG will be run by one moderator and one assistant).

Table 2. Soft skills over country and year

Time	Researchers	Participants
0-10'	The researchers great the participants. The "official" moderator explains purpose and context, explains what a focus group is, and introduces the co-authors and their roles (e.g. assistants). Explains that information is confidential and no names will be used. Then, lets the FG members make introductions. Last the moderator presents the goal of the study, the questions and the list of soft skills identified. The *assistants* make sure the participants have everything they need for a productive meeting and prepare for note-keeping and recording.	Sign the privacy statement, if needed
11' - 55'	Moderators probe and follows up questions to explore the key concepts more deeply. Moderator makes sure that each FG member expresses his/her opinion and gets a chance to participate in the FG conversation. The note-taking researchers make sure they collect observations.	Participants express opinions, share experiences about the soft skills presented on the list shown by the moderator.
55'-60'	Researchers thank participants, give them contact information for further follow up if requested, explain how they will analyze and share the data.	

After the FG: Immediately after the meeting, each researcher should write up a quick summary of her impressions. All researchers will receive copies of the notes taken during the FG and will first analyze the data individually and then get together to consolidate their conceptual categories. A presentation will be prepared to the REFSQ18 audience. After the conference, we will transcribe the notes and the audio recording and will do a more detailed analysis.

3   Threats to Validity

We evaluated the possible threats to validity [6] of our research design and expected results. The major limitation of our focus group setup is regarding generalizability. The extent to which generalizations can be drawn from FG research is restricted. This limitation is off-set by the opportunity to host two focus groups: one with local Netherlands-based practitioners and a second – with practitioners from Germany, the United States, England, Belgium, Sweden and other countries. We are conscious that if we had at least three focus groups, as methodologists suggest [5,6], this would have

brought much richer results. However, we could not complete this because of resource constraints on the practitioners' side at the REFSQ conference. We however consider this as our most important issue and, therefore, are actively searching for other opportunities to do focus groups in other venues and in other countries.

Second, a validity concern often associated with focus group studies is that the moderating researcher influences the group interaction. However, a study by Morgan [7] indicates that "in reality, there is no hard evidence that the focus groups moderator's impact on the data is any greater than researcher's impact in participant observation or individual interviewing". We also acknowledge that the focus group members can influence the data they produce, for example, by means of imbalanced level of participation by other focus group members. We plan to mitigate this by having the moderator use probing questions to those participants that seem more silent.

Third, we would like to note that this FG, as methodologists suggest (see [5], p. 4), is not meant to arrive at a vote or to reach consensus. The intent is to promote self-disclosure and that is what we were after in this study. According to [5], the research procedure we planned to implement is known as 'a participatory focus group'. It collects data through group interaction of people with various backgrounds but with common professional values and common roles in which they execute their professional duties.

4   Record of past empirical studies performed by the submitters

All submitters have a broad experience in planning, executing and reporting empirical studies in RE, software engineering and information Systems Research. Specifically, Daneva has been using focus groups in her research since 2008. She has also delivered a tutorial [8] on "Using Focus Groups in RE", as part of REFSQ 2014. Prior to this, she presented a tutorial [9] on focus group for Information Systems Research at the RCIS 2013 conference (International Conference on Research Challenges in Information Systems).

The second author, Wang, is experienced in quantitative studies in the area of RE for business process management solutions and project estimation. She also got involved in qualitative studies. Most recently, she used Grounded Theory to analyze the practitioners' understanding on security requirements in agile [10]. She served on the PC of the 2017 Empirical RE Workshop (EmpiRE'17) as part of RE'17.

The third and the fourth authors, Herrmann and Condori-Fernandez, have a long year experience with perception-based evaluation studies and served as the principal researchers of live studies that were part of previous REFSQ editions.

Specifically, Andrea Herrmann in 2010 executed the first life study at REFSQ [11] about risk-based requirements prioritization. Her publication list contains many studies using empirical methods such as experiments, case studies, surveys and Grounded Theory.

Nelly Condori-Fernandez executed two empirical studies in REFSQ. The first one was part of the REFSQ 2012 Empirical Track, where a survey on Empirical Research Practices in Requirements Engineering was carried out in collaboration with the first

author [12]. The second life study was on the relevance of quality requirements in Software Sustainability at REFSQ 2016 [13]. The results of this second study has been submitted to the special issue of the Journal of Systems and Software: "Sustainability and Longevity of Systems and Architectures". Her main empirically-driven research focuses on topics related to requirements prioritization and validation, software testing, sustainability design of software intensive systems, and user experience assessment. She serves as reviewer in program committees of various international conferences (e.g. ESEM, REFSQ, RE, ER, EMPIRE).

5   Role of the proposed study

This study is confirmatory in nature. It complements findings from prior studies that used job ads as the source of data collection. Both this study and the previously published studies contribute to theory-building on the soft skills important for RE occupations in industry. Moreover, this study will serve as a starting point for the development of hypotheses which we plan to investigate in follow-up interview studies and case studies.

6   Publicity Plan

The authors will recruit the participants in person. They will approach the candidate participants well in advance before the conference. Because the study does not require a large audience to participate, its execution is within the control of the authors and depends on work that the authors can do well in advance. For example, regarding the Dutch FG, the first author plans to visit the organizations of the potential participants as part of master project visits in these organizations, and invite the participants well in advance. The third author will use her professional network to ensure the participation of a few German professionals in RE.

For the reporting of the study results, the authors anticipate to have an audience of at least 50 attendees. This number reflects the size of the audience that attended the results presented by live studies in previous REFSQ conferences. Of course, all REFSQ participants are very welcome to join our presentation of results. We plan to ask the REFSQ 2018 local chair to send an invitation and a reminder to all registered conference participants to attend the session where we will report our results. The REFSQ 2018 Social Media Chair would post a message on Tweeter to remind the REFSQ attendees as well.

7   Sharing of the results

At the time of the conference, the results will be presented in a special session which will be included in the conference program. After the conference, the authors plan to execute a qualitative in-depth interview based study with those FG practitioners who

would be willing to participate. The research questions for this follow-up study will be determined based on the findings of the present focus group study. This forms our immediate future work. Our ultimate goal is to prepare a paper to be submitted to the next edition of REFSQ, in 2019.

8   Equipment

The two FGs will need a meeting room equipped with a flip chart, an in-focus projector and internet connection.

Acknowledgement

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