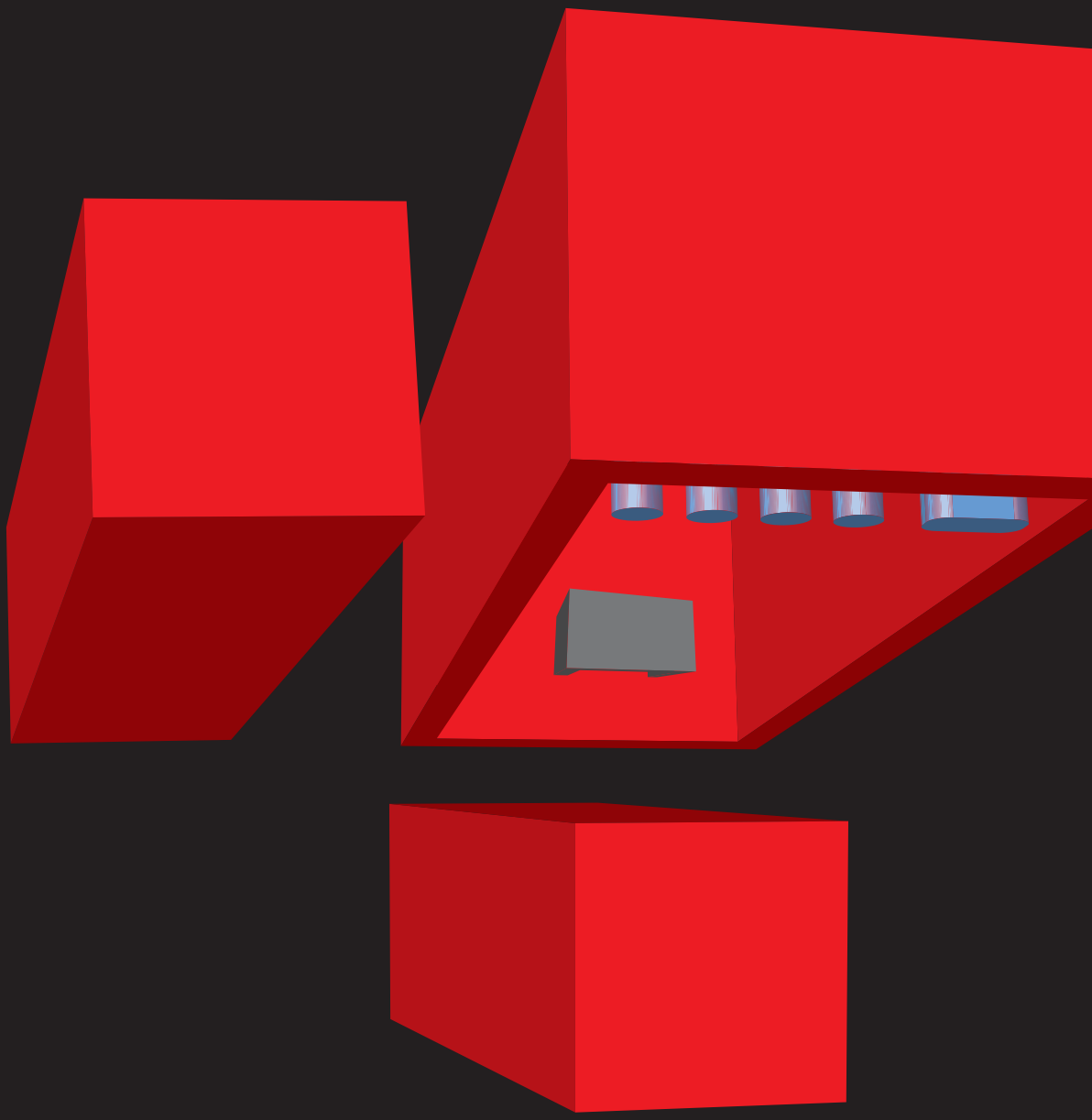
OPB Office for Properties and Buildings of the Canton of Berne

System Separation

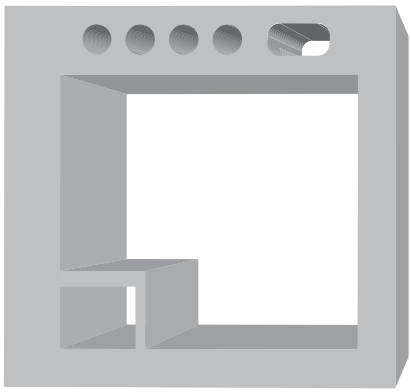


System Separation

A building is never completely finished – it changes over time according to unforeseen conditions and needs. For this reason, OPB has introduced a future-oriented planning method - system separation. In view of the reduced subsequent costs and the large room for manoeuvre for the future, the long-term return is greater than the time invested in this new method. OPB therefore takes system separation into account when planning and executing all types of construction projects.

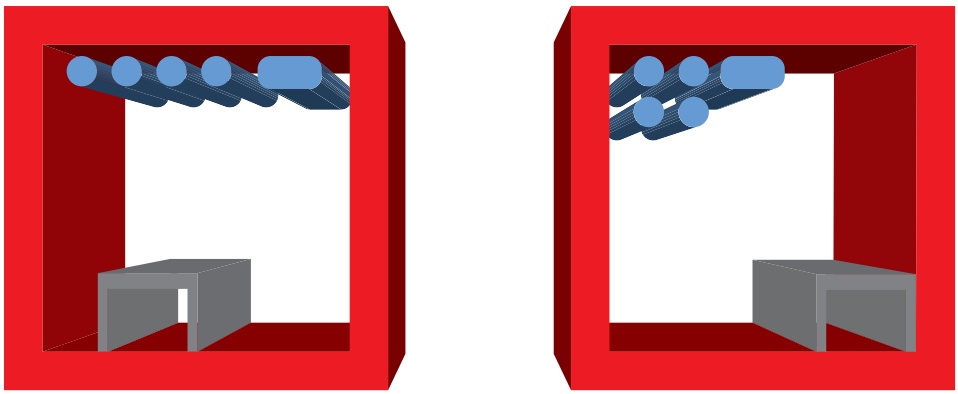
Today

Short-lived and long-lived construction elements are or will often be irrevocably combined so that the life cycle of the entire building is reduced to the one of the short-lived parts. For example, pipes embedded in concrete can only be replaced at an enormous expense in time and money. Or change of use becomes impossible because the building structure was conceived principally for initial use.



Tomorrow

During the planning and implementation stages, system separation separates the different life cycles and purposes of construction elements. This way, the life cycle of a building is anticipated.



Advantages

During planning and implementation

Planning complex buildings often takes several years. The requirements of future users therefore often change during the planning and implementation processes. By using system separation, each system stage can be defined and planned just prior to being installed.

During use

Thanks to system separation, future development of use or change of use can be made convenient. Maintenance costs are minimised and access where necessary is guaranteed. Coordination of component parts enables replacement of individual components in future use.

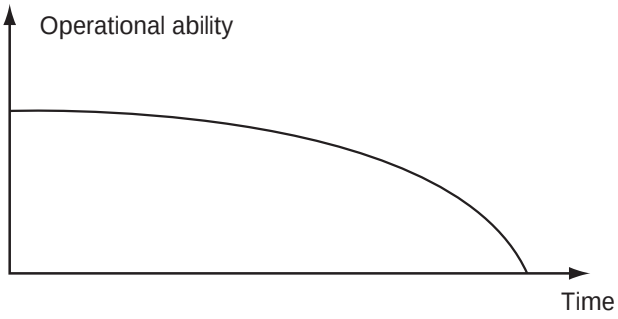
During dismantling

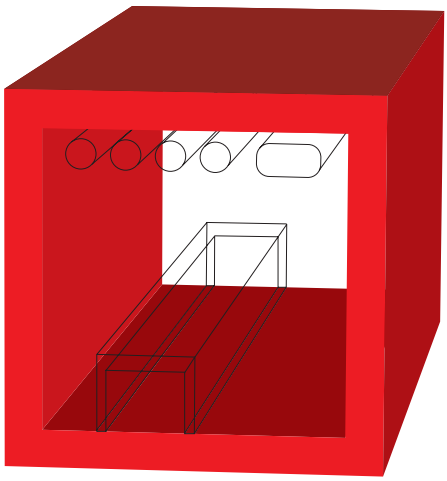
Coordination of component parts enables safe and high performance separation when a building has to be dismantled.

The systems

Primary system

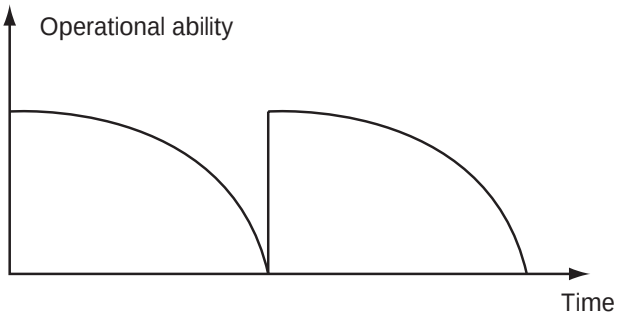
Long lifetime (50 – 100 years)
Unchangeable
Site development, supporting structure, external envelope

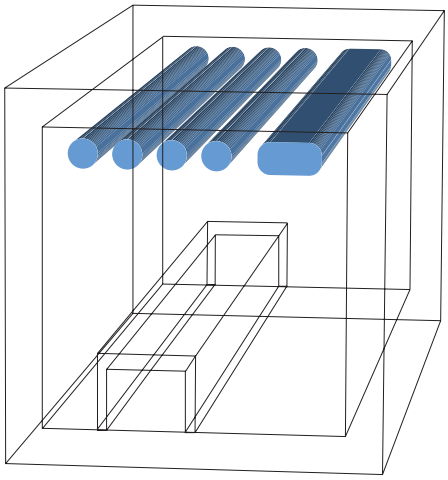




Secondary system

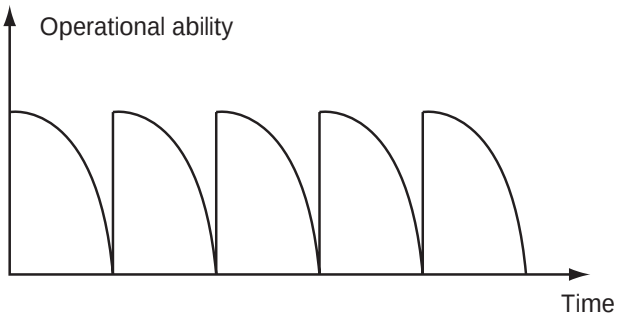
Medium lifetime (15 – 50 years)
Adjustable
Interior walls, ceilings and floors, primary installations (extensions)

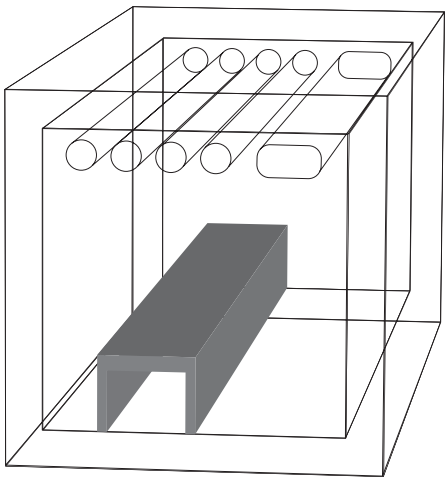




Tertiary system

Short lifetime (5 – 15 years)
Changeable
Devices, equipment, furniture





Flexibility

Buildings are often converted in use during their lifetime without a fundamental new conception of their structure being possible.

When considering flexibility, development of use as part of the same type of use must be distinguished from change of use. Development of use and change of use are in general only possible if the structure of a building allows it.

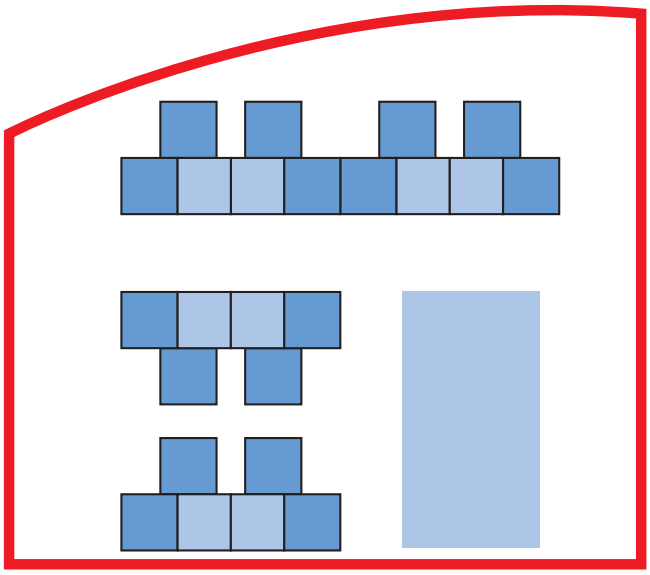
A number of essential factors decide on the capability of a building to accommodate such changes. These include floor to floor height, room depth, structural grid and façade window pattern, as well as technical conveyance systems. Using an adequate construction method can enable buildings to accommodate a wide range of uses at low cost.

The example

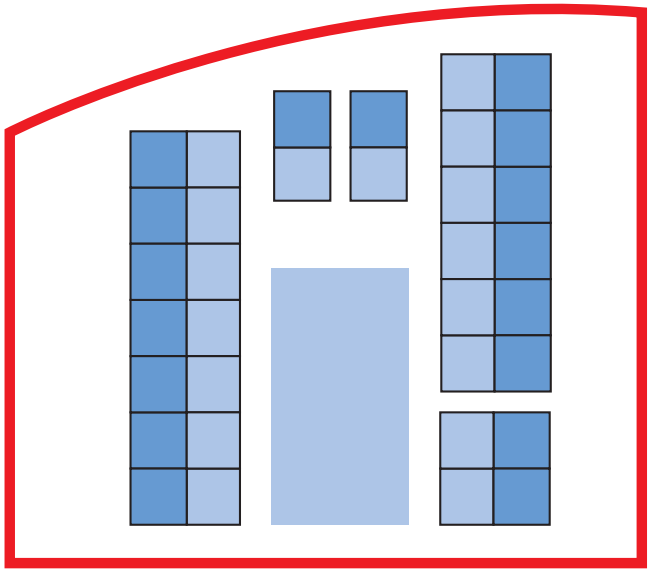
A specific example of implementing this concept is the Inselspital (University Hospital) in Berne. The west surgery wing (intensive care, emergency and surgery centre), which was just 30 years old, had to be demolished. Pipes embedded in concrete had reached their life expectancy and supporting partitions of the surgery rooms prevented them from being refitted.

The new construction is based on the principle of system separation, which has been put to the test for the first time. During implementation of the primary system, the project was completely redeveloped: the surgery rooms had to be rearranged in a totally different way than originally planned.

The basic structure of the primary system, which had been worked out in great detail, enabled such a change during implementation. System separation passed its first successful test.



Planned surgical concept called “cluster” at the beginning of the construction phase.



During implementation needs were redefined. A “linear” arrangement for the surgery rooms was preferred to the previously proposed “cluster” arrangement.

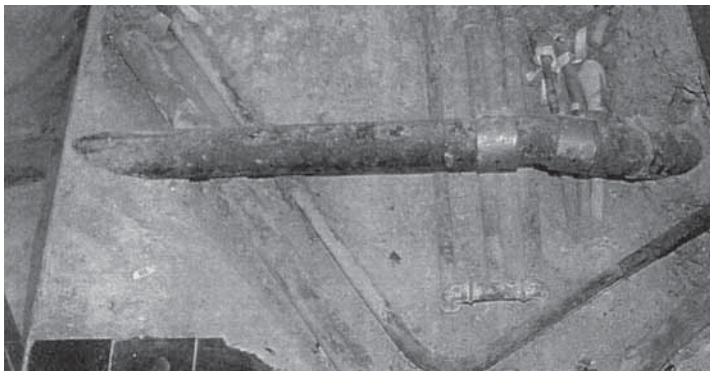
Component coordination

Component coordination enables the replacement of individual components in future use and state of the art separation during dismantling. Component coordination implies that components are not inextricably interweaved with each other. In each project, individual components are classified into the three system levels (primary, secondary and tertiary systems).

In addition, it must be determined in detail for each specific project whether within the system levels individual components have to be separated from each other. This may be necessary for maintenance, for accessibility to the technical conveyance systems. But even subsequent installation requires separation (e.g. conduits in a non-structural wall).

El.	BCC	Designation of elements description according to the building cost classification (BCC)	1	2	3
		Functioning external envelope			
E5	221	External doors, gates, sliding doors incl. automatic gate and door controls	x		
I5	228	Exterior blinds incl. blind controls	x		
		Supply of energy and basic services (water, gas, electricity) for the building			
I0	23	Electrical supply from the main distribution board to sub-distribution stations		x	
I4	25	Cold and hot water distribution		x	
		Building-related special equipment and services			
P1		Power equipment			x
P2		Telecommunications and security equipment			x

Separate cable conveyance on a regular grid for the development of an industrial site. The technical conveyance systems were made before the ultimate use was firmly decided.



Water and waste water conduits that are embedded in concrete violate the principle of separating components of different life expectancies.

Planning and implementation

With the help of system separation

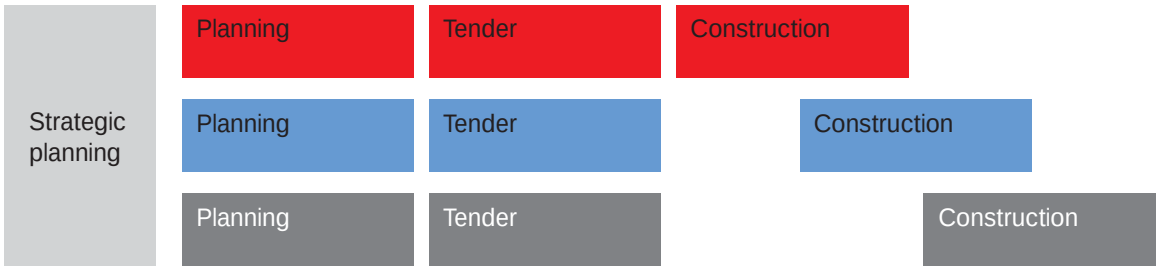
Large construction projects are characterised by a complex development and planning process. From the initial outline of the user's requirements to the implementation (construction) and start-up of operations, this process can last up to 10 years during which user requirements often change. Quite frequently the built project, after this process, has little in common with the original requirements.

With the help of system separation, the individual system stages become more independent of each other and the building as a whole becomes more flexible.

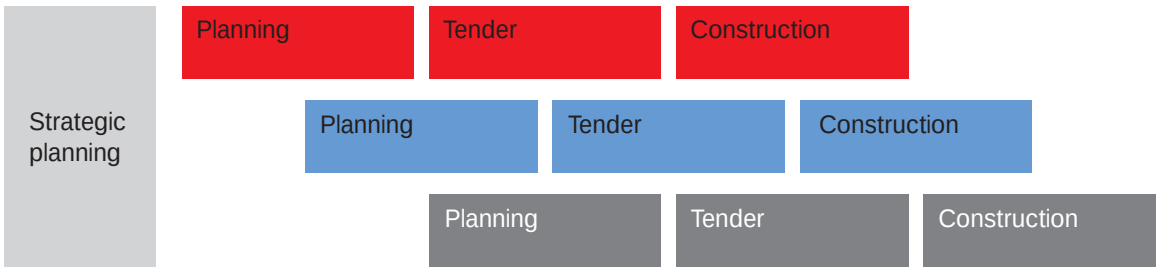
The time frame

Advantages of the parallel model
Planning and design exactly according to guidelines
Cost transparency when the contract is awarded
Awarding it e.g. to general contractor is possible

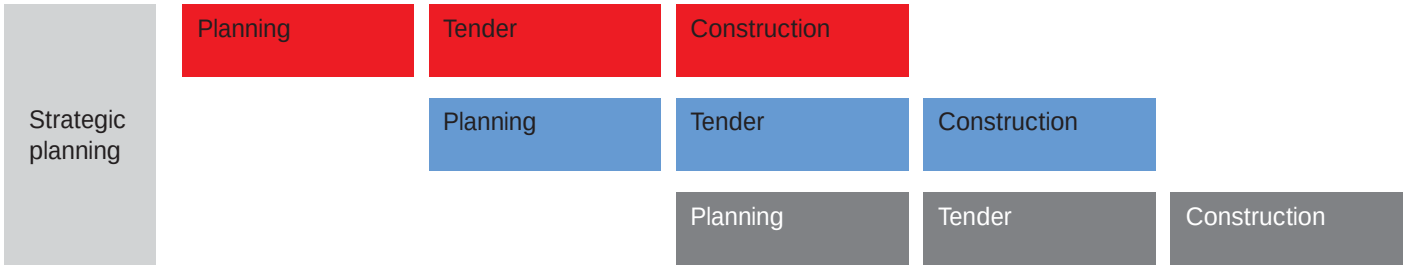
Disadvantages of the parallel model
Risk of inflexible construction method
Costs for replanning
Time gaps during global implementation without benefits



Parallel



Graded



Serial

Advantage of the serial model
Latest possible start of the planning for the tertiary system
Consider for changes
Flexible method of construction, automatically integrated

Disadvantage of the serial model
Cost transparency available at a later date
Possible additional costs due to flexibility
Interfaces between system stages

“What is caused by what was and what will be is caused by that what is.”

Rémy de Gourmont

2006

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