

# Exploitation of BIM-based information displays for construction site safety communication

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Pilot for advanced safety communication at construction site

## Basic information on the pilot test



- **The target** was to test the usability of LCD information display screens together with novel material, to promote safety communication at construction sites.
- Pilot was carried out at an office building construction site employing 50 people at that time.
- Two LCD information displays were placed at site premises, and used for disseminating **up-to-date and visualized safety related information** to construction workers/site staff.
- The project was **fully designed using 3D building information modeling** and the models were used in various site meetings.
- Site staff was eager to test **BIM-based 3D views also to improve safety related communication.**
- The pilot trials lasted 4 weeks, after which **feedback** over the display screens and presentations was collected with a questionnaire.
- Site staff have continued the practice independently.

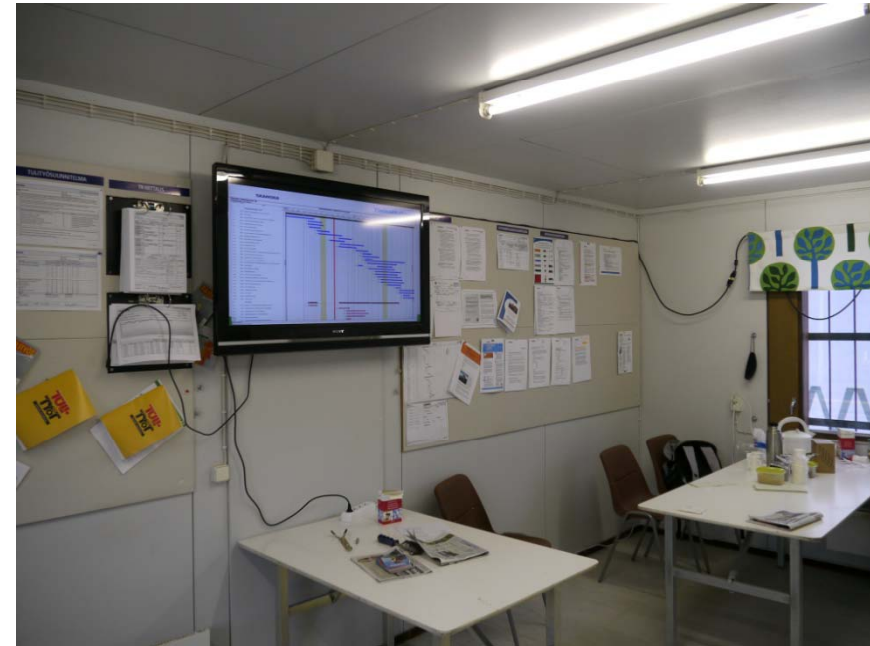
Pilot for advanced safety communication at construction site  
**LCD display positions at site**

One in the site office hall



The display in the hall of the site office premises was the main display for e.g. site visitors.

The other one in the staff break room



The display in the staff break room was the main display for site personnel.

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## Weekly INFO presentations 1/2

- Focused on developing information content (rather than the system/tools) -> Powerpoint presentation with views from the project's BIM-models was selected
- Consisted of in average 25 slides, lasting less than 10 minutes
- Run as a continuous loop throughout the day on the LCD displays
- A member of site staff updated the slideset once a week with new information (1 workhour was reserved for the work)
- Content focused on information that was:
  1. current/important on the specific week
  2. site-specific
  3. related to safety



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## **Weekly INFO presentations 2/2**

- Content provided information on:
  - Current affairs and events
  - Schedules and more detailed weekly plans
  - Positive safety notes
  - Safety observations
  - Accident or near-miss reports
  - Safety issues that need improvement
  - Particularly dangerous places on the site presented with help of 3D site plan
  - 3D site plan
  - TR Safety observation results (weekly safety level)
  - 4D-model views presenting the weekly plans (targets)

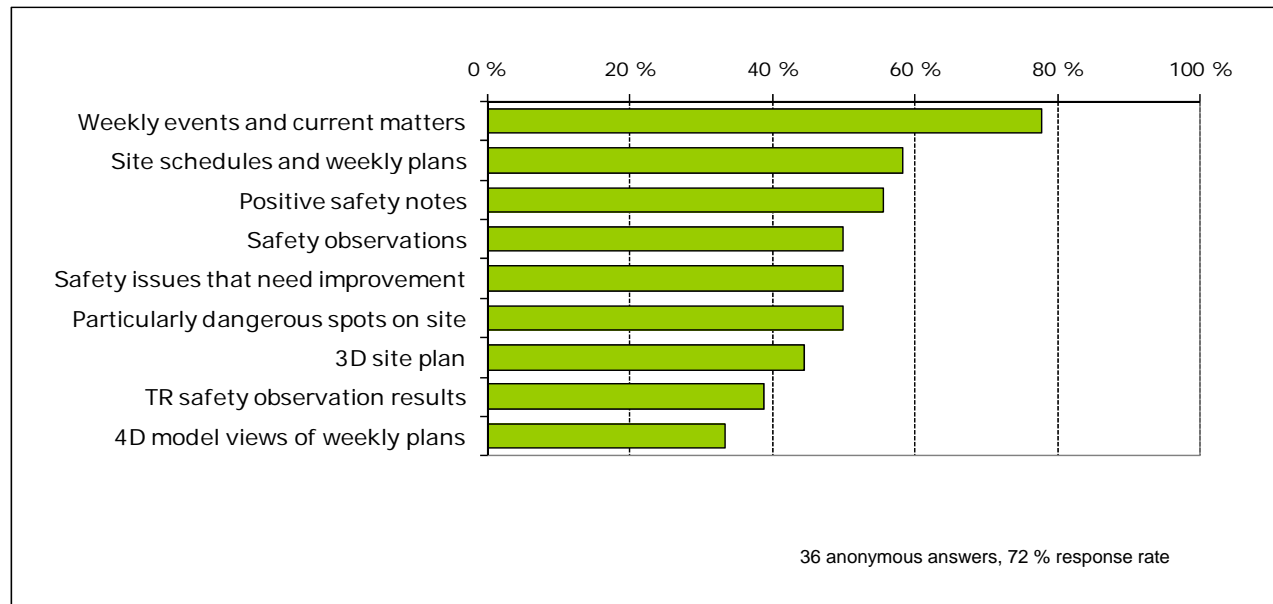
## Feedback

# Watching habits and general feedback

- Most of the viewers watched the entire slide show once in short parts during the week
- The information display was generally considered as a good source of knowledge on site affairs
- Weekly updating was considered sufficient
- The site staff reported that **the shown material have improved their overall understanding what is happening on site**
- **The more site-specific the content is, the more valuable** the site personnel consider the displays

## Feedback

## The usefulness of presented safety information

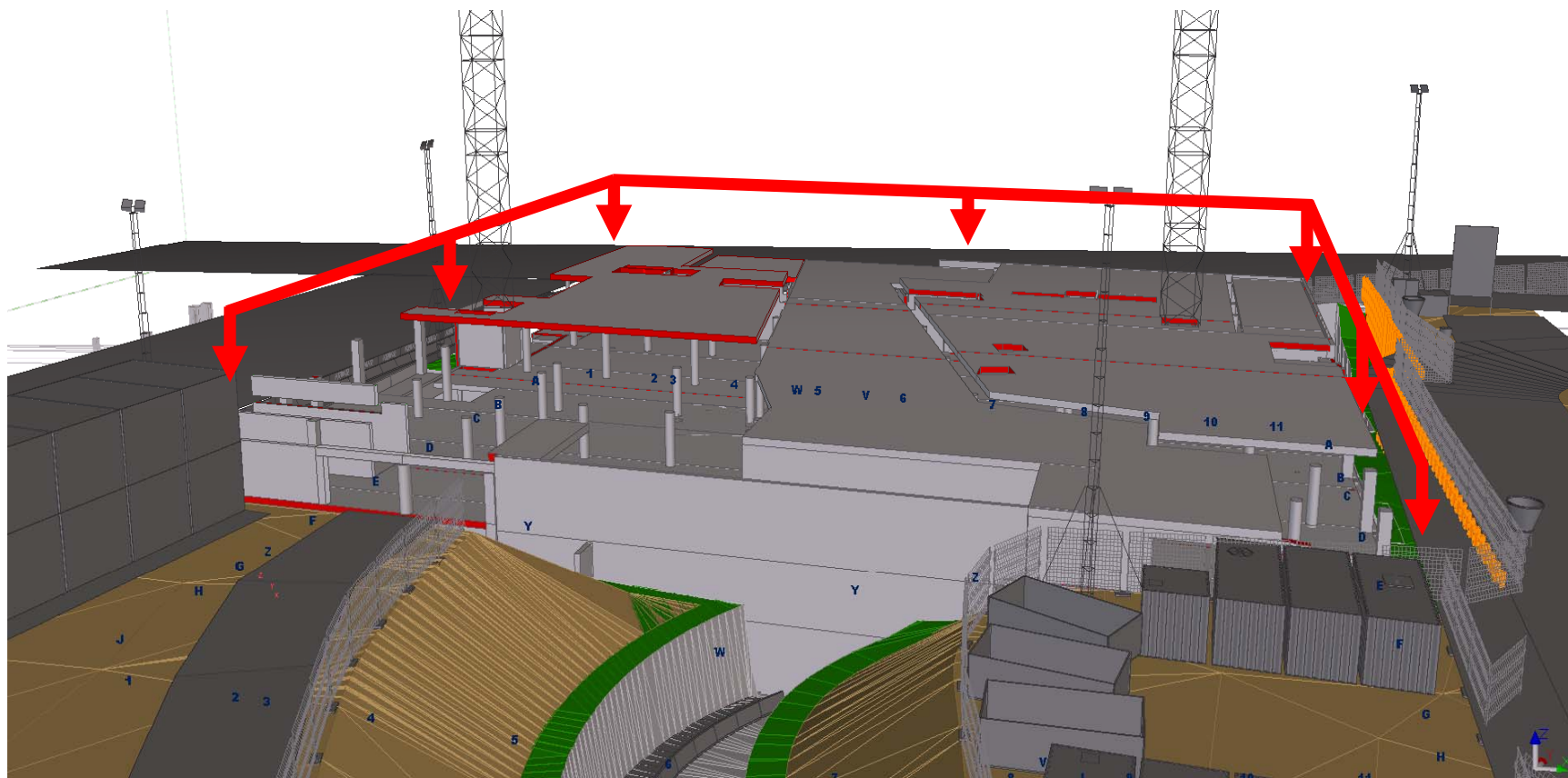


*How many thought the specific information was usefull*

- The most important information: 1) **weekly events and current matters** 2) site scedules and weekly plans 3) positive safety notes
- The least important: 4D target plans, TR Safety observation results (weekly observed safety level at the site) and 3D site plan
- Particularly useful information e.g. visualized information on dangerous spots on site, weekly timetable, accident reports



## Erityiset vaaranpaikat



Kellarikerrosten ulkoseinien lämmön- ja vedeneristystyö käynnissä.  
Holvilla työskentelyssä estettävä esineiden putoaminen reunalta.

## Main findings

# Benefits and possibilities

- Information displays provide **current, up-to-date information** that is **available** regardless of date or time of the day.
- Disseminate messages to a wider audience and reinforce the openness of site safety communication.
- **Equal information** to everyone being present
- Information easily accessible and understandable:
  - not lot of time needed to get the information
  - easily understandable 3D model views and other visual material break language barriers
- Good display content increase safety by making the people on site **more aware of what is going on** there.
- Support other means of communication

## Main findings

# Challenges and development needs

- Placement of the information display screens
- Limitations in use of 3D and 4D visualizations at the moment:
  - BIM-based animations (videos) effective, but not possible to create in all modelling software
  - colors in structural BIM-models: more realistic representations serve better safety communication
- Keeping site staff interested in the weekly INFO presentations
- Keeping the practice running:
  - the content should be easy to create and update
  - special software knowledge may be needed to create good material
- Wider use in building sites would require development of a centralized system, to efficiently collect and update the information that is e.g.
  - common to all/several sites

## Conclusions

- Info-screens has been tested on building sites in the past, but the information provided here was 1) on weekly-level, 2) mainly site-specific, and 3) used to promote safety. Additionally, formal feedback from the site was collected.
- Good feedback: Site staff have continued the Weekly INFO practice independently
- The usage of information display screens on construction sites has promising possibilities such as keeping current safety issues visible at all times.
- The usage of BIM is rapidly increasing and supports safety communication, but to take better advantage from BIM technology:
  - better BIM-based views, visualizations and animations for safety communication are needed
  - more up-to-date models are needed into use for safety communication
- Other development needs and challenges include establishing and spreading the weekly INFO practise to other building sites.





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technology**