Multimodal Interaction

Case Study – EU GUIDE Project

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Contents

• Scope

• User study

• Design

• Development
Users and new markets

Scope

Ageing-related impairments and preferences

Need for targeted services and adaptation, but limited technology and knowledge support for developers

New Business opportunities around „Senior TV”, but face lack of development support in addressing ageing-related issues.

Companies already start to address needs of elderly society (→ “Senior TV”), but
Technical developments - Platforms

Hybrid Web, TV services, video communication & social media apps on TV add complexity to established and accepted concepts, but could support services fostering social inclusion.

Technical developments - Devices

Integration of TV and mobile devices. Smart remote and second screen: tablet PCs. Not immediately targeting elderly users’ needs, but a technical opportunity for personalized experiences and support in managed interaction.
Problem in accessibility

GUIDE objectives
User Study

Users
Survey – Social status

• Education

• Profession

• Number of people living with

Survey – Functional ability

• Contrast sensitivity

• Colour blindness

• Audiogram

• Digit symbol test

• Trail making test

• Grip strength

• Active range of motion of wrist
Survey – Attitude towards technology

- I think that I need to use new technology
- I consider myself having the necessary skills to manage to use new technology tools
- I have problems to use these technologies properly even with practice
- The problems of technology devices are impossible to understand, so it is hard to find a solution
- When there is a problem with a new technology tool, it is because there is something wrong with that device
- I’m afraid to touch a new technology tool in case I’ll break it
- I don’t get advantage of using new technology tools
- I prefer to use an old fashion tool with fewer functions than a new one

Agree  Disagree  Neutral

Clusters

Data

Colour Blind  No CB 

No Blurred  Mid Blurred  Blurred & Distorted

No CogImp  CogImp

No MI  Mild MI  Severe MI

Interfaces can be optimized for different types of users
Usability requirements

• Response time
• Screen layout
  • Home button
  • Home screen
• Help screen
• Interface personalization

Personalization

One size fits all

Individualization
User Model

User Model -> Simulator

Simulator -> Runtime UM

Runtime UM -> Runtime Adaptation

Simulator -> Design Optimization

Design

User centred design process

Simulation Example
Development
Developing runtime user model

Range of User Parameters

Simulation

Rules

User model prediction

<table>
<thead>
<tr>
<th>Profile Code</th>
<th>GS</th>
<th>Tremor</th>
<th>ROM W</th>
<th>Minimum Font Size</th>
<th>Colour Blindness</th>
<th>Adaptation</th>
<th>Predicted Best Modality</th>
<th>Colour Contrast</th>
<th>Button Spacing</th>
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<td>Gravity</td>
<td>Pointing/Speech/Audio</td>
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</table>

*20 means: 0.2 * distance of target from centre of screen
*5 means: 0.05 * length of diagonal of the screen
Multimodal adaptation

User Input

GUIDE Core

Multimodal Fusion

Dialog manager

Multimodal Fission

Context Model

User Model

GUIDE Profile

System Response

Output devices

Browser
Avatar
Video
Stream
Audio
Stream

User Input devices

Motion sensor (pointing, gestures)
Speech recog. (speech)
Remote control (button selection)

Output devices

Browser
Avatar
Video
Stream
Audio
Stream

Framework application interface
Personalized Interfaces

New Interaction Technologies
Demonstration

GUIDE supports HTML5 web applications
Take away points

• Lifecycle of a project
  • User study → Design → Development
  • Validation will be discussed in next session

• Practical use of user modelling

• Multimodal interaction

• Interface personalization