

TNO Defence, Security and Safety Human Factors

## Usability engineering for mobile maps

Rosemarijn Looije  
Guido te Brake  
Mark Neerincx

TNO | Knowledge for business



### RGI-233 Usable and well scaled mobile maps for consumers

#### Partners:

- TU Delft
- ITC
- TNO Defence, Security and Safety
- ESRI
- LaserScan
- Municipality of Amsterdam
- ANWB



## Usability

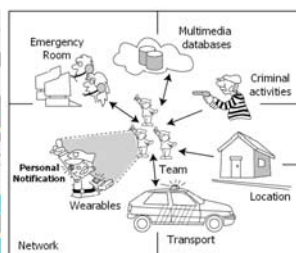
- Adaptability
- Fun
- Trust

<http://www.cs.cmu.edu/~marekm/projects/beatbots/>



## Why

- Users
  - Tourists
  - Citizens
  - Police
- Problems
  - Design
  - Usability testing

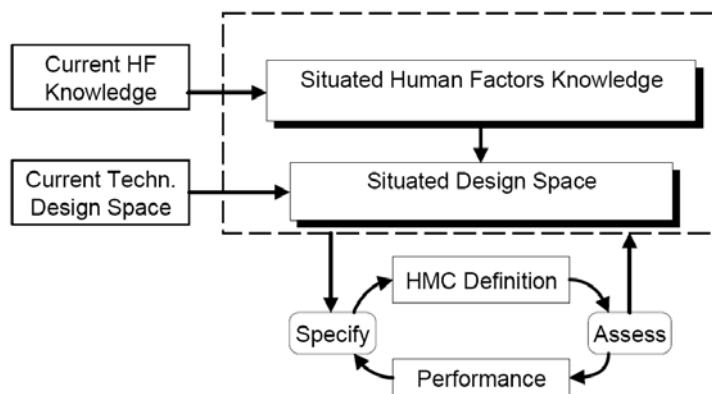


## Challenges

- Technical
- Social
- Environmental



## Situated Cognitive Engineering



## Technological challenges

- Interaction
- Panning
- Zooming



Initial view of the map

User presses on 6 key

View pans and zooms to show sector 6



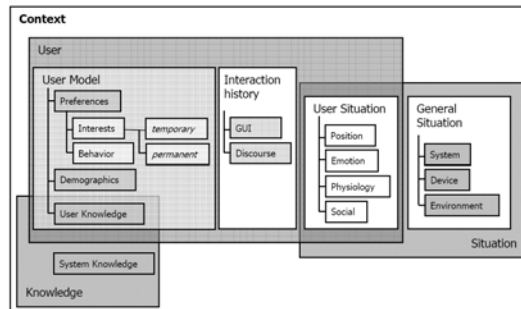
## Technological challenges

- Visualization
  - Level of Detail
  - Enhancement effects
  - 2D/3D
  - Off-screen visualization



## Environmental and social challenges

- Adaptation/Adaptivity
  - Context
    - User
    - Situation
    - Knowledge



9

TNO Defence, Security and Safety



## Usability Testing Mobile devices

- Device/emulator
- Field/Lab
- Users (experts/novices)
- Simulation
- Primary task

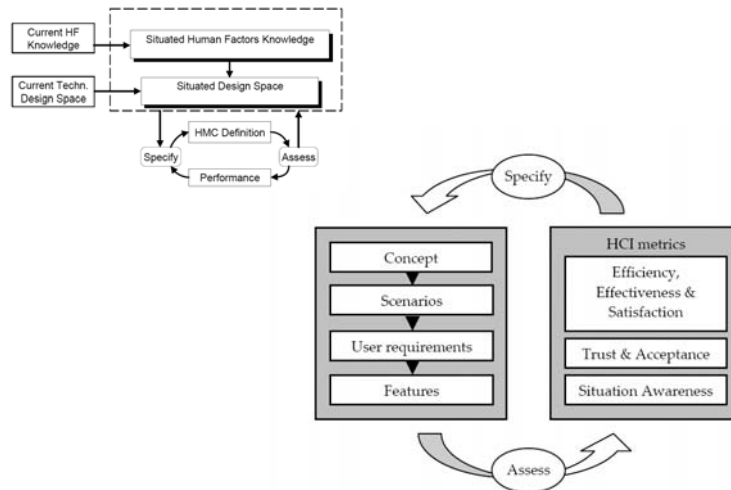


10

TNO Defence, Security and Safety



## Evaluation, Re-specification, and Re-assessment



## References

- Burigat, S., Chittaro, L., and Gabrielli, S. (2005). Visualizing Locations of Off-Screen Objects on Mobile Devices: A Comparative Evaluation of Three Approaches. In *Mobile HCI2006*.
- Dearman, D., MacKay, B., Inkpen, K. M., and Watters, C. (2005). Touch-n-Go: Supporting Screen Navigation on Handheld Computers. Technical Report CS-2005-08, Halifax, NS. Dalhousie University.
- Neerincx, M. A. and Lindenberg, J. (2005). Situated cognitive engineering for complex task environments. In Nielsen, J. (1994). *Usability Engineering*. In Morgan Kaufmann.
- Oulasvirta, A., Nivala, A. M., Tikka, V., Liikkanen, L., and Nurminen, A. (2005). Understanding users' strategies with mobile maps. In *Mobile Maps 2005-Interactivity and Usability of Map-based Mobile Services, a workshop*.
- Reichenbacher, T. (2003). *Mobile Cartography - Adaptive Visualisation of Geographic Information on Mobile Devices*. Thesis
- Robbins, D. C., Cutrell, E., Sarin, R., and Horvitz, E. (2004). ZoneZoom: map navigation for smartphones with recursive view segmentation. In *Proceedings of the working conference on Advanced visual interfaces (231-234)*.
- Streefkerk, J. W., Esch-Bussemaekers, M. P., and Neerincx, M. A. (2006). Designing personal attentive user interfaces in the mobile public safety domain. In *Computers in Human Behavior (749-770)*.
- Zipf, A. and Jöst, M. (2005). Implementing Adaptive Mobile GI Services based on Ontologies-Examples for pedestrian navigation support. In *CEUS-Computers, Environment and Urban Systems-An International Journal. Special Issue on LBS and UbiGIS*.



## Questions

