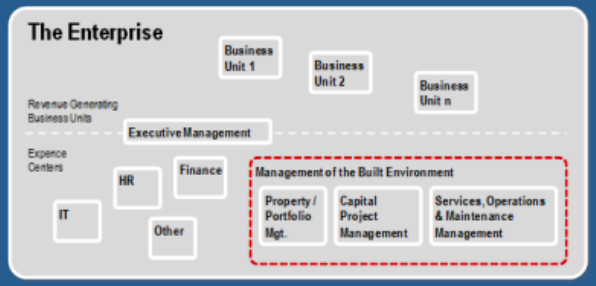
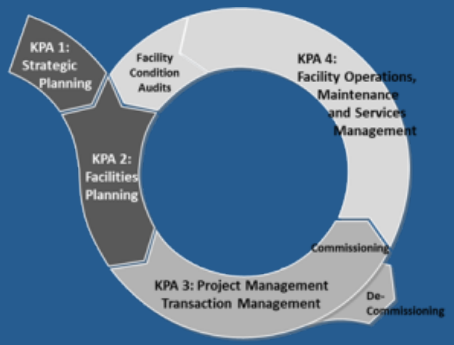
Open (flexible) Building -
A New Imperative for Healthcare Facility Design

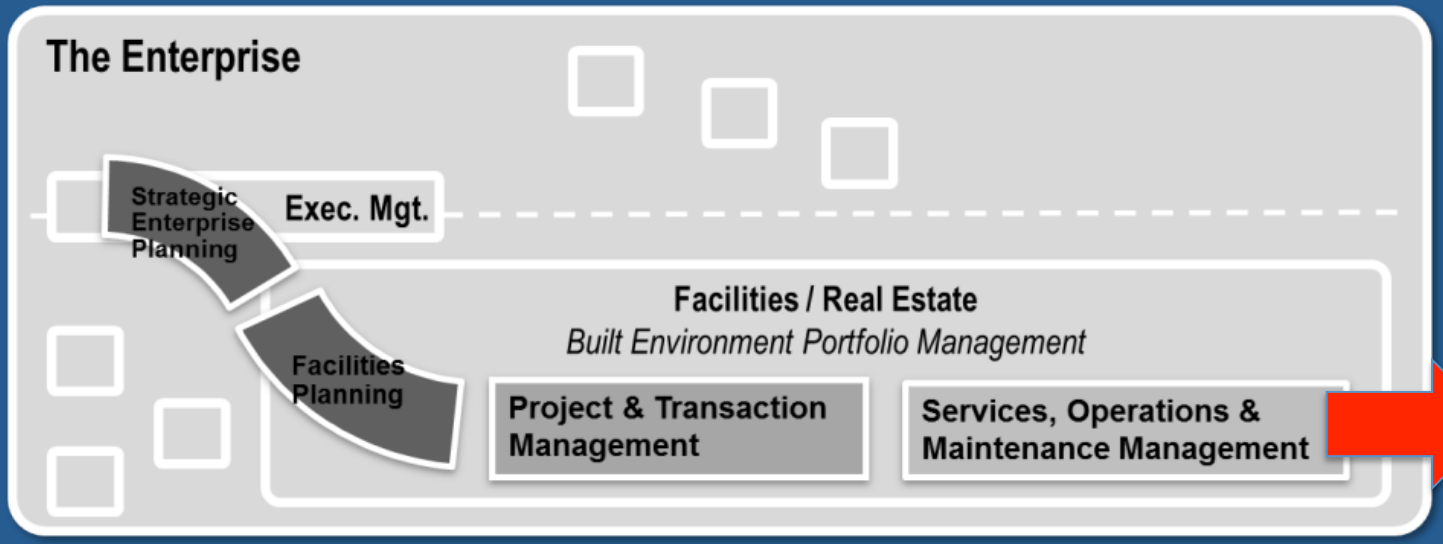
Like cities, hospitals are never finished

But we tend to acquire them using decision-making methods (and attitudes) that imagine them as complete artifacts….

The TIME DIMENSION is being drastically oversimplified or worse, ignored

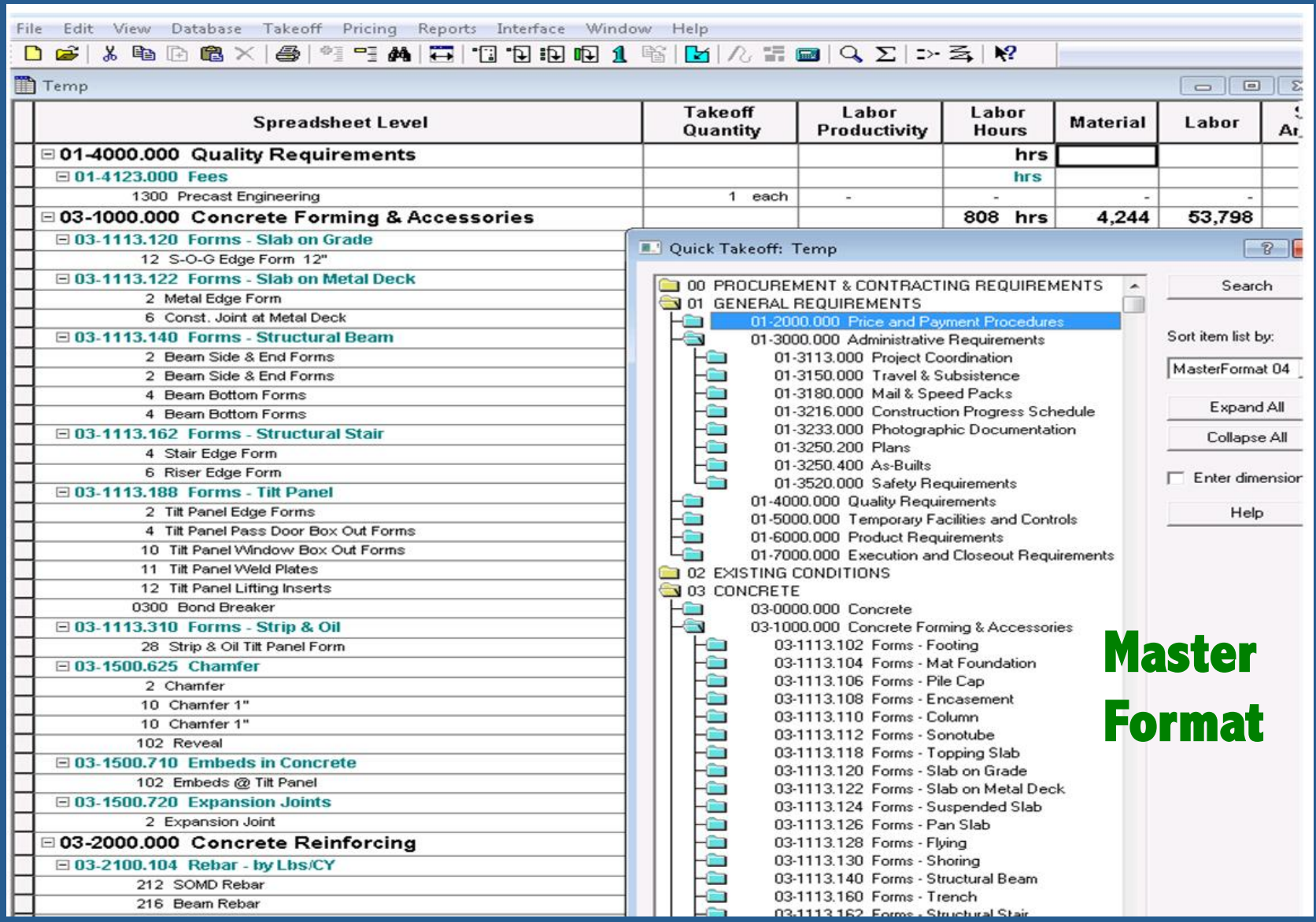






Performance Measurement in Facility Management: The Environment Management Maturity Model BEM3
Authors: Thomas Madritsch, Matthias Ebinger, www.researchjournals.co.uk

We tend to conceive of complex facilities as made up of thousands of parts, each specified and with a first-cost;



We group all the technical parts into TECHNICAL CLASSES:

Structural systems
Mechanical systems
Partition systems
Façade systems
Etc.

(loosely but inadequately related to time and change)

Planners group activities in FUNCTIONAL CLASSES

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

(all of which change)

Architects – and clients - sought legitimacy in "evidence-based design."

Detailed "architectural programs" have become the necessary first step to design…we lack confidence without that information…

On the other hand, a business view…

- Office buildings and shopping centers (but not yet housing) are designed to "churn"
- Clients ask architects to design empty base buildings with capacity for change, as a matter of course, with no controversy
- Other architects or interior architects design spaces for use, which are quite varied and inevitably change
- Specialized contractors and suppliers are responsible for each level

This view understands an inescapable historical reality:

- The city structure is permanent relative to urban design
- Urban design is permanent relative to the buildings
- Buildings are permanent relative to their fit-out (functions)
- Fit-out is permanent to the equipment and furnishings

Recognizing this hierarchical structure helps society manage inevitable change and uncertainty quite effectively

A NEEDED SHIFT IN PERSPECTIVE

FROM	TO
• Assets understood as static	• Assets understood as subject to transformation
• Decision making focused on the initial acquisition of an asset	• Decision making over time (assets will be transformed over time)
• Flexibility focused on technology	• Flexibility focused on sequenced decision-making over the life of the facility
• Flexibility separate from sustainability	• Flexibility ENABLING sustainability
• Flexibility as an option	• Flexibility as a requirement

The key concept is CAPACITY

- Life cycle: 50-100 years
- Long-term investment

BASE BUILDING or PRIMARY SYSTEM

- Life cycle: 5-20 years
- Medium-term investment

FIT-OUT or SECONDARY SYSTEM

Courtesy Canton Bern OPB

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

IO&T, FF&E or TERTIARY SYSTEM

Example 1: A Flexible Combat Infrastructure

- Capacity for change & development is possible at each level
- Criteria and production for each level are separated but recognize other levels
- Interfaces are key design and management issues

Example 2: A Flexible Utility Infrastructure

Courtesy Canton Bern OPB

Generation

Distribution

End Use

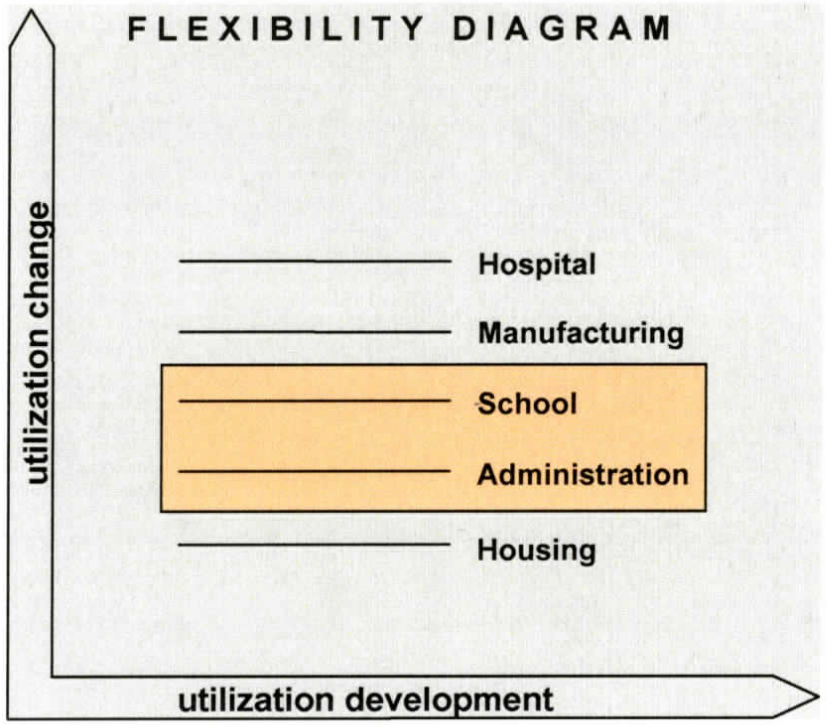
- Capacity for change & development is possible at each level

Criteria and production for each level are separated but recognize other levels

- Interfaces are key design and management issues

Portfolio Management

Definition of the capacity of possible utilization



Source: OPB Bern

A facility with capacity means it can accommodate change OF use (utilization change, e.g. from a school to a healthcare function) and change WITHIN a use (utilization development, e.g. reorganizing an OR).

Example of CAPACITY:

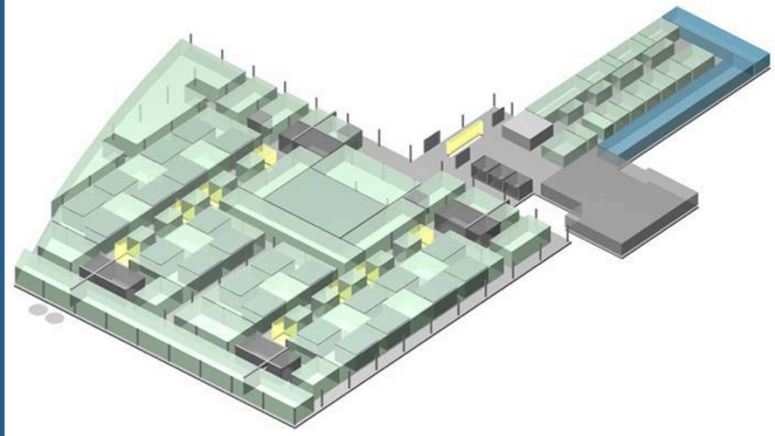
A variety of functional layouts on one typical floor.

Each 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 rooms



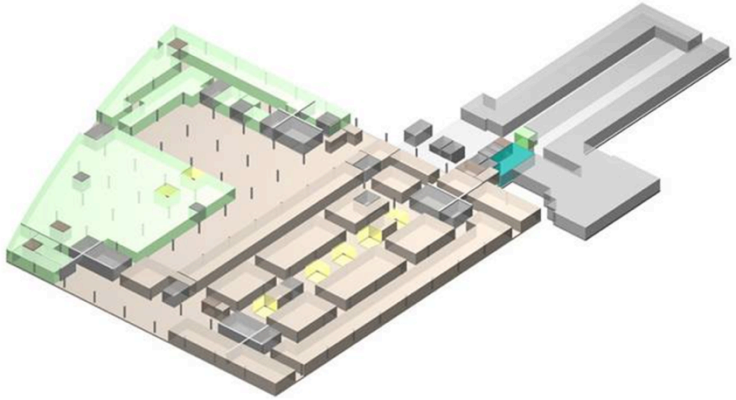
Floor D

Operation rooms

Floor E

Central laboratory

Intensive-care unit



Floor E

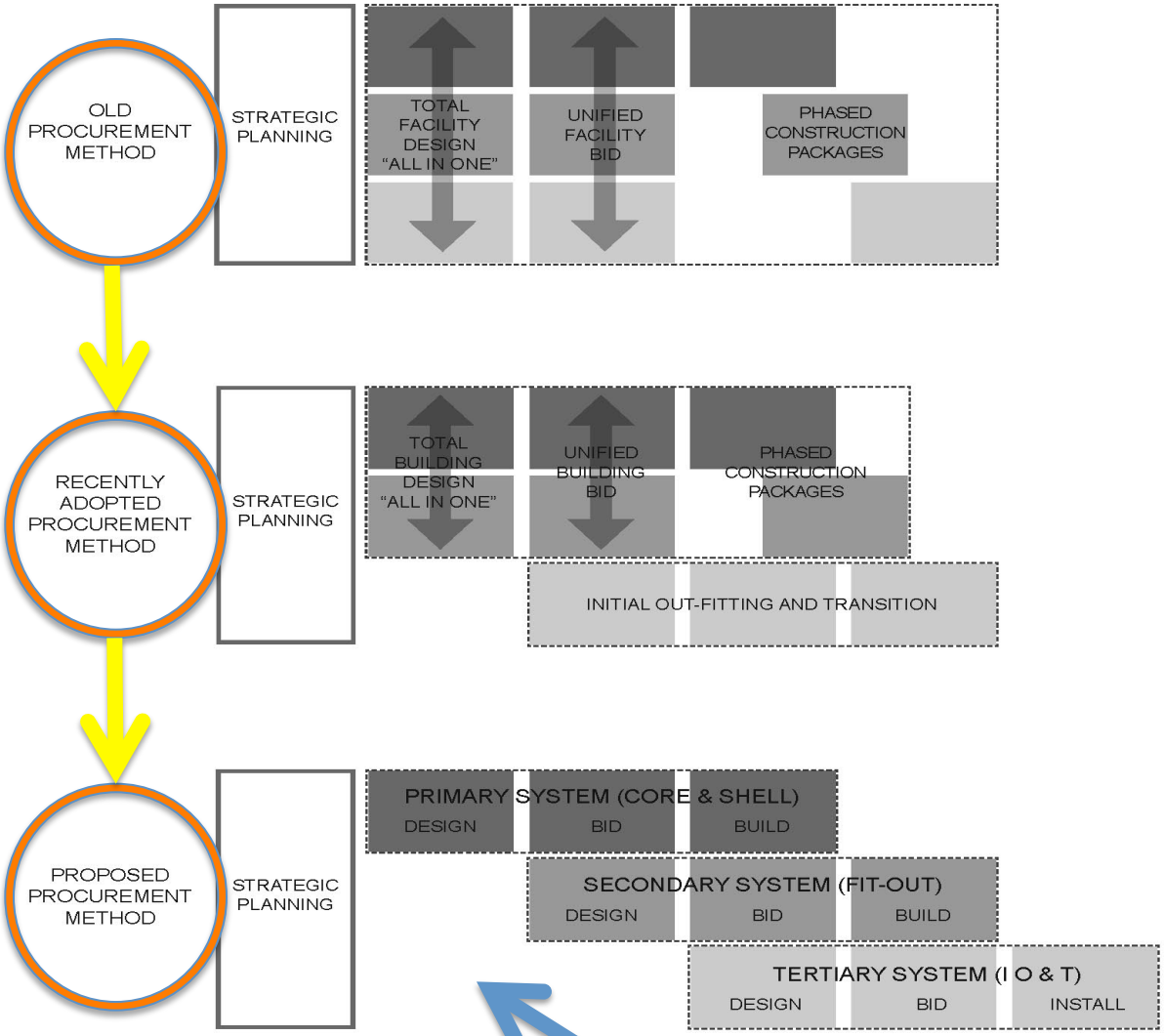
Central sterilization

Intensive-care unit

Floor D - operation clusters

Floor E - laboratories / intensive care

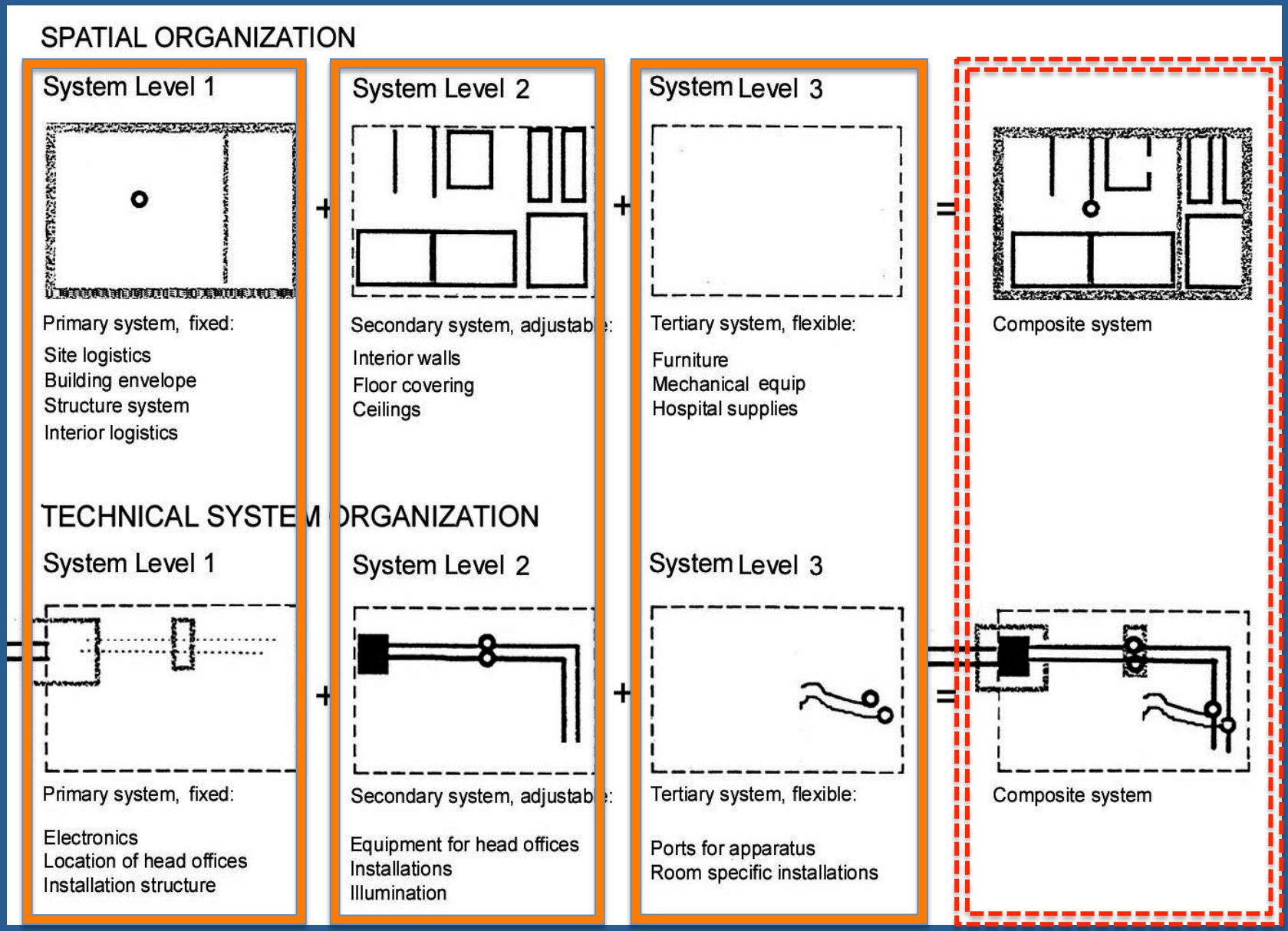
Insel Hospital Campus, Bern, Switzerland



New opportunity for just-in-time planning and cost estimating

Offering capacity requires a sequential decision-making process.

This assures that configurations with shorter life-spans do not drive decisions about long-lasting parts.



Source: OPB Bern

An example of what belongs to each level

SUMMARY

Courtesy Canton Bern OPB

- Good infrastructure design offers decision flexibility
- Flexibility offers long-term ROI

- Criteria for long-lasting parts must be distinguished from criteria for shorter-term parts

- Independent groups can make criteria for each level, but each must understand the time horizons and drivers of the others

- An understanding of infrastructure interfaces is critical

Adopting Open Building is imperative, but is not inevitable…

…yet there are precedents!

How did it become normal that all buildings would resist fires?

Or that natural light would be required in all habitable rooms?

Or that buildings would need to conserve energy?

Now, sustainability is (almost) normal.

Few declare that making a building sustainable (or fire resistive) will cost more and therefore should not be done.

Think about it!

Before these qualities became conventional, having them was considered to be too costly!

Now, all these requirements are normal because society understood them to be part of

THE QUALITY OF THE COMMONS

(valuable to society)

It's time for OPEN (flexible) BUILDING to become ordinary, part of the commons

– an imperative just as important as sustainability

Summary of
FLEX I, II and III
Studies for the
Defense Health Agency

undertaken between 2012 and 2015 by the National Institute of Building Sciences

DHA System Challenges

- The MHS is a complex public entity belonging to the tax payers. **WHO** therefore should be included in the conversations about solutions and **WHEN**, so the issues can be properly tackled?

- A consistent and evolving process is needed to help manage **UNCERTAINTY**…what does that look like and are there decision models that can help?

- What does the future of **INFRASTRUCTURE CRITERIA** look like if conversations are about system performance; how can **INFRASTRUCTURE CRITERIA** be developed and sustained?

- Can a **SYSTEM PLANNING CAPABILITY** be developed, and who should be part of it?

Overview of the three studies

Each study shared the same question:

How should DHA (as an owner and portfolio manager) improve its business processes to more effectively assure that its healthcare infrastructure is sustainable and prepared for change?

FOUR KEY PERSPECTIVES

First:

Disentangling (de-coupling) decisions and technical systems based on their life-cycle value is the basic principle;

Second:

The issue of "flexibility" is not essentially technical;

Third:

The MHS Healthcare system is best understood as an infrastructure system;

Fourth:

Policy directives and budgetary limitations in the future may put a high priority on upgrading the existing facilities infrastructure. This should be recognized explicitly as DHA criteria are revised and streamlined.

FLEX I & II

Consulting Team

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Prepared by the National Institute of Building Sciences
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Four Premises

(common to all infrastructure design and management)

1. Decouple decisions according to life-cycle principles (short-term decisions should not drive long term decisions);

2. Implement sequential decision-making from the get-go; it's how decision-making happens anyway into the future;

3. Facility flexibility needs to be demonstrated in design submittal documents and be monitored by DHA;

4. A culture shift in DHA to "a continuum of facility care" will embed flexibility as a normal part of doing business.

Recommended Flex Requirements

(for inclusion in the World Class Check-list)

1. Site Capacity
2. ***BUILDING EXPANSION FLEXIBILITY***
3. ***GEOMETRY OF THE STRUCTURAL SYSTEM***
4. ***NATURAL LIGHT***
5. Floor-to-Floor Height Requirement
6. Loading Capacity of Floors
7. Minimal Internal Structural Walls
8. Flexible Facades
9. Separated Systems
10. Layout and MEP flexibility for the Secondary System
11. Opportunity for Vertical Mechanical Equipment in the Future
12. ***MULTIFUNCTIONAL USE OF ROOMS***
13. Capacity for Variable Inpatient Bedroom Sizes

(2, 3, 4, 12 are in the check-list – we have made recommendations to augment them)

Recommendations

Recommendation 1:

FLEXIBILITY must be included as a tenet in the Medical Uniform Facilities Criteria with language linking technical and project planning principles.

Recommendation 2:

Incorporate specific performance requirements (10 offered) to be followed in the acquisition and long-term exploitation (management, adaptation and conversion) of facilities in the MHS portfolio.

Recommendation 3:

Explicitly link requirements for flexible facilities with requirements for sustainable-high performance buildings. Current mandates (laws) for sustainable-high performance infrastructure are interdependent with flexibility requirements.

Recommendation 4:

Develop and implement systematic tracking of facility behavior over time. Include the development of a policy and related metrics that identify and assess the capacity of facilities to accommodate various kinds of change.

Recommendations (continued)

Recommendation 5:

Implement [and monitor] an alternative planning and acquisition process the goal of which is to better accommodate change management decision-making during the planning, design, acquisition and facility exploitation cycles of MHS facilities.

Recommendation 6:

Audit and revise existing criteria: (to de-conflict and improve the workability of existing and future criteria)

Recommendation 7:

Flexibility of existing facilities (demonstrate efficacy of implemented flexibility strategies and develop criteria for improving the performance of existing buildings)

Recommendation 8:

Develop Methods For Tracking Facility Behavior

Recommendation 9:

Initiate A Periodic Shared Learning Forum

FLEX III

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Executive Summary

COORDINATED CRITERIA DEVELOPMENT

- The MHS should apply system-level resources in a routine process of coordinated criteria and standards development.

LONG-LASTING INFRASTRUCTURE

- The focus should be on acquisition of long-lasting infrastructure that is flexible by design - that is, evaluated on its capacity to accommodate changing missions, practices, and technologies.

HFEC and HFIC SHOULD BE USED

- Two existing organizational units - the Health Facilities Executive Committee (HFEC) and the Health Facilities Integration Council (HFIC) - should be used to implement the recommendations offered in this report.

Key Findings

1. Medical technology (e.g. EHR, telemedicine, robotics, diagnostics, etc.) and building technology (e.g. environmental controls, energy monitoring, etc.) are designed, installed and managed by different providers, and as such place sometimes conflicting demands on the MHS system;

2. HIT in the MHS – and especially the current EHR implementation project – is now the major technology demand signal.

3. An effort focused on organizational alignment of Clinical Operations, HIT, CIO and Facilities/Logistics is needed, with CLINOPS as the chief client and all other shared service entities providing support.

4. Development of MHS criteria for building technology needs renewed attention;

5. CIO and Facilities criteria in the MHS should complement each other;

6. The organization and hierarchical structure of current MHS facilities criteria are confusing.

Key Findings (continued)

7. The Facilities shared services team is under-resourced for the comprehensive effort needed to sort out and streamline its outputs and processes.

8. The difficulties faced in facilities procurement with regard to facility flexibility (e.g. conflicts during IO&T IT installation with work done prior to equipment specification) need to be remedied.

9. The teams providing asset acquisition, maintenance and provisioning (facilities, logistics, IT, maintenance) are not operating with the same vision or assumptions regarding their portfolio boundaries, resources, interface protocols, acquisition strategies and timing.

10. Current acquisitions (ROB and Bethesda) should be used to investigate new ways of coordinating HIT, CIO, LOG and FAC efforts.

11. The FLEX III Survey was designed to help the MHS focus on areas that the field identified as needing additional coordination work. Criteria development efforts should focus on those areas first.

Conclusions / Recommendations

Recommendation #1:

Adopt recommendations and concepts of FLEX I and II

Recommendation #2:

Build an interdisciplinary (coordinated) MHS System [Shared Service] criteria development capability

Recommendation #3:

DHA Facilities, HIT and Clinical Operations should join forces especially during the new EHR deployment

Recommendation #4:

Conduct and invest in an on-going criteria audit

Recommendation #5:

DHA should develop building technology expertise

Recommendation #6:

Create an interface resolution team

Recommendation #7:

Invest in lessons learned

Thank you!