



Mobile ELDIT

# E-learning and M-learning

Experiences, a Prototype  
and First Experimental Results

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## Outline

1. Introduction

2. ELDIT

3. Mobile ELDIT

4. Experimental Outcomes

5. Conclusions



# Introduction

## Definition of Mobile Learning



- E-learning + mobile computing
  - PDA
  - Cell phones
  - ✦ Any small, autonomous and unobtrusive device
  
- M-learning can include anything from job aids and courseware downloaded on your personal digital assistant to Net-based, instructor-facilitated training via laptop
  - Interact with people
    - Voice
    - Written messages
    - Still and moving images
  - Access content
    - Local
    - Remote
  - Access services

### Guidelines:

#### Short, not more than 5-10 minutes long modules

Users should be able to use their small fragments of waiting or idle time

#### Simple, funny and added value functionality

It should be possible to use an m-learning system without reading a user manual, and the experience of studying with the help of such devices should be interesting and engaging

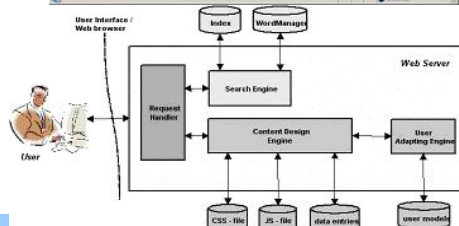
#### Area/Domain specific content, delivered just in time/place

The mobility should bring the ability to guideline and support students and teachers in new learning situations when and where it is necessary.



# 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.





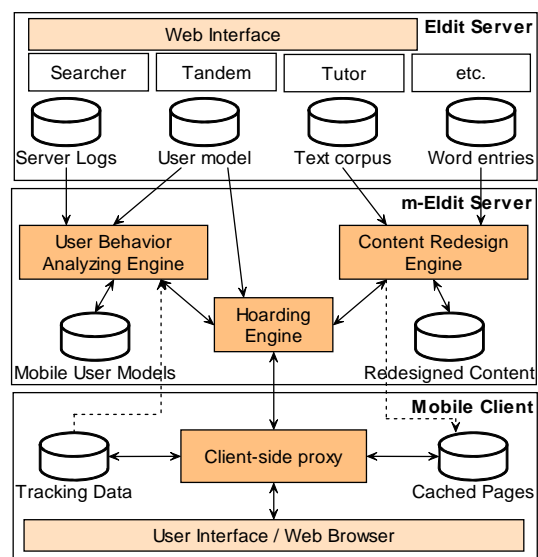
## From ELDIT to Mobile ELDIT

- E-learning platform that containing big quantity of learning materials
  - ELDIT contains about 800 texts and associated words in both German and Italian languages
  - Each text has about 150 words and few comprehension questions that the user should answer in the other language. Nouns, verbs and adjectives are linked to word entries with rich explanations, translations and additional data.
  - The texts are divided into two difficulty levels and are split into thematic groups.
- A self-motivated learner, who doesn't need any supervisory control of studying process
- A mobile device (PDA) which has intermittent connection and can not hold all the data of the e-platform in the memory (Commonly 64MB)
- The device is regularly synchronized with the main system



## Mobile ELDIT

### The Architecture





## Mobile ELDIT - Content adaptation

### ELDIT low-granulated XML data

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<!DOCTYPE text SYSTEM "C:\Program Files\Apache Group\Tomcat 4.1\webapps\cocoon\mount\mEldit\text.dtd">

<text id="it.ab.general.001">
  <meta id="it.ab.general.001.meta">
    <author id="it.ab.general.001.meta.author">goetheinstitut</author>
    <source id="it.ab.general.001.meta.source">system</source>
    <userid id="it.ab.general.001.meta.userid"></userid>
    <lang id="it.ab.general.001.meta.lang">italiano</lang>
    <level id="it.ab.general.001.meta.level">ab</level>
    <domain id="it.ab.general.001.meta.domain0">05</domain>
    <index id="it.ab.general.001.meta.index">001</index>
    <freq id="it.ab.general.001.meta.freq">00009490</freq>
  </meta>
  <title id="it.ab.general.001.title">
    <w base="come" lexref="it.g.fragewörter.1" ctag="PRO:inter:*:*:*" id="it.ab.general.001.title.w000">Come</w>
    <w base="si" lexref="it.g.reflexivpronomen.1" ctag="PRO:pers:*:*:*" id="it.ab.general.001.title.w001">si</w>
    <w base="diventare" lexref="it.v.diventare.1.lemma" ctag="VER:*:*:*" id="it.ab.general.001.title.w002">diventa</w>
    <q id="it.ab.general.001.title.q003">
      <w base="albergatore" lexref="it.n.albergo.1.deriv1.pbs0" id="it.ab.general.001.title.q003.w000">albergatori</w>
    </q>
  </title>
  <body id="it.ab.general.001.body">
    <p id="it.ab.general.001.body.p000">
      <s id="it.ab.general.001.body.p000.s000">
        <w base="Bed" lexref="it.n.nome.1.sense0" ctag="NPR:*:*:*" id="it.ab.general.001.body.p000.s000.w000">Bed</w>
      </s>
    </p>
  </body>
  ...
</text>
```



## Mobile ELDIT - Content adaptation

### M-ELDIT XSLT transformations

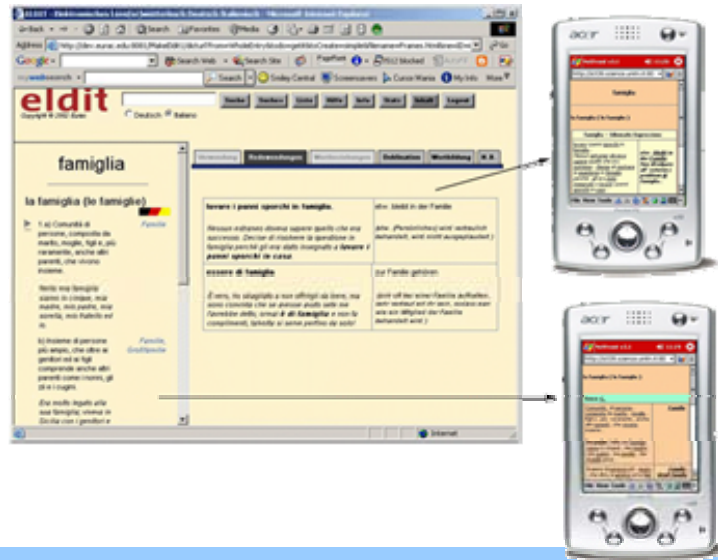
```
<?xml version="1.0"?>
<xsl:stylesheet xmlns:xsl="http://www.w3.org/1999/XSL/Transform" version="1.0">
<xsl:output method="html" indent="yes"/>
<xsl:output encoding="ISO-8859-1"/>
<xsl:preserve-space elements="**"/>
<xsl:output disable-output-escape="yes" />

<xsl:template match="text">
  <HTML>
  <HEAD>
    <META HTTP-EQUIV="Content-Type" CONTENT="text/html"/>
  <TITLE>
    <xsl:value-of select="meta/lang"/> - <xsl:value-of select="meta/level"/> - <xsl:value-of select="meta/domain"/>.
  </TITLE>
  </HEAD>
  <BODY bgcolor="#FFFFCC" text="#000000" link="#000000" vlink="#000000" alink="#333333">
    <text>Vai a: [</text>
    <a>
      <xsl:attribute name="href">TextsList</xsl:attribute>
      <xsl:text>Lista dei testi</xsl:text>
    </a>
    <text>]</text>

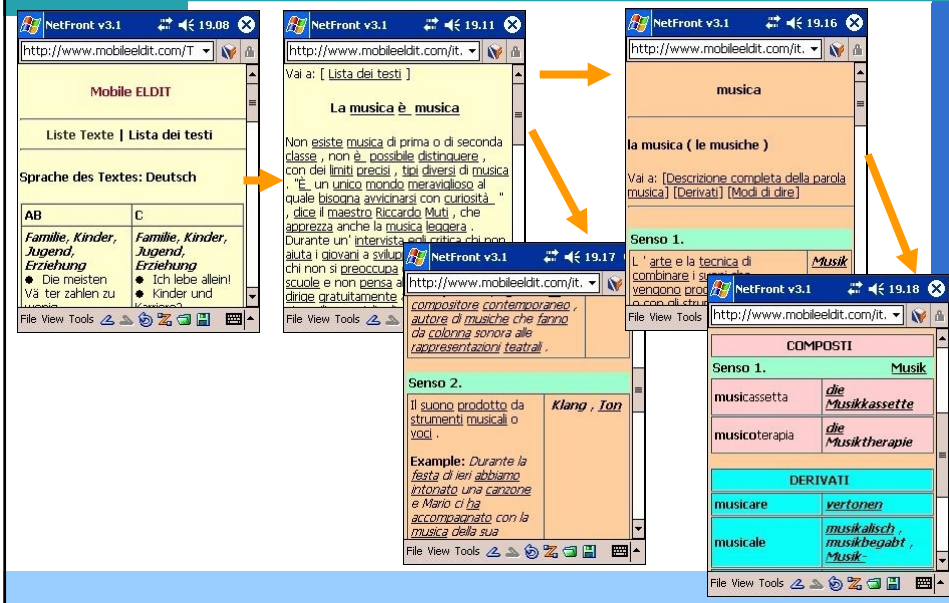
    <CENTER><H1><xsl:apply-templates select="title"/></H1></CENTER>
    <xsl:for-each select="body/p">
      <P><xsl:apply-templates select="s"/></P>
    </xsl:for-each>
    ...
  </BODY>
</HTML>
```



# Mobile ELDIT - Content adaptation



# Mobile ELDIT - Screenshots





## Hoarding

### What is it? Why we need it?

- Hoarding is a technique for selecting set of documents to be uploaded and used when disconnected.
- To allow 'any time, anywhere' access to the learning materials
  - to support offline access of learning content
- Often the device available memory is not big enough to contain all material of a system
  - a decision should be made what to put on the device
- To free the user from annoying procedures of pre-fetching content
  - decide automatically what the user will need



## Mobile ELDIT – The connectivity



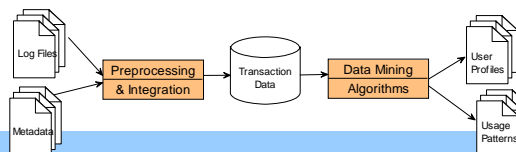
### PDAs – The Memory

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



### Mobile ELDIT 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





## Mobile ELDIT - Experiments

- Started in July 2004
- One iPaq3800 and two Acer n10 devices
- Up to now 10 users participated
- A short (not more than 15 min.) explanation was given to every user about general use of PDAs and the Mobile Eldit prototype
- The users were encouraged to read what they found suitable
- At the end each user filled-in a questionnaire for evaluating the system



## MOBILE ELDIT - Outcomes

- **Ease of use**
  - all users found the system easy to use
  - People that used PDA previously needed no introduction.
  - The others after a few hours of usage felt familiar enough with all needed functionalities.
- **Availability and freedom**
  - biggest advantages is the possibility to have it anytime, anywhere with you. The device is small and light and it can contain enough content to be used in different places.
  - All participants were using the system before or after work hours at home or during waiting-times, for example in the train while travelling to work or on the coach "because it is comfortable".
  - Some people liked the possibility to use the online Eldit system from their work desktop PC, but mainly as a dictionary.



## MOBILE ELDIT - Outcomes



## MOBILE ELDIT - Outcomes

### ▪ Fast access

data are accessible **very quickly** by the user compared to the time needed to find those words in a paper dictionary or other resource.

It is **important to connect every word with the exact meaning** in the context used in the text, which is quite a difficult task, but is substantial for the learner.

### ▪ Additional materials

people that were preparing for the bilingualism exam generally prefer **taking paper notes**, because it helps them to “remember better”. Even when tools for digital notes taking are available on the mobile device the users consider paper notes to be more efficient.

people that were studying the language without the goal to take any examination were **not generally using the system as the only source of ‘learning content’**, but were practising their skills by reading books, newspapers, magazines or listening to radio or TV in the targeted language.

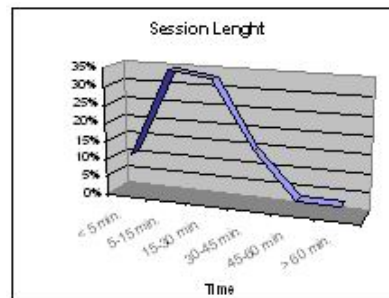


## MOBILE ELDIT - Outcomes

### ■ Periods of usage

time of each session varied from one user to another and ranged mainly from **five to forty-five minutes**.

It strongly depends on the student goals – students that **intend to take the exam** spend longer periods for systematic and concentrated studying



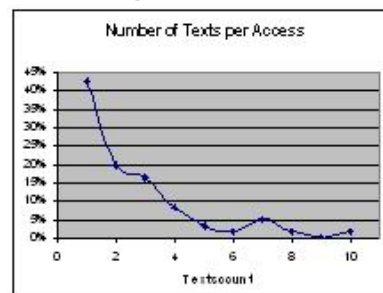
## MOBILE ELDIT - Outcomes

### ■ Number of texts per session

The number of texts read in one session varies from **one to more than five**.

Generally the first group of users read **one text per session**,

The second group spends less time on a single text and reads **more than one text per session**.





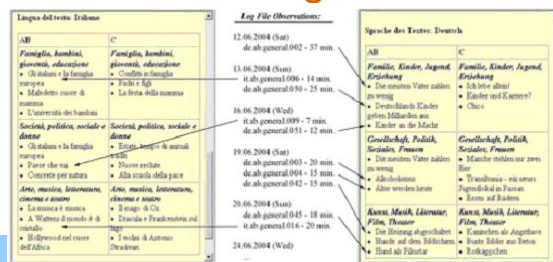
# MOBILE ELDIT - Outcomes

## Choice of language and difficulty level



! Some users reported changes in their own behavior short time before the exam date

## Consecutive browsing behaviour



# MOBILE ELDIT - Problems

## Battery

battery on Windows based PDAs discharges very fast and discharges even when the device is not used (e.g. is kept switched off for few days). After the device fully discharges all user data and user installed applications disappear.

surprising and frustrating for the users.

## Special characters

special German and Italian letters (à, è ...) were not correctly displayed in the browser.

## Slow transfer

very slow transfer between the desktop PC and the mobile device. The slowness of the serial communication channel on which data are transferred to the PDA remains however a major problem.



## Conclusions & Future Work

- Language learning is a good choice as a field of the use of mobile devices
- Our first results include some interesting findings on user behavior during system exploration
- Some problems with the usage of mobile devices were reported that should be considered in the future
- Outgoing Work: Deeper automatic analysis of user behavior in order to study and improve the hoarding process



## THANK YOU!

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**Marco Ronchetti\***

**Mobile ELDIT**

<http://www.science.unitn.it/~foxy/MobileEldit.php>

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**ELDIT**

<http://dev.eurac.edu:8081/MakeEldit1/Eldit.html>

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