Universidad del País Vasco

Euskal Herriko Unibertsitatea

The Digital Accessibility from the User Point of View

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INFORMATIKA FAKULTATEA

Egokituz (≈*adapting*)

- Egokituz is the Laboratory of Human-Computer Interaction for Special Needs
  - Created for the application of HCI methodologies and technologies to enhance the inclusion and digital accessibility of people with diverse types of disabilities.
  - Egokituz was founded in 1985 by three "hardware people"
  - Soon we discovered the need for HCI theories, methodologies and tools, in order to involve the user
    - User Centred Design approach
    - Usability
    - Cognitive Ergonomics
    - Formal methods for evaluation of the interaction
    - etc.

A bit of "history"

- While we worked on
  - Augmentative and Alternative Communication (portable computing devices)
  - A&A manipulation and mobility (assistive robots)
  - Web accessibility
    - Automatic evaluation tools
    - Transcoding methods
    - Remote evaluation tools
  - Adaptive accessible ubiquitous environments
  - Cognitive accessibility

- We took part in the "definition" of the field
  - European team that performed the TIDE Market Survey (1990)
  - EC Accessibility plans as expert, reviewer, evaluator, advisor
    - TIDE program, VI and VII FP, 2020…
  - IFIP Technical Committee 13 on HCI
  - Management Committee of the
    - COST291 bis (Telecommunications: Access for Disabled People and Elderly) and
    - COST 199 ter (Accessibility of Services and Terminals for Next Generation Networks)

We learned from many expert people


Luis Azevedo.
CAPS/T U Lisbon &


Brian Shackel


Gerrit Van Der Veer
(UL Amsterdam)

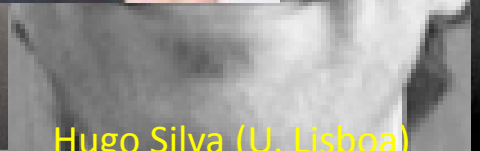

Simon Harper (U
Manchester)

Yeliz Yeşilada
(METU NCC Cyprus)

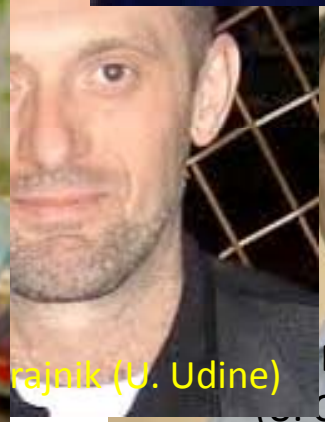

Anton Civit
U. Sevilla


Chieko Asakawa.
IBM research Tokio


Philippe Palenque (U.
Toulouse)


Hugo Silva (U. Lisboa)


Albert Cook
(U. Alberta)


rajnik (U. Udine)


Encarnaçao
(U. C. Lisboa)

We learned a lot from the users

- Motor impaired people (Manolo Lobato, Elkartu…)
- Deaf People (Federaciones Vasca y Andaluza de Personas Sordas, AransGi …)
- Blind People (ONCE, Begiris…)
- Cognitively impaired people (GUREAK…)
- Multiple disabilities (ASPACE…)
- etc.


Manuel Lobato (CEAPAT)

We learned from our (and sometimes others') errors

- Making mistakes is unavoidable
- What is important is to detect, analyse and avoid them in the future

Three (wrong) reasons to start a R&D project

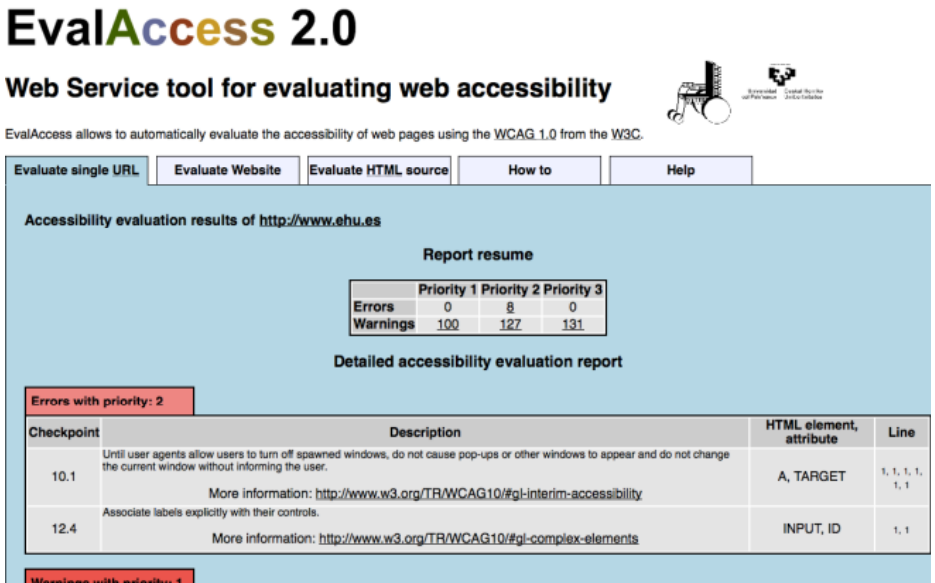
1. We can do it better and cheaper

- In 1985 we were approached to design a communicator for a girl affected by CP
  - There were some portable communicators in the market but they were expensive
  - We developed a chipper solid portable communicator: **Lamia**
  - we didn't charge any Labour, R&D Equipment, Premises' costs, Overheads, etc.
- repairing and maintenance, software updating, and functionality extension?
- We discovered that we couldn't replace a company with a good customer service

1. We can do it better and cheaper

- Today other delivery systems are possible
  - Free software available in Internet
  - 3D printable devices

- ¿Can these systems give sustainable and trustful support to people with disabilities?



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2. "A solution in search of a problem"

- Good willing technologists **imagine** applications to augment user capacities or alternate lost abilities
  - But the proposed solutions are not always convenient nor accepted by the target users
  - E.g.: a sonar torch for blind people to **substitute** the white cane
    - A reputed R&D team developed in the 90's an advanced piece of technology, solid and sound
    - They soon discovered that blind users rejected to try it because it hardly substitutes the information provided by the white cane.

- To be viable a project always requires a previous sound study of user needs.

3. Technology availability-driven projects

- We, technologists, are willing to apply fashionable technology advancements
- Usually we have fancy expensive technology at reach
- This approach drives to solutions that are
  - more expensive than needed
  - more complex than needed
  - hardly acceptable by users (because they stigmatize or tag them)

4. Founding availability-driven projects

- For many reasons, money inverted (mainly by EC) in R&D to develop technology for people with disabilities does no look to produce enough results for people with disabilities
  - A possible cause:
    - Reorientation of many research institutions to Accessibility and eHealth areas, because of the availability of funds in this area
    - Even if they lack experience and training in these fields
  - A possible effect: not innovation
    - Some proposals lack novelty and contribution: "variations over the same theme"
    - Leading to ignore previous developments and "reinvent the wheel"

Reviewers' Joke

- Projects rejected in other calls issued by different EC research areas can be recycled to accessibility calls:
- Just add "*for people with disabilities and elderly people*" to the title
  - E.g.
    - From " Atomic Rolling Skates"
    - To: "Atomic Rolling Skates *for people with disabilities and elderly people*"

Technology vs. Users

(when the user is the enemy)

1. This is not my problem

- 2001: a session in a conference on Digital Accessibility in Slovenia
- After a mostly technological presentation made by a brilliant, young speaker, someone made him a question:
  - Do you think that your development will be usable and accessible for the target population with disabilities you are considering?

- This is not my problem. I am an Engineer

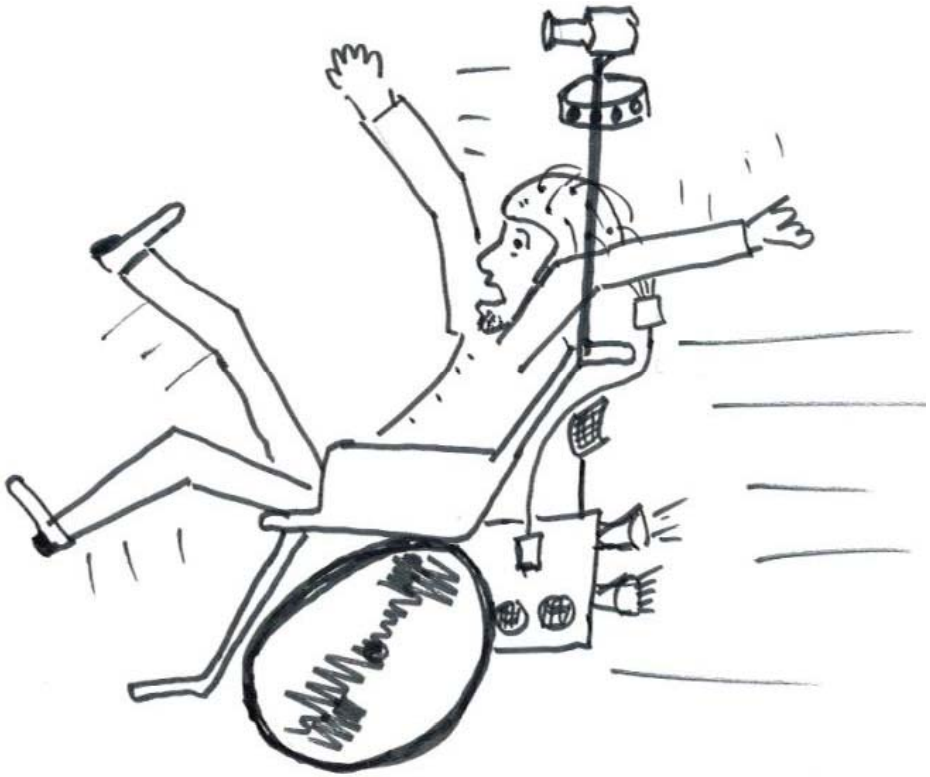
2. The proliferation of smart wheelchairs

- Almost any Robotic laboratory in the world has developed a Smart wheelchair (we too)
  - They are endowed with last generation sensors (laser, video cameras, etc.) and controllers.
  - They are able to autonomously drive to a required destination.
- **The main problem is the user:**
  - Smart wheelchairs are fully autonomous and they do not know how to cope with the estrange being sitting on them.
- Human-wheelchair interface has to solve two main issues:
  - **Who is in control?**
  - **How can the user and the wheelchair efficiently communicate**

2. The proliferation of smart wheelchairs: control

Control

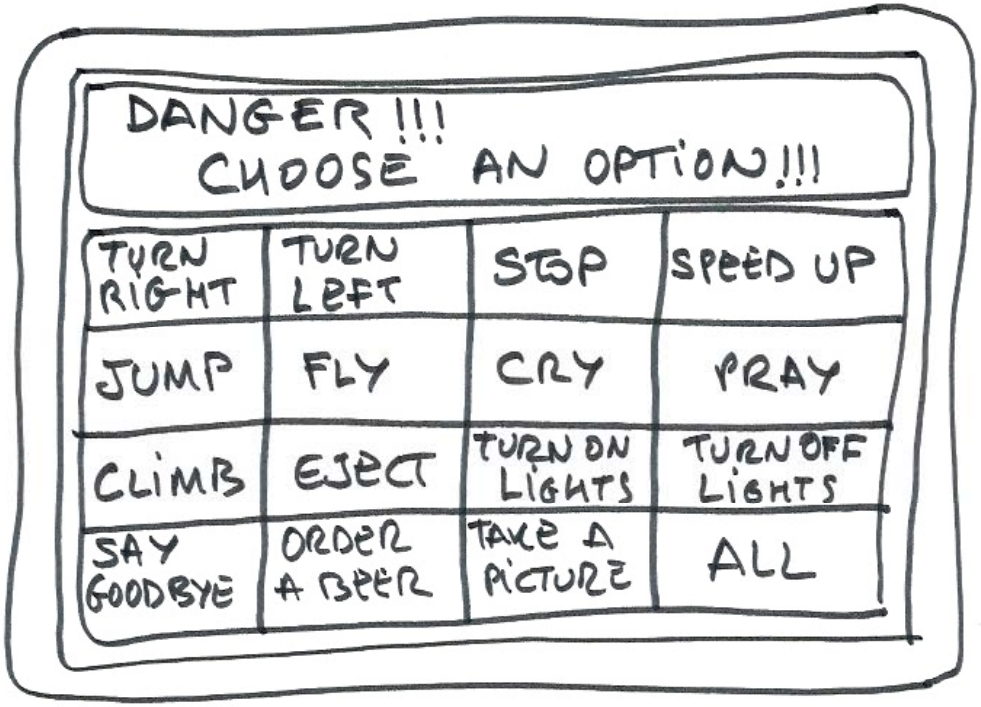
- Who takes decisions?
- Shared Control/Mixed Initiative: both agents (human and wheelchair)
  - Collaborate to made decisions
  - Assume full control *when it is necessary*
- Both agents have to know the other's abilities
  - Mental model about the partner
  - Negotiate conflicts



2. The proliferation of smart wheelchairs: communication

Communication

- How can the user and the wheelchair and understand each other and efficiently communicate?
  - Avoid too complex interfaces
  - Use Adaptive Intelligent user interfaces based on user/context/task models



3. Cultural Barriers to Assistive Technology*

- The cultural background of AT users (and their context influence the success or failure of AT acceptance/rejection.
- The users native culture, language, beliefs, and customs must be taken into account.
- To force individuals to acquire and try to use technology that they do not believe in or cannot accept conduces to AT failure.
  - Matching even the best, most complex, and most expensive high-tech AT with users who are culturally unprepared or unwilling to accept and use such devices will still result in AT failure.

* Evmenova A. Cultural Barriers to Assistive Technology. SPED 6701. East Carolina University.

3. Cultural diversity: translations

- CHAT was a pioneer Augmentative and Alternative Communication system developed by Dundee University in the 90's to help people with severe communication restrictions
  - Basically it was a text-to-speech system with pre-programmed sentences, structured by a model considering mood, phase of the conversation, etc.
- We were allowed to translate it form English to Basque language
- The Basque version did not functioned well: users found...
  - ...too many choices to start a conversation:
    - The small talk in Basque tends to be much shorter that in English: "direct to the spot".
  - ...too few choices to finish the encounter.
    - The farewell talk tends to be much larger in Basque: Just "goodbye" may result rude.
- The conversation model had to be completely redesigned

4. User testing without users

- The definitive way to validate a product with people with disabilities are formal user test with appropriate samples of users
  - It is required by serious journals and conferences
- But they are frequently performed with
  - **people without disabilities (sometimes artificially put in disabled conditions)**
  - even if real users are recruited, it often happens
    - No representative samples of users
    - No real conditions: laboratory places, with simulated environments, no real tasks...
    - Inadequate hypothesis and test:
      - evaluations that do not conclude the accessibility and usability of the product but other characteristics

User testing with non disabled students

- People with disabilities
  - Have different cognitive structure and functions
  - Have developed diverse strategies to avoid barriers

- E.g.: An student with covered eyes is not a blind user

5. Technology acceptance and rejection

Designers often report user rejection of their designs

- Do people with disabilities know their needs?

Possible reasons for rejection:

- **Tagging users**
  - Some equipment make disability more notorious
  - Users tend to prefer discrete devices
- **Misrepresenting users**
  - Some equipment (e.g. communicators with voice output) represents the user
  - Users tend to reject equipment that clearly differ to their own image
- **Increasing effort**
  - Complex interaction interface
  - Some equipment increases user effort to produce an output similar to the one produced by themselves

[1] Phillips B., Zhao H. Predictors of assistive technology abandonment. Assist. Technol. 1993;5(1):36-45.

Deceptive diffusion of results

R&D diffusion

- A metric for the quality of the research are publications in sound scientific journals
- Research institutions also promote public diffusion of their result in public media (TV, newspapers, etc.)
- The information that arrives to the general public is not always completely trustful
  - Because the journalists prefer impacting news
  - Because they misunderstand important details
  - Or because the researchers are not completely clear

Users' participation

Users participation

- Users are the key to
  - Know about their real needs
  - Analyse real accessibility barriers
  - Study the strategies they use to avoid barriers
  - Determine whether a design is useful or not
- Evaluations with real users are of vital importance
  - Selecting a sample of participants adequate
  - Taking care of ethical, and practical issues
- **When users participate in the complete process**
  - The possibility of design failures decrease
  - Even user with cognitive disabilities can participate if they are provide with adequate instruments

Elegune: a sheltered social network for people with cognitive disabilities

- GUREAK is a group of sheltered industries to provide employment to people with cognitive impairments
  - Workers having some experience in using computers for work or leisure were interested in using networks, such as Facebook but they were dissuaded by the difficulty they had in understanding and using them.

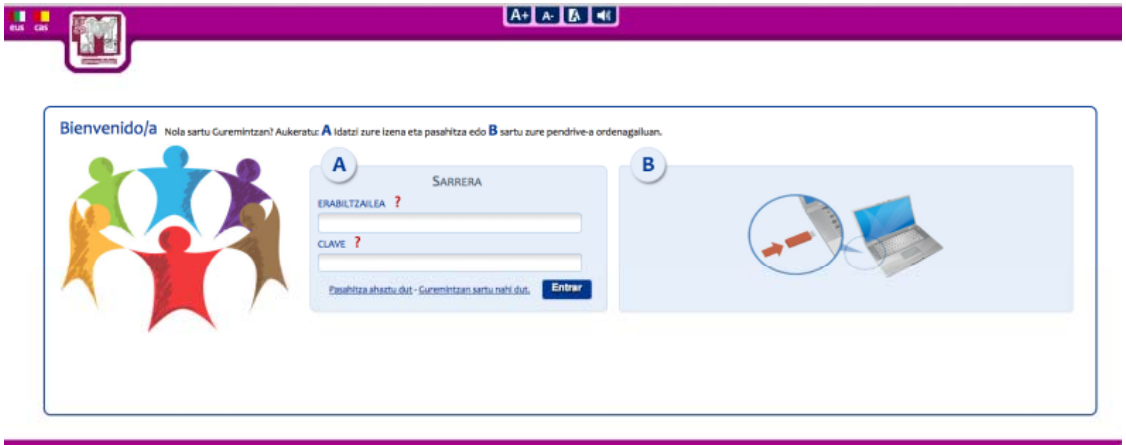
- GUREAK decided to create a sheltered social network
  - to **train** people with cognitive disabilities in using this type of web application.
  - to **monitor** the users' ability to behave in social networks in order to avoid any danger caused by inappropriate use.

People with cognitive disabilities in Participatory Design

- Elegune was designed with the **close participation of the users**
  - to collect their objectives, interest, likes, and restrictions
- **Special procedures** for participatory design with people with cognitive disabilities
  - Each consultation was designed in such a way as to make an answer possible
  - E.g.: , paper mock-up versions initially used to identify the requirements and difficulties that users have in using them

We learned that

- **Participatory design with people with cognitive disabilities**
  - It is possible provided that **adequate procedures** are designed to collect their opinions.
  - It allows a **progressive development** based on users' needs and capabilities, always ensuring their understanding of the application.
  - It **minimizes** the possibility of including **accessibility barriers**.
  - It **increases** the users' **affinity** to the resulting application and its **usage**
  - Elegune in YouTube:
    - Search Guremintza or click
    - http://www.youtube.com/watch?v=IOTChYnzzPE&feature=youtu.be



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Conclusions

- Users are the key to
  - Know about real needs
  - Analyse actual accessibility barriers
  - Study the strategies they use to avoid barriers
  - Determine whether a design is useful or not
- When users participate in the complete process
  - The possibility of design failures decrease
  - Even user with cognitive disabilities can participate if they are provide with adequate instruments
- Evaluations with real users are of vital importance
  - Selecting a sample of participants adequate
  - Taking care of ethical, and practical issues
  - Paid students can help to find initial design mistakes, but they are not real users

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