Foto: André Künzelmann UFZ 11.06.08

Interactive Wind Park Planning in a Visualization Center – Giving Control to the user

Dr. Björn Zehner, Department of Environmental Informatics
Given at: Digital Landscape Architecture 2009
21.-23. May 2009, Valetta, Malta
bjoern.zehner@ufz.de, bzehner@gmx.de

Förderkennziffern 01UN0601A, B

Public participation using choice cards
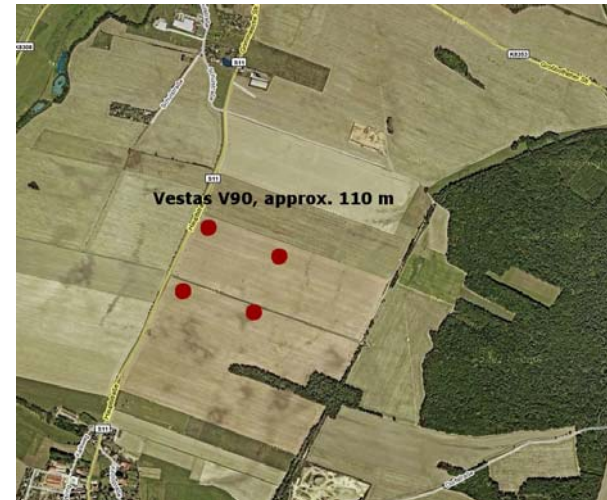
Which program would you choose

	program A	program B	program C
Size of the Windparks	large	small	medium
Max. heigth of turbines	200m	110m	200m
Local impact on nature	medium	low	medium
Min. distance to village	750m	1100m	1500m
Additional costs for electr.	0 €	6 €	1 €

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Using additional 2D visualization

Program A

Enercon E126, approx. 200 m

Program B

Vestas V90, approx. 110 m

Program C

Enercon E-126, approx. 200m

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Using additional 3D visualization

Program A

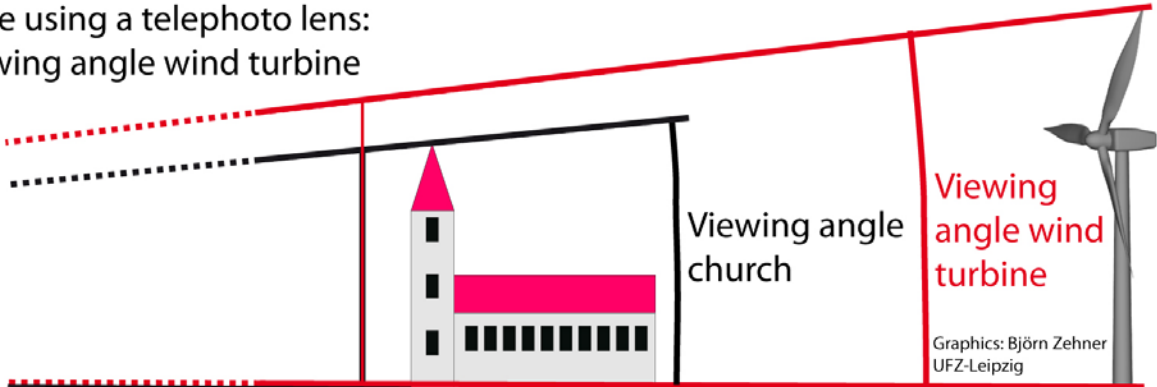Program B

Program C

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Public participation

Picture taken close up using a wide angle lens:
Viewing angle church > Viewing angle wind turbine

Viewing angle church

Viewing angle wind turbine
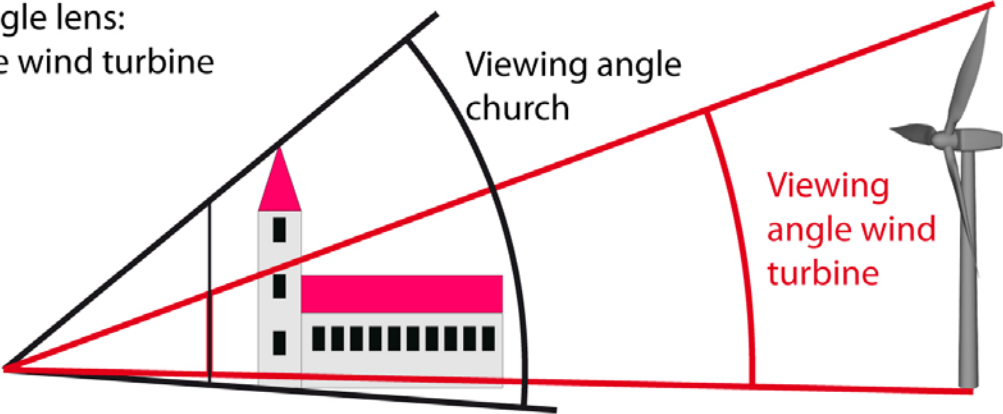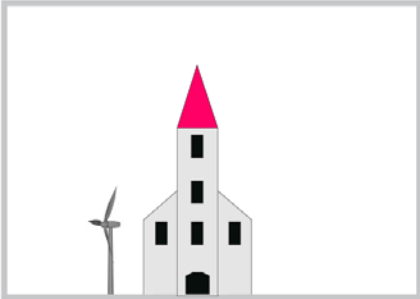
Picture taken from a distance using a telephoto lens:
Viewing angle church < Viewing angle wind turbine

Viewing angle church

Viewing angle wind turbine

Graphics: Björn Zehner
UFZ-Leipzig

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UFZ's Visualization Center

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UFZ's Visualization Center

- Supports stereoscopy using shutter glasses or infitec
- Supports head tracking

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Head-tracking

Projection screen

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Head-tracking

Projection screen
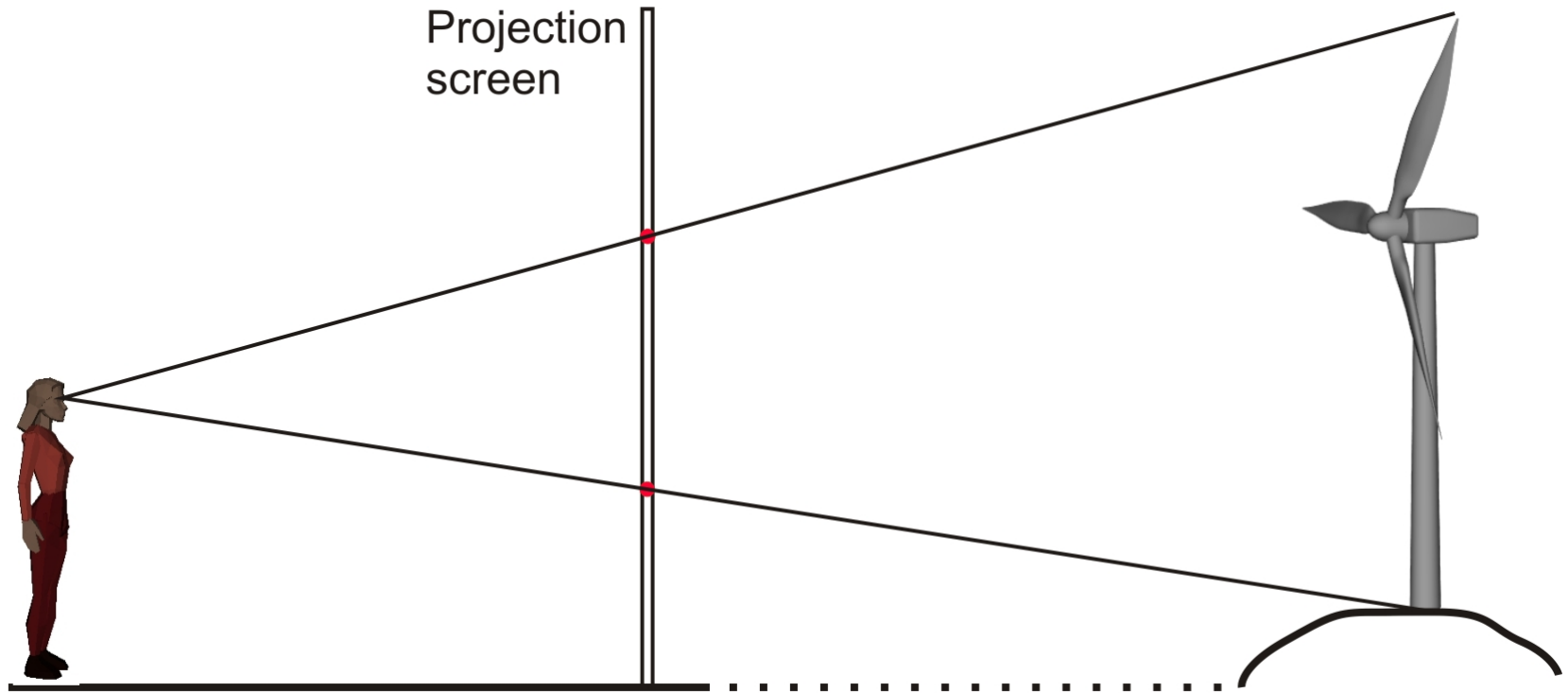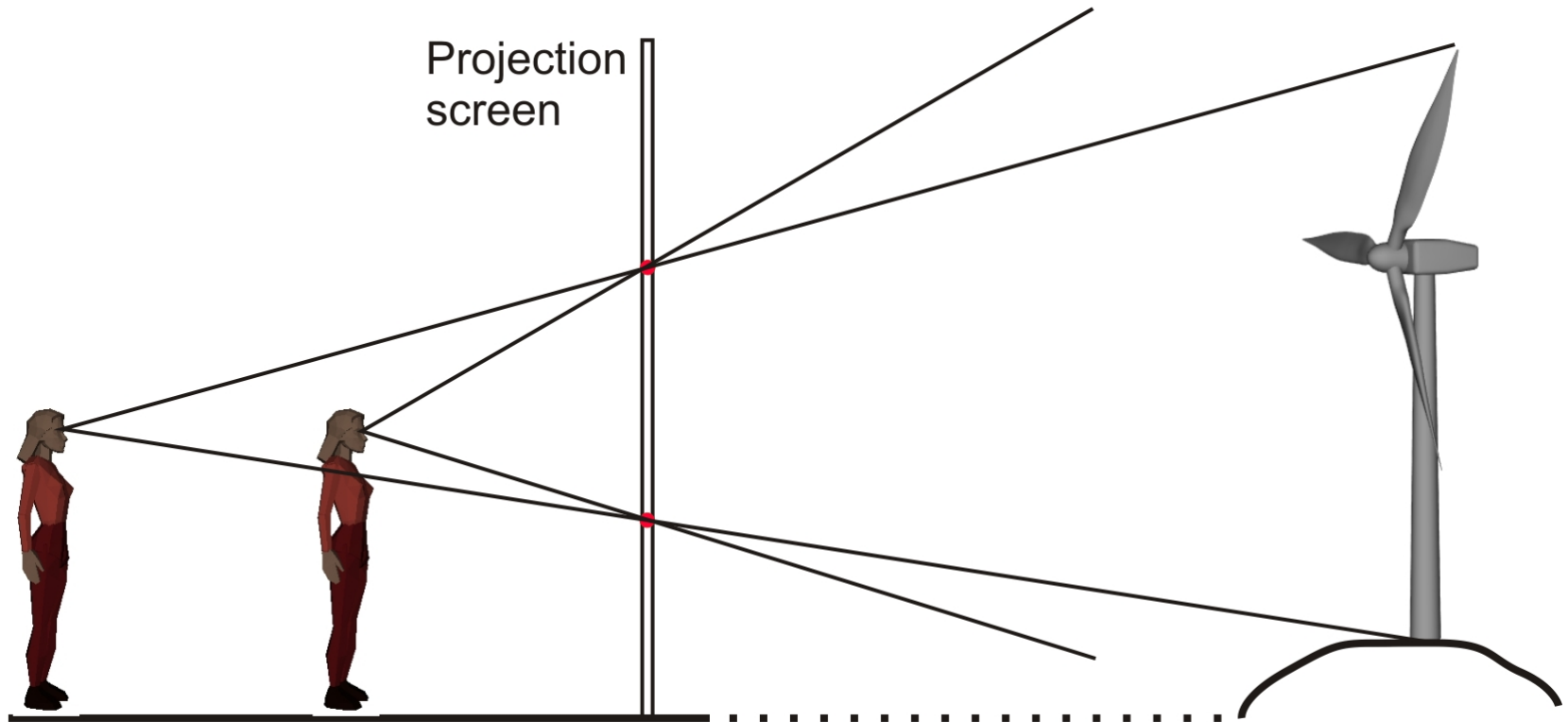
Because objects of interest are far away the visualization is:

- Very sensitive moving towards and away from the screen
- Less sensitive moving parallel to the screen (left/right)

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Focus of our visualization

Visualization from short distances (up to 2km).

Less on the question:
   Where can we locate a wind-park?

But more on the question:
   At this location will be a wind-park, how shall it
   look like? Number of turbines? Size of turbines?

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Interaction – giving control to the users

Why:

- People can quickly and efficiently play with different scenarios
- People should become aware of constraints the planners are exposed too
- Their preferences become visible without explaining them which parameters we are actually interested in (they are somehow hidden in the set of predefined turbines)

What is necessary:
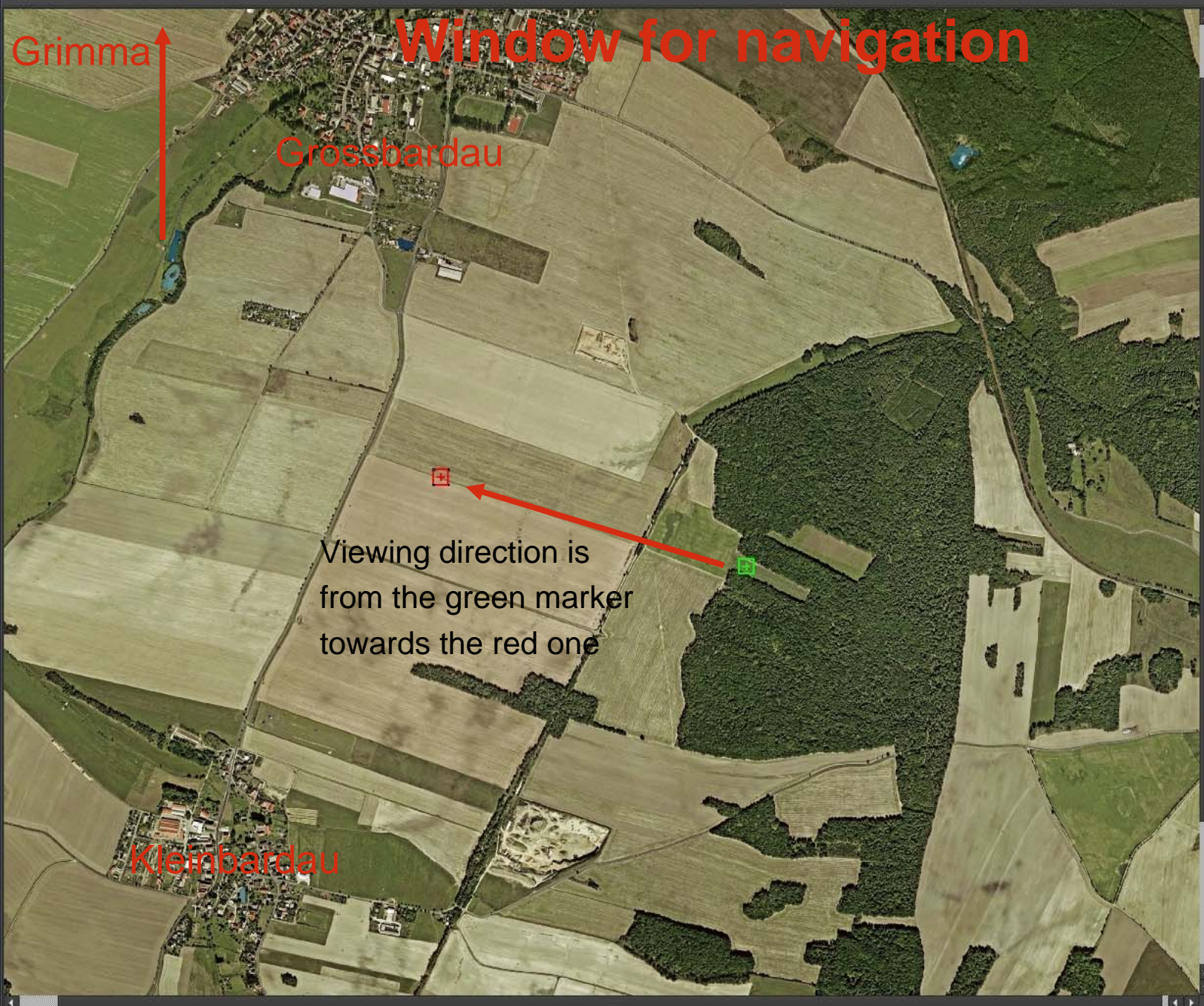- Very simple and easy to use interaction

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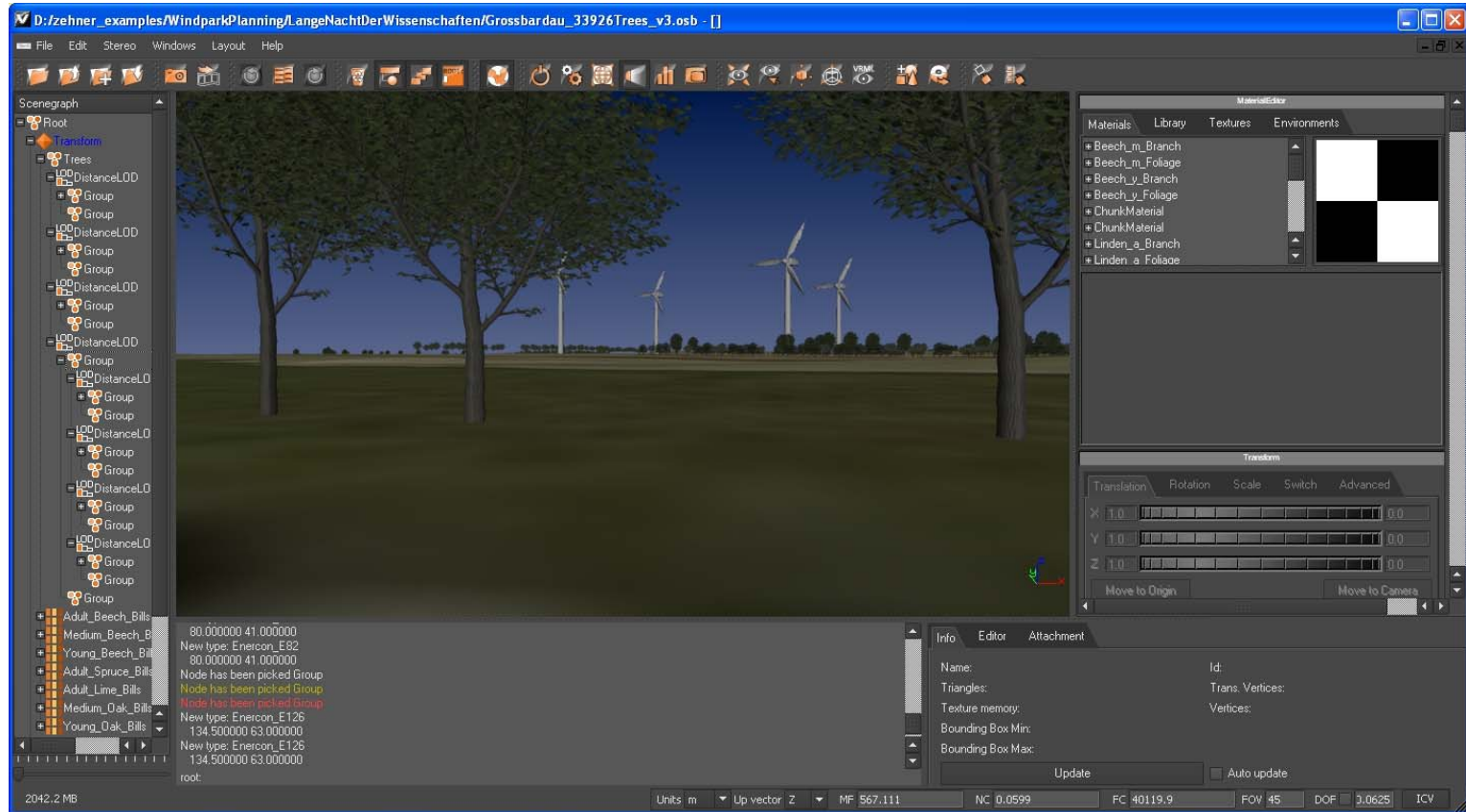
Interaction

Use of standard software is usually to complicated

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Interaction

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Window for navigation

Grimma

Grossbardau

Kleinbardau

Viewing direction is
from the green marker
towards the red one

NavigationPlugin

File
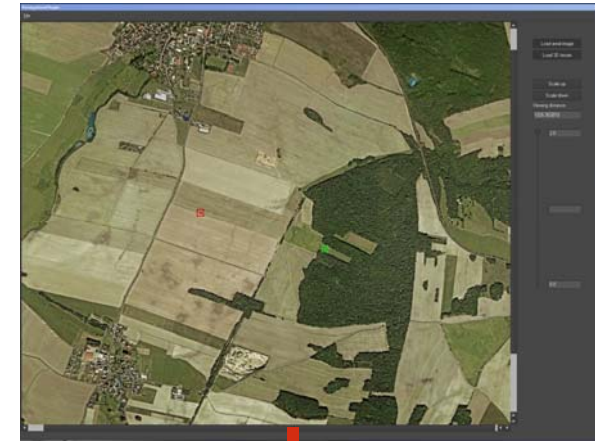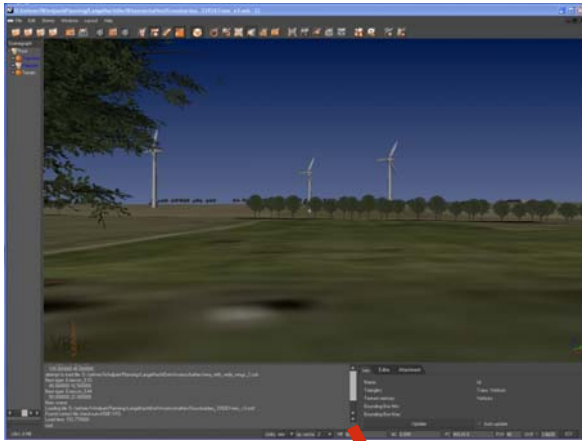
Load areal image

Load 3D terrain

Scale up

Scale down

Viewing distance:

1026.903816

2.0

0.0

Window for wind-park planning

Zoom in/out

Location and area needed for individual wind power engines

Add/remove turbine

Choose turbine type

Data for current turbine type

Rated power of the whole windpark

3D view of the windpark

Presentation at Leipzig's regional science day

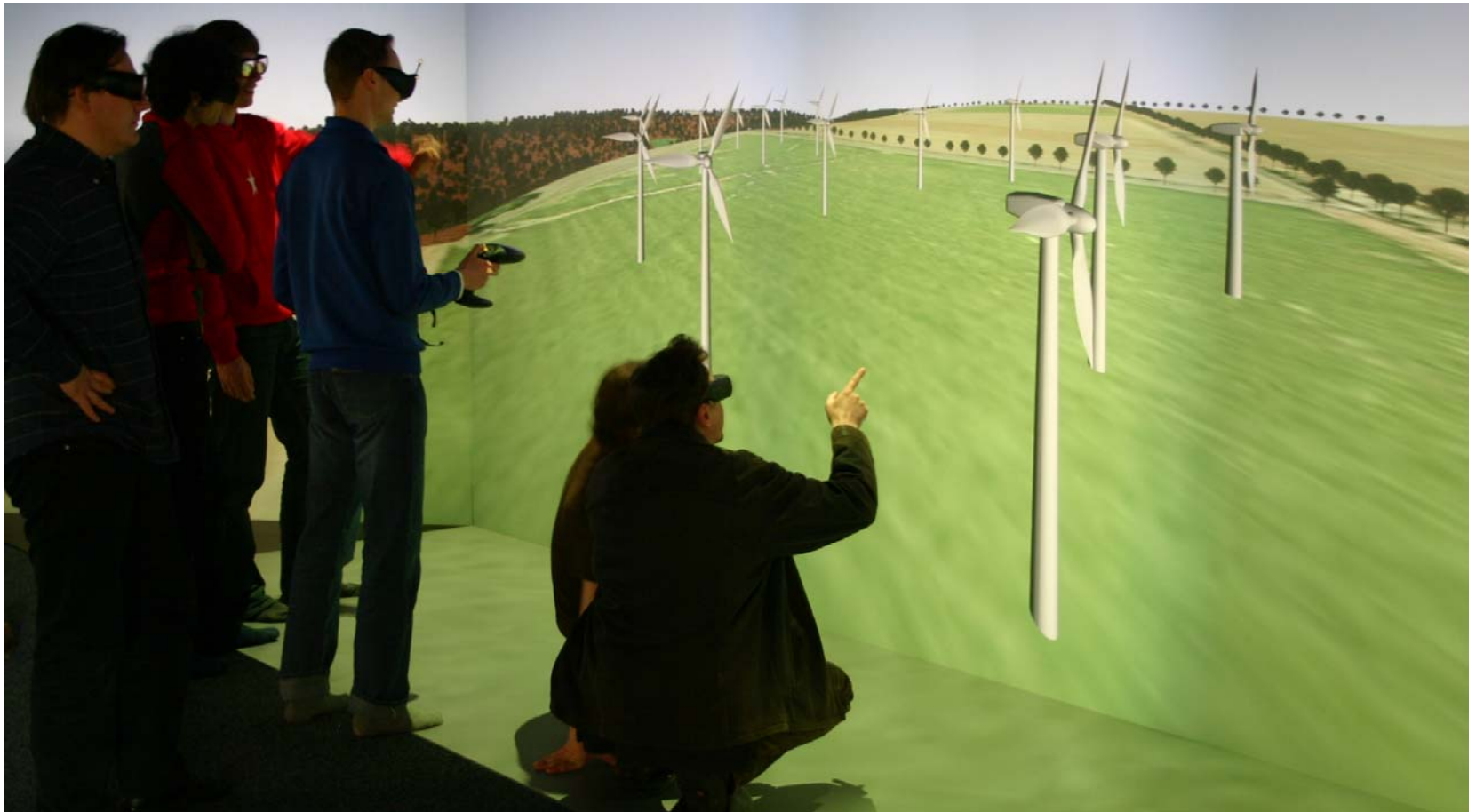Foto: Olaf Kolditz

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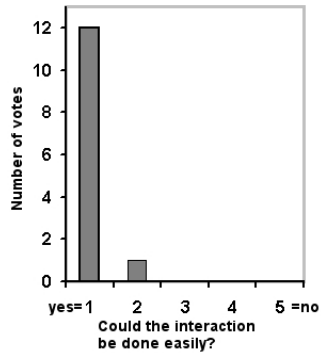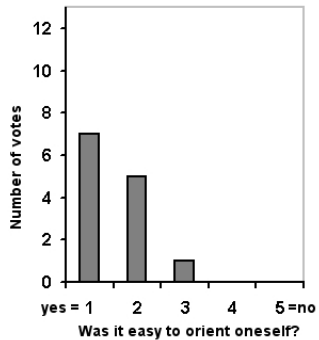
Presentation at Leipzig's regional science day

- Interactive experiment, carried out by the visitors

- Choice of different turbine types from a given set
    - Enercon E82, height: 121m, rated power: 2MW
    - Vestas V90, height: 150m, rated power: 3MW
    - Enercon E126, height: 202m, rated power: 6MW

- Users can plan a windpark at the given location

- Windpark must have a rated power of 18 MW

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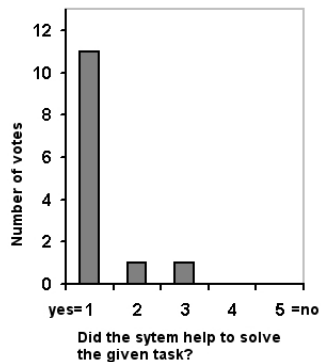
Presentation at Leipzig's regional science day

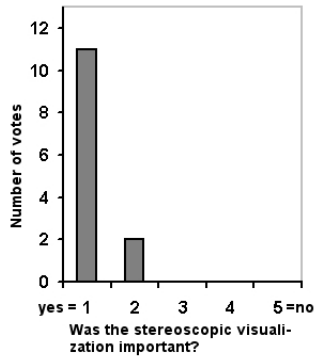- Nearly all users found the interaction could be done easily

- Users found it fairly easy to orient oneself

- Users found the systems helpful to solve the given task (planning a windpark with prescribed rated power)

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Presentation at Leipzig's regional science day

Was the stereoscopic visuali-
zation important?

Did the special glasses
disturb?

Did the visualization provide
sufficient detail?

- Nearly all users found the stereoscopic visualization important …..
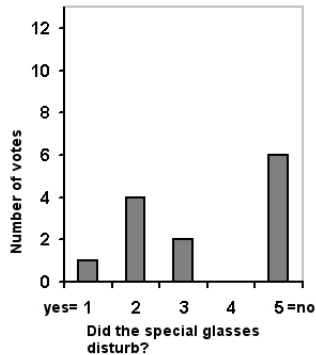
- …. even if more than half of them found the glasses at least somehow disturbing.
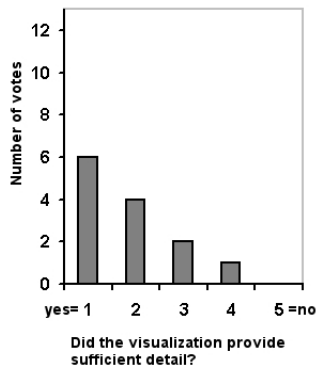
- More then half of them where at least missing some detail:
  - Sound
  - More detailed houses
  - More detailed green spaces

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Presentation to a panel of people involved in planning processes

Active stereo

Pros:
Brighter image !
Better colors

Cons:
Less reliable for presentations, depends
On batteries and the sync signal, send via
infrared

The presenter can often not be aware if
unexperienced users have problems, e.g.
do not see stereo at all.
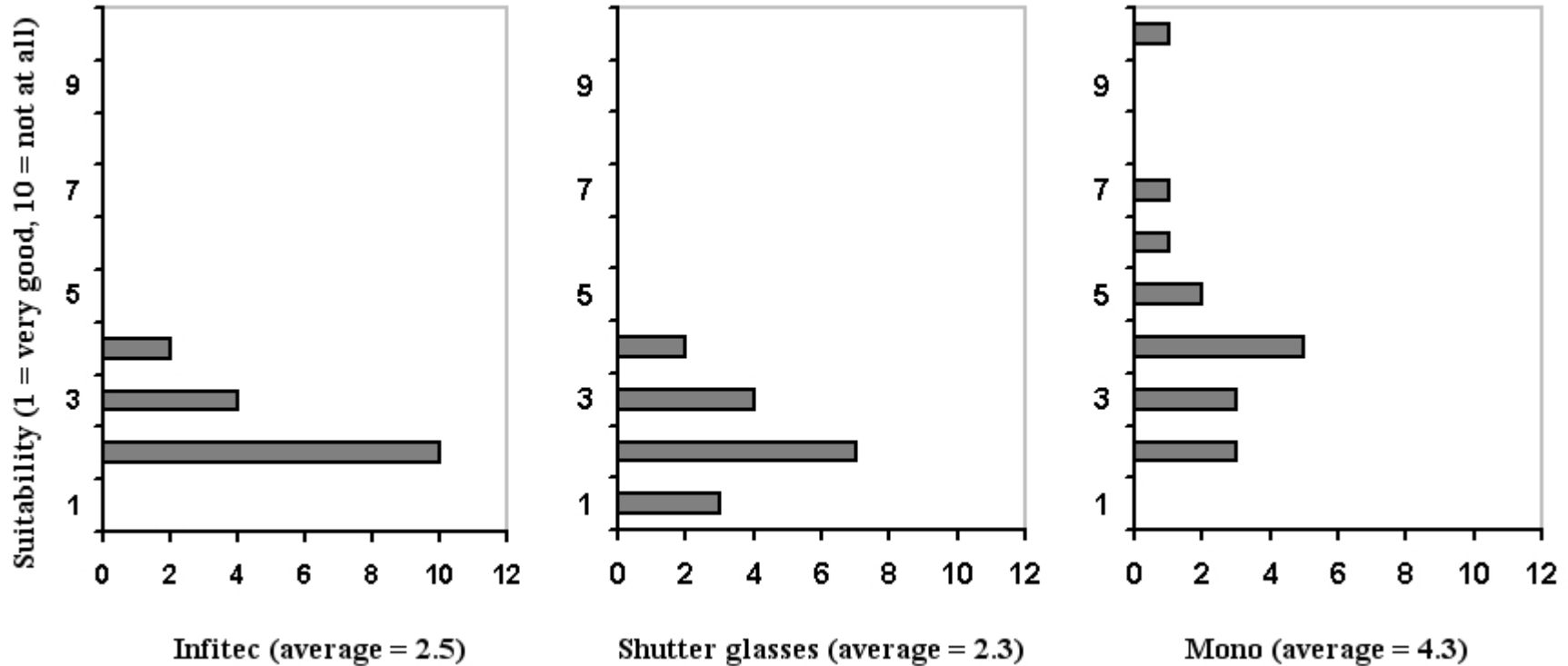
Passive stereo (Infitec)

Pros:
Very reliable as not dependent on any externals,
good for presentations to unexperienced audience

Cons:
Darker image !

Different colors for left and right eye, this is not
perceived while looking at the display but can
be strange when looking at other persons or a
monitor

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Presentation to a panel of people involved in planning processes

Infitec (average = 2.5) Shutter glasses (average = 2.3) Mono (average = 4.3)

- All Persons valued one or the other form of stereo higher then mono
- Infitec and shutter glasses are nearly equal
- The advantage of stereo is only very little
- 4 out of 16 would choose mono because it is cheaper and easier to use

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