



Group of Software and Service Engineering UNIVERSITAT POLITÈCNICA DE CATALUNYA

Barcelona, June 2017

The GESSI research group of the Universitat Politècnica de Catalunya (UPC) conducts research in many fields of software engineering, with particular emphasis on:

- Quality-aware Rapid Software Development: European project Q-Rapids
- Collaborative Requirements Engineering: European project OpenReq
- API Generation and Evolution: Spanish project GENESIS
- Software adaptation, evolution and monitoring: European project SUPERSEDE
- Self-adaptive systems for smart cars: the SACRE framework
- Risk management: European project RISCOSS
- Modelling and Project Management

Currently, we have several works to carry on (see a description below). If you are interested to collaborate in them, just contact us. Also, feel free to propose us any other topic you may be interested in.

Q-Rapids: Quality-aware Rapid Software Development

Title: Developing a graphical interface for a strategic dashboard

Description: The Q-Rapids project includes the construction of a strategic dashboard to be presented to decision makers. This strategic dashboard needs to offer a clear view of several strategic indicators like time to market, product quality, expected revenue, etc. The dashboard should allow also for treatments that decision makers may want, like what-if analysis (i.e., what is the consequence of making some decision). The work would include several phases: 1) analysis of existing dashboards and synthesis of their pros and cons, 2) design of the interface, 3) implementation, 4) usability tests.

Technologies: to be determined as part of the project

Contact: Xavier Franch (franch@essi.upc.edu)

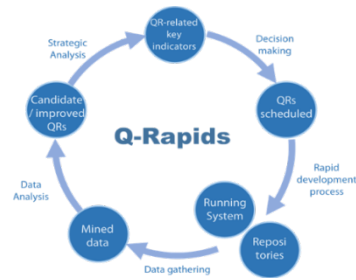


Title: Develop some modules of the strategic dashboard for the Q-Rapids project.

Description: Topics related to Q-Rapids project

Technologies: To be determined as part of the project

Contact: Xavier Franch (franch@essi.upc.edu)



Title: Possibilities for Master and Doctoral Thesis

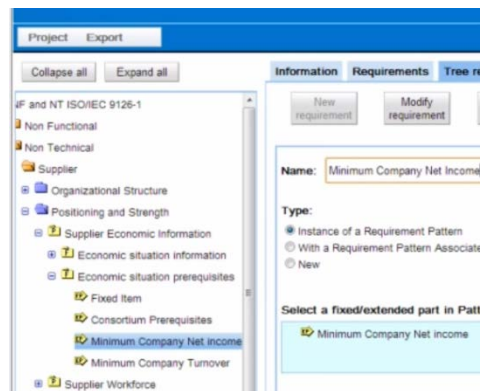
Description: Topics related to Q-Rapids project

Contact: Xavier Franch (franch@essi.upc.edu)

OpenReq: Collaborative Requirements Engineering

Title: Requirement Patterns Recommender System

Description: PABRE-Proj is a tool that helps Requirement Analysts during the elicitation and specification of requirements. This tool is based in the use of Software Requirement Patterns (SRP, (<http://www.upc.edu/gessi/PABRE/index.html>), which are collected and stored in an SRP Database. This work consists on developing new functionalities for the PABRE-Proj tool that allow searching SRP in the database and developing recommender functionalities to the requirements analyst. The recommendations will be based on natural language recognition algorithms, searches and pattern dependencies.

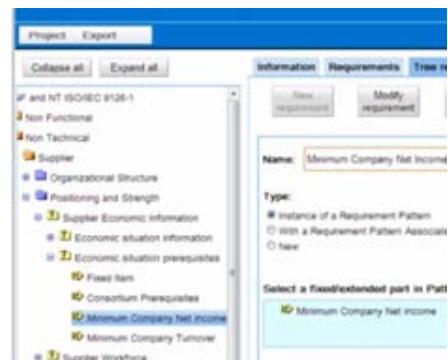


Technologies: JavaScript, REST Web Services, Hibernate, Derby, MySQL

Contact: Carme Quer (cquer@essi.upc.edu)

Title: Develop a new web front-end for the PABRE-Proj tool

Description: PABRE-Proj is a tool that helps Requirement Analysts during the elicitation and specification of requirements. This tool allows the definition of Software Requirement Patterns (SRP), which are collected and stored in an SRP Database. Currently ReqIF, which stands for Requirements A new front-end is necessary for the tool to improve its usability. This front-end will use PABRE-WS REST web services to interact with the database that stores the SRP.



Technologies: JavaScript, REST Web Services, Hibernate, Derby, MySQL

Contact: Carme Quer (cquer@essi.upc.edu)

GENESIS: API Generation and Evolution

Title: (Semi-) Automatic Generation of GraphQL APIs

Description: The main goal of this project is to develop a tool to help the generation of GraphQL APIs that provide an integrated, uniform and transparent access to a set of heterogeneous data sources and services. The generation process should be as automatic as possible.

Technologies: GraphQL, REST, JavaScript, XML, Ontologies, ...

Contact: Carles Farré (farre@essi.upc.edu)

Title: APIs Monitoring

Description: The market of Application Programming Interfaces (APIs) have experienced a significant usage growth in the last recent years. However, current techniques for the maintenance and evolution of these APIs are still done ad-hoc, with little automated support. For example, understanding how the users interact with the APIs, the Quality of Service (QoS), and how the APIs have evolved so far, may help developers in their maintenance and evolution activities.



This project consists on developing a monitoring system for RESTful APIs to gather (1) the Quality of Service (QoS), (2) the interaction of users with the API, and (3) changes in the evolution of the API. Such monitoring system will be developed using RESTful service technologies and will include a web-interface to manage the monitoring system and show the monitoring results.

Technologies: RESTful services, JSON, Java, Javascript, web-technologies.

Contact: Marc Oriol (moriol@essi.upc.edu), Jordi Marco (jmarco@cs.upc.edu)

SUPERSEDE: Software adaptation and monitoring

Title: Monitoring and managing software monitors

Description: Monitoring is a technique to observe the execution of a software system to ensure its reliability, Quality of Service (QoS), security and other characteristics of the software at runtime. However, for a monitoring system to be reliable, it has to be monitored as well. In this case, who monitors the monitors?

This project consists on implementing a monitoring system of a monitoring system, capable of detecting failures of the constituent monitors, get their performance, and ensure their correct execution. The applicant will also implement a web-based dashboard that reports the status of the different monitors at real time, with management capabilities to actuate on these monitors (e.g. stopping and starting monitors, changing monitoring configurations, etc).



Technologies: RESTful services, JSON, Java, web technologies (e.g. HTML5, CSS, PHP, AJAX,...)

Contact: Marc Oriol (moriol@essi.upc.edu)

Title: Social Network monitoring

Description: Social Networks (e.g. twitter, facebook, Instagram, etc.) have become an important instrument for the users to express their opinions, provide feedback, share their sentiment, etc. on several topics. Under this scenario, these Social Networks have become a decisive source of information for companies and institutions to better understand their users and stakeholders. However, current techniques and technologies to gather automatically the relevant data from all this sources are still scarce and limited.



This project consists on developing a Social Networks monitoring system in order to gather the comments, opinions and feedback of the users for a specific topic, accompanied with relevant metadata (e.g. location, language, etc.). Instead of developing the whole system from scratch, the applicant will start from an existing monitor of Twitter and extend it to (1) support more Social Networks and (2) provide several improvements in its functionality. Such system will be developed using RESTful service technologies and will include a web-interface to manage the monitoring system and show the monitoring results.

Technologies: RESTful, JSON, Java, Javascript, web-technologies.

Contact: Marc Oriol (moriol@essi.upc.edu), Jordi Marco (jmarco@cs.upc.edu)

The SACRE framework

Title: Smart Adaptation through Contextual Requirements for Automotive Systems

Description: Nowadays, one of the most popular applications of self-adaptive systems, in both the industry and research communities, are the smart (or intelligent) vehicles. These vehicles are capable of sense contextual data and adapt their behavior in response to these data, at runtime. If their functionality depends on context, runtime uncertainty could affect their performance.



The aim of this project is to develop a system, based on an existing prototype (<https://www.youtube.com/watch?v=6iBlvbpJ29w>), for supporting the adaptation of automotive systems through contextual requirements at runtime in the presence of uncertainty. Apart from the implementation, research activities regarding available technologies, standards and legislations for automotive systems are expected. The current prototype implementation uses data mining for supporting personalized adaptations, other techniques could be also investigated for improving the quality of the adaptations.

Contact: Edith Zavala (zavala@essi.upc.edu)

Title: Analysis Support for Self-Adaptive Systems

Description: Current self-adaptive systems are capable of handling complex issues as resource variability, changing user needs, and system intrusions or faults. In order to do so, they may perform requirement engineering activities by themselves, at runtime. However, in extremely demanding domains (e.g., smart vehicles, mobiles, smart cities, etc.) where context changes at very high speed rates and in unpredictable and unforeseeable ways, performing these engineering activities automatically is a big challenge.



The aim of this project is to evaluate a series of data analysis techniques, on an existing prototype (<https://www.youtube.com/watch?v=6iBlvbpJ29w>), for better supporting the adaptation of software systems through contextual requirements at runtime in the presence of uncertainty. The current prototype implementation is placed in the domain of smart vehicles and uses data mining for automatically operationalizing requirements based on user's behavior. Research activities in the areas of machine learning, data mining, neural networks, and other data analysis fields, are expected.

Technologies: Java, RESTful services, JSON files, and others.

Contact: Edith Zavala (zavala@essi.upc.edu)

Title: Adaptive monitoring for Automotive Systems

Description: Smart (or intelligent) vehicles exploit monitoring data (e.g., from the driver, the environment, the vehicle itself, etc.) in order to make decisions based on these data (e.g., turn on an alarm, activate self-driving functionality, etc.) at runtime. Low quality data (e.g., timeliness, correctness, etc.) will produce low quality decisions. Thus, consider runtime adaptive monitoring systems capable to change at runtime for improving data quality (e.g., changing sources, frequency, etc.) have become an important task for software engineers.



The aim of this project is to develop an adaptive monitoring system, given a specific framework, for an existing smart vehicle prototype (<https://www.youtube.com/watch?v=6iBlvbpJ29w>) with the aim of improving the quality of its decisions. Apart from the implementation, research activities regarding available technologies, standards and legislations for automotive systems monitoring are expected. The current prototype

implementation uses data mining techniques on top of monitoring data for supporting adaptations decisions, other techniques combined with the adaptive monitoring system could be also investigated for improving the quality of the decisions.

Contact: Edith Zavala (zavala@essi.upc.edu)

