STREAMER focussed Six perspective Balanced Scorecard

Financial Utilization of assets, optimization of working capital directed towards energy efficiency	**Patient Focus** Developing spaces of wellbeing to improve patient satisfaction through care and effective recovery	**Environment/Community** Reducing the use of energy and carbon emissions within the district
Internal Process Empower staff to deliver low energy solutions, optimising technology, improve efficient working practices	**Employee Satisfaction** Create low energy organisational culture, retention of staff through quality working environments	**Learning and Growth** Increasing expertise in energy issues, creating flexible and adaptability facilities for future healthcare needs.

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Communication
Past Experience
Project Leadership
Whole Life Costing
Clinical Efficency
Decision Making Process
Future Needs
Prescriptive
Low Carbon
High Carbon
Innovative
Current Needs
Therapeutic Environment
First Cost
Brief
Design
Procurement
Construction

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Therapeutic environment v'sClinical efficiency

Cardiff Royal Infirmary c1880

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Therapeutic environment

‘The first requirement of a hospital should be that is should do the sick no harm.

Little as we know about the way in which we are affected by form, colour, by light, we do know this, that they have a physical effect.

Variety of form and brilliancy of colour in the objects presented to patients is the actual means of recovery.’

Florence Nightingale Notes on Hospitals 1885

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Components of the therapeutic environment

- Sufficient car parking
- Clear way-finding
- Privacy & dignity
- Appropriate acoustics
- Natural daylight
- Interesting/relaxing views
- Low risk of hospital acquired infection
- Thermal comfort
- Environmental control
- Artificial lighting
- Art
- Entertainment systems

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single room vs multi bed.

- Effective isolation
- Specific cleaning regime
- Privacy & dignity
- Improved patient environment
- Reduced patient travel
- Individual room stores/supplies

- Patient interaction
- Capital cost
- Staffing cost

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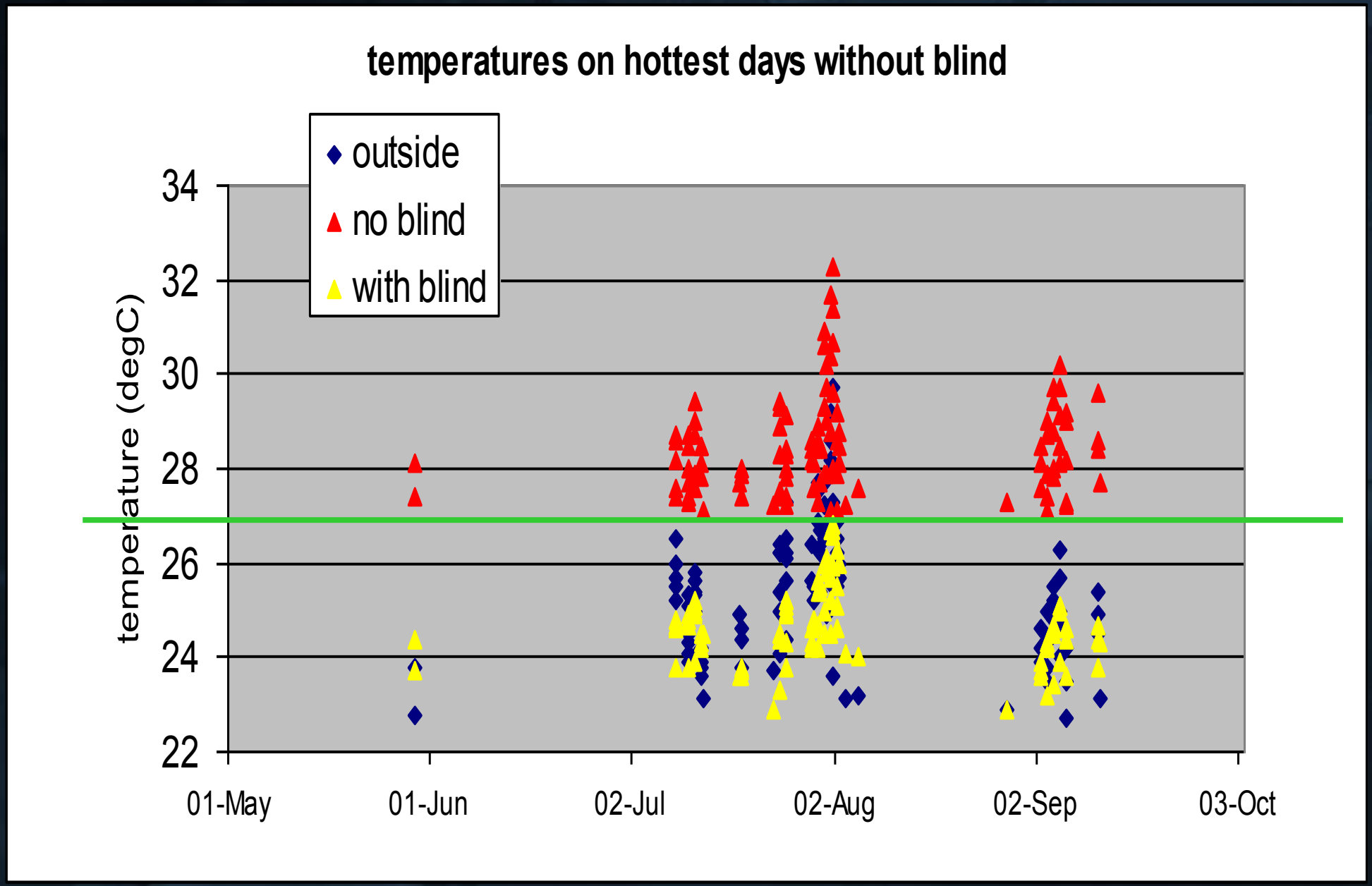
1999 summer analysis showing warmest days (exceeds 27degC in room) without blinds



South west England UK ref

ARUP

Southmead Hospital, Bristol Shading Solutions DRAFT

INTRODUCTION

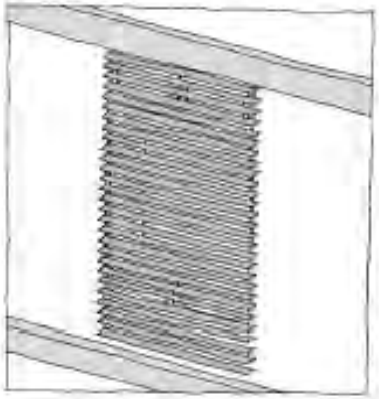
AFE has been requested to carry out a qualitative study for the different solar shading system of the Southmead PFI Hospital - Bristol. The aim of this study is to verify the if the considered solar shading devices answer to the selected requirements. The assumptions are based on what was discussed in the meeting of the 22nd of January 2008. The assessment has been limited to the single-patient wards areas.

Please note that this sketchbook is a first draft, and the study needs further analyses that will be carried out during the next days.

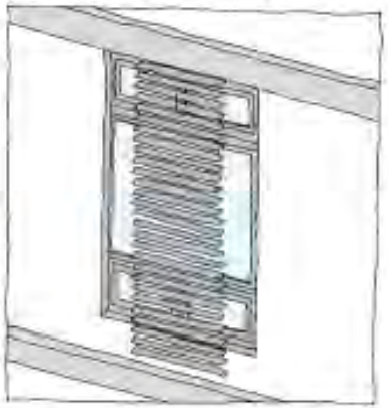
OPTIONS CONSIDERED

The pictures show Architecture NGM's sketches of some of the different shading solutions that have been analysed in the matrix in the next pages.

1. Sliding shutters



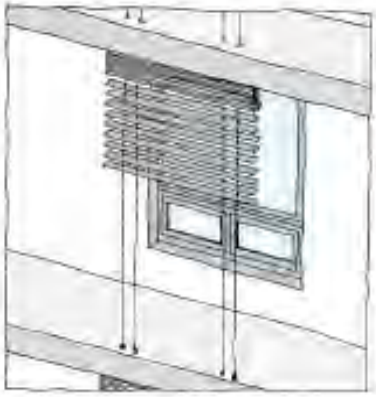
2. Fixed shutters covering the whole window



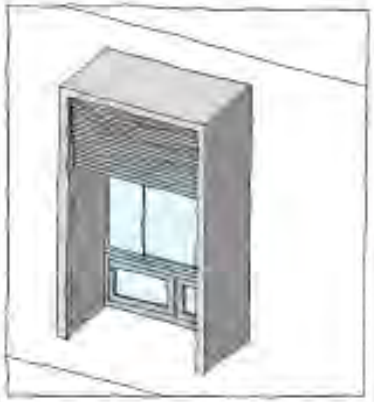
3. Fixed shutters partially covering the window

Current window layout

The window layout that is actually considered is the one showed in the left, which is made of a central fixed glazing, two operable glazing at the top and two operable glazing at the bottom.
The aim is to activate a stack effect from the bottom to the top, that allows the natural ventilation to be activated

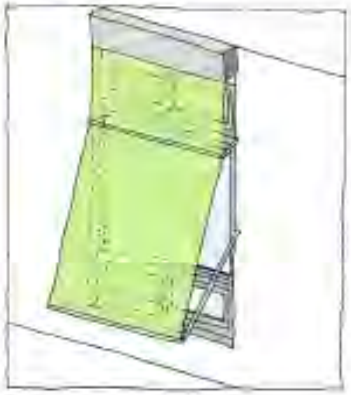


4. External retractable Venetian blinds with adjustable slats



5. Window hood: Overhang + Fins + Venetian or roller blinds

6. Interstitial blinds (modification of window layout)



7. Awning, fabric.

Ward design – solar shading concept & Leeward-windward effect

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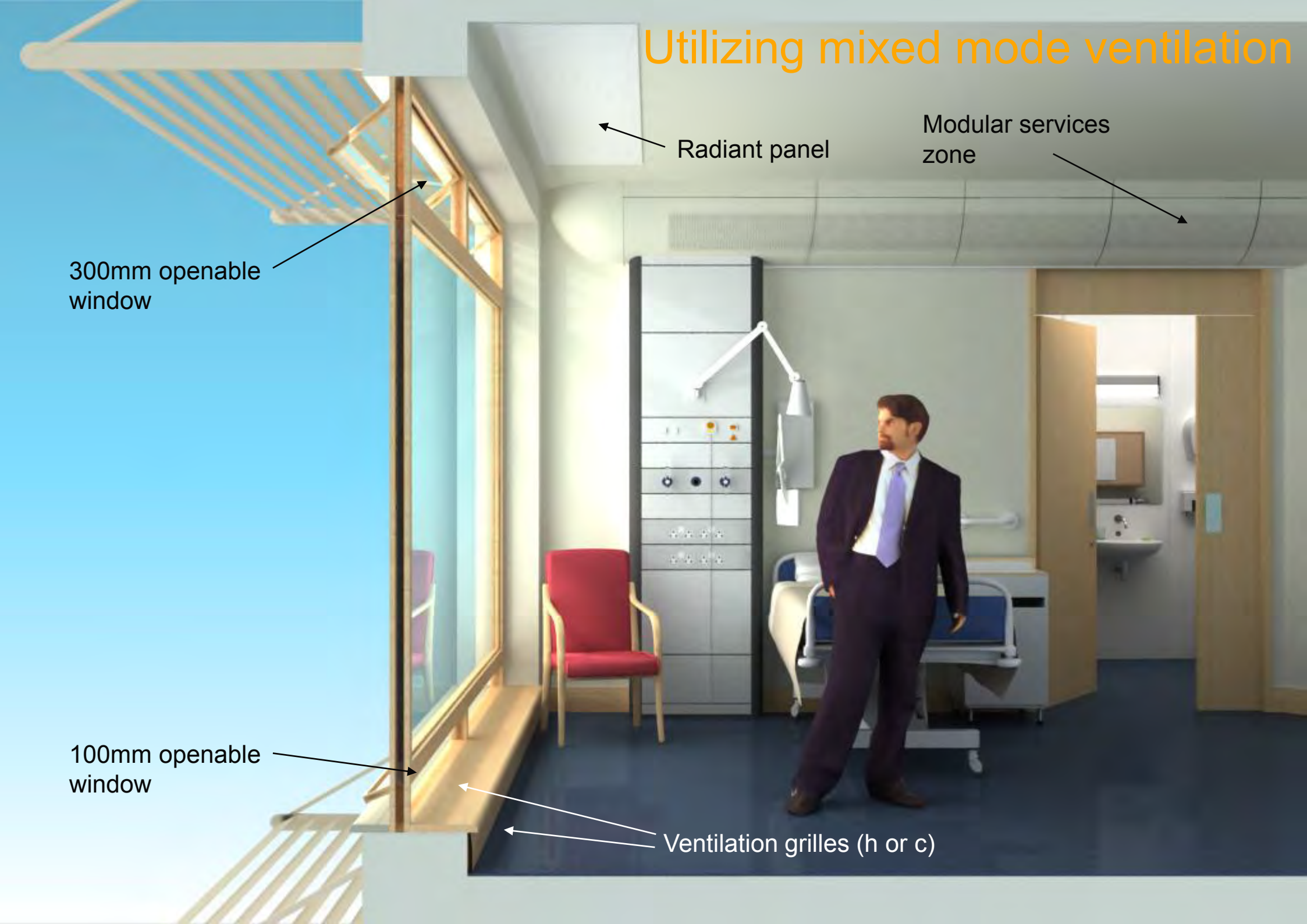
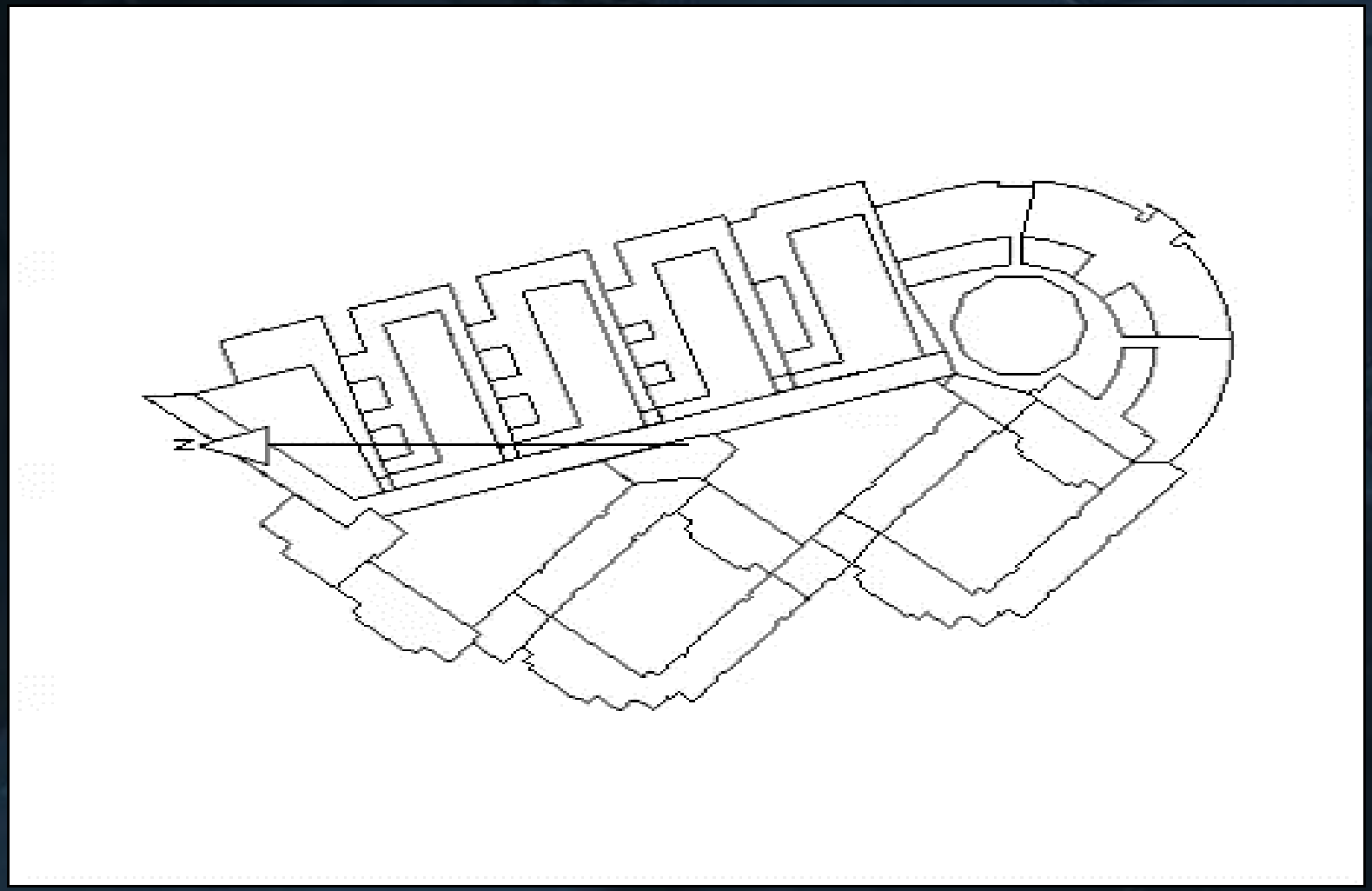
Utilizing mixed mode ventilation



Sunpath diagram



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Modelling direct sunlight and glare

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The use of balconies

Acute hospital Reykjavik - Iceland

Elderly facility in Limoges - France

Acute facility in Lisbon Portugal

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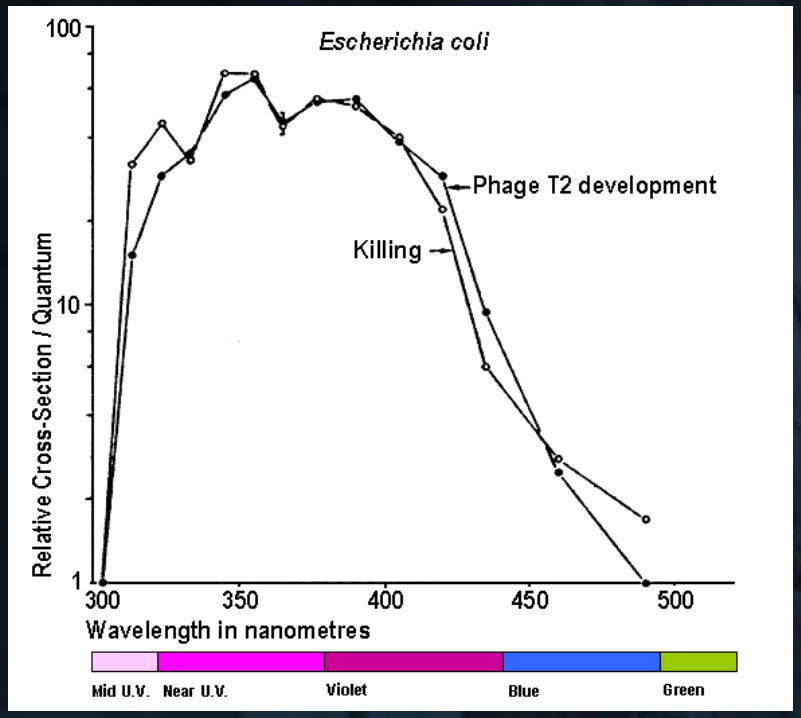
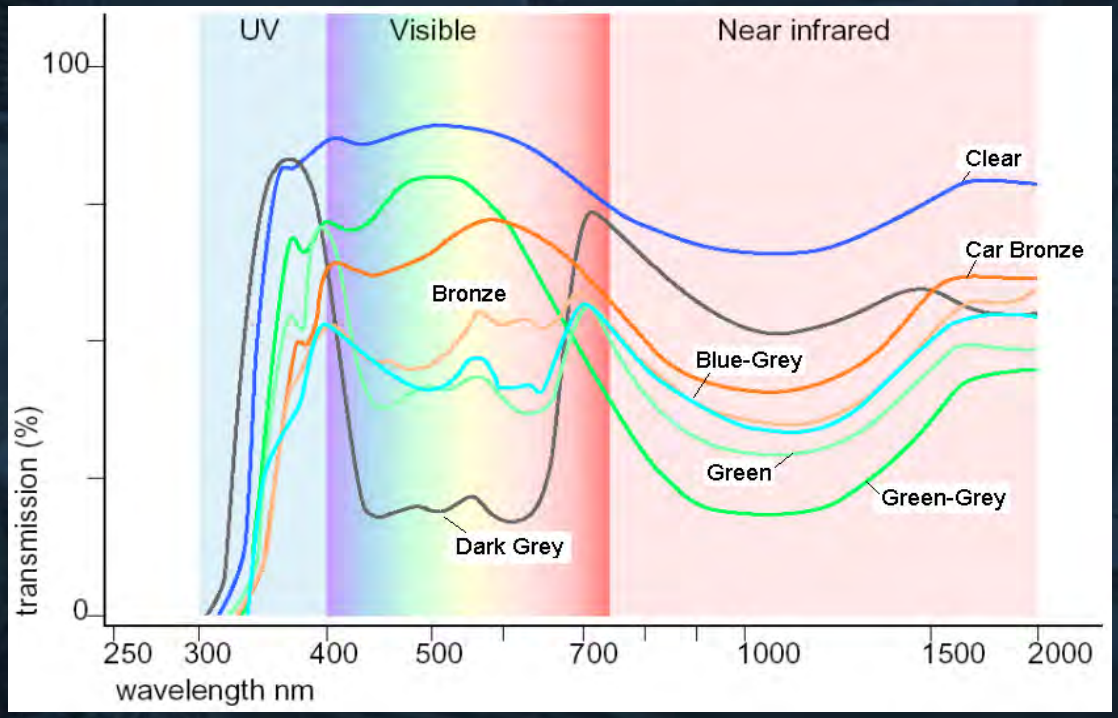
MICROBES AND LIGHT SPECTRA

The spectra of light microbes are exposed to may influence their growth rates & viability





In many instances light wavelengths that may kill microbes can be screened or heavily filtered through coloured glazing systems. Serotonin released by the patient may be reduced through screening in the same way.

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Isaac Jamieson – Imperial College London

Transmission of Infection

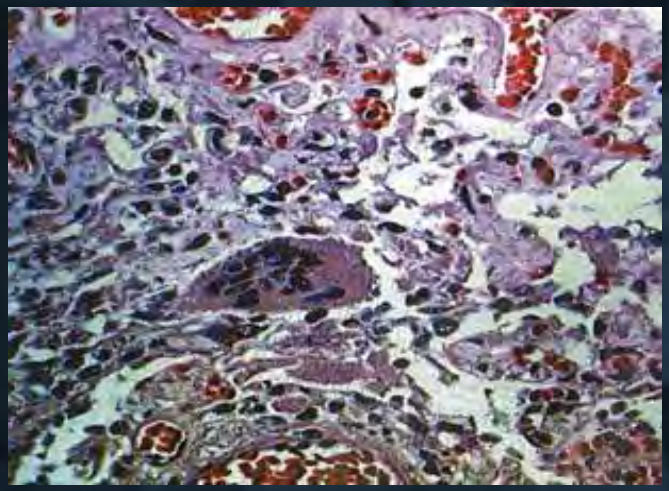
Contact transmission

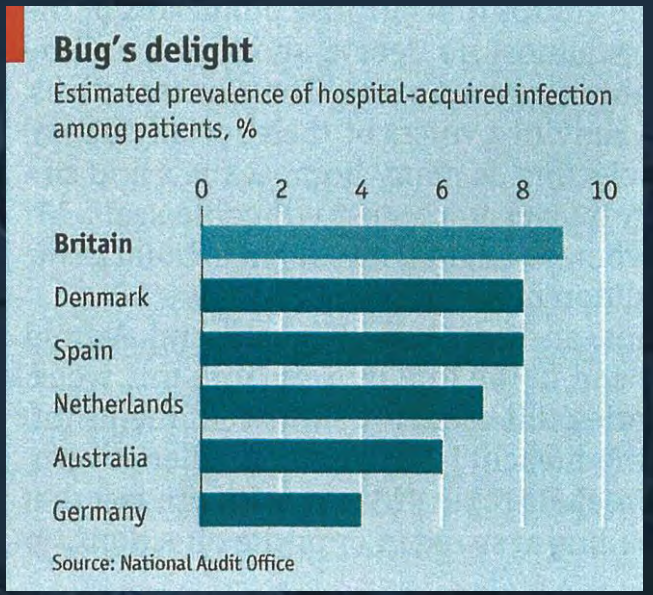
Droplet transmission

Airborne transmission

Common vehicle transmission

Vector borne transmission





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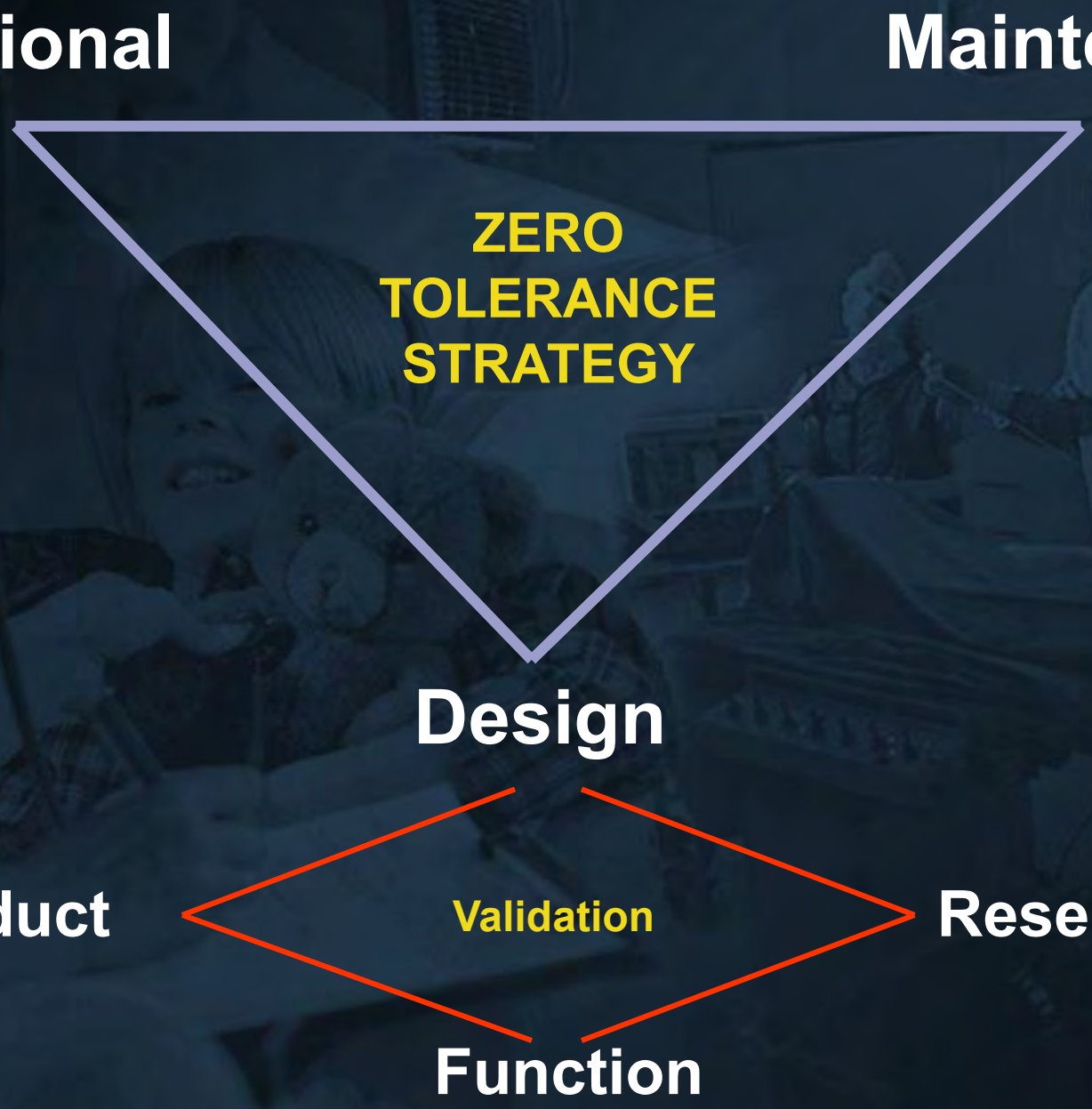
Infection control – A holistic design process



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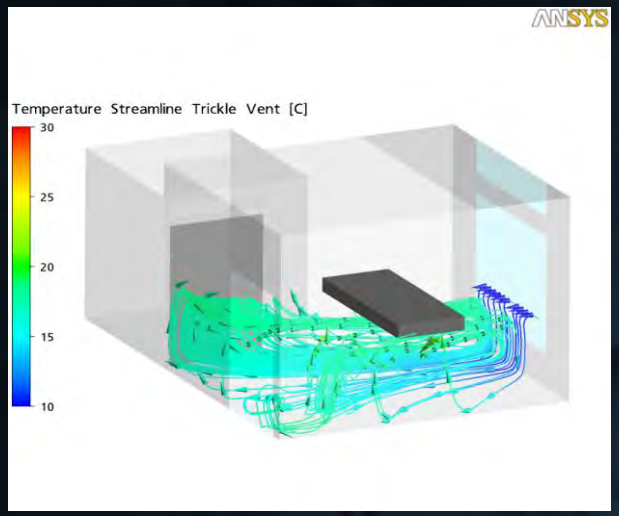
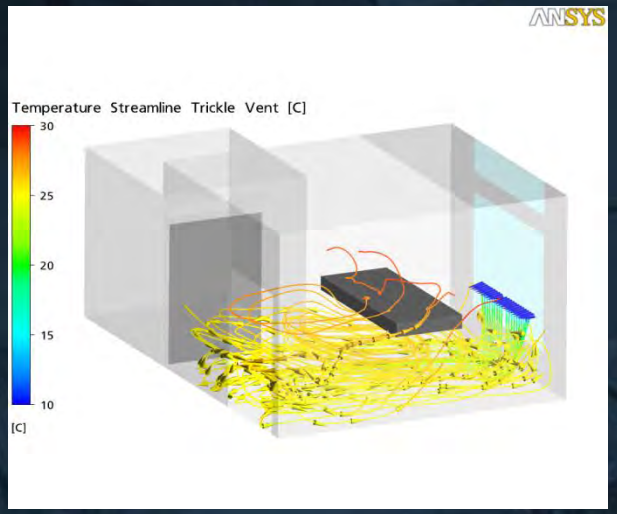
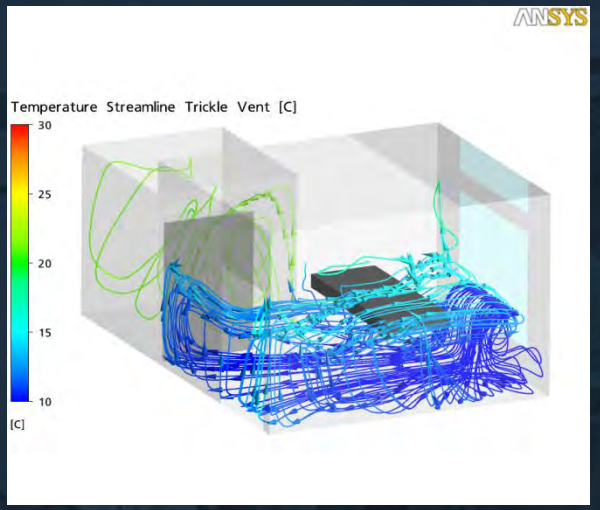
CFD Analysis – window and door leakage



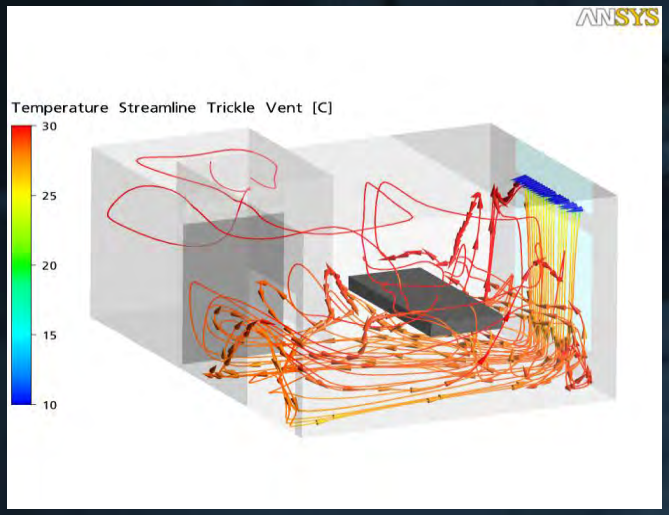
No wind LL Vent



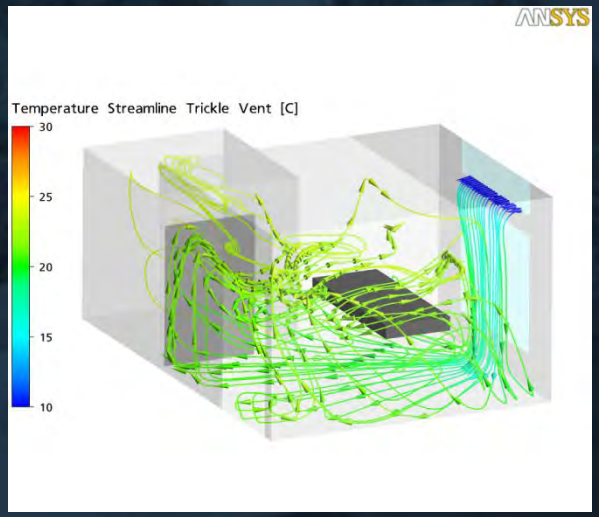
Leeward LL Vent



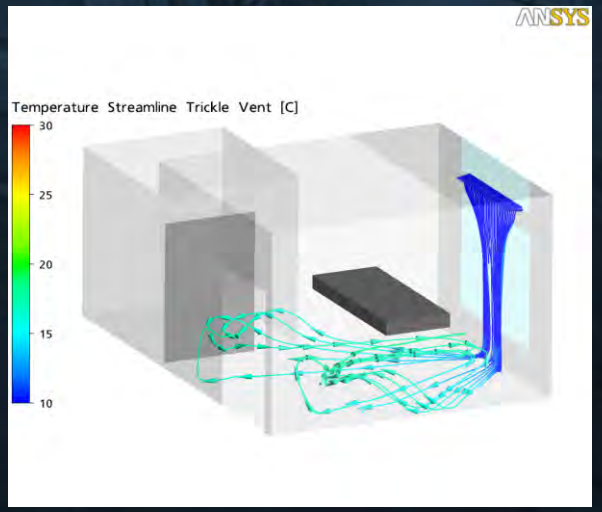
Windward LL Vent



No wind HL Vent



No wind HL Vent



Windward HL Vent window curtain

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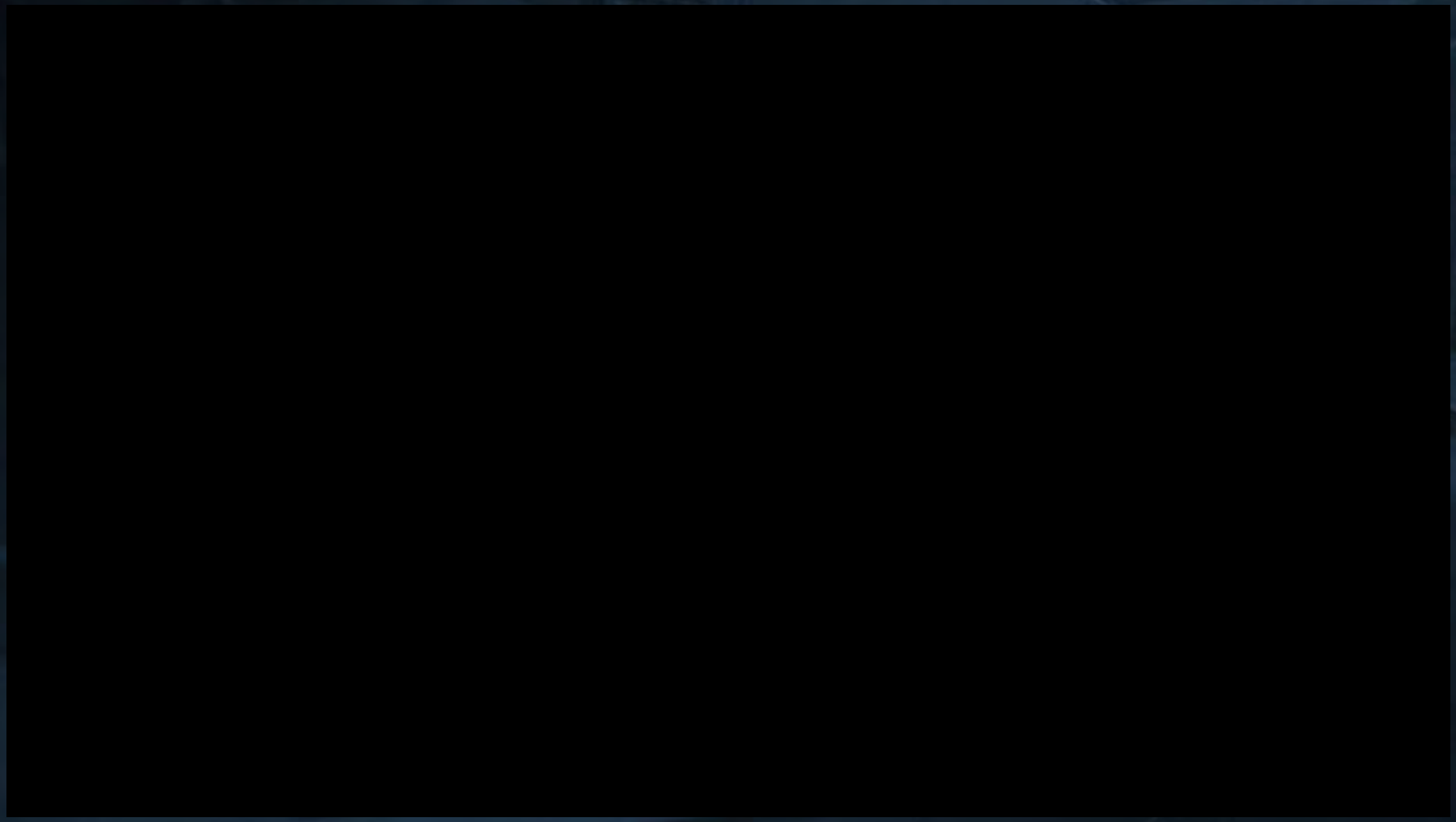
Example of Art in a healthcare environment



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The biggest challenge

The Existing Estate

Refurbishments are not sexy but they are essential essential

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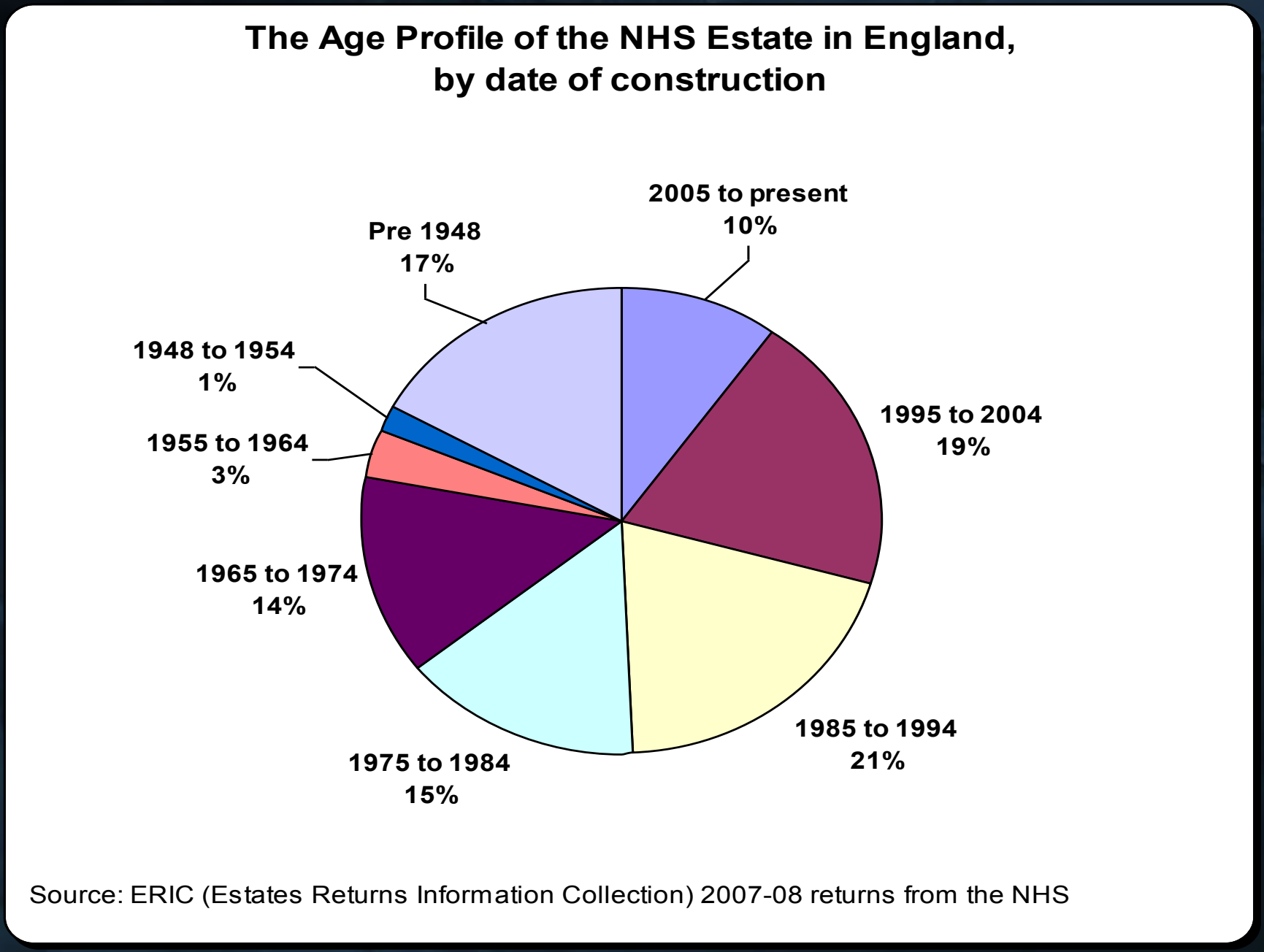
The existing estate – A major challenge



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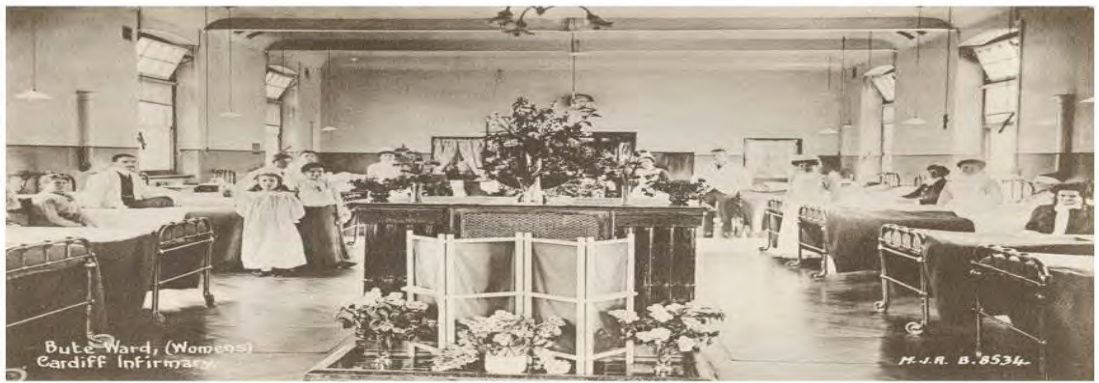
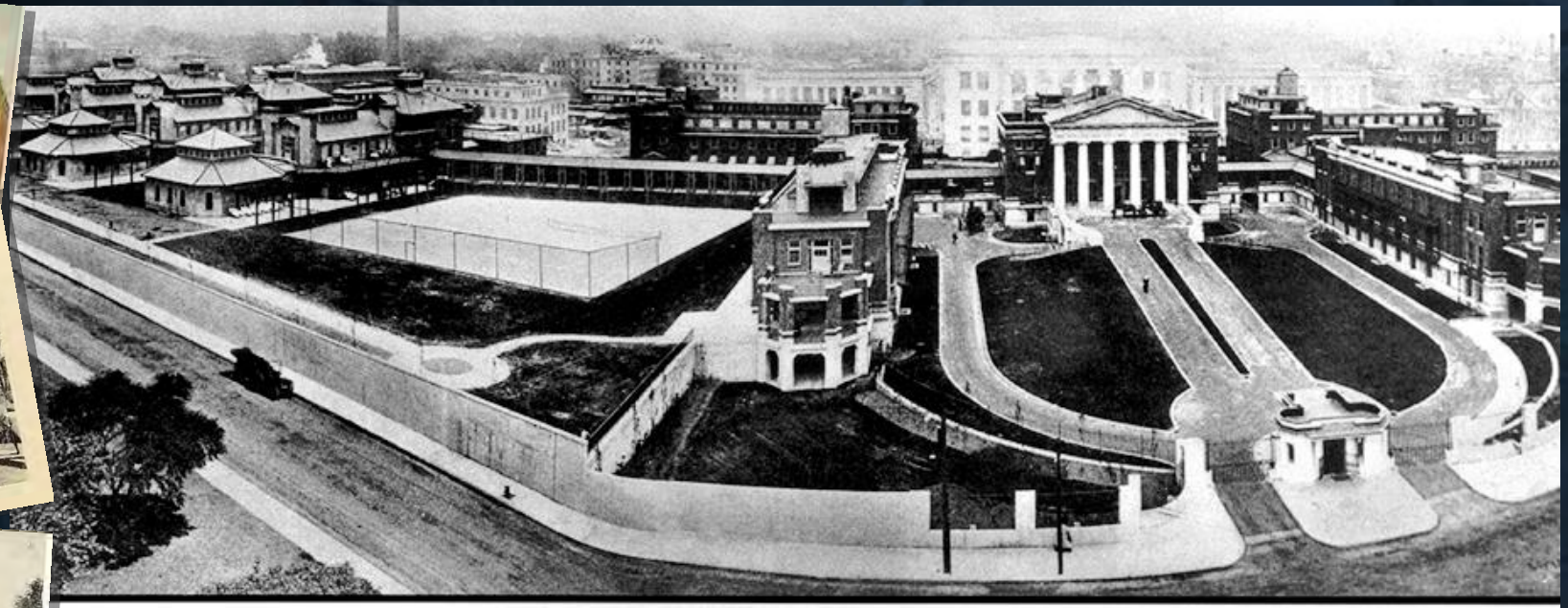
50% of the Estate pre-dates 1985


Bute Ward, (Womens)
Cardiff Infirmary.
H.J.R. B.8534.

ORIGIN | HISTORICAL PERSPECTIVE – BRIGHAM AND WOMEN'S



F, E, D, C

Domestic Building | Pavilion A | Administration Building | Entrance Lodge | Outdoor Nurses' Bui

GENERAL FACTS

The Hospital covers about 10 acres of land.

pacity 225 beds.

truction Fire-proof throughout.

Some of the chief objects have been to furnish the patients with the optimum amount of light and sunshine, and to make it possible for every patient to be easily moved out of doors.

lation By several systems, according to the requirements :

1. By the ordinary use of wall windows.
2. By windows in monitor roofs.
3. By accelerating heating coils in stacks.
4. By inlet fans.
5. By outlet fans.

Air Space in Typical Pavilions 2,400 cubic feet per patient.
This air can be changed five times each hour.

Flooring Largely battleship linoleum cemented to granolithic, except the outside marginal eight feet of open wards on main floor, which space is wholly granolithic to allow of heating by hot water pipes in an enclosed space below this part of the floor.

Heating Wards

1. Hot water direct.
2. By warmed granolithic floors in bed space.
3. By fanning filtered air over hot water pipes into wards.

Plumbing Single pipe system used throughout.

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HOSPITAL GROWTH | A HOSPITAL MUST CHANGE IN ORDER TO REMAIN RELEVANT

New and expanded fields of knowledge created space needs that were difficult for the hospital to meet. “The character of the work done within the walls of an institution is vastly more important than the walls themselves. Even so, it must not be overlooked that if the work is good, it grows, and the time comes when walls must expand in correspondence.” – BWH 1937 Second Master Plan Report

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HOSPITAL GROWTH | A HOSPITAL MUST CHANGE IN ORDER TO REMAIN RELEVANT

Hospital Growth Milestones:

1911 Hospital Opens
1937 Second Master Plan
1950's Research spurs New Construction
1969 to 1986 BWH triples in size.
1978 New 500 Bed Patient Tower opens
1994 Ctr for Women and Newborns opens
2008, Shapiro Cardiovascular Building opens.

Today, over 2.4 million square feet on main hospital campus.

2008, The Hospital Today

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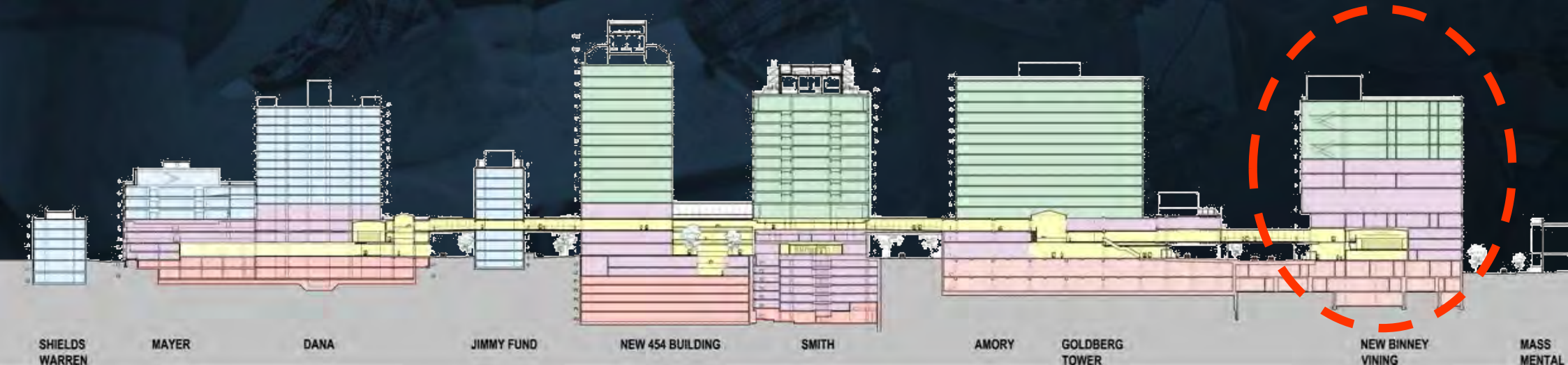
THICK & THIN | HORIZONTAL INTEGRATION - VERTICAL FINGERS

- **Centers of Excellence**
  - Service Line / Disease Centric
  - Discrete Institutions
- **Accommodations**
  - Thematic Centers
  - Institutional Identity
  - Mixed Acuity
  - Bidirectional Bench to Bedside



Typical models of the built estate

1. Linked pavilion or finger plan

The oldest typology and still in common use. The pavilions would often have clinical spaces on lower levels with wards above.

Examples
Woolwich Hospital and St Thomas's Hospital, London;
Hotel Dieu, Paris; many others worldwide

2. Low-rise multi-courtyard or checkerboard

This typology can offer a human scale in contrast to the institutional character that tends to overwhelm most hospital design. However it will tend to apply to the larger, non-urban sites or smaller hospitals.

Examples
Wexham Park Hospital; Venice Hospital (unrealized design by Le Corbusier); Homerton Hospital, London

3. Monoblock

The classic compact and circulation efficient type. The small atria/lightwells can take many forms and the lower floors may have fewer, with deep planning for non-patient areas or operating theatres. There is a need for artificial ventilation and the opportunity to incorporate Interstitial Service Floors.

Examples
Greenwich Hospital, London (demolished); Boston City Hospital; McMaster University Hospital, Ontario

Typical models of the built estate

4a. Podium and slab/tower
(also 'Bundled' or 'Stacked' in US)

The wards are generally in the tower with the clinical and technical areas in the slab. This typology can be effective on urban sites with small footprints but the upper floors can be problematic in terms of travelling distance.

Examples
Bridgeport Hospital, Connecticut; Prince of Wales Hospital, Sydney; Royal Free Hospital, London; UCL Hospital (PFI), London

4b. Podium with two or more towers/ blocks over

This typology avoids some of the potential travel distance and scale problems of no. 4a above but will require a larger site.

Examples
Birmingham Hospitals (PFI)

5. Street

The attraction of this type has lain in its flexibility and extendibility as well as the legibility that the street itself offers to patients.

Examples
Wythenshawe Hospital, Manchester; Northwick Park Hospital, London; Westmead Hospital, Sydney, Rikshospitalet, Oslo

Typical models of the built estate

6. Atrium/galleria

Atria have become extremely common in open plan office buildings where daylight can penetrate working floors from both sides. The cellular character of hospital buildings make atrtri a less obvious solution but there are a number of successful uses of this typology

Examples

New Children's Hospital, Sydney; Chelsea and Westminster Hospital, London; Hospital for Sick Children, Toronto; University of Maryland Homer Gudelsky Building

7. Unbundled

Unbundled is a pattern of segregation of the diagnostic and treatment functions on the one hand, and on the other the nursing functions along a shared circulation/support spine. 'Unbundled' is a North American term and the typology is dominant in current design there; but it is also used worldwide.

Examples

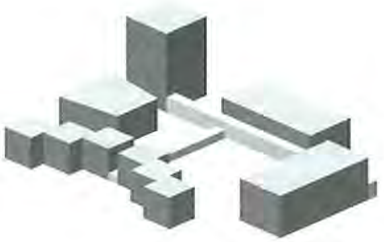
Norfolk and Norwich Hospital; many US examples

8. Campus

Individual buildings disposed around the site with or without enclosed circulation network.

Examples

Hospital sites that have been built up over the years with successive additions.



The real cost of refurbishment?

	Narrow Plan (2 Storey)	Narrow Plan (3 Storey)	Intermediate Plan	Deep Plan
Substructure	£2,082,540	£1,417,444	£1,408,147	£996,497
Superstructure	£2,379,005	£2,540,942	£2,612,866	£2,580,671
Roof	£1,865,548	£1,338,273	£1,195,924	£844,742
Façade	£4,678,560	£4,630,479	£4,882,135	£3,397,578
Internal finishes	£4,944,949	£4,931,111	£4,985,500	£5,004,332
Mechanical Services	£3,790,082	£3,762,333	£4,042,619	£4,740,210
Electrical Services (incl. lifts)	£4,150,357	£4,048,077	£4,106,319	£3,939,734
BWIC	£720,261	£617,680	£642,500	£617,680
Preliminaries and contingencies	£6,835,712	£5942,914	£6,367,686	£5,999,323
Total	£31,447,315	£29,229,253	£30,243,696	28,128,205

What is the real value?

	Narrow Plan (2 Storey)	Narrow Plan (3 Storey)	Intermediate Plan	Deep Plan
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Approx 13% saving due to a refurbishment!!

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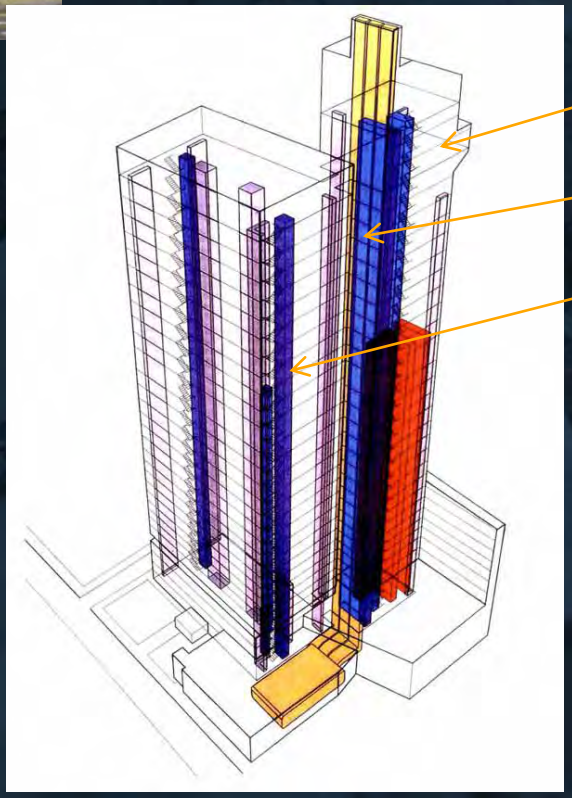
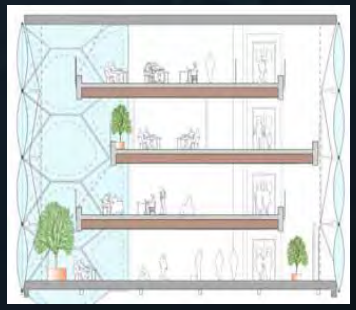
Guy's Hospital tower London

Constructed 1974



Proposed solution

Space



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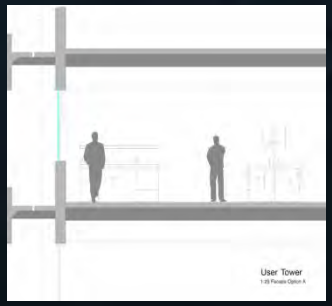

Facade

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Sanatorium hospital Hong Kong (SHHK)

1990’s

Now 45,000m2

Next 70,000m2

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Optimising flexibility - #1

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Refurbishment choices

- 1. Single phase whilst in occupation – redecoration
- 2. Single phase with decant – back to original use
- 3. Single phase with decant – change of use
- 4. Refurbished in a phased manner whilst in occupation
- 5. Replacement building engineering systems – space and distribution complexity
- 6. Resilience to system failure and climate change
- 7. Structural integrity 1 – re-cladding options
- 8. Structural integrity 2 – extended floor plate, en-suite pods fitted
- 9. Non-viable spatial solution for future models of care – change of use or demolish

All healthcare estate sites to have a clinically led development control plan clearly defining the future for the building stock given the likely changes in the provision of healthcare this is not easy but it represents wise sustainable investment. Who is best to do it?

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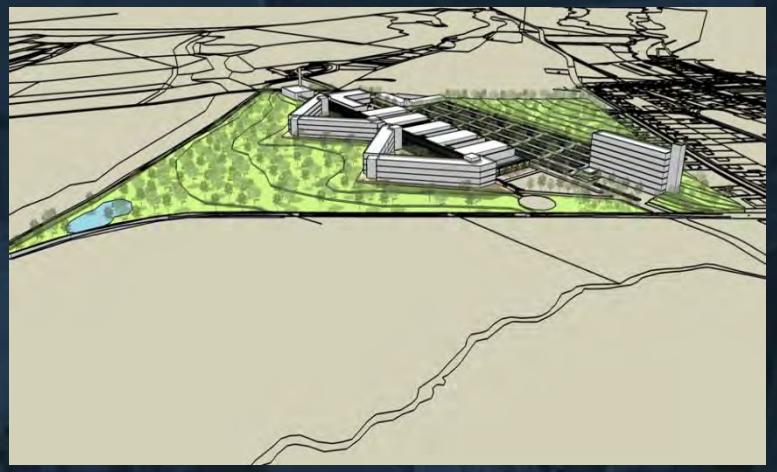
The Eastern Europe approach - Slovakia



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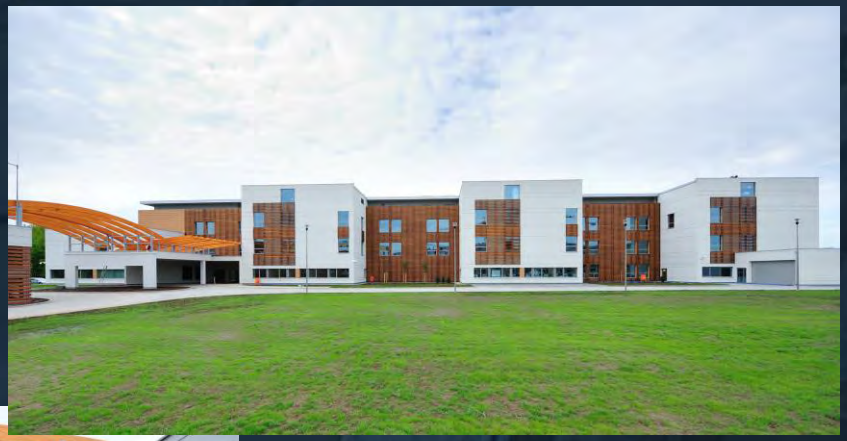
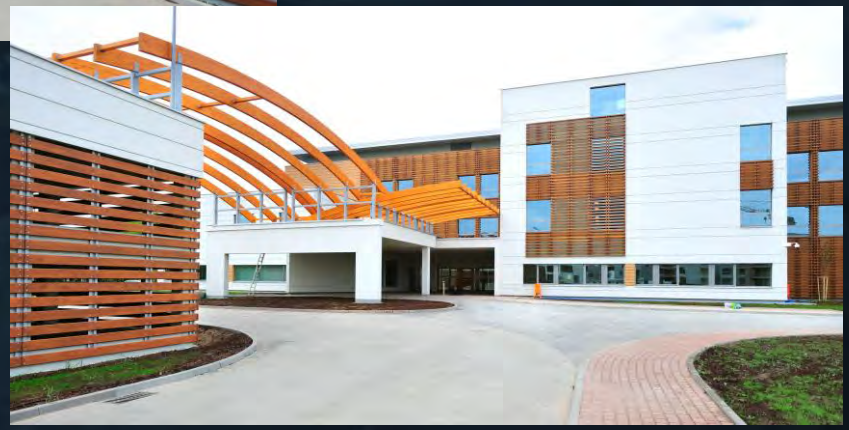
The Eastern Europe approach - Poland





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Ysbyty Aneurin Bevan

- Multi-Dis Lead including Acoustics & Fire
- New build, 10000m²
- Eco-development site with 40% better than Part L2 requirement
- Project Value £48m

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Big is beautiful in China

医院案例分析
Hospital Case Study

Chengdu P&M hospital
成都妇女儿童医院

总用地面积：100亩
Total land area: 100mu
总建筑面积：95136平米
GFA：95136sqm
床位数：1000床
Bed num: 1000
职工数：1600人
Number of employees: 1600

ARUP

Big is beautiful in China

医院案例分析
Hospital Case Study

Suzhou P&M hospital
苏州妇女儿童医院

总建筑面积：94800平米
GFA: 94,800 sqm
床位数：600张
Bed num: 600
停车数：800
parking space:800
手术室数目：14
OR num: 14
医院现状：设计中
Current status: under design

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Future healthcare design considerations - conclusion

- Healthcare is a complex sector
- Global demands are increasing
- A WLC model is essential to deliver value
- “Future clinical needs” must be a key driver
- New generation of patients
- The “district” carbon agenda must be recognised
- Innovation and best practice must be introduced
- The therapeutic environment needs developing
- The existing estate presents a real challenge
- We have to think holistically

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"A design team which produces a total, balanced, efficient design can help to produce a better environment."

Sir Ove Arup, November 1968

The end

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