The Frame And The Generic Space, A New Way Of Looking To Flexibility

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Abstract

Houses have an average life span of about a hundred years, whereas households and habitats can change radically and repeatedly during that time. Consequently house designers are faced with the task of giving form to a shelter for dwelling for a period during which the composition of the household and the associated spatial rituals will go through major changes.

Taking not the changeable but the permanent as a departure-point opens up new perspectives. The permanent, or durable component of the house, constitutes the *frame* within which change can take place. This frame defines the space for change. The frame itself is specific and has qualities that determine the architecture for a long period of time. The space inside the frame is general, its use unspecified; this space I have called *generic space.*

In this sense the frame frees other parts of a building. Take, for example, the loadbearing column. It relieves the wall from acting in a loadbearing capacity, it frees the wall. A notion essential to the frame's functioning is that of disconnection. The column can free the wall by virtue of the fact that wall and column are not inextricably linked.

A building can be separated up into a number of layers that together defines the building as a whole. Accordingly, the building can be regarded as a composition assembled from these layers. Each layer is distinguished from the others by the special role it fulfils. In the frame concept it is assumed that every layer may in principle serve as a frame. Basing my information on texts by Laugier, Semper, Loos, Duffy and Brand, I have made a distinction between the following five layers: Main load bearing structure, Skin, Scenery, Servant elements, Access. In principle I distinguish three categories of changeability: the *alterable*, the *extendable* and the *polyvalent*. These three forms of changeability can be linked with three types of generic space.

To explore my concept, I present an overview of every imaginable combination of layers. This catalogue of frames is then divided among four distinct series of combinations. The basic combinations and the combination series, constitute the tools for designing houses that proceed from the frame concept. It was the intention of this study to develop the frame concept and the body of concepts attendant on it. Building upon its predecessors, I developed a stimulating resource for anyone involved in designing houses that are able to accommodate change. The potentials and limitations of the frame concept can be further explored as designing proceeds.

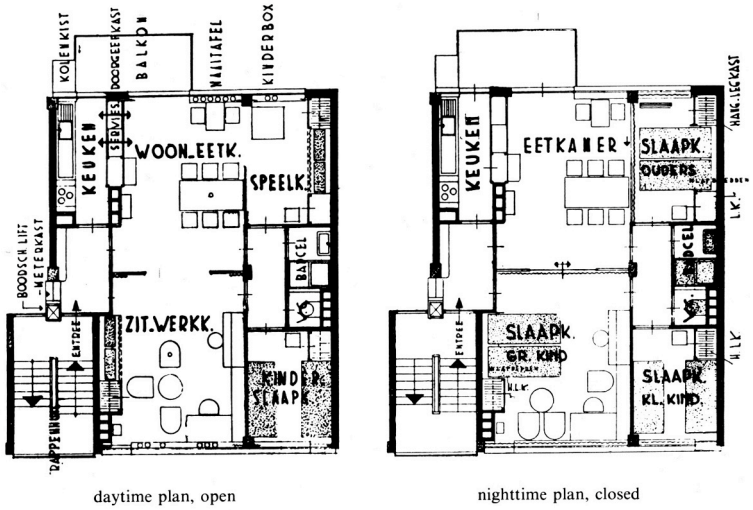
Keywords: Frame, Polyvalence, Layers, Generic space, changeability

Introduction

This study[1] is grounded in the fact that houses have an average life span of about a hundred years, whereas households and habitats can change radically and repeatedly during that time. Consequently house designers are faced with the task of giving form to a shelter for dwelling for a period during which the composition of the household and the associated spatial rituals will go through major changes.

Flexibility and changeability are key words in the approach of design for the unpredictable. When the architects of the modern movement at the beginning of the 20e century where facing the problems of mass housing flexible floorplan became a topic. Specially the concept of the minimal dwelling and efficient use of the space generated new solutions with sliding doors and folding beds providing the change from day to night floorplans. In the Netherlands Mart Stam and Johannes van den Broek designed houses (see figure 1) based on these ideas (Ottenhof 1981 (1936)). Beside of the day and night floorplan some architects at that time developed concepts for the free plan like the so cold *plan-libre* of Le Corbusier and later the support concept of Habraken.

Figure 1. Floorplan housing designed by J. van den Broek



daytime plan, open nighttime plan, closed

Taking not the changeable but the permanent as a departure-point opens up new perspectives. The permanent, or durable component of the house, constitutes the *frame* within which change can take place. This frame defines the space for change. The frame itself is specific and has qualities that determine the architecture for a long period of time. The space inside the frame is general, its use unspecified; this space I have called *generic space.*

The notion of frame is informed by the book Earth Moves by the French architect and philosopher Bernard Cache (Cache 1995). One of Cache's assertions is that architecture is the art of the frame. He distinguishes three functions that the frame performs: it separates, selects and rarefies. In the present study I propose that the frame has a fourth function: it frees. Take, for example, the loadbearing column. It relieves the wall from acting in a loadbearing capacity, it frees the wall. The non-loadbearing wall can then be moved

[1] This text is based on my PhD Thesis (Leupen 2002)

freely. A notion essential to the frame's functioning is that of disconnection. The column can free the wall by virtue of the fact that wall and column are not inextricably linked, in other words they can be disconnected.

Of what the frame might consist of? A building can be separated up into a number of layers that together define the building as a whole. Accordingly, the building can be regarded as a composition assembled from these layers. Each layer is distinguished from the others by the special role it fulfils. In the frame concept it is assumed that every layer may in principle serve as a frame. Basing my information on texts by Laugier (1977 (1753)), Semper (1851), Loos (1962 (1898)), Duffy (1990) and Brand (1994), I have made a distinction between the following five layers:


Main loadbearing structure (columns, beams, loadbearing walls, trusses and structural floors). The load bearing structure transmits the loads to the ground.


Skin (facade, base and roof). The skin separates inside and outside and at the same time represents the building externally.


Scenery (cladding, internal doors and walls, finish of floors, walls and ceilings). This scenery defines the space including its visual and tactile qualities.


Servant elements (pipes and cables, appliances and special amenities). The servant elements regulate the supply and discharge of water, energy and air and also include the appliances necessary to them and the spaces primed to accept these.

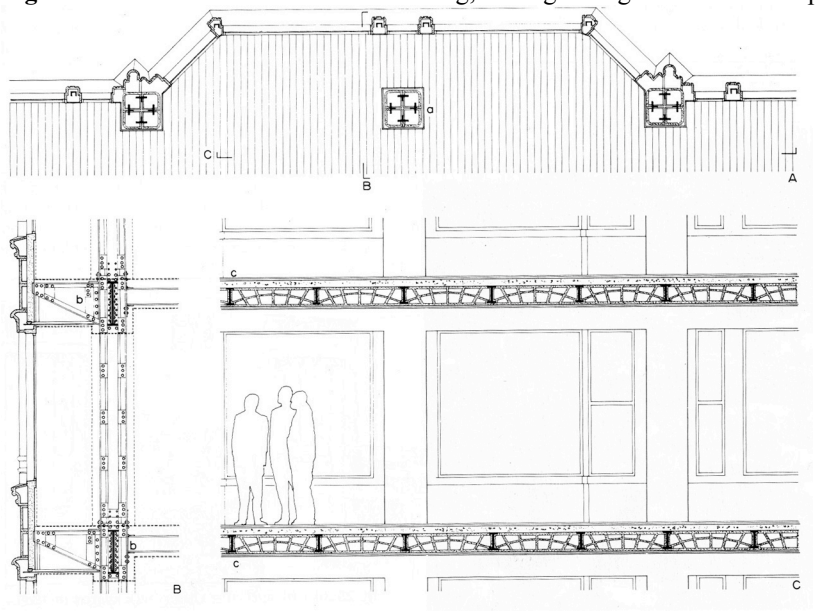

Access (stairs, corridors, lifts, galleries). This layer takes care of the accessibility of the spaces and/or the individual homes.

Aided by various sources including Priemus (1968) and Elsdonk (1990), I have done research into the forms the changeable can take. In principle I distinguish three categories of changeability: the *alterable*, the *extendable* and the *polyvalent*. These three forms of changeability can be linked with three types of generic space. Should the generic space contain a layer that can be changed then we may describe it as alterable. Should the generic space not be bordered on all sides then it is a question of extendibility. Should the generic space contain no other layers while the generic space invites different uses through its form and dimensions, then we have polyvalence; the generic space is then a polyvalent space. My research is based in the first instance on knowledge registered in designs and realised buildings. To be able to 'read' this knowledge from them it is necessary to analyse these plans. For this we need an analytical tool that is focused on the knowledge in question. The subdivision into layers as I proposed, is a sound tool for such analysis.

So as to better get at the properties of layers and frame, I have researched the five layers in their development into independent layers. The developments undergone by loadbearing structure, skin and scenery are so closely bound together that the development of these layers has been described as a whole. During the process, these layers become independent and regroup to form new coalitions and then become independent again. If we can discern in the primitive hut and the timber-framed house that grew out of it two distinguishable layers (loadbearing structure and skin), in the 18th-century house they were joined by a third layer, scenery. With the refining of applied materials and the shift in architectural ideas about exposing the structure, this layer would partially fuse again with the loadbearing structure and the skin.

A new generation of buildings came into play with the emergence of the iron skeleton. In the first generation of these buildings the facade acts in a load-bearing capacity. Skin and loadbearing structure then together constitute the frame. This I designate with the term *integrated frame*. This notion denotes frames consisting of two or more integrated layers. Such buildings can house different programmes without the need for radical constructional measures; the generic space is, then, a polyvalent space. During the course of the 19th century the skin became increasingly distinct from the other layers, a development that in a structural sense reached a provisional end with the application of terracotta elements by members of the Chicago School (see figure 2). However, fire regulations prevented the skin from achieving complete independence from the steel skeleton.

Figure 2. Burnham & Co. Reliance building, Chicago. Fragment of the floorplan and section.



New possibilities presented themselves with the arrival of non-flammable reinforced concrete. Le Corbusier was one of the first to explore the architectural qualities of the concrete skeleton. His Dom-ino study primarily concerned a division between carcass and finish, in his later villa designs the skeleton and in particular the column became more and more set apart and articulated as an architectural element, while the scenery also gained its autonomy.

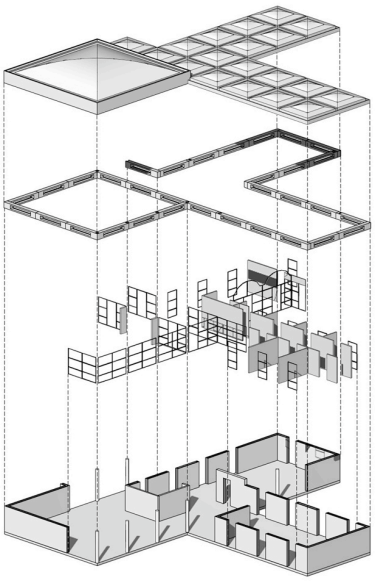
Duiker and Bijvoet, in their design for Zonnestraal aftercare colony, succeeded in developing and articulating the concrete skeleton in all its facets into an architectural object (see figure 3). Ostensibly Van Eyck is embroidering further on this development with his Orphanage but closer consideration reveals a shift occurring here between the assemblage of elements that structurally define the frame and the assemblage of elements that represent it (see figure 4). The architrave used here represents the loadbearing structure but is itself part of the skin or the scenery, depending on its position. It can also happen that a number of layers or portions of layers together form a frame. This is true of the Centraal Beheer office building. In situations like these I have introduced the notion of the *combined frame*. Since the 1970s the increasing demand for insulation has necessitated excluding even concrete loadbearing structures from view. Here too the

facade can represent the loadbearing structure. The emancipated glass facade wrapped around the loadbearing structure gives the imagination free rein, conjuring up images that might refer to what is inside the building but might well have other meanings.

Figure 3. Duiker and Bijvoet, Zonnestraal aftercare colony

The frame's articulation and the freedom that the frame creates is an important aspect of the frame concept. In principle it involves a more general issue, namely the relationship between flexibility and expressive architecture. Mies van der Rohe felt that a flexible building demanded a high-powered architecture (Spaeth 1985) p. 117. Van Eyck by contrast was of the very opposite opinion. The irony is that the Orphanage proves that Mies was right. The Villa Savoye, however, shows that Mies van der Rohe's postulation is not automatically reversible, for a forcefully articulated building does not necessarily make it a flexible one and, by extension, a frame. In spite of the column structure this building is flexible at all.

Figure 4. Van Eyck Orphanage, Amsterdam. Decomposition in layers



After a description of the development of loadbearing structure, skin and scenery, it is the turn of the servant elements and access. The servant elements consist of piping and ducting, the associated necessary appliances and the spaces primed to receive these. Banham (1969) has pointed out that the development of servant elements has taken place largely outside the architectural debate. Only during the course of the 20th century do we see a tendency to express this layer in the architecture. In some cases the organization and form of the servant elements go on to generate freedom for the other layers and so the servant elements work as a frame. Accommodating this layer in a zone or core produces spaces that are devoid of pipes, cables and appliances and therefore generic. A space uncluttered with service elements gives great freedom for scenery and use.

From the Middle Ages onwards access to a house evolved from a single corridor or stair into a system in its own right, an independent layer in the architecture. The prime driving forces for separating living space and circulation space inside the house were privacy and a sense of embarrassment (Elias 1990 (1939)). The desire for higher densities and the concomitant stacking of dwellings led to ingenious systems of stairs, corridors, landings and galleries. The access, originally interwoven with the floor plan of the house, gradually became disconnected from it. At the same time access entered into a new, structural alliance. Stairs and galleries were then made of concrete and merged with the loadbearing structure.

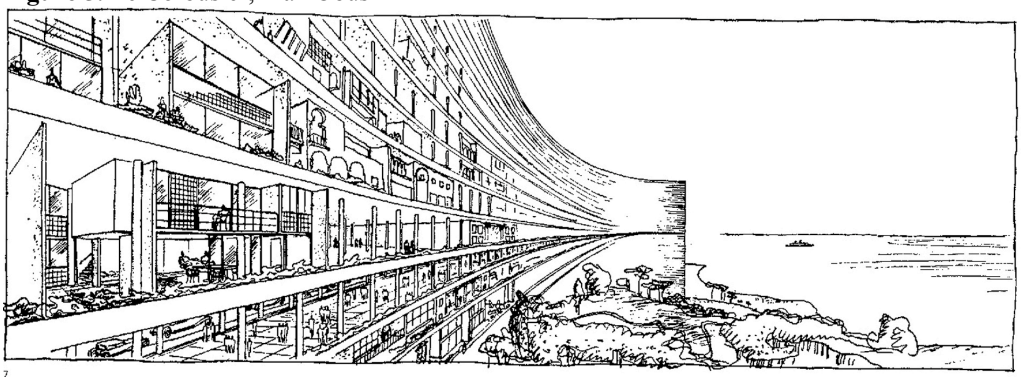
Next, the Modern Movement provided the architectural means to give the access a countenance of its own. Porch stair and gallery were articulated individually in the desire to represent the programme in the facade, though the corridor was still withheld from view. From the examples I analysed it transpires that the access can only be elevated to a layer of importance if given an extra function. This function may be representative (the foremost stairwell of the Haussmann block), or the access may be designed as a street (Spangen), balcony (Koekoekstraat) or front garden (Golden Lane). In this respect the gallery and porch have more potential than the corridor.

Now I enter into an aspect of the defining of layers. I suggest that every layer can imply one or more further layers. Every facade has its own loadbearing structure, a servant space can have its own scenery, and so on. The existence of these subsystems or sublayers can be seen as fractalising of layers, a notion culled from chaos theory. In discussing the five layers within the wide field of architecture the question arises of what has been developed in the way of changeability in the province of housing. I have chosen to use the four characteristics that particularise housing design as the leitmotif. These four fields I have designated with the terms *compartmentalisation*, *access*, *service system* and *spatial division*.

In the cases Obus (see figure 5), Unité, Urban Megastructure we can identify large structures that deal with access to individual units as well as with supporting them as a whole. Habraken developed the concept of supports (Habraken 1961), relating to large structures to be developed by the community within which each unit is built to the occupant's specifications. With a switch in the building market from high-rise to low-rise, attention shifted from the large combined support and access structures to compartmentalization and changeability within the compartment. The support concept

thus ceded to the carcass concept. Such as the fully stripped-back loadbearing structure (Haaksma's Casco project) to the polyvalent carcass (Hertzberger's Diagoon houses).
A number of experiments done with the changeability of dwellings proceed from the problem of services, the piping and ducting. In this field three approaches are possible: accommodating the services in raised floors, in columns and in facades. In some of these experiments the solution was sought in accommodating the pipes and cables in some way in the frame, the very frame that now had to bring about their freedom. It is this ambivalence that can result in additional investments. In dividing up the space - the fourth problem area - scenery plays a key role. It is conceivable that this layer too can enable changeability in the house and its use. This could happen with the aid of scenery with many movable parts. It is open to question, however, whether such 'active' scenery is the only way to design a house than can be used in different ways, i.e. is polyvalent.

Figure 5. Le Corbusier, Plan Obus



A pair of key notions are to be made, the support concept and the carcass concept. The support concept, which originated with Le Corbusier's plan libre and Plan Obus, finally gained full expression in the supports of Habraken and SAR (1965). This concept is primarily linked with access and the main loadbearing structure and can be characterised, using Heynen's terms (Heynen 1999), as open and transparent. The carcass concept, which implies the loadbearing structure if nothing else, is less specifically defined with regard to the remaining layers and can possibly be best typified as a container or cocoon that is able to accommodate change. In that sense this concept can be said to represent seclusion and enclosure.

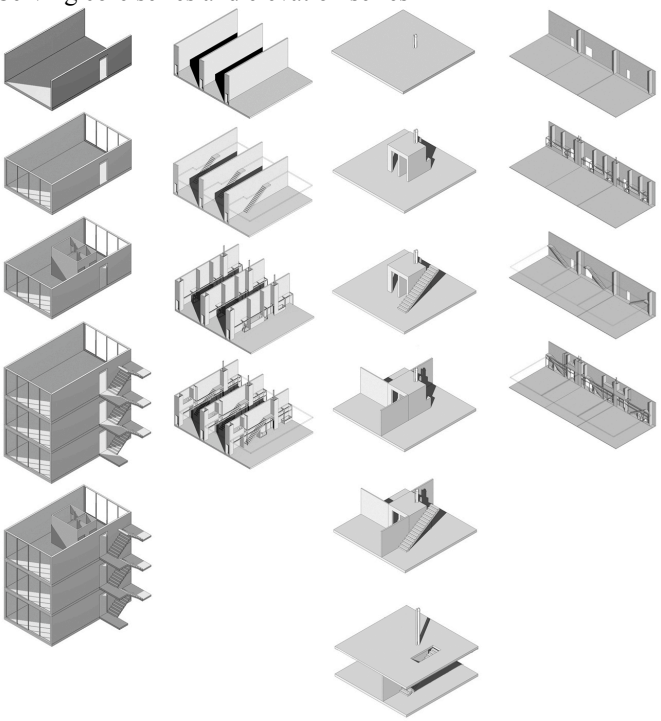
The frame as a design tool

The frame theory and the accompanying concepts provide a sound tool with which to analyse the nature and functioning of projects dealing with flexibility or changeability. The question now is whether the frame concept can yield more than just a tool for analysing existing projects. Armed with the instruments of analysis I developed, I have analysed a series of cases, but the question is, can the frame concept be deployed as a design tool to design houses able to withstand the time factor.

To explore this aspect, I made a overview of every imaginable combination of layers. This catalogue of frames is then divided among four distinct series of combinations (see figure 6). These series themselves proceed from a quartet of basic ingredients for changeable dwellings: basement, carcass, structural wall and facade. It is logical to assume the loadbearing structure to be part of the permanent component of the dwelling.

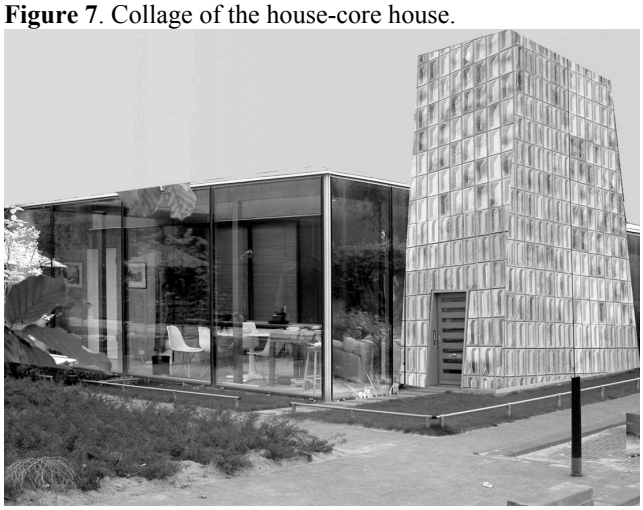
Two of these four ingredients - *structural wall* and *carcass* - accordingly ensue from the loadbearing structure. The other two - *basement* and *facade* - are in that respect deviant and relate to exceptional circumstances; circumstances which when seen against the background of recent developments in self-build, can certainly be deemed relevant.

Figure 6. Overview of four series of combinations. Left to right Carcass series, Loadbearing wall series, Serving core series and elevation series



The series of combinations and their described qualities may be regarded as the basic material with which to design houses according to the frame concept. Yet many other deliberations have also to be made during the design process. Taking the dwelling form and the building typology on the one hand and the desired kind of changeability on the other, the designer can develop his/her vision and opt for a specific kind of frame. The frame could exist just out of the loadbearing structure it could be an combination of the skin loadbearing structure and may be the access system, but also less obvious combinations are possible.

Figure 7. Collage of the house-core house.



For instance it may be possible to create a house based on a frame that consists of servant elements. Imagine a situation in which a client bought a piece of land, willing to build him self a house. Imagine again, there will be a firm producing prefabricated elements in the shape of a chimney containing all the necessities of a house like central heating, bathroom and a fire place. The client orders such a core of a leading firm. This house-core is the crystallisation point of the development of a new house (see figure 7). An important aspect here is that of articulating the frame. While desirable for the frame's functioning, how does this articulation fit into the concept envisaged by the architect? If in this case the house-core is well articulated, it claims to be treated carefully.

Here I will put the question of whether the frame concept gives cause for research into new building materials and constructions and, conversely, whether new materials and constructions might lead to new potentials for the frame. The above-mentioned deliberations together with the basic combinations and the combination series, constitute the tools for designing houses that proceed from the frame concept. It was the intention of this study to develop the frame concept and the body of concepts attendant on it, and this I have done in my book Kader en Generieke ruimte (Leupen 2002) (English translation of the title is: Frame and generic space). Based on a series of case studies this book finally seeks to be a stimulating resource for anyone involved in developing and designing houses that are able to accommodate change. The potentials and limitations of the frame concept can be further explored as designing proceeds.

Finely I will end with to statements: “Buildings based on the frame concept provides freedom in future use.” “The stronger the frame is articulated, the more it will claim to be treated carefully, the better it will be used.”

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