VUB SCIENCES & BIOENGINEERING SCIENCES

The Research Group

Software Languages Lab (SOFT)

has the honor to invite you to the public defense of the PhD thesis of

Jesse ZAMAN

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

DISCOPAR: A visual reactive flow-based domain-specific language for constructing participatory sensing platforms

Promotor:

Prof. dr. Wolfgang De Meuter

The defence will take place on

Thursday September 6 2018 at 17:00h

in Auditorium D.2.01 at the Campus Humanities, Sciences and Engineering of the Vrije Universiteit Brussel, Pleinlaan 2 - 1050 Elsene, and will be followed by a reception.

Members of the jury:

Prof. dr. Ann Nowé (chairman)
Prof. dr. Coen De Roover (secretary)
Prof. dr. Cathy Macharis
Prof. dr. em. Theo D'hondt
Prof. dr. Boris Magnusson
(Lund University, Zweden)
Dr. ir. Thomas Springer
(Dresden University of Technology, Duitsland)

Curriculum vitae

Jesse Zaman acquired his Master's degree in Computer Science at the VUB in 2013. He proceeded with his PhD at the Software Languages Lab where the main focus was on developing a generic approach towards reusable and re-configurable citizen observatories.

The results of his research have been published in five international peer-reviewed conferences. He presented at several international conferences and workshops, and was also invited for a collaboration with Zayed University in Abu Dhabi to demonstrate and test his research.

Abstract of the PhD research

The evolution of the smartphone as a general computing platform combined with the rich sensing functionalities that it has acquired in recent years, have led to a new collective data gathering paradigm called participatory sensing. Participatory sensing is the driving technology behind so-called citizen observatories; i.e. a set of cloud-based software tools that are used to gather, analyse and visualise data by a group of citizens that share some collective concern. Participatory sensing is often used in so-called campaigns. A campaign is a collective data gathering effort that is delimited in space and/or time.

Today citizen observatories have to be developed from scratch for each application domain, meaning that deploying a new citizen observatory is nothing less than a complex cloud-driven software engineering project that is extremely labour-intensive precisely because of its technical complexity. Despite an overwhelming demand for such platforms, they are thus beyond the reach of most societal stakeholder groups.

What is needed is a generic approach towards reusable and reconfigurable citizen observatories, i.e. a citizen observatory meta-platform that can be used by stakeholders to create new and adapt existing citizen observatories. Thus, apart from the technical design challenges, a key requirement of such a meta-platform is that it is easily accessible by societal stakeholders and communities. Deploying a new citizen observatory and setting up campaigns through the meta-platform should therefore be possible without or with only very limited programming skills.

In this dissertation, we present DISCOPAR (Distributed Components for Participatory Campaigning), a novel visual flow-based domain-specific programming language created specifically to hide the non-essential complexity of citizen observatories from the end-user, and to present only concepts that are truly relevant to their domain. DISCOPAR is used throughout the meta-platform to enable end-users to construct every part of a citizen observatory: the mobile data gathering app, server-side data processing, and web-based visualisations can all be set up using a single visual language, thereby greatly increasing the accessibility by end-users.

We validate our citizen observatory meta-platform and the DISCOPAR language – in terms of expressiveness, suitability and usability – through experiments both in laboratory as well as in real-world conditions. We demonstrate expressiveness by creating three radically different citizen observatories and test the suitability and usability during real-world experiments performed by different groups of people without any programming knowledge.