Summary of the 3rd International Workshop on Requirements Engineering and Testing (RET 2016)

[Co-located with REFSQ 2016]

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ABSTRACT
The RET (Requirements Engineering and Testing) workshop series provides a meeting point for researchers and practitioners from the two separate fields of Requirements Engineering (RE) and Testing. The goal is to improve the connection and alignment of these two areas through an exchange of ideas, challenges, practices, experiences and results. The long term aim is to build a community and a body of knowledge within the intersection of RE and Testing, i.e. RET. The 3rd workshop was held in co-location with REFSQ 2016 in Gothenburg, Sweden. The workshop continued in the same interactive vein as the predecessors and included a keynote, paper presentations with ample time for discussions, and panels. In order to create an RET knowledge base, this cross-cutting area elicits contributions from both RE and Testing, and from both researchers and practitioners. A range of papers were presented from short positions papers to full research papers that cover connections between the two fields.

Categories and Subject Descriptors
D.2.1 [**Requirements / Specifications**]; D.2.4 [**Software / Program Verification**]; D.2.5 [**Testing and Debugging**]

General Terms
Management, Documentation, Human Factors, Verification

Keywords
requirements engineering, testing, coordination, alignment

1. INTRODUCTION
The main objective of the RET workshop series is to explore, characterize and understand the interaction of Requirements Engineering (RE) and Testing, both in research and industry, and the challenges that result from this interaction. The workshop provides a forum for exchanging experiences, ideas and best practices to coordinate RE and testing. A primary goal of this exchange is to enable and provide incentives for research that crosses research areas and is relevant for industry. Towards this end, RET invites submissions exploring how to coordinate RE and Testing, including practices, artifacts, methods, techniques and tools. Submissions on softer aspects like the communication between roles in engineering processes are also welcome.

RET 2016 accepted technical papers with a maximum length of 15 pages presenting research results or industrial practices and experiences related to the coordination of RET, as well as position papers with a maximum length of 6 pages introducing challenges, visions, positions or preliminary results within the scope of the workshop. Experience reports and papers on open challenges in industry were especially welcome.

RET 2016 accepted four technical papers and one position paper. The workshop was visited by 17 participants and the proceedings are available online [2].

2. ORGANIZATION
The 3rd International Workshop on Requirements Engineering and Testing (RET 2016) was held on March 14, 2016, and was co-located with the 22nd International Working Conference on Requirements Engineering: Foundation for Software Quality (REFSQ 2016). The website for the workshop is available online[1]. The workshop was organized by Michael Unterkalmsteiner (Blekinge Institute of Technology) as general chair, Gregory Gay (University of South Carolina) and Michael Felderer (University of Innsbruck) as program co-chairs, as well as, Elizabeth Bjarnason (Lund University), Markus Borg (SICS Swedish ICT AB) and Mirko Morandini (Fondazione Bruno Kessler) as co-chairs.

3. PROGRAM SUMMARY
The program of RET 2016 comprised of an introductory part with a keynote, a discussion on the past and future of RET, and two paper presentation sessions followed by panels with the paper presenters.

After a welcome note, Baldvin Gislason Bern (R&D Expert at Axis Communications AB) gave an invited talk entitled "Tests as requirements - Why we don't do requirements at Axis". He illustrated why and how Axis, a company with approximately 100 different products, can be successful with a team of 120 test engineers and very little resources dedicated at requirements engineering and management. A major factor is the technology-driven domain the company is operating in, allowing product managers to push new technologies to the market, collecting data from customers and then acting upon this feedback to improve future iterations of

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[1] http://ret.cs.lth.se/16

the product. They key take-way idea from the presentation is that knowledge within a company on a technology/product/market changes over time, requiring flexible strategies for product development. With a novel technology, little knowledge and experience exist and requirements are unclear. The role of testing is to explore limits to gain knowledge. Therefore, test cases document decisions, as opposed to requirements which would document intentions. Knowledge that stems from testing the product is documented in test cases, rendering them a living documentation that is actively used and maintained over time. As the knowledge on technology in Axis matures and to be able to maintain a competitive edge, the company is adapting its strategy towards value driven product development. This will put customer feedback in the center, and, as a new source of requirements, drive product development.

The keynote was followed by a panel on future industry needs with respect to coordinating requirements engineering and testing. To kick-off the discussion, the workshop chair presented a thematic summary of the three instances of workshop in 2014, 2015 and 2016, generating a topic model from the 23 abstract that were accepted and presented in total at the workshop. He illustrated the predominant themes with Serendip [1], a visualization tool for topic models (see Figure 1). The rows represent the papers presented at RET in three years. The columns represent the identified topics[2]. The size of the circle on the crossing between article and topic represents the probability that the document was generated by the terms that represent the respective topic. The predominant topics at the respective workshop instances were:

- RET 2014: Tools, Security Requirements, System Testing, Experience, Development and Models

- RET 2015: Test Design, Testers, Quality

- RET 2016: Language, Quality, Artifacts and Data

This result suggests that the three workshops were driven by different themes, quality being a commonality between 2015 and 2016. In Figure 1, the topics are ordered from left to right, by the total proportion. The "tool" topic predominates, followed by "testing experience" and "requirements model". This result suggests that the accepted papers are thematically in line with the goals of RET (see Section 1), at least from the perspective of the used vocabulary in the abstracts. Based on these results and the preceding keynote, the panelists consisting of two researchers and three industry participants discussed future research avenues for RET. A common interest seemed to be the effective use of customer feedback to drive product development. This approach is quite feasible as one panelist from the mobile app domain observed, may however be impractical in other domains such as the automobile industry where feedback cycles with customers are more difficult to establish.

The panel was followed by the first paper session themed quality requirements. The talk "Testing Quality Requirements of a System-of-Systems in the Public Sector - Challenges and Potential Remedies" identified five main challenges when testing quality requirements: (1) evolving RE documents while testing is planned

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[2]The number of topics, 10, is a required parameter when generating the model and was set rather arbitrarily. However, 10 topics seemed to be enough to provide some differentiation between papers and not too much to be too fine-grained. Most of the topics were rather easy to label, based on the most frequent terms per topic.

Figure 1: Topic model of the papers accepted at RET 2014-2016

and ongoing, (2) test managers need to understand the business side of the company, (3) quality requirements are not quantified or (4) prioritized, (5) difficulty to generate test data that exercises all operational states. These challenges were matched with solution proposals from the scientific literature.

The talk "Evaluating and Improving Software Quality Using Text Analysis Techniques - A Mapping Study" identified 81 primary studies. The most frequent application of text analysis techniques was in defect management (bug classification and severity assignment), followed by requirements engineering (concept extraction). The most common data sources are bug reports and requirement documents. Interesting avenues for future research are to study mobile app reviews to understand software quality and to combine multiple data sources.

The talk "Specification of Non-Functional Requirements: A Hybrid Approach" proposed an approach to identify NFRs in natural language requirements using text processing techniques and ontologies, which are then modeled as use cases. The approach has been illustrated in a case study with a proof-of-concept example.

The second paper session comprised of a position paper and a full technical paper. The talk "Improving Project Coordination through Data Mining and Proximity Tracking" proposed to analyze what project members work on and to support direct interaction based on common work related themes when individuals meet. Proximity tracking would also allow to identify communication patterns that could provide insights who collaborates with whom and when.

The talk "Bridging the Gap between Natural Language Requirements and Formal Specifications" proposed to use requirements

boilerplates to support the formalization process of natural language requirements. The industry case study conducted at Airbus illustrated how a requirements quality tool was used to extract semantics from boilerplates to semi-automatically generate formal requirements specifications.

4. FUTURE
We plan to organize the workshop again next year since the topic attracted interested from both industry and academia. Our aim is to organize RET 2017 co-located with the 25th International Requirements Engineering Conference (RE 2017) in Portugal. If the workshop is accepted, the expected date for paper submissions is in June 2017.

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