VRIJE UNIVERSITEIT BRUSSEL

WEB & INFORMATION SYSTEMS ENGINEERING

# Cross-Media Information Spaces and Architectures

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beatsigner.com

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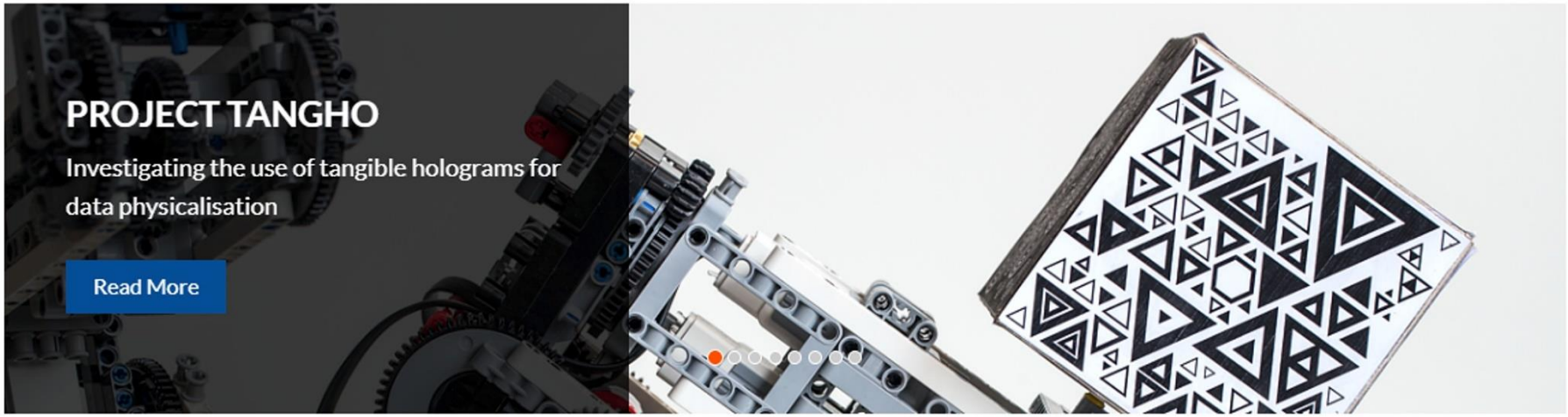


## ABOUT WISE

The Web & Information Systems Engineering (WISE) Lab is a research unit of the Department of Computer Science at the Vrije Universiteit Brussel and is headed by Prof. Dr. Beat Signer. The research activities of WISE concentrate on innovative information systems such as next generation web applications, context-aware applications and cross-media information spaces.

The WISE lab further investigates human-computer interaction aspects for those systems, such as interactive paper and cross-media solutions, data physicalisation, tangible holograms as well as multimodal and multi-touch interaction. We develop new engineering methodologies, tools and software frameworks for the rapid prototyping and efficient realisation of innovative information environments.

There is a strong emphasis on conceptual modelling and design, reasoning on designs, localisation and globalisation, adaptation and personalisation, accessibility and usability in general. Important technologies used in this context are graphical and visual design languages, domain-specific modelling languages as well as design patterns. Important application domains are web applications, augmented and virtual reality, serious games and e-learning.

## LATEST NEWS & ANNOUNCEMENTS

### Audrey Sanctorum's Research on eSPACE in VUB Today

Saturday, April 30, 2022 - 10:19

Our research on the eSPACE end-user authoring tool for cross-device and Internet of Things

Tweets by @VUB_WISE

WISE Retweeted

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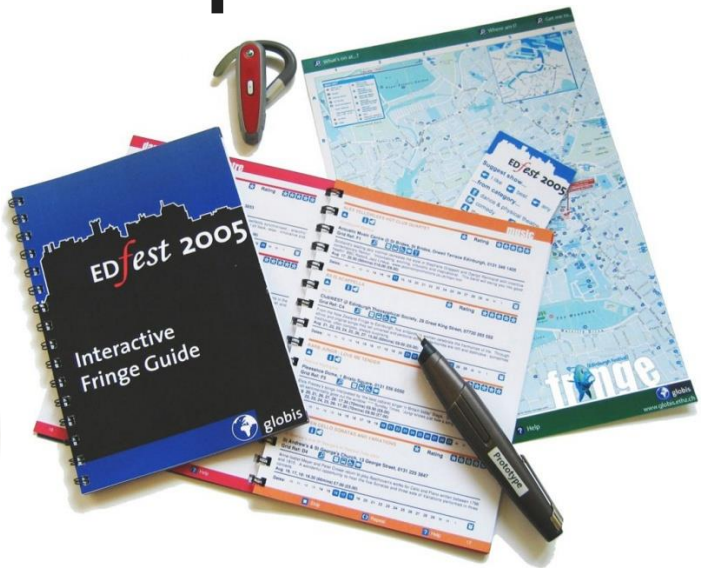
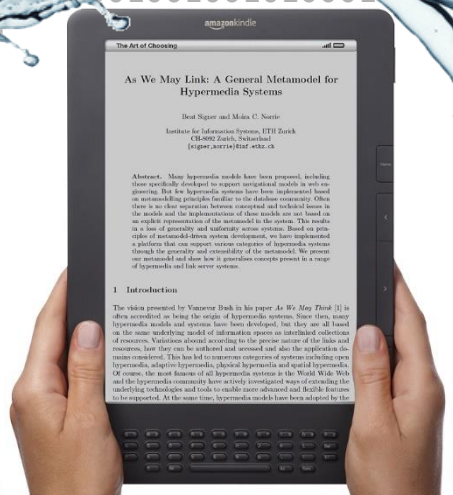
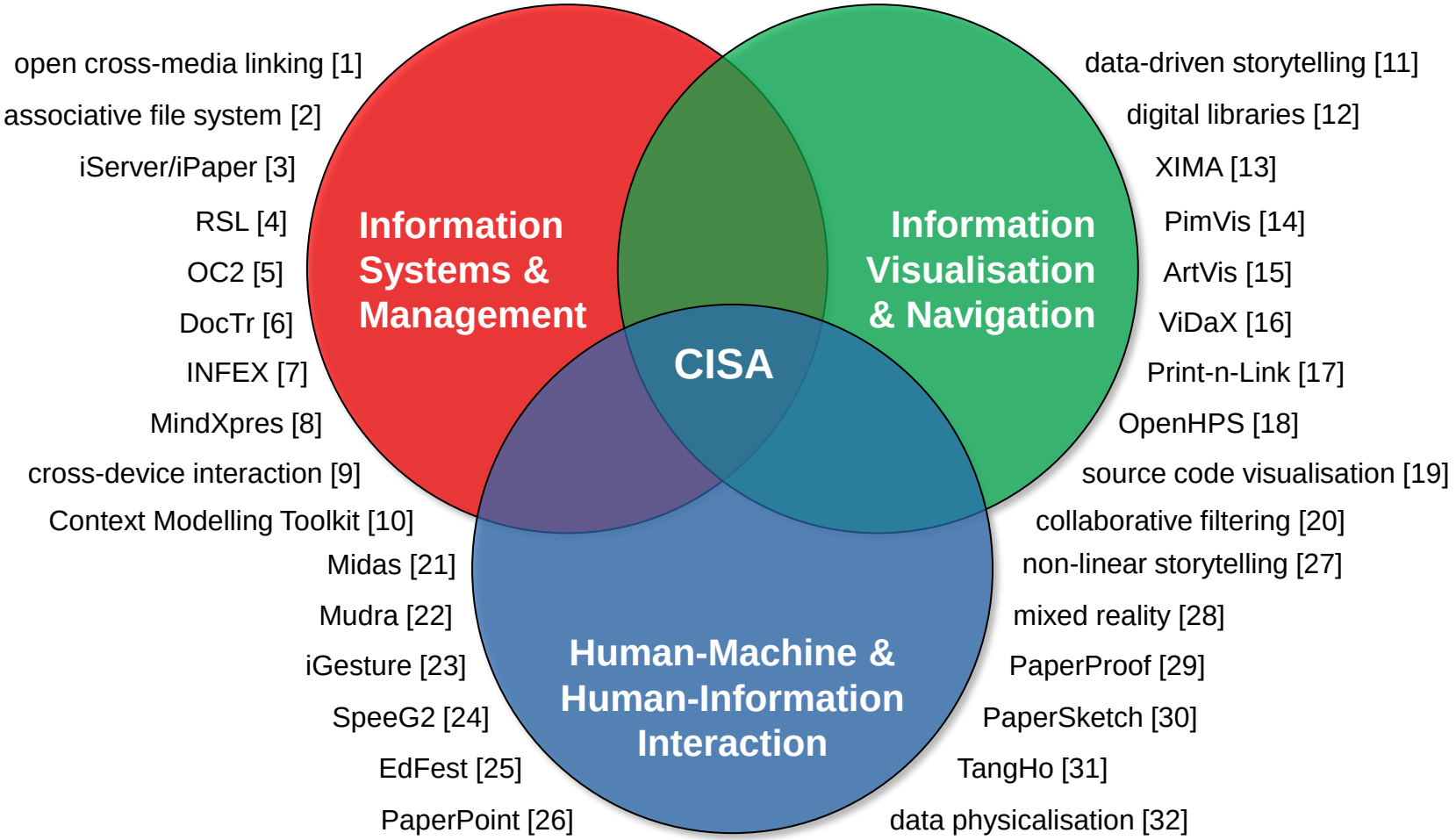
# Fluid Cross-Media Information Spaces



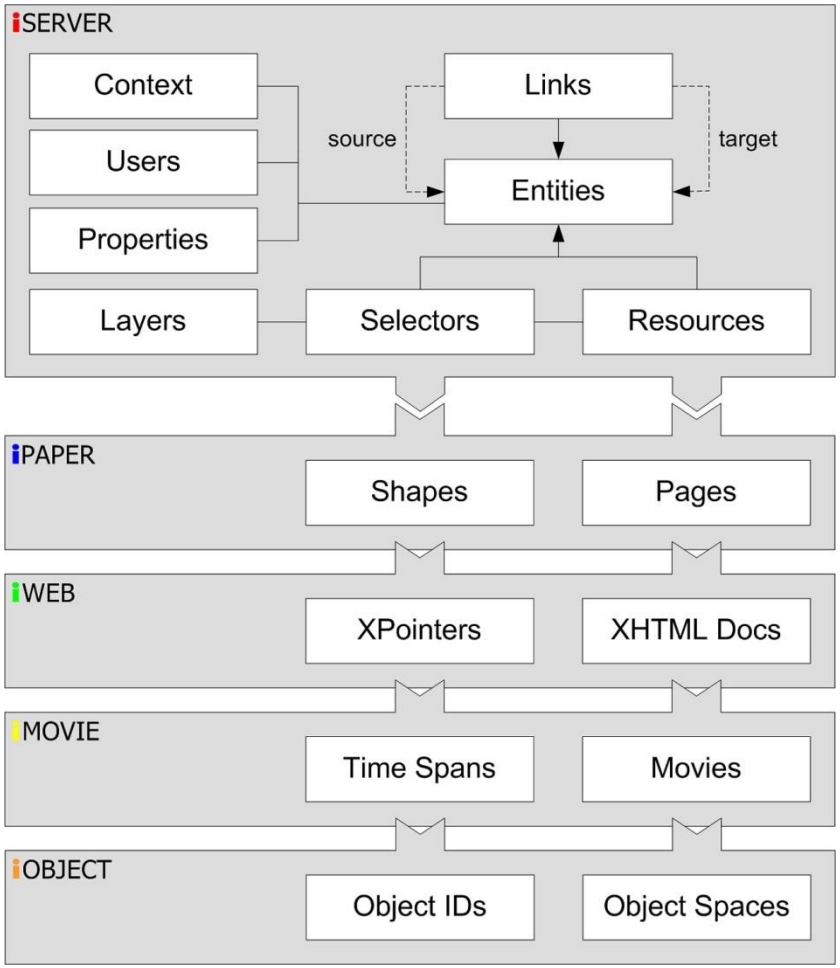


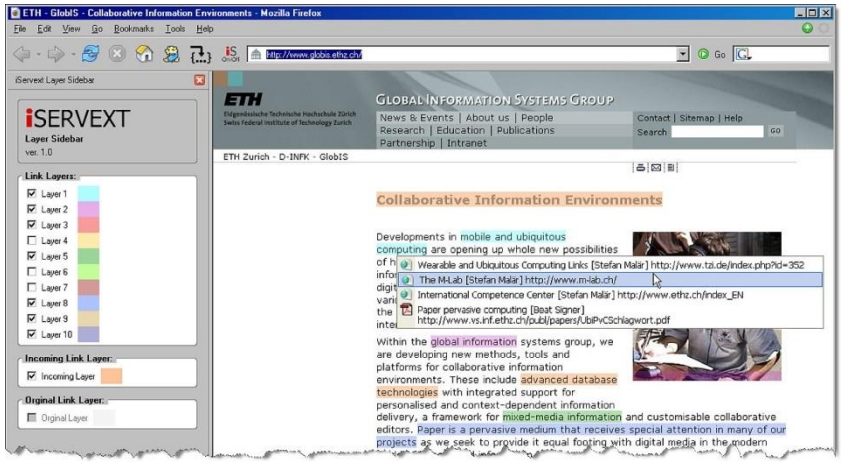



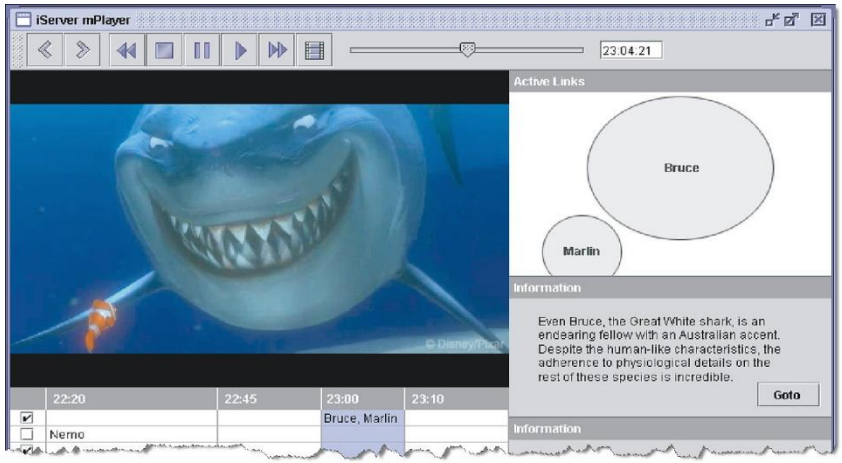

# Cross-Media Information Spaces and Architectures



# RSL Hypermedia Metamodel




Global Information Systems Group, ETH Zurich

Prof. Dr. Beat Signer
Cross-Media Technology, Interactive Paper, Data Physicalisation

Dr. Audrey Sanctorum
User-defined XDI and IoT Interaction, Human-AI Interaction

Maxim Van de Wynckel
Hybrid Positioning, Implicit Human-Computer Interaction

Xuyao Zhang
Extensible Platform for Dynamic Data Physicalisation

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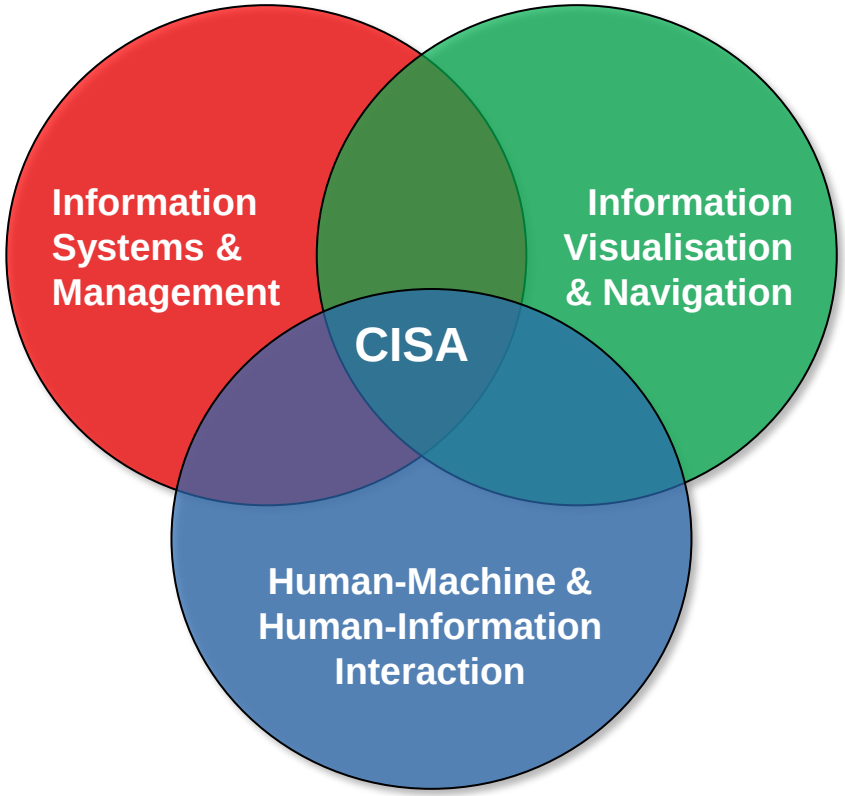
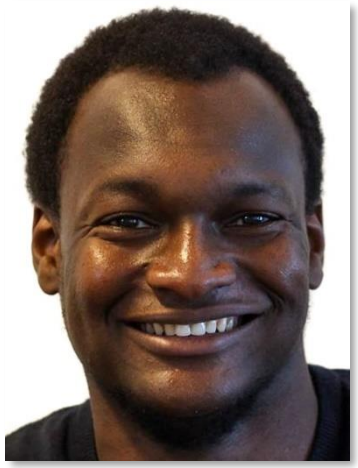
CROSS-MEDIA INFORMATION SPACES AND ARCHITECTURES (CISA)





Ekene Attoh
IoT Middleware, Context-aware Computing, Implicit HCI

Migdeily Cantera
End-User Development, Mixed Reality IoT UIs, Intelligibility

Isaac Valadez
Knowledge Physicalisation and Augmentation, Tangible UIs

Yoshi Malaise
Technology-enhanced Learning, Content-driven Presentations

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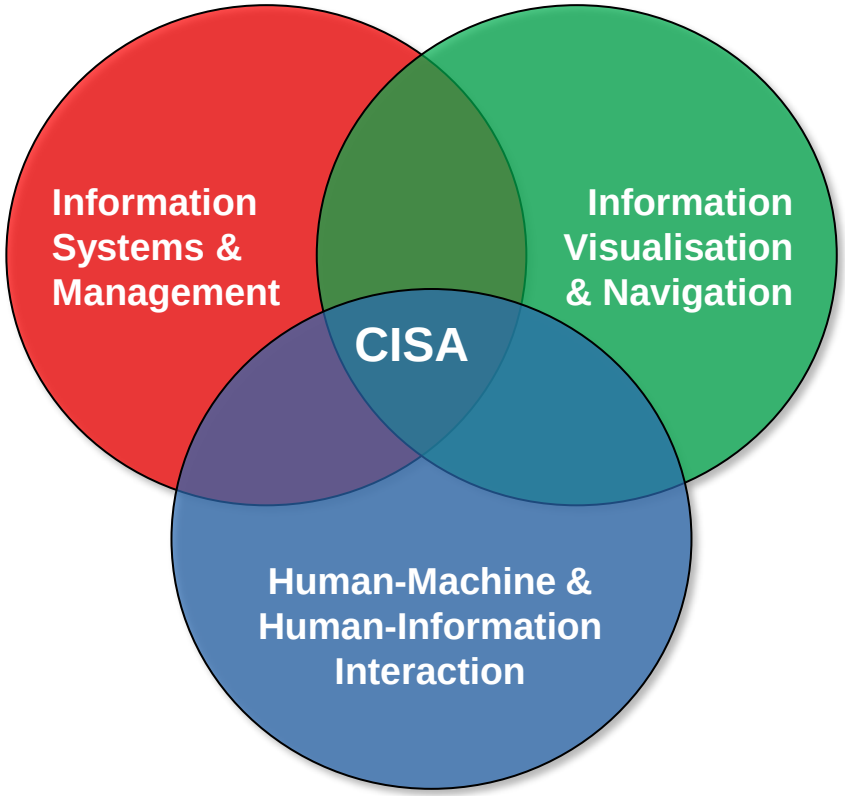
CROSS-MEDIA INFORMATION SPACES AND ARCHITECTURES (CISA)



Piet Van Der Paelt
Julia-based Framework for Simulation and Optimisation

Payam Ebrahimi
Dynamic Data Physicalisation, Real-Time Point Cloud Analysis

Arun Sojan
Dynamic Data Physicalisation for Digital Twins

Dr. Reinout Roels
MindXpres: Extensible Content-driven Presentation Tool

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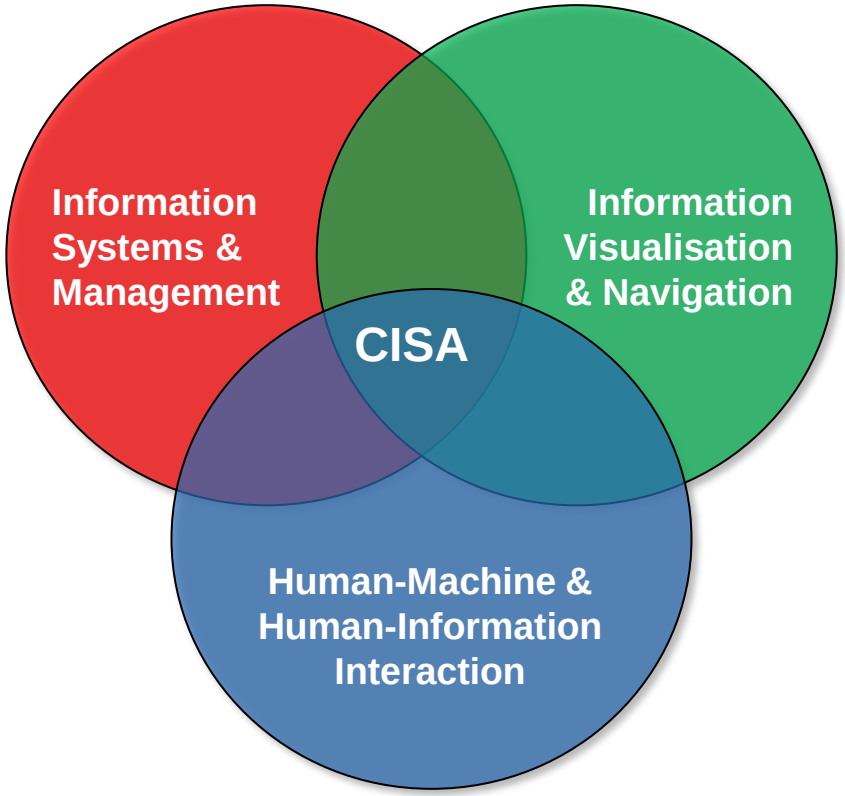
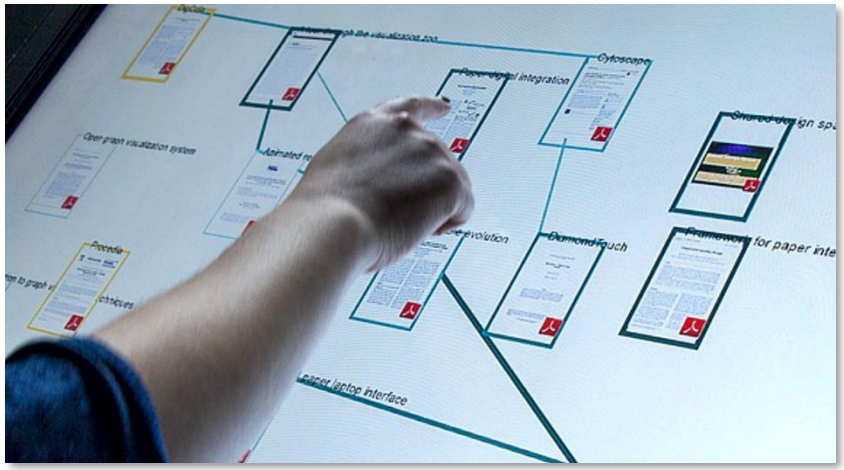
CROSS-MEDIA INFORMATION SPACES AND ARCHITECTURES (CISA)



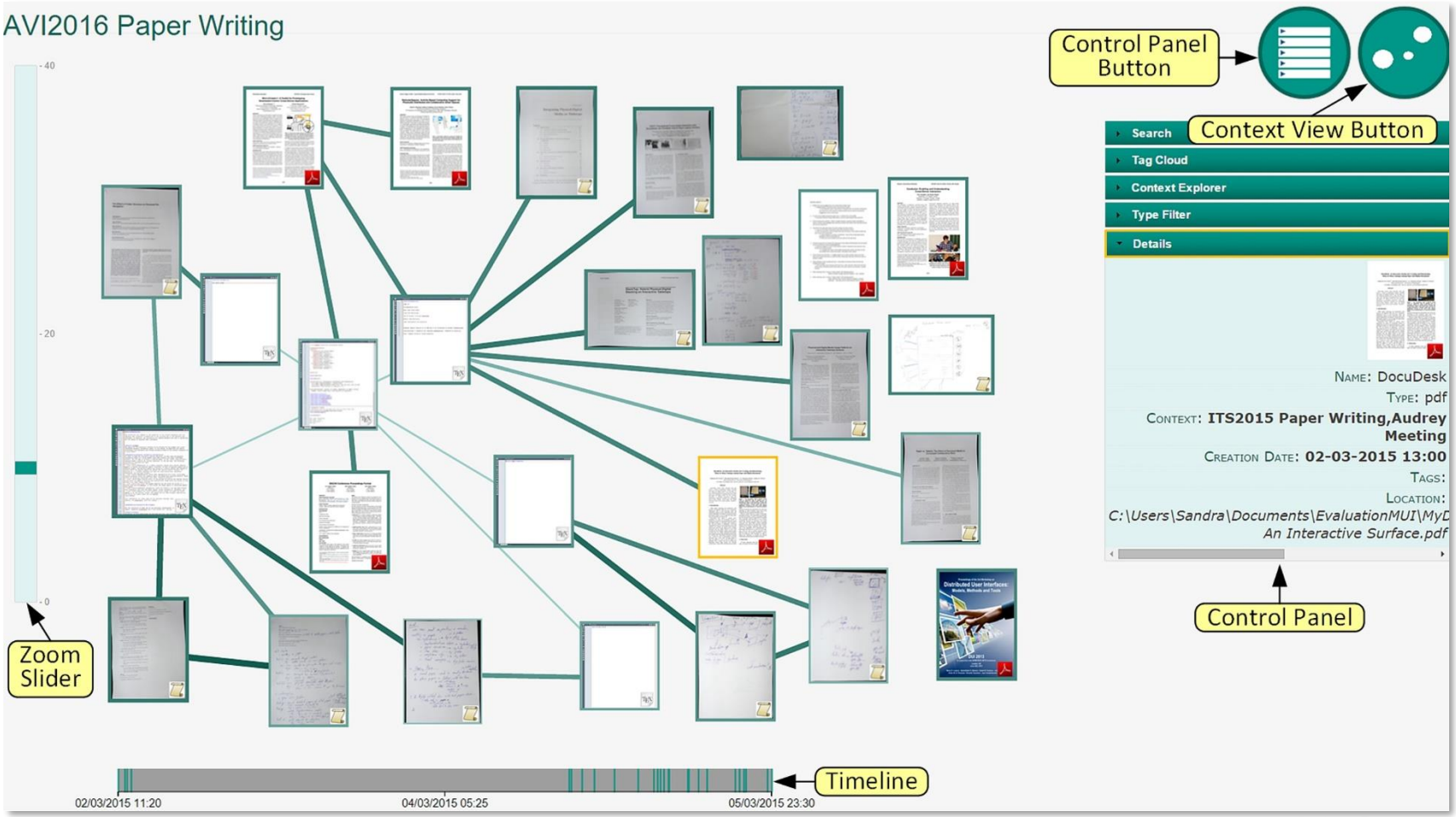
# Personal Information Management (PIM)

- *Keeping*, *organising* and *re-finding* information
  - digital and physical
- Study of human-information interaction
  - files, piles, mixtures, …
- OC2 PIM model
  - based on RSL hypermedia metamodel
- Cross-Media PIM system
  - *explicit* as well as *implicit associations* between entities



# PimVis Setup

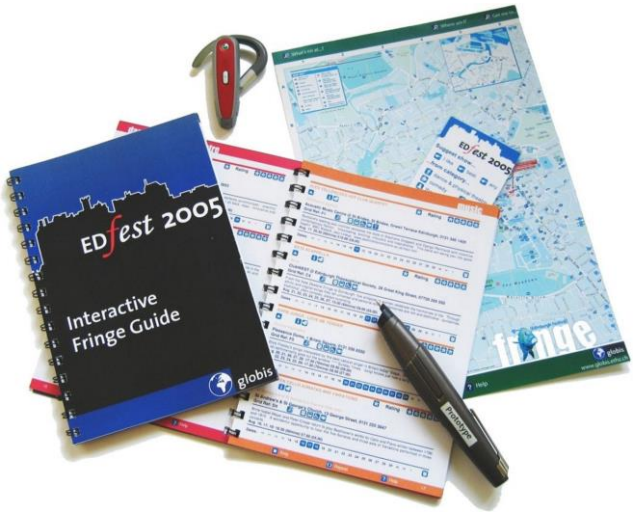
# PimVis Document View




Audrey Sanctorum

# Interactive Paper and Augmented Reality

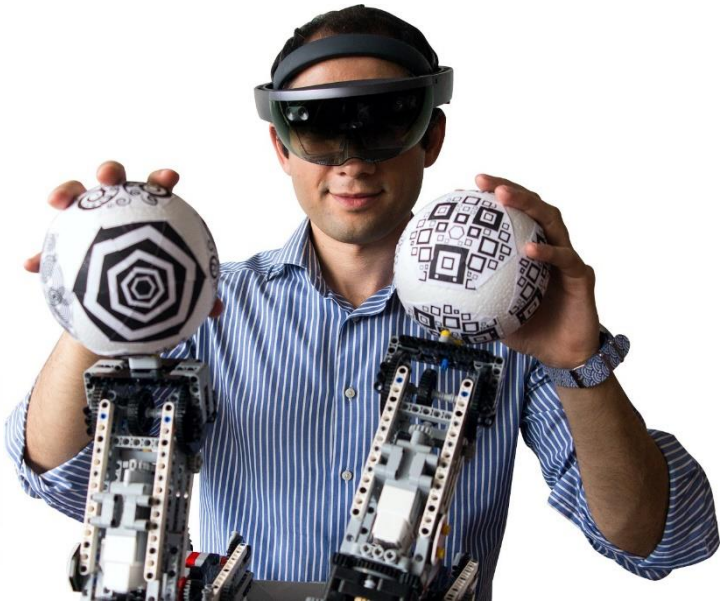
- Bridging the paper-digital divide
  - seamless transition
- *Visualisation* of interactive areas and functionality
  - design patterns
- Advanced visualisation techniques in combination with *tangible user interfaces (TUI)*

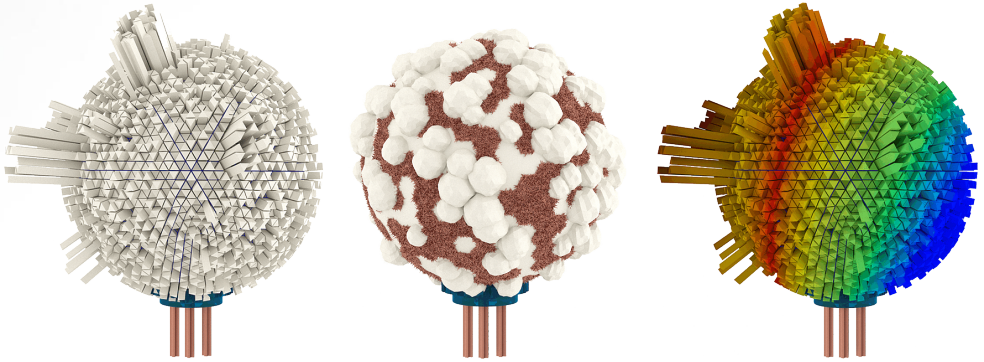



# ArtVis


Bram Moerman

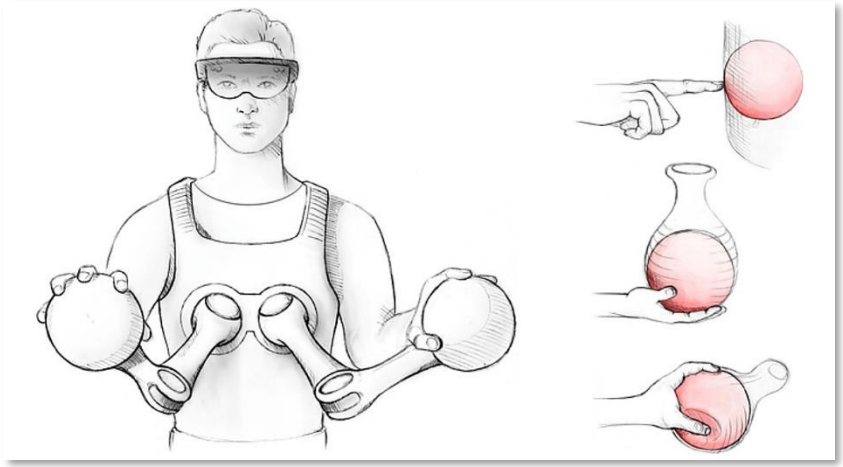
# Real-Time Cross-Media Data Exploration

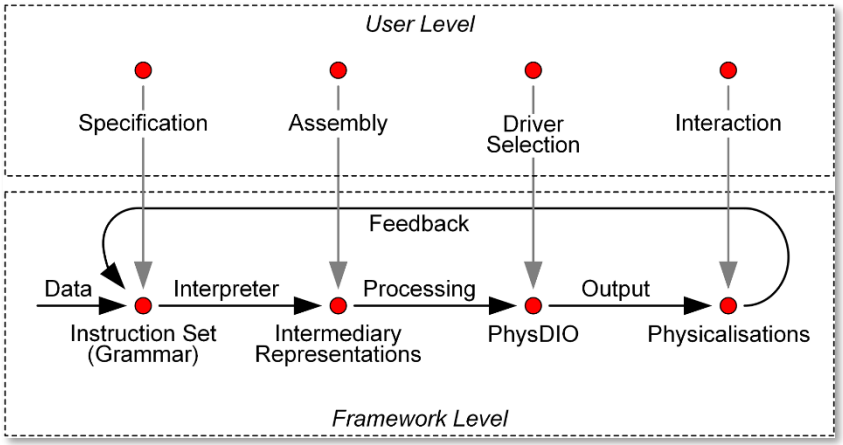




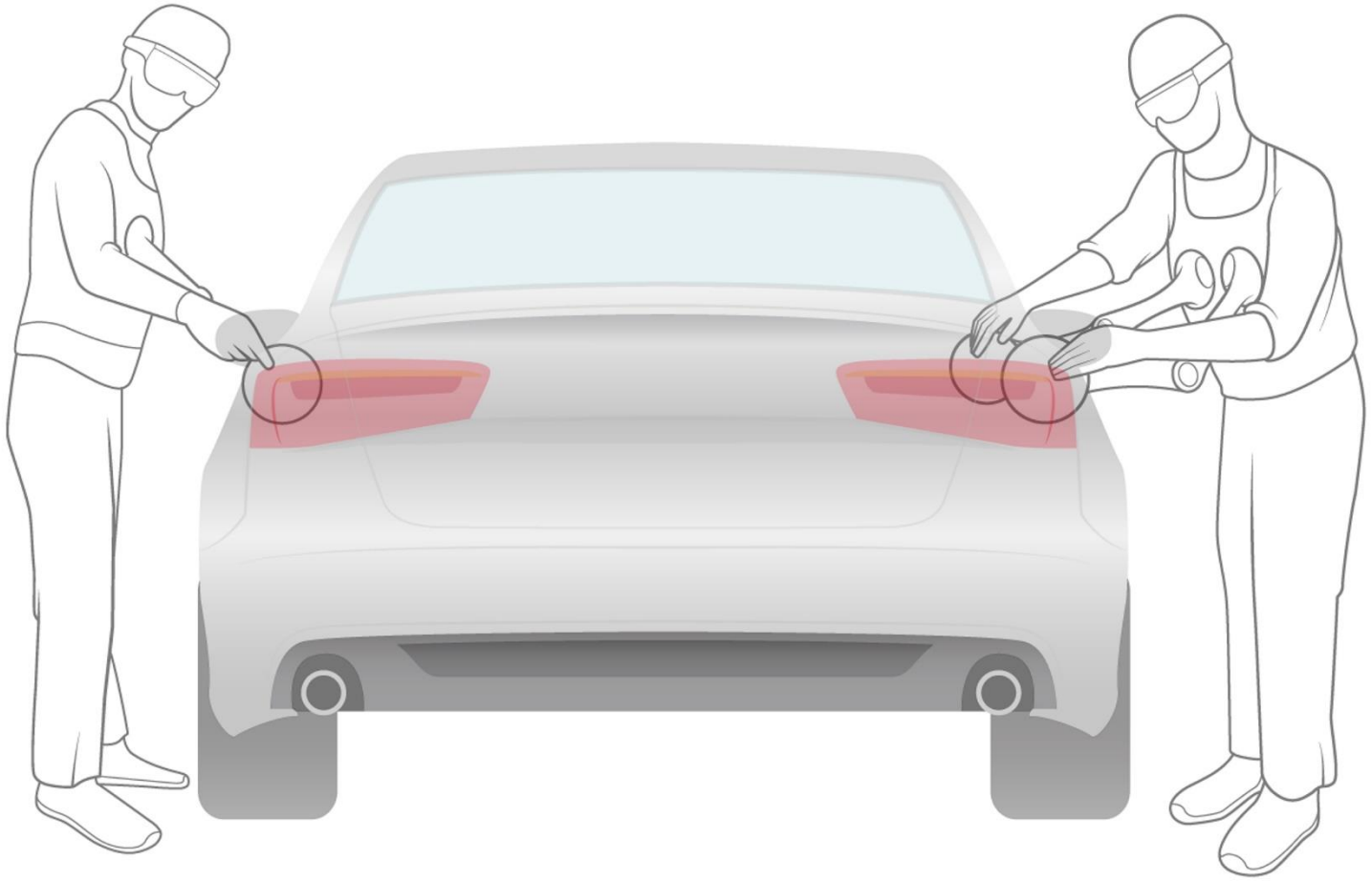
# Dynamic Data Physicalisation

- Physical objects used for input as well as output
- *Dynamic data physicalisation*
  - experimental *tangible holograms* (TangHo) platform
  - use *physical variables* such as temperature or texture
  - *exploration of big data sets*
  - dynamic *data physicalisation framework*
    - data physicalisation *grammar*



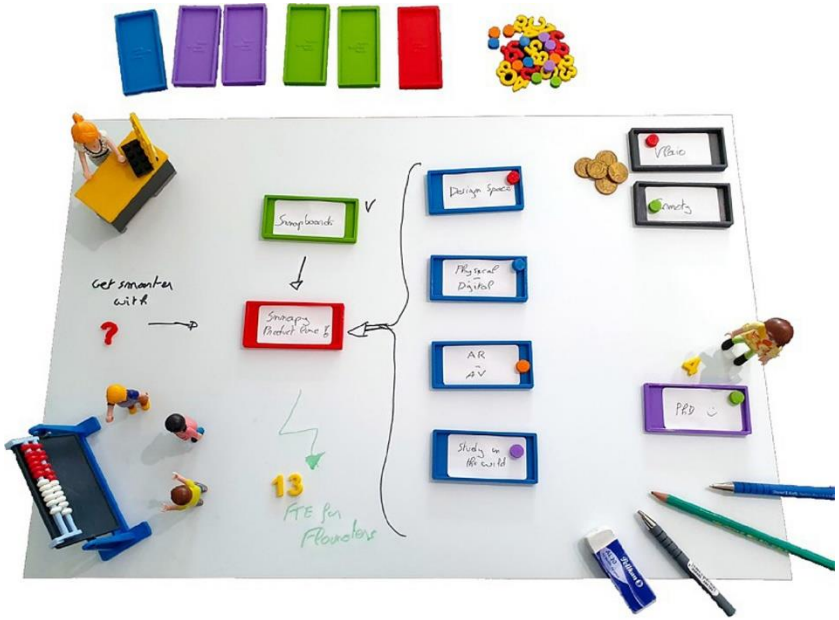


# Collaborative TangHo Interaction



# Knowledge Physicalisation

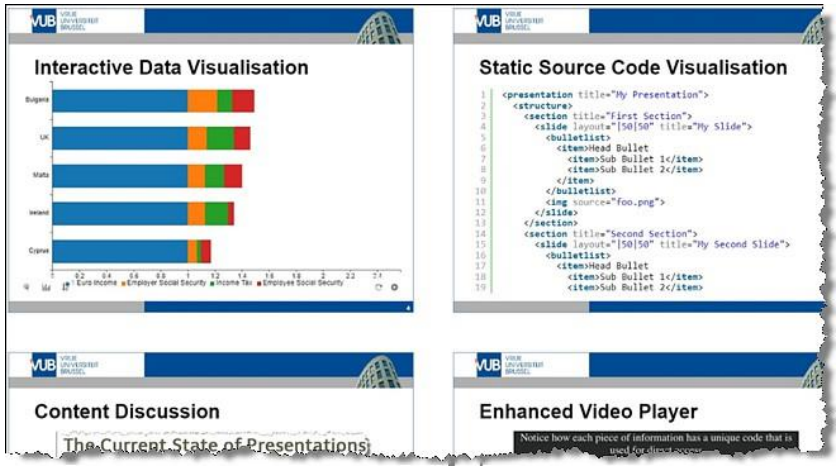
- Innovative educational and office tools
  - augmenting the scribbling process
  - knowledge physicalisation via tangible objects
- Design guidelines for *knowledge physicalisation and augmentation*



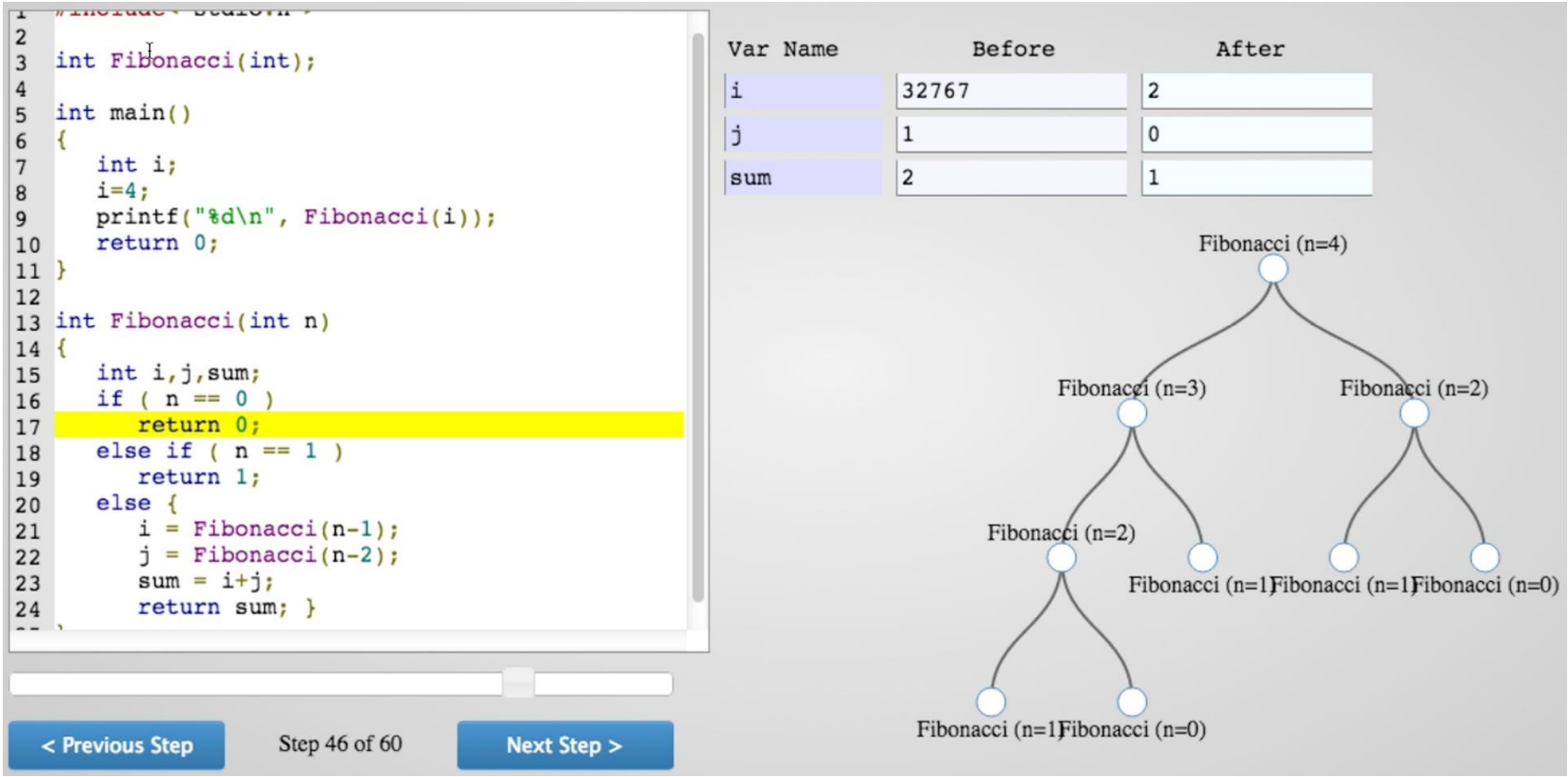

Innoty's Snnap Board solution

# MindXpres Presentation Platform

- *Extensible prototyping platform* for novel presentation concepts
  - *content-based approach*
    - separation of content and presentation (automatic visualisation)
  - cross-media *content reuse*
  - *non-linear navigation* via *zoomable user interface*
  - connectivity and interactivity
- Rich-media plug-ins
  - e.g. source code or interactive data visualisation

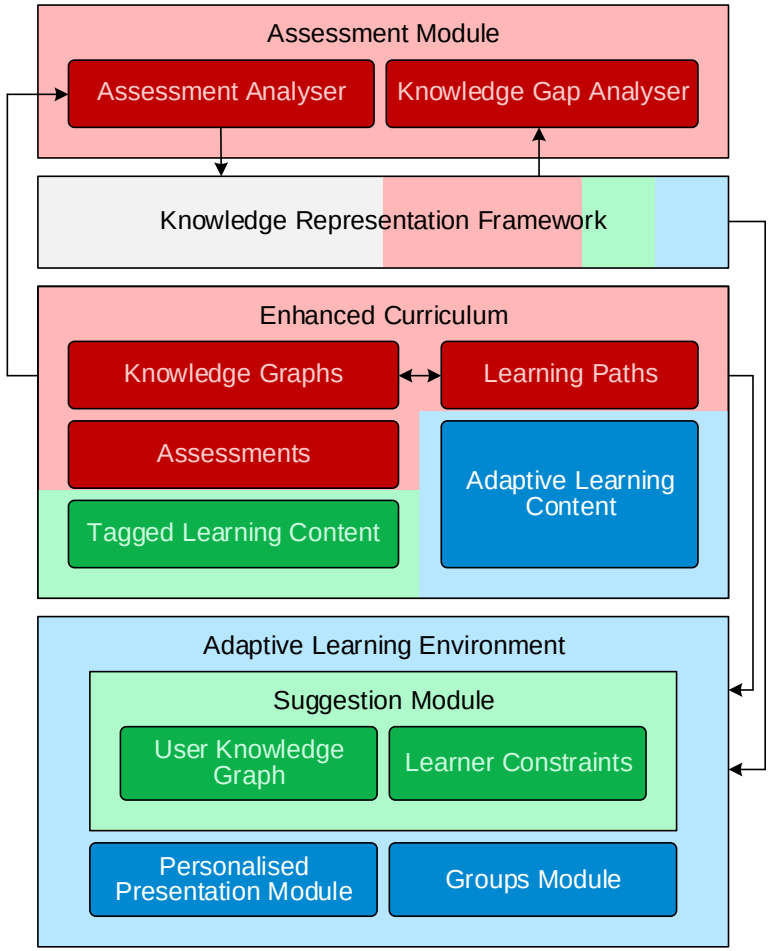
# Interactive Source Code Plug-in




Paul Mestereaga

# Personalised Learning Environments

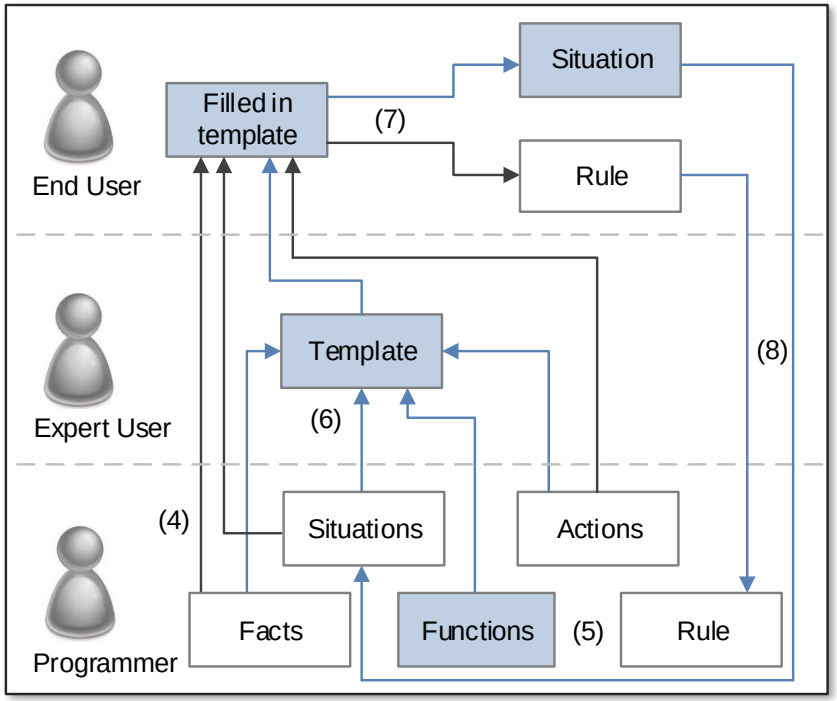
- Diagnostic assessments to detect knowledge gaps
- Suggestion of learning content
  - knowledge graphs
  - user knowledge graph
  - learning paths
- Automatic content adaptation
  - based on user preferences and constraints



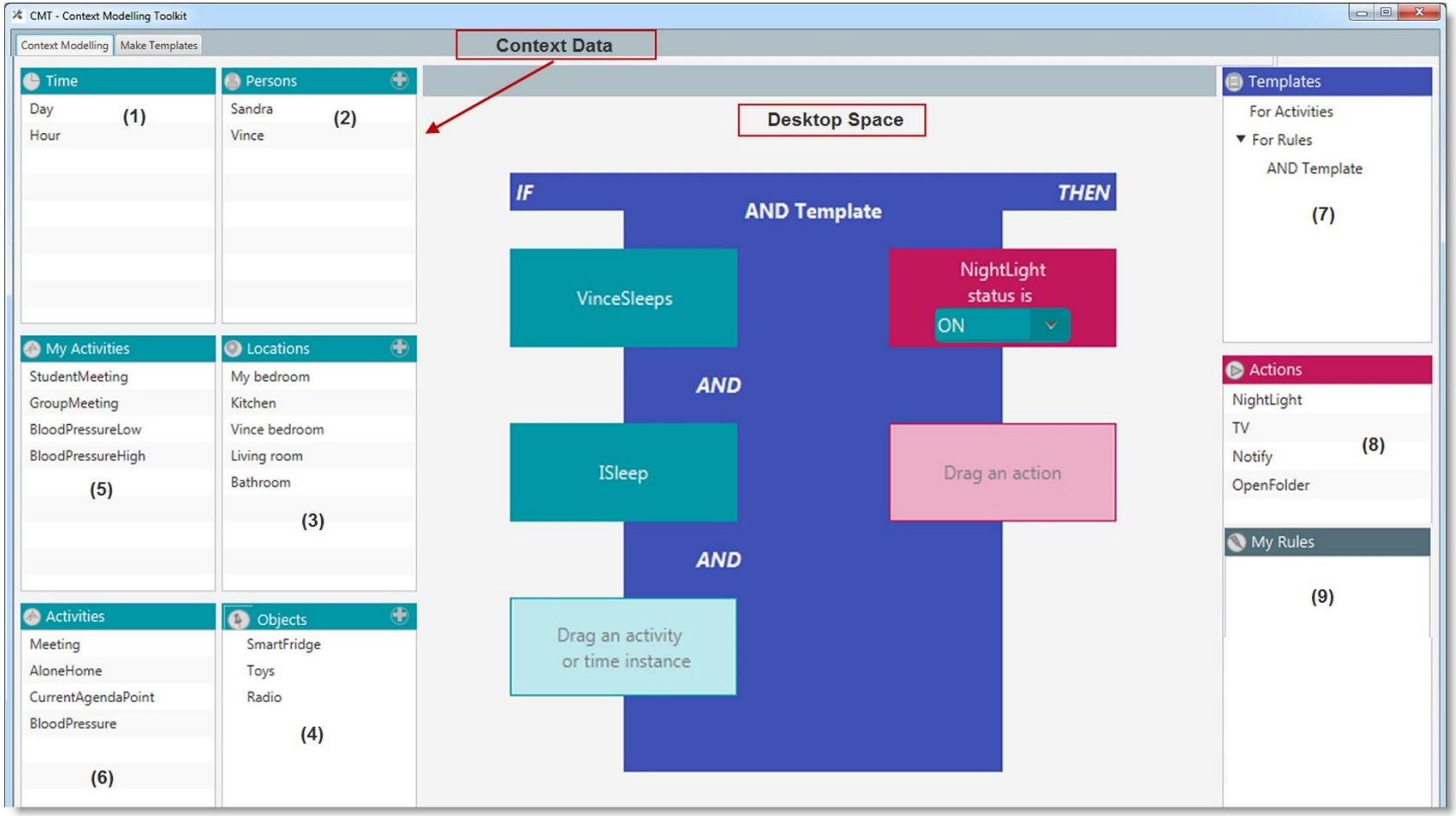
# HCI and HCII in Smart Environments

# Context Modelling Toolkit (CMT)

- Multi-layered context modelling approach
  - programmer, expert user and end user
- Beyond simple *"if this then that"* rules
- Client-server architecture
  - server: context reasoning based on Drools
  - client: sensor input as well as applications
- Increase trust via *intelligibility*

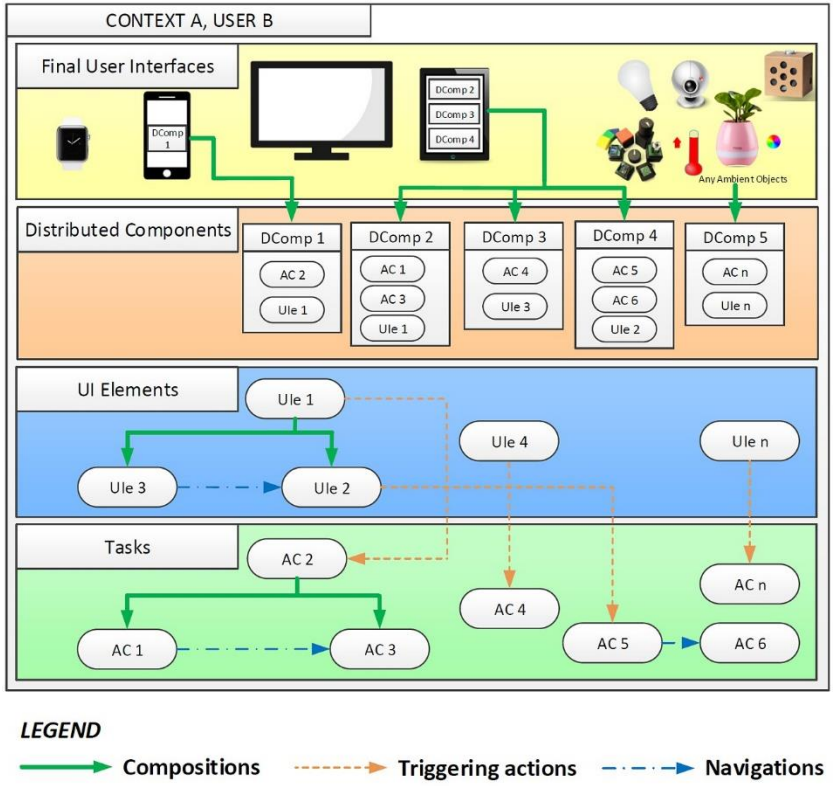


# Context Modelling Toolkit (CMT) …



# EUD of Cross-Device and IoT Applications

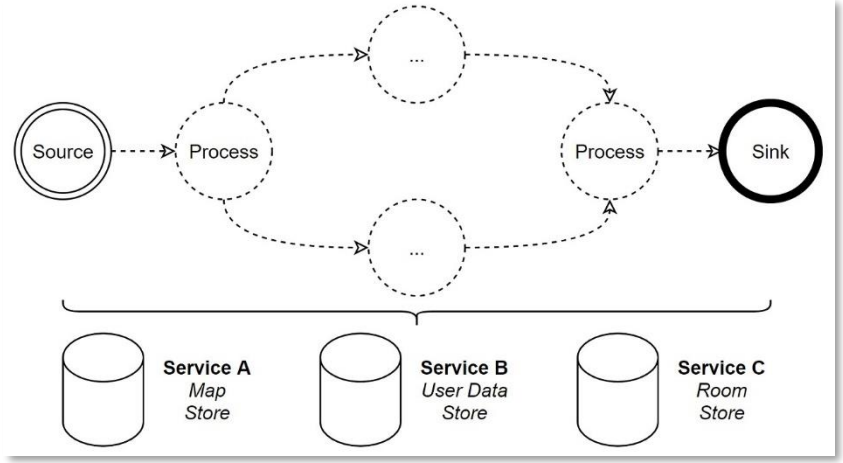
- Rapid prototyping platform for cross-device and IoT applications (eSPACE)
- End-user authoring
  - customised distribution of user interface components
  - mashup tool for digital and physical (IoT) components



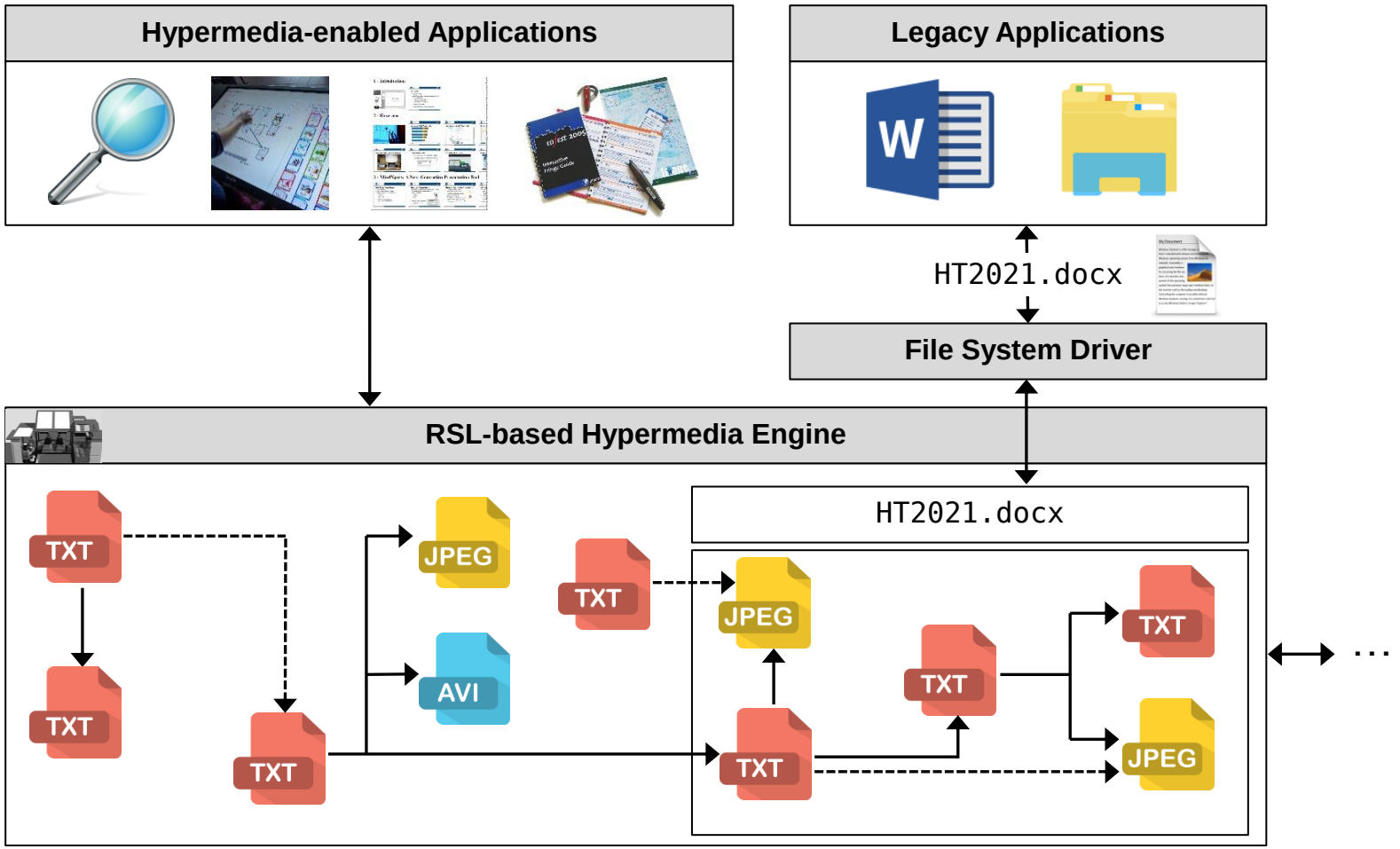
# Hybrid Positioning System

OpenHPS

- OpenHPS hybrid positioning system
  - *stream-based processing* of sensor data
  - support for motion-based and visual positioning
  - *decentralised* sensor fusion
- Combine existing and new positioning techniques
  - light-based positioning
  - noise-based positioning
  - SLAM using doppler radars
  - …




# RSL-based Hypermedia Engine



# Summary

- Personal Information Management (PIM)
  - Office of the Future
  - Document Engineering
- Next Generation User Interfaces
  - Dynamic Data Physicalisation
  - Mixed Reality User Interfaces
  - Paper-Digital User Interfaces (Interactive Paper)
  - Cross-Device User Interfaces
  - Gesture-based User interfaces
  - Multimodal User Interfaces
  - Human-AI Interaction
  - Implicit Human-Computer Interaction
  - End-User Interface Development

# Summary …

- Hybrid Positioning Framework (OpenHPS)
- Technology-enhanced Learning
  - Presentation Solutions (e.g. MindXpres)
  - Personalised Learning Environments
- Smart Environments and Internet of Things (IoT)
  - Cross-Domain IoT Solutions
  - Intelligibility

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