


OR design; characteristics and future directions

Noemí Basterman



Search with
history

Search with
history

 operating room of the future



Typical size: 700x 400 px



operating room of the future

operating room

Search 22,100,000+



The Operating Room of the
170 × 155 - 25 k - gif
nordic.stryker.com



Operating Room of the Future
400 × 289 - 148 k - jpg
siemens.com



The operating room of the
3644 × 2586 - 1184 k - jpg
clinicalcenter.nih.gov



Tomorrow's operating room
500 × 426 - 56 k - jpg
news.cnet.com



The operating room of the
400 × 289 - 136 k - jpg
siemens.com



Operating Rooms of the Future
725 × 292 - 83 k - jpg
aats.org



The Operating Rooms Of The
431 × 252 - 38 k - jpg
cimit.org



Operating Room of the Future
230 × 155 - 23 k - jpg
urmm.edu



hybrid operating rooms



תמונה

איקונים

בסביבות 170,000,000 תוצאות (0.21 שניות)





What is missing?
Where is Dany?



What/ who is missing?

Patient



- Cables
- Lines
- Tubes
- And more...

Staff



Surgeons
Anesthetists
Nurses
Non-medical

Missing....

From radial OR
to self-contained
Operating Table
(OT)

Some
Future directions

Data display and
information in
the OR

**Leg Amputations
15th century**



Anatomical theatre of the Archiginnasio, Bologna, Italy



16th century

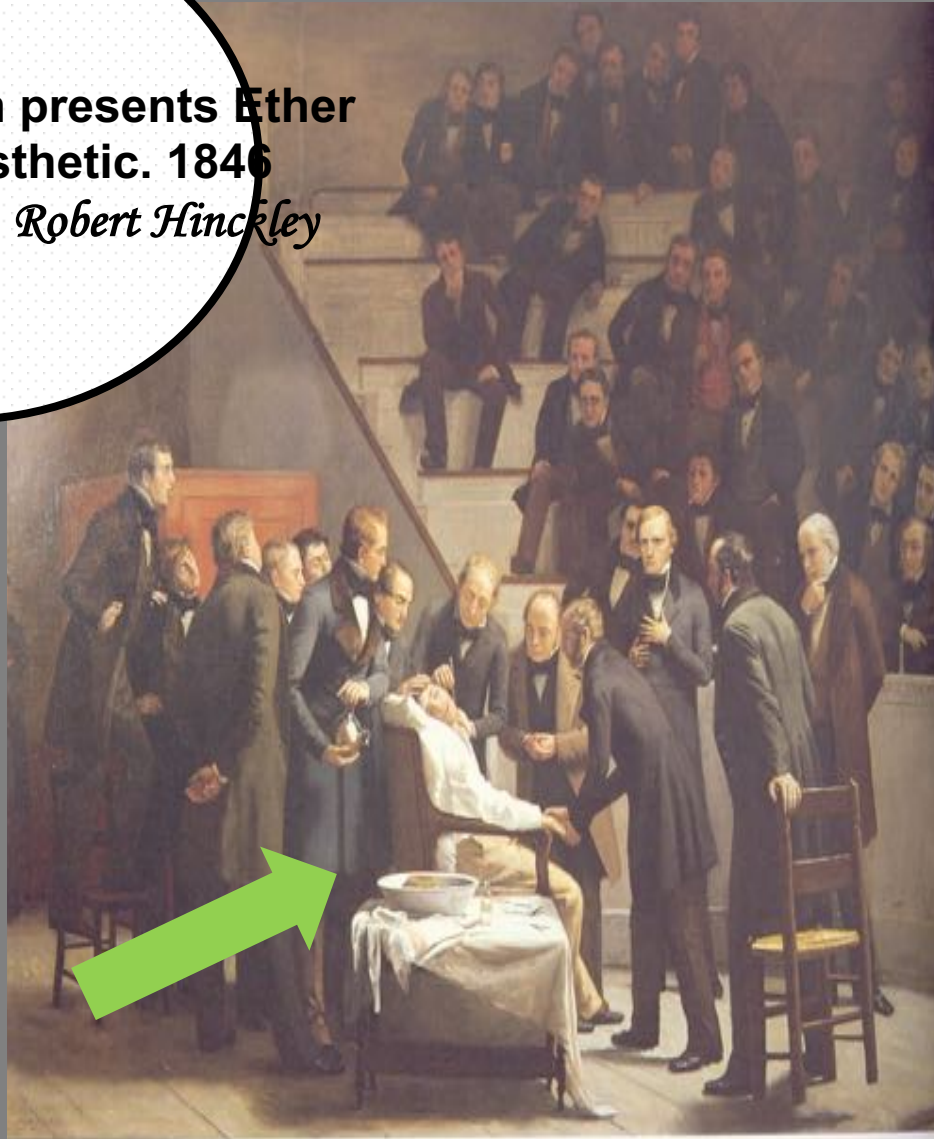
**Leg Amputations
18th century**



Operating table

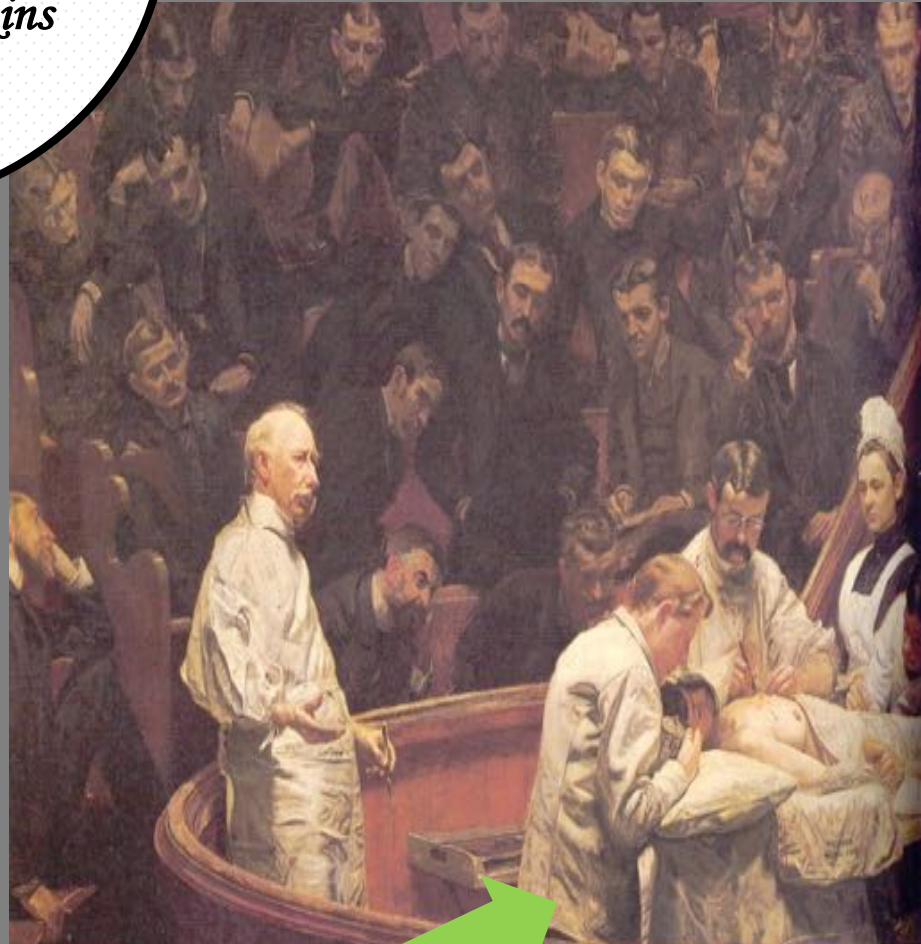
**Dr. Morton presents Ether
as an anesthetic. 1846**

Robert Hinckley



Operating Theatre

(Penn Univ)
Thomas Eakins



Operating Room

Beginning of
20th century





THE ENLARGED OPERATING THEATRE.

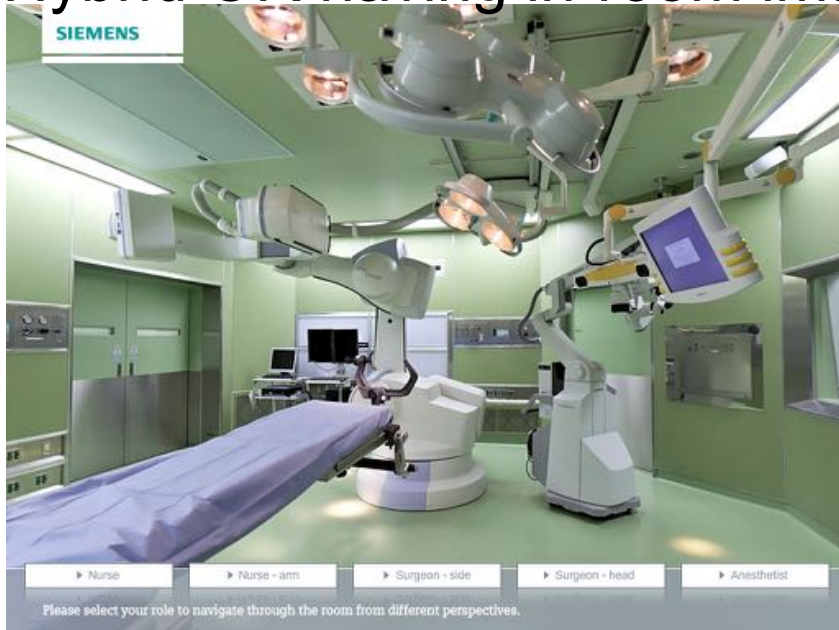
(Looking West).

Note the bay window, facing north, recently added, which increases the size of the Theatre by nearly one-half. 413 Patients passed through the Theatre last year.

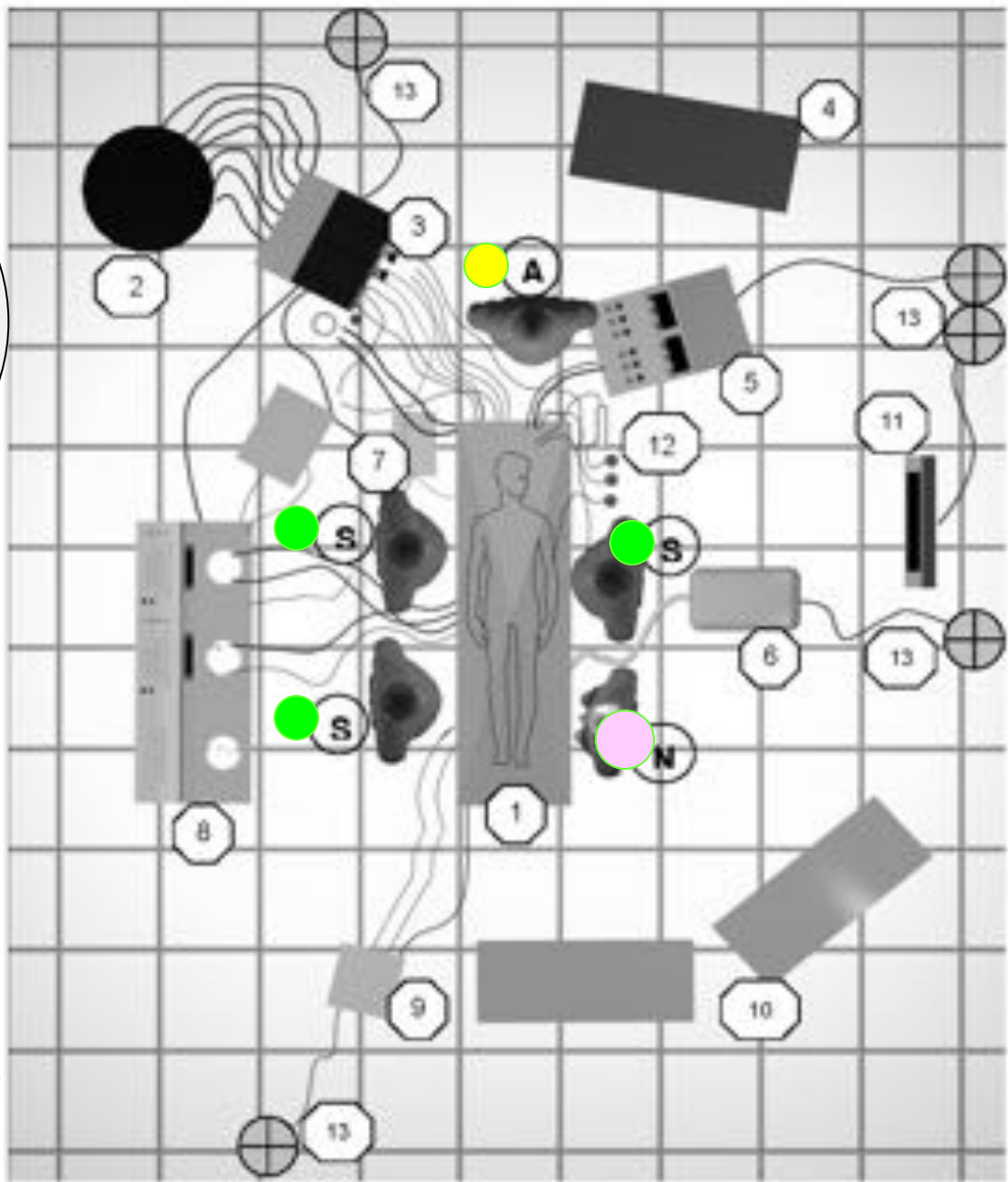
And Today



Hybrid OR having in-room imaging (CT, MRI, catheterization)

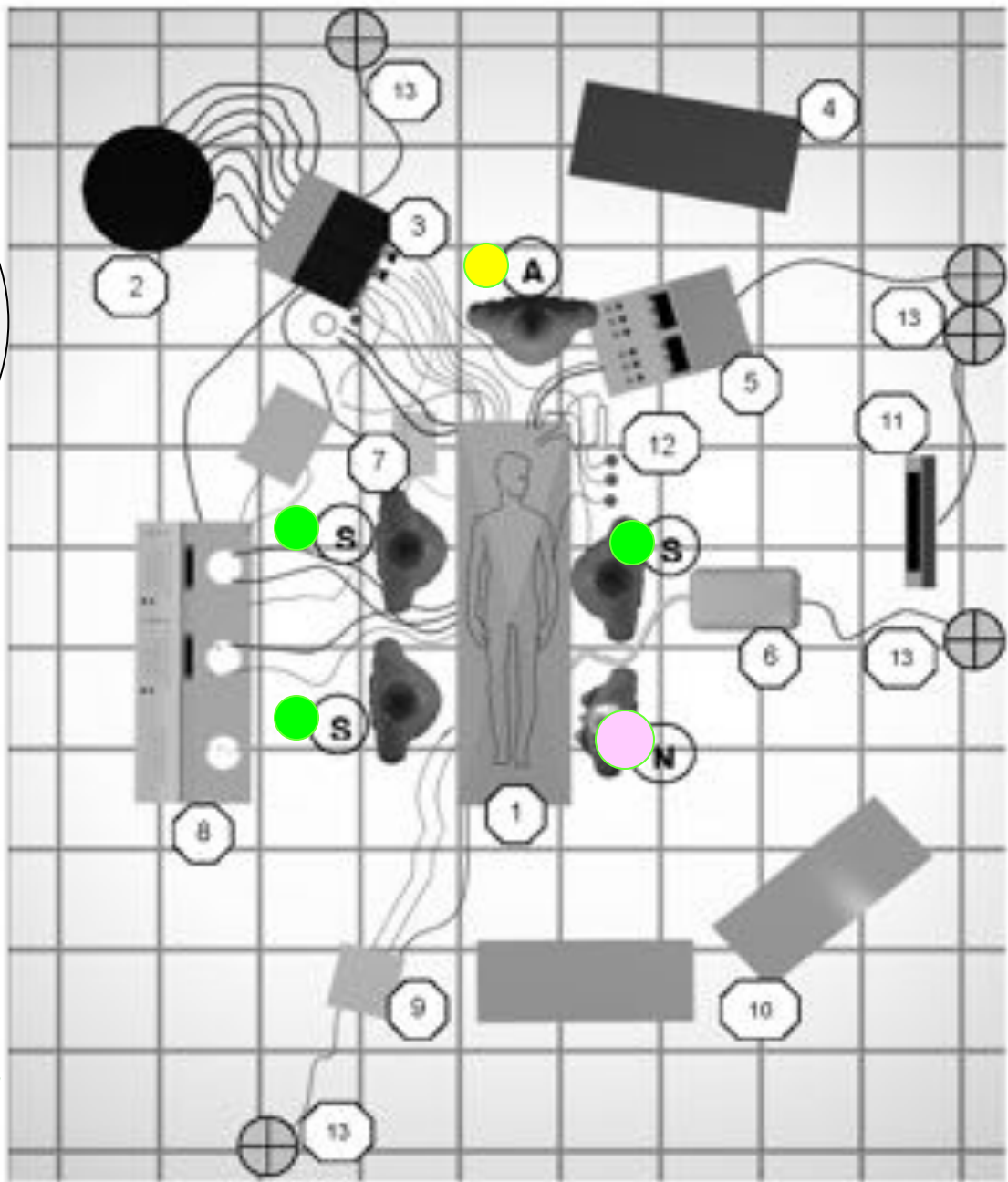


Operating Room Configuration



Ofek E, Pizov R, Bitterman N.
From a radial operating room to a self contained operating table.
Anaesthesia, 61(6): 548-52, 2006.

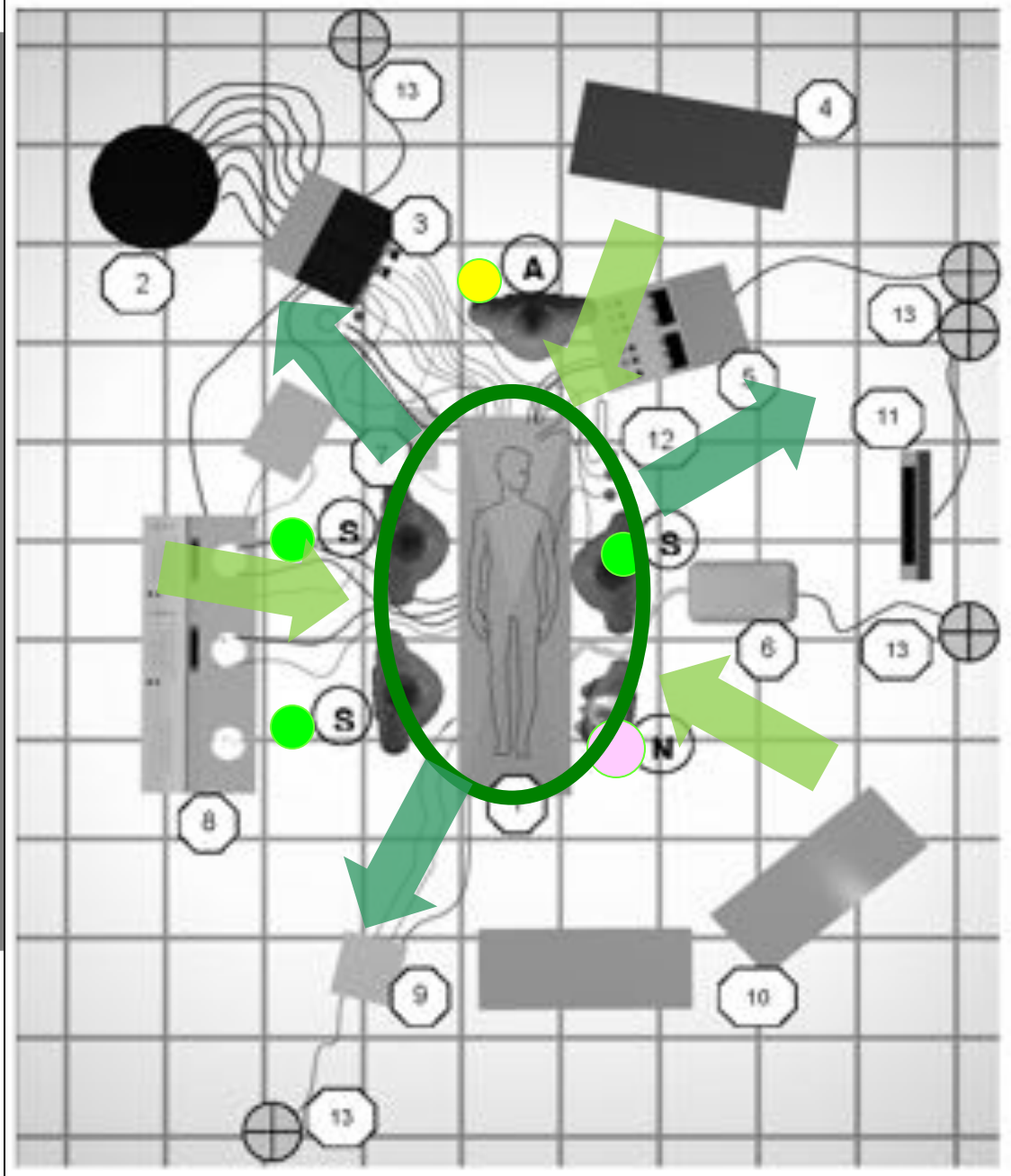
Radial Configuration



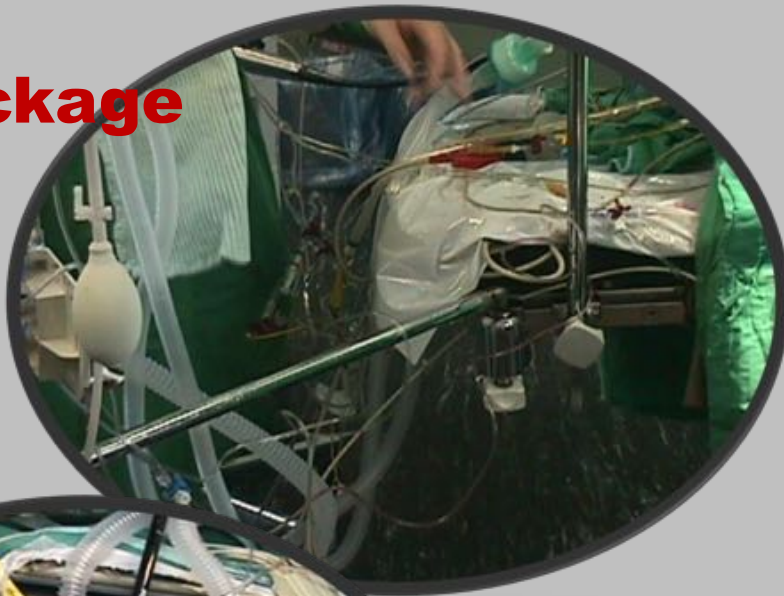
Ofek E, Pizov R, Bitterman N.
From a radial operating room to a self contained operating table.
Anaesthesia, 61(6): 548-52, 2006.

Radial Configuration

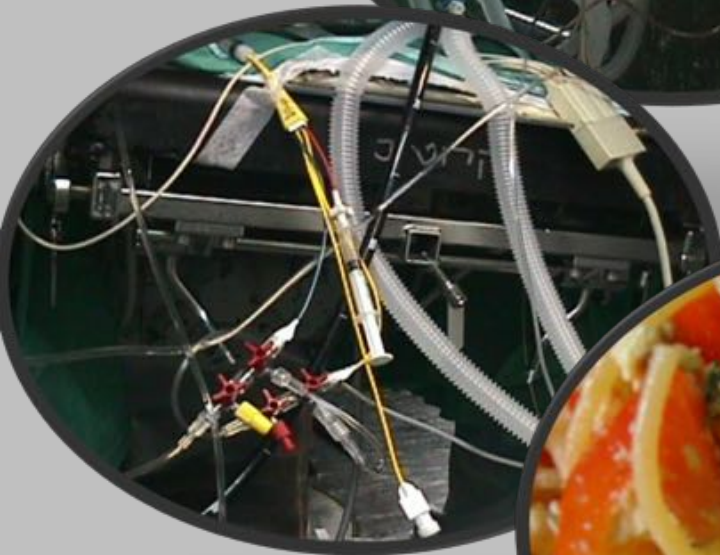
Ofek E, Pizov R, Bitterman N.
From a radial operating room to a self contained operating table.
Anaesthesia, 61(6): 548-52, 2006.



Blockage



Congestion



Restriction

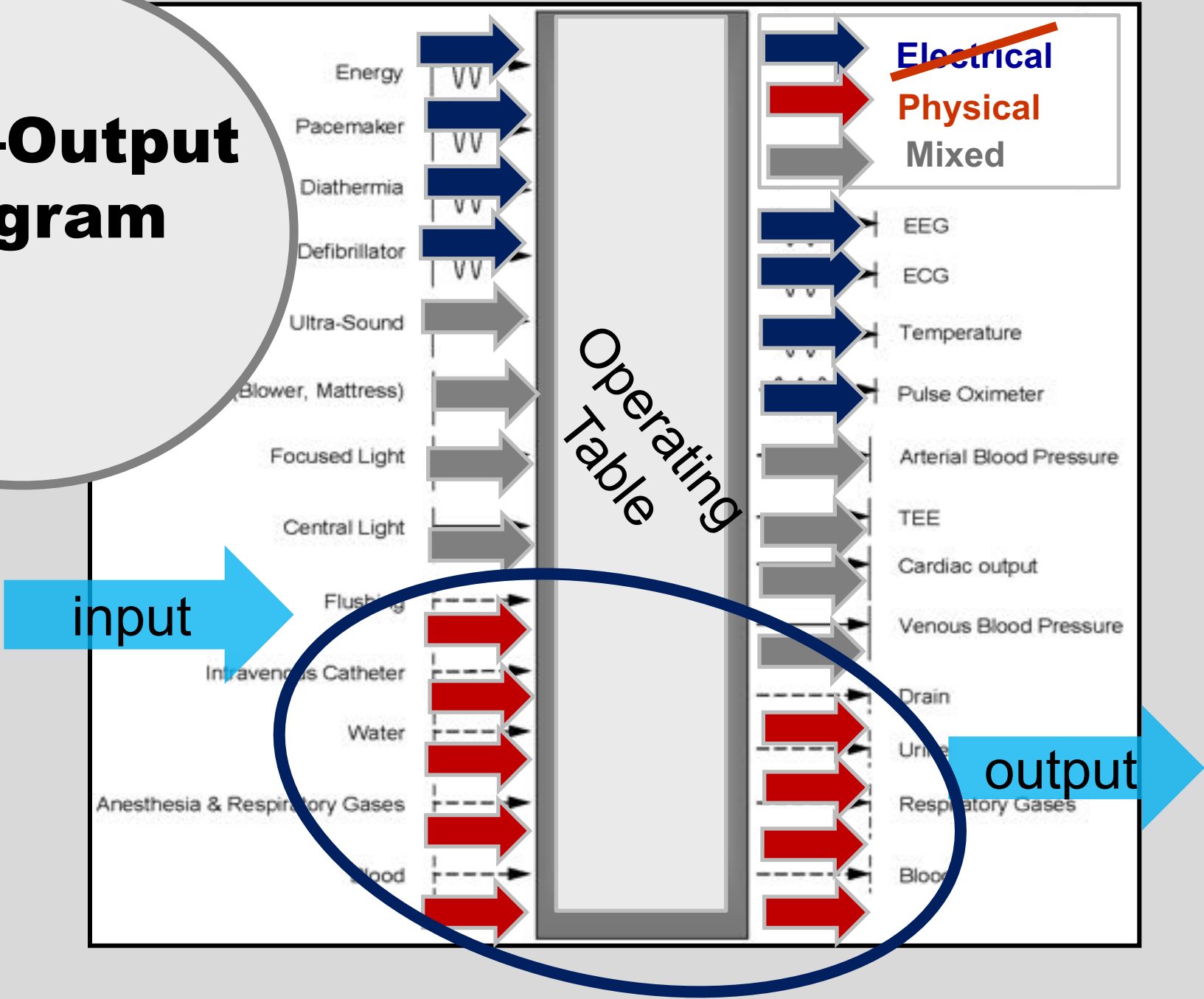


Methods

- Observations
- Video recordings
- Questionnaires
- Interviews

- Anna Becker
- Prof Yoel Donchin
- Eylon Ofek
- Prof Dany Gopher
- Katerina Klimovich
- Prof Reuven Pizov

Input-Output Diagram



Aim:



Ceiling-mounted BOOMS

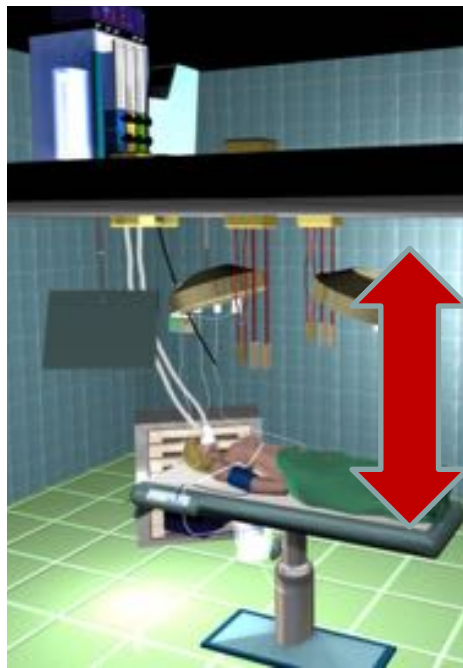


lazy Susan

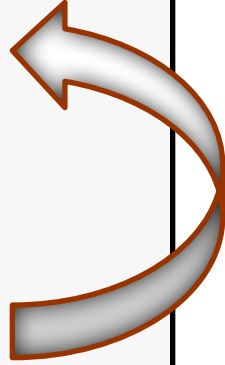
2018



2005



Ceiling-mounted BOOMS

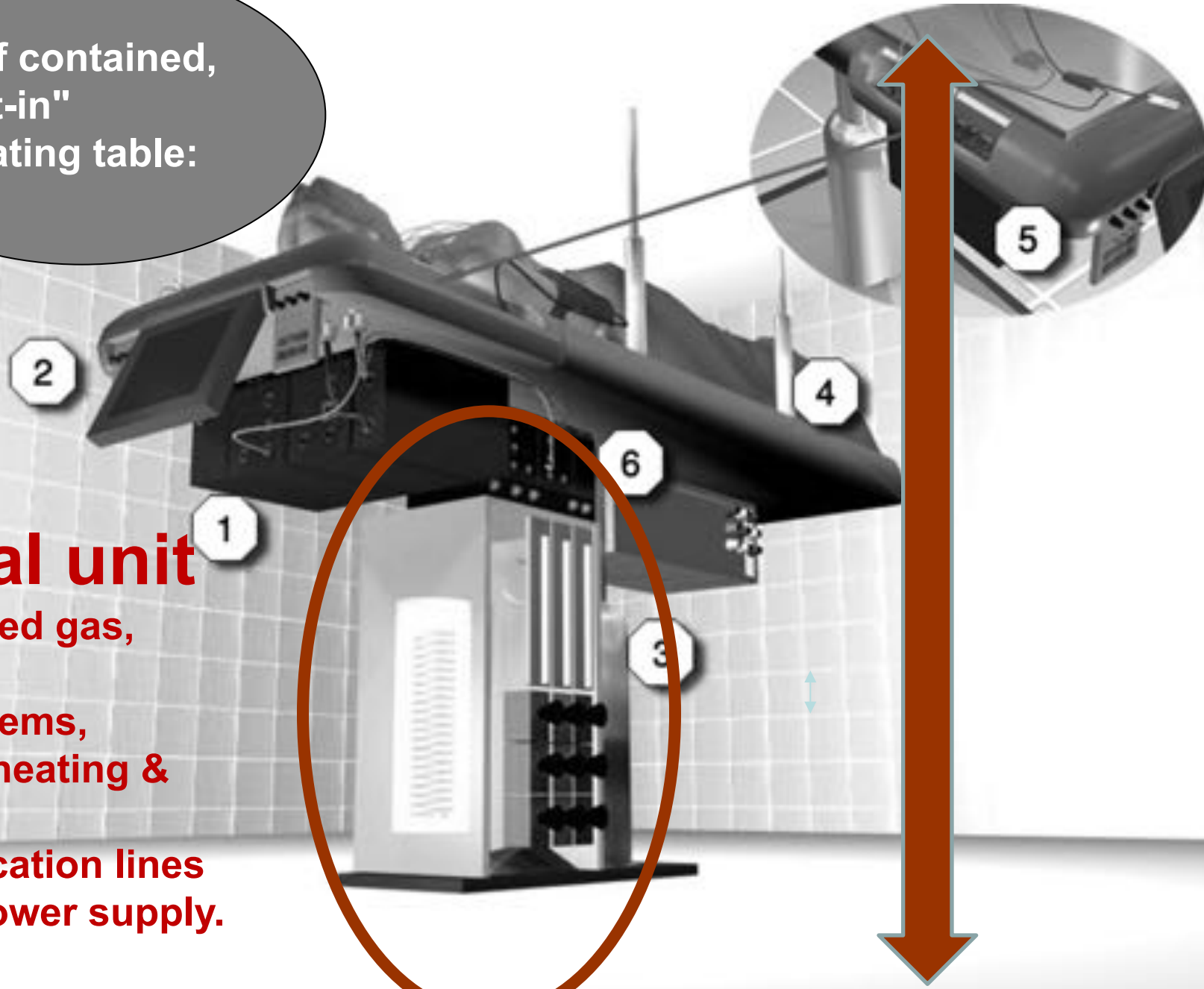


Erasmus MC, Rotterdam



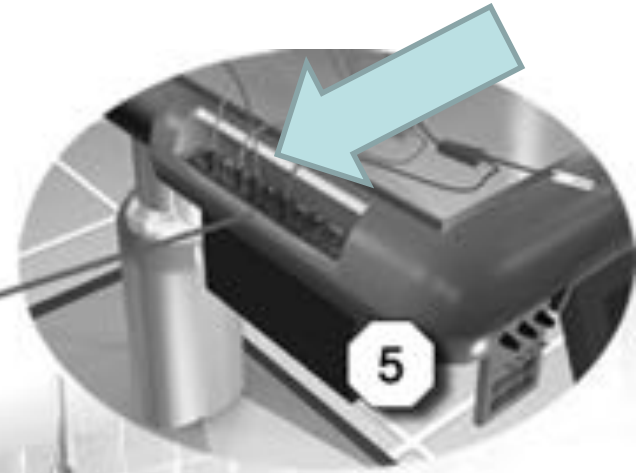
A self contained,
"built-in"
operating table:

central unit
compressed gas,
vacuum,
drain systems,
water for heating &
cooling,
communication lines
backup power supply.



A self contained,
"built-in"
operating table:

panels with
embedded
inlets;



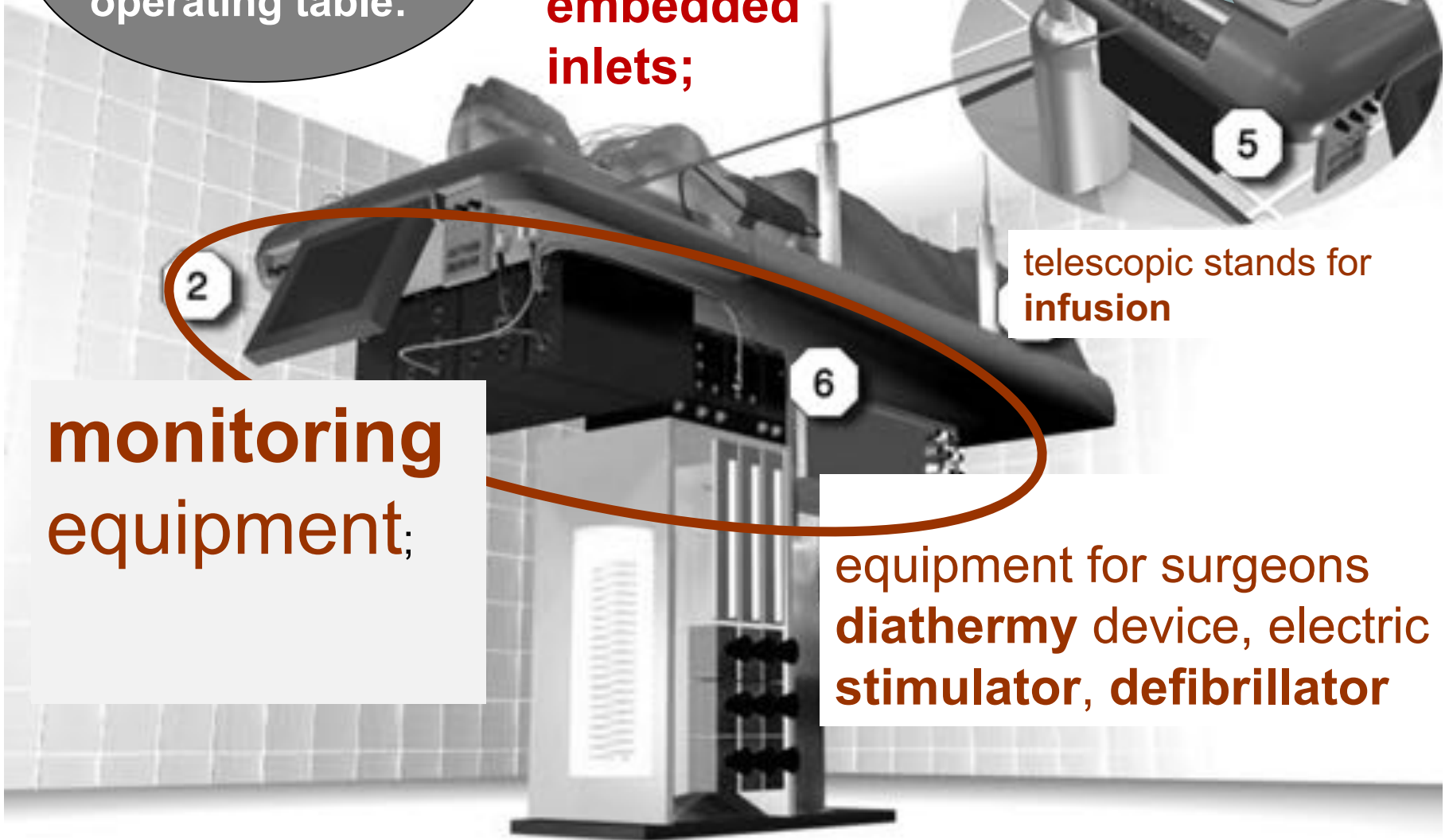
telescopic stands for
infusion

2

6

monitoring
equipment;

equipment for surgeons
diathermy device, electric
stimulator, defibrillator

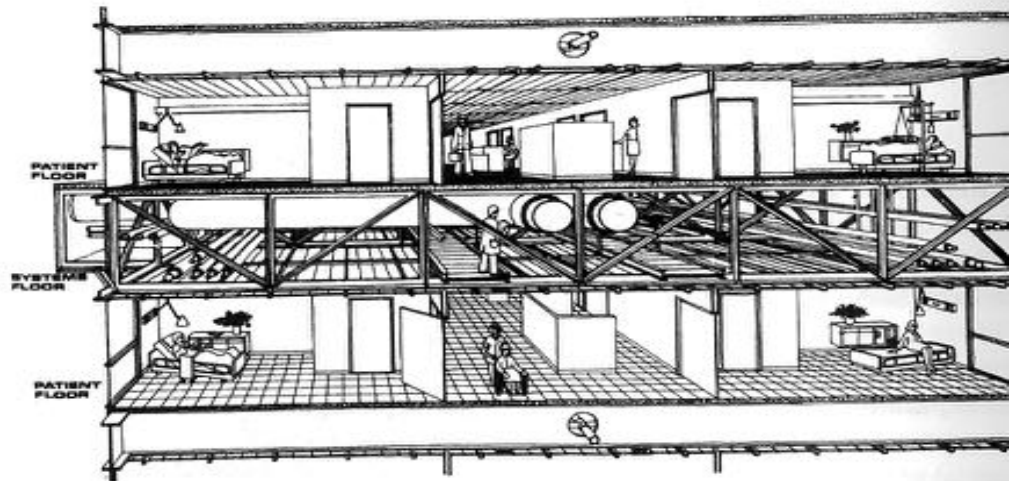
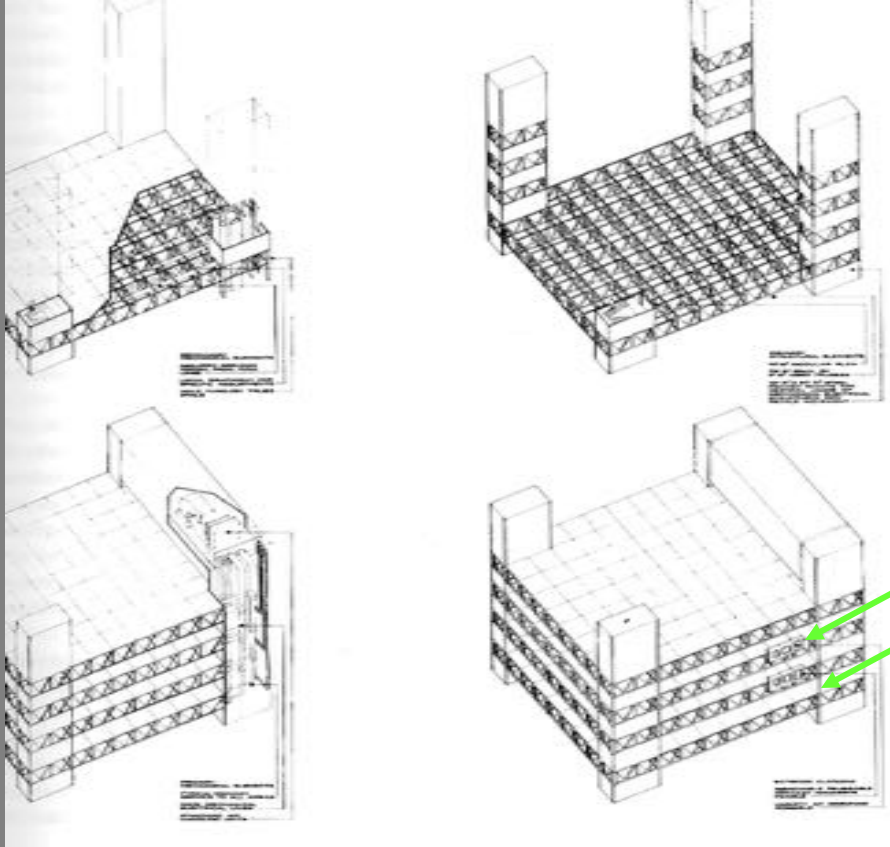


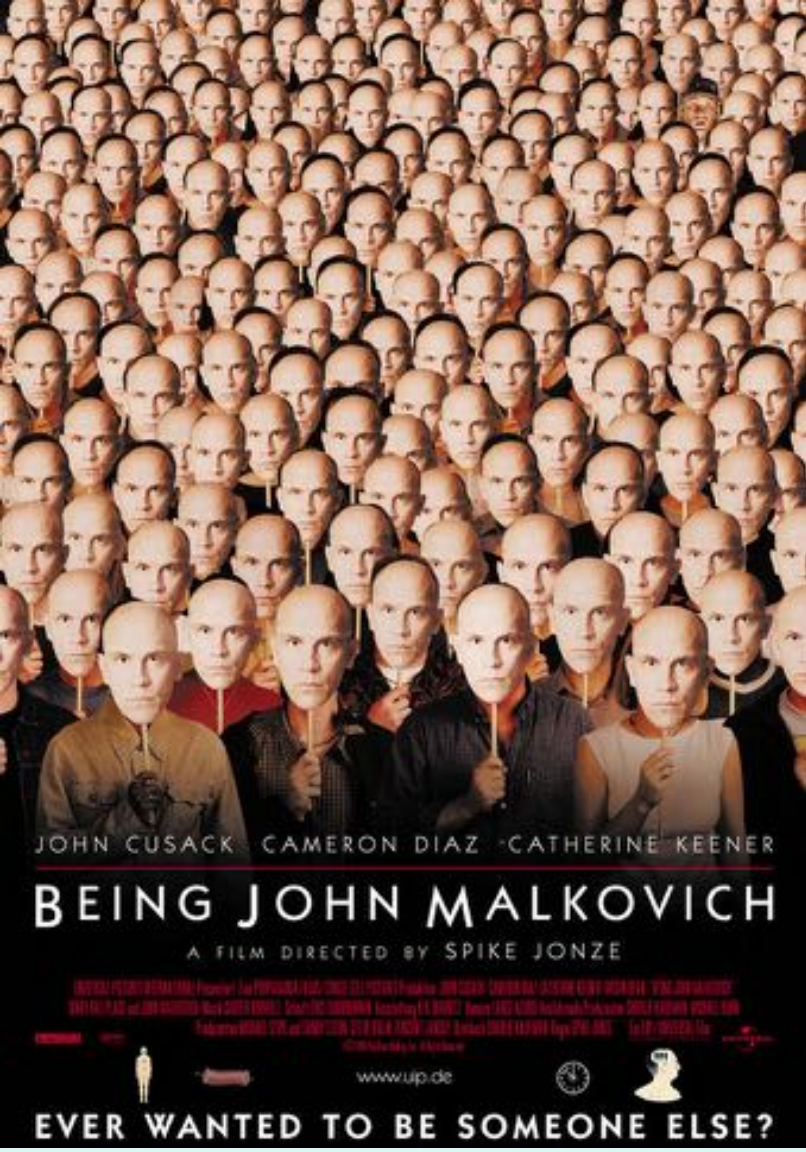
OR

Wireless
and
Tubeless
OR

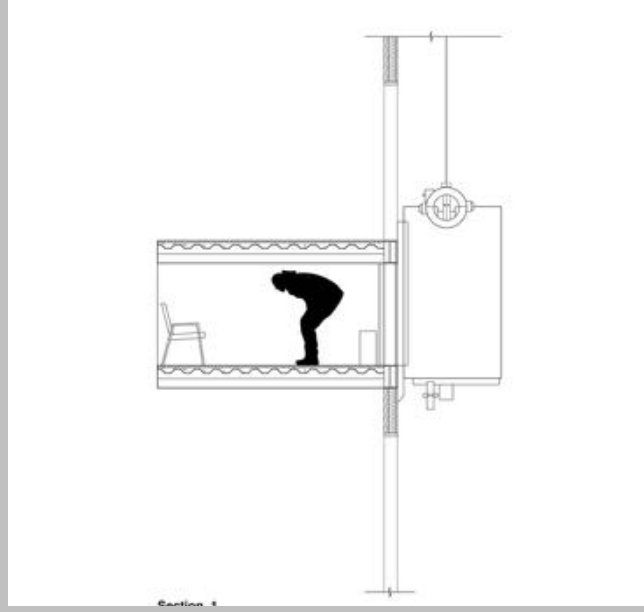


Interstitial floor





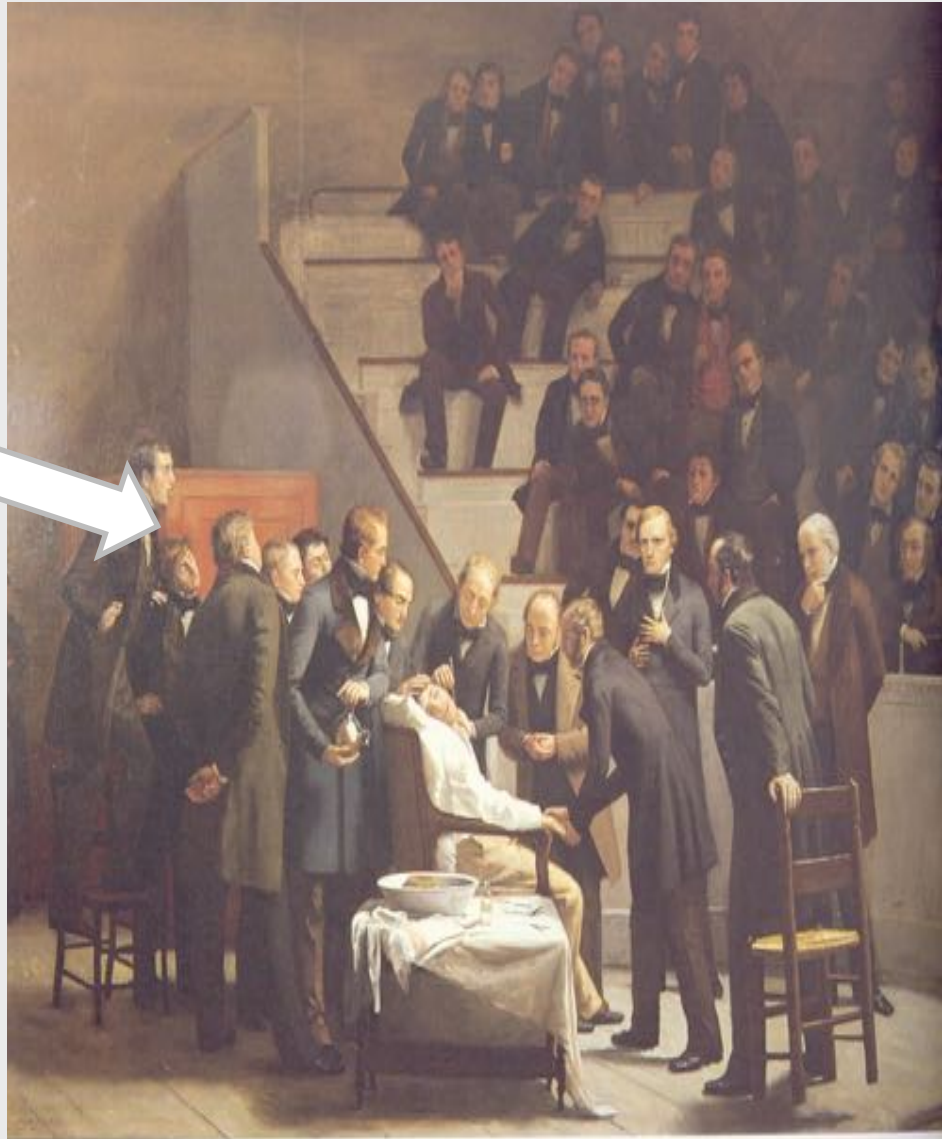
- 7½ floor.



by Spike Jonze.

From radial OR
to self-contained
Operating Table
(OT)

Data display and
information in
the OR



monitor- surgeon interactions

Focal distance
Light intensity
Dark adaptation
Glare
Color blindness
Aging..

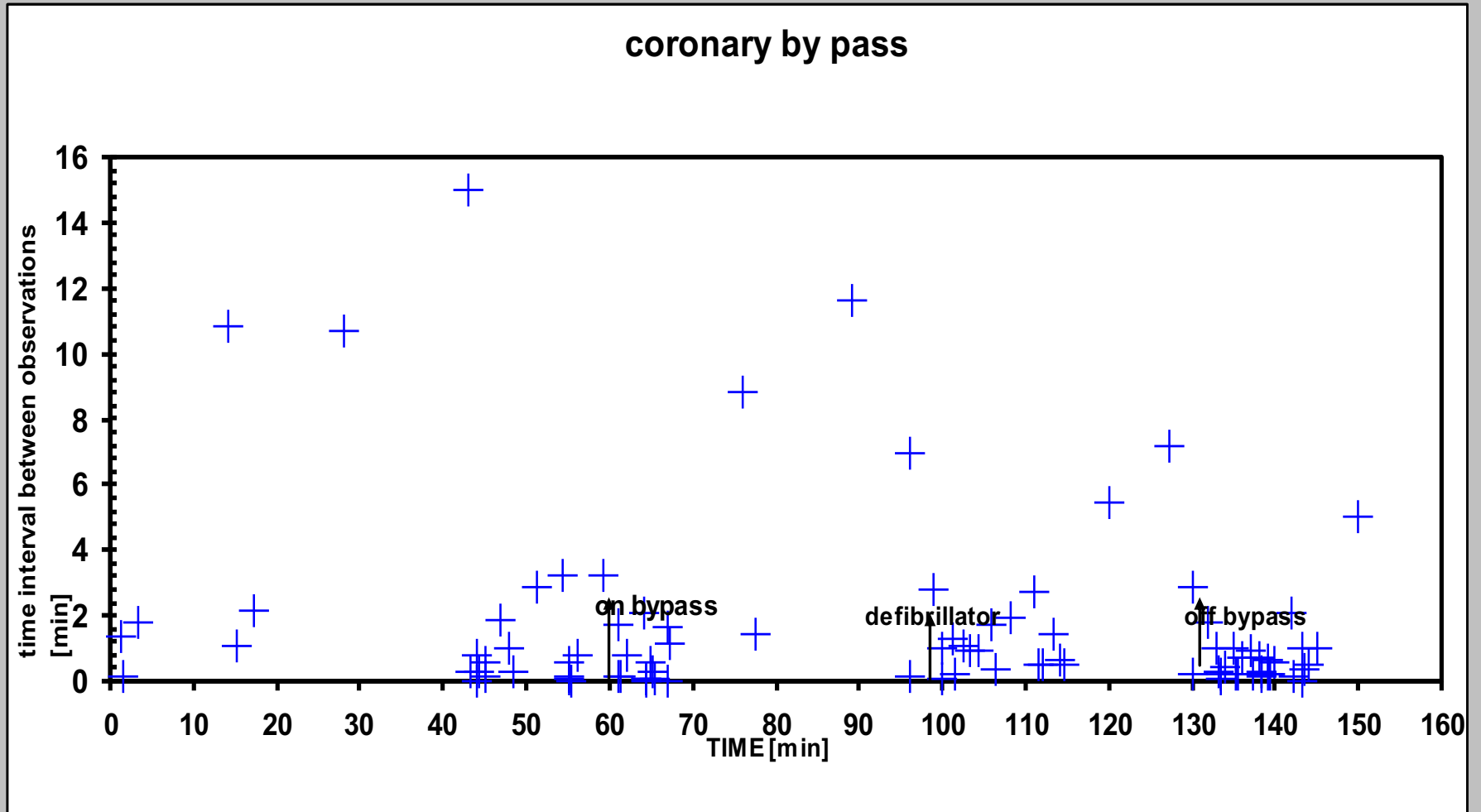


Monitors in OR



Activity sampling

Time Interval



Activity sampling - Gestures



A



B



C



D



E



F

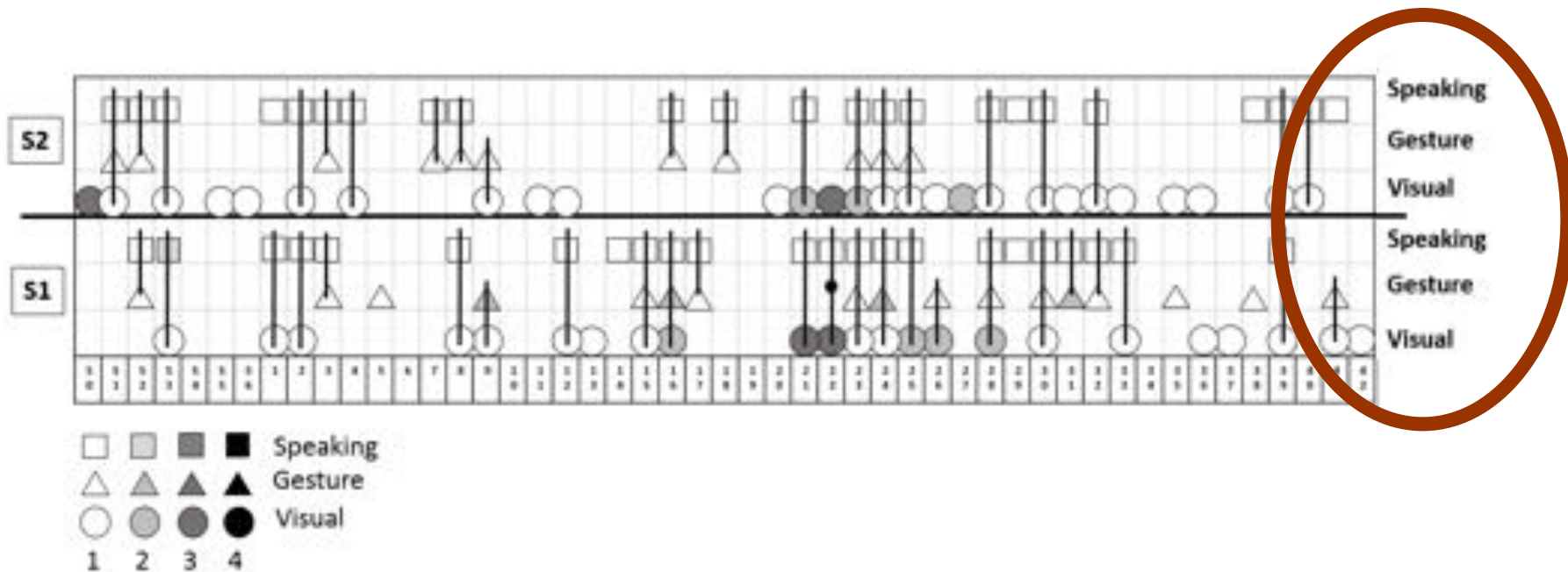


G



H

Task Analysis: Activity Sampling & Timeline



Dynamic, smart, responsive, tailored, personalized
multimodal information exchange system

From radial OR
to self-contained
Operating Table
(OT)

Some
Future directions

Data display and
information in
the OR




Interacts with hand gesture



3D holograms

Hololens
Microsoft



- Self contained OR table
- 2D  3D and even 4D (time)
- Multimodal OR design (visual, auditory, tactile considerations)
- Flexible (interstitial floors)
- Multidisciplinary open minded team !!!

Design
implications

The first step in designing or renovating a surgical facility is the establishing a multidisciplinary committee to coordinate the process. Committee members should include leading surgeons, anesthesiologists, nurses, biomedical and other engineers and experts in communication and supply systems. The hospital administration should also be represented. The committee should

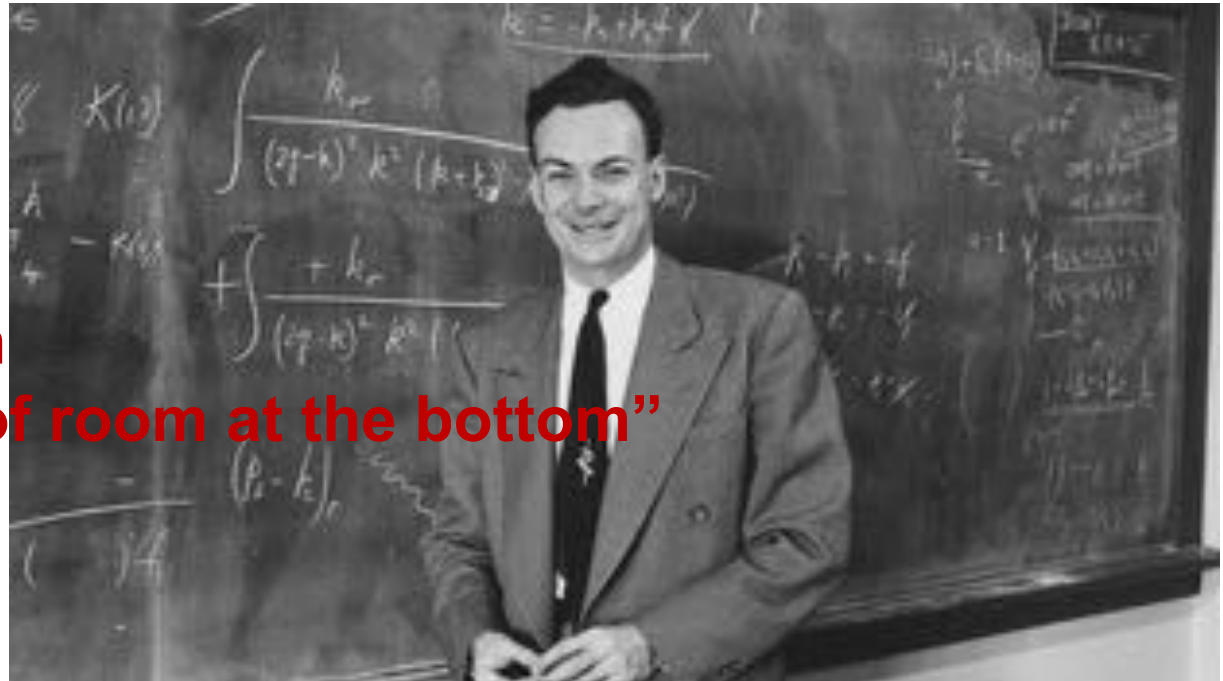
Gofrit, O., Weissman, C., Peleg, E., Lifshits, N., Pinchover, R., & Weiss, Y. (2016). Designing a modern surgical facility. *Perioperative Care and Operating Room Management*, 3, 12-20.

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*What about human factors experts?
Designers? Architects? Technicians?*

- "Although it is a very wild idea, it would be interesting in surgery if you could swallow the surgeon," **Feynman** told the audience.
- "You put the mechanical surgeon inside the blood vessel and it goes into the heart and 'looks' around. It finds out which valve is the faulty one and takes a little knife and slices it out."

1959,
Richard Feynman
"There is plenty of room at the bottom"



Fantastic Voyage (1966)



“Swallow the surgeon”

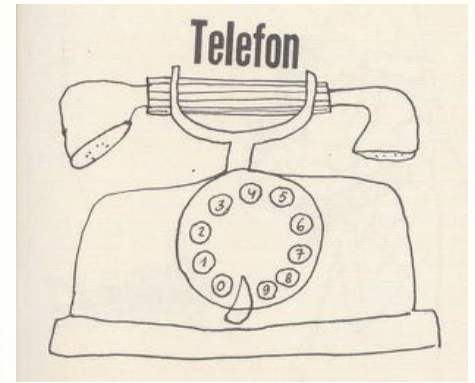





It is time to
Redesign the future OR

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Redesign the future OR



Welcome to

EUROPEAN HEALTHCARE DESIGN 2018

Utopia or dystopia: Visioning the future of health

Royal College of Physicians, London, UK, 11–13 June 2018

HoloLens Microsoft



virtual reality= visual field+ computerized images

Hand gesture manipulations

3D hologram

Independent, portable

Real time imaging