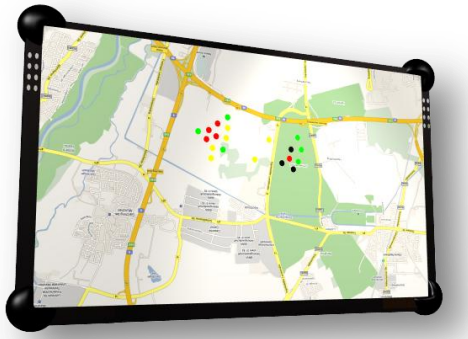
Speedup



2nd JRC ECML Workshop:
Map Interaction

Tayfur Coskun, Eva Artinger

Technische Universität München

Fachgebiet Augmented Reality – Prof. Klinker

Wir helfen hier und jetzt. ASB Arbeiter-Samariter-Bund

Speedup

SpeedUp

- Investigation of mobile and self-organizing communication and data platforms and of strategies for organization and action in complex, large-scale situations.

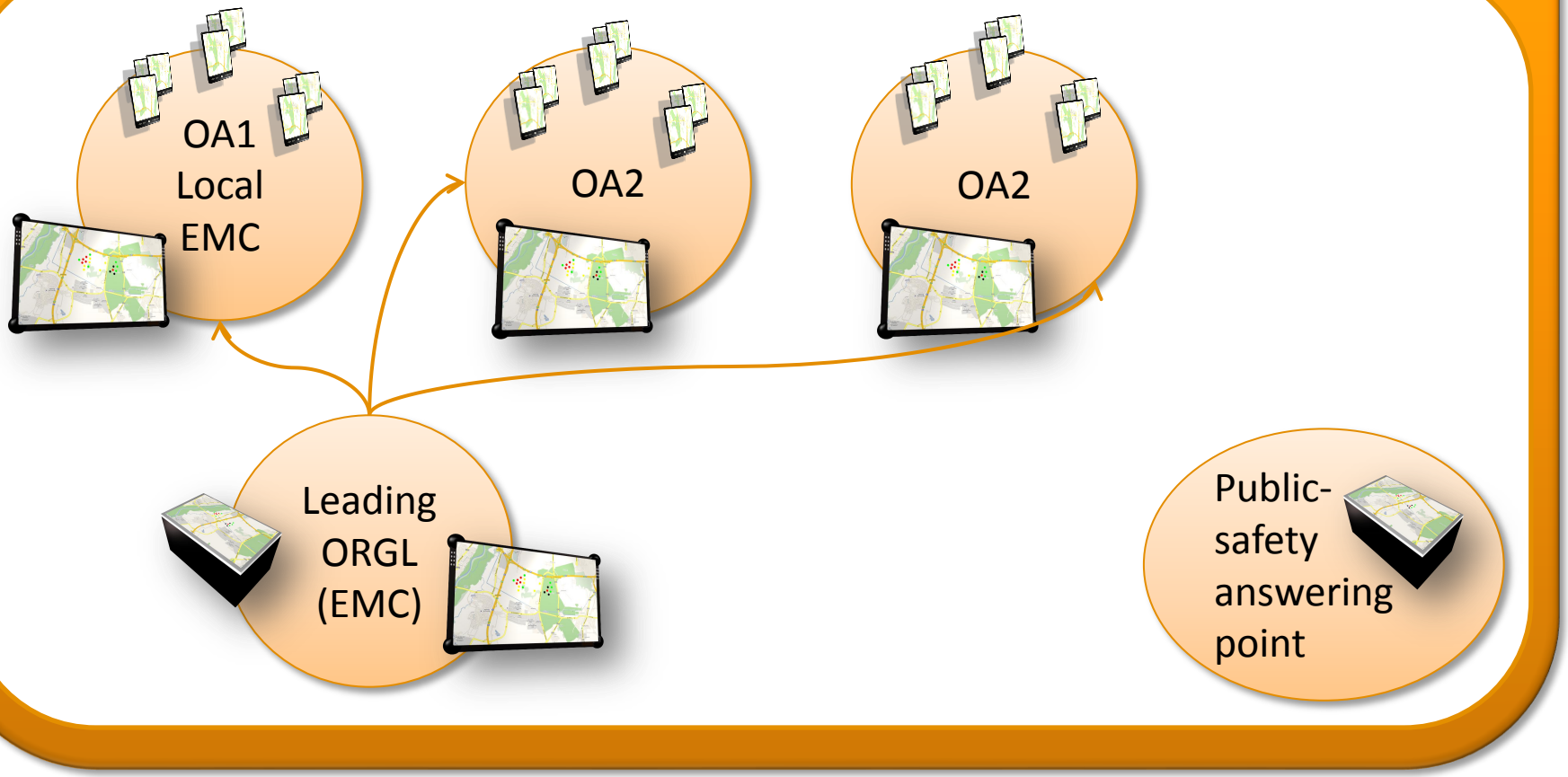
- Multiple partners:
  - Companies: Navimatix (Maps), Ageto (Administration), Agilion (Indoor Tracking)
  - Universities: TUM (UI), Friedrisch Schiller Universität Jena (Psychologic background, self organizing communications)
  - Target Group: Feuerwehr TUM, Arbeiter-Samariter-Bund Munich, Stralsund Rettungsdienst

Speedup

Mass Casualty Incident (MCI)

- **MCI =** An incident in which **more injured people** exist **than local rescue resources** are available
- **=>** Rescue personnel performs **triage algorithm** to determine patient priorities
- The **Emergence Medical Chief (EMC)** leads the rescue process
- Goal of the **project**: speed up the overall rescue process
- Goal of **TUM**: user-centered development of an intuitive, efficient and ergonomic User Interface to do so

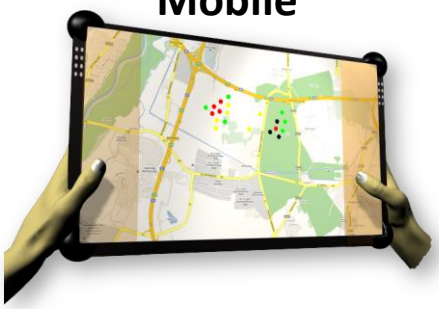
Which role uses which device



General Overview – *What TUM did in SpeedUp*

Map Interaction

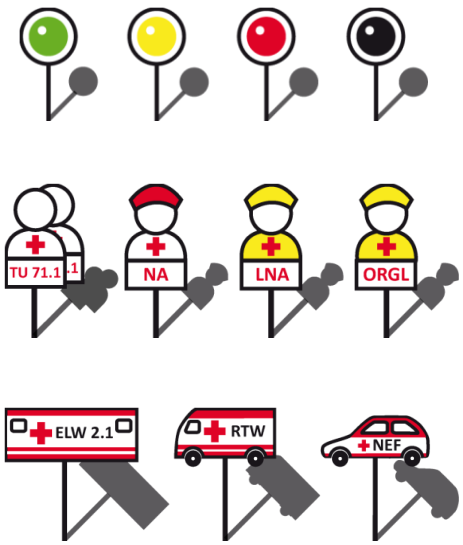
Mobile



Stationary

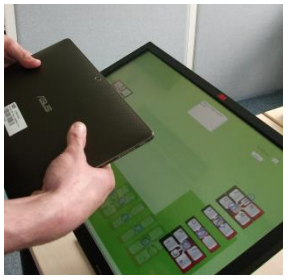
Map Visualisation

Both



Text Input

Mobile

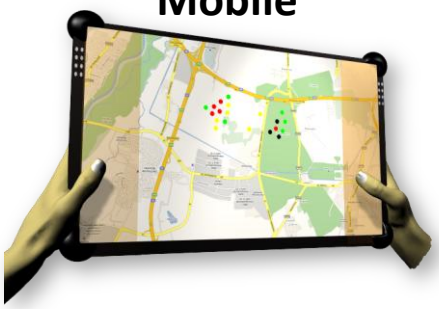


Stationary

General Overview – What you will hear about today

Map Interaction

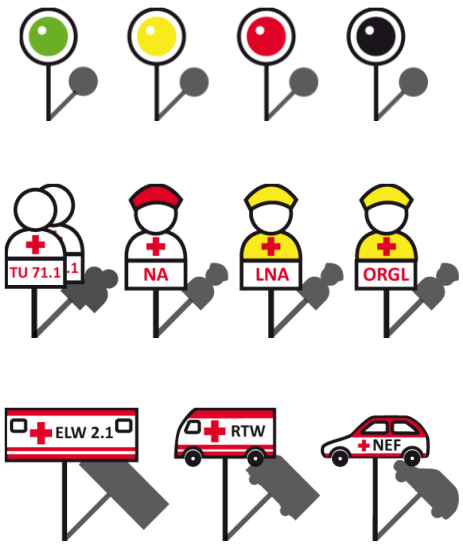
Mobile



Stationary

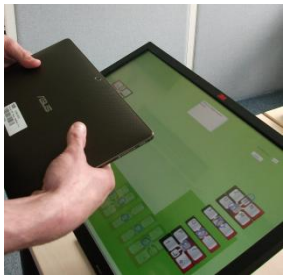
Map Visualisation

Both



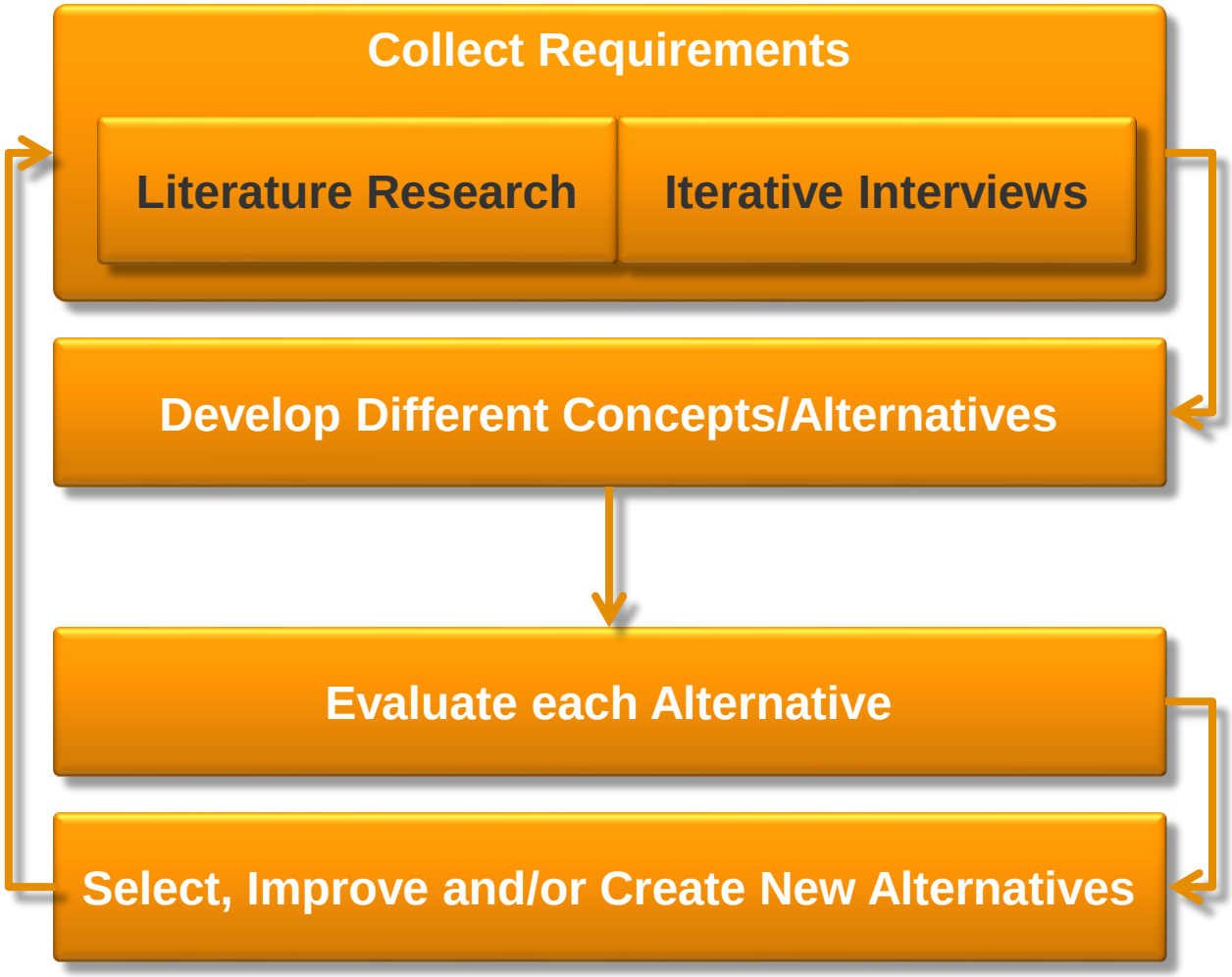
Text Input

Mobile



Stationary

General Development Process



Common evaluation settings

- Within-subject
- 4 to 8 test users according to Nielsen*
- Define evaluation tasks
- Evaluate Usability with **SUS**
- Evaluate Attractivity with **AttrakDiff**
- Evaluate affordance with **NASA-TLX**
- Conduct qualitative interviews

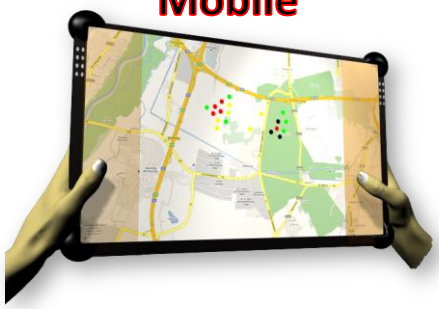
* Usability Engineering - Nielsen, J. and Hackos, J.A.T. – Acadamic press San Diego

Map Interaction - Mobile

Speedup

Map Interaction

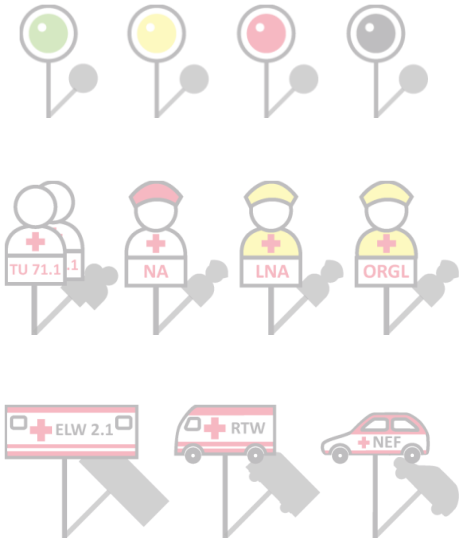
Mobile



Stationary

Map Visualisation

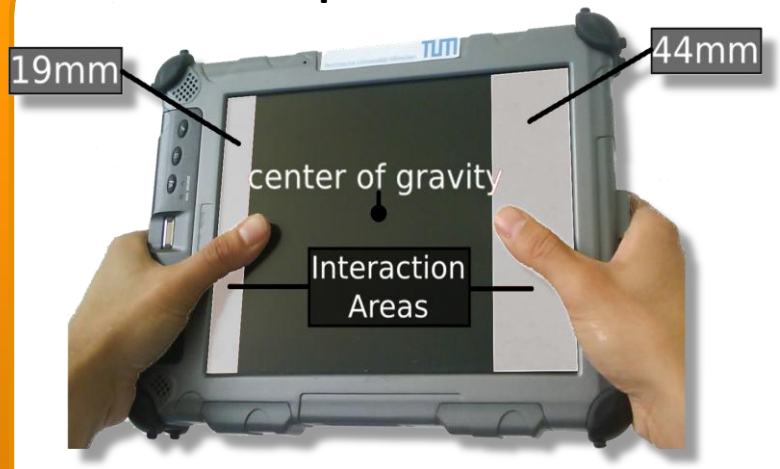
Both



Target Hardware: Ruggedized Tablet

Requirements / Challenges

Xplore 104

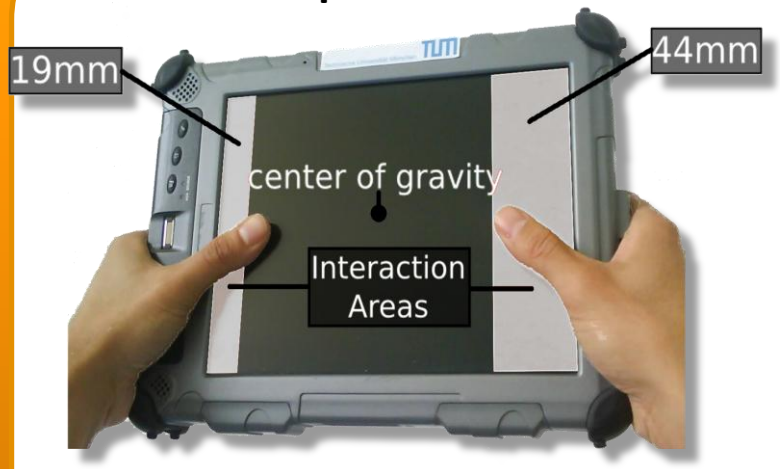


- Has been used by the Fire Department TUM
- Ruggedized Tablet
- Fulfills IP 55 (DIN EN 60529)
- **Weight of 2.38kg**
- Resistive Display
- Asymmetric Borders

Target Hardware: Ruggedized Tablet

Requirements / Challenges

Xplore 104



Fire fighters asked us to develop an UI which allows the user to hold the device in both hands while interacting with it

⇒ Indirect interaction

⇒ „Fat-Finger“ problem

⇒ Less sensible touch screen

Speedup

Conclusion

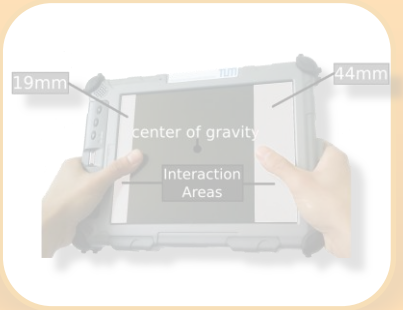
- Free interaction faster
- Border interaction more comfortable

User-Centered Comparison between Classical and Edge Interaction on a Heavy Rugged Tablet PC used in MCIs – GMDS 2012 / Informatik 2012; ***Gel Han, Tayfur Coskun, Eva Artinger, Amal Benzina, Gudrun Klinker***

Map Interaction - Mobile

Speedup

Selection



Selection

1st Iteration

A) Red Line
B) Selection Square
C) Auto Mapping

Mocomed 2010

2nd Iteration

A) Red Bar
B) Selection Square
C) Auto Mapping

IHI 2012

Selection

1st Iteration

A) Buttons
B) Slider

Mocomed 2010

Scrolling

1st Iteration

A) Minimap
B) Joystick
~~C) Arrows~~

IT Rettung 2010

2nd Iteration

A) Minimap 2.0
B) Radarjoystick 2.0

IT Rettung 2012

Map Interaction - Mobile

Speedup

2nd Iteration

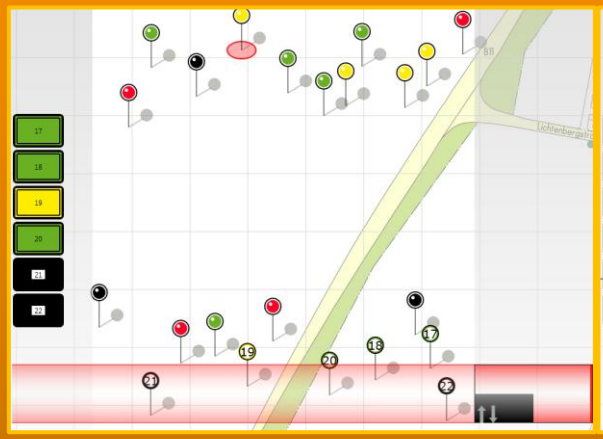
A) Red Bar
B) Selection Square
C) Auto Mapping

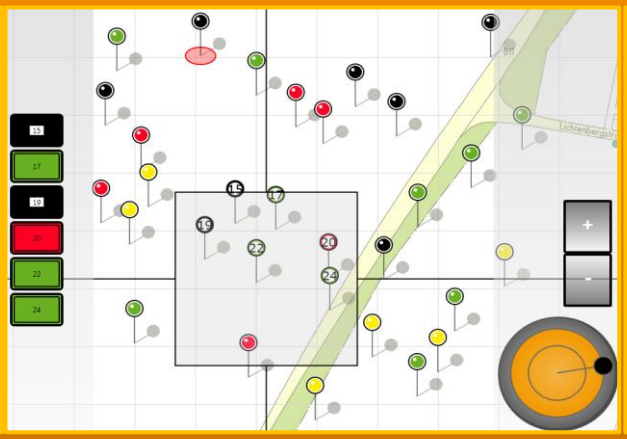
Selecting

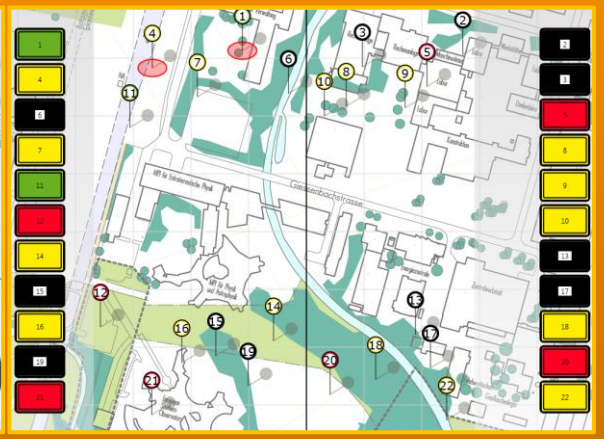
International Health 2012 – Florida, Miami

T. Coskun, A. Benzina, E. Artinger, C. Binder, G. Klinker

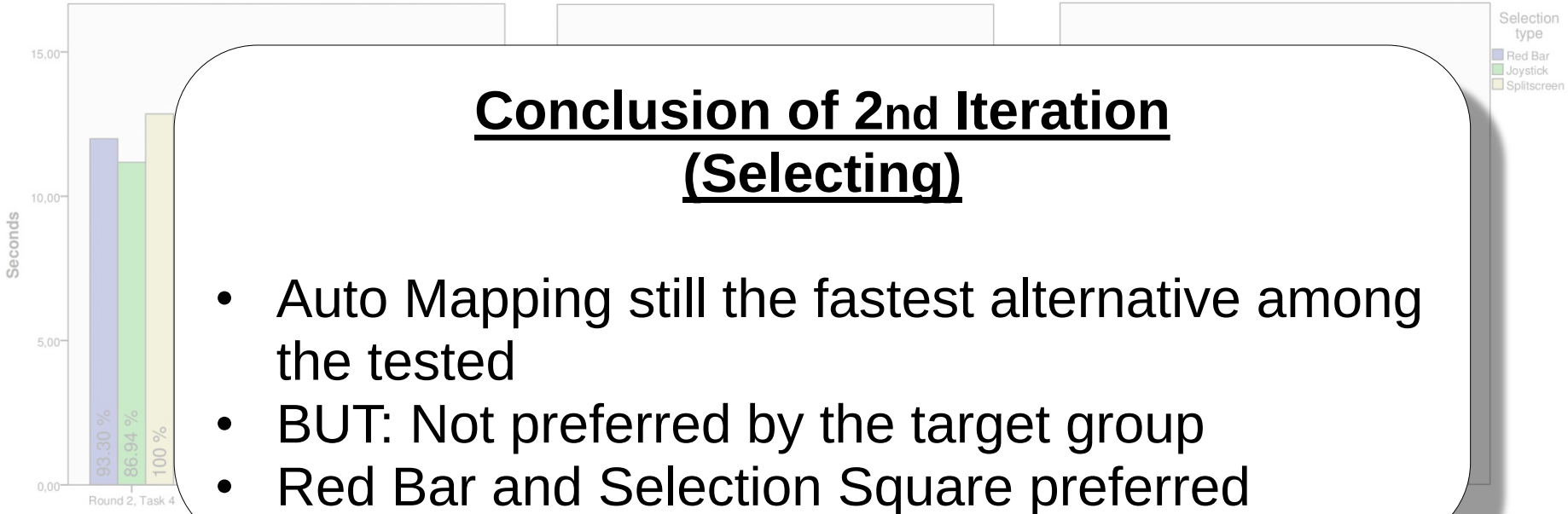
User-Centered Development Of UI Elements for Selecting Items on a Digital Map Designed for Heavy Rugged Tablet PCs in Mass Casualty Incidents







Speedup



Conclusion of 2nd Iteration (Selecting)

- Auto Mapping still the fastest alternative among the tested
- BUT: Not preferred by the target group
- Red Bar and Selection Square preferred

Strongly Distributed Patients

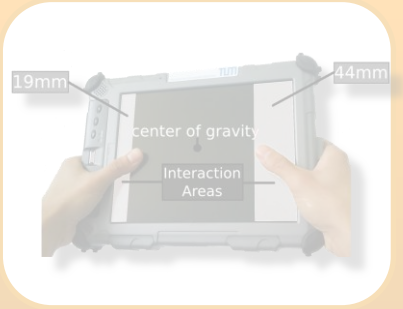
Less Distributed Patients

Speed per Round

Map Interaction - Mobile

Speedup

Border Requirement



Selection

1st Iteration

A) Red Line
B) Selection Square
C) Auto Mapping

Mocomed 2010

2nd Iteration

A) Red Bar
B) Selection Square
C) Auto Mapping

IHI 2012

Zoom

1st Iteration

A) Buttons
B) Slider

Mocomed 2010

Scroll

1st Iteration

A) Minimap
B) Joystick
~~C) Arrows~~

IT Rettung 2010

2nd Iteration

A) Minimap 2.0
B) Radarjoystick 2.0

IT Rettung 2012

Speedup

2nd Iteration

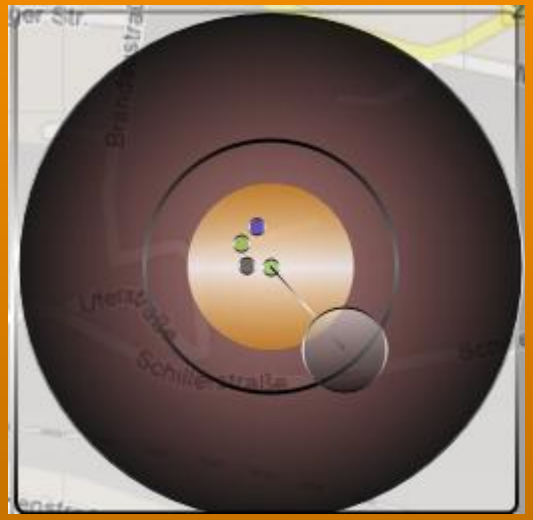
A) Minimap 2.0
B) Radarjoystick 2.0

Scrolling

IT Unterstützung 2012 - Braunschweig

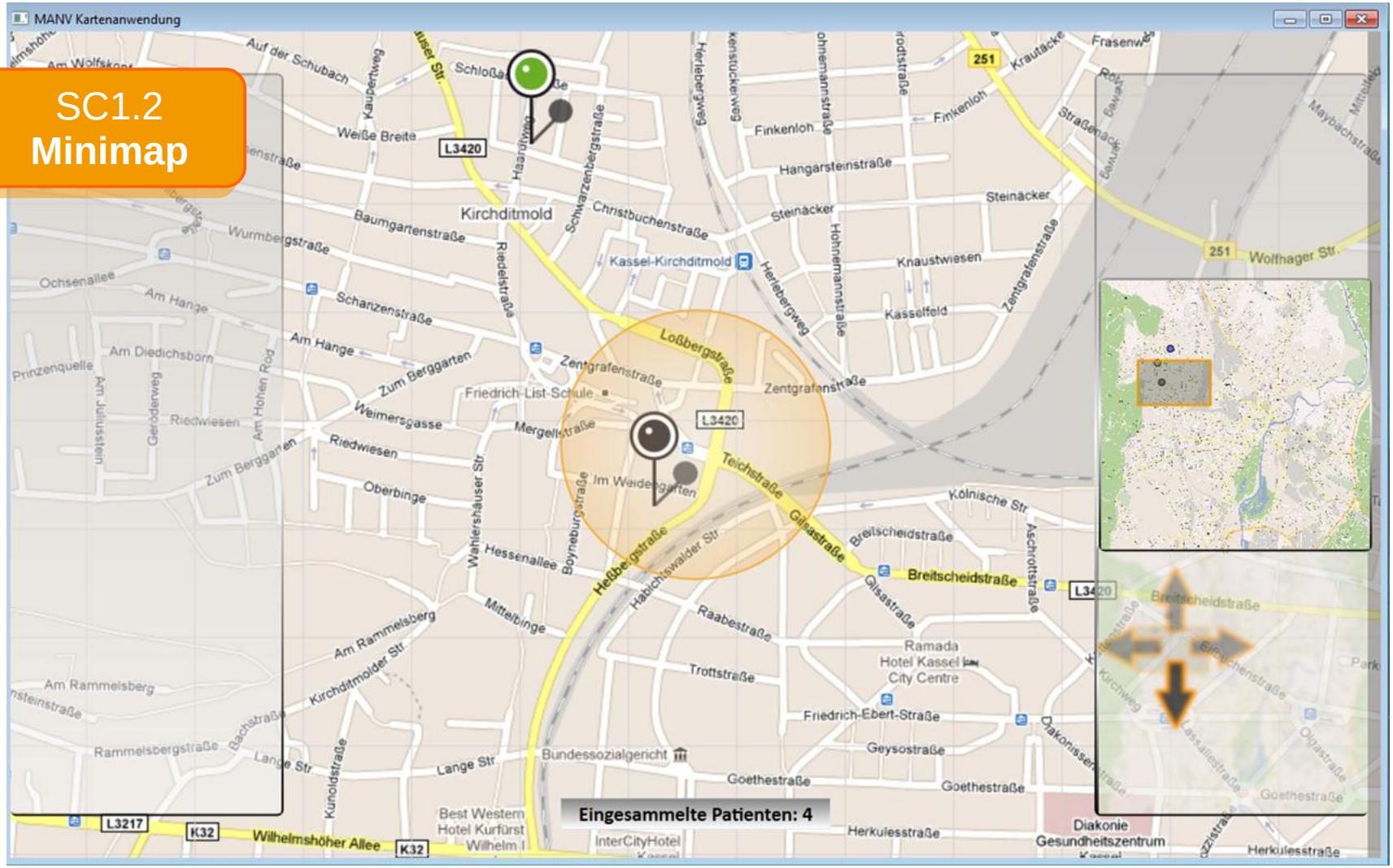
T. Coskun, C. Grill, A. Benzina, E. Artinger, G. Klinker

How-to Interact with a Map Application on a Heavy Rugged Tablet PC when Both Hands are Needed to Hold the Device



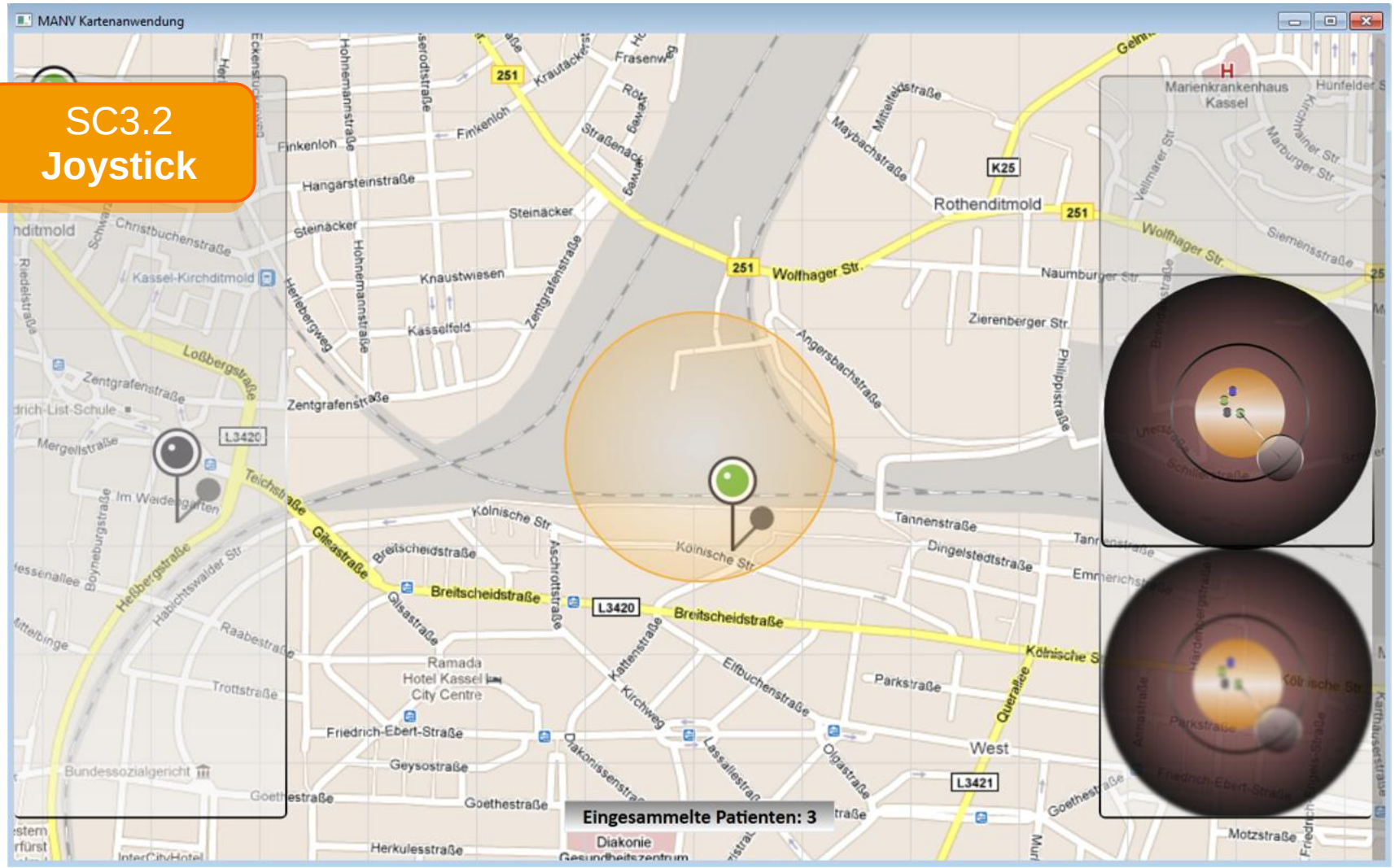
Map Interaction - Mobile

SC1.2 Minimap

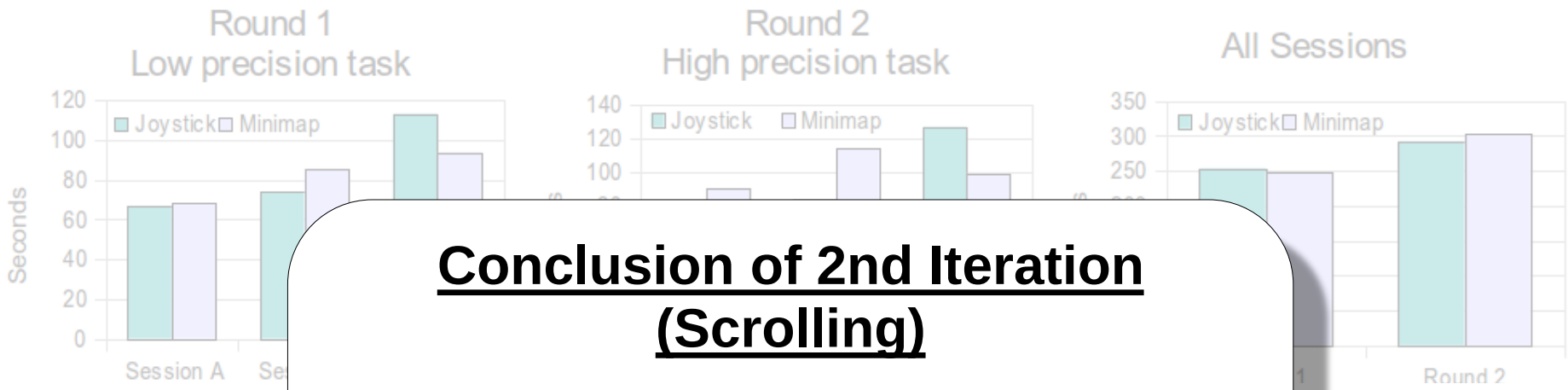


Map Interaction - Mobile

SC3.2
Joystick



Speedup



Conclusion of 2nd Iteration (Scrolling)

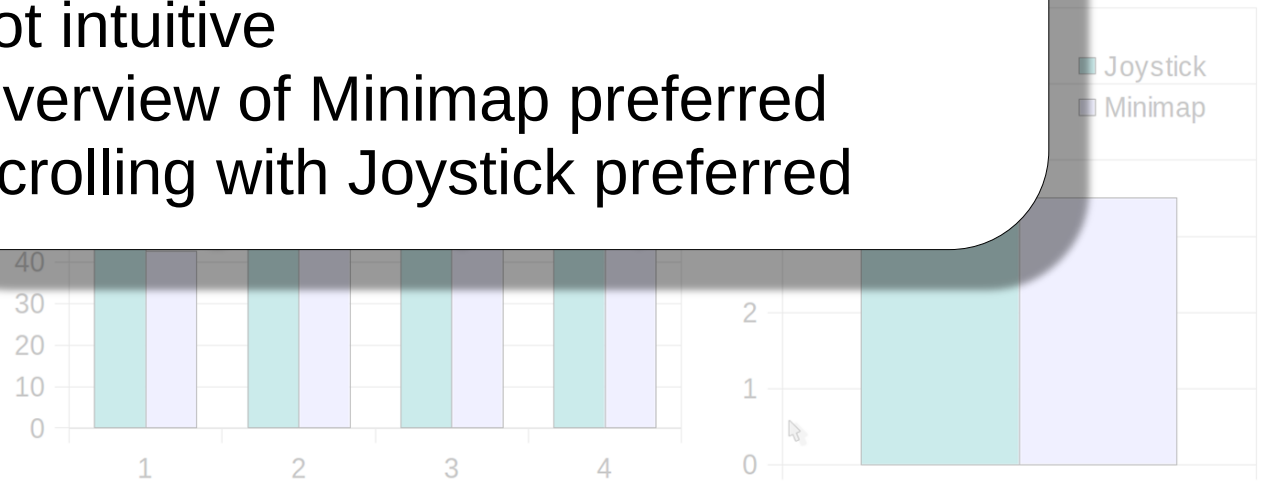
- Readjusting feature of Minimap 2.0 not intuitive
- Overview of Minimap preferred
- Scrolling with Joystick preferred

A: Low Distributi

B: Higher Distrib

C: Highest Distrib

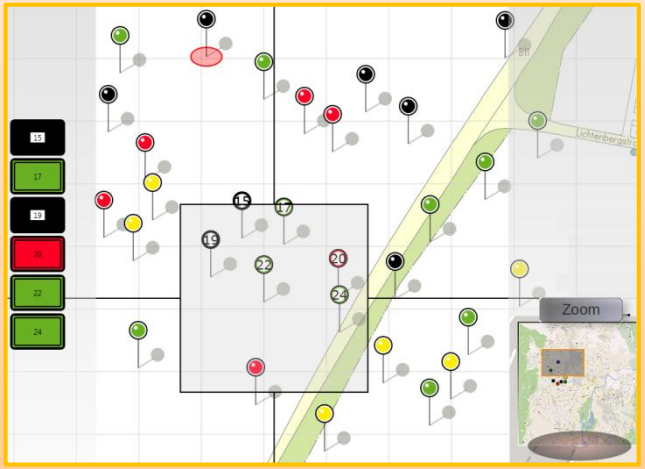
rolling Concept



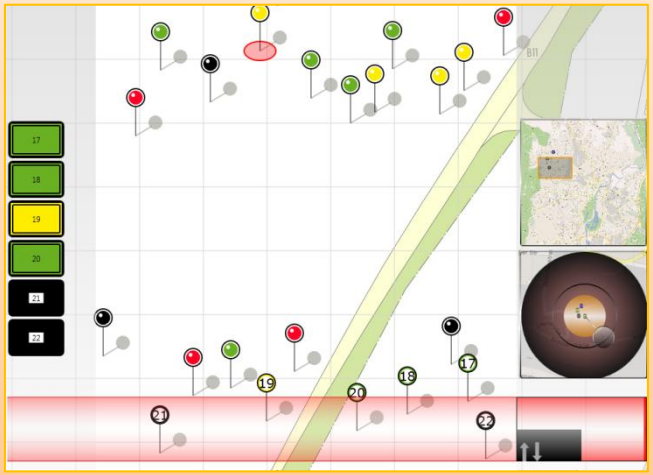
Speedup

3rd Iteration

A) Combination of all three metaphors in one UI element



B) Choose „best“ concept for each feature



Speedup

Advantages

+ Saves rare interaction space
+ Right hand does not need to move up and down, everything can be reached with the thumb
+ No Dual-Mode of the minimap

Disadvantages

- Might increase complexity

B) One UI Element per Action

Speedup

Advantages

+ One UI element for each action reduces complexity

Disadvantages

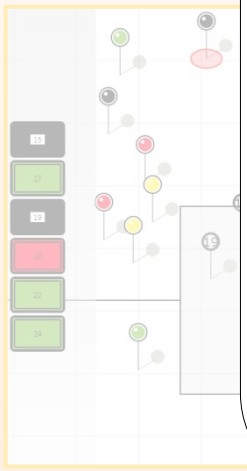
- Uses a lot of rare screen space
- Hands have to move up and down to reach the desired element

Speedup

3rd Iteration

A) Combination of all three metaphors i

B) Choose „best“ concept for



Conclusion of 3rd Iteration
(Including selecting, scrolling and zooming)

- B) preferred because of less complexity

Steps in this Iteration

1. Introduce and discuss the core idea with the target group
2. Collect feedback / Enhance core concept
3. Implement digital triage application version with and without FoT
4. Evaluate it with the target group and compare both versions to each other

Conclusion of 1st Iteration (FoT)

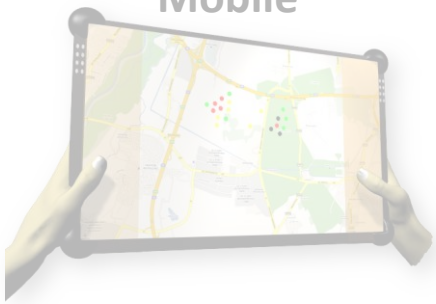
- No significant difference in SUS
- No significant difference in speed (in our setup)
- 4 out of 6 test users would prefer FoT

Map Interaction - Stationary

Speedup

Map Interaction

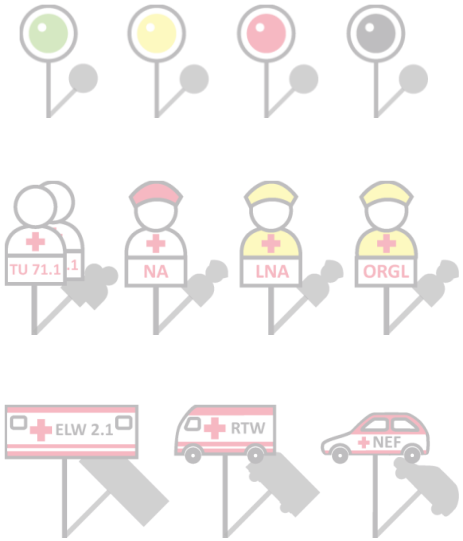
Mobile



Stationary

Map Visualisation

Both

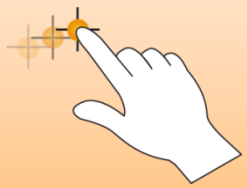


Map Interaction - Stationary

Speedup

2D Gestures – 1st Iteration

Scrolling



Zooming + Rotating

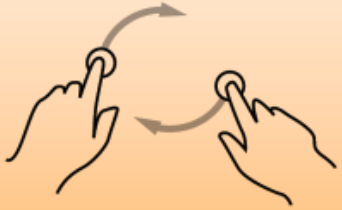
Selecting

IT Untersützung 2011

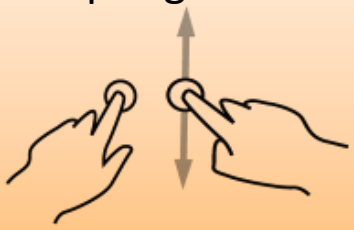
3D Gestures – 2nd Iteration

Drag

Scaling + Rotating



Depth gestures



Speedup

General Gesture Overview

- Review of 59 scientific publications
- Analysis of 420 gestures with 57 different actions
- Website: http://campar.in.tum.de/personal/abrek/index.html

Map Interaction - Stationary

Speedup

Home History Platform Gestures Gesture Analysis Links

This image is used under Creative Commons by Mike Gerhardt

You can touch this!

Multi-touch has become a common interaction technique for computer systems. Smart phones, table tops and multi-touch tables are only few devices that support this technique. Today, multi-touch is everywhere. Because of the wide range of gestures and their diverse mappings to different tasks, it can often be difficult for users and system designers to keep track. This website was created in addition to a bachelor thesis. Goal is to provide an extensive overview of the gestures that are used today and to present the results of the research.

Browse Gestures >

History

Touch interaction may be popular only since a few years, but surely it has been around quite a while. There is a long history behind this technology, which can be found today almost anywhere, from ticketing machines to smart phones. Bill Buxton is one of the pioneers of multi-touch. He has summarized the history of touch, which you can also find on his website.

Learn More>

Links

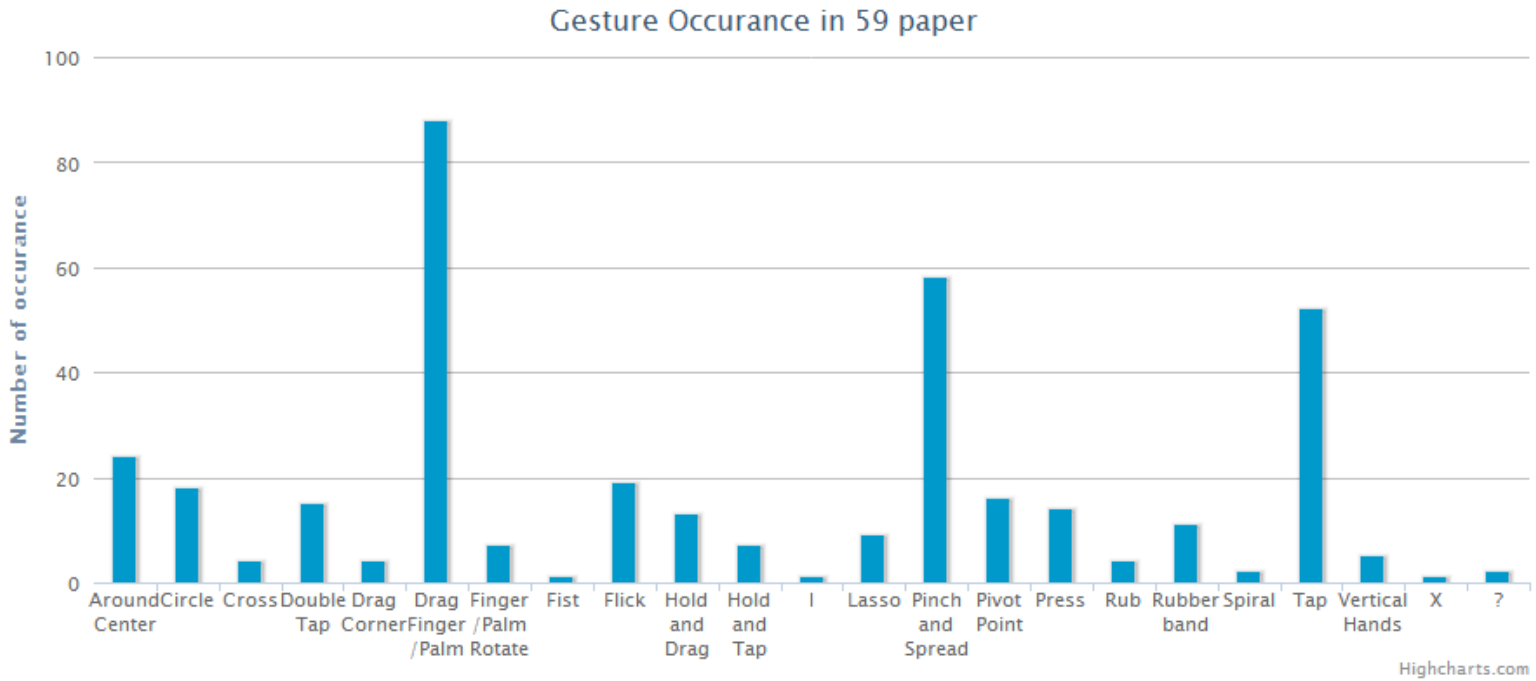
Many websites provide extensive information about multi-touch. Under the link section you can find the bachelor thesis and the gesture overview as a PDF file. You can find also further papers, books, websites and other information about multi-touch here.

Learn More>

Map Interaction - Stationary

Gesture Anlaysis

Goal of the gesture analysis was to collect gestures from selected papers and determine their use rates and the actions they are most often associated with. Overall, 59 academic publications were reviewed. 420 gestures and 57 different actions were analyzed. We created an overview with the gestures that appeared at least two times for the basic tasks selecting, navigating, zooming and rotating. Additionally, gestures for special tasks were listed. The table can be filtered for a gesture or an action. The graph below shows how often gestures appeared in our analysis. Here you can find the list of publications.



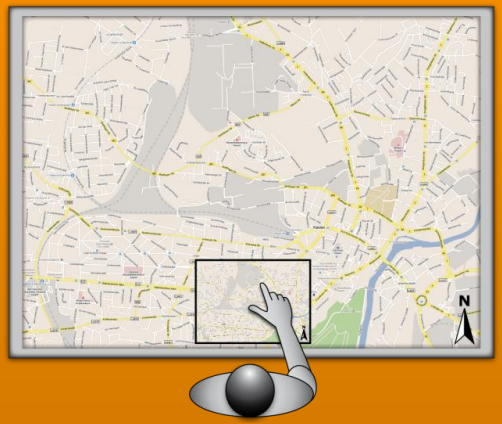
Select Gesture	Action	Description	Graphic
Select	Select		

90° with touch point and line between them (5)

Speedup

without any help (2)

Help to interact with a large scale multi-touch device (surface) in difficult orientations



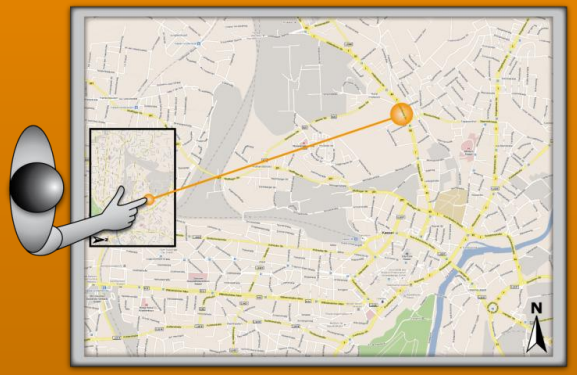
Default 0°

90° without help

90° with touch point

90° with coloured borders

90° with touch point and line

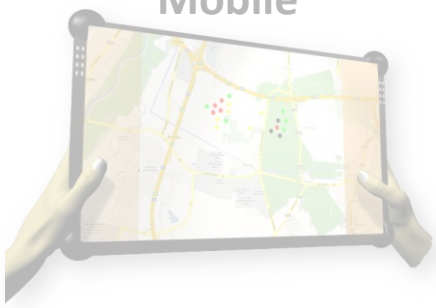


Map Visualisation

Speedup

Map Interaction

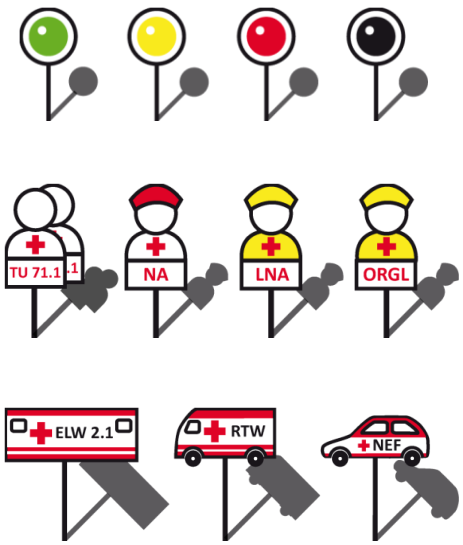
Mobile



Stationary

Map Visualisation

Both

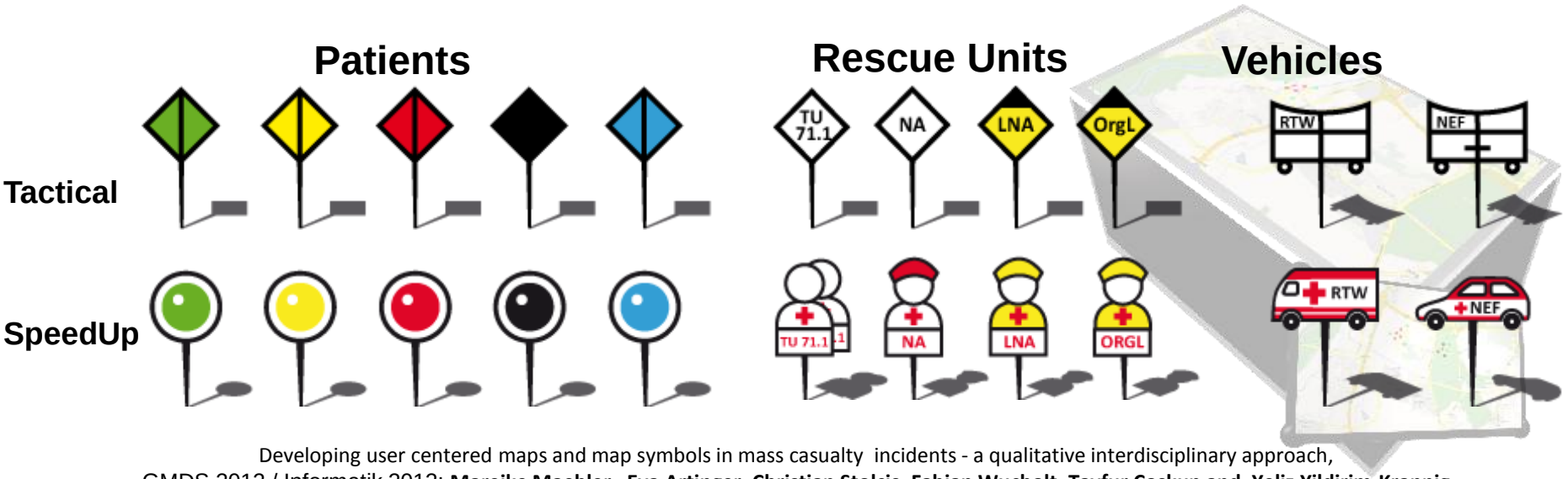


Visualisation of items

F: Comparison of tactical signs and the SpeedUp icons

Online Study

- Meaning of the icons
- Number of icons

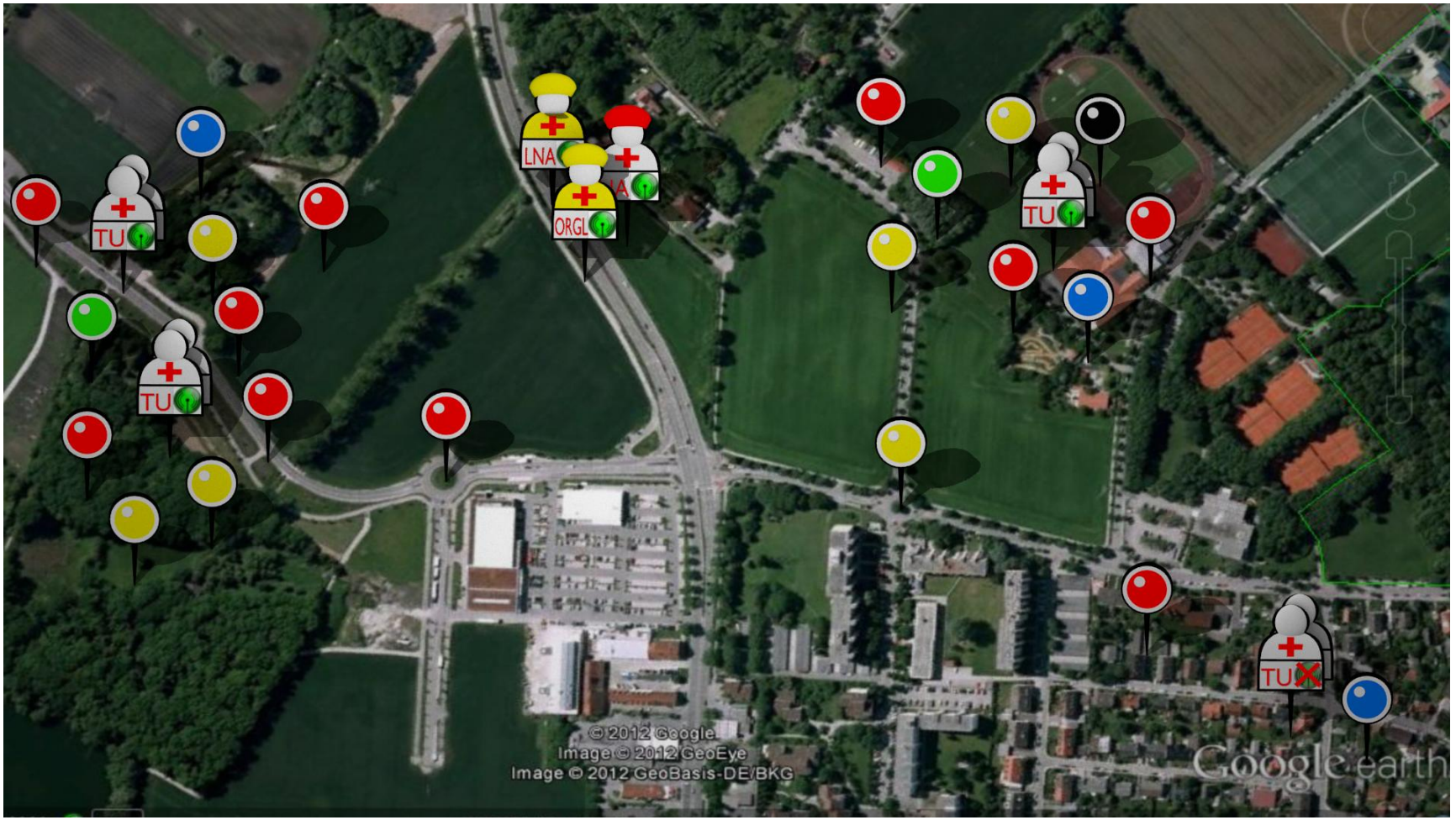


Group Visualisation of Patients and Resources (incl. Units)

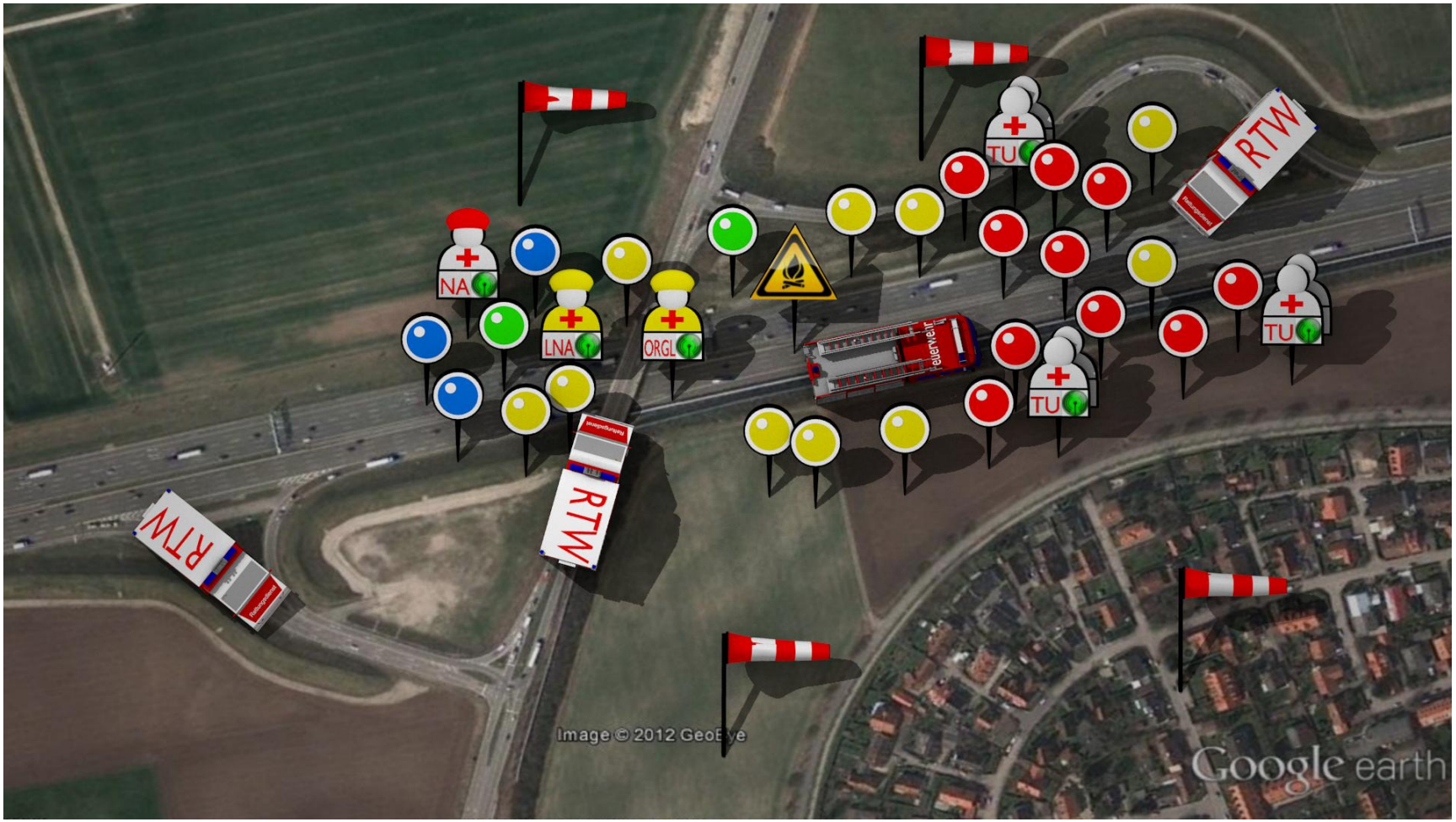
Conclusion of 1st Iteration (Group Visualisation)

- The EMCs would prefer group visualisations instead of detailed information of each patient
- The relief units in operation areas would be also interested in detailed information

Map Visualisation



Map Visualisation



Summary

- Ruggedized Tablet
  - Map Interaction with Border Requirement
    - Scrolling, Zooming, Selecting
  - Fog of Triage
- Surface
  - 2D and 3D gestures on Map applications
  - Gesture Review of literature
  - Orientation on a surface
- Map Visualization
  - Design of new MCI related symbols/icons
  - Tactical vs intuitive Icons
  - Group Visualization of Resources and patients

Thank you for your attention!

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