

REQUIREMENTS PRACTITIONER BEHAVIOUR IN SOCIAL CONTEXT: A SURVEY

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Abstract: The purpose of this research paper is to discover the social behaviour of practitioners that causes the communication breakdowns during the requirements engineering process. Requirements emerge from the social interaction and communication between the requirements practitioner and the various stakeholders. The main problems with the requirements engineering process are communication and coordination breakdowns, as well as the lack of domain knowledge or understanding of the problem. These challenges are all related to the social interaction during the requirements engineering process that impacts the quality of requirements. In practice, requirements are still produced with errors which then lead to unsuccessful solutions to problems. The ultimate goal of any practitioner is delivering a solution fit for purpose first time around. If the social patterns of practitioners that deliver quality requirements are known and compared with those that do not deliver quality requirements, individual performance can be adjusted. The results of this study confirmed that quality of requirements is dependent on the communication established between the requirements practitioner and relevant stakeholders. The communication is enabled through the trust relationships between the parties. A description of how practitioners behave during the requirements process is provided. By discovering these interaction patterns, communication can be improved and made more effective. Additionally, the relationships between the practitioners and their stakeholders are described. These trust patterns provide insight into the levels of collaboration, communication and sharing of knowledge between the practitioners and their stakeholders. By identifying these relationship patterns, the value each party receives from the relationships could increase, and the communication breakdowns could be minimised.

Keywords: Requirements, requirements engineering process, survey, communication, trust, problem solving

1. INTRODUCTION

Although the research community acknowledges the importance of requirements, the industry still faces many challenges in practice with the requirements engineering process during solution delivery [1]. Industry reports, surveys and research continuously identify poor requirements as the main contributor to failed projects [2-7].

Requirements engineering is about understanding the problem, and then solving it during a systems engineering, software engineering and business analysis process. Understanding problems involves human interaction [8-10]. A purely technical process cannot solve a problem where customers' needs are to be met [11]. The successes of an organisation, team or project depend on the knowledge in the organisation and are represented by the relationships between the people and the organisation [12]. If the requirements practitioner does not enable collaboration with stakeholders through relationships, knowledge of the problem could be incomplete and impact the quality of requirements [13-15].

The challenges experienced during the requirements engineering process relate to social interaction challenges, specifically communication breakdowns, and not necessarily technical challenges [11, 16].

Communication between the stakeholders and the requirements practitioners is highlighted by many researchers as one of the important challenges faced in practice in delivering accurate requirements [1, 6, 17-21].

The context in which the requirements engineering process is performed is a human activity system. Requirements emerge from the social interaction and communication between the stakeholders and the requirements practitioner [22]. The importance of effective communication to ensure a mutual understanding between the cross-functional team involved in the requirements engineering process has been emphasised over time [15, 23-30]. Collaboration and negotiation between the requirements practitioner and stakeholders provide the building blocks for strong relationships that allow for an interactive and involved requirements engineering process [29, 31].

Paech et al. [32] have summarised studies reviewed in literature to confirm what the problems with the requirements engineering process are:

- communication and coordination breakdowns
- lack of domain knowledge, i.e. understanding the problem in the world
- changing and conflicting requirements.

The requirements engineering studies consistently raise human interaction, in the form of communication,

collaboration or relationships, as a challenge. The focus of this research was therefore not to identify the challenges experienced during the requirements engineering process but rather to identify the social behaviour that causes the communication breakdowns.

The aim of this research was to identify the social behaviour during practitioner communication, as communication is one of the challenges that have an impact on the quality of requirements. The study revealed the practitioners' communication patterns during the requirements engineering process, and what relationships they establish with various stakeholders. A two-part survey was conducted. The first part of the study was to describe how the requirements engineering process is executed by practitioners and to establish what is used and what is not used in practice.

The second part of the study was to enhance the understanding of the social context within which the practitioners execute the requirements engineering process. This part of the survey was undertaken to derive a description of how the practitioner behaves during the requirements engineering process in order to identify the communication and trust patterns between the practitioner and the various stakeholders. Trust has been identified as one of seven success factors influencing the delivery of requirements [33]. It was decided to explore the trust relationships between the requirements practitioners and determine whether these relationships have any impact on the quality of the requirements. According to social studies, if trust is not present in a relationship, effective communication will not take place [34].

This paper's main objective is to document the communication patterns of practitioners and their consequences. By discovering these patterns the knowledge can be utilised to improve communication during the requirements engineering process. If communication is more effective, the outcome of the requirements engineering process, which is quality requirements, should improve.

The first section of this paper provides a summary of the research design. Secondly, the results collected are summarised and discussed to derive patterns on how practitioners behave during the requirements engineering process. Finally, key patterns are highlighted.

2. RESEARCH METHOD

Social behaviour could not be researched in isolation, but within the context of how the requirements engineering process is executed by practitioners. A research method was required to derive an understanding of what activities are generally performed during the requirements process and how many of the tools and methodologies available in literature are in use or known by practitioners. Secondly, the data had to provide insight into the level of

communication during the process and the impact of the collaboration on the quality of delivered requirements.

A survey was selected as the most appropriate research method to collect information about behaviours, knowledge, opinions, or attitudes of the requirements participants in order to derive a description of the requirements engineering process and the practitioners' behaviour. To document how the practitioners execute the requirements engineering process, data was collected from the first two sections in the survey. The final section of the survey collected information to derive a description of the social factors that impact on the requirements process outputs. This data was used to describe the communication patterns and trust relationships between the responsible person generating requirements and the stakeholders.

The focus of the data collected was on communication patterns and trust relationships between stakeholders and the requirements engineer. Communication is a challenge faced across communities in which the requirements discipline is executed; it is also identified as one of the main impacts on the quality of requirements. The trust relationships between the requirements practitioners and stakeholders were explored to determine whether these relationships have any impact on the quality of the requirements or on the communication. Additionally, as requirements engineering is defined as a problem-solving process, it was decided to explore the sources practitioners consult during this process. The patterns explored are summarised in Table 1.

Table 1: Behaviour patterns

Pattern	Behaviour analysed
Communication	<ul style="list-style-type: none"> Communicates effectively through personal interaction. Communication models used to facilitate communication during requirements engineering process. Motivation for communication interaction.
Trust	<ul style="list-style-type: none"> Reliance-based trust: determine if the practitioners were prepared to rely on others based upon (i) relying on another's skill, (ii) knowledge, (iii) judgement, (iv) actions including delegating and (v) giving autonomy. Disclosure-based trust: determine if the practitioners were prepared to share work-related or personal information that was of a sensitive nature.
Problem solving	<ul style="list-style-type: none"> Information-seeking behaviour of the respondents during the problem-solving activity, sources of information consulted were investigated based on sources suggested by literature [35].

As these are all social patterns that were to be observed, existing instruments were utilised where possible. During a project, requirements engineering bridges the communication between the stakeholders and the technical delivery team [36]. Based on this, information regarding the following communication patterns was collected:

- Communication with project manager on project impacts.
- Communication with sponsor to elicit business requirements.
- Communication with a subject matter expert to acquire domain knowledge.
- Communication with users to elicit functional requirements.

Literature was researched to identify the most appropriate possible instrument available to measure trust in the workplace. The focus of the trust relationships was intra-organisational relationships among co-workers [37]. It was decided to use the behavioural trust inventory developed by Gillespie [38]. This trust measurement was selected because it has been validated by other researchers and was classified as a best fit instrument to capture trusting behaviours [39].

The behavioural trust inventory measures the work relationships between employees and immediate managers, as well as between employees and immediate work colleagues [37].

Finally, to identify the research pattern of typical practitioners in understanding the problem to be solved, sources of information consulted were established as prescribed by literature [35, 40]. The following section provides a summary of the main observations.

3. SURVEY RESULTS SUMMARY

A total of 127 responses were received from requirements practitioners within the South African community. The survey took between 20 and 30 minutes to complete, which is 5 to 10 minutes longer than the suggested time by Rea and Parker, which suggest that web-based surveys should aim at completion within 15 minutes [41]. Two alternatives were considered: remove questions or separate the questionnaire into subsets [42]. The latter choice was elected. The first subsets of questions dealt with the requirements process to derive a description document of how the practitioners execute the requirements engineering process. The second subset was more explorative of the social interaction patterns.

The survey respondents were mainly from the finance and banking (33%), information and communication technology (23%) or government public sector and defence industries (9%). Although the majority of respondents were from these industries, the data confirms a presence of requirements practitioners across all industries.

The behaviour review provided a description of the practitioners' communication behaviour and the trust relationships they established during the requirements engineering process with various stakeholders. It identified the communication model used by practitioners during the execution of the requirements activities. It

also indicated the sources practitioners consulted during the problem-solving process. This provided the social context during the requirements process within which the practitioners operated. A summary of the patterns analysed during this review is presented in Table 2.

Table 2: Behaviour pattern results summary

Patterns	Actual behaviour
Communicates effectively through personal interaction	<ul style="list-style-type: none"> • In 93.7% of the instances the practitioners established communication with the project manager, and in 82.5% of the cases with the end-users. Communication was established with the subject matter expert in 77.6% of the cases. • Practitioners only established communication with the project sponsors in 61.7% of the cases. They indicated that they did not need to communicate with the project sponsor as this was the responsibility of the project manager.
Communication models used to facilitate the communication during requirements engineering process	<ul style="list-style-type: none"> • The communication direction between the practitioners and project manager indicates that both parties initiated communication interaction, with the project manager initiating communication 41.1% of the time and the practitioner 58.9% of the time. The message flow was multidirectional. • In the communication between the practitioner the project sponsor, subject matter expert and the end-user the practitioner was initiating the communication. The message flow was only a one-directional message flow. In 75% of the cases the communication interactions between the practitioner and the project sponsor were initiated by the practitioner. In 95.6% of the cases the communication interactions between the practitioner and the subject matter expert were initiated by the practitioner, and in 93.5% of the cases between the practitioner and the end-user it was initiated by the practitioner.
Motivation for communication interaction	<ul style="list-style-type: none"> • Practitioners reported that the main motivation for interaction with the <i>project manager</i> was to report on the progress of the analysis effort (64%). Other reasons provided for communicating with project managers were: <ul style="list-style-type: none"> ▪ To raise or identify risks (14%), agree on analysis approach for project (7%), requirement changes (7%), input for project costs, resource requirements and delivery (5%) and project status reports (3%). • The main reason provided for interaction with the <i>project sponsor</i> was to communicate the expectations and feedback from other senior managers and stakeholders (52.8%). Practitioners appeared to spend time with the project sponsor to ensure that the solution was understood (19.4%) as well as to resolve conflicts and political issues (19.4%). Additional reasons noted were status and progress reporting (3.2%) as well as to raise stakeholder concerns (0.8%). No response was noted by 4.4%. • The main reason for interacting with the <i>subject matter expert</i> was to gather knowledge about the domain in which the application/solution would operate (44.4%). Other reasons provided for communicating with the subject matter expert were: <ul style="list-style-type: none"> ▪ To gain an understanding of the underlying structure of domain problems (20%), gather knowledge about the activities performed in this domain

	<p>(28.9%) and resolve conflicting issues (3.1%). No reason was provided in 3.6% of the responses.</p> <ul style="list-style-type: none"> The two main reasons given for the interaction with the <i>end-user</i> were to interview the end-user about the functional requirements (58.7%) or to observe the user while executing the daily activities to understand the domain (30.4%). Only a very small percentage of the respondents (0.8%) spent time with the end-users to validate their understanding and discuss issues that were experienced (0.8%). 1.6% mentioned progress reporting as a reason and 7.7% did not provide any reason.
Trust relationships	<ul style="list-style-type: none"> The trust relationships between the practitioners and stakeholders indicated the trust is based on willingness to rely. The willingness to disclose information in all the relationships between the practitioner and the relevant stakeholder was low.
Problem solving	<ul style="list-style-type: none"> The majority of practitioners depended on sources of information such as either personal experience (15%) or conversations with customers (16%) and colleagues (17%). Fewer practitioners consulted standards (10%) and technical reports (9%) and had conversations with consultants (10%) or with vendors (8%). Academic, industry and textbook sources were used in a few cases (4%, 5% and 6%, respectively).

[44-46]. The respondents had to rate how frequently the requirements contained the eight quality characteristics.

To simplify the analysis, exploratory factor analysis was used as a data reduction technique to validate if the eight quality elements could be combined into fewer factors. Initial factor analysis confirmed that it would not be ideal to combine the eight elements. However, confirmatory factor analysis was done to validate the underlying structure of the quality scale and results suggested that the elements “consistent” and “traceable” should be excluded. By adjusting the quality scale the factor analysis confirmed that the six other elements could be summarised into one factor. A summary value for quality could therefore be calculated by using the median for each of the six elements as presented in Table 3.

The cross-table in Table 3 indicates a higher percentage quality of requirements when the practitioners established communication with the relevant stakeholder. The results show a clear pattern of dependency between the quality of the requirements and the communication established by the practitioners. A positive relationship is evident where established communication leads to the delivery of higher quality requirements. The pattern is consistent in each stakeholder’s case.

The communication behaviour, trust relationships and problem-solving behaviour patterns determined from the survey are discussed in detail in the next section. Additional analysis results to understand any impact on the quality of the requirements delivered by the practitioners are also included in the discussion.

4. SURVEY RESULTS DISCUSSION

Pattern 1 - Communicates effectively through personal interaction

This communication pattern highlighted that practitioners did not feel obliged to communicate with the project sponsor. They indicated that this was the project manager’s responsibility. Although the project manager is accountable for the communication management, the requirements practitioner is responsible for the communication management plan [43]. The requirements practitioner still has a direct responsibility to communicate with all relevant stakeholders within the business domain regarding the impact of the solution [43].

Literature constantly identifies communication and its impact as a challenge during the requirements engineering process [17-19, 32]. Further analysis was done to determine whether the communication interaction had any impact on the quality of the requirements delivered by the practitioners. The scale elements used to determine the quality of the requirements during the survey were based on the eight characteristics of a quality specification. These characteristics were traceable, modifiable, verifiable, ranked, consistent, complete, unambiguous and correct as defined by existing standards

Table 3: Communication established by quality of requirements

Communication established	Quality				Total
	Rating 1	Rating 3	Rating 3 to 5	Rating 5 to 7	
PM communication established (N = 49)	0%	2%	24%	74%	100%
PM no communication established (N = 4)	25%	0%	25%	50%	100%
PS communication established (N = 31)	0%	0%	16%	84%	100%
PS no communication established (N = 20)	5%	5%	35%	55%	100%
SME communication established (N = 40)	0%	3%	20%	77%	100%
SME no communication established (N = 10)	10%	0%	30%	60%	100%
EU communication established (N = 41)	2%	2%	10%	86%	100%
EU no communication established (N = 8)	0%	0%	63%	37%	100%

PM (Project manager), PS (Project sponsor), SME (Subject matter expert), EU (End-user)
 Rating: 1 (Never); 2 (Rarely, less than 10%); 3 (Occasionally, in about 30%); 4 (Sometimes, in about 50%); 5 (Frequently, in about 70%); (Usually, in about 90%); 7 (Every time)

Where communication was established between the practitioner and the relevant stakeholder, high quality requirements were delivered. The quality of delivered requirements where there was no involvement of the practitioners varied between very poor and good quality. There was no pattern here. As the cross-table shows a clear pattern, a Mann-Whitney test was done in each case of the two groups, where communication was established and in the case of no communication established, to validate if these two groups had the same median.

A Mann-Whitney test was performed to test the hypothesis that the means of the group where communication was established is the same as the mean as the group where no communication was established for each stakeholder. In the cases of the project sponsor and end-user there is a statistically significant difference in the means of the groups where communication was established and where no communication was established. This shows that where communication was established, higher quality requirements were delivered. The significance can be derived from results for the project sponsor data ($U = 191$, $p = 0.017$) and for the end-user ($U = 86.5$, $p = 0.03$).

This statistical significance did not hold up in the case of the project manager. The sample available for the *no communication established* group was very small and could be the reason why no statistically significant difference between the project manager groups could be found.

These tests confirm the relationship between quality of requirements and communication. Where communication has been established, the quality of requirements is higher.

Pattern 2 - Communication models

In the majority of the cases the practitioners established one-way communication with the project sponsor, subject matter expert and the end-user as presented in Table 2. The communication models used between the practitioners and the project sponsor, subject matter expert and the end-user were linear models, as there was only a one-directional message flow. A linear communication model is a unidirectional model that sends a message from the sender to receiver with or without effect. In non-linear models, the message flow is multidirectional [47].

The fundamental driver for a practitioner to communicate with the various stakeholders is to elicit information about the domain in which the problem should be solved. From the communication motivation as presented in Table 2, it is evident that the practitioners established communication to acquire knowledge. Additionally, the value for stakeholders is to acquire knowledge about how the solution to the problem will affect their business activities.

As emphasised by Sommerville et al. [48], when solving complex problems a socio-technical perspective is required. A socio-technical solution includes technical systems, but also includes knowledge of how the system should be used by stakeholders to achieve the ultimate objective [49].

The one-way linear communication model is not good enough to assist the practitioner in acquiring knowledge about the domain of the problem and in enabling all stakeholders to develop a mutual understanding of the solution.

To master the requirements engineering process, a good requirements engineer needs to manage the incompleteness of communication [14]. The practitioner as the owner of the requirements engineering process is responsible for facilitating this knowledge transfer to the various stakeholders. From the behaviour review it is evident that there is no drive from the practitioners' side to facilitate the knowledge acquisition for the stakeholders about how the solution to the problem will affect business activities. Only a very small percentage of the respondents (0.8%) spent time with the end-users to validate their understanding and discuss issues that were experienced (0.8%) as presented in Table 2.

To solve complex problems, companies and people are required to work together to create high quality solutions which they would not be able to produce individually [50]. Collaborations have become common where communication brings groups of people from diverse backgrounds and organisation roles together to work on a common problem [50].

If practitioners implement a more collaborative communication model instead of a linear communication model, they can facilitate the knowledge acquisition cycle for themselves (about the problem) as well as for the stakeholders (about the solution). In this way both parties would derive value from the engagement and a more complete understanding would be reached between practitioners and stakeholders.

Pattern 3 - Communication motivation

The communication motivation for interaction of the practitioner indicates a low percentage of communication with the project manager to agree on the analysis approach as presented in Table 2.

This behaviour confirms the lack of focus on the requirements planning activity to generate a requirements management plan that identifies the required work. According to the literature, the requirements practitioner is responsible for the creation of a requirements management plan, which is a key input to the overall project schedule [43, 51]. Agreement on an analysis approach for the project with the project manager was done in only 7% of the cases. During requirements planning a requirements management plan is generated

that identifies the required work. The plan forms the basis for the project cost and resource estimation. Only 5% of the practitioners communicated with the project manager regarding input into these estimations.

The practitioners communicated with the end-users to elicit information or to obtain knowledge about the domain. There was no focus on spending time with the end-users to validate their understanding. When this is compared with the communication model in the previous section, it aligns with the findings that the practitioners communicate with the end-users to elicit information or to obtain knowledge about the domain in which the problem should be solved. Practitioners should obtain knowledge of how the system should be used by stakeholders to achieve the ultimate objective [49].

Pattern 4 - Trust relationships

The behavioural trust inventory was used to measure trust relationships between the requirements practitioner and the various stakeholders. The inventory suggests that there are two dimensions of trust, i.e. reliance and disclosure [52].

From the exploratory factor analysis results, it was concluded that the ten elements in the trust scale could be summarised into two factors: one factor summarising five reliance elements and the other summarising five disclosure elements. The mean of each dimension was presented on the original scale used to measure the trust, i.e. a scale from 1 (not at all willing) to 7 (completely willing), with 7 indicating high disclosure or reliance and 1 low disclosure or reliance.

A summary of the trust behaviour of the respondents within interpersonal work relationships is given based on their willingness to be vulnerable. This willingness is described by the engaging in reliance and disclosure and is presented in Table 4. This summary separates the trust relationships where communication was established between the practitioner and relevant stakeholder versus where no communication was established.

Table 4: Trust relationships summary

Trust relationships	Project manager		Project sponsor		Subject matter expert		End-user	
	1	2	1	2	1	2	1	2
Reliance-based elements mean	4.5	3.95	4.74	3.36	4.56	3.73	4.12	1.77
Disclosure-based elements mean	3.9	4.6	2.91	1.99	3.08	2.7	2.79	1.2

¹ Communication established
² No communication established

A relationship characterised by a willingness to both rely and disclose represents a higher level of trust than a

relationship characterised by a willingness to trust in only one dimension [52]. The reliance and disclosure dimensions that characterise the trust relationship between the practitioner and the relevant stakeholder where communication was established were evaluated from Table 4.

It can be deduced from the results in Table 4 that practitioners had only a one-dimensional trust relationship with all stakeholders which is based on willingness to rely. The practitioners surveyed were not willing to disclose work-related or personal information that was of a sensitive nature. In all the relationships between the practitioner and the relevant stakeholder the disclosure element was low. To determine whether the reliance trust element was high or low, a comparison with a known population mean was done using a one-sample t-test. The results of the one-sample t-test show that the reliance trust element (mean = 4.5286, SD = 1.51906, N = 56) was significantly different from the hypothesis value of 5.93, $t(55) = -6.904$, $p = 0.000$. The disclosure trust element (mean = 3.9036, SD = 1.44825, N = 56) was significantly different from the hypothesis value of 5.4, $t(55) = -7.732$, $p = 0.000$.

Although the reliance trust element falls in the high reliance area, it can be confirmed that the trust relationship between the project manager and practitioner reflects low levels of trust. This is the only trust relationship that could be estimated as low or high compared with a known population mean, as no other population data exists for a relationship with the other stakeholders. It can therefore be concluded that the trust relationship between the practitioners is only one-dimensional with all stakeholders. It is based on willingness to rely, but is low.

The practitioners' behaviour was explored to determine if the trust relationship between practitioners and various stakeholders was similar or different when communication was established compared with when no communication was established.

The trust elements where communication was established were compared with those where no communication was established, in the case of the end-user, project sponsor and subject matter expert. Where communication was established, there was a higher level of trust in the relationship. The project manager trust relationship does not confirm this pattern; however, there were only four responses, and this is a very small sample to derive any conclusion.

These results confirm that where communication is not established, trust is low as suggested by the literature [34]. If the level of trust between the respondents and the various stakeholders is that low, it can be expected that the communication levels and interaction have not been established effectively.

In summary, communication was established but there is an indication that there was no two-way communication of information exchange. This is confirmed by the level of trust as indicated.

Pattern 5 – Problem solving

Problem solving is a fundamental competence that requirements practitioners should have [53, 54]. According to literature, as time passes during the problem-solving process, the sources of information consulted change [35]. During the early stages conversations with colleagues and personal experience are used. During the later stages of the process textbooks, codes and standards, industry newsletters and conversations with academics are used [40].

The preferred sources which were used by the practitioners were either personal experience or conversations with customers and colleagues, which are classified as initial sources [40]. The sources used by the practitioners indicate that the information-seeking behaviour did not follow a typical problem-solving process where the sources changed over time.

The results from this knowledge discovery, namely how practitioners behave during the execution of the requirements process, highlighted key findings as summarised in Table 5.

Table 5: Summary of behaviour findings

Theme	Finding
Social and technical elements impact the quality of requirements	The effectiveness of communication and of the execution of the requirements activities impacts the quality of requirements.
Quality impacted by the effectiveness of communication	The more practitioners establish communication with various stakeholders, the higher the quality of requirements delivered.
Practitioners' information-seeking behaviour	The problem-solving process of the practitioners depends on sources of information which are either personal experience or conversations; their information-seeking behaviour does not change over time.
Knowledge acquisition	There is no drive from the practitioners' side to facilitate knowledge acquisition for the stakeholders about how the solution to the problem will affect business activities.
Trust	Trust between practitioner and relevant stakeholders is low if communication has not been established.

The findings of the research were evaluated and, based on this evaluation, the conclusions were derived. The conclusions are discussed in the next section.

5. CONCLUSIONS

This paper provides a summary of how practitioners gather information about the problem during the requirements process, use the information and share their resulting information. By discovering these interaction patterns, communication interactions can be improved

and made more effective. This integration of the information collected and knowledge generated formed a more complete understanding of the causes of the communication breakdowns and therefore the lack of acquisition of domain knowledge, which is continuously mentioned as a challenge in requirements engineering that affects quality.

The communication patterns confirmed that the effectiveness of communication impacts on the quality of requirements. In addition, the trust relationships between the practitioners and the stakeholders affect communication effectiveness. The conclusion from these results is that the success of the requirements process is dependent on how well the process is executed, the creation of communication channels between the practitioner and various stakeholders as well as the development of human relationships based on trust.

If practitioners implemented a more collaborative communication model instead of a linear communication model, they would be able to facilitate the knowledge acquisition cycle for themselves (about the problem) as well as for the stakeholders (about the solution). In this way, both parties would derive value from the engagement and a more enhanced understanding would be reached between practitioners. If stakeholders received value from the engagement, a more collaborative environment would be established and fewer communication breakdowns would follow. More efficient communication has a direct impact on the quality of requirements.

The sources of information used by the practitioners reveal that the information-seeking behaviour does not follow a typical problem-solving process where the sources change over time. The preferred sources which were used by the practitioners were either personal experience or conversations. If practitioners aligned their information-seeking behaviour with a typical problem-solving process where the sources change over time, the quality of the requirements would be affected as more knowledge will be acquired during the problem-solving process. This would enable practitioners to gather comprehensive information about the problem.

This knowledge may be used as a basis for future research to integrate the social and technical activities of the requirements engineering process.

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