The development of inclusive policies: the impact of information accessibility on integrated educational and professional contexts

Advocating Accessibility
ICT4IAL - Riga, Latvia - May 2015

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The Global Initiative for Inclusive ICTs

Promoting the Rights of Persons with Disabilities in the Digital Age

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Headlines | Blogs | Talkback

- Selby Appoints UK's First Mayor with Learning Disabilities
- USA: Richmond Community College Offering Braille Transcription Course
- Wireless RERC Releases 2015-2016 App Factory Call for Proposals
- Global Consultation on the Inclusion of Persons With Disabilities in Humanitarian Response
- Research aims to improve access to music for people using hearing aids

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Accessibility Expert Zone

e-Accessibility Policy Toolkit

Learn more about ICT accessibility policy and the UN Convention on the Rights of Persons with Disabilities at: e-accessibilitytoolkit.org

Expert Blogs

Debra Ruh on **Employability & Technology**

Lucy Greco on **Accessibility in Education**

Robert Pearson on **Accessibility in Media**

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June 1-2, 2015 Promoting mobile accessible and assistive apps for an untapped market of more than 1 billion users worldwide. Visit: www.m-enabling.com.

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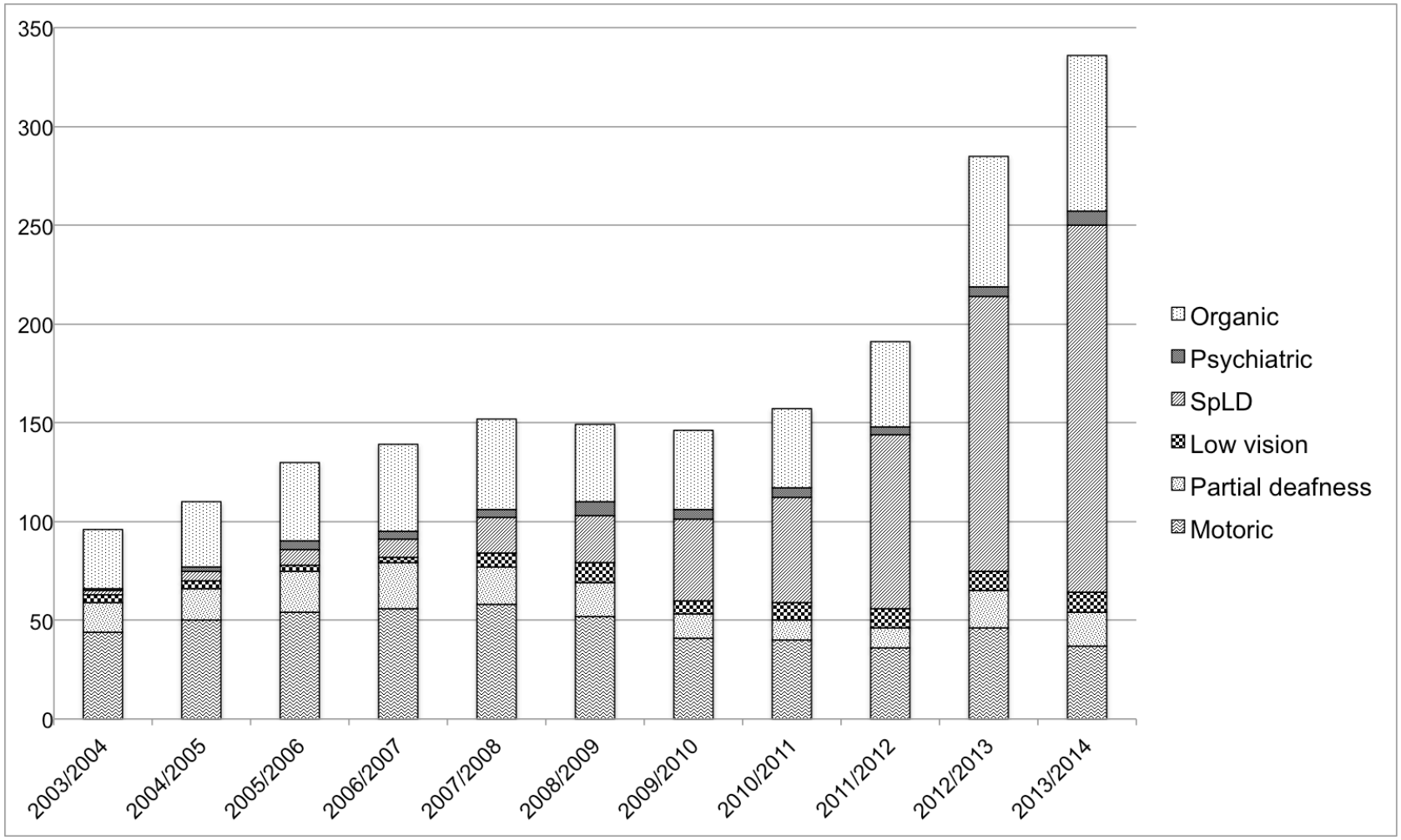
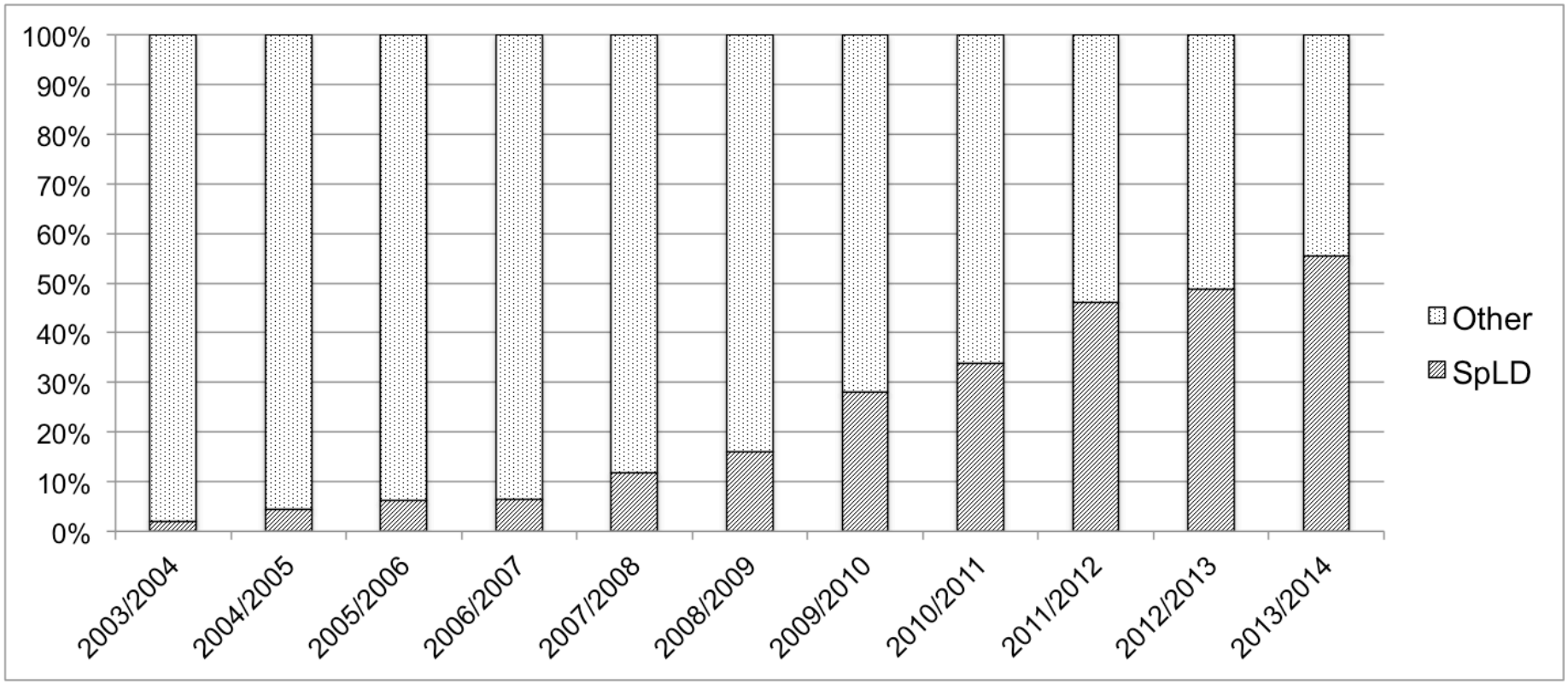
1. Students with Disability and Specific Learning Difficulties (SpLDs) at Politecnico di Milano, per year



1. Students with Specific Learning Difficulties (SpLD) at Politecnico di Milano, per year



1. The Politecnico di Milano Model

- Education is for adult life
  - To build a “professional self” (it’s important for everybody to become expert and exercise specific responsibilities in different contexts)
  - For employment, cultural and social responsibility

- Educational environments are small but complex and significant social and cultural contexts
  - Where people study, teach, work, cooperate, communicate, research
  - Many persons cooperate with different abilities and disabilities.
  - Everybody can experience autonomous and cooperative dimensions possibly supported by innovative strategies

1. The Politecnico di Milano Model

- At Politecnico di Milano
  - 340 young men and women with Disability and with Specific Lerarning Difficulties study to become engineer, architect or designer
- In Italy:
  - Two **special Laws** guarantee financial supports to organize special services to make the academic life more and more accessible.
  - **Each university receives funds** in relationships to the number of students with disability, the special projects which support them in studying and facing the first employment experiences.
  - **CNUDD and CALD groups the Dean's Delegate for Disability** of each university allowing them coordination, global policies and exchange of innovative strategies.

1. The Politecnico di Milano Model

- At Politecnico di Milano: **MultiChancePoliTeam** is the group of specialists which guarantees services to students with disabilities (www.polimi.it/disabilita)
  - A psycho-educational counseling
  - University attendance support (admission test, tutoring, personalized examinations, accessibility to the campus, administrative, accommodation and studying supports)
  - Teaching aids: conditions specifically suited to maximize the benefit of classroom and laboratory work by means of personalized and innovative technological teaching aids (Text To Speech & Automatic Speech Recognition technologies)

1. The Politecnico di Milano Model

- The **MultiChancePoliTeam** guarantees services to the students with disability:
  - Technological aids (HW and SW solutions for personal needs)
  - The Wireless Campus allows a personalized fruition of classrooms and laboratory activities, Internet and local services, ….
  - Distance Learning (only when strictly needed)
  - International mobility

1. The Politecnico di Milano Model

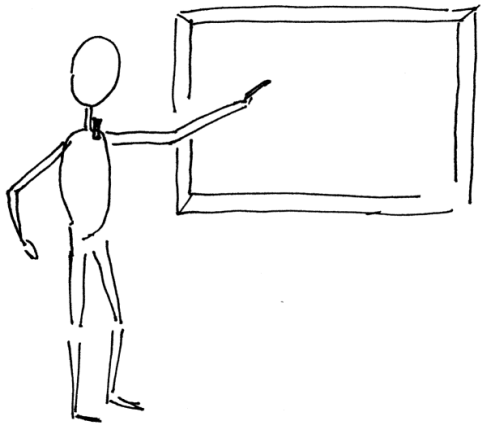
- Results in Employment
  - Students with disabilities with technical degrees from Politecnico di Milano: **0% unemployment rate** over 12 years
  - **First year** of employment **supported by the University** with government funds
  - All students, once they have experienced **good assistive technologies keep using it** for their private and professional lives
  - Programs help **employers better adapt the work environment** to persons with disabilities

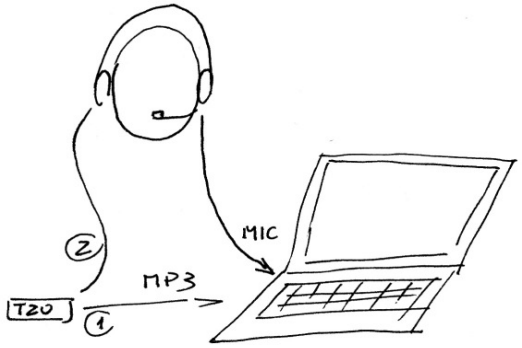
2. Research & Development

- The UBICAMPUS project
  - To navigate and explore a wireless campus
  - To obtain complete accessibility of global and local information (often changing daily)
  - To communicate with the other protagonists of the academic life
  - To handle emergencies and to be localized
  - To obtained personalized services based on a specific profile (**using an extended version of the WHO – ICF Model – named ICF***)
  - To adopt innovative solutions for independent life

2. Research & Development

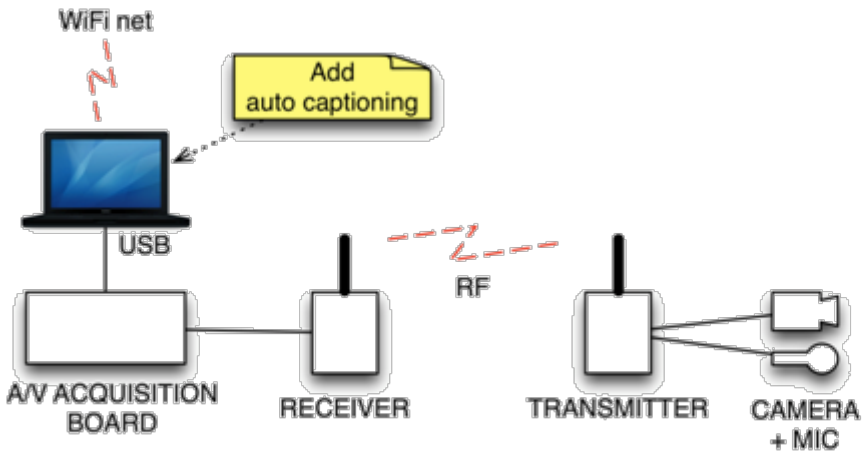
- Recording and converting lectures
- Allowing multimodal cooperation
- Creating guide-lines for teachers (to improve multimodal materials and lectures)
- Handling distance learning





2. Research & Development

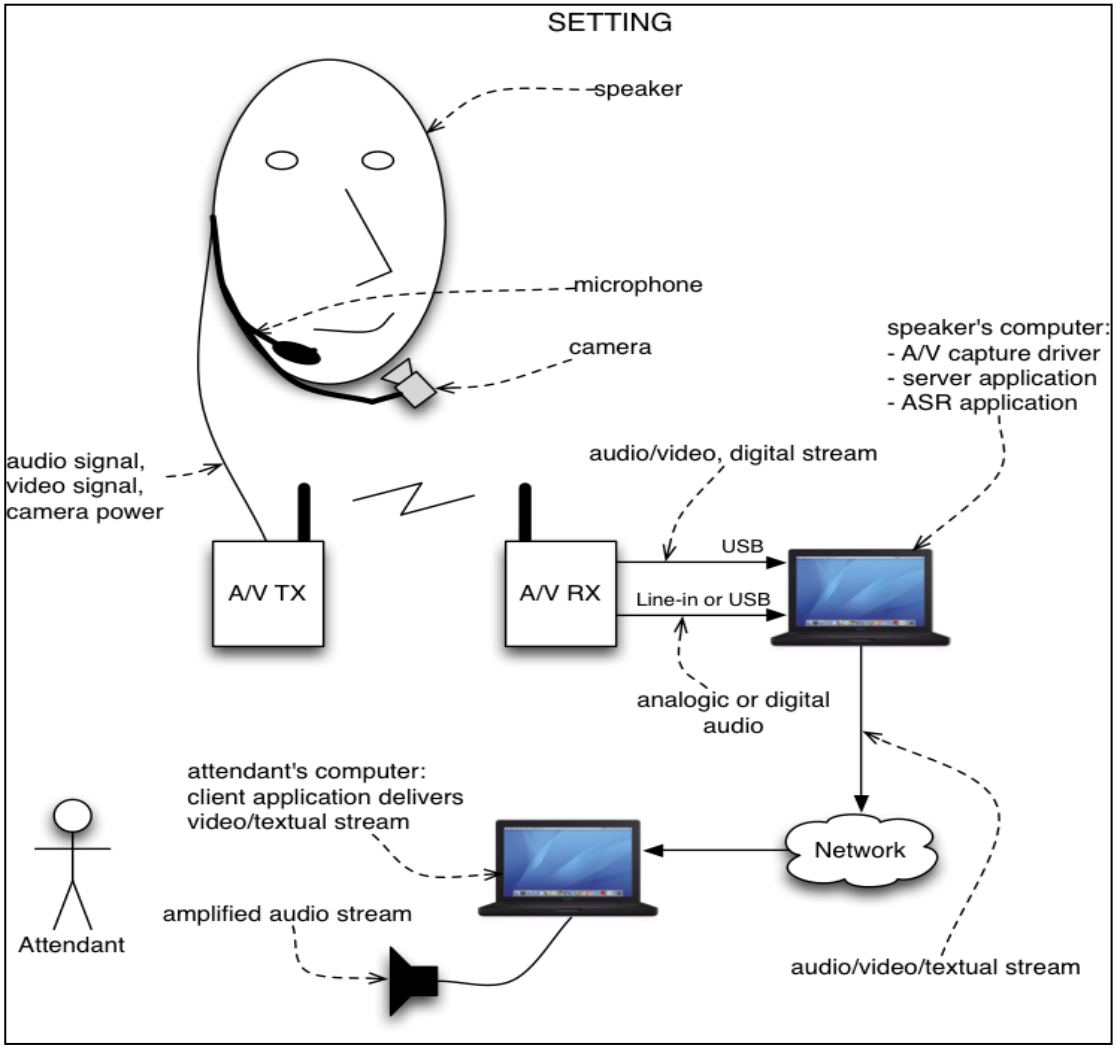
- The Campus Tools (CATS) project: multimodal access to lectures
  - Facilitate lip-reading for deaf or hard of hearing students
    - Video stream of lip movements
    - Audio
    - Captioning by ASR



CATS
Campus Tools for Students

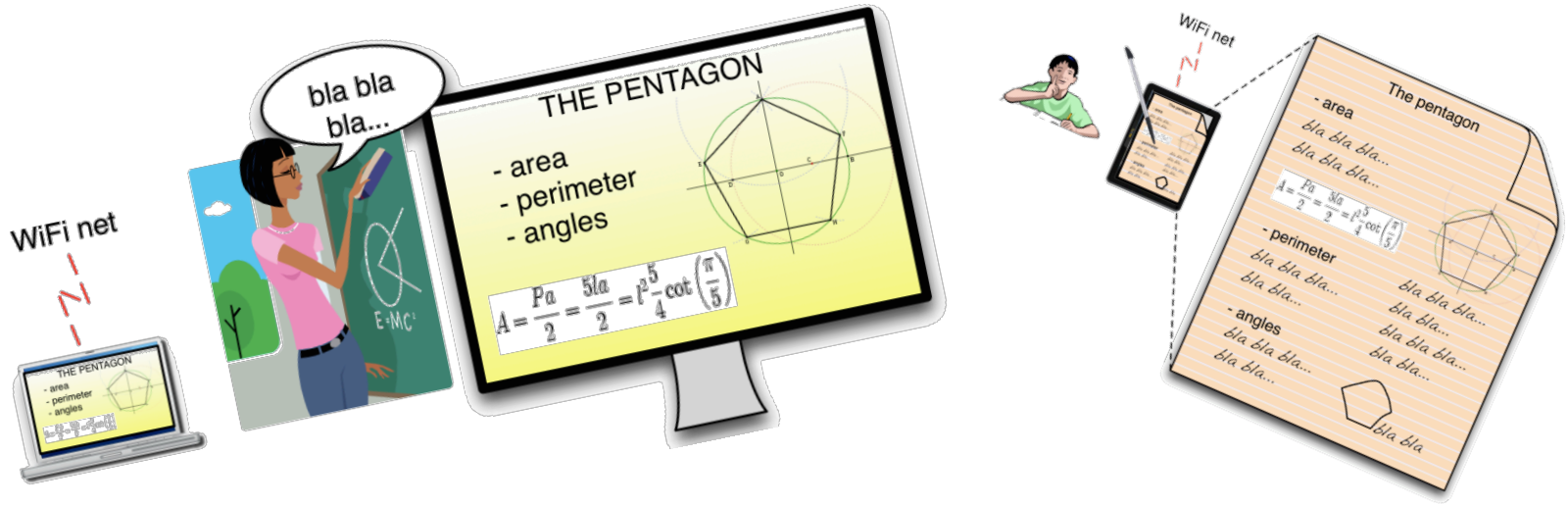
2. Research & Development - PoliLips

- Lips-reading for deaf students
- In a single integrated solution we mix the three information modalities we can collect from the teacher:
  - visual (lips-reading),
  - aural (ampl.signals),
  - and textual (generated by an ASR application)



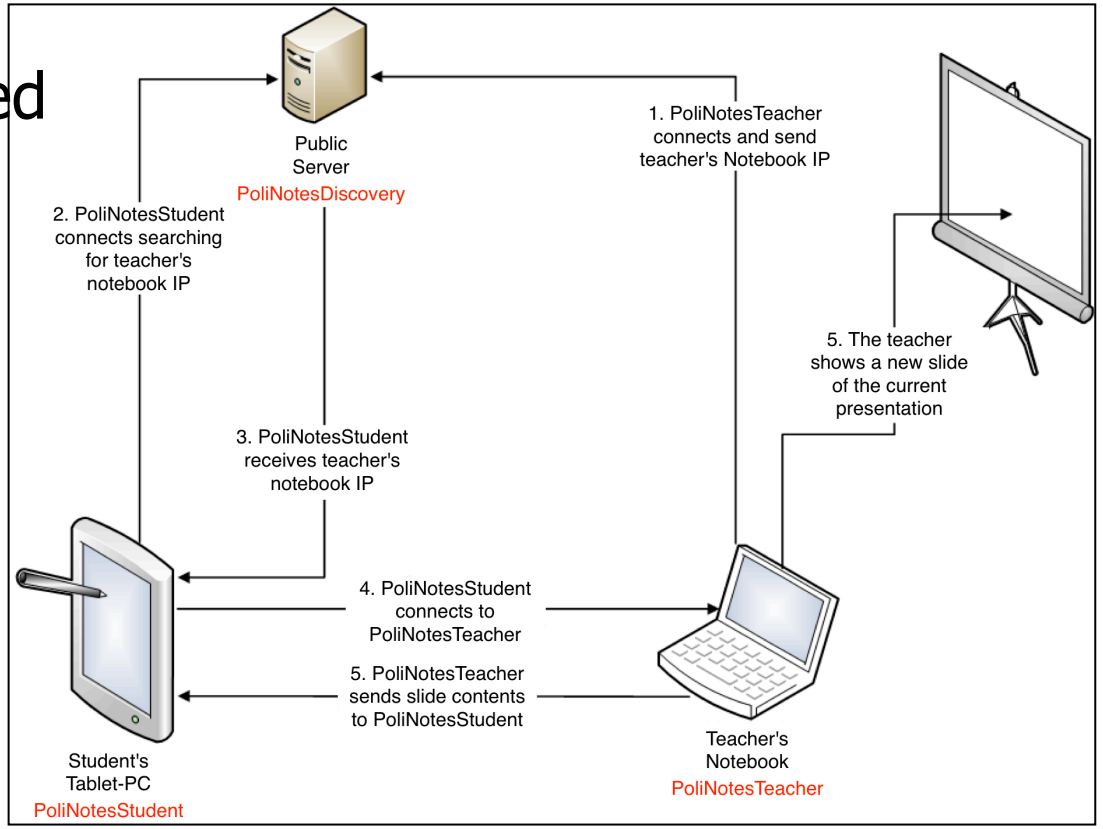
2. Research & Development

- The Campus Tools (CATS) project: multimodal access to lectures (cont.)
  - To facilitate notetaking
  - To mix slide objects and hand notes: PoliNotes
  - Additional innovative devices: IrisPen, IrisNote, LiveScribe, …



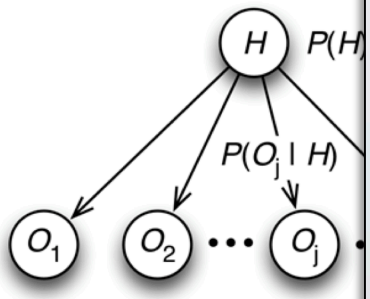
2. Research & Development - PoliNotes

- Slides shown by the teacher are subdivided in *objects*
- And sent *in real time* to the student's Tablet-PC
- The contents can be *rearranged* on the electronic sheet
- The student can also add *notes and drawings* using a stylus



2. Research & Devel. PoliNotes

Naïve Bayes

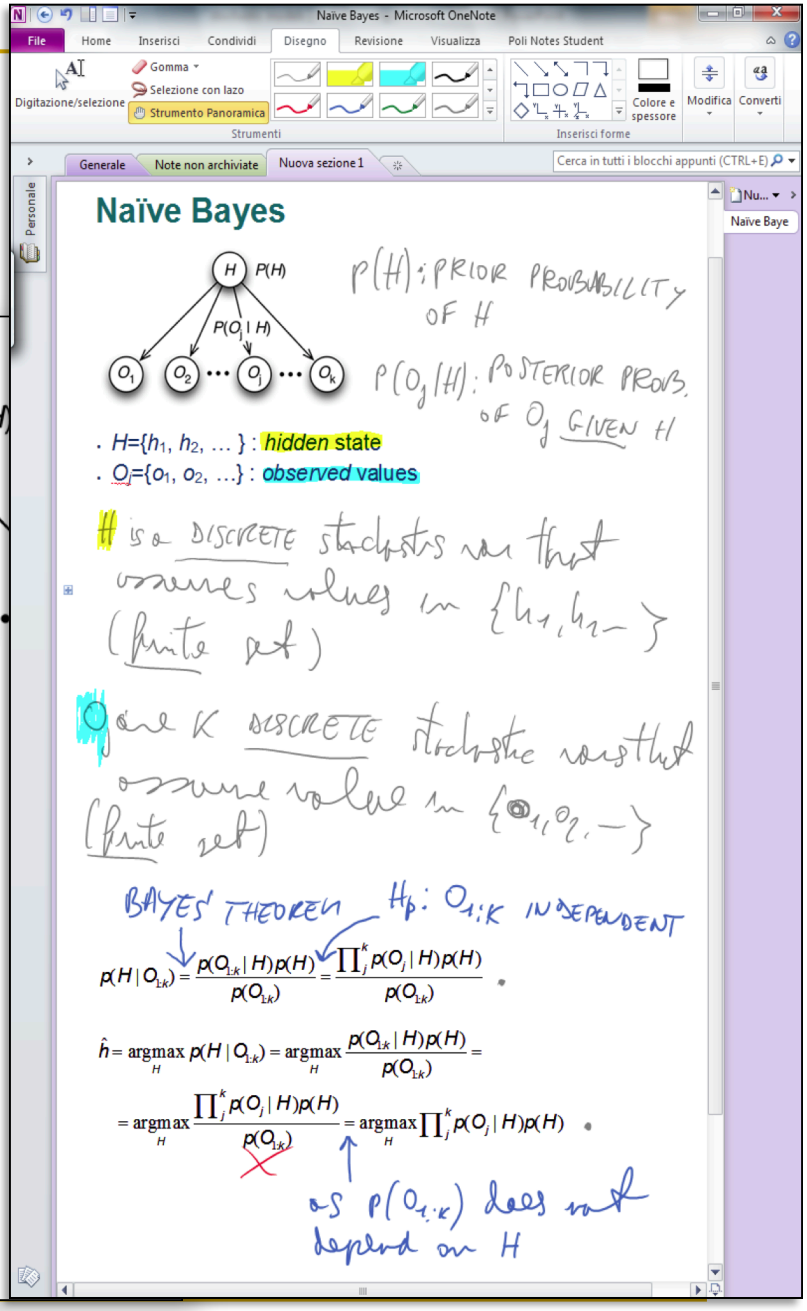


- $H=\{h_1, h_2, \dots\}$: *hidden* state
- $O_j=\{o_1, o_2, \dots\}$: *observed* values

$$p(H \mid O_{1:k}) = \frac{p(O_{1:k} \mid H)p(H)}{p(O_{1:k})} = \frac{\prod_j^k p(O_j \mid H)p(H)}{p(O_{1:k})}$$

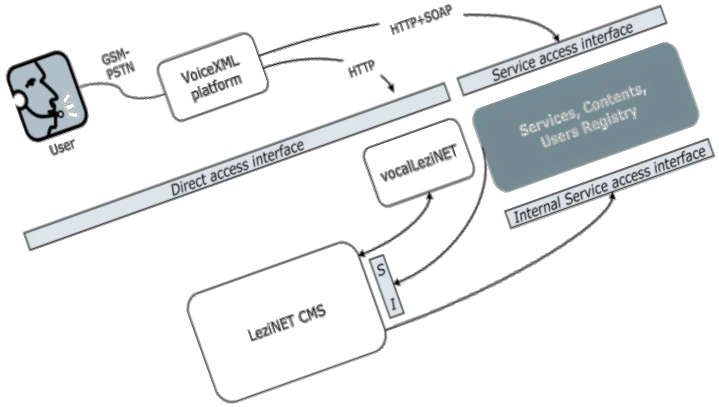
$$\hat{h} = \underset{H}{\operatorname{argmax}}\, p(H \mid O_{1:k}) = \underset{H}{\operatorname{argmax}} \frac{p(O_{1:k} \mid H)p(H)}{p(O_{1:k})} =$$

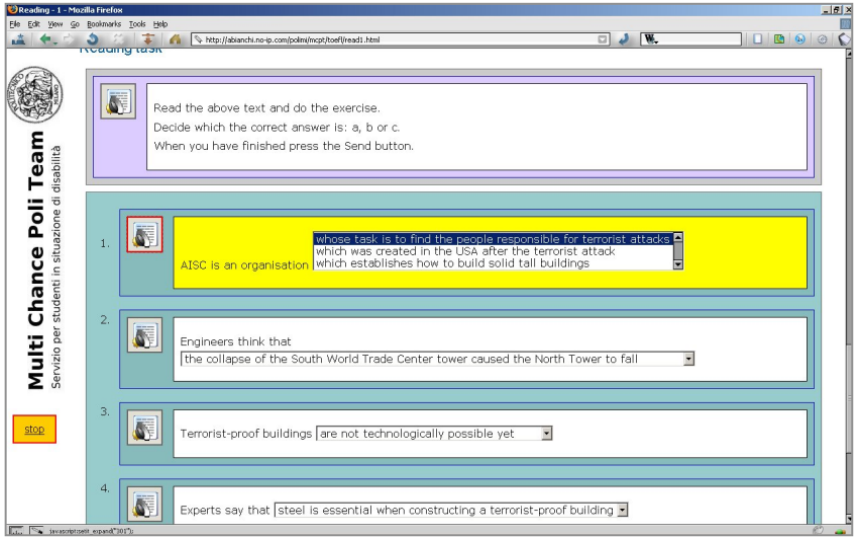
$$= \underset{H}{\operatorname{argmax}} \frac{\prod_j^k p(O_j \mid H)p(H)}{p(O_{1:k})} = \underset{H}{\operatorname{argmax}} \prod_j^k p(O_j \mid H)p(H)$$



2. Research & Development

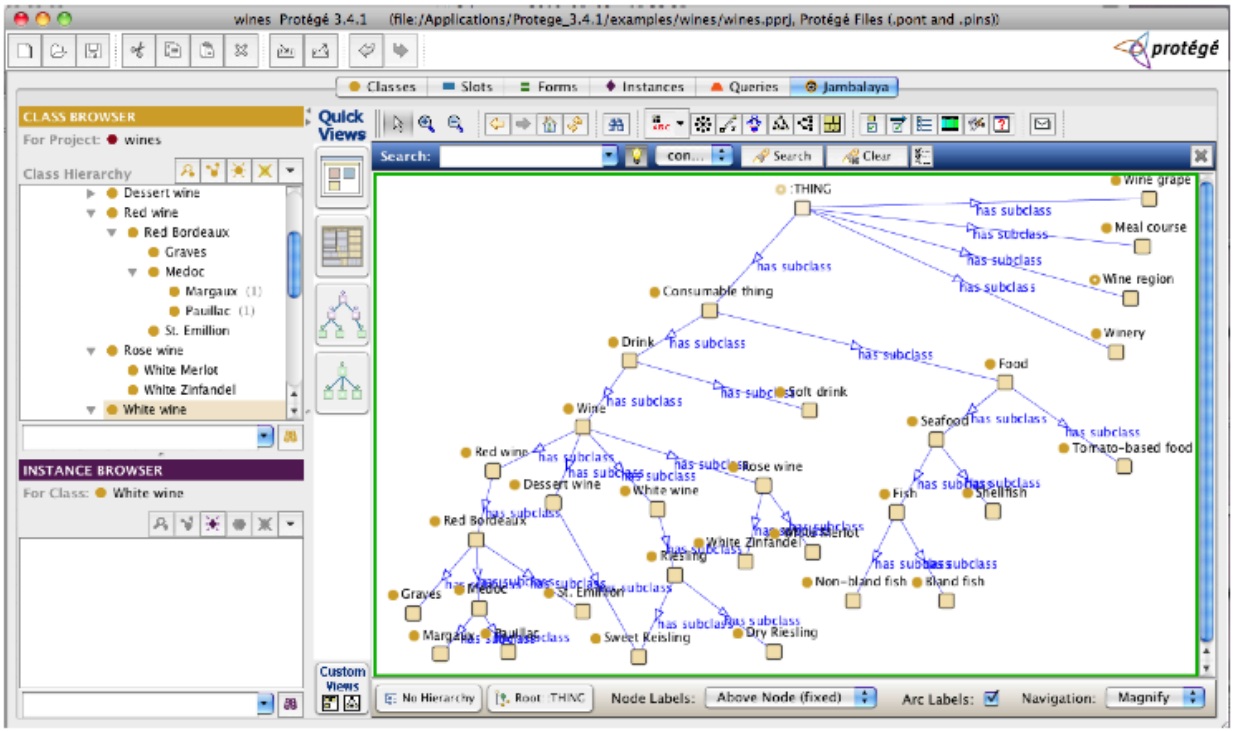
- Project: Natural Language Processing for learning and communicative impairments
  - To improve accessibility of textual and vocal contents
  - To support language learning and communication
  - To analyse vocal and communicative skills
  - To predict, summarize, correct, and support verbal and non verbal expression



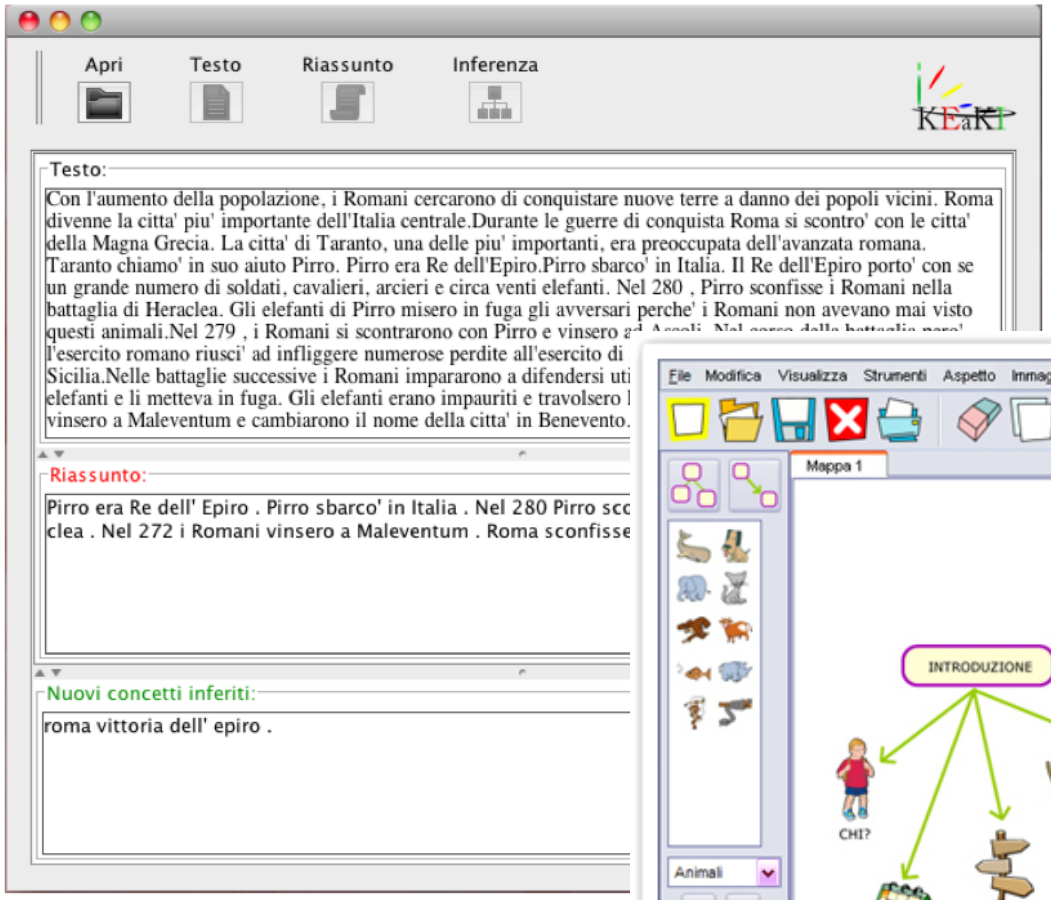


2. Research & Development: Text Semplification – Keaki Project

- Domain description
  - Based on ontology (a knowledge base)
- Summarization
- Inference
- Mental map generation for Dyslexia



2. Research & Development: Keaki Project

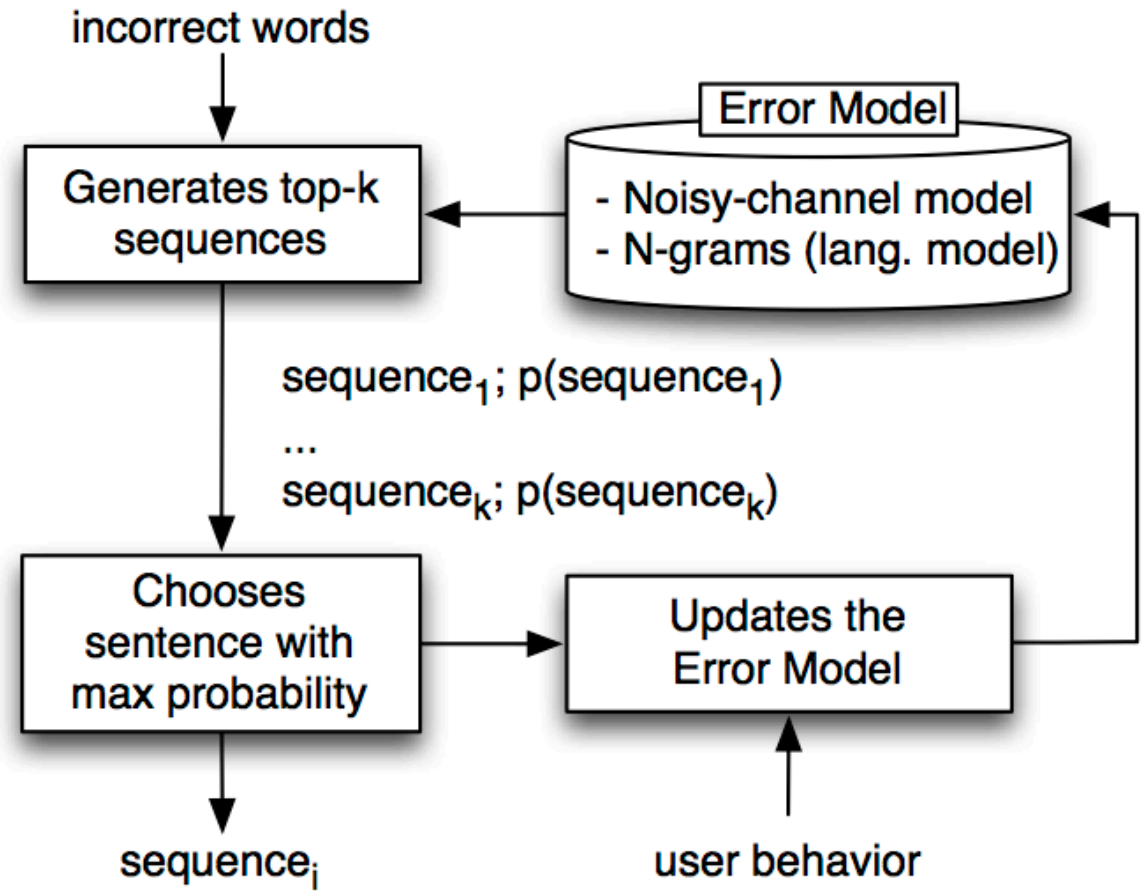


arcslab
adaptable, relational and cognitive software environments

G3ict

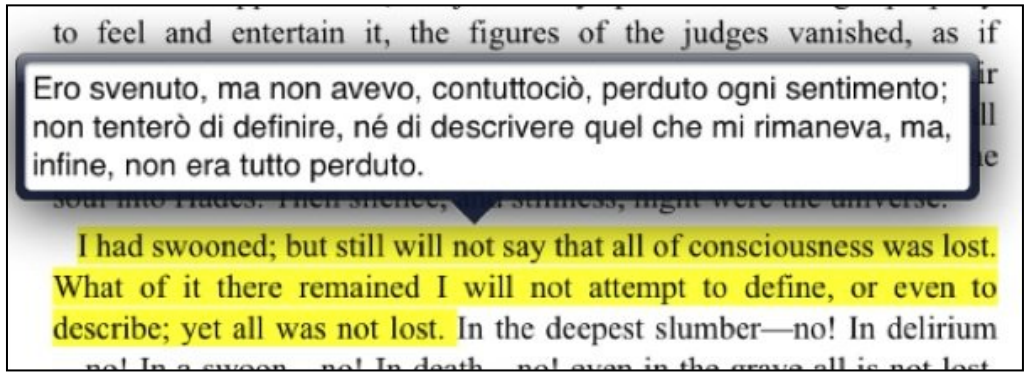
POLITECNICO MILANO

2. PoliSpell: an adaptive spellchecker and predictor for people with dyslexia

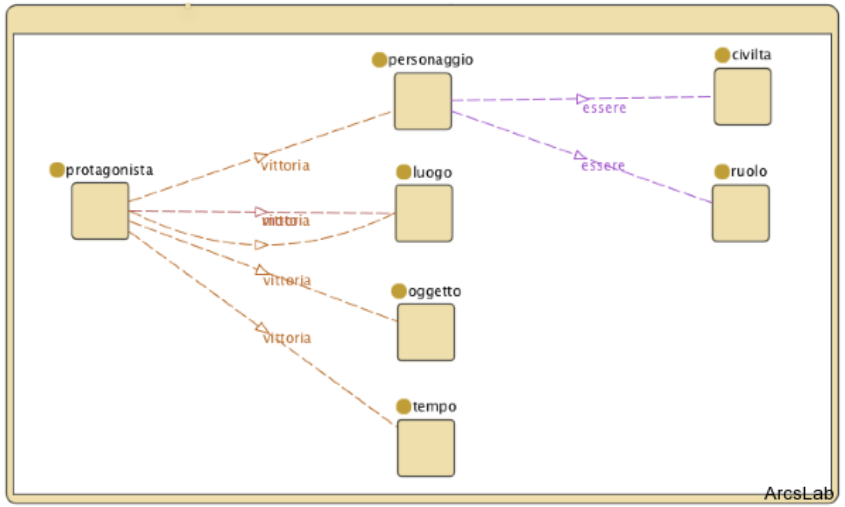


2. To improve Information Literacy

- BiText: a multilingual eBook reader
  - Exploits eBook natural dynamicity
  - Show translation, on demand
  - Could be extended for iconic languages

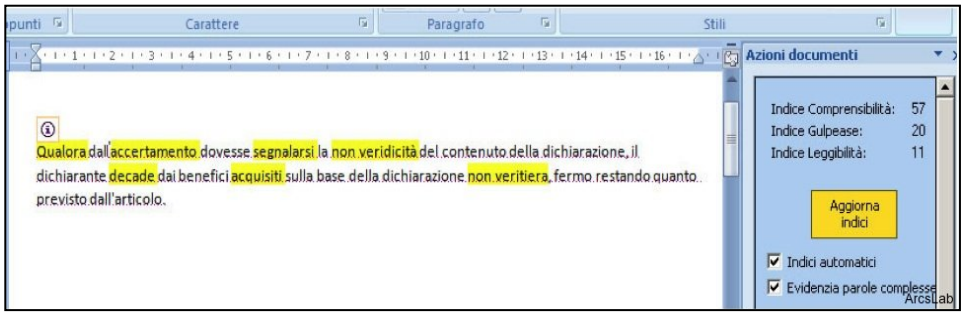


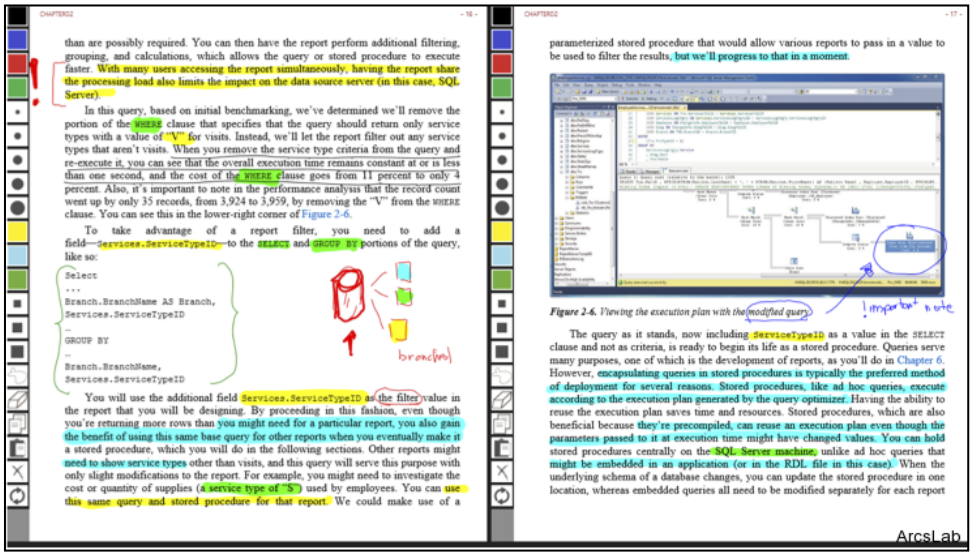
- KEaKI: summary and mental map
  - Generates a summary
  - Generates a simple mental map
  - Facilitates text comprehension



2. To improve Information Literacy

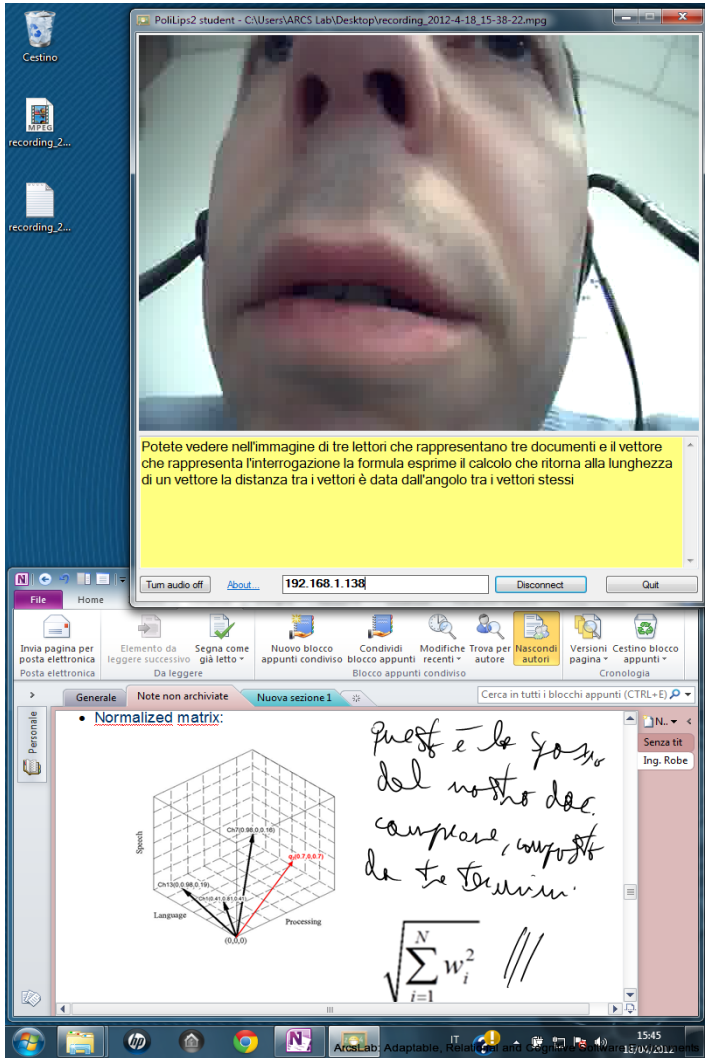
- SPARTA2: authoring of highly accessible texts
  - Calculates the readability level
  - Suggests where the critical parts are, and how to modify them
- PoliBook: electronic text book
  - Emulates a paper book
  - Permits students to add notes
  - Permits students to add new pages





2. To improve Information Literacy

- PoliNotes: note-taking
  - Mixes teacher's slides and student's notes on a tablet
  - Slide objects can be freely edited
- PoliLips: leap-reading
  - Camera and mic capture video and audio
  - ASR adds caption
  - The student receive such information on her laptop
- PoliNotes and PoliLips working together…



2. Document Accessibility

- **Content accessibility** in their different type: text, images, formulas
- **Customizability:** how to access / edit / personalize contents
- **Students Special Needs**: the multimodal approach

Visually Impaired:

- vocalization
- adaptability of font size, color, contrast
- customizability of layout based on the reading device
- reworking

Blind:

- vocalization
- description of images and formulas
- reworking

Learning Disabilities:

- vocalization
- reworking

3. Policies with Academic Actors and Stackholders

- Work in progress
- With the University Library System in our County (Lombardia):
  → A detailed document
  - To ask publishers for accessible texts
  - To adopt a specific University Library Licence for accessibility

3. Paper book

- Level 00 = paper book → not accessible
- Self production of digital version required:
  - To scan (Time!), > es. IRIScan Book
  - To recognize the text, > es. ReadIris Pro
  - To vocalize the text > es.Personal Reader, Text Aloud for SpLD; JAWS for blindness
  - To edit the text > es. Cmap. SuperMappe, ecc.
- Results:
  - You can vocalize and edit the text
  - You don't have alternative content for images and formulas

3. Images

- Level 0 = images (PDF, JPEG, TIFF, …)
  → not accessible
- Self production of digital version required:
  - To recognize the text,
  - To vocalize the text,
  - To edit the text
- Results:
  - You can vocalize and edit the text
  - You don't have alternative content for images and formulas

3. PDF

- Level 1 = PDF text → accessible IF
  - WELL produced → optimized for digital use
  - Distilled as a PDF file (not printed as a PDF)
  - Organized with structural tags
  - Enriched with alternative content for image
  - Open format → no DRM protection
- Results:
  - You can vocalize and partially adapting the text

http://www.adobe.com/accessibility/products/acrobat/training.html

http://pdf.editme.com/pdfua-mathml

3. PDF – accessibility support

- Provided by the standard:
  - Alt text for non-text elements
  - Structural tags (<h1>, <art>, <formula>, <index>, <section>, …)
  - Indication of the language used in the doc
  - Indication of the reading of the text
- Provided by the Acrobat Reader:
  - High contrast colors
  - Elements selection on the page by the keyboard
  - Vocalizer
  - Reading Mode: "reflowed text view", that allows you to enlarge font
  - JAWS has a specific way to read PDF in Acrobat (with some issues…)

3. PDF – weaknesses

- PDF accessibility depends on authors and distillers:
  - Authors should:
    - Enter alternative text for images
    - Enter structural tags
    - Include text language
    - Include Reading Order indication
  - Distillers should:
    - Insert the text so that it is usable (many distillers don't)
    - Avoid ligatures between characters, which the player is not able to recognize
    - Insert spacing between words, otherwise the "reflowed text view" does not work
  - Mathematical formulas are not readable by screen readers and can not be replaced by alternative text
  - The "reflowed text view" doesn't work on all the texts (eg. text in tables)

3. PDF – strengths

- Consolidated and mature Standard:
  - There are readers for all platforms, provided by Adobe and by third-parties
  - PDF allows you to accurately replicate the layout of a printed book

http://www.adobe.com/accessibility/products/acrobat/training.html

http://pdf.editme.com/pdfua-mathml

3. EPUB 3.0

- Level 2 = EPUB 3.0 → accessible IF
  - WELL produced → WCAG2
  - Open format → no DRM
- Results:
  - You can vocalize the text
  - You can adapt the text
  - You can modify the layout (not only "text reflowing"…) depending on the current device
  - You can have alternative content for image and formulas

http://www.idpf.org/accessibility/guidelines/

3. EPUB 3.0 – accessibility support

- Provided by the standard:
  - Alt text for non-text elements
  - Structural tags (HTML5 and / or WAI-ARIA)
  - Specified language used in the doc
  - Specified reading order of the text
  - Audio book (DAISY) with synchronization (SMIL)
  - Tags for specific pronunciation (PLS lexicon, SSML, CSS3 speech)
  - Accessibility of any interactive content (WAI-ARIA)
  - Content / style Separation (HTML / CSS)
  - MathML for formulas (MathML provides Alt text and alt img for formulas)

3. EPUB 3.0 – accessibility support

- Provided by readers:
  - There are different types of EPUB readers :
    - readers with / without vocalization
    - readers without support MathML, with support partial / total MathML
  - The reader is typically a sort of web embedded browser, and then typically supports operations like:
    - enlargement of typefaces
    - elimination of CSS
    - high contrast colors
    - support screen readers such as JAWS
    - reflow of the content, depending on the size of the display

3. EPUB 3.0– weaknesses

- Accessibility depends on publishers, authors and readers
  - Publishers: must follow a specific production line
  - Authors: must follow the accessibility recommendations (alt text, colors, page layout, etc.).
  - Readers: must support operations such as high-contrast colors, etc.
- Very recent standard
  - The readers are often very simple and compatibility with EPUB 3 is varies a lot
  - We currently have better readers on mobile devices than on PCs

3. EPUB 3.0– strengths

- Great adaptability of content to the device
- More controllable accessibility, depending on the author (see problems that can occur with PDF distillers)
- There are readers for all platforms
- There are no problems in vocalization (see PDF)
- It's difficult that a well-equipped user finds EPUB books inaccessible

greatest potential
less consolidated use

3. Asking for accessible files

- **Level 1 PDF –** with these specifications:
  - Extractable text
  - Alt text for non-text elements
  - Structural tags
  - Language specified in the doc
  - Reading order specified
  - But… there are problems in accessibility of formulas
- **Level 2 EPUB3 –** with these specifications:

- HTML5 (structural tags, etc.)
- WCAG2.0
- WAI-ARIA if necessary
- MathML for formulas, with alternative text and images

Summing up: 2 actual accessibility levels

		What it's needed to produce an accessible version…	**What you can obtain**	**Issues**
Level 00 ***Not accessible***	Paper book	- scanning, - OCR	- text vocalization, - text editing	Time ! Difficult for visual impaired / blind people
Level 0 ***Not accessible***	PDF, JPEG; TIFF ecc. image	- OCR	- text vocalization, - text editing	Time ! Difficult for visual impaired / blind people
→ **Level 1**	PDF text	- producing well-defined PDFs, - checking how the distiller generates the PDF	- text vocalization, - text reflowing, - personalizing fonts, colours, etc.	Depending on file "quality"
→ **Level 2**	EPUB 3.0	- Applying WGAC2	- text vocalization, - personalizing fonts, colours, etc., - personalizing the layout, - alternative text available for images and formulas	Depending on reader "quality"

3. Policies with Academic Actors and Stackholders

- Work in progress
- Marrakech Treaty (June 2013)
  - to Facilitate Access to Published Works by Visually Impaired Persons and Persons with Print Disabilities
- Readers/publishers: coordinated Political Actions
- OpenAccess Policies
- Dissemination and use of ICT4IAL Guidelines