

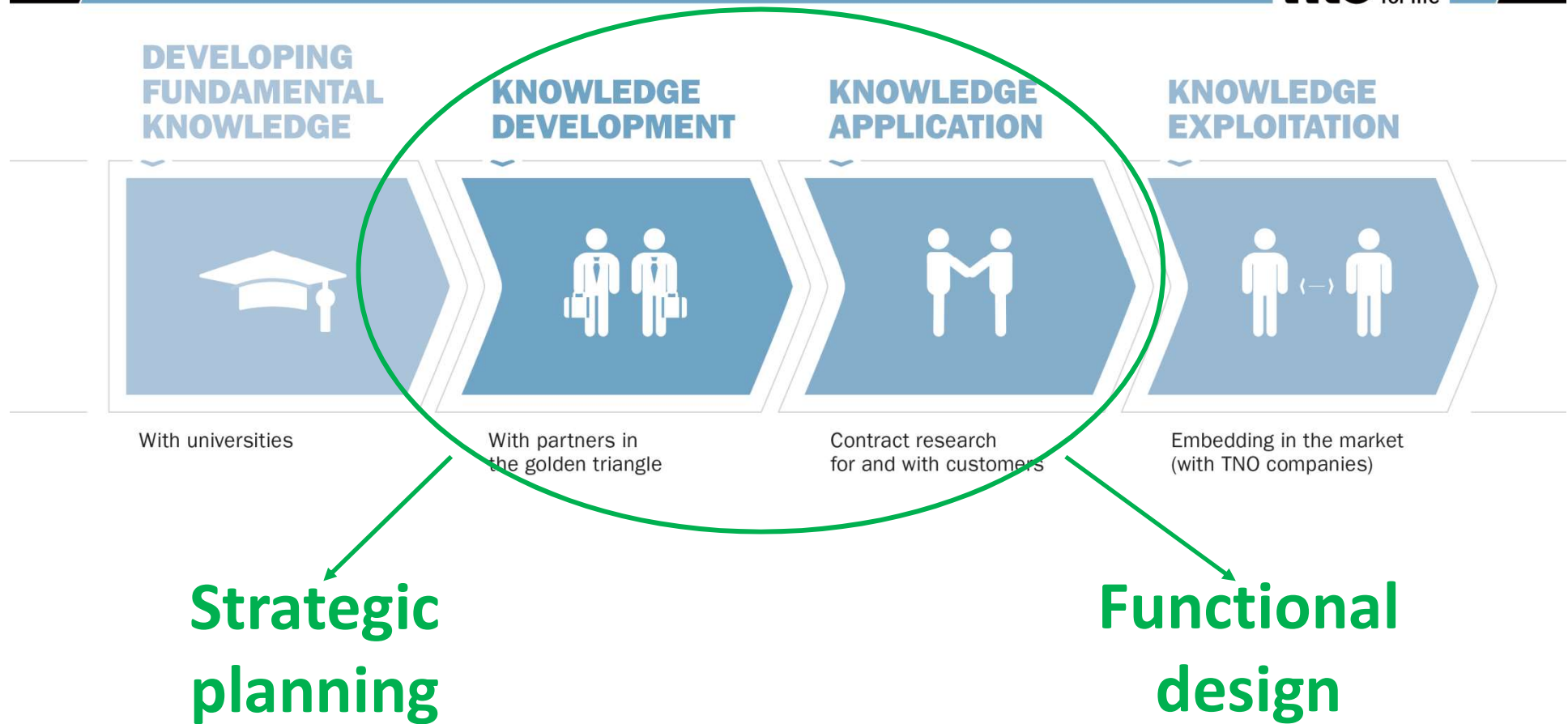


# › RESEARCH INTO PRACTICE

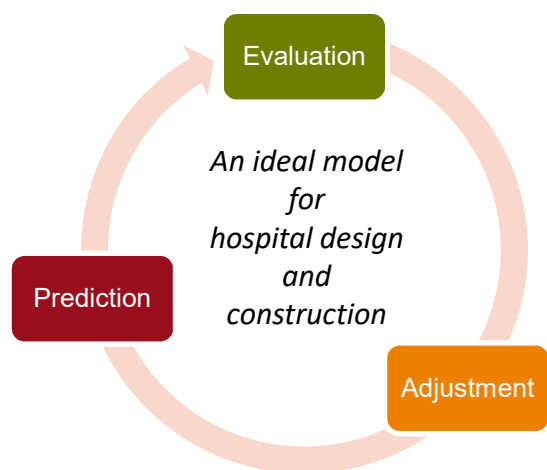
Obstacles and alleyways | Menno Hinkema

**TNO** innovation  
for life

# FOCUS AND LIMITATIONS



## RESEARCH INTO PRACTICE: RATIONALE



### In an ideal world...

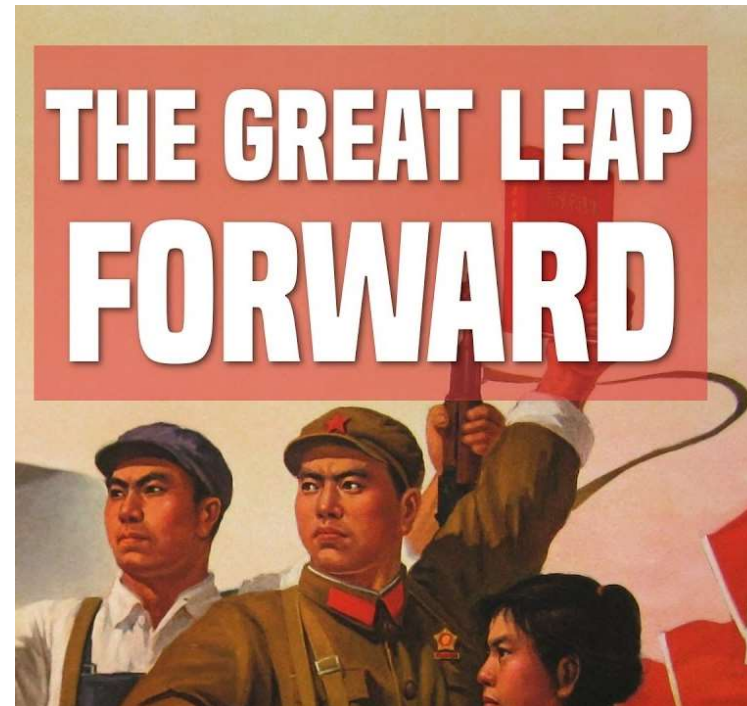
- Hospitals are planned, designed and constructed on the basis of a comprehensive and detailed set of key performance indicators defining expected quality, safety and fitness-for-purpose
- *The actual performance of existing hospitals is evaluated on the basis of a deep and structured understanding of the interrelationships between building characteristics and operational performance*
- Outcomes of evaluation processes are systematically used to improve existing building stock and strengthen the accuracy and predictive power of key performance indicators for future hospital projects
- *Thus, a system of continuous improvements ensures the availability of top-quality hospitals at the lowest possible cost to the public sector and other financial stakeholders*

## RATIONALE: WHY BOTHER?

But this is not an ideal world..



- Planning and design processes are haphazard and driven by non-effective considerations such as prestige, political expediency or lowest initial investment
- There is little tradition of systematic evaluation of results
- Planning and design processes start from scratch and do not take account of available evidence



## What seems to be the trouble?

~~Paucity of  
research~~

~~Poor quality  
research~~

~~Lack of urgency~~

# HUMAN PSYCHOLOGY IS KEY

Hospital planning and development process → Stress management responses



Appeal to consensus

Appeal to authority

Appeal to experience

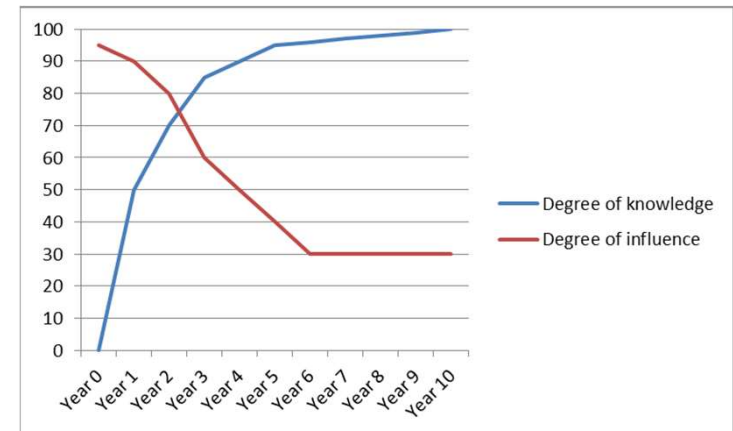
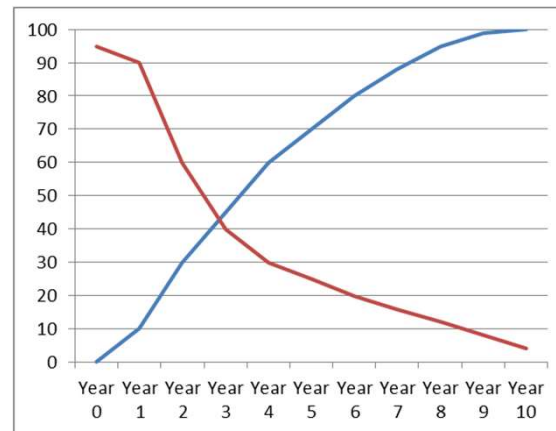
Irrational risk behaviour



Procurement methods stacked  
against innovation

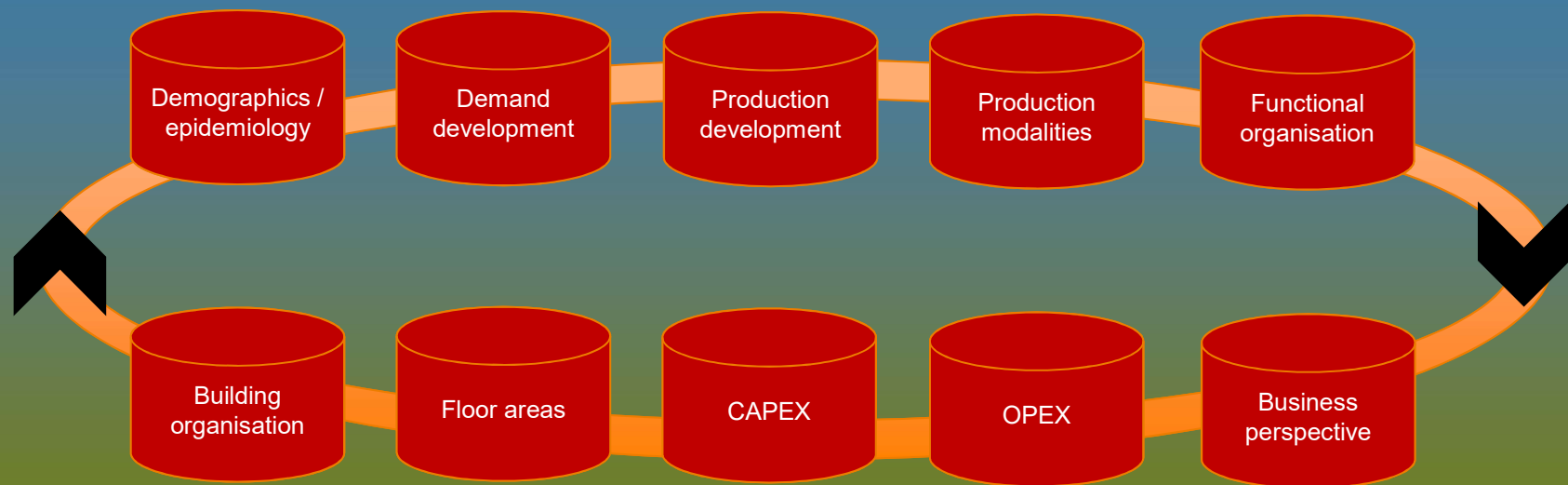


# UNCERTAINTY REDUCTION = STRESS REDUCTION



## INTEGRATED CONTROL OVER PLANNING DECISIONS = STRESS REDUCTION

### Virtual Hospital Model



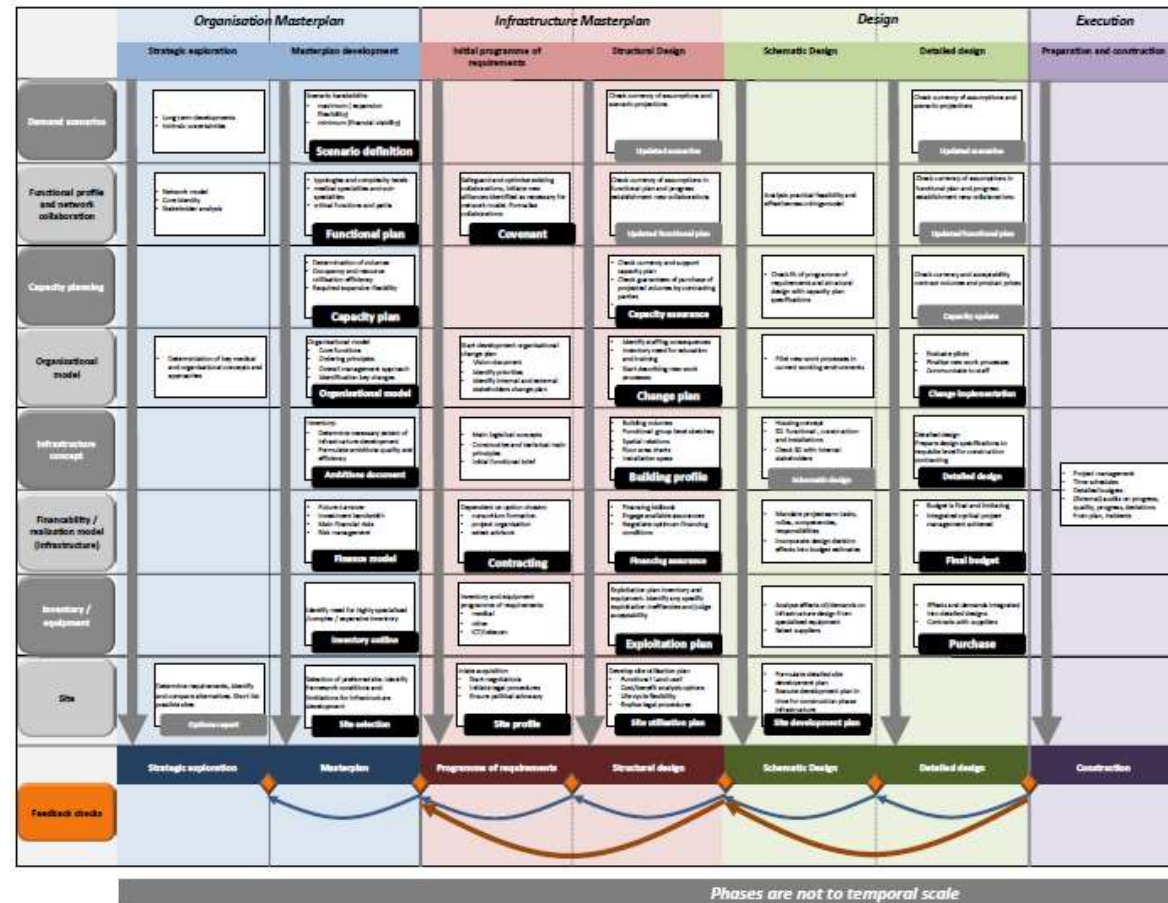
# INTEGRATED CONTROL OVER PLANNING DECISIONS = STRESS REDUCTION

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Decision making  
process

Controlling  
and steering a  
multi-factor  
large scale  
hospital  
project

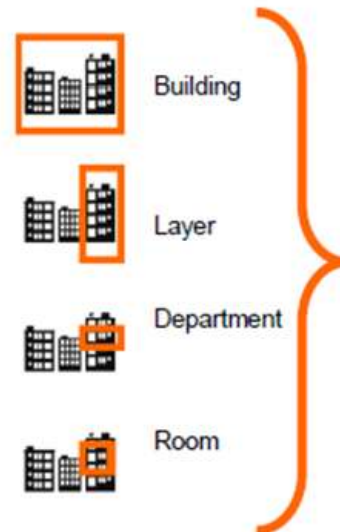
A conceptual  
and planning  
model



# INTEGRATED CONTROL OVER PLANNING DECISIONS = STRESS REDUCTION

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## The Challenge



Predicting future performance of buildings is more and more important to win contracts and gain competitive edge.

But modelling building performance in early design phases is difficult. Especially for complex buildings like hospitals.

Designs have to satisfy many different sets of performance indicators, in different domains and at different scale levels. This creates design dilemmas and problems.

Current models and systems are not SMART enough. They cannot generate early design alternatives for optimisation.

**Demand on building performance are growing ever more stringent and complex. Reliable achievement is crucial for healthcare quality, availability and safety.**



Financial performance

## Key Performance Indicators



Time use



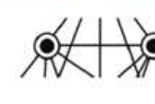
Occupancy



Rules



Layout



Relations



Daylight



Energy

# INTEGRATED CONTROL OVER PLANNING DECISIONS = STRESS REDUCTION

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## DASHBOARD

### Basic

Calculation year	2023
Baseyear data	2013
Startyear of operation	2020

### Demography Production

Hospital location 1	<input checked="" type="checkbox"/>
Hospital location 2	<input type="checkbox"/>
Hospital location 3	<input type="checkbox"/>
Hospital location 4	<input checked="" type="checkbox"/>

### Market Position

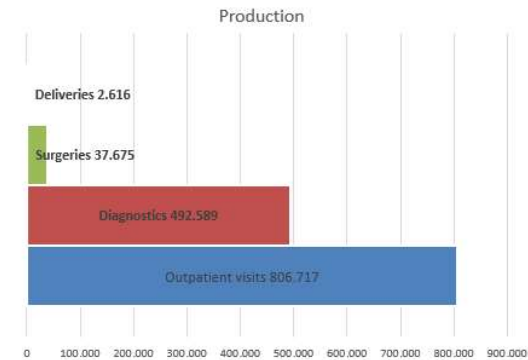
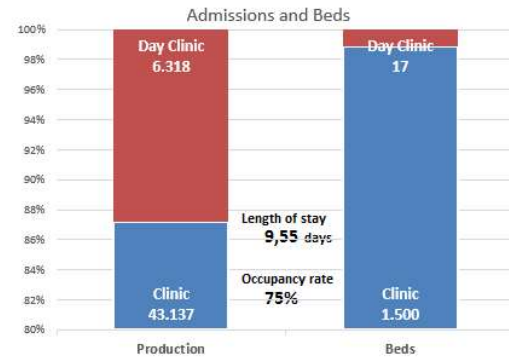
CLB increase -% market	0%
DCL increase -% market	0%
outpatient visits increase -% market	20%
Surgeries increase -% market	20%
Deliveries increase -% market	0%

### Base case adjustment scheme

adjusted ambition level building	<input checked="" type="checkbox"/>
adjusted ambition level building II	<input type="checkbox"/>
adjusted ambition level equipment	<input type="checkbox"/>
building&equipment utilisation	<input checked="" type="checkbox"/>
outsourcing non-essential	<input type="checkbox"/>
include commercial healthcare	<input checked="" type="checkbox"/>

### Occupancy and stay

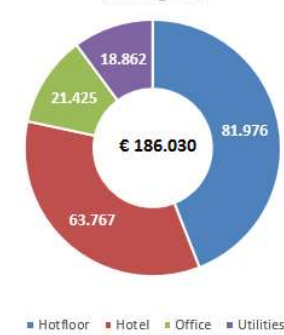
Occupancy rate general care change	0%
Occupancy rate special care change	0%



### Costs per m²



### Building costs



## WHY BOW TO CONSENSUS WHEN THERE IS EVIDENCE TO BACK YOU UP?

# DUTCH VENTILATED ISOLATION ROOMS



Bron: Erasmus MC



### Rationale?

*Prevention of airborne transmission of harmful micro organisms from patient to hospital environment (source isolation)*

*Prevention of airborne transmission of harmful micro organisms from hospital environment to patient (protective isolation)*

*Combined or universal isolation*

### Reference framework

*WIP-richtlijn Bouw- en inrichtingseisen isolatieafdeling: Ventilatie isolatiekamers (2004)*

#### Bijlage A. Literatuur

- 1 MMWR. Guidelines for Environmental Infection Control Health-Care Facilities. 2003; 52(RR10):1-42.
- 2 SCIC. Guidelines for the Classification and Design of Isolation Rooms in Health Care Facilities. A Public Health en Development Publication 1999; July.
- 3 College bouw ziekenhuisvoorzieningen. Voorzieningen voor verpleging in een ziekenhuis. 2003.
- 4 Berg TM, Boer Y, Boom FA. GMP-ziekenhuisfarmacie. 1996;50.

## WHY BOW TO CONSENSUS WHEN THERE IS EVIDENCE TO BACK YOU UP?

# PROVISIONAL INSIGHTS FROM CEN TC 156 WG 18

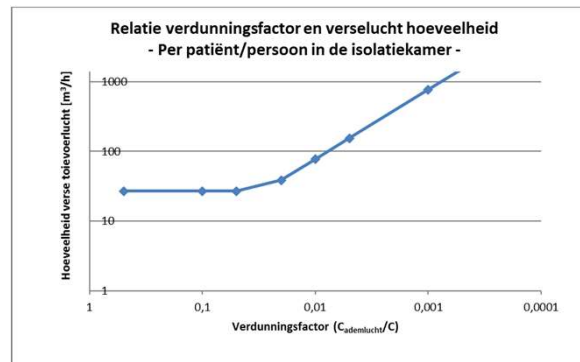
Important notice: all information presented here shows preliminary research findings from an ongoing guidelines revision process. It does not in any way constitute a consolidated position by the CEN TC 156 WG 18 or any of its members

Pressure differential has no effect

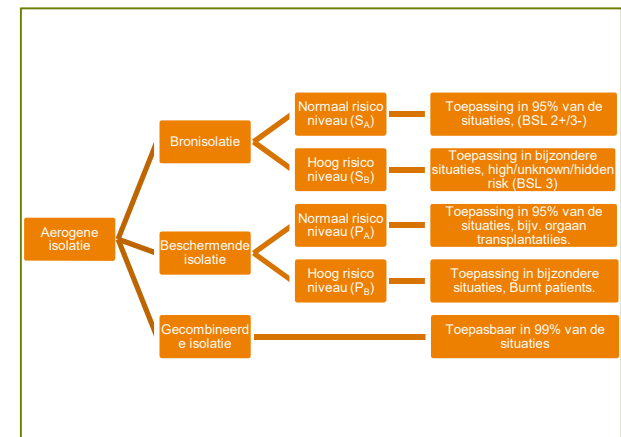


Except when walls/partitions are extremely air-permeable

Airborne transmission may not be the biggest risk factor

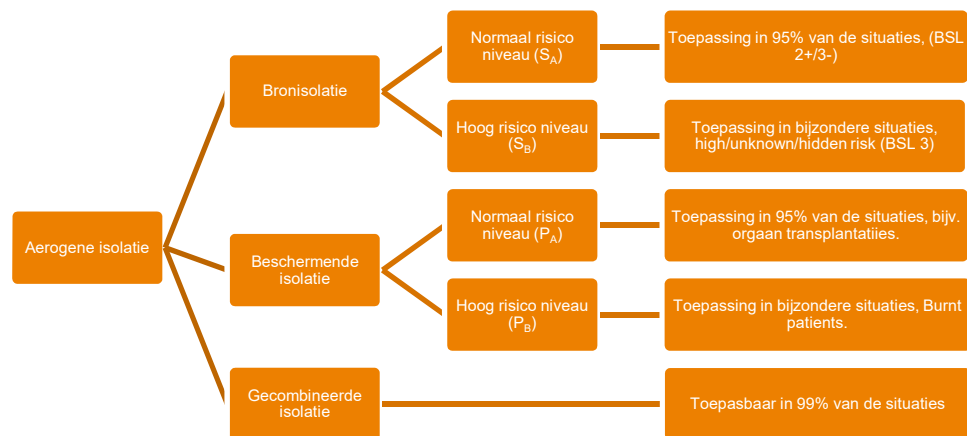


Tiered classification system would be useful

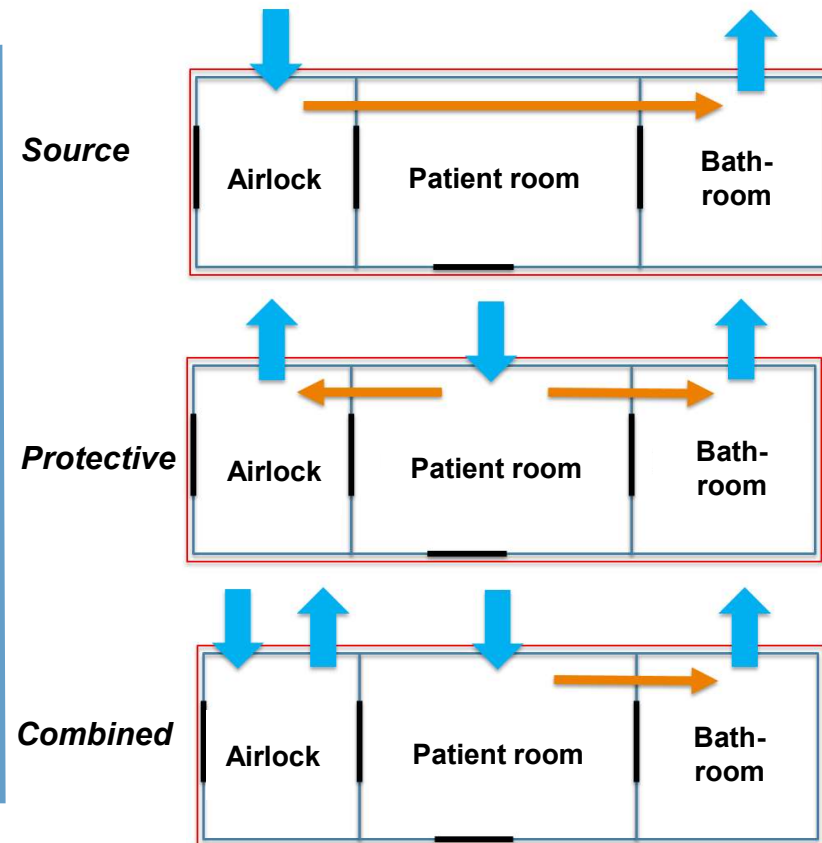


## WHY BOW TO CONSENSUS WHEN THERE IS EVIDENCE TO BACK YOU UP?

### POSSIBLE DESIGN IMPLICATIONS



**Important notice: all information presented here shows preliminary research findings from an ongoing guidelines revision process. It does not in any way constitute a consolidated position by the CEN TC 156 WG 18 or any of its members**



## OVERCOMING THE APPEAL TO EXPERIENCE

The hospital bed

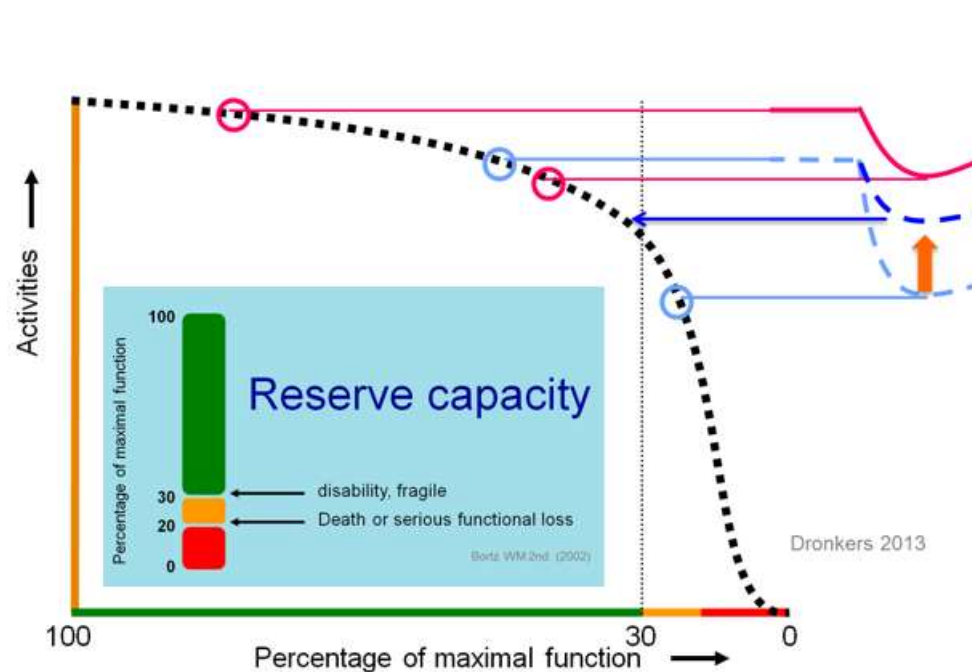


still the dominant paradigm



## OVERCOMING THE APPEAL TO EXPERIENCE

And that's pretty silly....



### The effects of inactivity...

> 70 years old, followed for 5 consecutive years

1 month limited activities

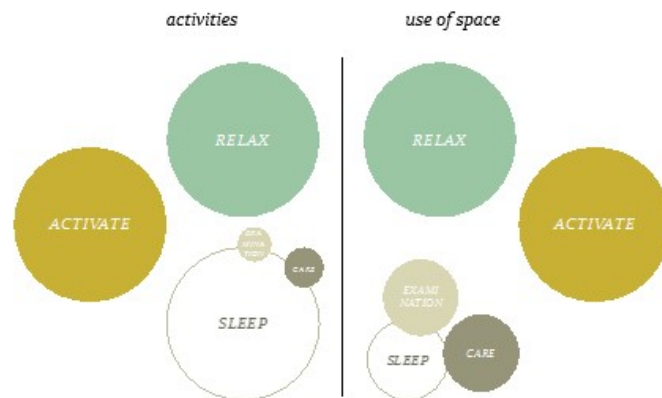
5.5 times more likely to develop disability

Hospital admission

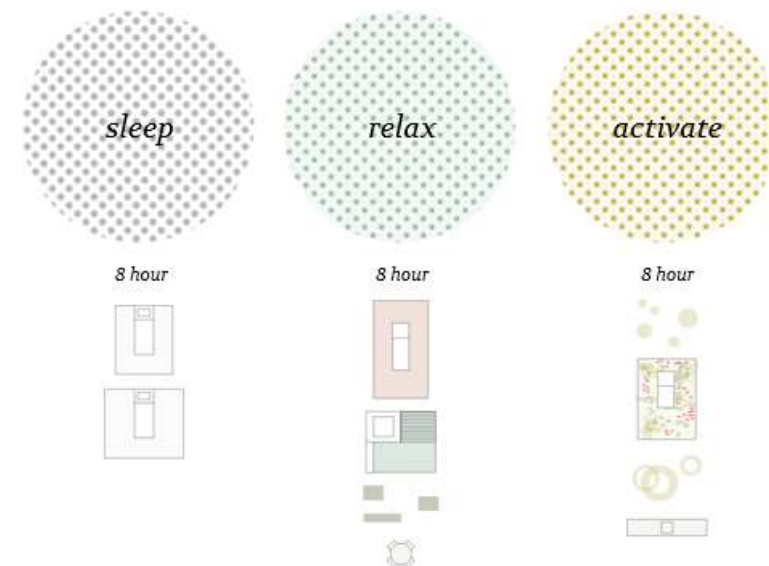
61 times more likely to develop disability

Gill TM, Allore HG, Holford TR, Guo Z. JAMA. 2004 Nov 3;292(17):2115-24.  
Hospitalization, restricted activity, and the development of disability among older persons.

## OVERCOMING THE APPEAL TO EXPERIENCE



Ward in time and space - Future



New organisation in time, space, care and cure

Image credits: dJGA Architects

## OVERCOMING THE APPEAL TO EXPERIENCE



*New lay-out*

*Image credits: dJGA Architects*

## OVERCOMING THE APPEAL TO EXPERIENCE



*Image credits: dJGA Architects*

# LESSONS FOR RESEARCHERS

**Learn to listen and respond  
to the real messages**



**Embed yourself in truly  
multi-disciplinary working  
communities**

A nighttime photograph of a city street. On the left is a brick building with many lit windows. On the right is a modern building with a curved facade and lit windows. A tram is moving from left to right, creating a long, bright green light trail. The street is illuminated by streetlights, and there are other light trails from cars in the background.

› **THANK YOU FOR YOUR  
ATTENTION**

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