Mobile, ubiquitous and context-aware learning

#2 Advanced SIKS course on Technology-enhanced learning
#1 What are the USPs of ML Research?
Open Universiteit - CELSTEC
Centre for Learning Sciences and Technologies
Research Group Mobile Media

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Mobile Media for Learning, Reflection, and Personal Development
Research Lines and topics

#1 Mobile and ubiquitous learning content
*Ubiquitous access to learning support and distributed multi-format learning content.*

- Mobile Video and Audio Content (Youtube EDU, iTunes U), Cloud-based learning content, Mobile data collection and aggregation, eBooks and tablet content.

#2 Orchestration of seamless learning support
*Instructional design of nomadic and seamless learning support.*

- Ubiquitous LMS access, Mixed Reality Games, Excursions and Field Trip systems, Mobile Augmented Reality, Mobile Learning Games, Object and location-based service access.

#3 Situated learning experiences
*Connect the Learning and the real World, context-aware learning systems, sensor-based learning support.*

- Experience sampling apps, Sensor-based learning apps, Situated and ambient displays, Context-aware social media, Tangible and smart-objects for learning
Mobile Learning Applications Domains

• eHealth and healthcare
  EMURGENCY: performance support and notification system, Handover procedures, Reference apps for daily practice

• Law and Management education
  OpenScout, OUNL iPad pilots, UNHCR mobile simulated games

• Architecture and creative industries
  MACE location-based content and social media, Cloud-based cooperation methods in design and architecture

• Cultural Heritage
  Mixed reality field trips with Cultural Sciences

• Logistics
  SALOMO: Situation Awareness and Mobile data collection

• Language learning
  ELENA, PhD projects

• Teacher education and networking
  mobile social networking apps
Service and research portfolio

• **How to innovate?**
  *Innovation workshops* for mobile media and learning in the OUNL Learning Innovation Laboratory, Desirability and technology acceptance studies of innovative solutions, Open innovation policy, open source frameworks

• **How to learn best?**
  Educational and instructional design for blended and ubiquitous learning
  Evaluation of increased awareness, efficiency, effectiveness.

• **How to implement your mobile learning support?**
  Prototyping mobiles cross-platform and with embedded technologies.
  Mashup and visualisation technologies for integrated solutions.
  Customized mobile solutions integrating legacy software.

• **What is my return on investment?**
  Piloting and evaluation of new solutions, following standardized methods.
  Usability and acceptance studies (mobile eye-tracking).

• **How to optimize your existing processes for mobile?**
  Content engineering and automation for mobile and multi-platform delivery.
  Multi-platform access to legacy systems integrated with daily practices.
New media for learning and professional development
Selection of the Conference Topics

- Mobile learning across formal and informal settings
- Ubiquitous and ambient learning and technology
- Theories, models and ethics for mobile and contextual learning
- Open and distance education with mobile devices
- Interoperability and standards for mobile learning
- Challenges for mobile learning in developing countries
- Mobile learning strategies in schools, higher institutions, industry, and organizations
- Adaptive, virtual or collaborative environments for mobile learning
- Augmented reality for learning
- Innovative approaches to learning of current and emerging mobile technologies
- Mobile learning across cultures
# 5: Current CELSTEC Research on mobile learning
Ubiquitous access to Learning

- Itunes U
- AR cards
- Tagged Objects

Contextualisation of Learning Experiences

- Context Blogger
- Mobile AR
- Mobile Moodle

Orchestration of Ubiquitous Learning Arrangements

- Ambient Displays
- Reflection eBooks
- ESM
- Mobile Communities
- Coupled Games

Educational Goals

- Situational Awareness
- Stimulating Reflection
- Context Specific Support
- Better Scaffolding
- Free Exploration
- Seamless Learning
Prototypes: Bus Composition

The Bus Composition is a visualization of bus departures from a bus stop on bus line 16 in Gothenburg, Sweden. The visualization design is the last in a series that is inspired by the compositions of the Dutch artist Piet Mondrian.
Reflective eBooks
Audio Augmented Fieldtrips
Mobile Activity Orchestration

http://hdl.handle.net/1820/2729
#2 Things that sense are different for users and their learning experience
and also mobiles become universal sensors ...
<table>
<thead>
<tr>
<th>Senses versus ...</th>
<th>cognition</th>
</tr>
</thead>
<tbody>
<tr>
<td>vision, hearing, smell, taste, touch, temperature, gravity and acceleration, position of body parts, magnetic fields, electric fields</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>raw data</th>
<th>Sensors</th>
</tr>
</thead>
<tbody>
<tr>
<td>light, sound, temperature, radiation, magnetic, electrical, pressure, gas, chemical, orientation, proximity, ...</td>
<td></td>
</tr>
</tbody>
</table>
Bio-Sensors

- Sensors to measure physiological parameters in humans and animals
- Towards sensing emotions...

- Example
  - Galvanic skin response
  - Heart rate
  - Blood pressure
  - Blood oxygen saturation
  - EEG, ECG
  - ...

Image from http://affect.media.mit.edu/

Albrecht Schmidt, 2006 - ERASMUS - Rome

What can you measure?
Some Examples

- **Temperature Sensor**
  - weather / temperature
  - human proximity and touch
  - device in operation
  - indoor / outdoor?
  - speed?
  - ...  

- **Light Sensor**
  - light level
  - light frequency (50Hz/60Hz)
  - indoor / outdoor?
  - movement?
  - usage of a environment
  - touch
  - ...  

- **Accelerometer**
  - tilt
  - vibration
  - acceleration
  - gestures
  - shock
  - position?
  - Interaction?
  - ...  

Dependent on the application a sensor can be used to measure different phenomena in the real world

Albrecht Schmidt, 2006  -  ERASMUS - Rome
so a smartphone is a sensor pack the user carries around ...

it is mobile and ubiquitous tec.
The v2.3 SenseCam shown close up and as typically worn by a user. The model pictured here has a clear plastic case that reveals some of the internal components.

SenseCam in Context
LISTEN: 3D Audio
Augmented Environments
sensors augment your reality ...
there is even no mouse but a ...
... different discourse
and different forms of exploration: The MACE experience
**Task Widget** allows to see all tasks and contents of a currently running field trip.

**Navigation Widget** allows to view a map of a field trip and to navigation tasks.

**Messaging Widget** gives all participants of a field trip an instant messaging tool.

**Sensing Widget** allows to capture sensor data (GPS, other sensors, etc.) and connect it to contents.

**Conference Widget** allows to video conference from field and classroom.

**Content Widget** allows to view the contents of the LMS and collect images and data from field trip devices.

**Metadata Widget** allows to edit and add context data to the field trip data.

**External Tools Widget**
#3 What is this context?
ontological challenge: what is context and how can we conceptualize it to better understand learning in context?
context is multi-disciplinary

“...a narrative that begins with work drawn from geography and architecture, that moves into discussions about research from anthropology and psychology and onto work drawn from education and computer science.”

Note: About context and interdisciplinarity

Shared on March 23rd, 2012 from Kindle

See recent activity from Marcus Specht
body network sensors, rooms intelligent carpets, wall colour, or gesture tracking, building, architects already create completely new facades for buildings, public places and city planning new artefacts will enable dynamic routing and highlighting of space context is always ...
context is dynamic ...
context is social ...
context is connecting ...
engineering challenge: what are the opportunities for technology to enhance learning in context?
#sensor technology can record data in a scalable way.

http://quantifiedself.com/
#cloud technology can support seamless learning trajectories.

#AR technology can augment your perception of a context ...

http://www.designbynotion.com/metamirror-next-generation-tv/
whitepaper online: http://www.e-learningevent.nl/e-blog

youtube playlist: http://www.youtube.com/playlist?list=PLA2A5852D66C31396

follow my blog for updates: http://www.marcuspecht.de

follow OpenU Topic Mobiel Leren http://openu.nl
display technology can create feedback loops ...
#display tech. can support awareness and reflection.

#visualisation technology can support personal sense making.

#4 A TEL model for contextualised learning support
# the plan: how to model and design this: **Ambient Information CHannelSs AICHE**
AICHE Processes
AICHE Processes

Enrichment

Aggregation

Sensor
Sensor
Sensor
Sensor
Sensor
AICHE Processes
AICHE brings together context-aware computing, semantic-web technologies, instructional design for adaptive and personal learning, HCI aspects as tangible computing and IOThings.
#1 context is complex and always.

#2 engineering challenges need to focus then *technology* ...

#3 ... can *enhance learning* to be more dynamic, flexible, personal, social, connected ... put in context.
#4 Some questions for You!

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celstec.org
#1 is your content accessible by Mobiles and ubiquitous technology?

wap, mobile browser, app
#2 is there a link between your content and the real world that suits your learning goals?

location, time, objects, rooms, ...
#3b how can you capture the relevant part of context with the simplest possible sensor setup?

logging, location, tags, movements,
#4 what is your killer app?

average access to mobiles apps is 10 sec
#5 how does mobile access relate to other ubiquitous services?

tabs, pads, boards, ambient displays
#4 Invent your app!
limited info-update in time --> LIMIT
Product Name
What problem will it solve for me?
How does it work?
Why should I buy this?
meer weten?