New Technologies for Competence Development

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Open University of the Netherlands - OTEC

- Started in 1984; national institute;
- Two missions:
  1. provide open distance education
     - 7 faculties, 24000 students, 24 study centres in Netherlands and Belgium
  2. innovate education
- The Educational Technology Expertise Centre (OTEC) of the Open University of the Netherlands carries out R&D into Learning Technologies.
- The current technology development programme is investigating Self-Organized Learning Networks. (Ca. 80 Staff)
Trends and current research at OUNL

- Competence Development in Learning Networks (TENCompetence), Informal and Formal Learning in Competence Development
- Competences and Context in Workprocesses (PROLIX, APOSDLE)
- Social Software in Competence Development
- Game Based Competence Development
- **Contextualized Learning Support**
  - Context Indicators for Learning (PHD)
  - Context Metadata for Learning Support (MACE)
  - A Reference Model for Contextualized Learning (PHD)
Why Contextualized Learning?

- Knowledge acquisition in a cultural context and the integration in a community of practice (Wenger & Lave, 1991)
- Learning is always situated within its application and the community of practice (Mandl, Gruber, & Renkl, 1995)
- Reflection in action and reflection about action (D. A. Schön, 1983; D.A. Schön, 1987)
- ...
Smart Context Indicators
Smart Indicators

(a) after accessing three items
(b) after accessing ten items
(c) after accessing 60 items

(a) learner is less active than the community and less active than last week
(b) Most active community member
Context Metadata Bridges

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Combining Context and Competence Metadata
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Combining Context and Competence Metadata

- WINDS
- IRB
- DYNAMO
- ARIADNE
- 3RD PARTY CONTENT
- REGULATIONS
- CTS
- LESSONS
- PTs
- MAPS

- OAI-PMH
- CAM-RSS
- LOM
- HARVESTED
- CAM
- ATTENTION METADATA

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- LESSONS
- REGULATIONS
- 3D MODELS
- DESCRIPTIONS
- MAPS
- 3RD PARTY CONTENT

- WINDS
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- DYNAMO
- ARIADNE

- OAI-PMH
- CAM-RSS

- LOM
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- CAM
- ATTENTION METADATA
- DOMAIN METADATA
- COMPETENCE METADATA
- CONTEXT METADATA

- WEB SERVICES
- FEDERATED SEARCH
- USER MANAGEMENT

- MACE PORTAL

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Combining Context and Competence Metadata

- OAI-PMH
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- CONTEXT METADATA
- USER MANAGEMENT
- ATTEENTION METADATA
- INTEGRATED WIDGETS
- MACE PORTAL

LESSONS
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- DYNAMO
- ARIADNE

- MACE PORTAL

- IMPROVED ACCESS

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Combining Context and Competence Metadata
Context Enrichment Services

```java
String assignContentToPosition(String positionId, String contentId)
String[] getAllPositions()
Position[] getPositionsInArea(double nwLat, double nwLon, double seLat, double seLon)
Position getPositionOfContent(String contentId)
String removeAllContentsFromPosition(String PositionId)
Position[] getPositionsInRange(double lat, double lon, double radius)
StringArray[] getContentsOfMultiplePositions(Position[] position)
Position[] getPositionsOfMultipleContents(String[] contentId)
createPosition(String positionId, double latitude, double longitude)
String removeContentFromPosition(String positionId, String contentId)
String removePostion(String positionId)
String getContentShortInfo(String positionId)
String[] getContentsOfPosition(String positionId)
```
Combining Services with Context Metadata

EXAMPLE: MAP WIDGET
Combining Services with Context Metadata

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Combining Services with Context Metadata

EXAMPLE: MAP WIDGET

LOM → HARVESTED METADATA → ADDRESS → CONTEXT SERVICE → LOCATION? → LOCATION METADATA

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Combining Services with Context Metadata

EXAMPLE: MAP WIDGET
Combining Services with Context Metadata

EXAMPLE: MAP WIDGET
Combining Services with Context Metadata

EXAMPLE: MAP WIDGET

LOM

HARVESTED METADATA

ADDRESS

CONTEXT SERVICE

LOCATION?

LOCATION?

LOCATION?

LOCATION?

COORDINATES

LOCATION METADATA

GEONAMES.ORG

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Combining Services with Context Metadata

EXAMPLE: MAP WIDGET

COMBINING SERVICES WITH CONTEXT METADATA

EXAMPLE: MAP WIDGET
Combining Services with Context Metadata

EXAMPLE: MAP WIDGET

LOM
HARVESTED METADATA
ADDRESS

CONTEXT SERVICE

LOCATION?

LOCATION?

ADDRESS

COORDINATES

GET NEARBY BUILDINGS
GET PROJECTS IN AREA
SET LOCATION FOR CONTENT

LOCATION METADATA

GEONAMES.ORG

LOCATION?
A Reference Model of Mobile Social Software
# Dimensions of Analysis

<table>
<thead>
<tr>
<th>Content</th>
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<th>Information flow</th>
<th>Purpose</th>
<th>Pedagogical model</th>
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<td></td>
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<td>engagement and immersion</td>
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</table>
Example: Shared Documents with Notification
Content …
Different forms of Content

- The MOBILearn project combined multimedia content creation, content delivery and stores context metadata about that content.
- KLIV project (Eva Brandt & Hillgren, 2003) delivered *video content* to PDAs used by nurses.
- xTask adds the *collaborative editing* of content and *instant messaging* for discussing the content.
- Environmental Detectives (Klopfer, Squire, & Jenkins, 2002) is an example that along with content creation stores *location metadata*.
- RAFT project, which demonstrated effects on classroom engagement and participation with the integration of *authentic learning materials* from remote field trips (Bergin et al., 2007)
Context ...

Context, describes applications based on the context parameters taken into account for learning support.
Context taken into Account

- Individuality Context, includes information about objects and users in the real world as also information about groups and the attributes or properties the members have in common.
- Time Context, basically this dimension ranges from simple points in time to ranges, intervals and a complete history of entities.
- Locations Context, are divided into quantitative and qualitative location models, which allow to work with absolute and relative positions.
- Activity Context, reflects the entities goals, tasks, and actions.
- Relations Context, captures the relation an entity has establish to other entities, and describes social, functional, and compositional relationships.
Context Examples

- Mobile Language Learning, Ogata and Yano (2004b) CLUE
- AwarePhone (Bardram and Hansen, 2004) uses location to locate fellow employees within the hospital, a calendar artefact to capture and share time context and indicates the activity of a user at a certain moment.
- TANGO system (Ogata and Yano, 2004a) and the Musex system (Yatani et al., 2004) detect objects in the vicinity by using RFID tags. Moop (Mattila and Fordel, 2005) couples (GPS) location to observations/information gathered in the field.
- Wallop (Farnham et al., 2004) allows its users to discover social relationships and provides social awareness by storing and analysing social context information.
Purpose ...

Purpose, describes applications according to the goals and methods of the system for enabling learning.
Purpose Examples

- Social Software in General: *Identity management, information sharing, relationship management* (Richter & Koch, 2007)
- *Sharing Content and Knowledge*: iLogbook (Bull et al., 2004)
- *Facilitate discussion and brainstorming*: Mobile notes.
- Mobile *recommender systems* like MovieLens Unplugged
- Location *awareness*, group awareness, NearMe
- HANDLer project offers conversation between mobile learners to support *knowledge exchange* (Sharples, Corlett, & Westmancott, 2002)
Information Flow

Information Flow, classifies applications according to the number of entities in the system's information flow.
Pedagogical Models

Pedagogical paradigms and instructional models
## Study Mobile Technologies for Learning (Nesta Futurelab 2004)

<table>
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<tr>
<th>Theme</th>
<th>Key Theorists</th>
<th>Activities</th>
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</table>
| Behaviourist learning  | Skinner, Pavlov | • drill and feedback  
                        |                  | • classroom response systems                                   |
| Constructivist learning| Piaget, Bruner, Papert | • participatory simulations                                   |
| Situated learning      | Lave, Brown     | • problem and case-based learning  
                        |                  | • context awareness                                            |
| Collaborative learning | Vygotsky        | • mobile computer-supported collaborative learning (MCSCL)      |
| Informal and lifelong learning | Eraut       | • supporting intentional and accidental learning episodes     |
| Learning and teaching support | n/a           | • personal organisation  
                        |                  | • support for administrative duties (eg attendance)           |

Table 1: An activity-based categorisation of mobile technologies and learning
Behaviourist Learning - Content in Context

Classroom Applications
- Formative Assessment
- Peer Feedback
- Anonymous Feedback
- Group Awareness

Stimulus
- Present Stimulus
- Contextualize Stimulus

Aggregate Responses
Collect Responses

Response

Contextualized Content Presentation
- Programmed Instruction
- Contextualized Learning Activities
- Field Trips, City Rallys

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Mobile Situated Learning

Authentic Learning Environment

- Authentic Domain Activities
- Field Trips
- Context Metadata

Learning Activity

- Reflection in and about Action
- Mobile Blogging
- Community of Practice

Context
Examples

- **Behaviourist approaches** on learning are the foundation of most *notifications systems* (SMSCoach). Moreover, the more standard form of notification systems want the user to react on or learn about some peer activity being performed.

- **Constructivist approaches** like MediaBoard (Colley & Stead, 2004) create a mobile accessible working space aimed at fostering interaction in a community of practice. *Annotation tools* like Mobile Notes, used in brainstorming sessions are also often designed from a constructivist point of view.

- An example of *situated learning* support is the RAFT project that aims “to provide a cooperative learning environment spanning field trip and the classroom”.

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#### Table 1 A reference model for mobile social software

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Architecture for Contextualized Media

- Indicator/Actuator Layer, Interaction Logic and Dynamic Multimodal Output
- Control Layer, Application Logic and Process Definition
- Semantic Layer, Data Aggregation and Entity Definition
- Sensor Layer, Sensor Proxy, Data Capture

Electronic Media
- Audio Channel
- Text Document

Physical World Object
- Activity 2
- Activity 3
- Step
- Condition
- physical object
- user 2
- user N

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ContextBlogger: Campus Memories

- Tagging and Location Sensors
  - Semacode, Barcode, RFID
  - WLAN Ekahau, GPS
- Blogging Systems and APIs
- Goal: enable mobile content injection and delivery
- Evaluations on Language Learning
- Health Care Pilot

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Thank You.

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