

A General Architecture for Mobile Learning

Anna Trifonova and Marco Ronchetti

Department of Information and Communication Technologies
Università degli Studi di Trento, Italy

E-learning

- Distributing didactic material
- User identification and authorization
- Gathering of data relative to the user system interaction
- Etc.

E-learning

- **Access to resources (data)**
 - Support of learning objects (LO)
 - Support for Learning Metadata
 - Quizzes and questions
- **Specific e-learning services**
 - Content management services
 - Assessment
 - Knowledge management (KM)
 - Tools to support learners and tutors in managing their learning resources
- **Common services**
 - Support of different actors (students, teachers, tutors, administrator and guests)
 - Collaboration tool
- **Presentation**

M-learning

- M learning can include anything from job aids and courseware downloaded on your personal digital assistant to Net based, instructor facilitated training via laptop
- E learning + mobile computing
 - PDA
 - Cell phones
 - ❖ Any small, autonomous and unobtrusive device



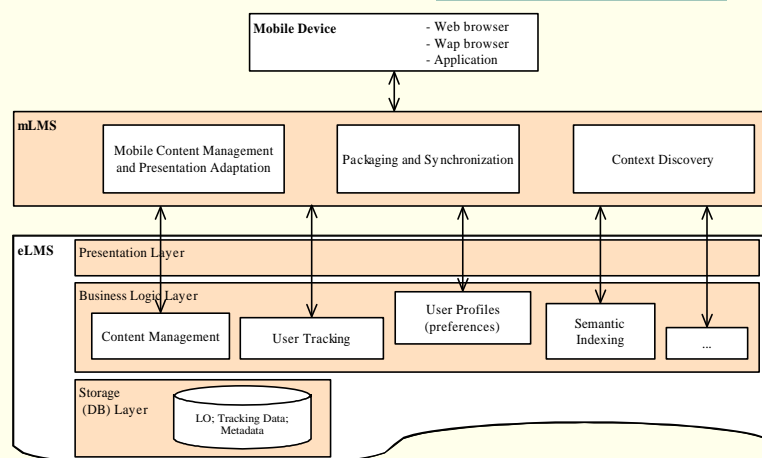
Activities on mobile devices

- Interact with people
 - Voice
 - Written messages
 - Still and moving images
- Access content
 - Local
 - Remote
- Access services



E-learning vs. M-learning

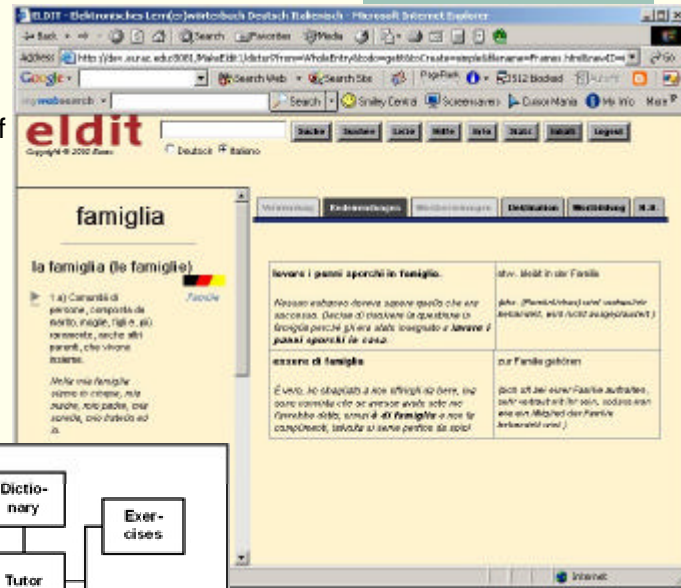
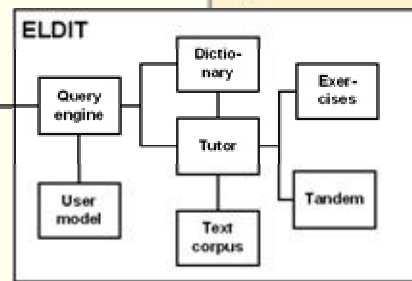
- **Context**
 - Spatial information (i.e. physical location)
 - Environmental information (i.e. noise level)
 - Availability of resources (i.e. battery, network, bandwidth) etc.
- **Devices' hardware and software**
 - Small screens
 - Small or no keyboard
 - Limited / incompatible software
- **The connectivity**
 - WAP, GPRS, UMTS, Bluetooth, WiFi, etc.
 - Periods of disconnection, either intentionally or not



Example m-learning system

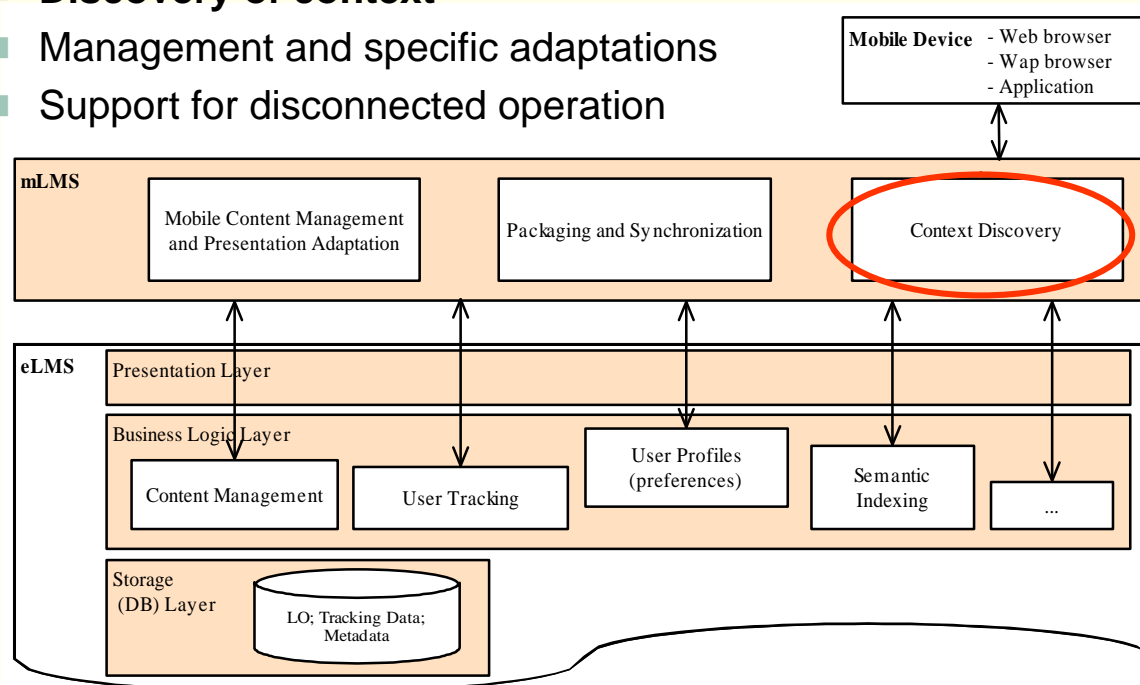
■ ELDIT

- An innovative electronic language learning system for the population of South Tyrol
- Helps to prepare for the exams in bilingualism
- For everybody interested in learning German or Italian language
- Consists of: electronic learner's dictionary, a text corpus, quizzes, a tandem module, an adaptive tutor, etc.



A General M-Learning Architecture

- Discovery of context
- Management and specific adaptations
- Support for disconnected operation



M-Eldit - Discovery of context

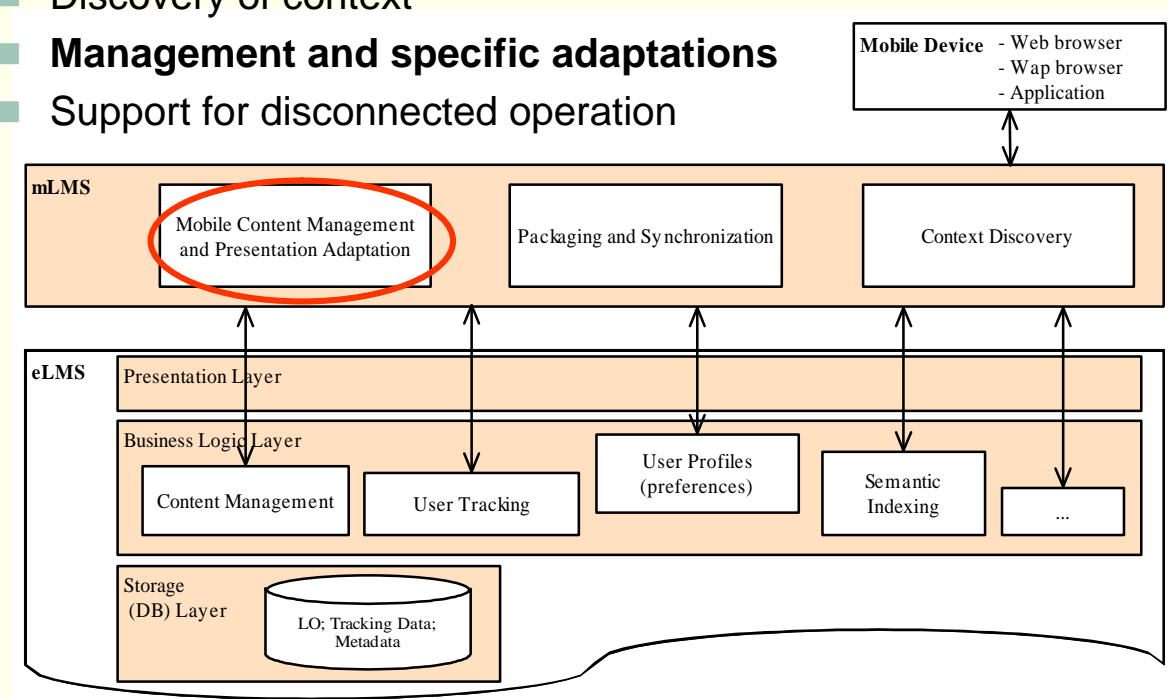
```

GET http://science.unitn.it/mEldit/text.056 HTTP/1.1
Accept: application/vnd.wap.xhtml+xml, application/xhtml+xml;
  profile="http://www.wapforum.org/xhtml", text/vnd.wap.wml, image/vnd.wap.wbmp, */*
UA-OS: Windows CE (POCKET PC) - Version 3.0
UA-color: color16
UA-pixels: 240x320
UA-CPU: ARM SA1110
UA-Voice: FALSE
UA-Language: JavaScript
Accept-Encoding: gzip, deflate
User-Agent: Mozilla/2.0 (compatible; MSIE 3.02; Windows CE; PPC; 240x320)
Host: science.unitn.it
Proxy-Connection: Keep-Alive
  
```

HTTP request from a mobile device
(iPAQ Pocket PC)

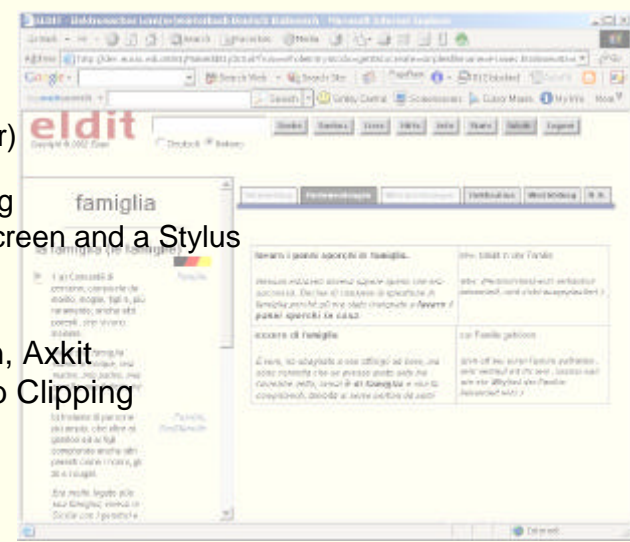
A General M-Learning Architecture

- Discovery of context
- **Management and specific adaptations**
- Support for disconnected operation

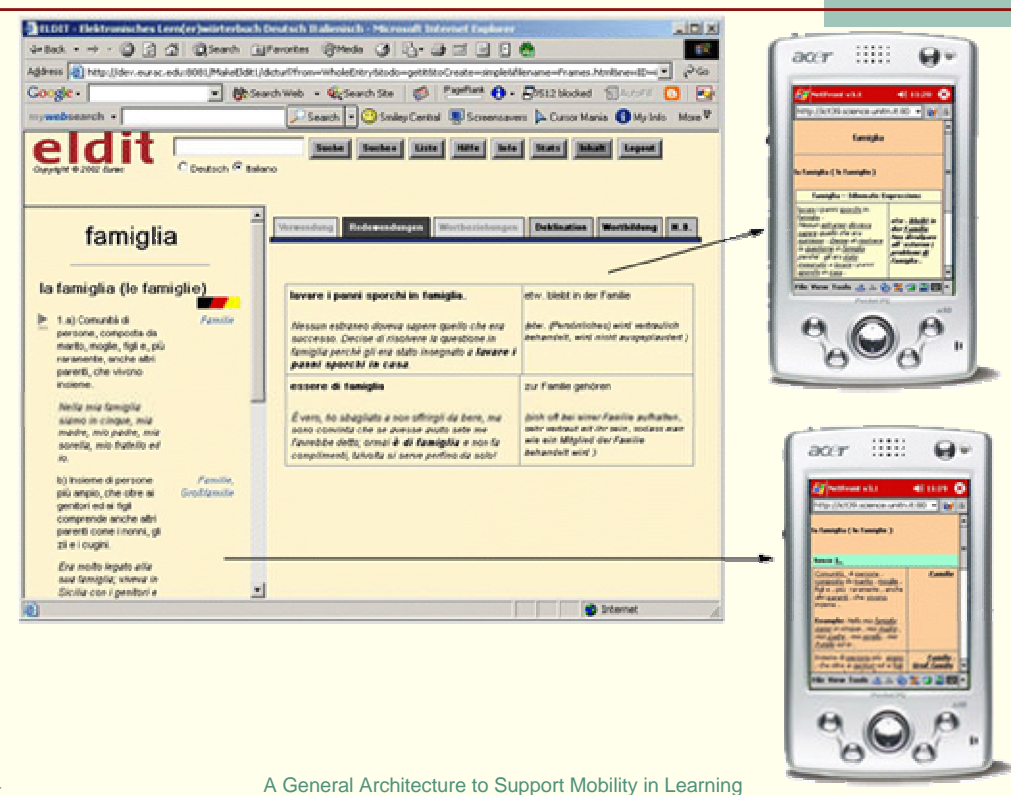


M-Eldit - Specific adaptations

- Most web pages are designed to be displayed on desktop computers with color monitors having at least 800x600 resolution
- Modern Web Browsers allow frames, animations, scripts, applets and etc.
- PDAs
 - Common: 240x320 pixels (16-bit color)
 - Limited browser functionalities: no frames, no applets, limited scripting
 - Hard input, through touch-sensitive screen and a Stylus
- Possible Adaptation Techniques
 - Server-based - XML/XSLT, Cocoon, Axkit
 - Proxy-based - AvantGo, Palm Web Clipping
 - Client-based - XHTML/CSS
 - Etc.

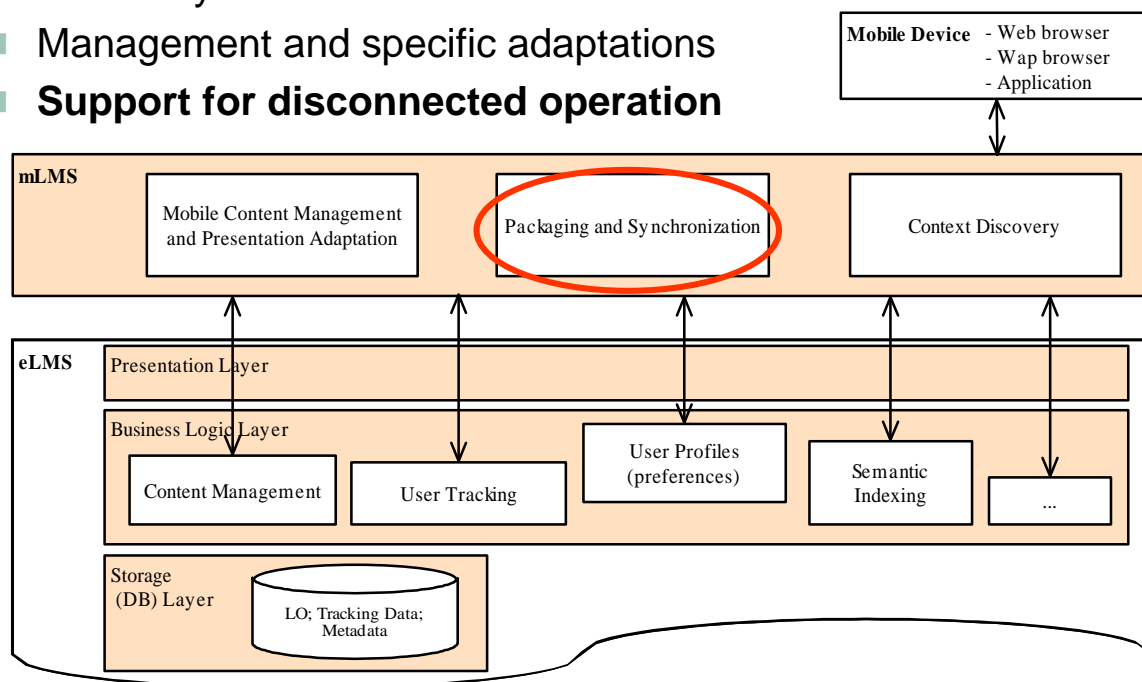


M-Eldit - Specific adaptations



A General M-Learning Architecture

- Discovery of context
- Management and specific adaptations
- **Support for disconnected operation**



ICALT 2004

A General Architecture to Support Mobility in Learning
Presenter: Anna Trifonova

13

M-Eldit – The connectivity

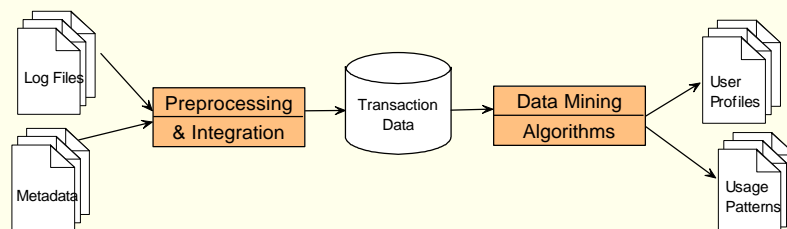


PDA's – The Memory

- Commonly 32 – 64 MB Main memory available
- Extensible – possible to add external memory

Mobile Eldit – The Hoarding

- Allows offline usage - we need a mechanism for selecting what is needed by the user
- Based on the tracking of the user activities during the offline usage of the system
- Taking care of content's coherence and synchronization with the system
- Predict which 'learning path' the user is most likely to follow
- Assign weights to the learning objects based on their importance for next user session
- Uploaded to the device first the objects with higher weights until the device's available memory (cache) is filled
- Analyze how successfully the previous uploads were and improve further prediction



ICALT 2004

A General Architecture to Support Mobility in Learning
Presenter: Anna Trifonova

14

Final Overview

- We presented a general architecture to support mobile learning scenario
- We discuss that the services provided by eLMS have to be changed (adapted) for accessing them through mobile devices and that additional (mobile specific) services should be supported
- We identify three main functionalities for a mLMS, which sits on top of the usual eLMS
 - “Context Discovery”
 - “Mobile Content Management and Adaptation”
 - “Packaging and Synchronization”

Thank you!

A General Architecture to Support Mobility in Learning

Anna Trifonova and Marco Ronchetti
*Department of Information and Communication Technologies
Università degli Studi di Trento, Italy*

Anna.Trifonova@dit.unitn.it
www.science.unitn.it/~foxy

Marco.Ronchetti@dit.unitn.it
<http://latemar.science.unitn.it>