Conspiracy Walls in Requirements Engineering – Analyzing Requirements like a Detective

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Abstract

[Context and motivation] Existing requirements engineering (RE) methods and tools support practitioners. [Question/problem] However, with the increase in cross-disciplinary teams, the communication between team members requires a better understanding of role-specific interests and information needs. Moreover, selecting the right methods for gathering information based on actual needs is important and challenging as well. How can information needs be satisfied and the gap between as-is and to-be analysis be bridged? Other disciplines offer potential tools and methods that might be worthwhile to adapt. [Principal ideas/results] We envision the use of conspiracy walls taken from the crime investigation domain—in RE. [Contribution] In this interactive session, we want to investigate the question of the applicability of the conspiracy wall method for data analysis in RE on the example of software products targeting citizens in rural areas. We provide pre-filled conspiracy walls for all participants of the CreaRE workshop and perform data analysis based on our exemplary evidence, leading to a joint discussion of the applicability of the method.

1 What Do Criminal Investigation and RE Have in Common?

Requirements engineering (RE) as a discipline has spawned a variety of methods and tools that support practitioners in their work. The large number of different methods for various activities and information needs in RE require the expertise of requirements engineers to choose the right tool for the job. This challenge increases when working in cross-disciplinary teams (consisting, e.g., of requirements engineers, UX experts, software architects, psychologists, marketing experts), where each role brings their own information needs and typical methods. Also, the preparation, storage, and analysis of the collected data and information becomes even more challenging due to heterogeneous types of media (e.g., digital or analog, well structured or unstructured).

To master these challenges, it might be worthwhile looking beyond the methods currently used within RE. In the D4RE workshop series [3] (collocated with RE and REFSQ conferences), researchers aim to learn from other fields outside RE and investigate potential tools, methods, concepts, and processes that could be adapted. One

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In: M. Sabetzadeh, A. Vogelsang, S. Abualhaija, M. Borg, F. Dalpiaz, M. Daneva, N. Fernández, X. Franch, D. Fucci, V. Gervasi, E. Groen, R. Guizzardi, A. Herrmann, J. Horkoff, L. Mich, A. Perini, A. Susi (eds.): Joint Proceedings of REFSQ-2020 Workshops, Doctoral Symposium, Live Studies Track, and Poster Track, Pisa, Italy, 24-03-2020, published at http://ceur-ws.org



Figure 1: Exemplary conspiracy wall used by detectives in crime investigation. Data and information is stored on a wall, assumptions and insights are written on sticky notes, and potential interrelations are marked with red strings. We envision a similar visualization to be applied in RE.

potential area of interest appears to be criminal investigation, as investigating a crime scene and identifying a murderer can be a challenging puzzle to solve [1]. Crime investigators interview witnesses, analyze the location and its surroundings, physically pin the collected information to walls—conspiracy walls—and search for possible motives of potential criminals.

In RE, we are not searching for people who committed a crime and for their motives, but rather for the "the perfect solution" that fits the stakeholders' needs, the project context, and the given constraints. None of these are obvious, hence RE as a discipline has evolved in the first place. Nevertheless, one can argue that criminal investigation activities somewhat resemble activities in requirements elicitation. Requirements engineers proceeding from as-is situations to to-be scenarios identify and evaluate ideas for requirements. They link existing evidence (e.g., information obtained from stakeholders, from document analysis, through site visits, by apprenticing) with visions of a to-be situation. This evidence can be represented, for example, in the form of photos, empathy maps, screenshots, concepts, comic figures, personas, or vision videos.

Criminal investigators try to connect the evidence visualized on the conspiracy wall in order to draw conclusions about a particular crime (as shown in Figure 1). Actively trying to find the connections between pieces of information ("the motives") involves challenging assumptions and thinking outside the box, hence this is a creative process. Visualization supports the analysis of such evidence by different project members from different disciplines. The physical form and the visualization may be less important than the actual information. This is comparable to RE activities related to generating new ideas for requirements and solutions. Ideas need to be validated by evidence and a suitable visualization should reveal "white spots" that support the elicitation of further evidence, leading to more complete requirements and better fitting solution ideas. Conspiracy walls should support this process in an iterative manner. Lastly, teams of criminal investigators are not homogenous, but rather cross-disciplinary. For example, veterans and newcomers, or police officers and psychologists, work together to solve a crime. This is similar to cross-disciplinary RE teams. Based on these commonalities between criminal investigation and RE, we have come up with an initial version of the conspiracy wall method for RE.

2 Overview of the Conspiracy Wall Method and Interactive Session

The envisioned method comprises four phases (preparation, data collection and visualization, data analysis, and wrap-up). The first activity of the preparation phase is a "kick-off" meeting in which all relevant project stakeholders come together to discuss the project topic and, if available, initial requirements-related information such as the project's motivation, its overall vision, or relevant stakeholders. Each stakeholder has the chance to express their information needs by explicitly stating a set of leading questions that are of relevance for achieving individual project-related tasks. Both the information needs and the leading questions provide hints for "a body of requirements-evidence" that should be elicited during the data collection activities during the subsequent data collection and visualization phase. This phase is aimed at collecting data that contributes to the aforementioned body of requirements evidence with the help of the methods identified and prepared during the preparation activities of phase 1. The collected data is visualized on the conspiracy wall in the form of suitable artifacts (e.g., pictures, statements, sticky notes with insights from observations, diagrams). During the data analysis phase, different project team members come together to assess, analyze, and interpret the evidence visualized on the conspiracy wall based on their individual leading questions. Any new insights, open issues, or leading questions that emerge should be documented on the wall by using artifacts such as sticky notes, drawings, sketches, or physical links to documents. As shown in Figure 1, the relations between the different artifacts

should be visualized as well. Drawing conclusions and answering the leading questions is a creative task, as motives or needs need to be assessed and ideation takes place. The data analysis continues throughout the project, including iterations of the data collection and visualization phase, if required. The *wrap-up* phase aims to reflect any lessons learned during the usage of the conspiracy wall. Reflection meetings might be scheduled on a regular basis to identify questions that are still unanswered, missing information, or even new ideas or improvement suggestions for visualizing the data more appropriately.

In the interactive session, we want to apply the conspiracy wall method together with the workshop's participants, thereby focusing on the data analysis phase of the method. This will allow the participants to gain an initial shared understanding of our envisioned method, enabling them to discuss its benefits and drawbacks. Key insights should be reflected in the professional experience of each participant. We expect the discussion to result in valuable learning about cross-disciplinary RE that can be applied to existing RE methods and tools. The session will consist of four parts. We will act as moderators, guiding the participants through the interactive session and ensuring that time limits will be adhered to. First, we will briefly introduce the conspiracy wall method to the audience, explaining the background and the four phases (approx. 5 minutes). Next, we will divide the participants into subgroups and provide several pre-filled physical conspiracy walls on the topic of mobility in rural areas, as well as a set of leading questions. The participants will then examine the evidence on the conspiracy walls and get a common understanding (approx. 5 minutes). Third, the subgroups will discuss the leading questions and try to answer them using the evidence on the walls, i.e., executing the third phase (data analysis) on their own. New insights and leading questions will be documented directly on the groups' walls (approx. 10 minutes). We will end this interactive session with a joint discussion of the conspiracy wall method (approx. 10 minutes).

3 Discussion

We envision the conspiracy wall method to contribute to the existing set of RE methods by providing several benefits, especially when moving from as-is analysis towards to-be modeling. Pennel et al. investigated the use of techniques and experts from the policing domain in creativity workshops [4]. Their research focuses on the application of creativity techniques for RE rather than the aspect of bringing in knowledge from the policing domain. Bartl et al. present a framework for a creative, interactive process that incorporates many different techniques for elicitation, need finding, stakeholder analysis, idea generation and assessment, solution finding, and prototyping. Their framework can be viewed in the same manner as a "canvas". Executing the suggested techniques and visualizing the data reveals blank areas and missing evidence [2].

When conspiracy walls are used, each project stakeholder can contribute information needs, leading questions, and evidence, and cross-disciplinary discussions are encouraged. Different roles will ask leading questions according to their information needs, which should then be answered by the entire project team, leading to a better understanding of role-specific activities and related information needs in the team. Also, suitable data collection methods can be identified based on the information needs and leading questions of the project team members. This allows tailoring RE activities to the specific circumstances of each project, as not every activity fits the information needs of every project. Additionally, we expect that it will be easier to trace relations between different artifacts than with digital tools, due the analog representation of digital information. Any representation can be chosen (e.g., sticky notes, red strings, paper cards) other than digital tools, which only support given means. Scaling this technique for large or distributed project teams remains an issue.

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