

FLEXIBLE HOUSING TYPES

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Abstract

Due to current global ecological and economic challenges, concepts for the design of sustainable and adaptable building structures are again becoming more important in Europe.

Furthermore, the growing demand for individual adaptable housing types is also fuelled by individualization, demographic change ethnic diversification, and the transition to a flexible world of work.

Since the end of the 1980s, the range of flexible dwellings has significantly been broadened in Europe, which led to a wide variety of types: from functional open floor plans, floor plans with sliding walls and various combination types to vanguard space sceneries, experimental high-tech adaptable structures and building types with open functional program.

In this article, the methods of flexibility will be structured. Additionally, some new innovative flexible projects will be introduced.

Keywords: Flexibility; Flexible dwellings; Adaptability; Social change; Individualization

NEW USER DEMANDS IN HOUSING

After a period of latency, the role of flexibility within innovative housing concepts has regained importance in Europe since the end of the 1980s. The new models are strongly interrelated with the social, cultural and economic changes in postindustrial society. Growing prosperity, individualization and distinction of lifestyles due to the change in values, modified household and population structures as well as the changing world of employment, have all contributed to a qualitative shift in housing requirements. In Europe the trend is moving away from the conformity in housing and living patterns of an industrial society towards greater heterogeneity and instability in living arrangements. "The role model of social life, that determined how to live one's own life according to the preset specifications of traditional blueprints, is becoming obsolete." (Beck, 12/ 2001, p. 30)

Hence, new specific demands for adaptability in housing is developing within a broader class of the population, considerably broadening the range of already known adaptability motives (family cycle, economy, participation). Four main aspects of social change seem to particularly stimulate the evolution of new flexibility demands in housing:

Individualization and diversification

The theorists of reflexive Modernism (Beck, Ulrich/ Giddens, Anthony/ Lash Scott, Rifkin, Jeremy Schulze, Gerhard a.o.) directly link the European cultural turmoil of the 1960s, and with

this the weakened importance of the categories of class, family and gender, to society's strive for individualization and diversification, processes that paved the way toward diversification in living arrangements and lifestyles. The discontinuity in the course of people's lives forms part of these developments. Nowadays, the course of life no longer follow a predictable line of development but are merely "patchworks" of different phases of education, employment, parental leave and domestic work, directly affecting housing and living needs.

New household arrangements

The self-contained living pattern of nuclear families that served as the housing ideal of modern industrial societies is gradually losing importance. Household and living arrangements are fundamentally changing and diversifying. In addition, family households, singles, DINKS, single-parents and apartment shares play a major role. Today, households are also subject to accelerated internal change that is reflected in the high divorce rates (36 % in Germany as of today). It directly influences the sphere of living.

Demographic change

Because of the predicted demographic development with a growing proportion of older people, providing housing for the elderly will become an important sector in housing. In Germany for example the majority of people older than 65 years – more than 93% – still lives in their own "normal" apartment and wants to remain there. But most of these apartments may not be adequately adaptable to changes in household size or composition (family cycle, need for care, death of spouse). Flexibility concepts for dividable apartments seem reasonable here.

Changing world of employment

In the context of globalization of national economies, Europe is transforming into information and services societies with far-reaching consequences for private and public life. New forms of working at home, such as long-distance learning, sporadic freelancing and a growing – cost-related – demand for home care call for new adaptable spatial solutions. Furthermore, the increasing importance of home-telecommuting and phases of life-long-learning connect the private and professional sphere through new forms of spatiotemporal overlapping. Adaptable structures are needed that respond to these new conditions and allow for combination and alternation of working and living.

NEW FLEXIBILITY PROJECTS

In this brief delineation of essential development tendencies, the wide variety and potential for change in housing and living becomes visible. The new conditions and user demands are a challenge for today's planning and extend the options for individual practices.

Due to the individual values of users, an increasing desire for personal influence and identification within the living sphere becomes evident. Contrary to the period of the 1960s and 70s, the present flexibility approaches acknowledge these tendencies of individualization by following design approaches that focus on creating identity but also by carefully and precisely profiling the user's needs. Spatial openness and indeterminateness are combined with distinct profiling of specific functional and subjective user demands.

In the following, some examples of recent flexibility projects from German-speaking countries will be introduced. Even though the conceptual approaches differ, predominant tendencies in the development of flexible housing become visible.

The projects presented may be classified by the following scheme of methods of adaptability:

METHODS OF ADAPTABILITY

1. Functional flexibility - Flexibility of space

- 1.1 neutral-use spaces (Future housing)
- 1.2 interpretable and subdividable multifunctional loft space

2. Integrated flexibility - Flexibility of kinetik and adaptable elements

- 2.1 movable screens / partition wall
- 2.2 mobile fittings and multifunctional furniture
- 2.3 adaptable materials

3. Structural flexibility – Flexibility of construction

- 3.1 modifiable interior walls (Balance)
- 3.2 combining and separating floorplans horizontal and vertical (Future housing)
- 3.3 support and fit-out –concepts
- 3.4 multifunctional buildings (UFO)

EXAMPLES OF THE NEW DEVELOPMENT IN FLEXIBLE HOUSING IN EUROPE

Architectural firm Hansjörg Tschom: Future housing, Graz, Austria 2006

(Type: 3.2 combining and separating floorplans horizontal and vertical)

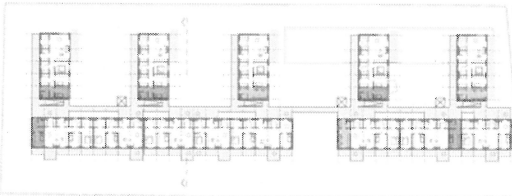


Figure 1 future housing - ground plan



Figure 2 The extended gallery also serves as an area where people can stay a while and communicate in front of the housing units

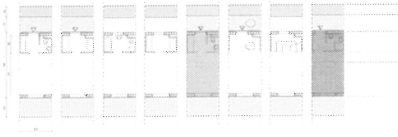


Figure 3 Modular system



Figure 4 Small apartment (37.90 m²) and single apartment (19.3 m²) versions

Figure 5 Three-room apartment (77.10 m²)

Figure 6 Home/work version (76.80 m²)

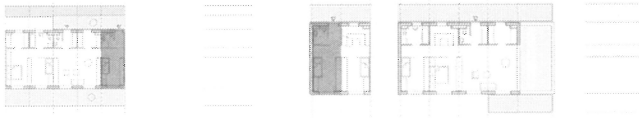


Figure 7 Multi-generation living (96.60 m²)

Figure 8 Five-room maisonette (108.50 m²)

With the 'future housing' project in Graz, architect Hansjörg Tschom shows one way of responding to changing requirements in living, while at the same time ensuring residential buildings are long-lasting and hold their value.

In terms of basic design, this project distances itself from the idea of designing a building once and for all, but instead provides a kind of 'structural framework' that can be used in many different ways. Inside the residential units themselves, and at the interfaces between public and private, this development presents spaces as challenges for users to appropriate for themselves and fill with life.

The essentially flexible design of this five-floor honeycomb-like structure is based on the idea of combining equivalent use-neutral space modules. The apartments are accessed via broad galleries, which are much more than just entrances.

The ground plan structure is based on adding a uniform clear basic module of 14 m². The two façades are made as load-bearing wall panels, so the spaces within can be left completely clear. The principal area of the gallery has a continuous service layer in front of it, which means that each module occupies a space of 23 m². This basically modular structure makes it possible to be pronouncedly flexible: people can even make changes and modifications at a later date.

Individual apartment sizes and layouts can be tailored to suit the first residents' wishes before they move in. As well as being able to combine spatial units flexibly, housing modules and ancillary areas can also be designed and used differently. The spectrum of possibilities ranges from an open loft to a cell structure with separate individual rooms. Not only can they be

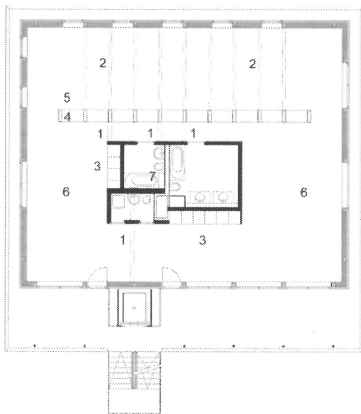
combined horizontally, housing modules can also be combined vertically to form maisonettes. The service line has been designed to accommodate any internal stairs that may be required. The architects have passed this variant-rich spectrum of possible housing designs and layouts onto future users as well, designing housing products for singles, couples, families with children, multi-generational dwellings, communes and home/work combinations, with apartments varying from 19.3 m² to 108.50 m².

The design also allows for long-term alterations and new combinations. If a family shrinks as children grow and move out, for example, they can split off individual rooms and let them as individual dwellings.

With its progressive design, the future housing project is seen as a model by the Graz Wohnbaulabor, not just for Austria, but for Europe as well.

Haerle Hubacher Architects: Balance ‘Wohnparks’, wallisellen 2000, uster 2001 and fällanden 2003, Switzerland

(type: 3.1 modifiable interior walls)



- 1 Ways of dividing apartments
- 2 Ways of dividing rooms
- 3 Kitchen locations
- 4 Cupboard wall
- 5 Individual space
- 6 Living space – communal areas
- 7 Installation shaft

Figure 9 Haerle Hubacher Architects: Balance system ground plan

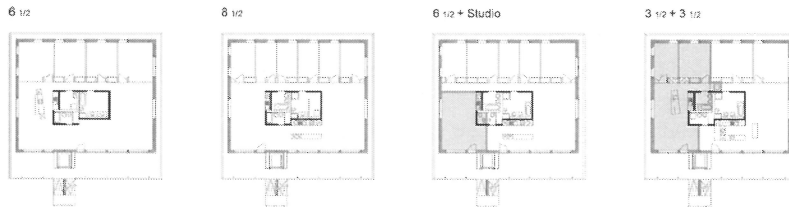


Figure 10 Possible apartment and room division options, suggested by Haerle Hubacher Architects

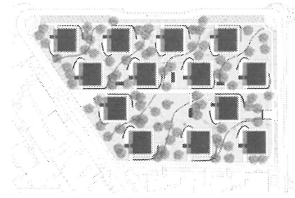
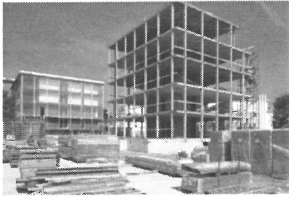


Figure 11 Balance housing development, Fällanden, carcass with visible concrete ceilings and wooden beams at façade level

Figure 12 Balance housing development in Wallisellen 2000

Figure 13 Balance housing development in Wallisellen 2000, ground plan

There is one key question which has been running through the history of high-rise house building since the early 20th century:

How can the particular qualities of having a home of your own – the individuality, freedom and identity it offers its residents – be achieved in dense urban structures?

The new variety of household forms and increasingly varied housing needs have raised the question again, but even more strongly than before. In addition, changing economic and environmental conditions are also putting the idea of the detached house in suburbia increasingly up for question.

Own homes stack up

Open outside stairs or a lift lead to a generous two-part terrace area with an outside balcony running all round all floors. People can see where their own home is, and walk all round it on the balcony, just like in a detached house. The apartments, with their generous full height glass doors and windows on all sides, face the circulating area, so they can catch the sun on three sides over the day like a detached house.

Flexibility

The reason Balance housing units are so flexible is because the ground plan has light on four sides and can be used in many ways. It can be divided freely and reversibly and the individual rooms can be used in many ways.

Moving the vertical structural supports to the façade means that the ground plan can be kept largely free of structural components. There are just two fixed components dividing the inside space: a service and media core, and a cupboard wall area. These two components divide the ground plan into an entrance area, two generous living room areas, and a space layer for individual rooms. The individual rooms behind the cupboard walls can be divided in different ways by inserting partition walls in different ways.

This means many different housing options can be created for quite different households. To help future users divide their apartments up to suit their own needs, the architects have created a plan showing what options the ground plan offers. The spectrum here ranges from minimally divided loft apartments for singles or couples, through apartments for families with many children, with children's bedrooms and a parents' bedroom, apartments for communes with equal individual rooms, apartments with separate working areas or offices, apartments with drop-in units, through to housing units for two separate households.

These divisions can also be reversed at any time, because separating the load-bearing structure from the fitting out means that the inside spaces can also be redivided in the future.

Each floor is sold as a single unit in principle to protect the overall concept for the long term. There are rules that are designed to maintain the external look of the estate by defining how much room for manoeuvre owners have when it comes to refurbishments and conversions that affect the outside of the building. Inside, owners are basically free to divide their apartments up as they like, provided that their designs do not affect the sanitation provisions of the building.

The cost-effective and sustainable realisation of the Balance idea

The architectural design creates the conditions for lasting, cost-effective building at different levels. First, its relative high density means it takes up little space in terms of urban development. Its system construction makes it cheap to produce, and its component structure means it is cheap to maintain in the long term, as it can be refurbished easily or have individual components replaced.

In the long term, having flexible layouts will also be a good thing, as it makes conversion easy and inexpensive, which will help buildings retain their long term value.

One particular feature here was that the shell or skeleton of the building was formed as a *Bauhütte* (a shed or a construction framework) created by the main contractor. Within this *Bauhütte*, a permanent team of tradesmen was assembled who could complete their work on site and on a just in time basis. Once established, this team could work more efficiently and cost-effectively than in the normal building process in which contractors are commissioned for work individually. The materials used were selected on an environmental basis, and all buildings are made to Swiss 'Minergie' standards (www.minergie.ch).

Structural system

Engineering office Henauer und Gugler AG, designed a structural system for the four to five story building consisting of an inner concrete core for rigidity and an enclosing circle of wooden edge columns carrying the 20 cm thick concrete ceiling every 2.46 m, and with a maximum span of approx. 6.0 m. The 16/18 cm edge columns were made of wood for heating reasons. As the loads on the ground floor and first floor are high, the wooden edge columns here are designed as a paralam construction, as opposed to the laminated structures on the upper floors. The forces from the beams at ceiling level are transmitted via a steel tie structure. The façade consists of a light-active glass-board honeycomb construction which, together with the building systems used (controlled apartment ventilation) means the Balance concept could be achieved as a Minergie project.

The favourable design conditions and the *Bauhütte* construction method meant that the housing units were relatively very cheap to buy. Competent housing advisers helped prospective buyers to divide the space in their apartments up as well if need be.

The high demand for Balance apartments shows how much interest there is for such flexible housing amongst many different groups.

The Uster Balance estate was awarded the Zürcher Oberland construction prize in 2003.

Dietz Joppien Architekten AG. UFO Loft and commercial building, Frankfurt am main, Germany, 2004(Type: 3.4 multifunctional buildings)

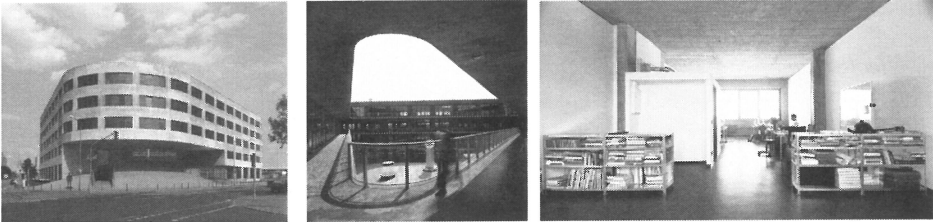


Figure 14 Photo outside and inside : Eibe Sönnecken/ www.eibephotografie.de

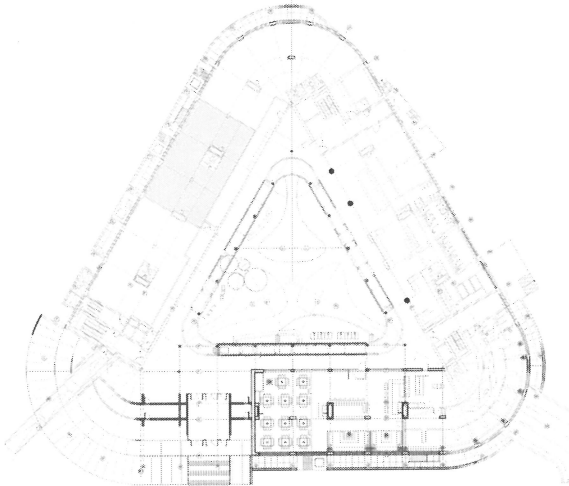


Figure 15 Ground plan of ground floor with the Cocoon Club

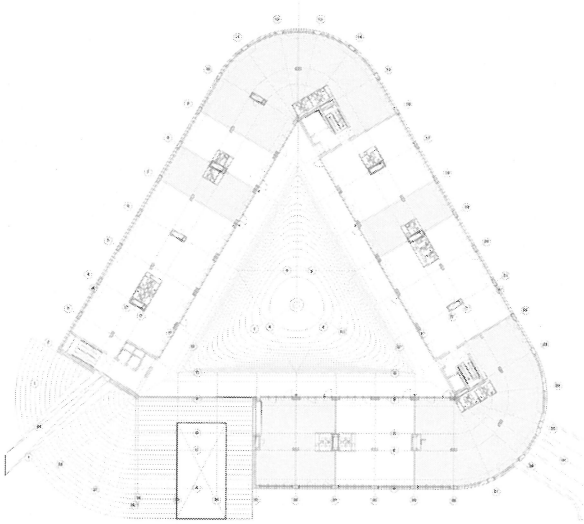


Figure 16 Ground plan, upper floor

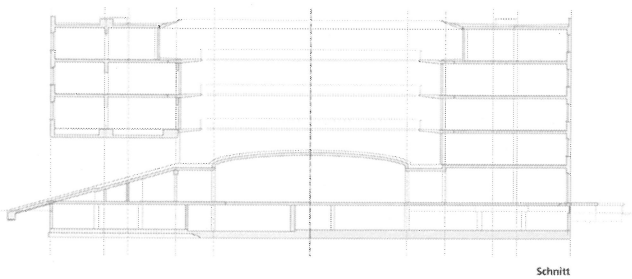


Figure 17 Section

This property in Frankfurt's traditionally industrial Fechenheim area had to be developed quickly for financial reasons; but there seemed to be no way of tying potential commercial tenants in quickly.

From these dire straits came the idea of an 'open programme' building, which was designed to be suitable for a wide range of users from service industries to crafts and trades. Reformulating the aims in this way put the focus on the multifunctionality of the building and making programme changes easy to organise. While not provided for in this development area, there is no reason why such a design could not also be used for residential and/or a combination of residential and commercial uses in the future.

With its simple but striking triangular geometry, this expressive large form radiates the meaning and recognition that was desired. It acts as a signpost that creates order out of chaos.

The seamless visible concrete design in particular helps its monolithic appearance. Using visible concrete also helps it mediate between the particularly 'rough' atmosphere and robustness of the industrial location and the upgrading and 'gentrification' of the urban quarter it wishes to bring. Inside, however, there is a complete contrast with the compact, closed off nature of the outside. Around the central atrium, open to the skies, is the communications centre of the building. Circular galleries, each 2.50 m wide, greet visitors and lead them along almost entirely glazed façades behind which large numbers of administrative businesses, laboratories and commercial units have established themselves.

This gallery offers tenants and visitors far more than just a generous entrance space; it also provides an area for meeting and taking breaks, and is even used for barbecues now and then.

Diversity in unity

The functional openness and flexibility of this building in eastern Frankfurt is achieved through 'over sizing' the load-bearing structure and spatial dimensions.

The wide-arching 'oversized' reinforced concrete structure was also used throughout in the gallery area for high loads of 5-10 KN/m² to allow for heavier loads from equipment used in commercial businesses. The reinforced concrete ceilings rest on the load-bearing façade and on pillars inside the building, integrated in the infrastructure area in each case. This load-bearing structure and infrastructural elements form the permanent, 'solid' elements, whereas all the other fitting out inside can be replaced.

The broad spans and clearance of over 3.60 m provide maximum freedom of space when it comes to fitting out. At the same time, the generous access system of three vertical access shafts that house stairs, passenger and goods lifts, and the internal circular gallery means that all the units in this 16800 m² area (excluding the underground car park) have free and equal access. The internal space can be accessed from every second axis point. This 'overdevelopment' means the structure can be divided flexibly into as many sub-units as are desired from 87 to 1200 m².

The building is handed over to the tenants as a 'stainless skeleton', without any fitting out: in other words, with screed, visible concrete surfaces and basic utility connections. Service areas and WCs are also merely provided for. Closely-spaced, sufficiently dimensioned utility shafts make all components easily accessible, so everything can be installed retrospectively without destroying anything, providing the flexibility which is so important in terms of individual utility requirements. All utilities are visible, so they can be redesigned quickly and cost-effectively. All the fitting out work is handled by the tenants.

Another of the building's features is how it incorporates a monolithic seamless materiality into its design. The decision here came down in favour of local-cast concrete, as a monolithic object means precast sections cannot be used, as the joints create problems. The result was a 50 cm thick load-bearing outer wall made as a complete monolith of light cast concrete. Using the right concrete mix gave a thermal conductivity of 0.57 and heat insulation U value of 0.95 W/m²K (although this value no longer meets German requirements). Another advantage of this simple approach was that complicated, intricate and expensive details were not necessary. Once concreting was finished, the insulated outer walls and ceilings were completed.

The UFO project reinterprets the traditional typology of multifunctional buildings.

In the uncompromising form in which it has been created, this synthesis of architectural and structural engineering ideas is durable, and also cost-effective in the long term. The UFO has now established itself as a 'brand' in Frankfurt, and the flexibility of the structure has already proved that it is suitable for a variety of different uses.

SUMMARY

Even though the projects shown vary in concepts, they demonstrate predominant development tendencies and principles:

In recent housing innovations in European countries, openness, adaptability and individually interpretable spaces play an important role again: In the wake of transition to an information society, the diversity, inconsistency, and dynamics of life are mirrored in concepts of housing that offer a multitude of coexisting options „as well as“ replacing the predetermined mutually exclusive alternatives „either/or“ industrial society used to provide.

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