

Trip Report: Abbreviated Post Occupancy Evaluation (POE) of Open Building (OB) Applications and Examples in Bern, Switzerland

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Reviewer	Org./Office	Building	Open Design Theme	Finding/Question/Comment/Issue	Recommendation (if applicable)
Dunbar	DHFPO-E	INO	General - Open Building Decision Making	<p>As discussed in literature and at the INO tour, OB builds on existing concepts for flexibility, but extends them through separation of 'Systems' to ensure capacity is built in to support life cycle transformation which is a given condition for healthcare operations and technology.</p> <p>A key question is to what extent flexibility is built into a project or a System, and the answer on the tour was generally, "by the team."</p> <p>Thus, for OB to succeed, the team must be integrated and informed to ensure good decisions are made in directing the course of an OB based project.</p> <p>Corporate level buy-in may then require corporate control of direction and oversight of OB implementation. Weak local teams (who can assure local teams will operate optimally?) may not execute based on a corporate direction to determine flexibility levels. SK COMMENT: I have always been reluctant to use the word "Systems" to describe each of the "Crate," "Bottles," and "Liquid" used in the seminal image used by the Canton Office of Properties and Buildings to communicate their new policy. Their policy is so similar to the convention to distinguish a "base building" from the "tenant fit-out" from the "FF&E" - so prevalent in ALL office and retail real estate property world-wide, right? No one would call these "systems." The difficulty is that we don't have a word to characterize this business model! The key word is INFRASTRUCTURE CAPACITY - what does each decision in designing an infrastructure offer to the next decision coming later (by other decision0makers) acting "lower" in the infrastructure hierarchy? THIS IS THE ESSENCE OF OPEN BUILDING. A hierarchy of decisions (about a given part of an infrastructure), offering capacity to the next actor in this decision hierarchy. As for the success of an infrastructure, its partly a matter of skills, partly a matter of conventions, partly a matter of working out interface and boundary conditions, and partly a matter of explicit and enforced rules of the game.</p>	<p>DHA and Services should continue to assess the value of OB, but must earnestly consider what levels of 'the team' can be trusted to handle this type of decision making.</p> <p>Corporate boards may need to carefully document the larger expectations for quality/cost/time tradeoffs to achieve OB capacity goals. Processes must be established to allow local teams to involve OB advisors from the Owner/User to guide key decision making during execution. SK COMMENT: This is essential. Its been interesting to note that at the OPB (Office of Properties and Buildings), the SS procurement method has withstood over 10 years, during which time its champion (Giorgio Macchi) retired, and at least three (that I know) project managers have moved on to other jobs in other companies, and still the SS methods survives. It has become simply their way of doing business. And yes, training was and is involved.</p>
Dunbar	DHFPO-E		Design - Separate Design Contracts not Essential	<p>Discussions addressed whether separate design contracts for Primary, Secondary and Tertiary Systems are necessary to ensure separation of the Systems. Conclusion was that this is not required, as long as the Owner is able to maintain consistent application of the separation concept. Especially for PS, this is the key factor to success. SK COMMENT: Separate contracts have not been used by OPB (Office of Properties and Buildings) since the INO project, due to the cost to the client organization (OPB) in managing the separate contracts. According to my interviews this was a big compromise. Its interesting to note that over time, separate contracts will be let to A/E service providers to provide renovations at the "Secondary System" or "Tertiary System" levels, and that these will be "separate" contracts from those that produced the facility in the first place and very likely different A/E teams than the original teams...so separate contracts is nothing new. In a typical US office building, separate contracts are absolutely normal for the "base building" and the "Fit-out;" so why the fuss?</p>	<p>DHA should not necessarily attempt to split design into System packages as recommended in Flex II study. There is a cost and time premium for the handoff between firms, and DHA has the ability to direct the application of OB in the UFC and PSA and manage it through Service and Agent execution via metrics reporting and tracking. SK COMMENT: Agree, but the alternative could be tried-out in a smaller project to evaluate what it offers. And, as more attention is paid to rehab of existing MHS facilities, more "agile" contracting may be needed, in which partitioning the tasks in certain ways becomes useful. (see the papers on "Task Partitioning" by Professor Eric von Hippel at MIT Sloan School.)</p>

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Dunbar	DHFPO-E		Design - Manage Primary System as a set of Corporate BIM Templates	The Primary System concept and development per project could be managed at the corporate level. If adopted at the 'warehouse for healthcare facilities' level, DHA and Services could seek Primary System products per project that become part of a BIM template set for rapid selection at various future sites. Best variants could be selected based on various project conditions (footprint, orientation, massing, grid dimensions, materials, slab heights, site typology, climate,...). SK COMMENT: Yes, but the only thing to watch out for is what the template specifies. There was an interesting effort in the '80's in the GSA/PBS's "Peach Book" to distinguish an "out-of-system" procurement from an "in-system" procurement. The relation between them (interfaces) was crucial. Several were built but the concept died due to lack of support within the client organization (too many habits had to change to keep it going). This was reported on in FLEX I (including interviews with key players).	DHA should study a shift of PS design and data base management to the Corporate level to determine if it could be sustained over multiple projects/years with significant cost and schedule savings. Ideally, projects would start with an corporate technical team selection of PS as basis for the 1391 cost projections and move directly to a site adapt of the PS as Secondary System design begins. SK COMMENT: Not sure what this means.
Dunbar	DHFPO-E		Construction - Speed and Reduced Risk in Fast Tracking	OB is promoted as an extension of standard business practices for corporate and highrise facilities, which leverage early packaging for fast track construction. The Primary System concept adds speed and reduces risk of Fast Tracking by developing a PS that is generic and flexible in nature. SK COMMENT: Be careful about "generic." I'd say "capacious" and "tied to its location" rather than generic. A good base building is good architecture and should exploit the very best technology, logistics, contracting methods (like fast-track) and software available.	DHA analysis should couple this concept with its value for expediting construction with and lowering risk through Fast Tracking. ROBMC PDT should assess aspects of the project that could benefit from the combination of OB principles and Fast Tracking. SK COMMENT: Agree
Dunbar	DHFPO-E		Primary System - OCO Applicability	The Primary System concept seems to have particular value for semi-permanent (OCO) construction. Robust level-3 solutions in OCO healthcare facilities require quick planning and execution. Ready to execute, basic structural frameworks for PS could be prepositioned for quick starts. SK COMMENT: Absolutely. But the A/E team must still be held accountable for the capacity of the "primary system" with particular emphasis on the MEP capacity. Additionally, I believe that robust "Secondary+Tertiary" system bundles are equally valuable for insertion into varied extant and available "Primary Systems" which may not be very good in capacity, but are available to be gutted, set-up, and used.	DHA/Services should consider applications of OB for OCO projects.
Dunbar	DHFPO-E		Tertiary System - IO&T	Separation of Tertiary System components has a goal to minimize the ripple effect on more permanent systems (Primary and Secondary). Again, determination of TS versus SS is a design team decision set. Equipment is a clear example of TS, but infrastructure and utilities support of regularly transitioning equipment planning and inventory requires careful consideration. Handling these special live load, MEP and other conditions should be planned to minimize disruption to SS to the extent determined up front in project development. Steel plates, surface mounted electrical/IT chases, raised floors, demountable or no dropped ceilings were solutions seen or discussed in Bern to address this Systems boundary. SK Comment: Interviews with OBP people over the last decade has demonstrated to me that this is a key area requiring further study: they basically ignored this (expecting the A/E community to deliver best cost solutions), focusing instead on "getting the Primary System" right (which meant separating it from the Secondary System). I still think this is our biggest challenge. Its OK to "merge" SS and TS (as Steelcase, Herman Miller, Hill-Rom, etc. attempt to do (and struggle to hold down costs compared to "conventional" fit-out). In OPB projects, MEP is generally designed/delivered as part of SS. Space for these systems is assured in the PS, however. These interface issues are difficult and need further careful study, for sure.	DHA should maintain a list of acceptable/recommended/directed equipment support solutions to guide design teams if OB is implemented as corporate policy. Ease of maintenance access and relocation/addition of equipment support systems as well as the equipment itself should be a common goal for the ROBMC team. SK COMMENT: OK, but this is added work for an already understaffed DHA Facilities group. Robust performance specifications for MEP and Equipment should call out the best from the Agents and AE/Construction community.

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Dunbar	DHFPO-E		General OB - Value Proposition	A key measure of OB success is facilitation of change and related cost and time savings. This relates to both change during design and construction, but also and especially change across the operational life cycle of the building. It also results in a facility capable of extended life cycle for the Primary System, so that the core facility remains useful beyond those of facilities built with less 'capacity'. All of these applications decrease cost, churn time impacts and effort. SK COMMENT: Agree.	Assessment of the value of OB must be made by a corporate team with a view of life cycle value and the negative impacts of change. Facility Managers will appreciate the investment in reducing negative impacts of physical change. Project level managers are less likely to see the value of OB, though change in healthcare requirements across large project timelines can be significant. Corporate teams supporting OB need to ensure success through education of project managers throughout the enterprise on the value proposition beyond the project phase. SK COMMENT: Fully Agree
Dunbar	DHFPO-E		Schedule	A schedule advantage of OB is in the fast tracking of System packages in both design and construction. SK COMMENT: Yes, agree.	Application of OB concepts should be considered based on the cost and schedule value of time savings from 1) early design focus on Primary System allowing early start of PS construction, 2) parallel processing of PS construction and Secondary System design, 3) early design focus on SS allowing early start of SS construction and 4) parallel processing of SS construction and Tertiary System design. SK COMMENT: Absolutely. This comparative analysis should not be difficult to do.
Dunbar	DHFPO-E		Quality - Ceiling Heights	One critical capacity factor is slab to slab heights. SK COMMENT: Yes. Even without using IBS, CannonDesign in their Universal Grid Theory projects is using 18" floor to floor.	Ensure adequate ceiling space is provided to facilitate all anticipated change within the typology of the building. ROBMC PDT should assess the S2 ceiling heights during 35% design to ensure future changes can be accommodated. SK COMMENT: In the INO, ceiling heights on several of the lower floors were constrained by the need to align with floors of the adjacent building. Also, part of horizontal plenum space has to be allocated for horizontal drainage and other piping runs. In the INO, the 4 pipe sleeves at each (closely spaced) column reduced the amount of plenum space for drain lines. Also, they poured a secondary 15cm thick concrete floor as part of the SS, separated from the PS slab by a membrane. In this SS layer, they buried some conduits and piping. Other "thin" floor mat ideas should be explored as alternatives to "raised floors" which, while useful in some areas of a healthcare facility, aren't generally approved. An example is the MATRIX TILE system (http://www.infillsystemsus.com) which is available in Europe.
Dunbar	DHFPO-E		Acquisition Strategy - Value for ROBMC Clinic Building	While OB documentation says it is useful with multiple acquisition strategies, it seems most valuable when coupled with Fast Tracking or Early Packaging with DB. PS design and construction can advance under DB while Secondary System design is still underway, reducing both time and cost. SK COMMENT: Agree. The OB documentation referred to only suggests that OB is not to be conflated with Fast Track or other acquisition strategies, but can be used with several of them...	ROBMC can benefit from the OB concept of optimizing the Primary Systems in the Clinics/Admin Building. This concept should be developed during 35% design so the clinic module capacities are optimized. In the RFP, the GC/DB should be allowed the option to start PS construction without requiring full design of SS. SK COMMENT: Good to know. AE should demonstrate PS capacity and client (including German partners) should carefully evaluate, even against the possibility that in time the building would be used for a school, hotel, etc). Refer to the Kortrijk Hospital in Belgium designed by Baumschlager Eberle (www.be.com)
Dunbar	DHFPO-E		Acquisition Team	A key factor for OB success is the acquisition or execution team, since much of the determination of capacity requirements relies on the execution team's determination of the optimum level of capacity and flexibility to achieve. SK COMMENT; Agree	Recognize the importance of the project team up front for OB projects and ensure proper staffing and integration early in the project. SK COMMENT; Agree

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Dunbar	DHFPO-E	INO	Flexibility - Accommodates Change	The strongest example at INO of the success of OB was the clinical laboratory. User was ecstatic about the results of a major lab renewal that included replacement of the Secondary Service floors, systems and all high technology and utility supported Tertiary Service equipment. the project was completed in 8 months. SK COMMENT; The other example that I am aware of happened much earlier, during planning for the SS of Phase I. In-depth programming was being done. Just before installation was to take place, the head of surgery left and a new one was brought on-board. The new head of surgery wanted an entirely different surgery suite configuration and got it, without significant negative cost or schedule impacts. The OPB management team was quite happy.	Info only
Dunbar	DHFPO-E		Applicability for ROBMC	Application of OB should be decided prior to the project start. Since ROBMC is already at a 20% design stage, OB is not fully applicable. Some specific aspects of it may be useful and achievable at no negative impact.	ROBMC PDT should assess what aspects of OB flexibility can be achieved without negatively impacting design or construction quality, schedule or cost.
Dunbar	DHFPO-E		Applicability for DHA Program	The importance of the Bern site cannot be overstated in terms of understanding the implications of OB, since OB has been established as policy for all federal buildings in the state (canton) of Bern.	Info only, but the point is this site is more than a single hospital or town policy, and thus is similar to a decision such as DHA is considering regarding implementation of OB.
Dunbar	DHFPO-E	INO	Design - Single Contract but Separate Design Teams	A single, quality healthcare AE team can execute an OB project through final design with Systems Separation, but the team must be directed and managed to avoid healthcare planners in the Primary Systems development phase. As documented, project OB goals and criteria ('a handful') must be established by the Owner and team for the PS team prior to AE selection, and this criteria should be part of the AE selection criteria, separate from the criteria for Secondary and Tertiary systems. SK COMMENT; Agree.	AE contracts for full design services on projects seeking OB goals should be written to separate the design teams so that healthcare planning is not included in PS, and the AE is selected on PS design capabilities as well as SS and TS. SK COMMENT; Agree. I think the challenge is most heavy on the PS design team. Being used to work from a program of requirements, AE teams may be lost.
Dunbar	DHFPO-E		General - Open Building as Part of Program	OB application requires a wholistic view of facilities live cycle management that nests in the bigger flow from corporate/campus/city master plan to facilities master plan to project programming to Primary System design to Second System to Tertiary System to operations with ongoing SS and PS renewal and ultimately back to the master plan. SK COMMENT; Agree. The fact that people come and go is evidence that the SS policy has to be clear and have buy-in at the top, to withstand the inevitable pressures to return to the way things have always been done. The management team has to be trained.	Info only, regarding life cycle facilities management.
Dunbar	DHFPO-E	University	Design - Example of Change during Execution	The university library was new construction as part of a downtown steel factory conversion development. It was master planned to be a chemistry lab and was underway when a corporate decision converted it to a library. While the high ceiling heights of the lab spaces were not essential to the library functions, the rest of the 'capacity' of the building was sufficient to support the library efficiently (and beautifully in many aspects). SK COMMENT; I wish that some university in Switzerland would take this seriously and do an indepth POE - including (more interesting perhaps for DHA) interviews with the OPB management team and the AE team and construction company. In the case of DHA, it would pay off in the long term to conduct such examinations of problem areas such as interface of SS and TS (IO&T), etc.	Info only, but an example of how significant change can and will occur during project development.
Dunbar	DHFPO-E		General OB - Data Tracking	The facilities program management team in Bern was exceptional in their willingness to share lessons learned with us and others interested in OB. Most unfortunately, they have been 'too busy' to maintain data on the results of their concept. INO was completed for operations in 2007 (phase 1), yet they don't have staff (including FM) or patient feedback; comparative cost, schedule or operational impact analyses; or records of renewal projects to share. comparisons. SK COMMENT; See above comment.	This is a reminder of the importance of data and metric tracking, which DHA should certainly implement for evaluating and tracking transformative program initiatives such as OB.

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Dunbar	DHFPO-E		Funding	There will be a premium for Primary System construction due to the added capacity. The Bern team estimated 5-6%, but said the amount is wholly dependent on the team's determination of the level of flexibility sought. SK COMMENT; I had not heard of that up-charge for the PS. I think everyone knows how difficult it is to establish first costs (incurred by the client and the AE team) vs long-term costs. It also raises the question of "premium" ...is making a building "sustainable" or "earthquake resistive" adding a premium? Or is it just the cost of doing business?	DHA will need to program additional funds to achieve OB capacity goals. Estimate should be based on a corporate modeling of what capacities should be sought. Prior to that, an amount of 5-6% times the cost of PS (core and shell) should be added, minus any value assumed due to Fast Tracking.
Dunbar	DHFPO-E	INO	Construction - Separation of Systems by Contract	The Bern team does not consider use of separate construction contracts for the three Systems critical, except in building typologies where that is standard practice. The added cost, coordination and conflict risk is not worth the advantage of keeping the two contractually separate.	DHA should not require System Separation to include separate contractors for each stage of a medical project. IO&T is the primary delivery method for related components (IO and IT) DHA Tertiary System, so that is standard practice and advisable. SK COMMENT; what is included in each decision-bundle is the issue. IO&T has been going for several years. Maybe its time to reassess it's "contents" vis-a-vis a SS approach (just as it's important to experiment with different contents for PS and SS).
Dunbar	DHFPO-E		Primary System - Criteria	The purity of the Primary System is the key goal of the OB concept. To achieve its separation from SS and avoid compromising it, the project team must establish a shortlist of criteria to guide the PS design team. Some of these beyond project definition (scope, cost, quality) could be site/siting constraints, massing, access requirements..... SK COMMENT; Agree. How this works has always been an unanswered question for me, when I talk to the OPB folks. The OPB issues a limited (invited) RFP (competitions are standard as I understand it); the proposals are then reviewed by a team of OPB staff and invited architects to serve on the "jury." This "jury" apparently runs the proposals thru the paces of their own "capacity analysis" using criteria that may not have been part of the RFP (I think this is the case). I have the jury proceedings from the PS for Phase I (in German) and have never had time or \$\$ to get them translated. For the INO, 10 A/E teams were invited to make proposals for the Phase I PS, with the criteria that none had ever done a hospital before. The winner (Peter Kamm) had, years before, done an OB project for his own office and residence and understood the idea. Anyway, I agree that the architectural quality and capacity of the PS is of fundamental importance. The clients' OB criteria are therefore fundamental - not too many and not too few, but just right. Each project is different and the AE community must be given the challenge to do excellent work with the principles! Pretty soon it will be normal (and schools will teach students how to design without a detailed program of requirements...now THAT will be a revolution!)	If OB is implemented for MHS, DHA should develop and maintain a list of PS criteria and a process for coordinating variations during project development (programming).
Dunbar	DHFPO-E		Primary System - Determination	The Primary System components must be determined. While it can include circulation and utility shafts or mechanical system location(s), Bern team advises to allow these to be part of the Secondary System, so the PS design maximizes capacity and flexibility. Minimum features would include siting, massing, structure and envelope. Also MEP connection points should be considered, especially if there is a Central Utility Plant. SK COMMENT; This is a real point of disagreement among those I talk with about SS. In fact this is about the vision held by the client vis-a-vis its contribution to the built environment (to the culture)! Some argue for a warehouse (read Walmart) architecture; others argue for (for example) Rowe's Wharf in Boston, or the main building at MIT. The latter are significant contributions to the coherence and longevity of those places (both have been renewed and remodeled countless times, mostly at the SS and TS levels). In them, a clear hierarchy of public spaces has endured, with the capacity to accommodate a finer-grain of other circulation spaces. Should actual MEP be included in the PS, or just space for changing MEP when functions are decided and change?	If OB is implemented for MHS, DHA should develop and maintain a standard for what building design components make up the PS. SK COMMENT; Set some criteria, run with them through a number of projects of different sizes and mission-orientation, then assess and redo the criteria. Help may be needed by "objective" eyes.

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Dunbar	DHFPO-E	INO	Primary System - Life Cycle	The State of Bern projects a 100 year life expectancy for the hospital building Primary System. DHA builds for a 50 year life cycle. The question is what drives the 50 year cycle? Does the DOD recognize shorter life cycle value due to the nature of military or specifically military medical strategy and longer term transportability and a norm of 'pick up and move out' (BRAC, Army Transformation,...), or is 50 perceived as 'the best we can do'? If the latter, the Bern concept should be assessed for the additional value DOD would gain from extended use and value of PS. SK COMMENT; This is so interesting. How does a "life expectancy" get established? In Japan, for example, after decades of "scrap and build" (which was the basis for the thriving construction sector from 1950 - 1990), a societal shift has taken place and the idea is now "stock maintenance; or stock reactivation." The Japanese government, as part of this reorientation, passed a law in 2008 providing developers incentives to build 200 year housing. By now, tens of thousands of units have been realized, and the new law has sparked intense competition all along the supply chain to get in on the act and make a profit, from real estate developers, product developers, architects, engineers, utility companies, etc. Of course "Japan is not the US;" but interestingly, China is beginning to take this seriously (on the fringes), lead by a very large government Institute (China Institute of Building Standards Design and Construction). And in the Netherlands, the pressure to find new uses for the existing stock is strong. So, who says how long buildings should last?! One developer in the Netherlands says "I want architects who can design buildings that are accommodating, energy effective and lovable!"	DHA should assess drivers of its 50 year asset life expectancy. If 'longer is better', Implementation of OB should be weighed in relation to the additional plant value gained from doubling the life of the PS.
Foo	EUD	INO	OB System Split out	The design of the shell (primary system) and then fitting out (secondary and tertiary system) necessitates overdesign due to the undefined follow on requirements. If the goal is cost savings, it appears the first costs may actually increase. Contractual complexity from 3 different systems with 3 different designers, 3 different contractors, and 3 final inspections will contribute to project schedule growth, hence increased cost. In general, the solutions adopted by this hospital have not demonstrated any added flexibility nor cost savings. Finally, the German contracting and acquisition strategy currently in place which requires clearly defined requirements may also not be suitable to the concept. (Foo 17 Sep 15 memo provides more detailed rationale, which is included as individual comments below) SK COMMENT; Not necessarily. IO&T are already separated. Cost savings are related to client objectives. It costs more to make a building net-zero (relative to not doing that). But we still do it, for general societal reasons. Management skills need to keep pace with the client's mission. So some new skills may be needed. And as the comments above make clear, it is not mandatory that separated contracts be let.	Don't apply OB concept to ROBMCR.
Schuch	LBB		OB System Split out	The goal of a staggered finish process and especially the inherent problems and boundary conditions were, at best, touched upon but not discussed from a technical or structural point of view. We were not able to detect applicable solution approaches or new processes. SK COMMENT; Agree. Further investigation is needed. But getting the interfaces and boundary conditions sorted out initially will surely have a positive ROI over the life of the facility, during inevitable changes. The problem is always that people deciding often don't have responsibility later when the boundary frictions occur.	More detail regarding process and technical solutions are needed to assess OB in contrast to other methods of acquisition.

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Schuch	LBB	University	Quality - Exposed utilities in OB	The explanations given on the new construction of the auditorium at the University of Bern were essentially aimed towards an architecture that is most economical. What is to be mentioned in particular in this respect is that the buildings were constructed without cladding so that the brickwork, the concrete and the steel concrete of the walls, and partially also of the ceilings and floors, remained non-covered or non-plastered. Electrical/water/waste water/ventilation and heat installations were visibly laid directly upon the structure in an orderly way. Eventually, it is up to the user to decide to which extent he will accept visible pipe systems, since they pose questions in regard to cleaning, safety and hygiene, apart from negative visual effects; i.e. while there are financial advantages to this type of construction, it also bears disadvantages. An extensive amount of installations and many intersecting utility lines will lead to a cluster of lines and pipes. Lines/Pipes installed on wall surfaces inside corridors are easily damaged, and if they are not installed outside of movement areas, they are not protected or secured in a particular way; or they are not installed in a robust way. In addition to this, questions of noise and fire protection have to be taken into account. SK COMMENT; Agree. The client's priorities are in evidence here.	Be cautious about using 'utilitarian' solutions with exposed utilities in health care settings. SK COMMENT; While visiting the INO labs, the question arose about "open" vs "closed" ceilings. The answer was that even with a "closed" ceiling cavity (concealing the MEP lines), dust inevitably collects but is never cleaned. With an "open" ceiling, a regular cleaning regime has been established and its easier to clean being open. Again, a client's priorities are evident here, and the question is not about the SS approach but the specific solution.
Schuch	LBB		OB System Split out	The phase-oriented implementation of a design and construction is not a new process either; in fact, it is the regular process implemented at the German Construction Administration. The construction of buildings in lots corresponds to the standard procedure within the German contract-award rules, which envisions the solicitation and awarding of shell construction work as a first package while the design of the installations is yet not complete at that point. According to our internal rules, this process also includes that the work package (shell construction) encompasses approximately 40% of the entire work in order to reach a sufficient degree of cost certainty for the project. SK COMMENT; This is very interesting to know. But phasing construction does not in itself assure CAPACITY. But, once I was visiting a new hospital project in Frankfurt, and was guided by the chief medical officer. I asked him if the AE teams were required to demonstrate (in drawings) how the building could accommodate change (either during procurement or over the long-term). He said yes, or course. I asked if the AE team was paid more to provide this "extra" work, and he said "no." This clearly deserves more careful study. Are any German universities studying this?	Info Only
Schuch	LBB		OB System Split out	This process has been in conflict with the U.S. Forces requirements so far, since the U.S. Forces require a high degree of cost certainty and therefore basically require the awarding of a general contractor.	Info only
Schuch	LBB	INO	Use of Shelled Space for Flexibility	Decision was made that various areas were not constructed/fit-out (Shell space); a decision, which was solely based on funding reasons. These areas were then called "strategic clear areas" and were not fit-out or used for the time being. There was no specific strategy or process involved however. Such later fit-out of shell space is usually more costly than implementing the work as part of a general concept. Also, the responsible individuals described this process as being highly problematic and in hindsight, also cost-intensive, since many components and systems had to be adjusted. SK COMMENT; Important information. Actually, fitting out a "shell space" is equivalent to what is done in a "gut/renovation" process later (e.g. a surgery suite is transformed to an intensive care unit). Nothing new there. The problems identified are the problems to be solved to get a "flexible" facility - technical interfaces (disentangling long-lasting parts from those with shorter lives), capacity and contract boundary friction.	Shelled space as implemented at INO should be considered cautiously due to increased cost and change issues.

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Schuch	LBB	INO	Flexibility - Accommodates Change	Renewal of the laboratory areas did not form a larger challenge. There were almost no changes to the very large room with the many columns. Solely the utilities were laid in a visible way and the laboratory workstations were positioned in the room. This was indeed executed in a very short time frame but did also not form a technical challenge of special proportions. SK COMMENT; The experience deserves to be studied and perhaps compared to other buildings that were not explicitly designed for change.	Info only
Schuch	LBB		Flexibility - Slab height	All parties agreed that it is highly important that there is sufficient space upwards in order to place utility systems or larger ducts/pipe-crossings and to secure the maintenance of the systems at the same time. A sufficiently dimensioned floor-to-floor height with reserve space in the suspended ceilings is one of the essential factors to reach flexibility and a cost-efficient way to execute potential future alterations. What is true for horizontal space is also true for vertical distribution. The shafts and vertical distributions must also be sufficiently dimensioned in order to allow for later adjustments or alterations. SK COMMENT; Agree. Regarding space for vertical MEP distribution, an effort must be made to secure/reserve shaft-space for future demands. This is not easy because of severe pressure to use every square meter of floor area for "functions." FM people have to be vigilant to assure that such vertical shaft space is reserved.	Consider raising the floor to floor height on ROBMC and ensure adequate vertical space across the program.
Foo	EUD	INO	OB System Split out	Insel hospital is located in an urban location with historic buildings surrounding it. This acquisition strategy was adapted to obtain public funding, convince city council buildings will be built for the long term (100 yrs for the shell), convince investors interior is flexible enough not to scrap and build when requirement change. ROBMC does not have said restrictions. SK COMMENT; The SS strategy was adopted for system-wide application, including other building types, some in more rural areas. A prison was built using SS principles and the AE team was required to demonstrate how it could become "normal" housing at some time in the future.	Info only
Foo	EUD	INO	OB System Split out	The final completion date for the Insel hospital's INO addition is 2060. With a 45 –yr horizon, it is conceivable many requirements and function will change significantly. ROBMC has no such horizon and functions are fairly well defined.	Info only (Correction: 2060 is a general Master Plan projection for various demolition sites; INO demolition is not anticipated. Staff indicated a 100+ life cycle for the Primary System). SK COMMENT; INO is slated for demolition in PHASE 8 (sometime prior to Phase 9 dated 2060) according to the Master Plan documents I have.
Foo	EUD	INO	OB System Split out	In order to plan for flexibility or the unknowns in the primary system, the non-punched out portion of floor slabs are designed to accept 7.5 kNm-2 live load. Typical hospital surgery rooms are designed for 2.0 kNm-2. This is over 3 times normal floor live loads. This increases the structure's first cost.	Info only
Foo	EUD	INO	OB System Split out	Major MEP systems will be built with the secondary system. However all the connection loads need to be known at time of the primary system design. For a hospital of ROBMC's complexity, specialized systems it adds risk to the project to estimate the connection and supply loads with the primary system. Without knowing what will be designed with the secondary system, the primary system will have to be built with contingency hence increased cost. SK COMMENT; Risk now or risk costs of refurb later. Same trade-off of any infrastructure system. It takes skill and time to get this right. Early attempts will offer good lessons...	Info only
Foo	EUD	INO	OB System Split out	The floor punched out areas without reinforcement is difficult to comprehend structurally. At best, these areas would have limited load bearing capacity. This limitation reduces departmental flexibility. Insel used these areas as light wells which impacts usable square footage.	Info only

