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Conference Paper · April 2019

DOI: 10.1145/3319008.3319352

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Understanding the Most In-demand Soft Skills in Requirements Engineering Practice: Insights from Two Focus Groups

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ABSTRACT
[Context] Research on the professional occupation of Requirements Engineering (RE) indicated soft skills as very important in employers' search for RE specialists. A very long list of soft skills came out of prior research, with proficiency in English being ranked as the Number One skill. [Question/problem] To what extent, however, are these skills deemed critical in RE in practice, and also in making hiring decisions in RE, and why? Which skills are to be ranked higher in regard to hiring decisions, and which lower? In this study, we compare results based on analyses of job ads with practitioners' perceptions in real-life organizations. [Methodology] We executed two focus groups (FGs) with RE practitioners from industry, as part of the REFSQ 2018 conference. [Principal ideas/results] The soft skills from previous studies were discussed in depth with the FGs participants regarding where and why these skills are needed or sometimes are even unnecessary. Here, we report a ranked list of soft skills, among which communication skills were considered as the most important. Next, some of the skills ranked as the most important in job ads, are not needed everywhere. [Contribution] The results lead to a more differentiated view on those soft skills that requirements engineers need in practice, and the reasons for these skills' importance.

CCS Concepts
• **Software and its engineering → Software creation and management**

Keywords
Requirements engineering; business analyst; soft skill; communication; qualitative study, focus groups; industry-relevant research.

1. INTRODUCTION AND MOTIVATION
Recent studies [1,2,3] on the skills demanded by industry from requirements engineers as presented in job ads, collectively concluded that companies today search for professionals that excel in soft skills. Based on qualitative and quantitative analysis applied on the text description of RE job ads in Germany [2], the Netherlands [3], Mexico and Brazil [1], these authors distilled soft skills − next to RE-specific tasks, technical method-related skills and competencies. Collectively, these studies [1,2,3] concluded that in contrast to technical skills (also called "hard skills"), such as expertise of RE methods, tools and processes [4], 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 [2] identified 14 soft skills. And compared to those from studies in the Netherlands [3] and Latin America [1], the in-demand soft skills in the German RE job market were partly overlapping (see Table 1) but differed in their ranking of importance. Despite of these variations, the studies [1,2,3] all concurred on proficiency in English as the most frequently mentioned soft skill in job ads. However, is its importance high 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 on the extent to which job ads reflect the real market priorities in terms of soft skills.

In what follows, we present the design of our empirical study, our execution, our data analysis, our results and our discussion on them.

2. OUR EMPIRICAL DESIGN
Our study's purpose was 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. We performed an early qualitative evaluation in which we set out to answer three research questions (RQ):

RQ1: *Are the soft skills reported in RE job ads deemed important by RE practitioners?*

RQ2: *How do RE practitioners rank soft skill by level of criticality?*

RQ3: *Why do RE practitioners deem these soft skills important?*

To answer these RQs, we carried out two focus groups (FGs) inspired by the methodological guidelines of Krueger and Cassey [6]. Our choice for using the FG research approach is motivated with the following: (1) The FG research method is a suitable technique for an inquiry like ours, e.g. obtaining initial, qualitative feedback on specific 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.

Below, we first introduce FGs in general, and then describe our research process. A FG is a group discussion on a given topic, which is monitored, facilitated and recorded by a researcher [8,9]. It is a way to better understand how people think about a concept, an issue, a practice, a product or a service. In essence, the researcher provides the focus of the discussion, and the data comes from the group interaction. As the interaction is at the heart of the FG method, the researcher is primarily interested in how experts react to each other's statements and points of view, how they build bridges between their different perspectives, and how they build up shared understanding during the discussion. As a qualitative research technique, FGs can serve both exploratory and confirmatory the purposes [8,9]. The key steps in a FG-based research process include the following [6]: (1) defining the research questions, (2) planning the FG session, (3) selecting FG participants, (4) executing the session, (5) data analysis and (6) results reporting. Sub-sections 2.1 and 2.2. present how we implemented these steps in our specific settings.

Table 1. Soft skills over country and year

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

2.1 Study Planning

Our FG study was designed as part of the submission process for the so-called "live studies" at the 2018 International Conference on Requirements Engineering – Foundation for Software Quality (REFSQ'18). A live study at REFSQ: (i) is a piece of empirical research done with the REFSQ participants at the time of the conference itself; (ii) is scheduled in the conference program and (iii) is advertised by both the conference organizers and the live study authors to create awareness and assure participation. Because REFSQ has an industry day with RE expert practitioners as presenters and attendees, a live study with practitioners had an increased chance to recruit specialists in RE during that day of the conference. Moreover, our proposed empirical design was reviewed by three REFSQ'18 Program Committee members. Their feedback was incorporated in the final version of our research plan [11] that we executed at the time of the conference (March 2018).

We first compiled a list of those soft skills collectively resulting from the published studies [1,2,3]. As the list was very long (an extract is presented in Table 1), it seemed nearly impossible to carefully discuss all those skills in two FG sessions of 60 minutes (length was determined by the REFSQ'18 scheduling). Therefore, we decided to use a list of 9 soft skills, that (1) were ranked high in the most recently published study of job ads in the Netherlands [3], and (2) were common in all previous studies [1,2,3]. This choice was justified because the potential FG participants available at the REFSQ'18 conference were mostly from Europe (from the Netherlands in particular). In line with this, in the FGs, the basis of our discussion was the following **list** of soft skills:*(i) Language*

proficiency in English, (ii) Teamwork skills, (iii) Communication skills, (iv) Analytical skills, (v) Self-confidence, (vi) Flexibility, (vii) Customer orientation/ Empathy with users, (viii) Willingness to travel, (ix) Self-organization.

To investigate RQ1-RQ3, the following questions (***Q1-Q4***) were prepared to guide the FG discussion: ***Q1:*** Are the presented soft skills something that you observe to be critical for RE in practice? Why? ***Q2:*** Is there a critical soft skill that is not on the list? ***Q3:*** Considering our set of critical soft skills, how would you rank these according to their criticality? ***Q4:*** Is there a soft skill that is particularly critical for the application domain in your company? Or a soft skill critical for a specific RE-role, be it business analysts, data analysts, systems analysts?

Q1 delivers answers to RQ1 and RQ3. Q2 adds to RQ1. Q3 belongs to RQ2 and Q4 contributes to RQ3.

2.2 Participants Recruitment

Our RQs drove our choices in composing the FGs. We selected practicing RE-professionals interested in exploring similar questions from their companies' perspectives. We deployed a purposive sampling approach [6] to selecting these FG participants. Our selection criterion was that each participant had been in charge of RE in at least one project. Specifically, we did not mean professionals who just read requirements as part of being responsible for project management tasks, development tasks, or requirements sign-off. The experience of each practitioner was verified prior to the study. We approached the practitioners individually and solicited their participation knowing that they would attend REFSQ'18. They all were frequent conference attendees from the RE circle world-wide. Some were the industry speakers included in the industry track of REFSQ'18 (https://refsq.org/2018/conference-programme/industry-track/). These practitioners served usually as partners in research projects of universities and were willing to work with researchers in explorations of industry-relevant research topics such as ours. As the REFSQ'18 conference took place in the Netherlands, many practitioners came from Dutch companies.

3. EXECUTION

We ran two FGs. As these were "live studies" of REFSQ'18(https://refsq.org/2018/conference-programme/live-studies/), room and facilities were arranged at the conference location. For the execution of each FG, we allocated specific roles to each researcher. The FG had one moderator and two note-takers. There were 13 practitioners who committed to the study. We therefore planned to have 6-7 participants per FG. The first FG was planned in the morning and the second was scheduled in the afternoon. However, on the day of the study, one practitioner of the afternoon FG canceled his participation because of illness and three other practitioners of the afternoon FG asked to join the FG in morning because of other commitments to the organization of the industry day at REFSQ. We had to accommodate their requests "on the fly" and adapt our research design in the face of these participants' changed availability. Our revised FG setup included having the first FG composed of ten participants and the second FG − of two. This choice was methodologically justified through the understanding of Morgan [7], a prominent qualitative research methodologist and an author of FG guidelines that makes the case for using "mini-FGs". First, as Morgan suggests, two or three participants in a FG can engage in the kind of "sharing and comparing" that is one of the major advantages of FG in general. As Morgan puts it: "The participants can build on each others' contributions in a number of different ways, using the dynamics of a conversational setting to extend the data beyond what would routinely be available in a one-on-one interview". Second, a FG with two participants has the potential to considerably increase the amount of depth and detail that the researchers get from each participant. We also make the note that according to Morgan such mini-groups do not pose validity threats to a FG study, when combined with a FG with more participants, because both "big" and "mini" groups they maintain the fundamental characteristic of FGs by providing interactive discussions. The researchers, however, should be aware of the group dynamics changes in a small FG, which can also meant that we needed to change both our moderating style and the kinds of questions that we ask. In line with this understanding, the moderator asked more probing questions inviting the participants of the second FG to provide more examples and richer contextual information to illustrate how they experienced the importance of soft skills in their RE practice.

The first group was composed of REFSQ'18 attendees that were employed in RE jobs in the following organizations: in consulting companies as full-time RE professionals or as self-employed RE consultants in the Netherlands (6 practitioners), in a product development company in Germany (1 practitioner), and in universities in Canada (1 practitioner) and in Italy (2 practitioners). Nine participants had more than 15 years of professional experience in IT projects, in RE roles. The participants from the universities were teaching RE and occasionally were consulting companies on RE subjects. One participant had three years of professional experience in a RE role. The practitioners were working in various domains: local government, automotive, educational systems and systems in the gas and oil sector.

The second FG included two seasoned practitioners from the RE training and knowledge-sharing unit of a large global IT company. These practitioners act as internal consultants to the company's project staff on RE. Although this FG was small (mainly because of the specific timing in the conference program, which turned out inconvenient for some practitioners), these two participants engaged in a lively discussion with us (the researchers). They reflected on the corporate culture and its effects on RE practices, and also compared and contrasted examples of the many projects going on in their very large organization. Because of this level of engagement [7], we considered the session a FG and not a group interview as it would be the case if there would not have been an active discussion both among the participants, and the researchers.

Each FG had a duration of 60 minutes. The 60 minutes of each FG were spent as presented in Table 2. Immediately after the meeting, each researcher wrote up a quick summary of her impressions. All researchers received copies of the notes taken during the FG.

4. DATA ANALYSIS

The two FGs produced qualitative verbal data. We transcribed them verbatim. Then, the coding guidelines of Saldana [10] were used for data analysis, particularly we applied structural coding. Each statement was attributed to one or several of the following codes:

I: a soft skill from the list is considered to be important
+: argument for the importance of a soft skill
-: Argument for a soft skill not being important
A: additional soft skill, not on the list so far
R: Ranking of soft skills

The coding was done by three researchers independently, each working in an isolated location. These three researchers were all present in the FG sessions. Each researcher performed two coding cycles. Once they were done they consolidated their coding results and classified them according to the RQs.

Table 2. Agenda for the FG sessions

Time	Researchers	Participants
0-10'	The researchers greet the participants. The moderator explains purpose and context, explains what a FG is, and introduces the co-authors and their roles. Explains that information is confidential and no names will be used. Instead, numbers were distributed to the participants. 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 transcript writers prepare for note-keeping and recording.	Get their participant number
11'-55'	Moderator probes 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.	

5. RESULTS

Using the codes, relevant participants' statements were identified to answer our RQs.

RQ1. Are the soft skills reported in RE job ads deemed important by RE practitioners?

In order to answer RQ1, we analyzed three aspects, namely whether:

(1) *all soft skills from the list have been deemed as being important by at least one person*. We used the codes I, R and "+" for this analysis. We found that all soft skills from the list (in Section 2.1) were indeed considered important by at least by one practitioner.

(2) *there were soft skills that have been judged to be not (always) important.* We gathered all arguments given to support or not the importance of the corresponding soft skills. To know which soft skills are not always important, we used those statements codified with "-". We found that these soft skills were: (i) English and willingness to travel, which are needed depending on the project. (ii) Self-organization which might be less important if the project manager organizes everything well. (iii) Self-confidence which is needed depending on the role and organizational culture.

(3) *there were additional soft skills deemed as important but missing from our original list*. Using all statements coded with "A", we found that: (i) Many additional soft skills suggested by the FG members were in fact subcategories of the soft skills in our original list (see Subsection 2.1.). For example, selling and convincing was considered to be part of empathy. Being able to moderate was considered part of communication skills. Being able to resolve conflicts we considered part of the teamwork skills. (ii) Others were not soft skills, but hard skills, which we discarded. Finally, the resulting list of **additional** soft skills included: goal-orientation / result-orientation, ability to reflect on the job-related practices and artefacts, ability to be modest and not "knowing it all much better", being able to learn, ability to develop and maintain a vision, non-verbal skills, feeling responsible, ability to spot and tell about problems early and seek for help, and curiosity.

In summary, the answer to RQ1 is: The soft skills reported in the RE job ads based studies [1,2,3] are indeed important, but not in all project settings. Plus, we found also additional soft skills, which were not so frequently listed in job offers but were considered as important by our participants.

Table 3. Comparison between rankings of soft skills obtained from two different studies

Soft Skill	Rank	
	from the job-ads study in NL, 2015 [3]	**from our FG study, 2018**
Communication skills	3	1 ↗
Teamwork skills	2	2-5 →
Analytical skills	4	2-5 →
Flexibility	6	2-5 ↗
Customer orientation, empathy with users	7	2-5 ↗
Self-confidence	5	6-7 ↘
Self-organization	9	6-7 ↗
English	1	8-9 ↘
Willingness to travel	8	8-9 →

RQ2. How do RE practitioners rank soft skill by level of criticality?

In each FG, the participants were asked to choose the three most important soft skills. In order to get to a consolidated ranking, we assigned one point to each skill mentioned in a FG member's top three list. We then summed up the points received by each skill.

With 5 points, communication skills rated highest. Four skills achieved 3 points each: teamwork skills, analytical skills, flexibility and customer orientation/ empathy with users. Self-confidence and self-organization got 2 points each, while English and willingness to travel got no point at all.

We compared our present observations to those in our 2015 study using job ads in the Netherlands [3]. Table 3 shows the results of this comparison. We observed that compared to our findings from [3], the importance of 'Flexibility' and 'Language (e.g. English)' were overestimated in job-ads, while the importance of 'Customer orientation/empathy with users' and 'Self-organization' were highly underestimated.

RQ3. Why do RE practitioners deem these soft skills important?

For each soft skill, we gathered the participants' statement indicating if the participants perceived the skills as important or not important (codes "+" and "-"). Table 4 shows these arguments for each soft skill.

Table 4. Statements for and against the importance of the soft skills (citations from participants)

Soft skill	Arguments for the importance of the skill	Arguments for against the importance of a skill
Communication skills	● Communication skills are important for any job ● There is a lot of teamwork in RE, hence communication is a must	
Teamwork skills	● Teamwork skills are important for everyone, not only in RE ● Teamwork includes leading a group with respect to context, and to keep to rules and templates ● RE as a whole means working with others, thus teamwork is key	
Analytical skills	● A requirements engineer must be able to switch between abstraction and details ● He/she must be able to decompose problems and to abstract, but also to work in a structured way	● Too much of it is bad because of risks to over-analyze and over-engineer seemingly trivial requirements ● There is a danger of analysis-paralysis.
Flexibility	● This is important because of working in different time zones	● Being too flexible signals reluctance to make decisions ● Flexibility may signal a lack of ability to say "No" and push back, which is detrimental to requirements negotiation.
Customer orientation / Empathy with users	● A business analyst needs to see the work from other peoples' perspective	
Self-confidence	● You need it if you need to work with stakeholders who are much older than you ● It can happen that a specification is thrown away, when a new requirements engineer writes his first specification; this demands self-confidence, i.e. to be sure that one can learn it, to be sure of one's own working style, but also to be flexible and to adapt, to cope with week-wise planning, dynamic context or unknown application domain, or with masses of information ● In software requirements for car manufacturing, the work climate is harsh; what does not work there is speaking in term of understatements ● "I don't get respect". This attitude slows down the work to be done. When you know that you'll get negative responses, you get reluctant.	● Too much self-confidence can be detrimental, too. Such a person ignores advices from clients, stakeholders and peers. ● Whether it is needed, depend on the role; if you act as a requirements engineer and also serve as a project manager or an architect
Self-organization	● It is important because a requirements engineer works mostly alone.	● The requirement engineer does not need to organize anything, when a project manager makes the plans
Language proficiency in English	● It is needed for communication in general ● It is needed to specify requirements if working with international vendors.	● It is best to use the local language for requirements. ● In government projects, English is not needed.
Willingness to travel		● Too much of it is detrimental as you detach yourself from your clients.

6. REFLECTION ON THE FINDINGS

Our FG participants confirmed that the soft skills we found in job ads, are indeed relevant for practice. However, their frequencies of appearance in job ads do not reflect their importance in practice. E.g., although proficiency in English is demanded most often, our FGs did not rank it high. The participants gave us some hints on why this is the case. In the first FG which was composed by practitioners from the Netherlands, there was a consensus that many of the RE tasks that consulting companies execute for their clients happen in government organizations which write their requirements in Dutch and therefore English proficiency is good but not a prerequisite for the RE job. Plus, those systems that consulting companies deliver in large Dutch organizations with many local users, also prefer their requirements to be documented in Dutch. Next, the two RE practitioners from North America that participated in the second FG pointed out that the explicit statement

of English language proficiency as a soft skill might well be country-specific (or continent-specific). From their perspective, being able to communicate in English was a basic skill that is a prerequisite for any IT job, not just for RE jobs. As it was commonly assumed that searching for a job in America would imply English language proficiency on the applicant's side, there was no point to discuss this as a soft skill for RE jobs in the context of hiring.

Furthermore, the FG participants collectively expressed the view that the importance of many soft skills is contingent to project context. For example, the demand for requirement engineers' willingness to travel varies from project to project based on whether the project is distributed across multiple countries or regions in a country. Moreover, flexibility to work across time zones was deemed highly contingent on whether global projects are there. Clearly, a government organization in a country is much less likely to call for this type of flexibility when considering hiring requirements engineers.

Finally, the practitioners' interactions opened up the discussion on the fact that too much of a soft skill that is generally perceived as positive, could become detrimental for a project. For example, too much use of analytical skills was deemed a trigger for "analysis-paralysis" of the requirements. Or, too much of requirements engineers' flexibility could translate in inability to make decisions or to push back in case of unrealistic requirements that stakeholders may pose to a system. Two practitioners added that this happens if a requirements engineer "does not know how to say "No" to a stakeholder". This reasoning of our practitioners could be traceable to results in leadership research and organizational psychology [12] that suggest that "too much of anything is bad". How much of each soft skill is good enough for RE jobs is so far unexplored, however a highly interesting research question. We think it warrants future research as it has important implications for RE teaching.

7. VALIDITY OF THE RESULTS

The major limitation of our FG setup is regarding generalizability [6]. Methodologists suggest that at least three FGs are needed [5,6], to achieve contextually rich results. However, because of time and resource constraints within the REFSQ program, we could host only two FGs. Despite of this, we consider our findings indicative; they mainly show that there is a gap between reality as presented by job ads and as experienced by practitioners. Understanding this gap is important and calls for more empirical research with companies. Particularly important is to replicate the study by running FGs in specific areas, e.g. government projects versus automotive companies' projects. This would increase our community's understanding of the variation in the soft skills demands based on the industry sector in which the RE professionals exercise their professional duties. Second, a validity concern often associated with FG 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 FGs moderator's impact on the data is any greater than researcher's impact in participant observation or individual interviewing". An experienced moderator can reduce this risk and keep influencing participants to a minimum. Specifically, the first author has been using FGs in her research since 2008 [8,9]. Furthermore, we also acknowledge that the FG members can influence the data they produce, for example, by means of imbalanced level of participation by other FG members. We mitigated this by having the moderator use probing questions to those participants that seem more silent. Finally, 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 FG'. It collected data through group interaction of people with various backgrounds but with common professional values and common roles in which they execute their professional duties.

8. SUMMARY AND FUTURE WORK

This study found that the soft skills listed in the job ads [1,2,3] in fact are relevant, but their frequencies of being mentioned do not reflect their importance in real life RE practice. Our results have some implications for research, teaching and practice.

First, based on our findings, we plan further studies to investigate more in depth, in which context which soft skill is needed most. We think that this would probably depend on the application domain, type of project and other context factors and on the role which the person gathering requirements has in the project. Practitioners repeatedly emphasized that one can have too much of most of the skills. So, it still is open what is the right extent needed of each soft skill. When does the virtue become a vice?

Second, our research informs RE teachers 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.

Third, practitioners' certification organizations in RE might consider including these skills in their portfolio of educational course offerings. Moreover, 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.

9. ACKNOWLEDGMENTS

We want to thank all the practitioners who took part in this research. This work was supported the National Natural Science Foundation of China under grant Nos. 61702378.

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