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## Intelligent, community-driven requirements engineering (Poster)

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2017-05-22

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Mäenpää , H M K , Raatikainen , M J , Tiihonen , J T & Männistö , T M 2017 , ' Intelligent, community-driven requirements engineering (Poster) ' , 13th IFIP WG 2.13 International Conference on Open Source Systems (OSS 2017) , Buenos Aires , Argentiina , 22/08/2017 - 24/08/2017 .

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# Intelligent, community-driven requirements engineering: OpenReq Finland

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**Abstract.** Researchers from University of Helsinki are working on intelligent, open-source requirements management platform with decision-support capabilities. This poster presents the planned research approach and expected deliverables.

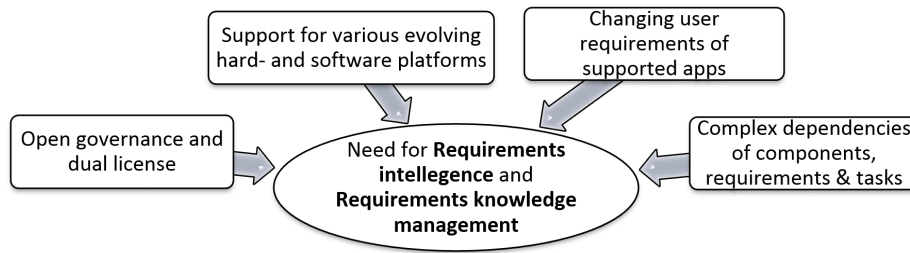
**Keywords:** Requirements engineering, Open Source

## 1 Introduction

Many large open source software (OSS) projects of today attract diverse ecosystems of actors, which each work to achieve their goals in developing the collaboratively created software products or solutions. Here, the requirements engineering process is key in bringing in knowledge about needs of users of the software, businesses that take advantage of it, and stakeholders that care about interoperability of the software product in between different environments. In the continuous flow of requirements, these viewpoints become intermixed with project-specific needs such as architectural design and technical debt. This calls for processing the requirements to avoid redundancies and interdependencies. This is often performed manually, which encumbers not only daily development, but also the work of people who are responsible for the software product's long term planning and sustainability.

In this setting, research opportunities arise from the need for supporting informed decision-making. Special challenges include how risks and dependencies should be managed and what decision factors should be considered in the process [1]. These two contribute to the choice of development strategies of different software artifacts - and to selecting the appropriate stakeholders for doing so.

This poster presents a research task that aims at creating intelligent requirements engineering techniques and tools as a part of an EU-wide research project OpenReq. The expected results include requirements intelligence that can aggregate relevant feedback from actual software usage and communications on social media and question and answer forums. The tools include features for stakeholder



**Fig. 1.** Need for Requirements Intelligence at QT. Adapted from [2]

identification, as well as features that facilitate the software development work flows. To achieve these results, we will leverage modern recommender algorithms together with semantic and inference technologies.

## 2 Research setting

The OpenReq project joins together several industrial and academic partners<sup>3</sup>. We chose to collaborate with The Qt Company as it hosts an established and mature open source software project which gathers an active voluntary developer community and an engaged set of commercial stakeholders that take part in developing the Qt software [3].

In this context, we emphasize the empirical research approach for its ability to provide understanding of phenomena in their authentic context [4]. Using mixed-method case study designs will allow us to build a case-grounded theory that can be replicated in order to confirm, challenge or extend our results [4,5,6]. With this, we aim at create novel means for solving problems in collaborative requirements engineering and validating their impacts on both industry practices and future research.

The Qt open source software project produces a cross-platform application development framework. The software is widely used in developing desktop, embedded and mobile applications that can be run natively on various software and hardware platforms with little or no change in the underlying source code. For example, Qt has become central in the KDE desktop environment of Linux and in the embedded software of automotive industry.

The software is offered with both open source and commercial licenses by *The Qt Company* which hosts the open development community and supports its many activities. The project’s hybrid governance model comprises of two parts: an autonomously operating open community and The Qt Company’s internal functions. The Qt Company holds most of the release authority, at the same time relying heavily on the open community in many aspects of its development and support.

<sup>3</sup> See section 4 for a detailed view

On the one hand, the stakeholder ecosystem of Qt contains companies as dominant actors because the companies base their businesses on building applications with Qt. On the other hand, Qt is influenced by several large OSS communities that produce related technologies and therefore have an interest in its development. Requirements engineering in this competitive and complex environment meets several challenges as the versatile stakeholder ecosystem produces requirements in high volumes and with heterogeneous quality. The requirements may be mutually incompatible, require each other, or their implementation may compete on same resources. A large portion of requirements are processed manually by the community's members and therefore motivating the developers and supporting their self-organization around specific tasks are important. Here, requirement dependencies pose a special challenge, which is emphasized by the cross-domain, cross-company, and cross-platform nature of the Qt software. Figure 1 summarizes the reasons behind The Qt Company's seeking for requirements intelligence support.

### 3 Deliverables

To address these challenges, a three-year research project "*Intelligent Recommendation and Decision Technologies for community-driven requirements engineering*" has been established and the the University of Helsinki is a part of the project with The Qt Company. The project is an EU-wide collaboration that aims to provide a fully integrated open-source requirements management platform with features such as:

- **Intelligent requirements analytics** that link actual software usage and users feedback (e.g., from social media) to the requirements information.
- **Stakeholders' Personal Recommender** that implements advanced machine-learning algorithms to assist identifying possibly relevant stakeholders based on their interaction profiles, comments, and historic contribution data.
- **Dependency Management** tools that support requirements reasoning and reuse of requirements knowledge.
- **Group Decision Support** that enables resolution of preference conflicts, and the identification of openly formed consensus in development decisions and release planning.

These functionalities will be integrated to the existing state-of-the art work flow coordination and requirements management tools to facilitate the many complexities of open source software development that various industries face.

## 4 Research partners

### Scientific coordinator:

Hamburger Informatik Technologie- Center EV (HITEC), Germany

### Research collaborators:

Technische Universitt Graz, Austria

Universitat Politecnica de Catalunya, Spain

University of Helsinki, Finland

Engineering Ingegneria Informatica, Italy

### Industrial partners:

Hutchinson Tre Italia, Italy

Siemens Osterreich, Austria

The Qt Company, Finland

Vogella, Germany

## Acknowledgements

This project has received funding from the European Unions Horizon 2020 research and innovation programme under grant agreement No 732463.

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