



A VR-based Manual Wheelchair with Visual Feedback and Physical Simulation



Evelyne Klinger, PhD
ELHIT, Laval, France

Cybertherapy, June 2007, Washington



Context

- Need to raise awareness about the difficulties met by people with disabilities in daily life
- ELHIT's purpose: Integration of VR technology in the field of Health and Handicap



2



Acknowledgments



- ESCIN
 - Edouard Delassus, Guillaume Zicola, Tom Granger
- Master MNRV
 - Erik Geslin, Céline Châtelain
- Presence & Innovation Laboratory
- Nautilus

3



Using a manual wheelchair (MWC)



For people:

- With physical (and) cognitive disabilities
- With a necessity for social and everyday life.
- With the stress of various obstacles



4



Consequences of MWC use



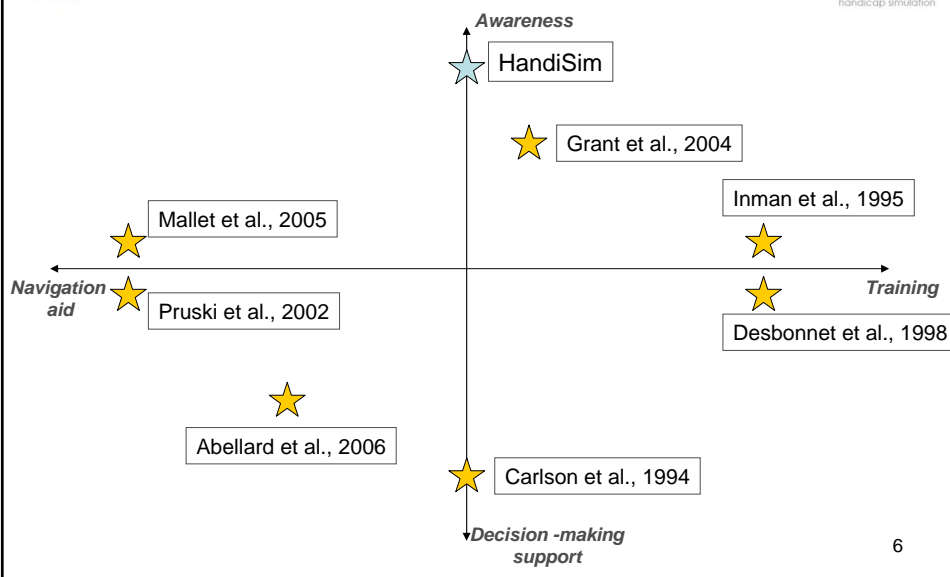
- Reduction of autonomy
- Increase of isolation
- Likely loss of self-esteem
- Lack of understanding

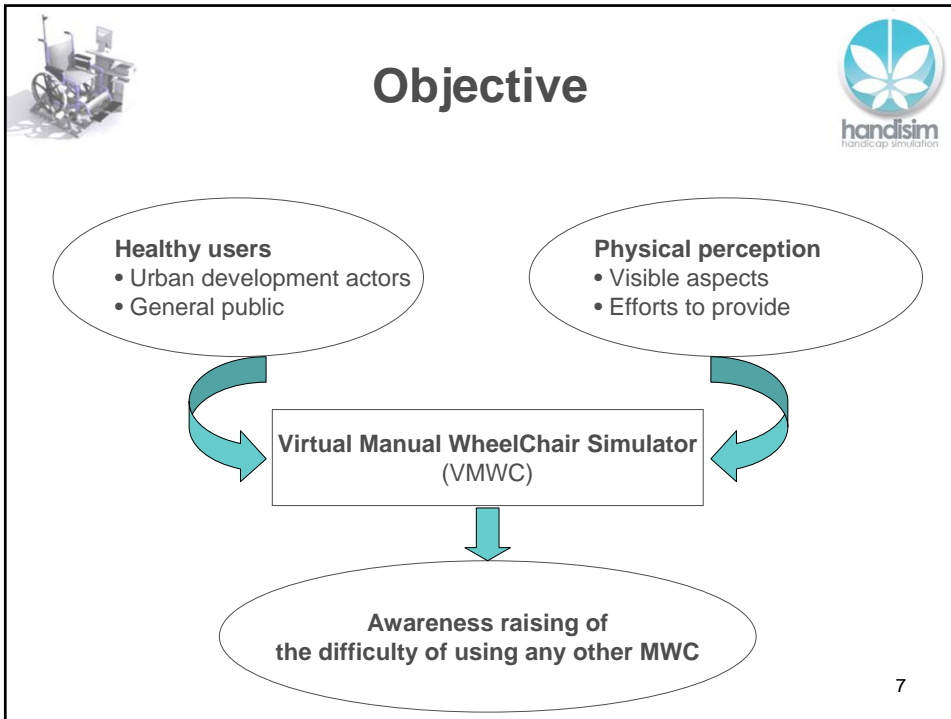

→ Increase of the feeling of disability

5




Other studies







Design & Implementation issues



- **Design issues**
 - Talking with MWC users
 - Listing difficulties
 - Spending a full day at work in a MWC
 - Definition of a scenario and tasks
 - Constraints: low cost

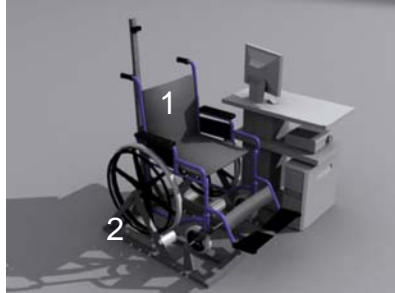
- **3 main fonctionnal components**
 - Visual simulation
 - Physical simulation
 - Control system



8



The VMWC



1. The MWC
2. The Platform
3. The user with HMD
4. The wall screen for the public

- Navigation with the wheels
- Potentiometers
- Perception of ground slope



The Virtual Town



10



The Virtual Town



11



The Virtual Town



12



Test procedure

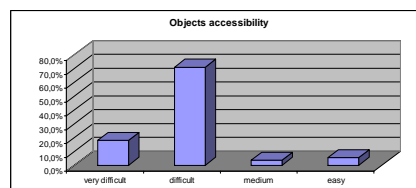
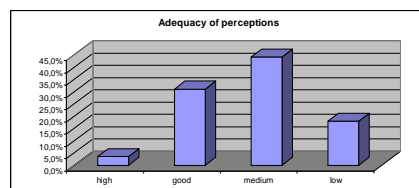
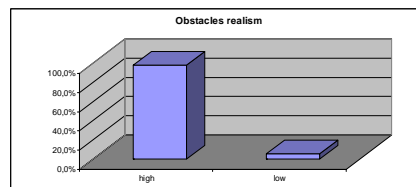
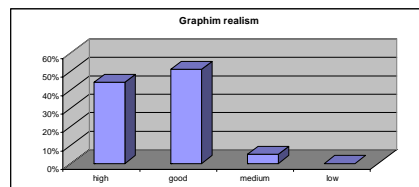


- During Laval Virtual
- 56 participants (3 regular MWC users)
- Questionnaire about:
 - Realism
 - Awareness of difficulties
 - Easy-using

13



Results



14



Conclusion



- First stage of a VMWC simulator
- Capacity to raise awareness of MWC users' difficulties
- Necessity of new developments

15



Perspectives



- Virtual Manual WheelChair (VMWC)
 - Force feedback
 - Data record
- Virtual Powered WheelChair (VPWC)
 - Dimensions of the wheelchair
 - Choice of navigation tools
- Generally speaking
 - Educational aspects
 - Training

16



Thank you !



E L H I T
Équipe Lavalloise
Handicaps & Innovations Technologiques

evelyne.klinger@angers.ensam.fr