

The Research Group

## Web & Information Systems Engineering

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

**Reinout ROELS**

to obtain the degree of Doctor of Sciences

Title of the PhD thesis:

### MindXpres: Conceptual and Technical Foundations for Next Generation Presentation Solutions

**Promoter:**

Prof. Dr. Beat Signer

The defence will take place on

**Monday, May 27, 2019 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. Olga De Troyer (chair)  
Prof. Dr. Johan Loeckx (secretary)  
Prof. Dr. Jo Tondeur  
Prof. Dr. Katrien Verbert (KU Leuven)  
Prof. Dr. Kris Luyten (Hasselt University)

#### Curriculum vitae

Reinout Roels obtained his degree of Master of Science in Applied Informatics at the VUB in 2012, summa cum laude. As a PhD candidate he performed qualitative as well as quantitative research, and his strong technical skills contributed to various research artefacts that are now also used by other students and researchers. The results of the performed research led to 9 publications at international peer-reviewed conferences and journals, 2 of which have received a best paper award. In addition to his educational duties as teaching assistant, Reinout also supervised 2 Bachelor's theses and 16 Master's theses.

#### Abstract of the PhD research

Presentation software such as PowerPoint, also known as slideware, has become a de facto standard as support for oral presentations. However, these tools were initially created as simulators for physical slides and have adopted many of their characteristics, including their limitations. These limitations include a strictly linear navigation of presentations, relatively static content and a tedious and time-consuming authoring process. Presentation software was introduced over 30 years ago but these tools have changed very little since their inception. This is especially remarkable given the other technological advances that were made in the same timespan. Even though slideware may not be the optimal medium for all scenarios, the fact remains that it is used everywhere. Therefore, addressing existing shortcomings and unmet user needs can have a major impact. In this dissertation we start by investigating the existing shortcomings of presentation tools. By means of a literature study, observations, a survey and the programmatic analysis of more than 12000 PowerPoint documents, we derive user needs and pinpoint issues that should be addressed. Our experiments resulted in a large dataset and a database of extracted metadata that will further help other researchers in the domain.

As we show, existing presentation tools enforce specific (arguably outdated) paradigms which makes it difficult to address the observed shortcomings directly in existing tools. We motivate the need to revisit the concept of a presentation and to rebuild the conceptual and technical foundations that are required for improved presentation tools. This resulted in the MindXpres platform, a reusable presentation prototyping platform that allows researchers and developers to easily implement and evaluate novel presentation functionality. We present a new conceptual framework, content model and presentation engine with the aim of enabling novel presentation solutions. Our underlying information system is based on advanced hypermedia concepts and provides core support for content reuse, collaborative authoring, user management, versioning, semantics and context awareness. The MindXpres presentation engine's plug-in architecture is more flexible than existing presentation software, enabling a wide range of presentation styles, data visualisations, audience interactions and solutions that help presenters to deliver their content more effectively. Any component can easily be extended or replaced, and we support both existing presentation styles such as Prezi-like canvas presentations or PowerPoint's classic slideshows, as well as some new presentation styles. The extensible architecture further provides support for content types that are not easily visualised in other presentation software, such as dynamic, interactive or audience-driven content.

After providing the necessary conceptual and technical foundation we demonstrate the flexibility of the MindXpres platform by developing a number of proof-of-concept solutions for some of the identified shortcomings and unmet user needs. We discuss various plug-in solutions related to the management of presentation content, a better involvement of the audience in presentations, interactive and dynamic data visualisation, providing feedback on the presenter's performance and content, novel presenter views and some solutions that allow the presenter to create better content with less effort. MindXpres offers the conceptual and technical foundations that allow developers and researchers to create well integrated and interoperable solutions, and to realise currently unsupported next generation presentation concepts. Ultimately, our contributions and proof-of-concept solutions might pave the way for more efficient presentation authoring and more effective knowledge transfer via oral presentations.