Volume 2 Issue 3

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 732253.

Quality-Aware Rapid Software Development

From Exploitation Manager's pen

Welcome to read our latest newsletter. During the past six months, we have been enjoying hectic moments for Q-Rapids users within the companies as well as for researchers in writing the number of publications like recently accepted IEEE-Journal paper.

The Q-Rapids solution has been now also released in GitHub and we are improving the open community approach during the next months to come. Enjoy yourself while reading about some of our recent activities and stay tuned for the next months to come. We are now more than ever ready for the potential adopters of the integrated Q-Rapids solution!

Best regards,

Jari Partanen
Exploitation Manager

Integrating Q-Rapids Solutions into Use Case Companies' Processes

The University of Oulu has carried out a series of workshops for supporting the iterative integration of Q-Rapids into the use case companies' processes. The impact of the transformation from the view of the processes for managing quality and quality requirements has been also analysed during the workshops. Moreover, the workshops contributed positively to the creation of a generic Q-Rapids software development process, which can be used by companies outside the consortium to achieve quality awareness through Q-Rapids solutions.

Bittium and Softeam participated in this activity, which consisted of a series of three workshops, from late February until early May 2019. During this time, both companies had considerably advanced in utilizing the Q-Rapids solution by triggering the utilization of Q-Rapids in new use case projects during Spring 2019, thus fitting excellently to the target setting of the Q-Rapids plans.

The workshops had a common structure containing:

- checking the utilization of Q-Rapids at the time of the workshop
- checking process metrics status in to identify process related improvement opportunities
- suggesting & discussing possible new ways for broadening the utilization throughout the whole software development process
- setting targets to the next workshop accordingly
- informing the companies of the latest developments of the dashboard
- informing the companies of the development of the generic Q-Rapids software development process

While repeating the same basic structure over three workshops, we were able to gather valuable data for analysing the impact of Q-Rapids on the processes for managing the total quality status in the case projects. One interesting finding was that Q-Rapids was used not only for managing quality requirements as stated in the project plan, but for managing the quality status of the product and the processes in general – a flexible tool, indeed. Moreover, following the big picture and details of quality status turned out to be a task for the whole organization, from developers to project managers, and up to directors.

Key people from the companies participated, including Q-Rapids champions, process development managers, and project personnel. The workshops were carried out in good and relaxed atmosphere, transferring new knowledge and information in both directions.

Big thanks for the participants from the case companies!

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Integrating Quality Requirements in Softeam Quality Assurance Process

The Q-rapids platform provides a new mechanism which allows to control that a product meets the quality criteria defined by our organisation: The Quality Requirements Generation. We at Softeam, have integrated the Quality Requirement Generation in our development process to increase the quality of our products and process.

Quality Requirement Generation

Setting up the quality requirement generation system (Figure 1) has started by the configuration of the QR-ALERT tool (1), a component of the Q-Rapids platform which allows to periodically check the quality metrics computed by the platform according to threshold values defines as quality goals by our Quality Engineers. If a monitored metric exceeds the identified thresholds, the Softeam Quality Team is notified via the dashboard (2) of the Q-Rapids platform. An adapted answer, drawn from a catalogue of solutions aiming to solve this quality issue, is suggested to our Quality Engineers who can choose to implement it. In this case, a Quality Requirement presenting the solution to the quality issues will automatically be generated (3) in our project management tool, Open Project.

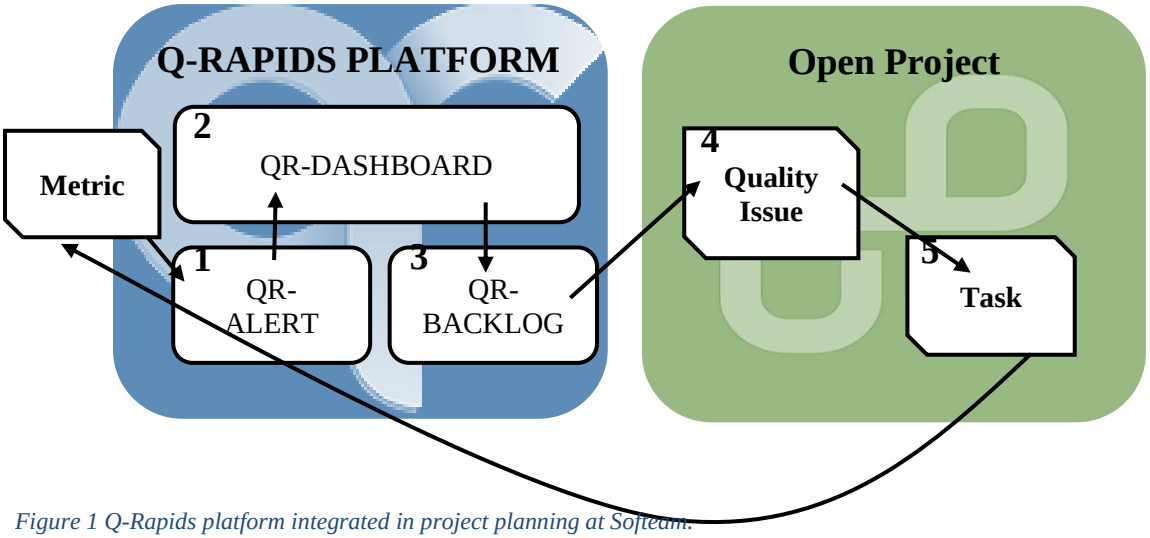

Figure 1 Q-Rapids platform integrated in project planning at Softeam.

Translating the quality requirement into project plan

As quality is essential for our teams, none of our project managers can accept that the project plan is modified by automatic tools. To solve this issue, we decided that Quality Requirement will be integrated in a project work package as a new kind of task type called Quality Issue (4). Project manager can decide to close the Quality Issue, if it considered that the recommendation is not relevant or to derive a concrete task (5) integrated into the project roadmap. In both cases, the project manager must justify the decision by providing a rationale. The project manager's response to these quality issues is further monitored by the Q-Rapids platform to produce indicators on the quality process implementation.

This new approach of managing the quality of our projects has raised a lot of enthusiasm both from our Quality Engineers and from project managers. The quality teams see a way to promote quality in our organization projects managers appreciate the recommendation integrated into project management tools and freedom that have been left for them to address these problems. All project stakeholders have also highlighted the gains in communications between the various teams allowed by the automation of the quality requirements management process enabled by the Q-Rapids platform.

Assessing the impact of new Quality Requirements

Q-Rapids provides Agile Software Development companies the capability to improve the Software Quality of their products through a novel automated data-driven approach. The quality requirement generation system is one of the key features of Q-Rapids for such a purpose. It provides companies a list of suggested quality requirements, obtained from a quality requirements patterns catalogue, to mitigate and resolve quality issues that are detected through constantly monitoring the metrics, factors and strategic indicators that define the quality of the product. This implies that whenever a quality issue is detected, an alert is raised, and quality requirements are suggested to resolve such alert.

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The impact that the suggested quality requirements have on the quality of the product can be assessed through state-of-the-art what-if-analysis techniques. In this regard, Q-Rapids enable decision makers (e.g. product owners, team leaders) to clearly see beforehand the impact that different quality requirements would have on the quality of the product, which guide them to take informed decisions whether to include or not a suggested quality requirement into the backlog, or even decide between different suggested alternatives (e.g. for the same quality issue there might be two or more quality requirements able to solve it).

All such features are accessible through the Q-Rapids Strategic Dashboard, which provides a highly intuitive and easy-to-use interactive mechanism to generate such quality requirements and graphically visualize the results of the what-if-analysis techniques. If the decision maker decides to include the quality requirement in the project backlog, the Strategic Dashboard can export it directly to the project backlog management tool (e.g. Jira or Open Project).

Increasing agility in ITTI

We are in a continuous process of implementing techniques that help adapt to change and we motivate our leaders to encourage a culture of agility throughout every part of our organization. Essentially, we inspect and adapt for endless improvement. We use every opportunity to learn agility and pro-product thinking. We regularly organize themed breakfasts as well as 'lessons learned' sessions in the company related to projects along with analysis and sales. Quoting the Harvard Business Review[1], In a constantly evolving business climate, an organization has the ability to move quickly and effectively. Because every day we want to be better than yesterday, we operate on many levels, with the best practices that Lean, Agile and Scrum provide. We want to 'see the Whole', 'think as a Customer' and analyze to

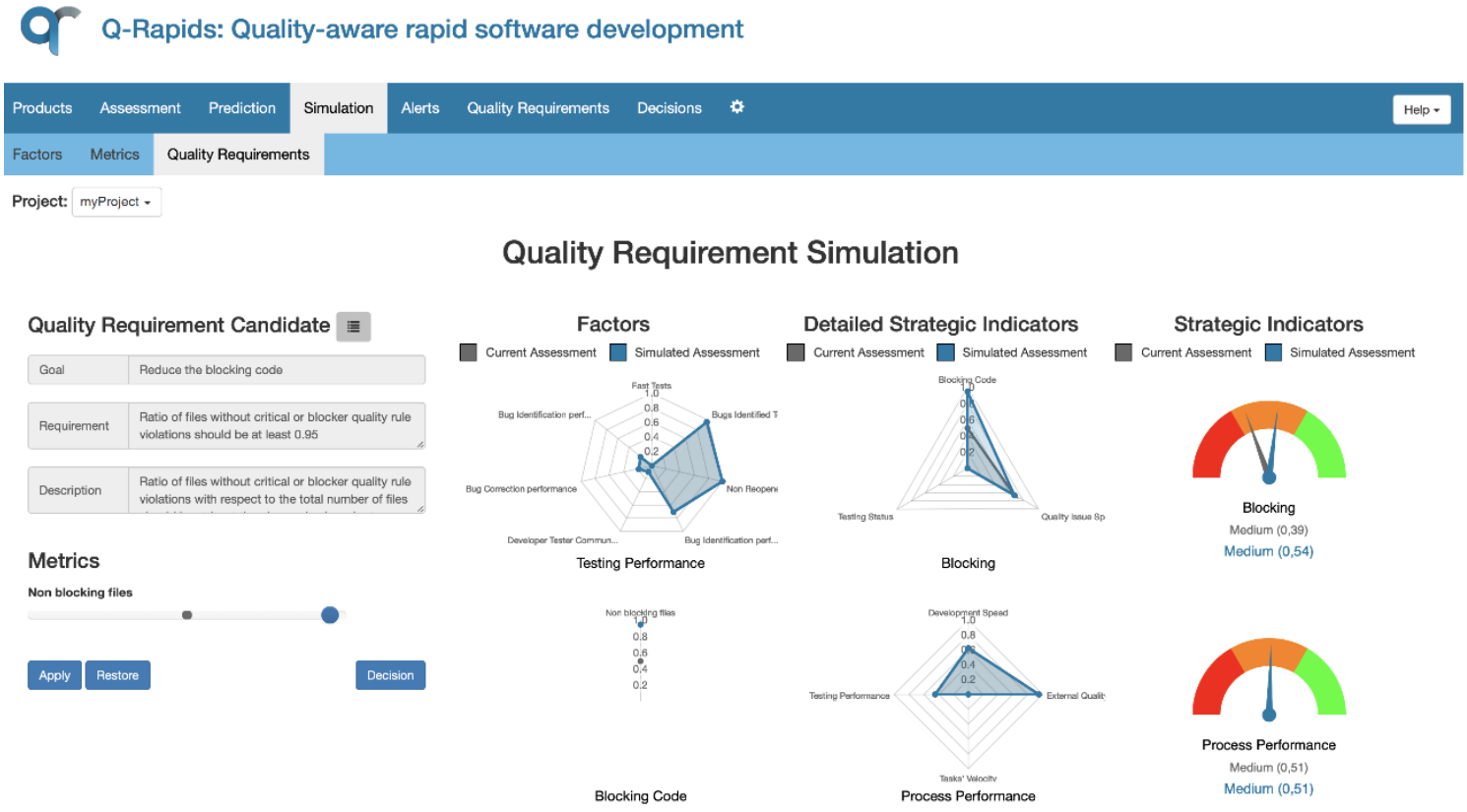

Figure 2 Q-Rapids dashboard captures.

[1] https://hbr.org/webinar/2018/12/leading-the-agile-organization

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determine 'What is Valuable'. The most important for us today are continuous experiments in this area, which can become an integral part of the company's plan for continuity and development. We are convinced that the right way to achieve those goals is by establishing and supporting cross-functional teams.

Pilot 2 – gaining confidence for the importance of the Q-Rapids solution

Until now there have been two pilots conducted with Q-Rapids solution in Bittium. The first pilot was implemented together with one team consisting of a product owner and at the largest eight developers in the area of production test software development. The pilot was started in 2018 and has been up and running about one year to date.

The second pilot was established with a larger set-up with altogether five implementations of Q-Rapids solution in the context of product information systems development. The second pilot has been the first trial for enhancing system implementation to be able to do roll-out and exploit Q-Rapids for the use of products and projects in the company in a wide scale. The whole team in the pilot 2 consists of a product owner, project manager and some 15 developers. In addition, there has been several stakeholders following up the success of the implementation.

Currently, the following factors are used for the integrated Q-Rapids solution for the follow-up and prediction of the performance:

- Feature throughput; the number of features that meet time to market target with the targeted levels of quality.
- Release frequency; intervals and number of the releases as target increased amount of releases per time unit.
- Realized requirements; the number of overall realized requirements referring to quality requirements that are used in actual features and releases.
- Product quality; product quality aspects referring to the "itilities" like the maintainability, reliability, and functional suitability of the product being developed.
- Process performance; process performance referring to the efficiency and quality of the used software development life-cycle approach.

These quality factors were addressed during the first week of June when Q-Rapids evaluation took place at Bittium. The preliminary results show an improved performance of the integrated Q-Rapids solution as well as improvement opportunities for the usability and maintainability.

At the same time roadmap for scaling Q-Rapids solution as part of our development chain has been planned and the first steps have been taken in that direction. Third implementation is planned to happen during second half 2019. In addition, the solution has been now presented widely inside the company creating a large interest towards the solution of Q-Rapids. For example, we had much over 50 interested participants while we had our "Project Break" event.

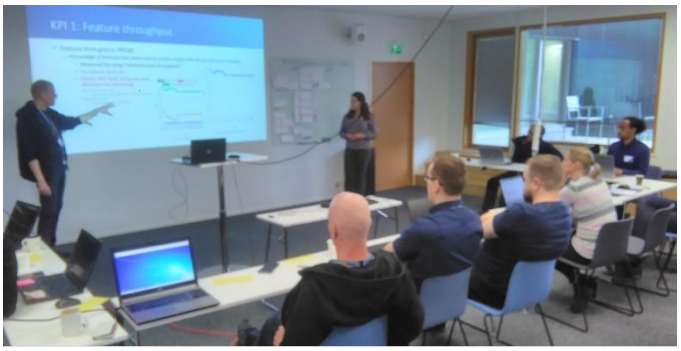

Figure 3 Q-Rapids researchers visiting Bittium in June 2019.

Industry talk in REFSQ'19

Calendar week 12/2019 – the first time to hold a speech in conference as industry representative, the first time to attend REFSQ conference and first time to visit Essen Germany. Much to be excited, even nervous about. After all it was 2015 when I had last time attended a full conference and back then I was a PhD student presenting a paper.

I found the event refreshing change for the daily work, almost like a vacation. I was inspired by the keynote speeches. Prof. Dr. Anthony Finkelstein mentioned in his speech "Speaking Truth to Power" that RE research in industry should consider in relation to company's business processes, because it is anyway business that drives the companies. Prof. Dr. Kevin T. Ryan gave good retrospectives for the RE research and practices over the decades proofing that young PhD students should never overlook the classics when choosing their topic. Dr. Peter Peters, keynote was titled "Requirements Management

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in the "Agile World" – a disappearing act?" and this raised contradictory viewpoints from the audience.

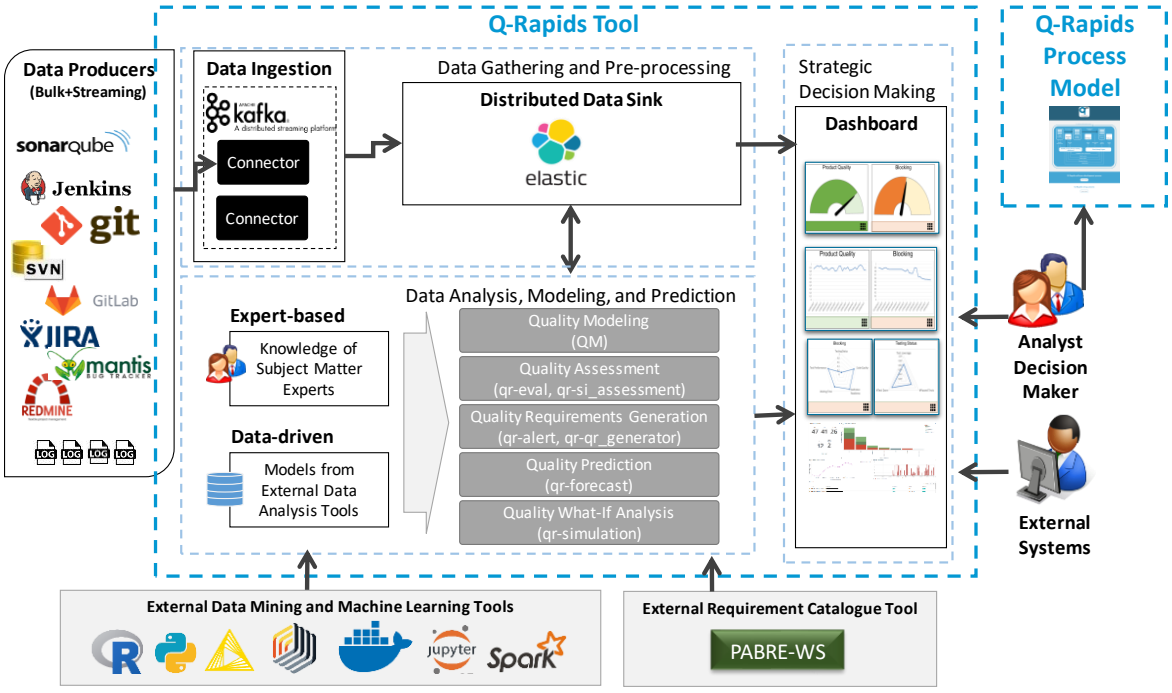
In addition to the interesting speeches, I had an opportunity to meet nice people from different parts of the globe and with diversity of backgrounds. The discussions I had with them over coffee breaks and conference dinner gave the fruit of thought to take home. And yes, talking in front of audience in a big room was not very much different as industry representative than as a researcher. Our challenges to address are just more practical and not necessarily academically so intriguing. The presentation is available in Q-Rapids SlideShare

Tool support for data gathering and analysis

The integrated Q-Rapids solution has several components offering diverse functionalities for software analytics, such as a strategic dashboard for decision makers, a process model for agile adopters, and a quality model for actionable analytics **Error! Reference source not found.**. Two of the components, available on GitHub, where the data flow starts are:

- *qrapids-connect*[2], which consist of several Apache Kafka connectors for ingesting data from heterogeneous data sources, e.g., issues and measures from SonarQube, and,
- *qrapids-eval*[3], which defines a quality model by aggregating the raw data into metrics, and further on into factors and strategic indicators. This quality model is the base for multiple advanced analysis scenarios available in other components, from assessing on real-time software quality aspects, to predicting the behaviour of quality aspects, to simulating the impact of improving a quality aspect, and to generating quality requirements. The quality model can be customised and/or replaced in different companies, working as a plug-in, allowing the creation of quality models based on expert knowledge or data mining analysis techniques.

During the course of more than a year, incremental versions of these two components have been deployed in the four industry partners of the Q-Rapids for assessing and improving software quality. We performed a case study across these four companies exploring the integration of quality models into software analytics tools (by means of the integrated Q-Rapids solution). The results show the potential for future adoption, as well as challenges and lessons learned regarding the adoption of quality models in software analytics tools in companies. The interested reader is referred to our latest journal article "*Continuously assessing and improving software quality with software analytics tools: a case study*"[4]



[2] https://github.com/q-rapids/qrapids-connect
[3] https://github.com/q-rapids/qrapids-eval

[4] Martínez-Fernández, Vollmer, Jedlitschka, Franch, López, Ram, Rodríguez, Aaramaa, Bagnato, Choraś, & Partanen, IEEE Access, 2019.

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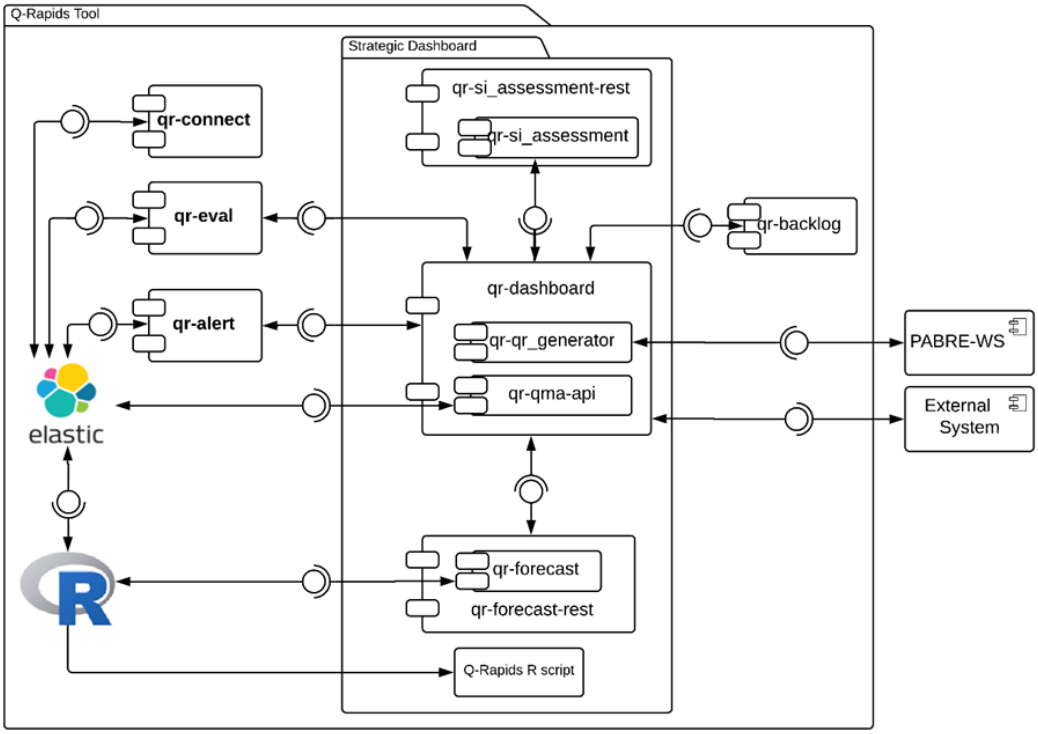
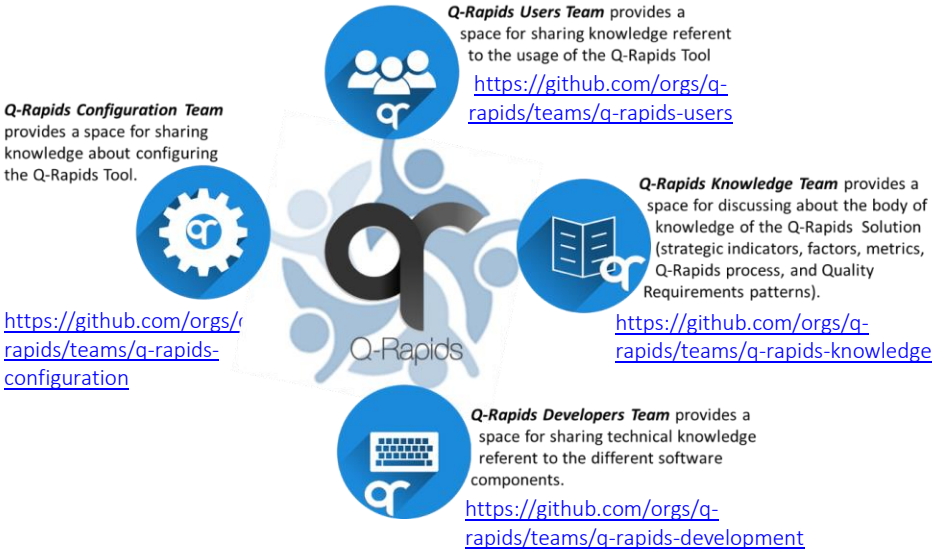
Q-Rapids Open Community

Q-Rapids Open Community is devoted for promoting the quality aware software development and the use of the Q-Rapids project results outside if project consortium. For this open quality aware software development community and mission, several professional profiles of individuals and institutions are welcomed and are being invited: technical (developers, IT architects and designers, implementers, support), business (software quality consultancy, software development process experts), communication, and any potential user of the Q-Rapids Tool.



For supporting the Q-Rapids Open Community, we set-up the Q-Rapids organization in GitHub (https://github.com/q-rapids), in this space you can find repositories containing the source code of the Q-Rapids Tool components and four teams where the community members can learn and share knowledge about related topics: Q-Rapids Users, Q-Rapids Knowledge, Q-Rapids Configuration, and Q-Rapids Developers.



Q-Rapids Tool architecture diagram depicts all the software components integrating the tool, there is a code repository for each component. Among the repositories, there is the https://github.com/q-rapids/q-rapids repository that can be used as the entry point. This repository will guide you to the different repositories and required knowledge. If you are not a community member, you can communicate with the community by adding issues to any of the repositories (https://github.com/q-rapids/q-rapids/issues).

If you are interested in being part of the Q-Rapids Open Community, you can send your GitHub contact and the teams you are interested in to our Community Manager Lidia López (llopez@essi.upc.edu).