



# Assuring the long-term usefulness and performance of healthcare facilities

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**We understand that,  
like cities, hospitals  
are never finished**

**But we basically don't  
know how to think  
about this...it's a new  
challenge.**

**... and is a subject of  
interest on an  
international level....**





# Understanding Permanence and Change

- The city structure is permanent to the urban design
- The neighborhood is permanent to the building
- The building is permanent to the fit-out
- The fit-out is permanent to the equipment

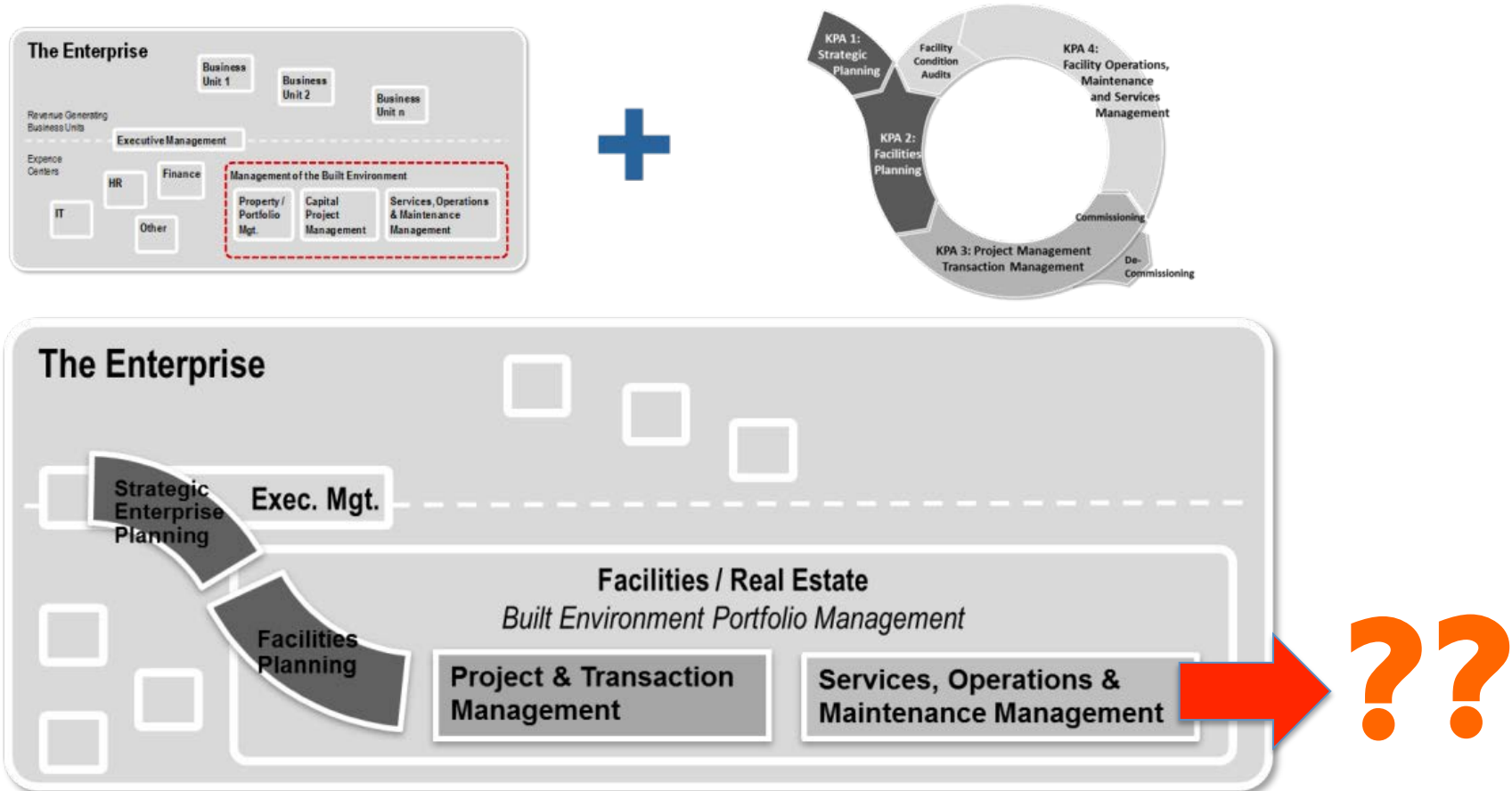
When recognized in our planning, this hierarchical structure helps us manage change



# Our subject needs to be the organization and distribution of decision-making – **OVER TIME** –

Most diagrams on FM and facility design decisions put their emphasis on getting the building built. Then the rest of the history of that facility is lumped into a box called O&M, and that is the end of the diagram.

**WHAT GOES IN THE O&M BOX IS THE KEY POINT and teaches us that we need to rethink our upstream decision-making to be ready for long-term asset sustainability.**



**Performance Measurement in Facility Management: The Environment Management Maturity Model BEM3**

Authors: Thomas Madritsch, Matthias Ebinger, [www.researchjournals.co.uk](http://www.researchjournals.co.uk)

# As technical experts, we tend to think about complex facilities as made up of thousands of parts, each specified and given a cost;

The image shows a software application window titled 'Temp' with a menu bar (File, Edit, View, Database, Takeoff, Pricing, Reports, Interface, Window, Help) and a toolbar. The main window is divided into two panes. The left pane is a spreadsheet with columns for 'Spreadsheet Level', 'Takeoff Quantity', 'Labor Productivity', 'Labor Hours', 'Material', 'Labor', and 'Ar'. The right pane is a tree view titled 'Quick Takeoff: Temp' showing a hierarchical structure of project items.

Spreadsheet Level	Takeoff Quantity	Labor Productivity	Labor Hours	Material	Labor	Ar
01-4000.000 Quality Requirements			hrs			
01-4123.000 Fees			hrs			
1300 Precast Engineering	1 each	-	-	-	-	-
03-1000.000 Concrete Forming & Accessories			808 hrs	4,244	53,798	
03-1113.120 Forms - Slab on Grade						
12 S-O-G Edge Form 12"						
03-1113.122 Forms - Slab on Metal Deck						
2 Metal Edge Form						
6 Const. Joint at Metal Deck						
03-1113.140 Forms - Structural Beam						
2 Beam Side & End Forms						
2 Beam Side & End Forms						
4 Beam Bottom Forms						
4 Beam Bottom Forms						
03-1113.162 Forms - Structural Stair						
4 Stair Edge Form						
6 Riser Edge Form						
03-1113.188 Forms - Tilt Panel						
2 Tilt Panel Edge Forms						
4 Tilt Panel Pass Door Box Out Forms						
10 Tilt Panel Window Box Out Forms						
11 Tilt Panel Weld Plates						
12 Tilt Panel Lifting Inserts						
0300 Bond Breaker						
03-1113.310 Forms - Strip & Oil						
28 Strip & Oil Tilt Panel Form						
03-1500.625 Chamfer						
2 Chamfer						
10 Chamfer 1"						
10 Chamfer 1"						
102 Reveal						
03-1500.710 Embeds in Concrete						
102 Embeds @ Tilt Panel						
03-1500.720 Expansion Joints						
2 Expansion Joint						
03-2000.000 Concrete Reinforcing						
03-2100.104 Rebar - by Lbs/CY						
212 SOMD Rebar						
216 Beam Rebar						

The tree view on the right shows a hierarchy starting with '00 PROCUREMENT & CONTRACTING REQUIREMENTS', followed by '01 GENERAL REQUIREMENTS', '02 EXISTING CONDITIONS', and '03 CONCRETE'. Under '03 CONCRETE', there are sub-items like '03-1000.000 Concrete Forming & Accessories' and '03-1113.102 Forms - Footing'.

**Master Format**

**So we group the technical parts and activities  
into **TECHNICAL CLASSES:****

**Structural systems**

**Mechanical systems**

**Partition systems**

**Façade systems**

**Etc.**

**Planners group activities in**  
**FUNCTIONAL CLASSES**  
**(with associated equipment):**

**Intensive Care**  
**Operating Suites**  
**Pharmacy**  
**Emergency**  
**Laboratory**  
**Inpatient beds**  
**MRI**  
**Etc.**



# PROBLEM!

**The view of buildings as unchanging became enshrined in “functionalism.” With enough scientific measurement, we could finally have the evidence to “get it right”. Architects – and clients - sought legitimacy in scientific evidence...**

**The detailed “architectural program” became the necessary first step to design... we didn’t know how to make decisions without that information...**



# We then put all the parts and functions into one document that attempts to be comprehensive,

- Not a sound business view...
- Against the realities of change
- Against decision flexibility

## THIS MAKES NO SENSE AT ALL!

### e.g. DoD Form 1391

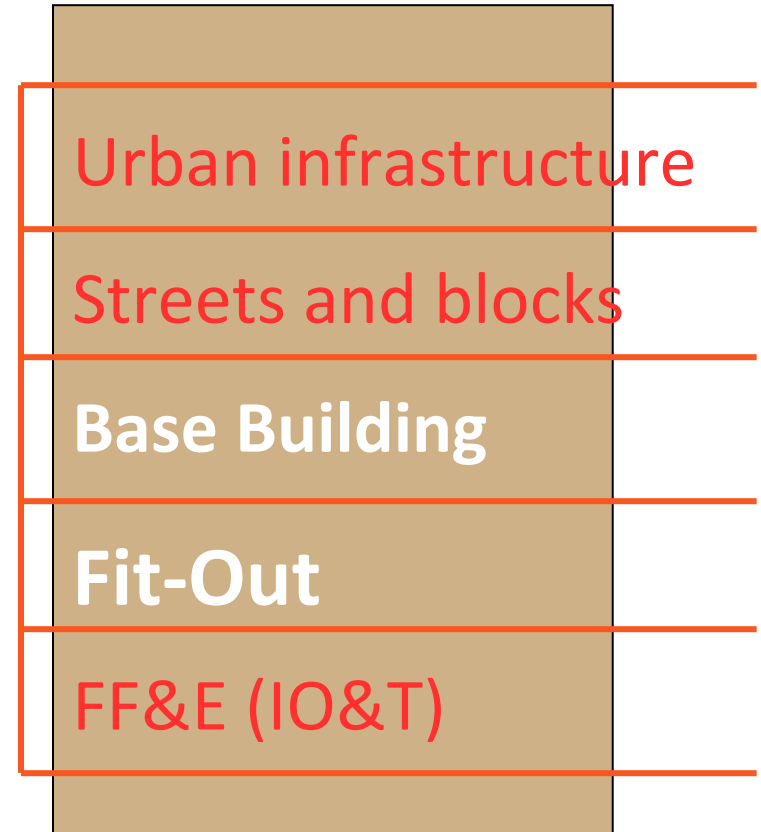
1. Component DEF (TMA)		FY 2011 MILITARY CONSTRUCTION PROJECT DATA		2. Date FEB 2010	
3. Installation and Location: Lackland Air Force Base, Texas			4. Project Title: Ambulatory Care Center, Phase 2		
5. Program Element 87717D		6. Category Code 550	7. Project Number 72752	8. Project Cost (\$000) 162,500	
9. COST ESTIMATES					
Item		U/M	Quantity	Unit Cost	Cost (\$000)
<b>PRIMARY FACILITIES</b>					
Diagnostic, Surgical, Therapeutics Center		SF	298,747	373.14	123,869 (111,474)
Expand Mechanical/Electrical Plant		LS	--	--	(3,036)
Special Foundations		LS	--	--	(3,045)
SDD and EPAct05		LS	--	--	(6,314)
<b>SUPPORTING FACILITIES</b>					
Electric Service		LS	--	--	8,716 (1,994)
Water, Sewer, Gas		LS	--	--	(107)
Steam And/Or Chilled Water Distribution		LS	--	--	(976)
Paving, Walks, Curbs And Gutters		LS	--	--	(1,553)
Storm Drainage		LS	--	--	(562)
Site Imp (1,910) Demo ( )		LS	--	--	(1,910)
Antiterrorism Measures		LS	--	--	(278)
Other		LS	--	--	(1,336)
ESTIMATED CONTRACT COST					132,585
CONTINGENCY PERCENT (5.00%)					6,629
SUBTOTAL					139,214
SUPERVISION, INSPECTION & OVERHEAD (5.70%)					7,935
CATEGORY E EQUIPMENT					15,351
TOTAL REQUEST					162,500
TOTAL REQUEST (NOT ROUNDED)					162,500
INSTALLED EQT-OTHER APPROPRIATIONS					(0)
10. Description of Proposed Construction: Construct the second phase of a multi-story ambulatory care center on special foundations. This phase will provide a new Diagnostic, Surgical, and Therapeutic Services Center and associated support spaces. The mechanical/electrical plant will be expanded. The existing Wilford Hall Medical Center will be demolished in a later phase. Supporting facilities include utilities, site improvements, surface parking, and access roads. The project will be designed in accordance with the criteria prescribed in Unified Facilities Criteria UFC 4-510-01 (MIL-HDBK-1191), DoD Minimum Antiterrorism Standards for Buildings UFC 4-010-01, Americans with Disabilities Act and Architectural Barriers Act Accessibility Guidelines (ADA/ABAAG), and applicable energy conservation legislation. Commissioning, operations and maintenance manuals and Comprehensive Interior Design will be provided. Air Conditioning: 1,200 Tons.					
11. REQ: 645,400 SF		ADQT: 81,685 SF		SUBSTD: 1,446,470 SF	
<b>PROJECT:</b> Construct Diagnostic, Surgical, Therapeutics Center (Phase 2)-of-an Ambulatory Care Center. (CURRENT MISSION)					
<b>REQUIREMENT:</b> Provide a modern and appropriately sized Ambulatory Care Center to support 57,000 healthcare beneficiaries at SAMMC - South.					
<b>PHASING PLAN:</b> Multiple phased projects will ultimately replace Wilford Hall Medical Center (WHMC) to provide an Ambulatory Care Center of sufficient size and capacity at San Antonio Military Medical Center - South Campus (SAMMC-S) for the care of over 57,000 enrollees and a training platform for Graduate Medical Education (GME) in the San Antonio					

# AN ALTERNATIVE:

## LEVELS of INTERVENTION can organize our work

Levels have important dependency relations between them, and define the relationship between parties operating on these levels.

“Higher” levels set the stage for “lower” levels; e.g. fit-out can change without forcing the base building to change...etc.





# A business view organizes the thousands of parts and functions into decision “levels.”

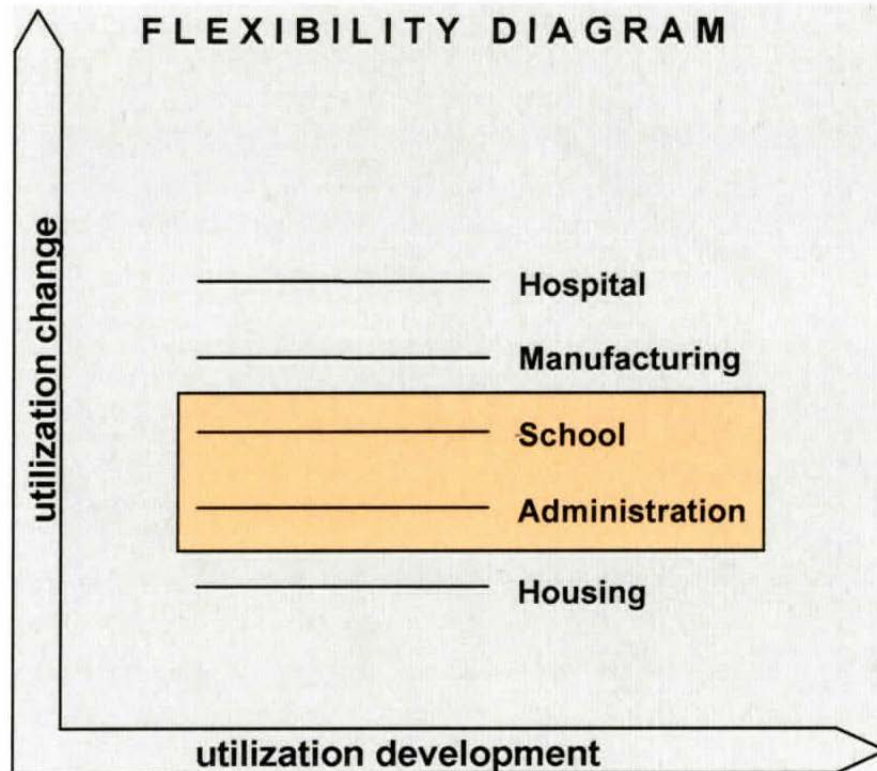
**Office buildings are designed for variably paced “churn”**

- **architects design empty base buildings**
- **other architects or interior architects design the tenant spaces**
- **specialized contractors and suppliers are involved at each level of work**



# Portfolio Management

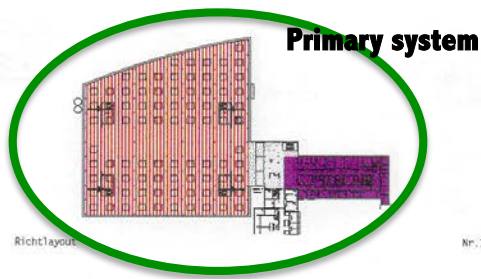
## Definition of the capacity of possible utilization



Source: OPB Bern

**This diagram shows that “capacity” of a facility means it can accommodate change OF use (utilization **change**, e.g. from a school function to an administrative function) and change WITHIN a use (utilization **development**).**





Richt layout



Nr. 1 [INSIDE]



Nr. 2 Lichtkörper



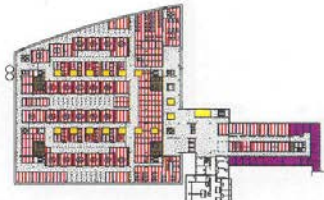
Nr. 3 FELIX



Nr. 4 "mis en pieces"



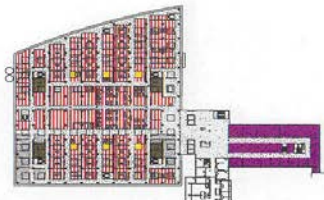
Nr. 5 "INO mall"



Nr. 6 verrillion



Nr. 7 COM6



Nr. 8 LICHT BLICK



Nr. 9 SYMBIOSE

Functions sorted by project parts

- |                             |                                  |                           |
|-----------------------------|----------------------------------|---------------------------|
| TP 1: Surgery theaters      | TP 4: Nuclear medicine           | TP 8: Clinic direction    |
| TP 1: Central sterilization | TP 4: Archive nuclear medicine   | Building Technology       |
| TP 2: Intensive care        | TP 5: Central laboratories       | Supply and waste disposal |
| TP 3: Emergency             | TP 5: Central pharmacy           | Traffic area, general     |
| TP 3: Emergency bed station | TP 6: Storage central pharmacy   | Light shafts              |
| TP 1: IDR                   | TP 6: Education Center, Research | Empty, reserve            |

Comparison layout level D

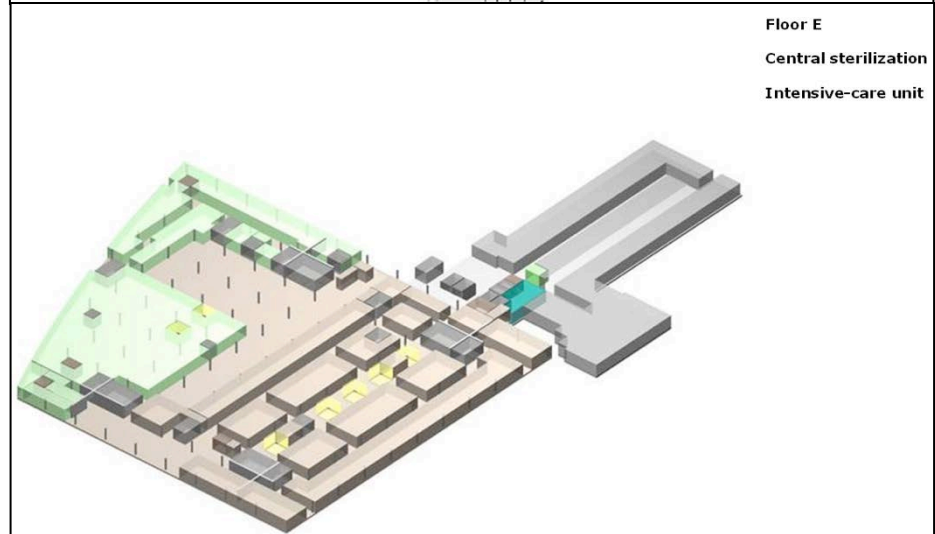
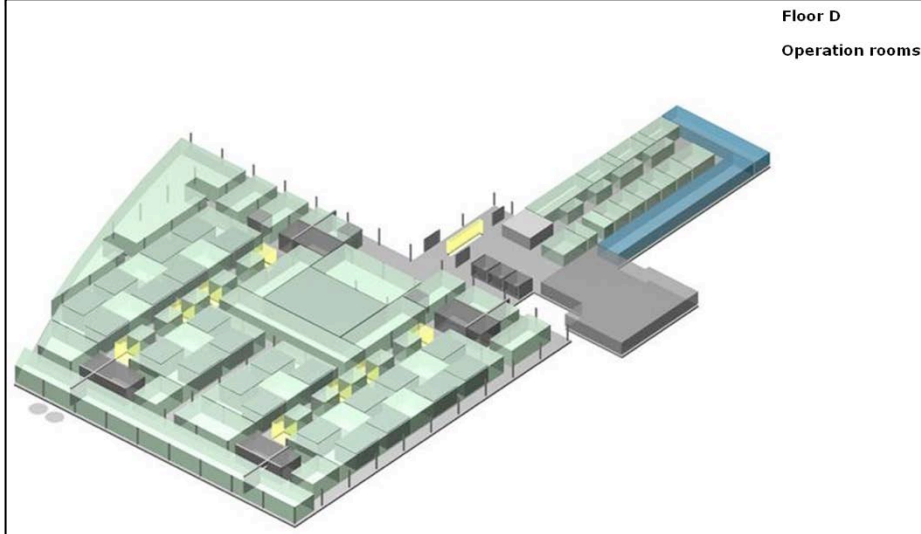
INO Inselspital Bern competition secondary system  
 SPA Suter + Partner, diplomierte Architekten Oktober 1999

# CAPACITY:

**A variety of functional layouts are possible on one typical floor of a well-designed base building.**

**Each layout here is a proposal from one of the firms competing for the Secondary System design of the INO hospital in Bern.**

**The firm selected for the Secondary System had to accept the Primary System as its "site".**

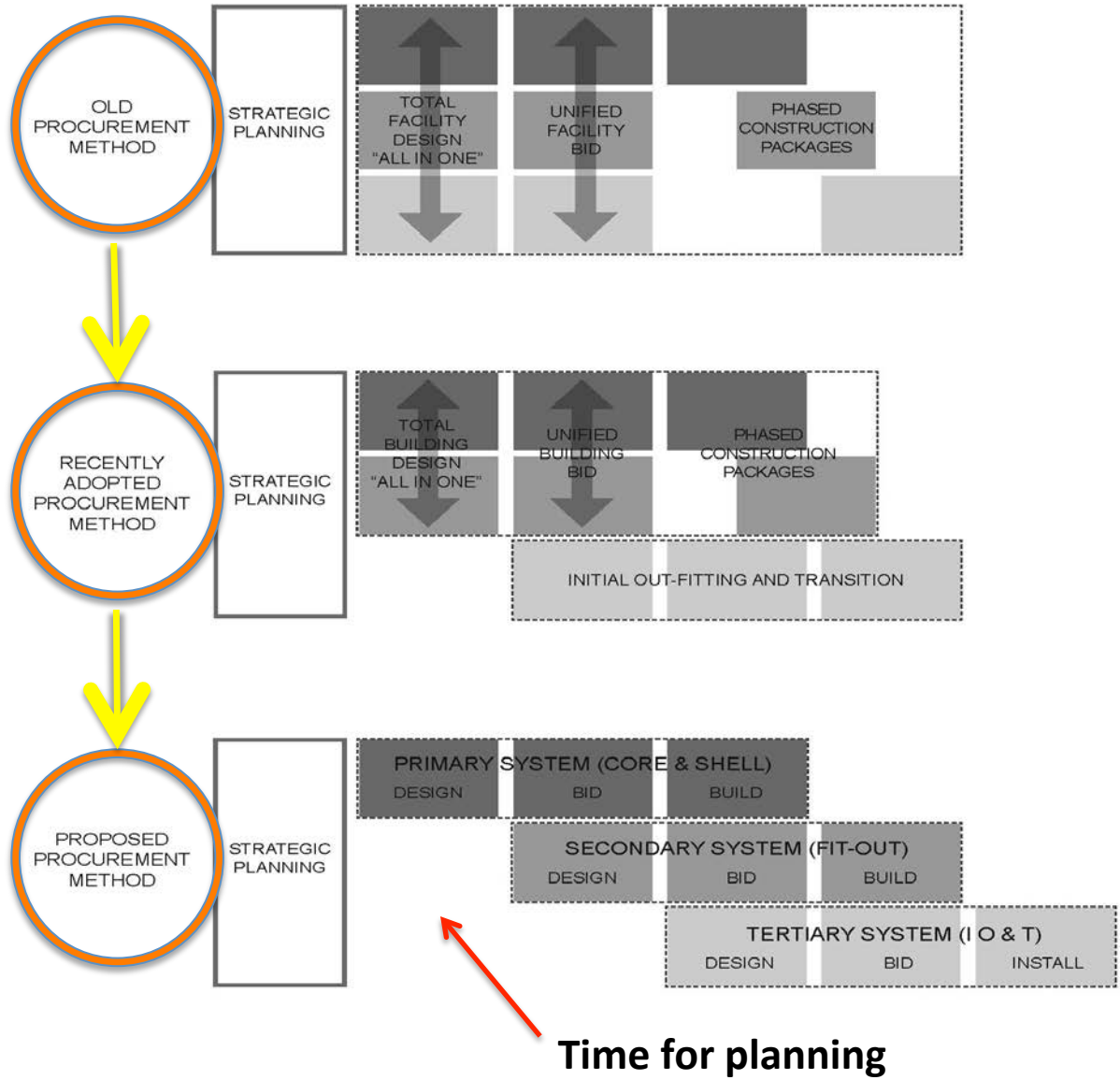


Floor D - operation clusters

Floor E - laboratories / intensive care

**Insel Hospital Campus, Bern, Switzerland**



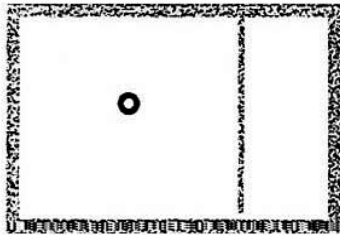


# A proposed serial decision-making process

...transitioning from a process (top diagram) that attempts to specify everything at once to a process that sets up a facility with long-term value (prepared for change) by deferring functional decisions closer to the time of occupancy....

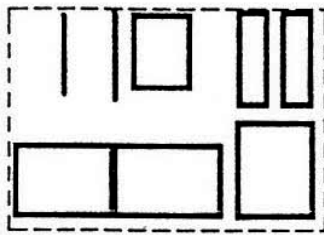
# SPATIAL ORGANIZATION

System Level 1



Primary system, fixed:  
 Site logistics  
 Building envelope  
 Structure system  
 Interior logistics

System Level 2



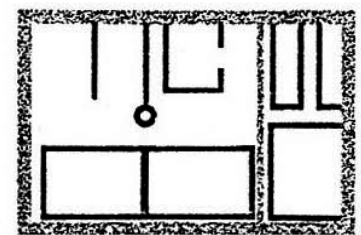
Secondary system, adjustable:  
 Interior walls  
 Floor covering  
 Ceilings

System Level 3



Tertiary system, flexible:  
 Furniture  
 Mechanical equip  
 Hospital supplies

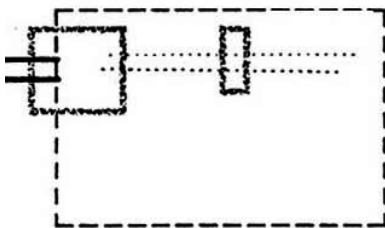
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Composite system

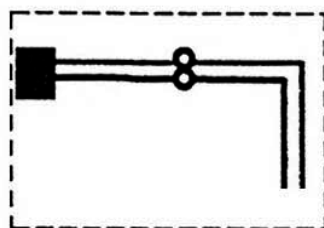
# TECHNICAL SYSTEM ORGANIZATION

System Level 1



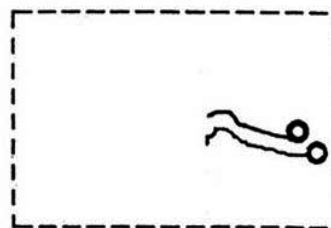
Primary system, fixed:  
 Electronics  
 Location of head offices  
 Installation structure

System Level 2



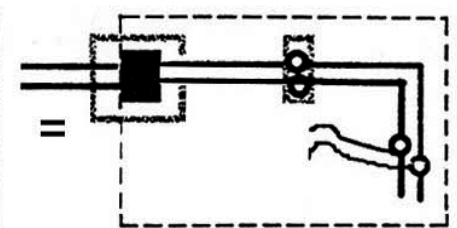
Secondary system, adjustable:  
 Equipment for head offices  
 Installations  
 Illumination

System Level 3



Tertiary system, flexible:  
 Ports for apparatus  
 Room specific installations

=



Composite system

Source: OPB Bern

**This diagram begins to define what belongs to which system level**

# Meeting the sustainability agenda

## Primary System

Life cycle: 50-100 years  
long-term investment,  
unchangeable



**BASE BUILDING**

## Secondary System

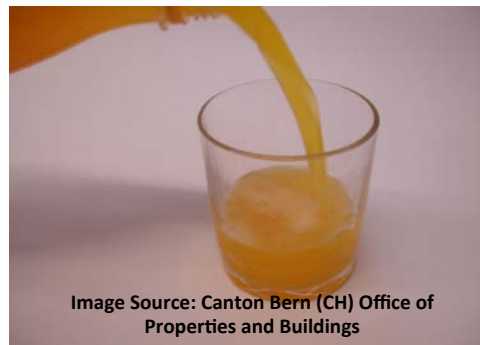
Life cycle: 5-20 years  
medium-term  
investment, adjustable



**TENANT WORK or  
FIT-OUT**

## Tertiary System

Life cycle: 2-5 years  
Short-term investment,  
changeable



**FF&E (Furnishings,  
Fixtures and  
Equipment) or IO&T**

Image Source: Canton Bern (CH) Office of  
Properties and Buildings



A close-up photograph of two hands, one from the left and one from the right, holding a blue cylindrical object. The hands are positioned as if they are about to twist or break the object. The background is a blurred green, suggesting an outdoor setting. The lighting is bright, highlighting the texture of the skin and the smooth surface of the cylinder.

# Summary

- 1. “Flexibility” or capacity requirements cut across lines of authority in client organizations**
- 2. Scenario planning and cost modeling are needed**
- 3. Design submittal requirements must coincide with serial decision-making and demonstrate capacity for change**
- 4. Vigilance and compliance monitoring by the client is vital**