Documentation is dead: why Requirements Engineering should further develop from formalization to effective collaboration

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Motivation

Traditional RE emphasises formalization and documentation. Practitioner literature underlines the needs for precise natural language requirements, elaborate model-based specifications and a high-degree of traceability and reusability (e.g. [1], [2]). However, we argue that formalization and documentation have become less important and research should instead focus on effective means of collaboration.

Changes in the last decade

Nowadays, software is ubiquitous: from Smartphone to Smartwatch and Smarthome. We argue that only a small share of all these applications is vital (e.g. safety systems) or business critical (e.g. enterprise resource planning) and therefore requires a meticulous documentation. Instead, for most applications fast time-to-market und short user-feedback cycles to validate and generate requirements have become far more important than a extensive and traceable list of requirements set in stone. While being already in production new requirements appear on the way and are addressed by immediate updates.

In recent years also the requirements engineering process has changed (e.g. [3]). What used to be requirements spread sheets and sophisticated requirement documents has been replaced by user stories written on post-its by the user in interactive workshops. A quick photo of the workshops results remains as one of the few artefacts of the requirements elicitation. Likewise the software design process has changed, too. Instead of seemingly complete but unrealistic and risky concepts, vertical and horizontal prototyping has been established in all areas of software development: clickable user interface mock-ups, frontend libraries like Bootstrap or Google Web Toolkit, back end frameworks like Java Spring or test driven development are just some examples. These prototypes inform and reveal realistic requirements and contain more explicit knowledge than any traditional documentation ever could.

Implications for RE

The consequences for most RE undertakings become obvious: the documentation of requirements is no longer a well-written 200 page document with numerous diagrams and tables but a loosely coupled set of artefacts like user stories, prototypes and interview notes ([3]). These artefacts proliferate spontaneously and become mostly obsolete shortly after their occurrence. The mutual understanding of requirements is no longer enforced through formalization but guaranteed by a closely interwoven human-interaction process. Formal traceability becomes less important since a concept is not created by individuals but in a team that passes it as a whole. Furthermore, in short release cycles it is irrelevant what the origin of an early stage requirement was. The only need for a formal documentation remains in life or business critical domains or in areas with a large variety of stakeholders (e.g. application programming interface descriptions, operations manuals).

Instead of heavy documentation, the collaboration among the RE stakeholders (with only light-weight documentation) is gaining importance. The role of personal and virtual face-to-face communication is strengthened accordingly as collaboration methods such workshops, stand-ups and live prototype feedback are part of the everyday routine.

Potential directions for RE

In the following we try to outline ideas for further research in RE without any claim to completeness:

Collaboration in larger corporations: Agile RE processes have proven beneficial in smaller teams. Even large software companies have successfully broken down their organisations into small units with responsibility for end product features. However, in many larger corporations with heterogeneous internal stakeholders from many different departments the use of agile requirement processes has its limitations. The business side within the organisation with stakeholder from different departments can seldom adapt to the speed of an agile team. Likewise, the central IT department might prefer the waterfall approach while a single business function could easily adapt

to an agile approach. From our experience a document-driven waterfall approach is often preferred by business stakeholders in large corporations to clear off their desk after the requirements specification. The question is how less formal and more collaborative RE processes can be established within larger corporations.

Collaboration between organisations: It is very often the case that numerous different organisations are involved in requirements elicitation, specification and implementation that do not have comparable cultures and do not share similar implicit knowledge. The question is how a shared understanding can be achieved without the need for explication through formalization and documentation. Or to put it differently: how can agile methods work in decentral, culturally diverse teams? Potential enablers should facilitate communication and might include temporary cross company-team rooms, daily virtual stand-ups and scheduled on-site work t a partner's location.

Effective RE team setup: RE teams nowadays not only consist of software engineers but also of dedicated (business) analysts, user experience designers and software architects. Experienced team members not only collect requirements and pass them on to the implementation team but are also able to meet early requirements with feasible design alternatives and derive new requirements. In these teams the documentation overhead can be reduced due to a high degree of implicit understanding. Central question are how effective RE teams are formed and what kind of RE teams perform well in which situations. Consequently, it must be discussed what team size is adequate and how it is affected by virtual collaboration.

Evidence instead of assumptions: A significant number of practitioners believe that RE is "common sense". Advice like "Use the following natural language patterns to specify effectively." or "Keep surveys short!" are widespread but lack empirical evidence (e.g. [4]). This is also the case

for collaboration with common rules like "The more communication the better." or "Personal communication is generally favourable to virtual." A sound review of existing research as well as empirical evidence on RE practices, in particular the benefits of less formal documentation would be highly beneficial.

Conclusions

In this paper, we argued that traditional requirements approaches such as formalization and extensive documentation have become less important in recent years. We attributed this to a changing application landscape of mostly non-vital "apps" with short development and feedback cycles and a prototype-driven software engineering process. We concluded that collaboration and communication in combination with a minimalistic documentation is of higher relevance. Therefore, we proposed research ideas in the field of collaboration such as inter-company collaboration and effective RE team setup.

References

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