



Virtual environment (CAVE) as a tool for end-user participation in health facility design, a case study

Tiina Yli-Karhu, EPSHP, project manager, tiina.yli-karhu@epshp.fi
Helinä Kotilainen, THL, chief architect, helina.kotilainen@thl.fi

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HospiCaseY Project 2009-2011

To use virtual environment **multiprofessionally**, as a joint design forum for end users and designers, and to examine various patient and operating processes and the properties of spaces within a virtual environment.

To **support user participation** and to develop new user-based design processes.

To **create a systematic feedback system for the evaluation** of the success of construction projects.

The project is part of the Spaces and Places 2008-2012 programme of the Finnish Funding Agency for Technology and Innovation.

CAVE

- Computer Automated Virtual Environment





Contents

- Research material
 - recorded and decoded discussions
 - video recordings
 - photographs
 - questionnaires
- Research methods
 - thematic contents analysis
 - SPSS software (questionnaires)
- Results
- Possibilities to use



Visits to CAVE

- A **patient room**, an **examination room** and a part of an **emergency center** (100 m²) were modelled into the CAVE
- Approximately 280 visitors
- Board of the Y-house, designers, planners, engineers, contractors, accessible building committee and **end-users** from the health center and specialized health care
- Questionnaires were distributed to the end-users, 187 of them was returned



Virtual model of a patient room

Research material from CAVE
patient room + bathroom

- group interviews **10**
- findings **758 + 534**
- questionnaires **51**





Virtual model of an examination room

Research material from CAVE
Examination room

- interviews [13](#)
- findings [1314](#)
- questionnaires [39](#)





Virtual model of an emergency centre, appr. 100m²

Research material from CAVE

- interviews 17
- findings 1992
- questionnaires 65

Spaces:

- registration
- triage
- waiting areas
- corridors
- observation rooms





Thematic contents analysis

- findings altogether appr. 4600
- primary themes, 14
- secondary themes, 23 – 25



Primary themes

- layout
- accessibility
- furniture
- accessories
- materials
- durability
- ergonomics
- hygiene
- safety
- lighting
- colours
- blinds / curtains
- aesthetics
- virtual environment

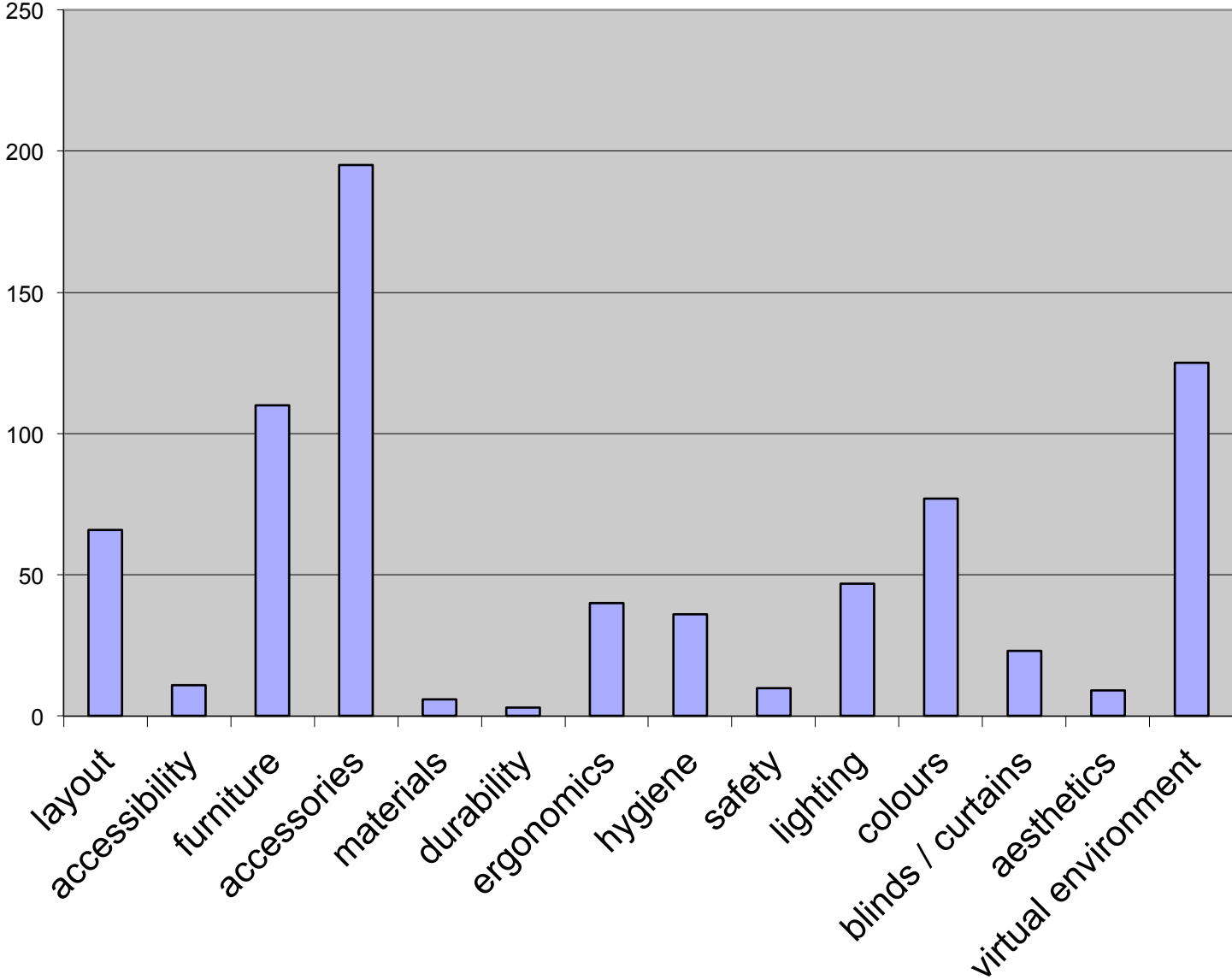


Secondary themes

- 10. Need
- 11. Dimensions
- 12. Layout
- 63. ~~Expectability of windows~~
- 7. Furniture
- 8. Touchability
- 9. Positioning
- 10. Need
- 11. Dimensions
- 12. Layout
- 13. Functionality

- 22. Acoustics
- 23. View
- 24. Durability, ease of maintenance
- 25. Materials
- 26. ~~Appeal~~
- 21. Privacy
- 22. Acoustics
- 23. View
- 24. Durability, ease of maintenance
- 25. Materials
- 26. Appeal

PATIENT ROOMS, primary themes





Comments on patient room & bathroom

- furniture
- accessories
- layout
- functions
- accessibility
- assisting
- ergonomics
- colours, blinds / curtains

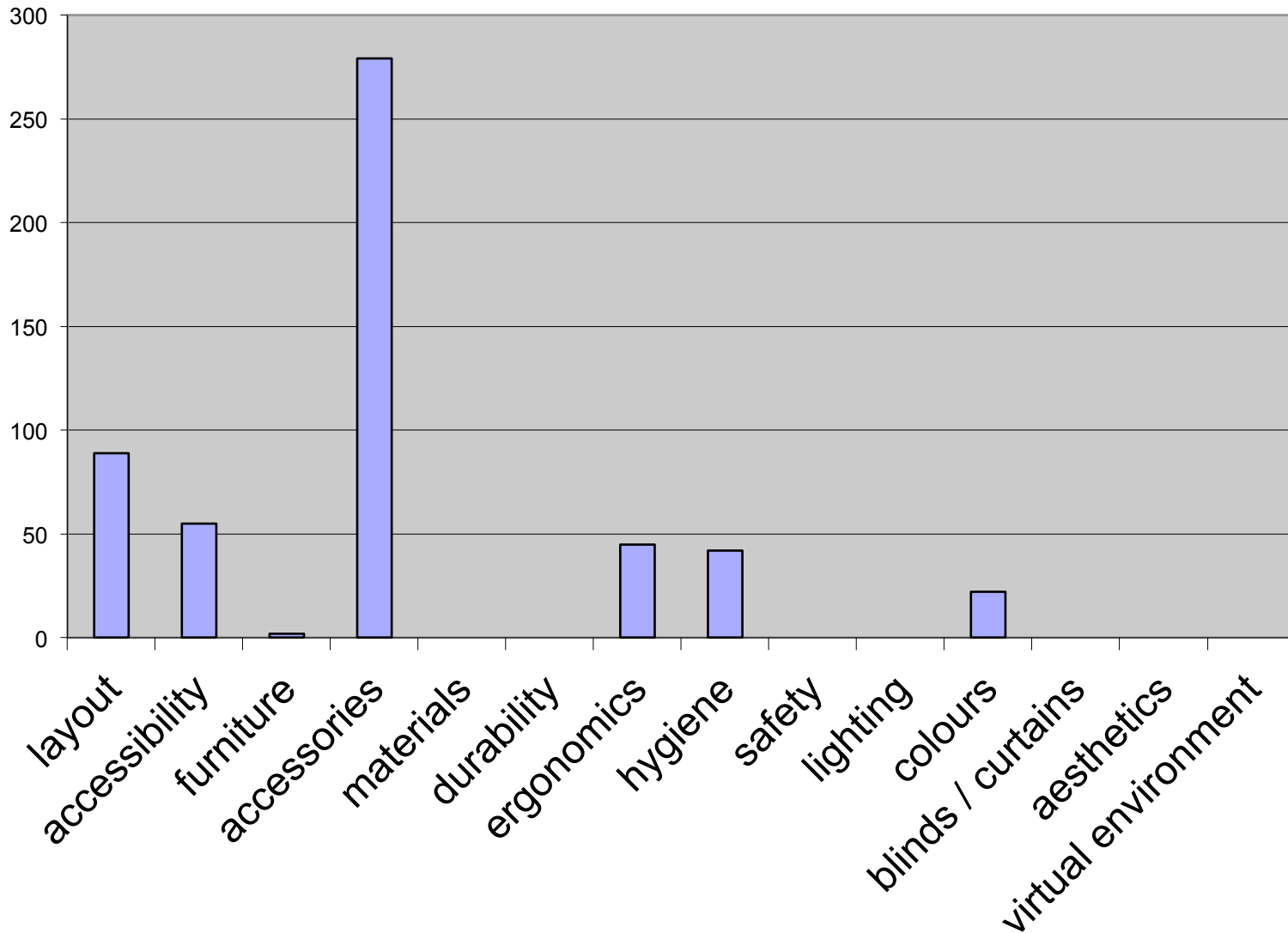




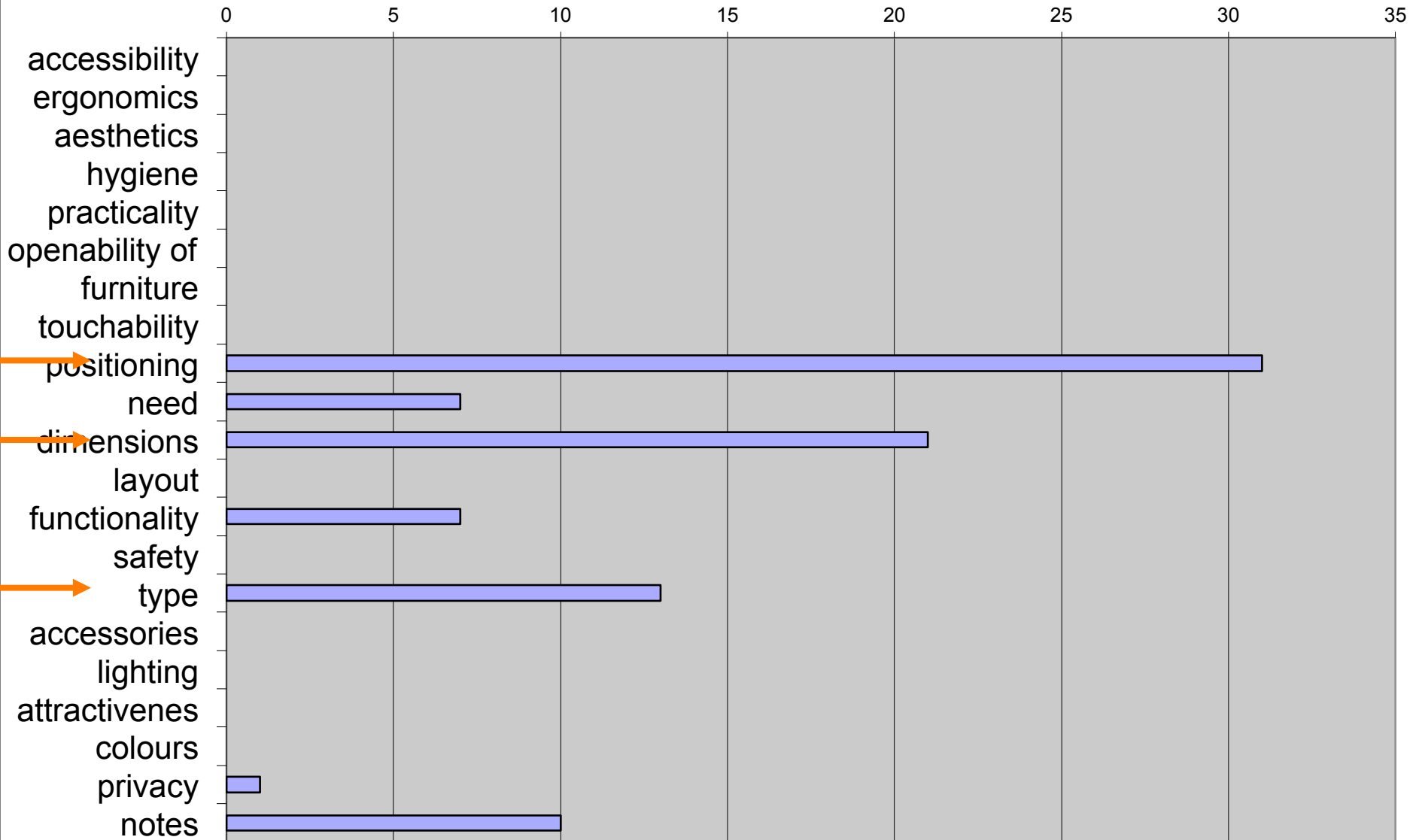
Hospice Case BATHROOM

	layout	accessibility	furniture	accessories	materials	durability	ergonomics	hygiene	safety	lighting	colours	blinds/curtains	aesthetics	virtual space
accessibility														
ergonomics														
aesthetics											4			
hygiene				1										
practicality														
openability of windows														
furniture														
touchability														
positioning	31	16	1	56			31							
need	7	16		45	5		6	10			2			
dimensions	21	4		2			2							
layout														
functionality	7	1		20				5						
safety				1										
type	13	6		108	19		4	13			15			
accessories														
lighting, daylight														
attractiveness														
colours														
privacy				1										
notes	10	12	1	45	24		2	14			1			
Altogether	89	55	2	279			45	42			22			0

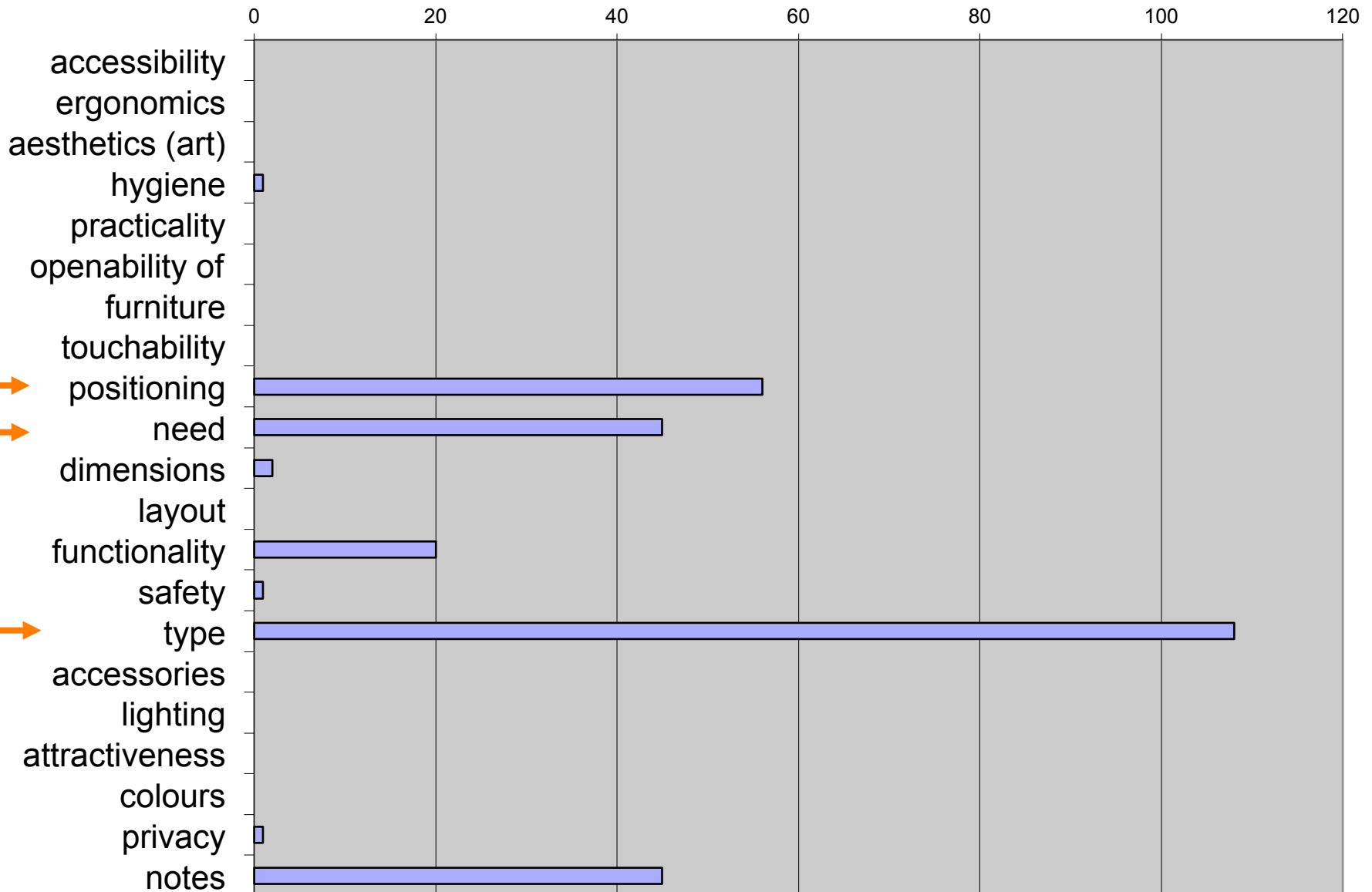
BATHROOM, primary themes



BATHROOM, layout

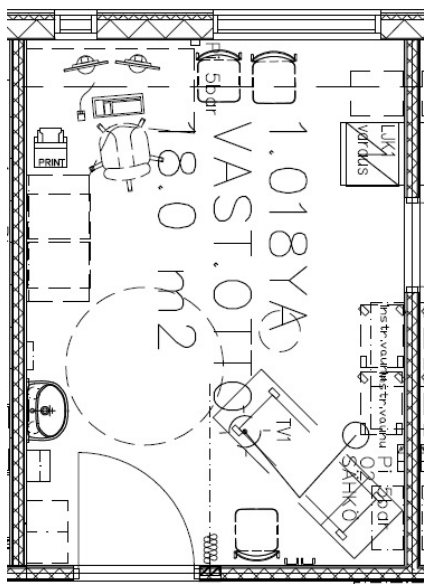


BATHROOM, accessories

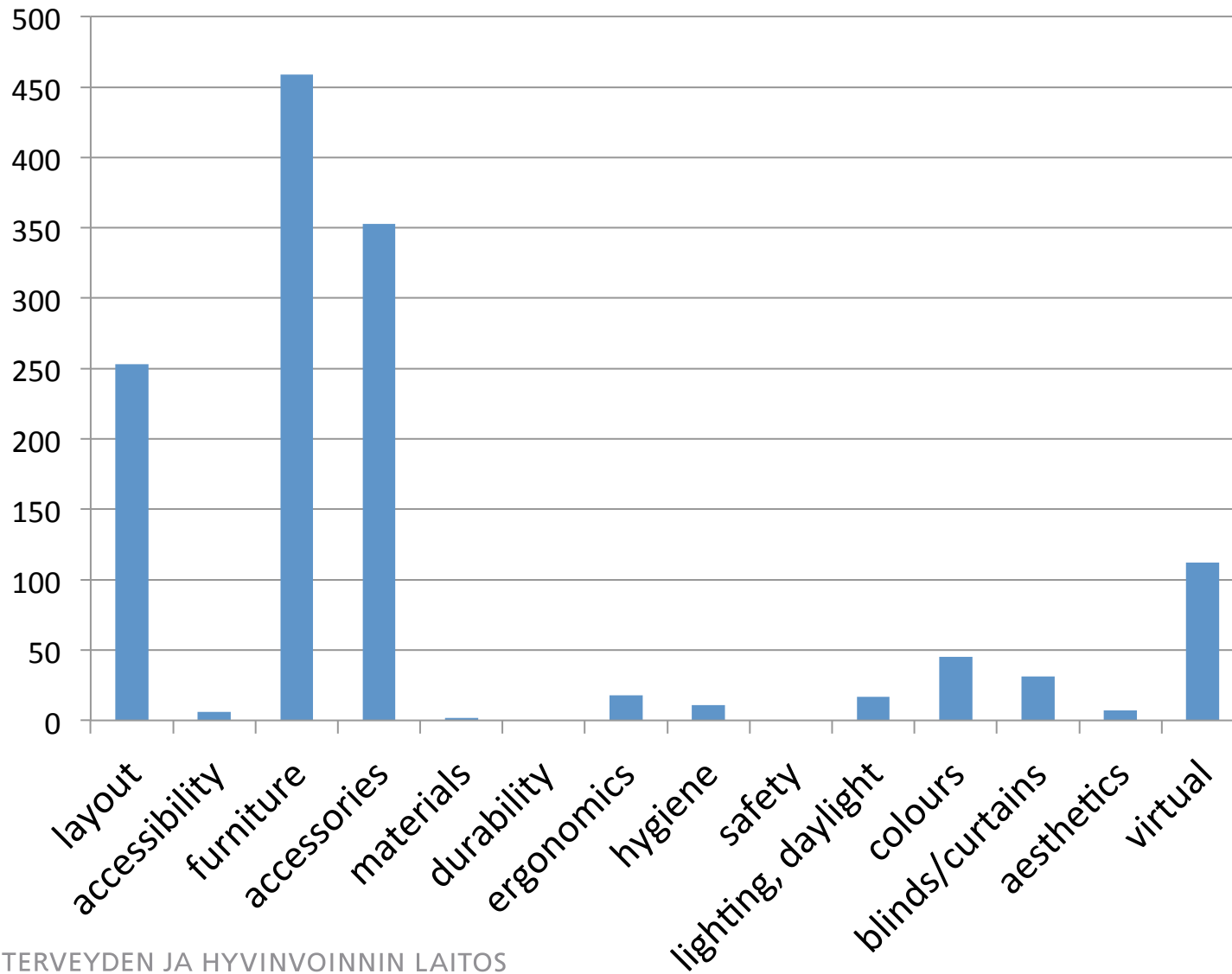




Comments on the examination room



EXAMINATION ROOM, primary themes





Main entrance

Päivystyskeskus

Keskuskatu

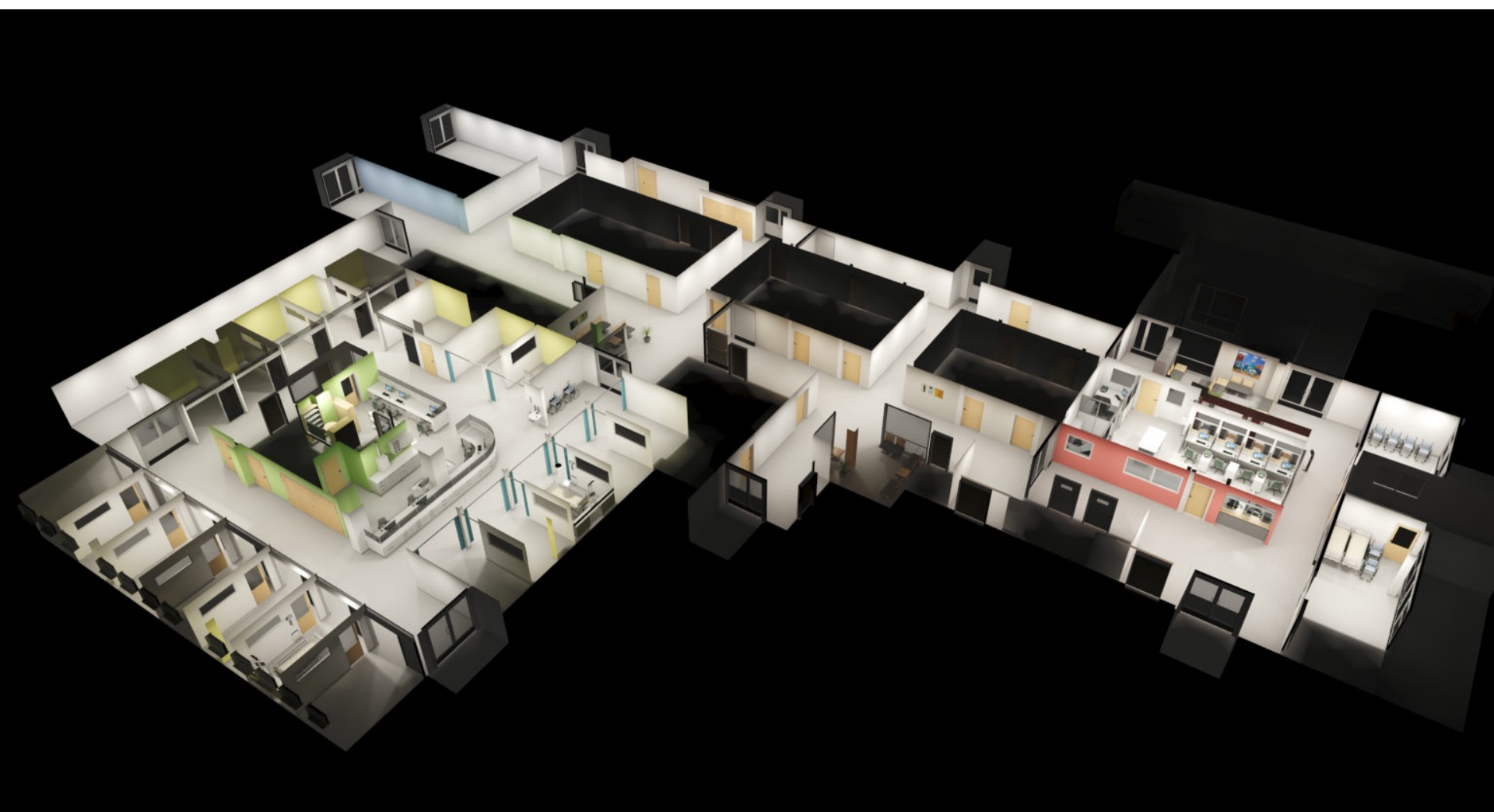
YD

YA

YC

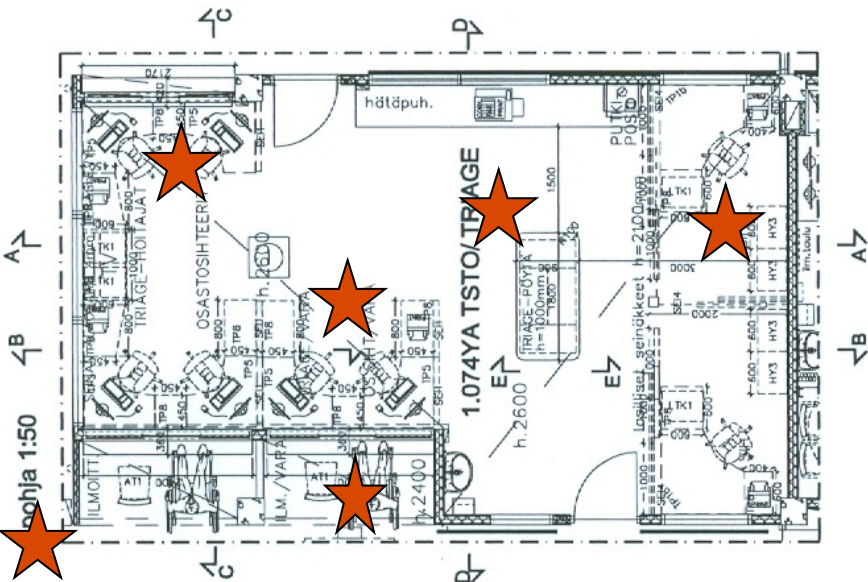


Virtual model of the emergency centre (a part)





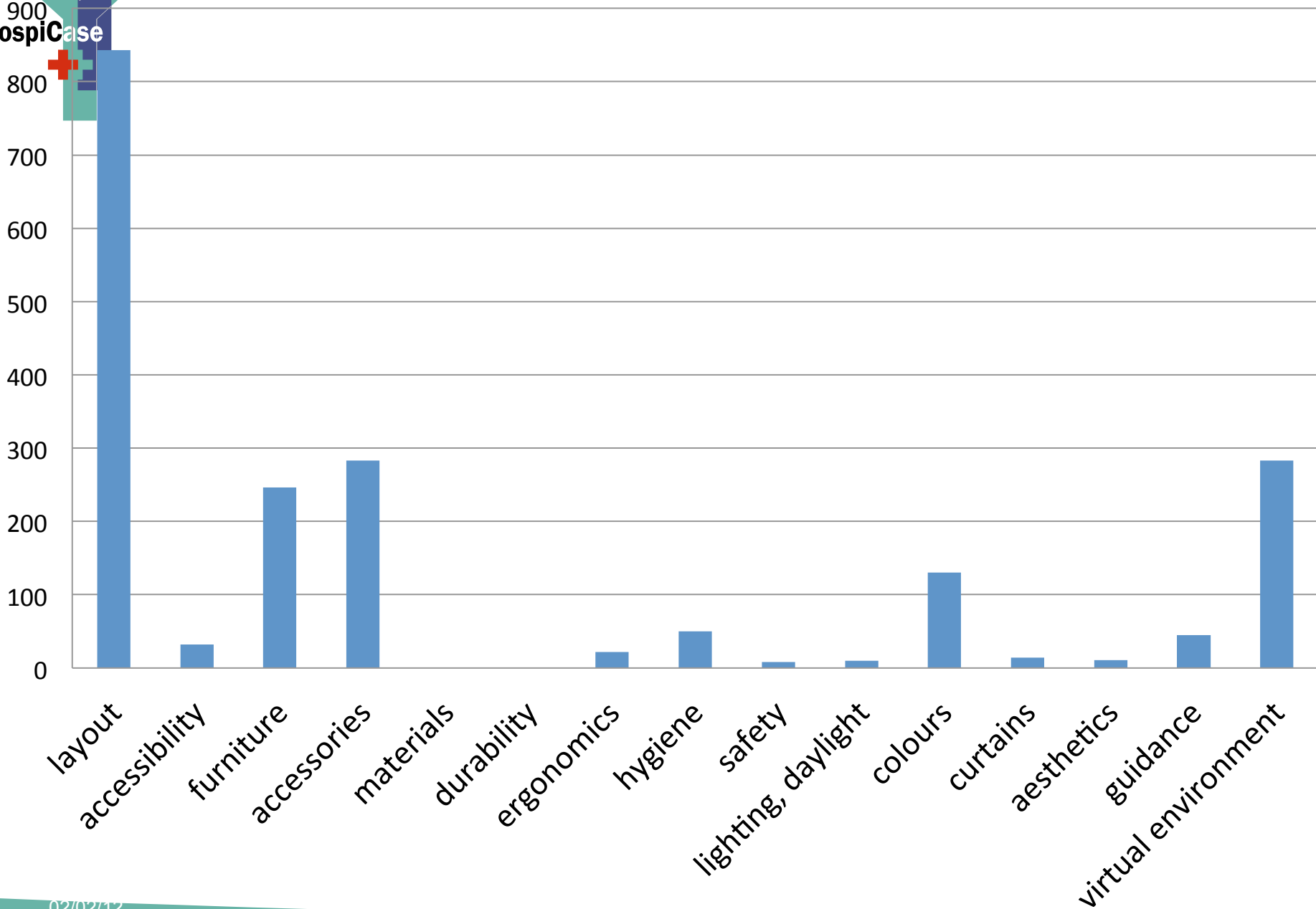
Triage, comments in CAVE



- arrival to the emergency centre
- patient / staff contact
- working in triage / privacy
- safety, privacy, accessibility, guidance

EMERGENCY CENTRE, primary themes

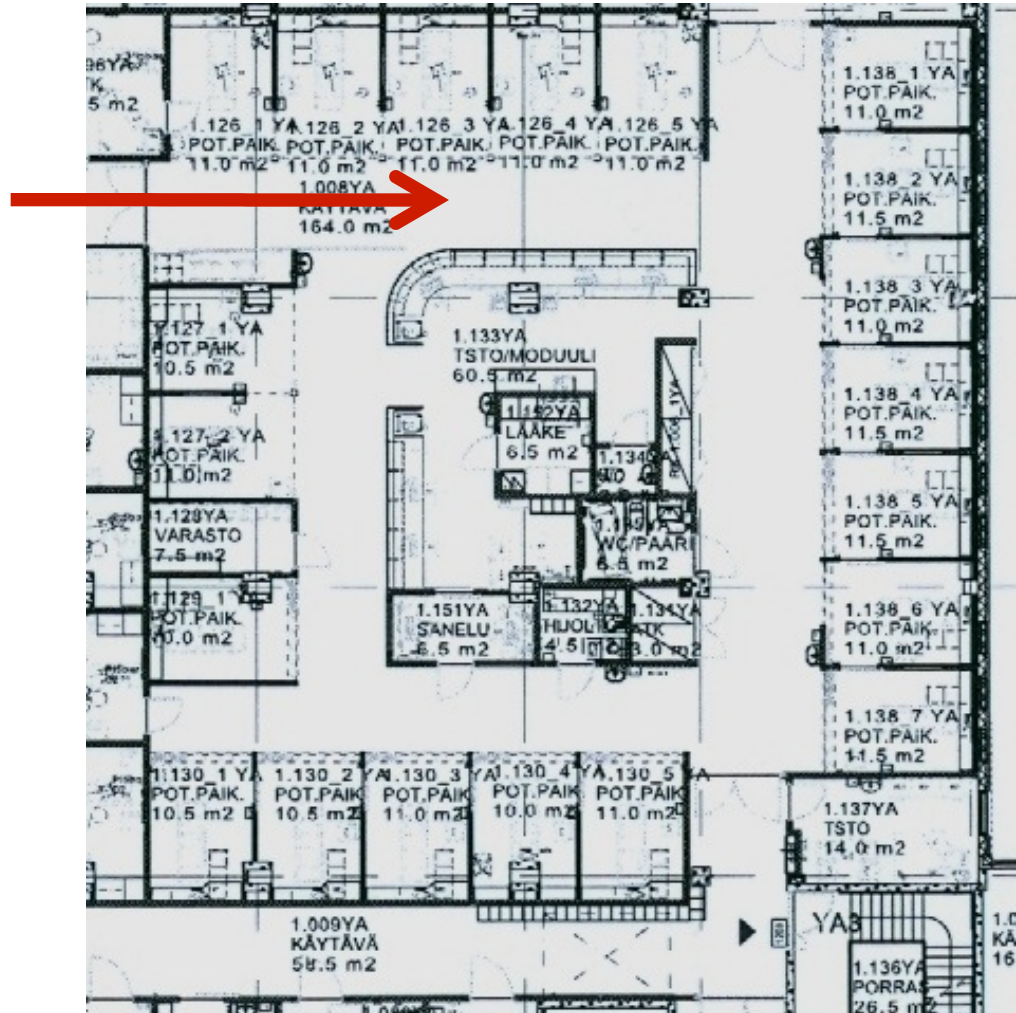
Hospice





Observation rooms, comments in CAVE

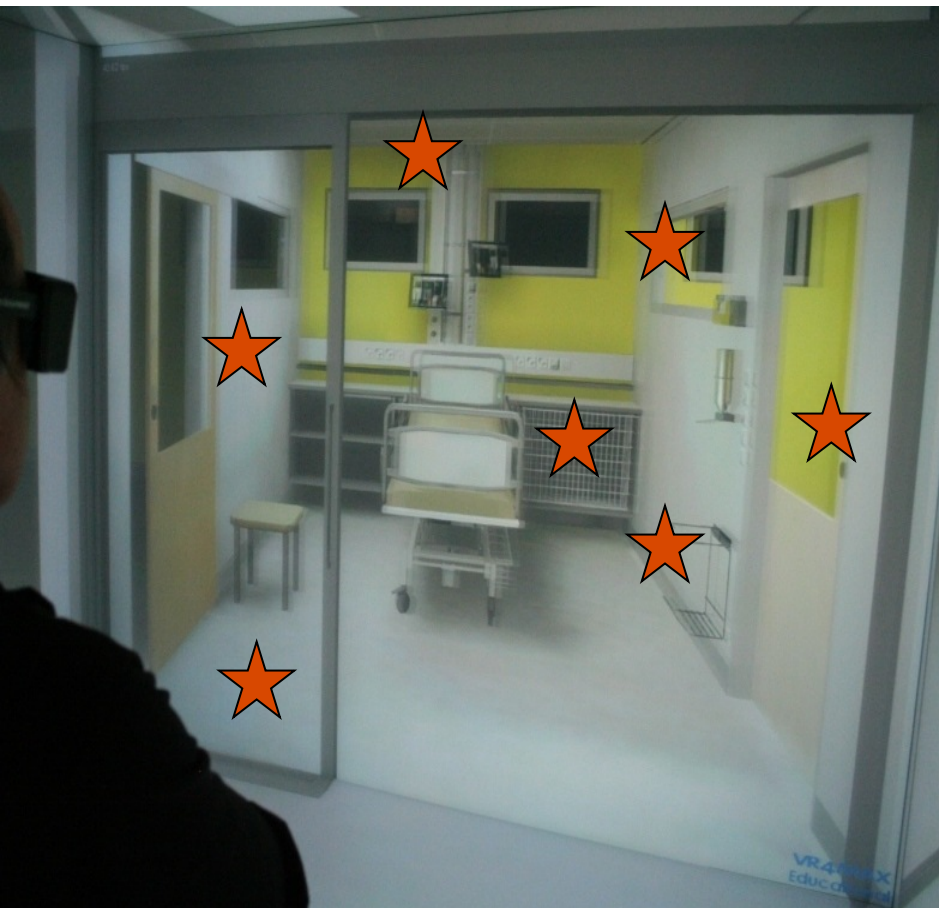
- visual access
- partitions/windows/doors
- privacy
- relatives
- guidance
- furnishing





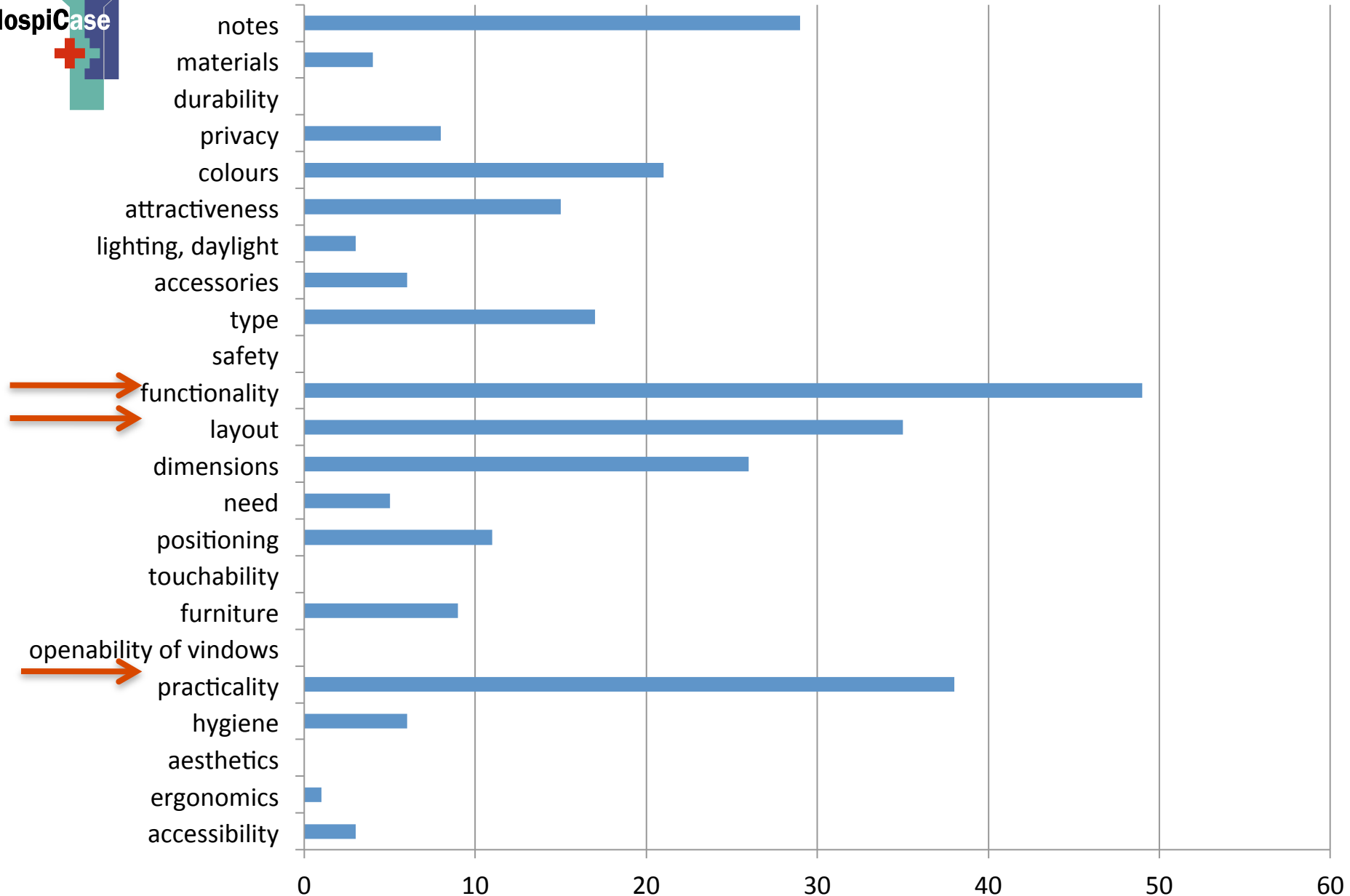
Emergency observation room, comments in CAVE

privacy, visual access, accessories, furniture, relatives



EMERGENCY CENTRE, virtual environment

HospiceCase





SUMMARY, issues mentioned most often

- In examination rooms most attention was paid on furniture, accessories and then third layout
- In patient rooms accessories were number one, then furniture and layout
- In bathrooms the most important were accessories and then layout and accessibility
- In emergency centre most discussions focused on layout and after that accessories and furniture



Interaction staff / patients

- Functions in the examination room, interaction around examination table
- Assisting patient around the bed and in the bathroom
- Monitoring patient in the emergency centre and controlling visitors in the unit
- Functions in triage and registration of patients, control of arrival area



Useful comments on various issues

- ease of **cleaning and maintenance**
- **accessibility** of different patient categories
- complex **processes** such as the care of emergency patients
- special considerations such as **signs**.

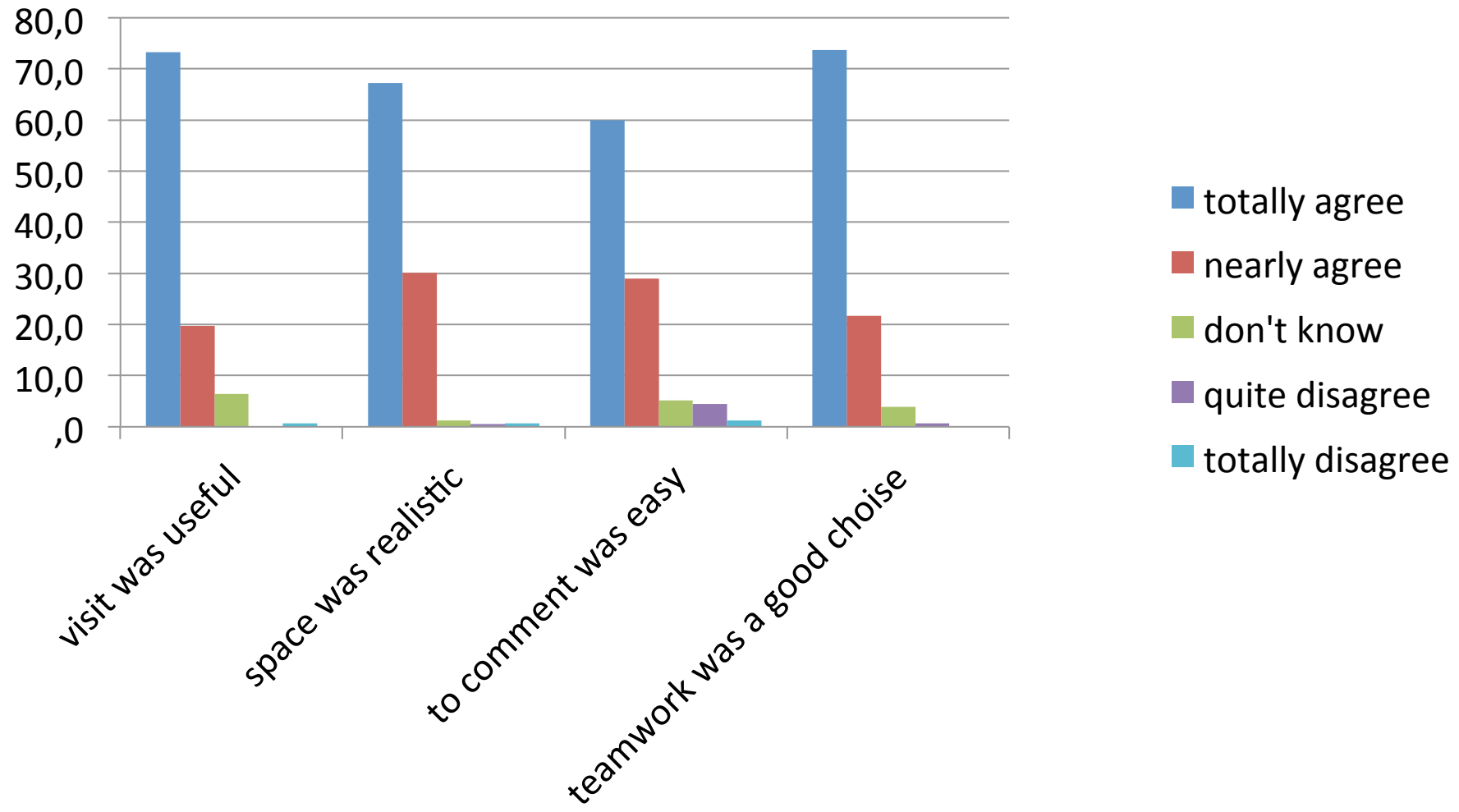


Questionnaires (to fulfil the interviews)

- **FIRST IMPRESSION** /attractiveness, functionality
- **SPACE** / adequateness,form, barrierfree to move and work
- **FURNITURE, EQUIPMENT**/ positioning, functionality, number
- **ACCESSORIES**/ functionality, positioning, outlets, gases
- **COLOURS, LIGHTING**/ attractiveness, sufficiency
- **FUNCTIONALITY** / suitability, ergonomics, safety
- **COMFORTABLE** / space, furniture, privacy, working peace, view, daylight
- **CAVE** / practicality, reality, easy to comment, teamwork



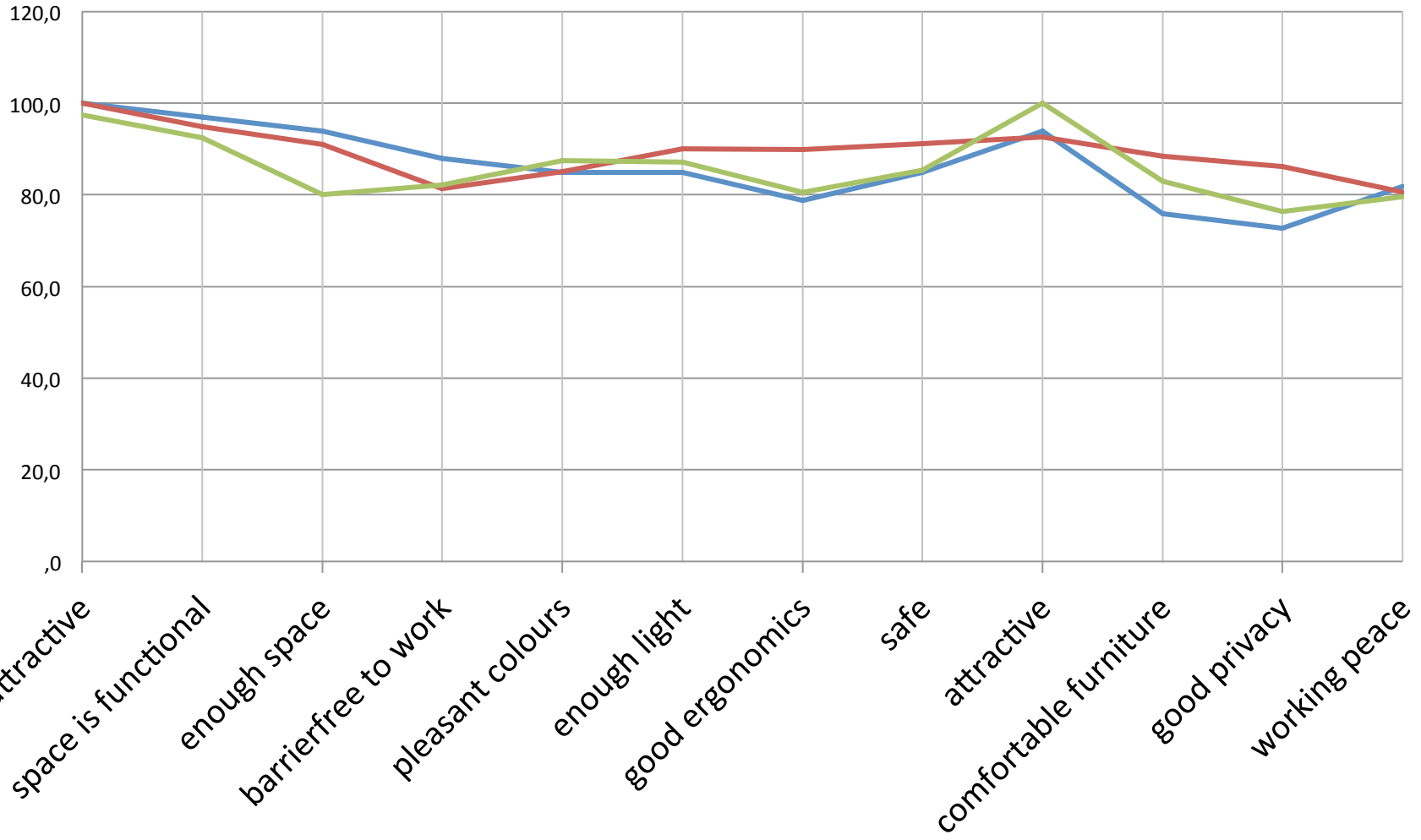
Experience in the virtual space, CAVE





Agree and nearly agree comments by age structure groups (%)

- 20 - 35
- 36 - 50
- 51 - 65





Tools for HospiCaseY project

- CAVE
- management tool for requirements
- web based post occupancy evaluation
- evidence based design thinking
- learning organization



CAVE used in different planning phases

- project planning/alternative space requirements, complex departmental entities
- draft phase / space models, size, fit to functions (repeated spaces!)
- later phases/ focusing details
- to produce vivid alternatives easily
- to produce alternatives before architectural drawings
- to produce interactive and changeable models



THANK YOU!



www.hospicasey.fi