

USABILITY OF BUILDINGS

“Usability and adaptability in hospital buildings”

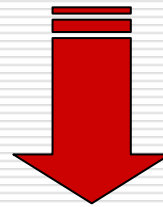
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Challenges in hospital buildings

- buildings characterized by major complexity
- rapid and accelerating changes in
 - medical technology and ICT
 - treatment methods
 - pattern of diseases
- culture and ideology due to patients' privileges
- increased effectivity and productivity

Perhaps the most important challenge.....

Long planning and building period.....



The project conditions and the users needs
are often changed!

The term usability – the demand perspective

Usability is defined as

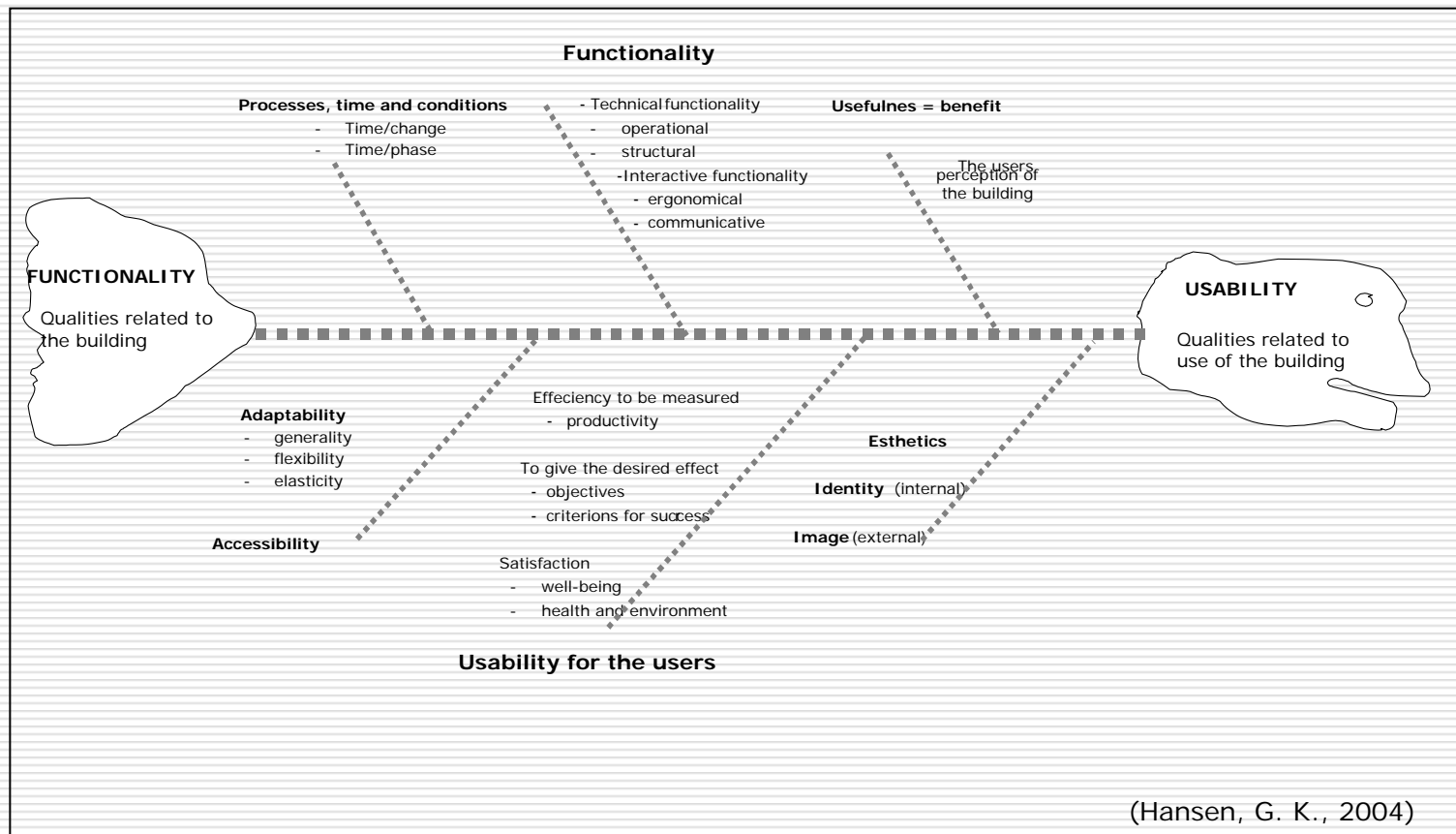
*"...effectiveness, efficiency and
satisfaction with which a specified set of
users can achieve a specified set of
tasks in a particular environment"*

(ISO 9241, "Ergonomics of human system interaction".)

Usability is determined by 3 key factors

- ❑ *effectiveness* – whether users can achieve what they want to do with the product
- ❑ *efficiency* – how long it takes them to achieve it
- ❑ *satisfaction* – their feelings and attitude towards the product

Criteria and parameters affecting usability of buildings

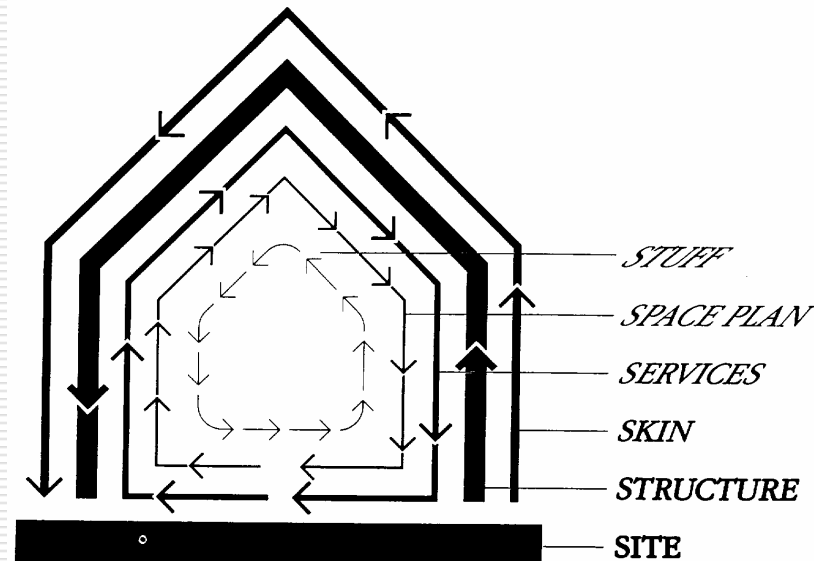


Adaptability – the ability to change

- *" ..the ability to change as a result of internal or external influence, and is regarded as a strategic "from the top" approach"*

□ (Blakstad, 2001)

- generality
- flexibility
- elasticity



Operationalizing the terms - Rikshospitalet



- ❑ 138.590 sqm
- ❑ Total cost: 6 billions NOK
- ❑ 585 patient beds
- ❑ 90 hotel rooms (hospital hotel)
- ❑ 5549 employees (2003)
- ❑ About 40.000 patients inlaid and on daily treatment
- ❑ About 130.000 polyclinical consultations

Rikshospitalet

- ❑ 1989: The planning started
- ❑ 1994: The building started
- ❑ 2000: Moving in

- ❑ Area:
 - 1992: 109.000 sqm
 - 2002: 138.590 sqm
- ❑ Cost:
 - 1992: 2.8 billions NOK
 - 1999: 5.9 billions NOK



Rikshospitalet



Flexibility in Rikshospitalet

*"The new hospital buildings are prepared for changes in size and organization. This was an explicit requirement at the time when the resolutions were made. The hospital can be rebuilt and adapted to changes in patient groups and new technical equipment without affecting the hospital activity too much. The need to ensure organizational flexibility and general solutions are primarily solved by **gathering homogeneous functions**, like laboratories, treatment rooms and bed areas in functional related buildings. In treatment buildings are **departments of surgery, radiology and polyclinical treatment gathered floor by floor**. In this way a specialty can undertake a corresponding area from the specialty next door, within each building. This is ensuring that changed needs can be followed-up without big problems.*

(...)

It was approved a number of expansions and considerable changes during the planning and building period. This could happen without the totality of the building project suffering, because it was taken into account in the initial phase of the project." (The director of Rikshospitalet, 2003)

Rikshospitalet

- ❑ Movable functions are located next to heavy functions with a possible need for expansion
- ❑ Ward departments, areas for polyclinical treatment and surgery are designed identical, and can, with minor adjustments, be used by all specialities at the hospital.
- ❑ Example: An area of 11 beds in the post-operative area was transferred from the Department of anaesthesia to the Department of cardiac surgery. (figure 1)
- ❑ The department of neuro surgery has increased their number of patient beds from 33 to 55 during the building process, without having to do changes in the building. (figure 2)

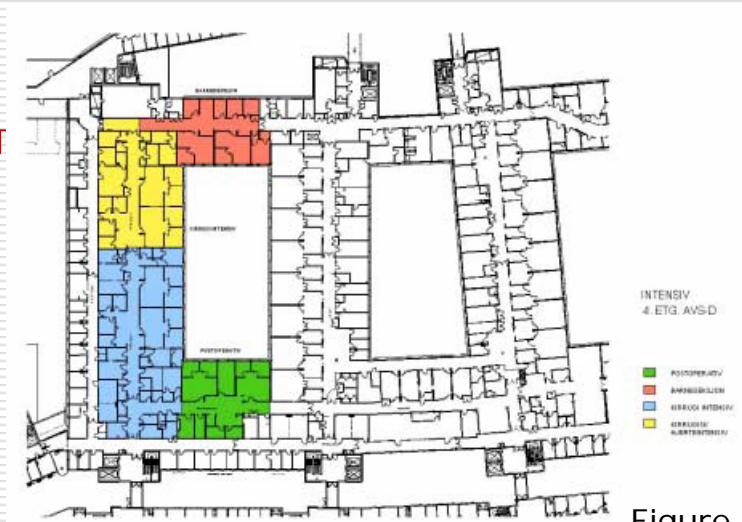


Figure 1

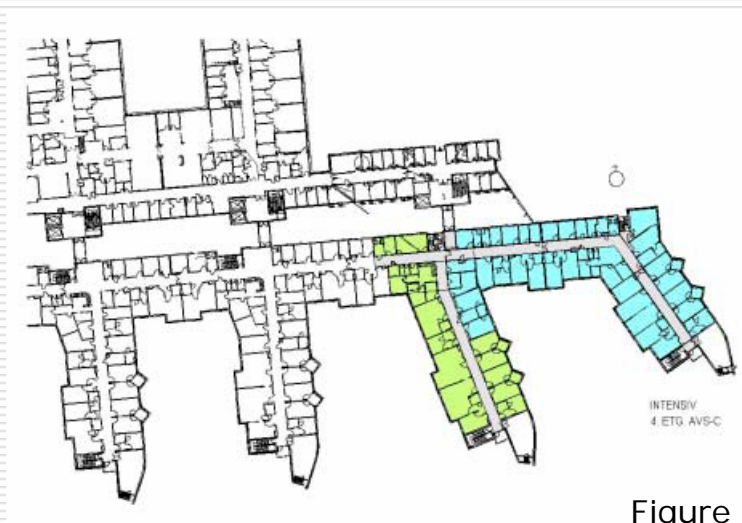


Figure 2

The evaluation of Rikshospitalet

- underestimating the consequences of expansions and changes to time, cost and quality
- unrealistic and changing assumptions
- early calculations of costs
- changes resulted in a higher overlap than intended in the main phase
- quality has been sacrificed

Implementation of flexibility

- conceptual flexibility
- standardization and generality in design
- sites that makes expansion possible
- intermediate technical stores
- excessive capacity
- flexibility in planned solutions
- flexibility within economical frames

St. Olavs University Hospital

- ❑ 197.500 sqm
- ❑ Total cost: ~10 - 11 billions NOK
- ❑ ? beds
- ❑ 110 hotel rooms (hospital hotel)
- ❑ 7573 employees
- ❑ About 46.000 patients inlaid and on daily treatment
- ❑ About 275.000 policlinical consultations



St. Olavs University Hospital

- ❑ 1991: resolution of making a development plan
- ❑ 1995: architectural competition
- ❑ "RiT-lækkert" was the winning concept
- ❑ 1997: The development plan was completed
- ❑ 1997: The Norwegian Parliament gave their approval of the winning concept
- ❑
- ❑ Cost:
 - 1995: 2,3 billions NOK
 - 1997: 4,25 billions NOK
 - 1999: 7,28 billions NOK
 - today: exceeding 10 billions NOK?
- ❑ Area: 
 - 1995: 125.000 sqm
 - 1997: 167.500 sqm
 - 1999: 186.500 sqm
 - 2004: 197.500 sqm



The concept RiT-lækkert

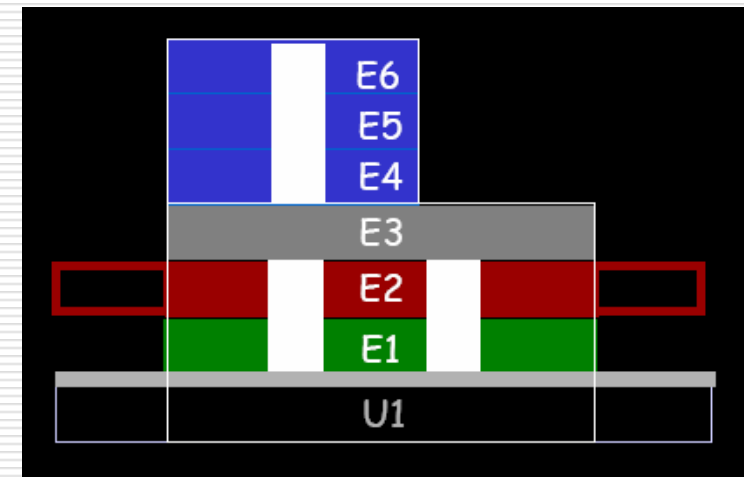
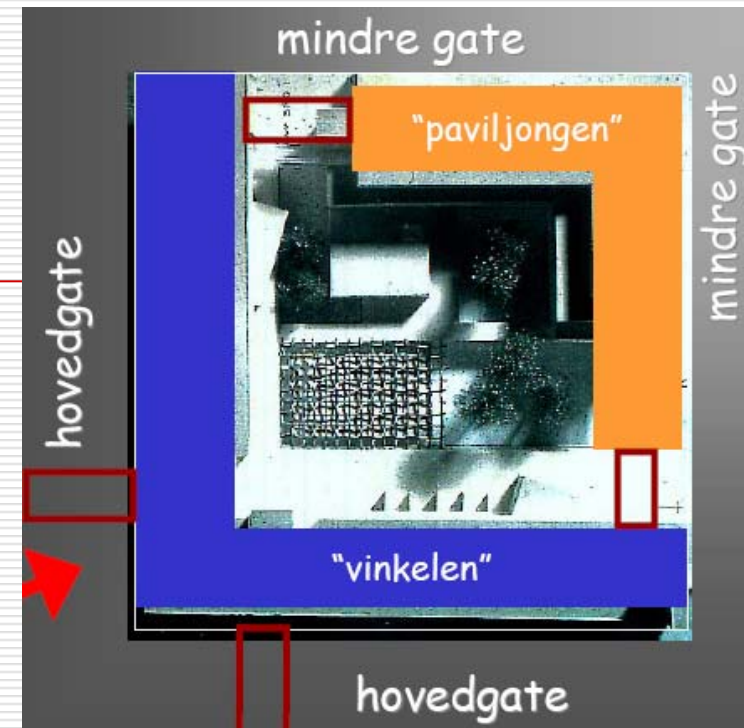
*"The future hospital consists of simple, general and flexible buildings in a **"suitable size"**, with enough **height between the stores** to adjust to varying claims for technical constructions. The buildings are situated at own **sites of a generous size**.*

(...)

*The future hospital building is not bound to a specific use during the life time. The story plan, with a **general design**, makes different kinds of future possible. The block concept, with **homogeneous, general buildings**, permits large flexibility at a possible future internal move."*

The concept "General center"

- *"The center never to be built"*
- a model describing and ensuring general and fundamental solutions common of all centres, to ensure coherence, unity, flexibility and totality in the project.
- "prototype" for each center



Changes in St. Olavs University Hospital



St. Olavs Hospital in 2013



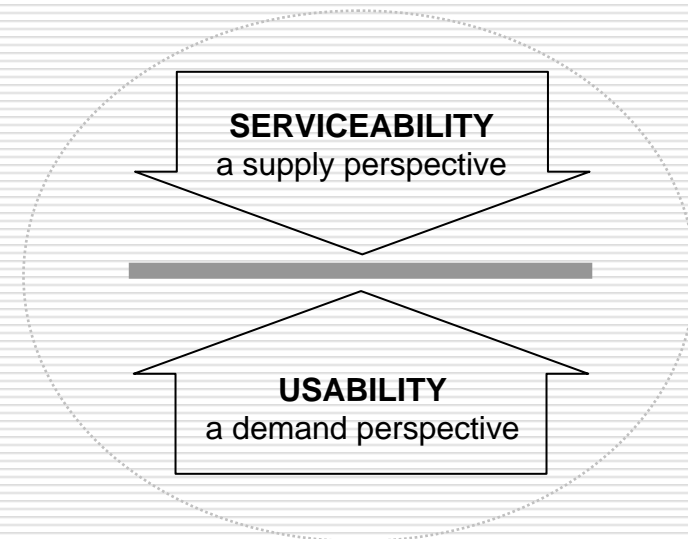
The superior plan from 1997

Summing up

- ❑ *" the final result of the building project is mostly influenced by the politicians, choosing the site and localization."*
- ❑ political decision process in an early phase of the planning
- ❑ what degree of flexibility should buildings have?
- ❑ is the flexibility used when it is necessary?

Serviceability – the supply perspective

- the capability of a building to provide a range of performances for which it is designed, used or required to be used, over time
- whether the building is capable of offering satisfying functionality for the users



Functionality – might result in usability?

- ❑ functionality defines whether the product will offer functions and features that users need to complete tasks
- ❑ usability will describe whether these features will be used easily and efficiently during task completion

FUNCTIONALITY

Focusing functionality.
Defining criterions offering the desired result due to time, cost and wanted effect considering the objectives of the organization

PLANNING PHASE

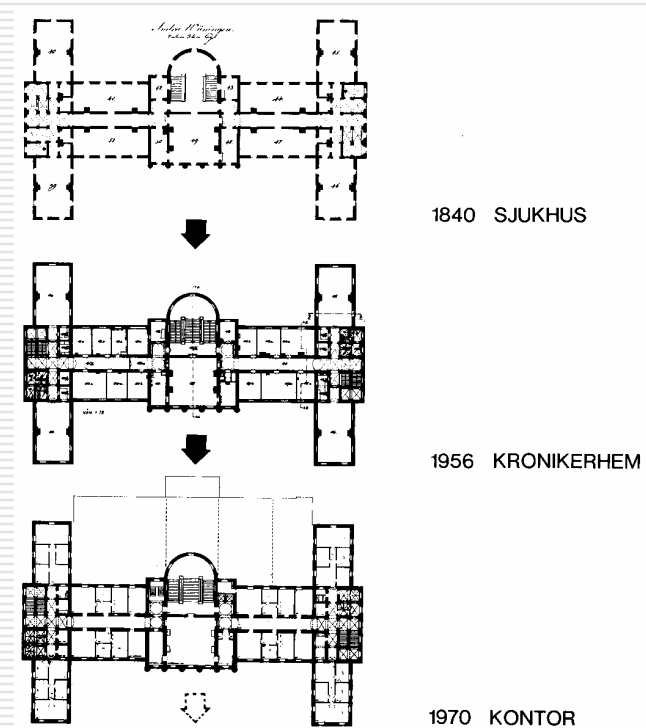
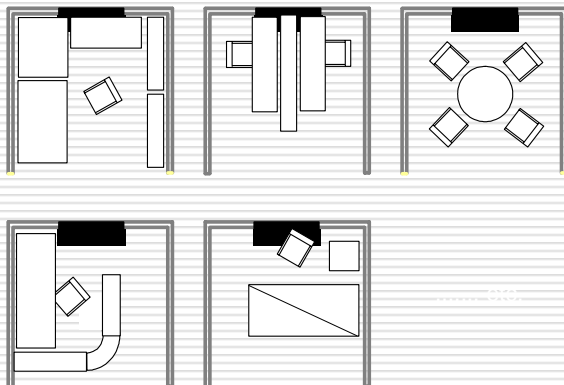
USABILITY

Focusing qualities in use and effectiveness, efficiency and satisfaction considering the use of internal and external users

BUILDING IN USE

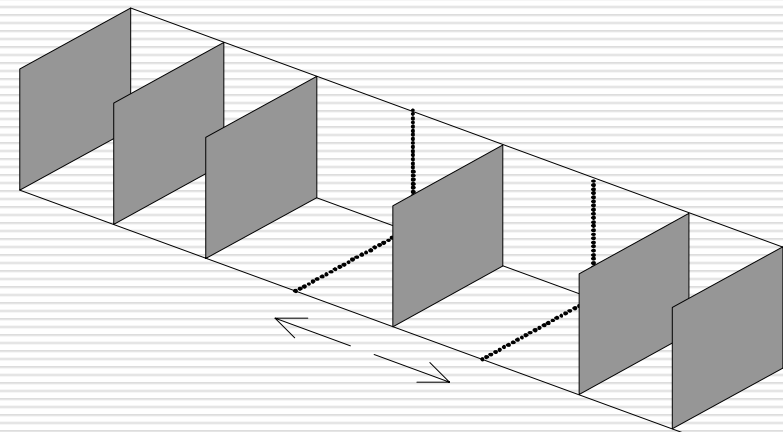
Generality

- the buildings ability of meeting changing functional demands without changing characteristics, i.e. the ability of meeting different functional needs without doing considerable changes in the building



Flexibility

- the buildings ability of meeting changing functional demands through changing characteristics, i.e. the possibility of doing changes in the building and technical structure at minimal costs and abruptions in operation, without increasing the buildings area.



Elasticity

- the possibility of growth (increasing usable area) or partition of the areas in a building (decreasing area of use)

