Flexibility in housing design has social, economic and environmental advantages and yet is currently often ignored. The first of two papers sets out the history of this issue.

Flexible housing: opportunities and limits

Tatjana Schneider and Jeremy Till

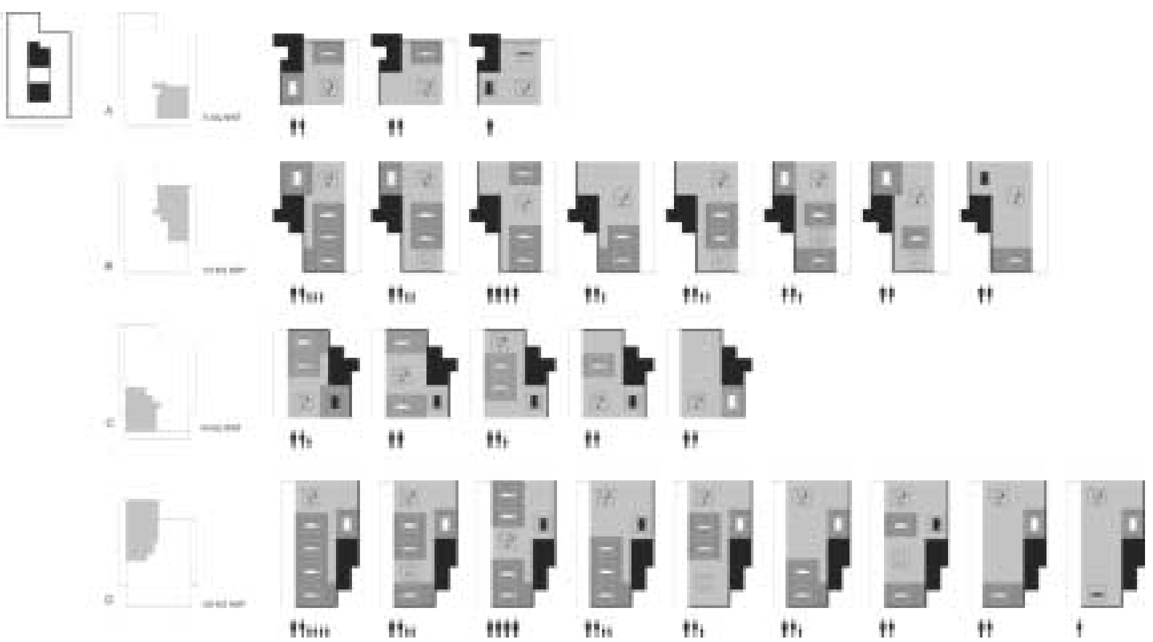
Introduction

Flexible housing can be defined as housing that is designed for choice at the design stage, both in terms of social use and construction, or designed for change over its lifetime. This paper argues that flexibility is an important consideration in the design of housing if it is to be socially, economically and environmentally viable. The degree of flexibility is determined in two ways. First the in-built opportunity for adaptability, defined as 'capable of different social uses', and second the opportunity for flexibility, defined as 'capable of different physical arrangements'.[1] This principle of enabling social and physical change in housing might appear self-evidently sensible. However, despite numerous attempts from a policy as well as a user side to embrace the principles, flexibility in housing design has never been fully accepted. The tendency to design buildings that only correspond to a specific type of household at a specific point in time reflects a way of thinking that is predicated on short term economics. This paper argues that one should instead accept the need for longer term thinking, which reflects the uncertainty of future occupation and housing demand. While it has been argued that flexibility costs money, Henz states that if any upfront additional investment is needed (which we would argue is not always the case) it can be set off against long-term economic calculations such as a higher appreciation of the dwelling on the part of the user, less occupant fluctuation, and the ability to react quickly to changing needs or wants of the existing or potential inhabitants and the market *[1]*.[2]

This ability is of particular importance for the social housing sector, where the opportunity to change the use or configuration provides a level of choice, for both tenants and their public sector landlords, which is otherwise non-existent in this sector.

Against flexibility

The idea of housing capable of accommodating change has been the subject of numerous initiatives, architectural competitions, research projects, and



1 Siedlung Brombeeriweg, Zürich, Switzerland (architect: EM2N Architekten, 2003). Twenty-five scenarios show the variability in plan can be achieved through the internal rearrangement of walls. This potential makes it possible for the owner, a cooperative society, to react to changing demand and needs of new and existing tenants.

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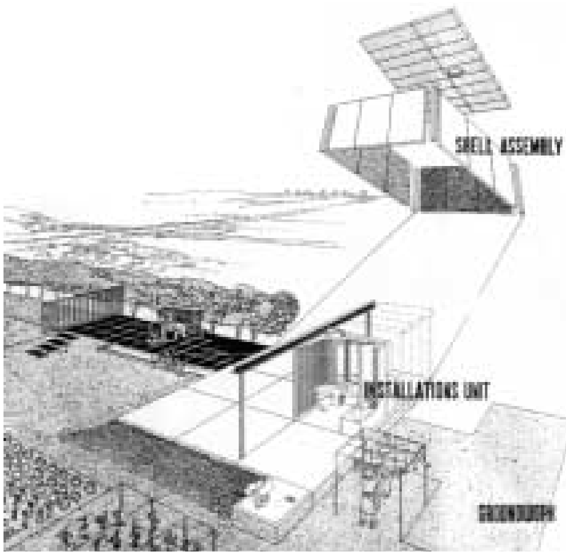

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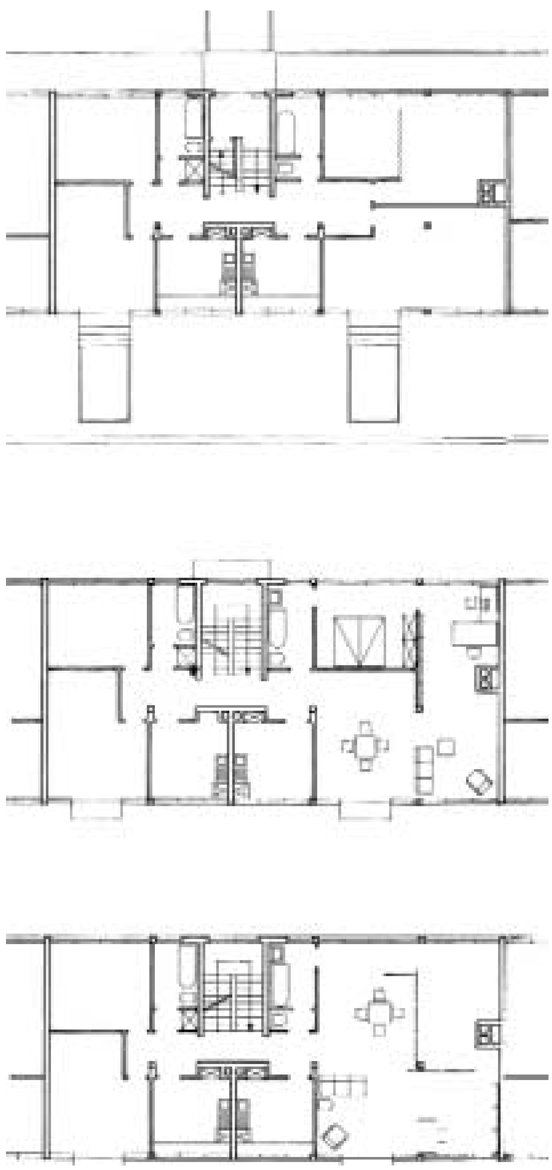
government reports throughout the twentieth century.[3] Typically the debates about the notion of flexibility generate as many proponents as opponents. Flexibility has been attacked as propagating a 'false neutrality';[4] it is often considered an ideological myth or questioned as being merely an architectural toy, such as in the essay 'Adaptable Housing or Adaptable People?' by Jia Beisi.[5] In addition, it is seen as having no real relevance outside the realm of one-off experimental projects or indeed as having the potential for going against the needs of users and playing into the hands of 'exploiters'.[6] In the early 1980s, James Stirling declared that he was 'sick and tired of the boring, meaningless, non-committed, faceless flexibility and open-endedness of the present architecture'.[7] Although he uses this stance to justify the specificity of his design for the Stuttgart Staatsgalerie, it was symptomatic of a widespread concern that the promise of the concept had outgrown its ability to deliver.

If flexibility in housing is to achieve its full potential, it has to mean more than endless change without fixed determinants. This wider intent is examined by considering flexibility under issues of Modernism, finance, participation, sustainability and technology.

Modernist ideology

Flexibility accords to some of the key tenets of Modernist ideology. First, it elides with a technically determined agenda of industrial prefabrication *[2]*. Second, Modernism's interest in new models of habitation, together with at least lip-service to the empowerment of the user, was well served by the notion of flexibility. Architects, particularly in the 1920s, were questioning existing patterns of living and approached the building as something that could change over time and something that could adapt to the wishes of its inhabitants. So Ludwig Mies van der Rohe went to great lengths in developing, in conjunction with other architects and interior architects, a large number of possible layouts for his apartment block at the Weissenhofsiedlung *[3]*.



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2 Prefabrication, USA (architect: Walter F. Bogner, 1942). Bogner's proposal for a completely prefabricated house was part of the Architectural Forum's quest for the 'The New House 194X', which asked 43 architects to design a house that should be adaptable to different needs resulting from changes in family composition as the family grows older. Bogner designed a house with dimensions based on a cubic grid of 8 x 8 feet (horizontally and vertically), which is further sectioned into three parts. One installation unit, consisting of bathroom and kitchen, subdivides the floor space to which accessories can be added that provide living facilities for a couple, couple with child and, by enlarging the shell, for an even bigger family.

3 Apartment Block, Weissenhofsiedlung, Germany (architects: Mies van der Rohe and Schweizer Werkbundkollektiv, 1927). Mies van der Rohe, acknowledging that buildings generally last longer than the functions for which they were initially designed, proposed that flexibility was one of the most important concepts of architecture. Here, the structural frame of the building, with only one or two load-bearing columns within the space of a unit, allows for a variety of possible subdivisions. This potential was further demonstrated by calling in a further 29 architects and interior architects who worked on the interior arrangement and furnishing of his flats (Kirsch, 1987).

Allying flexibility with progressive technologies, van der Rohe states that the frame construction was the most appropriate form of construction to deal with the differing needs of the occupants, allowing him to test the greatest variety of floor plans. 'For the present, I only build the perimeter walls and two columns within, which support the ceiling. Everything else ought to be as free as possible. Were I to succeed in producing cheaper plywood walls, I would only design the kitchen and bathroom as fixed rooms, and the remaining space as variable dwelling space [*Wohnung*], so that I would be able to subdivide these spaces according to the needs of the occupant. This would also have advantages insofar as it would provide the possibility to change the layout of a unit according to changes within a family, without large modification costs. Any joiner or any down-to-earth laymen would be in the position to shift walls'.[8]

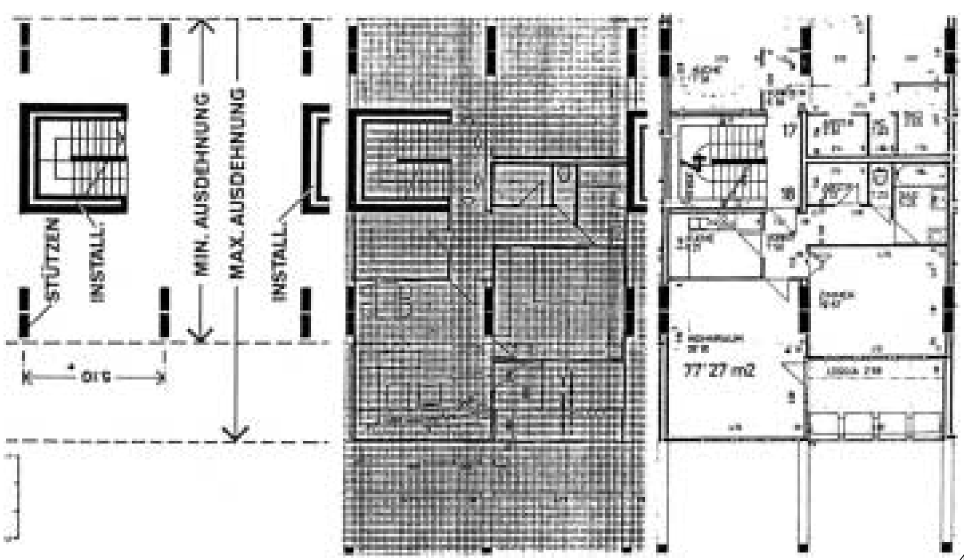
However, as Adrian Forty notes, one should not take this Modernist rhetoric entirely at its apparently benign face value.[9] He argues that flexibility extends the apparent reach of the architect when confronted with the dilemma that their involvement in a building 'ceased at the very moment that occupation began. The incorporation of "flexibility" into the design allowed architects the illusion of projecting their control over the building into the future, beyond the period of their actual responsibility for it'.[10] Flexibility as an ideology thus becomes part of the wider regime of control with which modernity is associated.

Indeed, some of the most inflexible of all recent housing is designed by architects who have used the word flexibility for its rhetorical value as a signal of progressive modernity. This results in housing schemes that are *representations* of flexibility, but in use are often less flexible than normal housing. One example of this is the 1988 housing scheme designed by Günther Domenig at Neufeldweg, Graz in Austria. The early design stages of this project were informed by participation and user choice and the resultant design boldly expresses the potential for flexibility in its frame and infill system.[11] However, because of the technical complexity, largely inflicted by the complex geometries, the scheme has remained unchanged since its construction. Visiting it, one is struck by a sense of a frozen moment in time and of early obsolescence, when flexible housing at its best should provoke a feeling of temporal looseness. What this scheme and others like it suggest is the need for a certain scepticism towards the more rhetorical examples of flexibility, particularly those that doggedly take the word at face value to denote elements that move and flex (another standard signal of progressive modernity). As we shall see, some of the most successful examples of flexibility tend to operate in the background.[12] As Gerard Maccreanor notes, flexible housing often works through its very ordinariness, employing robust and timeless techniques, rather than through foreground imagery or overtly representational signals.[13]

Participation / use

If one approach to flexibility may be about extending the control of the architect, another is about apparently dissolving it. Herman Hertzberger, for example, regards an architect as someone who can 'contribute to creating an environment which offers far more opportunities for people to make their personal markings and identifications, in such a way that it can be appropriated and annexed by all as a place that truly "belongs" to them'.[14] Similarly, Jean Renaudie states that, 'the important thing, for me, is to give everyone the possibility to express that which is not determined, but which remains latent vis-à-vis the use of space'.[15]

Here flexibility is seen as something that gives the user the choice as to how they want to use spaces instead of architecturally predetermining their lives. In the words of the French architect Arsène-Henri, flexible housing provides 'a private domain that will fulfil each occupant's expectations'; it is not about designing allegedly 'good' or 'correct' layouts but aims to provide a space which can accommodate the vicissitudes of everyday use over the long term.[16]



4 Wohnen morgen, Hollabrunn, Austria (architects: Ottokar Uhl + occupiers, 1976). Around half of the 70 dwelling units were designed by the occupiers themselves. They were able to choose: a) the arrangement of the given support structure in the dwelling units; b) the size of the dwellings, by determining the position of the facade elements; c) the subdivision of the dwelling into rooms – also kitchen and bathrooms; d) the number, type and position of windows and doors; and e) the finishing of the dwellings.

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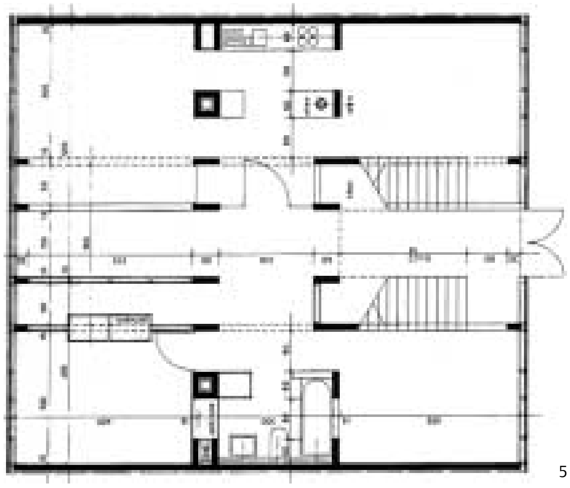

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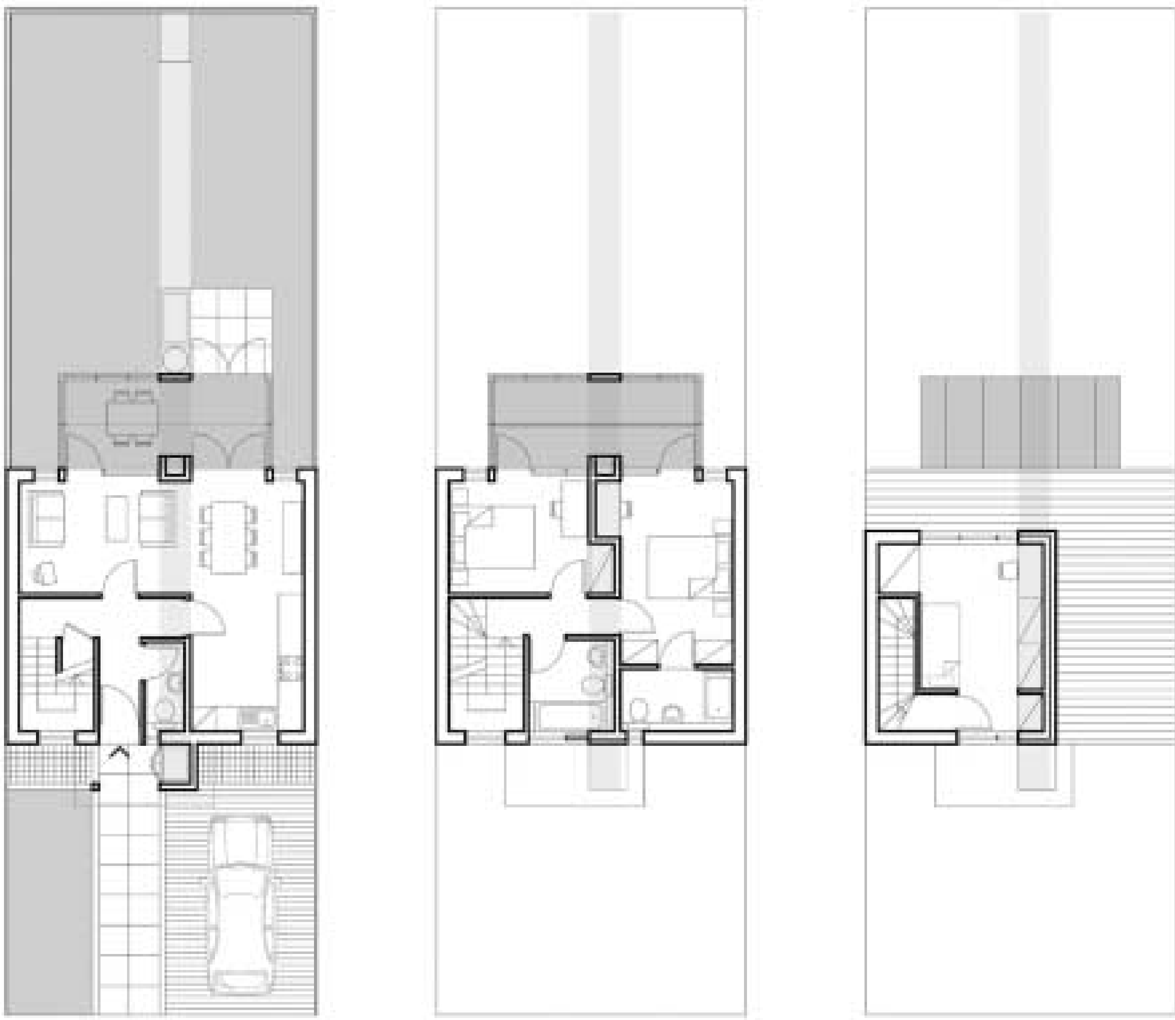
5 Competition entry for Hegi Winterthur, Switzerland (architect: Walter Stamm, 1987). Units of 9.90 x 11.40 have 'hard' (services, technology) and 'soft' areas (space). Rooms don't have a specific function, but can be bedroom, living room or work space.

6 'Living Wall' concept, UK (architect: PCKO, 2002). All spaces within a building are connected by a 'Living Wall' zone, which contains all the horizontal and vertical services, but also all the storage and energy collection. There will be blank slots, shelves and spaces where the 'Living Wall' can be upgraded and retro-fitted with additional or new technology, i.e. a central vacuuming system, or a water recirculation system, rubbish collection and recycling.



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This notion of empowerment is also a central feature of participatory design processes. Flexible housing not only allows users to take control of their environments post-occupation, but also during the design stage. Generally, buildings that are designed to be adaptable over time, will also lend themselves to user participation during the design process. One of the most fervent advocates of participation was the late Austrian architect Ottokar Uhl and the office Arbeitsgemeinschaft für Architektur, Stadtplanung, Koordination, who proposed that the advancement of architecture would not come through form, but would only come from engagement with the processes of designing and building *[4]*.[17]

However, participation, if understood as the tailoring of buildings to the precise needs of a user at one point in time, can very quickly be turned ad absurdum by changing occupant configurations.

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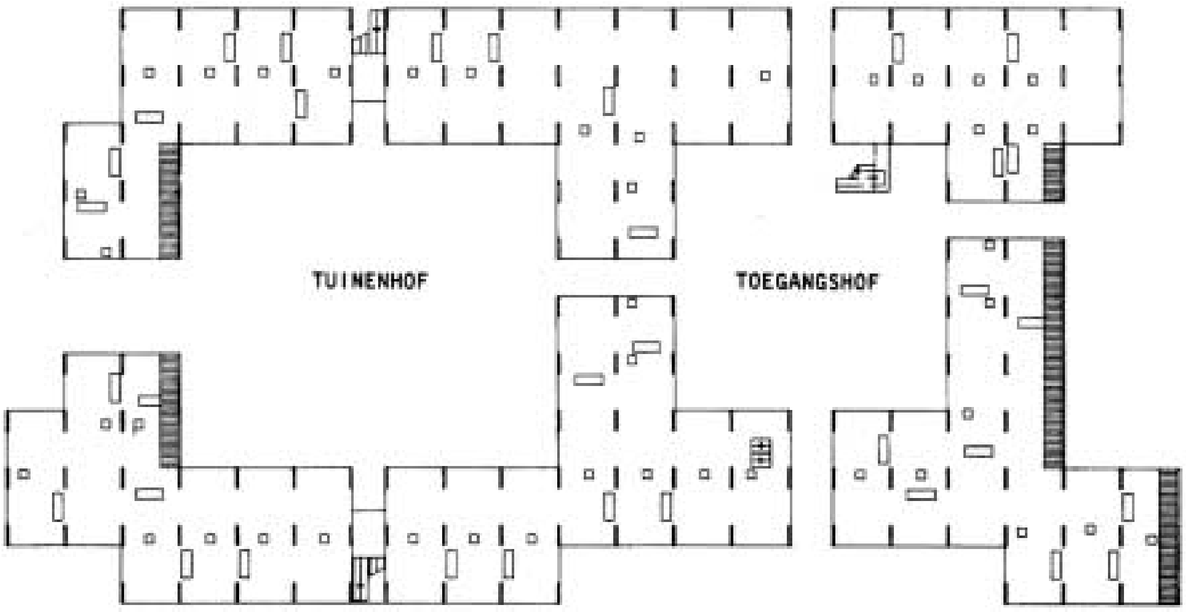

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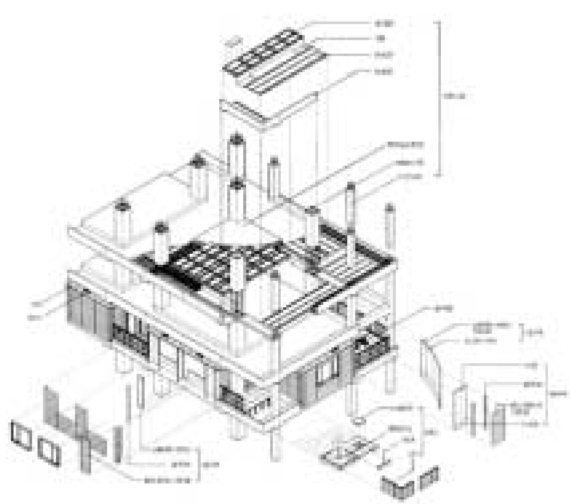

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7 Molenvliet, Papendrecht, The Netherlands (architect: Werkgroep KOKON, 1977). Molenvliet-Wilgendonk was a project submitted for a competition for the design of 2400 dwellings in 1969. The support structure consists of cast-in-place concrete framework, with openings in the slabs for vertical mechanical chases and stairs; to allow for variation and changeability in unit designs, the location of support elements was determined by a series of capacity studies: the facade is a prefabricated wooden framework. The design of housing units also involved user participation in various levels of the design process.

8 Next21, Osaka, Japan (architect: SHU-KO-SHA arch. + urban design studio, 1993). Here, the component system is divided into four groups according to the required life of each component and production path, they are manufactured as separate systems and modules so that outer walls, kitchens, baths and toilets, and gardens can be moved. Building elements are divided into two groups: long-life elements with a high degree of communal utility (columns, beams and floors), and short-life elements in private areas (partition walls, building facilities and equipment).

Therefore architects such as Walter Stamm, the architect of a participatory scheme in Wasterkingen, Switzerland, developed structural and design principles made for the 'second tenant' (typically unknown) or multi-usability *[5]*.[18] This system of multi-usability considers walls as furniture: removing or adding a wall doesn't necessitate plaster work or new flooring; notches in the columns suggest and visualise possible points of connections. For Stamm, the quality and details of the spaces resulting from this in-built adaptability are equal in importance to the service strategies and design principles that enable the flexibility.[19]

Technology

A certain logic of construction and provision of services allows flexibility of configuration, which in turn enables flexible use and occupation. Many of the more emphatic examples of intentionally flexible housing have a formal clarity, distinguishing between those elements that are fixed and those that are open to change and variation, allowing the upgrading of individual items with little disruption to the entirety of the building.[20] This form of 'future proofing' is particularly relevant to the provision of services which tend to need to be both continually updated and protected against obsolescence *[6]*.

Probably the best-known constructional principle to facilitate flexibility in housing is that of Habraken, whose theory of 'supports' was developed in opposition to prevailing conditions in the Dutch housing sector of the 1960s, as well as to enable his ideas of user participation. 'Supports' laid out a system in which the 'support' or base building is differentiated from 'infill' or interior fit-out in residential construction and design. A support structure, as both technical device and social frame, 'allows the provision of dwellings which can be built, altered and taken down, independently of the others' *[7]*.[21] The theory of 'supports' was subsequently developed into an approach that has generally become known as Open Building. The term is used to indicate a number of concepts that consider architecture and the built environment as a


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series of distinct levels of intervention or processes, under the general precondition that the built environment is in constant transformation and change *[8]*. Habraken, and the current Open Building movement, emphasise the use of modern construction techniques and prefabricated elements (factory-produced columns, beams and floor elements), but also the separation of base building, infill systems and subsystems, and manufacture and design for ease of assembly and disassembly.[22]

While Open Building today typically presents a highly technicised building method, flexibility can also be achieved through simple building materials such as timber, as exemplified in the work of Walter Segal. Segal's approach centres on systematisation without inventing a system ab initio: 'Standardisation in itself I have tried to do all my working life. But in building it is only significant if you do not standardise but that you use standardised things' *[9]*.[23] As with Habraken, we see in Segal the use of a flexible technical system as a means to achieve a 'flexible' social end, with his seminal buildings of the 1960s founded first on a belief in the empowerment of the lay self-builder. There is a tendency for technical solutions to flexibility to move from being a means to an end, to ends in themselves. Flexible technologies lend themselves to a certain technical determinism in which the use of new construction techniques and prefabrication overrides issues of design and social occupation.[24]

9 Lewisham 2, London, UK (architects: Walter Segal with Jon Broome and self builders, 1986). Self-builders have ranged from retired men in their 60s to single mothers and many were families with young children; all semi-skilled people who ended up constructing a house with a concept that is generally that of Meccano. Mass-produced materials are assembled in their market sizes, the structure is a balloon frame, most infill parts of the structure are not fixed together (all materials typically held in position by friction in order to maximise resale value of materials).

10 Flexsus House, Seto-City, Japan (architect: Takenaka Corporation, 2000). Flexsus 22 was designed as a system that can provide high changeability as well as a new structural system with high endurance that can improve the flexibility of housing units. It guarantees a durability of 100 years and flexibility of room plans being adaptable to changes in life stages and styles. The building is composed of a universal structural frame made of slabs and wall columns without hanging beams, a double floor system for public circulation, easy to renew monitoring and evaluation system (M&E system) installed inside of the shared M&E shaft, and hand railings in kit-format with minimum connection with the structural elements for easy removal/ installation. The exterior wall, the intermediate part between the 'Support' and the 'Infill', is in the cladding system, in high precision and for easy renewal, which consists of standardised concrete panels and aluminium sill applicable either for glazing or panels.

11 Greenwich Millennium Village Phase II, London, UK (architect: Proctor & Matthews, 2001). Identical plan forms of around 70m² can potentially accommodate a family, a couple that also uses the flat as a work space, and three independent people sharing. The subdivision is possible through acoustically sound sliding walls.

12 St. James, Nottingham, UK (developer: The Life Building Company, 2001). Potential buyers could choose a 'loft', a '1-bed' or '2-bed' plan.

Finance

The least researched area of flexible housing is the financial side. Sense tells us that flexibility is more economic in the long term because obsolescence of housing stock is limited, but there is little quantitative data to substantiate this argument. However, all our qualitative research indicates that if technological systems, service strategies and spatial principles are employed that enable the flexible use of a building, these buildings in turn will last longer, and they will be cheaper in the long run because they reduce the need and frequency for wholesale refurbishment *[10]*.

Although it is generally acknowledged that buildings which can be easily adapted over time will reduce running costs (to a housing association, public landlord, or home owners) whole life costing or the 'systematic consideration of all relevant costs and revenues associated with the acquisition and ownership of an asset', is seldom taken fully into consideration.[25] Overall, the increasing importance of whole life costing in the public sector is inextricably linked with notions of flexibility.

In the private sector, arguments about whole life costing fall on the deaf ears of the developers and so one has to turn to the argument of user satisfaction, which, as studies in other countries have shown, can be increased by implementing spatial adaptability and flexibility.[26] These arguments are supported by recent studies in the UK. The CABE / RIBA (2004) report on the future of housing identified 'Culture, Flexibility and Choice' as one of the key emerging themes over the next twenty years, stating that 'the nature of the individual households is forecast to

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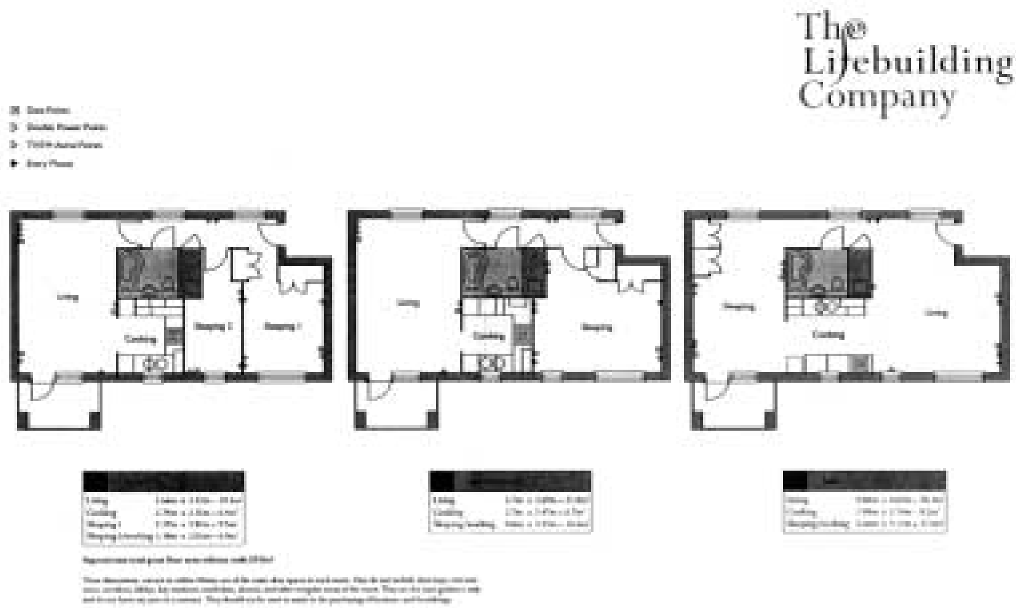

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continue changing. Viewed in tandem with the diverse modes of living, working and leisure time, it can be seen that our future housing needs to be flexible'.[27]

The lost opportunity

It appears that all these arguments in favour of flexibility in housing are some way from being accepted. Housing, particularly in the UK, is still regarded as a disposable commodity with the implicit suggestion that people just move on to the next property when their personal circumstances change. This runs contrary to the fact that houses are one of a country's most important assets, as was recognised all those years ago in the Parker Morris Report.[28] Certainly other countries have been acknowledging this not least through the higher percentage of GDP invested in housing.[29]

A number of conditions lead to the vast majority of contemporary housing in the UK being built for both inflexibility and thereby for obsolescence. In the UK, market-led factors largely determine the shape of housing, even in the hugely diminished public sector.[30] First, in the private sector there is a massive excess of demand over supply due to the scarcity of land, or at least land in the right places.[31] This means that with houses selling almost automatically, there is no incentive for developers to innovate or offer added value. Their main objective is to get the housing sold as quickly as possible and in this the future needs of the users hardly registers as a factor. Second, because the number of rooms is seen to be more important than the size of rooms, private housing tends to be designed down to minimum space standards and designated room types. This results in what Andrew Rabeneck calls 'tight-fit

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functionalism', the idea that rooms can only be used in one predetermined way because of the size and shapes of the rooms.[32] For example dining rooms are often included because they add perceived status to the property – but they are long and thin and usually have two doors thus making them extremely difficult to use for other purposes. Third, because of the economics of the building industry, outdated and inherently inflexible construction techniques are the norm.[33] Internal partitions are often loadbearing and roof spaces generally filled with trussed rafters which means that they can never be converted in the future.[34] Finally, services are fitted in a time-honoured and now outmoded manner, buried into walls or floors and so extremely difficult to add to or upgrade.

In effect, therefore, the housing sector is building in obsolescence through inflexibility; as one housing developer told us, this is not entirely accidental. Inflexibility means that once the users' needs change, as inevitably they do, the occupants have no choice but to move. This keeps the housing market in a state of permanent demand. If flexibility were built in, occupants would be able to adapt their houses and so stay longer in them; this would depress the housing market and limit the continuing sales on which developers depend. Housing developers actually promoting flexibility were thus described to us as like turkeys voting for Christmas. The only way to get over this problem is to show that building in flexibility adds value to the property and so it can command a higher price for little, if any, extra investment.[35]

However, there are a few signs that in the UK things are changing. The UK Design Council, for example, suggests that the best way to make sure customers buy the industry's products and services is to 'give them exactly what they want. [...] Observing people carefully and analysing how they live their everyday lives needs to be central to the design process' *[11]*.[36] In the end a move to the incorporation of flexibility in private sector housing will inevitably be market driven. Private sector customers, missing a real choice that goes beyond choosing the carpet colour or the frontage of kitchen cabinets, are being served by a few house builders who have moved into what is still a niche market by offering alternative layouts within the same shell *[12]*.

Contrary to the private sector where people can exercise choice or simply sell on, people renting from a social landlord typically cannot just move somewhere else if their social situation changes. The Housing Corporation, which is responsible for investing public money in housing associations, states that it wants 'to ensure that people will want, and be able, to live in these homes, now and in the future'.[37] In its Scheme Development Standards, which is the overriding, and for many overbearing, design document for social housing, it lists under 'recommended items' that dwellings should be designed to facilitate future internal remodelling by full span floor construction, non load-bearing internal walls, floor / ceiling space service runs, the possibility of later loft conversions, and to facilitate the subsequent provision of a side or rear extension.[38] However, this comes at the very end of a long list of essential items housing associations need to fulfil in order to receive grants; 'recommended' suggesting that it is not necessary. In many other ways the Scheme Development Standards work against flexibility. So, determining a standard width for any room determines a fixed configuration of furniture, which in turn fixes patterns of use. One of the most provocative, but also sensible, suggestions at a recent conference on flexible housing,[39] was that the best way of achieving flexibility would be to get rid of room designations – labels on rooms that back in 1961 the Parker Morris Report found to be inhibiting flexibility 'both in the initial design and in the subsequent use of a dwelling'.[40]

This paper has argued that the adoption of flexible housing has benefits in many areas. It addresses issues of finance: the idea that flexibility is more economic in the long term; participation: the way that flexible housing encourages user involvement in the design process; technology: the ways that flexible housing exploits, or is determined by, advances in construction technology; and use: the way that flexible housing adapts to different usage over time. The body of work already in existence provides a rich source of examples which can inspire future practices. With an approach to flexibility as broad as this, the multitude of methods for achieving flexibility is large. Architects, policy makers, housing developers, providers and most of all users cannot afford to overlook any of these issues. Despite the long list of lost opportunities and present obstacles, much has already been done to challenge existing conditions and much can be done to lever the issue of flexibility into the wider public domain.

arq 9/3-4 will continue this discussion in Jeremy Till and Tatjana Schneider's 'Flexible Housing: the means to the end'

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Notes

1. Steven Groák, *The Idea of Building: Thought and Action in the Design and Production of Buildings* (London: E & FN Spon, 1992), p. 15.
2. Alexander Henz and Hannes Henz, *Anpassbare Wohnungen* (Zürich: ETH Wohnforum, 1997), p. 4.
3. Architectural competitions, research projects and government reports included: 'Das wachsende Haus', competition, Germany (1932); 'The new house 194X', Architectural Forum, USA (1942); 'Homes for today and tomorrow', government report, UK (1961); SAR, founding of a research institute under Habraken, Netherlands (1961); 'Flexibler Wohnungsgrundriß', competition, Germany (1971); 'Wohnen Morgen', competition, Austria (1971); 'Fleksible boliger', competition, Denmark (1986, 1990/91); 'Accommodating Change', competition, UK (2002).
4. Adrian Forty, *Words and Buildings: a Vocabulary of Modern Architecture* (London: Thames & Hudson, 2000).
5. Jia Beisi, 'Adaptable Housing or Adaptable People?' in *Architecture et Comportement / Architecture and Behaviour* 11, pt. 2 (1995), 139–162.
6. Maureen Taylor, 'User Needs or Exploiter Needs', *AD* 11, (1973), 728–732 (p. 728).
7. Forty, p. 143.
8. Karin Kirsch, *Die Weissenhofsiedlung: Werkbund-Ausstellung 'Die Wohnung':Stuttgart 1927* (Stuttgart: Deutsche Verlags-Anstalt GmbH, 1987), pp. 59–61.
9. Forty, p. 143.
10. Ibid. p. 143.
11. Günther Domenig, 'Wohnprojekt "Neufeldweg" in Graz/A' in *Deutsche Bauzeitschrift* 39, pt. 4 (1991), 492–502.
12. Jeremy Till and Sarah Wigglesworth, 'The Background Type' in *Accommodating Change*, ed. by French (London: Architecture Foundation, 2002), pp. 150–58 (p. 152).
13. Gerard Maccreanor, 'Adaptability' in *a+t* 12 (1998), 40–45 (p. 43).
14. Herman Hertzberger, *Lessons for Students in Architecture* (Rotterdam: Uitgeverij 010 Publishers, 1991), p. 47.
15. Irénée Scalbert, *A Right to Difference: The Architecture of Jean Renaudie* (London, Architectural Association, 2004), p. 40.
16. Andrew Rabeneck, David Sheppard and others, 'Housing flexibility?' in *Architectural Design* 43 (1973), 698–727 (p. 701). The most extreme expression of flexibility can probably be found in Yona Friedman's demand for structures that are 'transformable at will by the individual'.
17. Bernhard Steger, *Über Partizipation. Mitbestimmung bei Ottokar Uhl* <http://www.parq.at/parq/sections/research/stories/297/> [Accessed 19 July 2005].
18. Nikolaus Kuhnert, Philipp Oswalt and others, 'Die Wohnung für den Zweitmieter' in *Arch+* 100/101 (1989), 30–33. Despite a cross-wall construction and no further internal subdivision, the floor plans of the scheme at Wasterkingen proved to be expensive to alter.
19. Ibid., p. 32. Twenty years before Stamm, the Dutch architect John Habraken (1972) called for the interdependence of the dweller and dwelling in buildings which 'from the beginning are totally part of ourselves, for better or worse'. It may be easy now to dismiss this as hopeful rhetoric, but Habraken's vision is not simply one of ideology.
20. Flexibility with regard to the provision of services is, above all, important for the public sector. Maintenance of existing housing stock (upgrading of technical systems, ranging from new kitchens to wiring and heating) is no longer grant assisted in the UK. Whereas a number of years ago social landlords could get grants for improvement, today long term maintenance of properties has to come out of income and a 'setting and sinking fund' for each scheme.
21. Nicolaas John Habraken, *Supports: An Alternative to Mass Housing* (London: Architectural Press, 1972), p.13. Too often interpreted on a merely technical level, Habraken himself stresses, first, that the book 'Supports' was intended to be a 'suggestion for *one* possibility among many' and, second, that a dwelling is only a dwelling, when people come to live in it. Habraken saw 'Supports' as an alternative approach to the functionalist concept of the 'machine for living'.
22. Ibid. and Stephen Kendall and Jonathan Teicher, *Residential Open Building* (London: E & FN Spon, 2000). While Open Building certainly provides the foundation for flexible and adaptable spaces, the quality of some of the environments produced could certainly be questioned. In Walter Stamm's understanding, this arises because technical issues and those of prefabrication are too often stressed over the provision of spatial quality.
23. John McKean, *Learning from Segal: Walter Segal's Life, Work and Influence* (Basel: Birkhäuser, 1989), p. 148.
24. David Gann, Mark Biffin and others, *Flexibility and Choice in Housing* (Bristol: Policy Press, 1999). While the report addresses innovation in construction, new processes, the reduction of inefficiencies, etc., in the UK and abroad, it fails to connect these technical conclusions to issues of design.
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31. Kate Barker, 'Review of Housing Supply. Delivering Stability: Securing our Future Housing Needs' (London: Her Majesty's Stationery Office, 2004), p. 20.
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33. This problem has been the subject of a number of UK Government reports, most recently the so-called Egan Report (1998).
34. In some cases, even if walls are not loadbearing, they are made of blockwork because, as one of our interviewees said, this gives a feeling of 'superior robustness' to potential purchasers. Anyone who has attempted to knock down blockwork knows that it is not exactly the most flexible material.
35. This research has not been carried out, though there is some evidence that potential purchasers do value the ability to adapt their future homes, if only because they feel they are being given a choice. In the UK only one small developer, The Lifebuilding Company, has explicitly addressed the issues of flexibility as part of a wider sustainable agenda.
36. Design Council, *Competitive Advantage through Design* (London: Design Council, 2002), p. 23.
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