Inclusive Identity Management – Usability perspectives on IDM

IFIP IDMAN 2010
11. November

Kristin S. Fuglerud
Senior Research Scientist
Head e-inclusion
Norsk Regnesentral

e-Me – inclusive identity management in new social media

The e-Me project is funded by the VERDIKT program, the Research Council of Norway.
Content

- What is inclusive design?
- Motivation for inclusive IDM
- Existing knowledge and examples
- A prototype
- Summary
Inclusive design and related terms

► Many related terms:
  ▪ design for all,
  ▪ universal access,
  ▪ universal usability,
  ▪ accessible design & sensitive inclusive design etc.

► Norwegian legislation users the term “Universal design”

► Universal design (uu) - The design of products and environments to be usable by all people, to the greatest extent possible, without adaptation or specialized design.

► uu - Denotes the process and the resulting design
E-inclusion?

► E-inclusion ('e' standing for electronic) will prevent 'digital exclusion' by
  ▪ ensuring that all information and communication technology (ICTs) is accessible for all

► Why important? precondition for democracy, education, work, participation in working life and in social life.

► E-inclusion also means to create new 'digital opportunities' for the inclusion of socially disadvantaged people:
  ▪ ensure equal access to knowledge and information resources (vital for democracy and participation)
  ▪ offer new job opportunities (empowerment through ICT)
  ▪ overcoming barriers to mobility and geographic distance
Political pressure and legislation

Broad political awareness and initiatives in EU:
► The "i2010 – A European Information Society for growth and employment“ shall foster inclusion, better public services and quality of life through the use of ICT.
  ▪ E-inclusion is one of the main priorities.
► EU has signed the UN Convention on the Rights of Persons with Disabilities
  ▪ This makes an additional pressure to bring EU legislation in line with the demands of the Convention, including the Article on universal design of ICT.
► Several EU Member States, like Britain, Italy, France and Norway already have clauses in their national legislation to promote universal design of ICT.
Universal design is about accommodating diversity in demographics, situations and devices.
Important goals of universal design in ICT

► Increasing the usability and accessibility for all users
  ▪ Interaction style should depend on the users sensory, motor and cognitive abilities, situations and devices.
  ▪ using different modalities, such as: text, pictures, illustrations, symbols, sounds, voice, vibration
  ▪ make sure that it can be used together with various types of assistive technology - by following standards.
    ◦ E.g. Braille equipment, text to speech, spell control, foot pedals etc.

► A person in a constraining situation may produce similar requirements to a system as an impaired person....
## Multimodal requirements (1)

<table>
<thead>
<tr>
<th>Constraining situation</th>
<th>Corresponding impairment</th>
<th>ICT requirement</th>
<th>Alternative designs</th>
</tr>
</thead>
<tbody>
<tr>
<td>People in situation where eyes are busy</td>
<td>Visually impaired</td>
<td>Operable without vision</td>
<td>Give info in haptic or sound format</td>
</tr>
<tr>
<td>People in a very noisy environment</td>
<td>Hearing impaired</td>
<td>Operable without hearing</td>
<td>Give info in visual or haptic form</td>
</tr>
<tr>
<td>People not speaking current language</td>
<td>Reading impaired</td>
<td>Operable without reading</td>
<td>Use audio output, illustrations etc</td>
</tr>
</tbody>
</table>
## Multimodal requirements (2)

<table>
<thead>
<tr>
<th>Constraining situation</th>
<th>Corresponding impairment</th>
<th>ICT requirement</th>
<th>Alternative designs</th>
</tr>
</thead>
<tbody>
<tr>
<td>People who are distracted or stressed,</td>
<td>Reduced cognitive abilities:</td>
<td>Operable with limited cognition</td>
<td>Use clear and simple design. No excess information. Reduce number of choices. Explain same thing in different modalities. Follow standards</td>
</tr>
<tr>
<td></td>
<td>- problem solving</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- attention</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- memory</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Reading/ writing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Content

► What is inclusive design?
► Motivation for inclusive IDM
► Existing knowledge and examples
► A prototype
► Summary
Flexibility

- Flexibility in interaction modality and interaction style gives more people access in more situations

  but

- This flexibility requires
  - more functionality and more choices

- Leads to
Complexity

- Inefficient for all and
- a barrier for people with cognitive impairments
Adaptation and personalisation

- Need for personalisation and adaptation according to users' current abilities and situation

- Challenges
  - People who need personalisation are not able to do it on their own.
  - Personalisation should not replace good design
  - Personalisation in itself adds to complexity

- Possible solutions
  - Establish profiles with as little as possible effort from the user
  - (Semi) automatic profiling by testing and monitoring the user's abilities and situations?
  - Focus on cognitive abilities
Inclusive identity management becomes essential to e-inclusion
Content

► What is inclusive design?
► Motivation for inclusive IDM
► Existing knowledge and examples
► A prototype
► Summary
Existing knowledge

Usability and accessibility of security mechanisms and IDM technology

► Low usability of *IDM-systems* has been found to be a major source of flaw and risk
► Users seek to get things done with the least possible effort
► Current IDM systems are inaccessible to many user groups, in particular to elderly and users with disabilities
► Users use weak passwords
► Many user groups have problems with CAPTHCA’s
Something the user has

- Smart card
- Code card
- Hardware code generator
- SMS to your mobile (e.g. Scandiabanken)

Challenges

- physical ability to wipe a card, to see/read and understand a code or a password
Something the user has (cont 1) Accessible security tokens

► Hardware code generator (DNB Nor provides with big display and audio)
1. What the user has (cont. 2) accessible security tokens

- SMS to mobile phone – text to speech software on the mobile
Something the user knows

- pin codes
- passwords
- Captchas

- Challenges
  - dyscalculia
  - memory
  - cognition
Something the user knows (cont. 1)

Accessible password requirements?

► Image based "pin"s
Accessible password requirements?
- Audio based capthcas
Something the user knows (cont. 3)

- Choosing a word relating to several images:

- http://www.captcha.net
Something the user is or does

Common biometrics
- Fingerprints
- Iris recognition
- Signature
- Speech/voice recognition
- Way of walking

Other methods:
- Hand geometry
- Vein geometry
- Facial recognition

Illustration from:
Challenges:

- Not all people have the same physical features.
- The physical feature may be temporary or permanently damaged by disease or accident.
- Biometrics usually have higher failure rates with the very old. As people get older, ageing processes tend to degrade biometrics.
- Inaccuracy: Sometimes it just fails for no explainable reason.
Possible solutions

► Flexibility of authentication methods
► Present alternatives

► Challenge: how can these alternatives be presented in an accessible way?
  ▪ Profiles: creation, storing, management?
  ▪ Privacy: (the user do not necessarily want the webservice to know about impairments)
Content

- What is inclusive design?
- Motivation for inclusive IDM
- Existing knowledge and examples
- A prototype
- Summary
Uu-autentiseringsprosjektet – Prototype I

Storebrand: Forsikring, bank og sparring - storebrand.no - Mozilla Firefox

Bank
Sparing
Forsikring

7 av 10 sparer på å flytte forsikringene til oss

Slik påvirkes du av finanskrisen
Det siste året har vært svært turbulent i finansmarkedene. Storebrand gir deg en oversikt over hvordan de ulike spareordningene påvirkes. Se våre råd om de ulike spareformene

Rosa sløyfe-aksjonen 2008
Som hovedsamarbeidspartner til Kreftforeningen støtter Storebrand opp om Rosa sløyfe-aksjonen 2008. Les mer om aksjonen

Spar i IPS - få lavere skatt
Nå kan du igjen spare til egen pensjon med skattefordeler. Spar inntil 15 000 kroner i året, og få inntil 4 200 kroner i lavere skatt. Start sparringen til en bedre alderdom

Copyright Storebrand • Informasjon om behandling av personopplysninger og cookies

Norsk Regnesentral
Norwegian Computing Center
Prototype II

NettBank - Logg inn

Brukernavn

Passord

Utfør  Avbryt  Hjelp
Prototype II

NettBank - Logg inn

Brukernavn
Passord

Utfor  Avbryt  Hjelp
Prototype III

NettBank - Logg inn

Brukernavn: 0404665678
Passord: ********

Tillate programmet enCap å starte?
Prototype IV

Tast PIN-kode (4 siffer)
Prototype V

Sikkerhetskode: 932669
Prototype VI
Taleprototypte VII

NettBank - Storebrand Bank ASA - Mozilla Firefox

Totaloversikt
Du kan endre totaloversikten under Eget oppsett

Oppsummering
Disponibelt 677,43 Sum trukket kreditt 0,00 Sum lån 0,00

Mine konti
Kontonavn Disponibelt Saldo Velg funksjon
Storebrandkonto 9100.15.1 677,43 677,43
Sparekonto 9100.15.1 000,00 000,00
Sum disponibelt 677,43

Betalinger de neste 90 dager
Forfallsdato Mottaker Fra konto Beløp Velg funksjon
25.10.2008 LIER KOMMUNE 7874.05.88000 Storebrandkonto 9100.1 1 922,00
Sum 1 922,00

For å lese pdf-dokumenter, må du ha Adobe Reader. Dette programmet kan du laste ned gratis her.

Get Adobe Reader

Got the picture?
Prototype evaluation

► We tested with 5 and 5 visually impaired dyslexics - these are the results:

► Well received

► Need for improvements
  ▪ Installation and setup requires thorough preparation and test
  ▪ voice quality,
  ▪ user dialog and prompts can be improved

► user wanted to flexibility
  ▪ reading speed
  ▪ grouping of numbers - two and two or one by one.
  ▪ Pause, repeat, volume

► Conclusion: an improved solution could increase the accessibility for visually impaired and people with dyslexia
<table>
<thead>
<tr>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>► What is inclusive design?</td>
</tr>
<tr>
<td>► Motivation for inclusive IDM</td>
</tr>
<tr>
<td>► Existing knowledge and examples</td>
</tr>
<tr>
<td>► A prototype</td>
</tr>
<tr>
<td>► Summary</td>
</tr>
</tbody>
</table>
### Summary – need for alternatives

<table>
<thead>
<tr>
<th>Metode</th>
<th>Kjennetegn, utfordring</th>
<th>Syns-hemmede</th>
<th>Hørsels-hemmede</th>
<th>Bevegelses-hemmede</th>
<th>Kognitiv funksjons-hemming</th>
<th>Dysleksi og dyskalkuli</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passord</td>
<td>Tekstbasert, oftest visuelt</td>
<td>✅</td>
<td>✅</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Tekst captcha</td>
<td>Vanskelig tekst</td>
<td>✗</td>
<td>✅</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Smart kort</td>
<td>Lite kort med chip eller stripe.</td>
<td>✗</td>
<td>✅</td>
<td>✗</td>
<td>✗</td>
<td>✅</td>
</tr>
<tr>
<td>Pin koder</td>
<td>Tallbasert, oftest visuelt</td>
<td>✗</td>
<td>✅</td>
<td>✗</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Fingeravtrykk</td>
<td>Må kunne plassere fingeren riktig</td>
<td>✗</td>
<td>✅</td>
<td>✗</td>
<td>✗</td>
<td>✅</td>
</tr>
<tr>
<td>Stemme-gjennkjenning</td>
<td>Mikrofon, kontekst</td>
<td>✅</td>
<td>✗</td>
<td>✅</td>
<td>✗</td>
<td>✅</td>
</tr>
</tbody>
</table>
Summary

► Offer alternatives
► Multimodality
► No single solution will suit everybody – need alternatives
► Need profiles in order to do personalization and adaptation
► Profiles have privacy challenges.
New challenges

- Increasing use of Social media
- Increasing no of services
- Integration of services with different use context and thus security/privacy requirements
  - Private,
  - Commercial
  - Public
- Real life dynamics vs. virtual life
Challenges of user security research

► Privacy/security is rarely a primary goal for users:
  ▪ Most users do not care about privacy/security until it is broken.
  ▪ A study itself may introduce bias by having the participant focus more on security than outside an experimental setting.

► Qualitative methods such as observation and interviews have been used successfully in a number of studies but have limitations:
  ▪ Ethical issues in unobtrusive/covert real life studies
  ▪ Significant inconsistency with what people say they do and what they actually do.

► Lab experiments has its limitations:
  ▪ When using dummy data users do not act to protect their data as if it is their own.
  ▪ Huge privacy and ethical challenges of having users using their own data
Thank you for your attention!

Questions?

Contact information:

- Kristin S. Fuglerud
- Senior researcher
- Norwegian Computing Center
- e-mail: kristins@nr.no
- Phone: +47 22 85 25 00
Technology developed for disabled has become mainstream technology:

► **Telephone:**
The telephone was one of the many devices Bell developed in support of his work with the deaf.

► **Typewriter:**
The first typewriter was built by Pellegrino Turri in 1808 for his blind friend Countess Carolina Fantoni da Fivizzono. He wanted her to be able to write love letters legibly.

► **Transistor:**
Bell Labs scientists developed the transistor in order to make smaller and less power-consuming hearing aids. This invention became the primary technology responsible for fueling a revolution in the telecommunications industry - and this continues today.

More examples: http://www.icdri.org/technology/ecceff.htm