

## **Impact! Mass Housing as the Cornerstone of Bauhaus Contribution to Future Design Methods**

*Yael Allweil, Ph.D - Technion Faculty of Architecture, [aryael@technion.ac.il](mailto:aryael@technion.ac.il)*

*Nimrod Regev - Technion Faculty of Architecture, [mail@studio-toro.com](mailto:mail@studio-toro.com)*

### **Abstract:**

This paper discusses Bauhaus' impact on the future of design by examining its key role in the formation of four design strategies developed to meet the problem of mass housing. Mass housing was first regarded as a problem for professional designers in the modern context of the industrial city. Yet it was in interwar Bauhaus where housing was first articulated as the center of all design problems—from the city to the building, to the chair. Bauhaus teachers and students saw housing as an extreme design problem, through which architects and designers developed new design methods for meeting the demands of affordability, functionality, varied needs, and mass production. In this paper we identify four key design methods articulated for mass housing in the interwar period, and their changes and re-articulations over time: (a) Design rigour; (b) Disassembly and reassembly; (c) Seriality vs. replication; and (d) Democratic design. Our paper opens with a theoretical and technological mapping of the four design methods as articulated in design manuals, syllabi, and designed objects. Afterwards, we trace the evolution of the four methods over time by examining their design articulations in four key periods of modern housing: interwar modernism, post-WW2 mass housing, experimental avant-garde futurism (1960s–1970s), and contemporary design explorations. The four design methods exemplify Bauhaus' impact as a modern design laboratory. Likewise, they limn more modern approaches to similar problems, like the move to kit furniture and kit housing.

**Keywords:** Mass Housing, Design Methods, Design History

### **Introduction: Mass Housing as a New Design Problem**

This paper discusses the impact of the Bauhaus on the future of design by examining its key role in the formation of four design strategies developed to meet the problem of mass housing. As Naylor, Droste and others have shown, other schools of architecture and design in Germany, Russia and Holland had experimented with 'preliminary' courses and interdisciplinary approaches in establishing a methodology for design and design

education. Yet it was at the Bauhaus of the interwar period where housing was first articulated as the center of all design problems. ‘What is unique about the Bauhaus’ writes Naylor ‘is the fact that its ideologies epitomize changing concepts concerning the nature and purpose of design’.<sup>1</sup> These, as seen in Gropius’s preoccupation with type-forms and standardization, addressed deep changes in articulating the democratic purpose of architecture, challenging architects and designers to develop new design methods for the demands of affordability, functionality, varied needs, and mass production.

In this paper we identify four key design methods articulated for mass housing in the interwar period: (a) Design rigour; (b) Disassembly and reassembly; (c) Seriality vs. replication; and (d) Democratic design. Our paper maps the four design methods at the Bauhaus and related architects. We then examine the changes and re-articulations of the four design methods over time in three distinct periods: Post-WW2 mass housing; Experimental avant-garde; and the contemporary.

### **Interwar Mass Housing: Developing New Design Methods**

The Bauhaus manifesto of 1919, as well as its implementation via the celebrated syllabus, declare building as the goal of creative capacity. Design for mass production in the built environment was triggered by housing as a design problem requiring new methods.

(a) Mass—rather than customized—production requires systematic, **rigorous design**. Developing techniques for rigorous design included a combination of repeated and incremental design attempts followed by graphical or rational comparative analysis in multiple cycles, allowing analytical advancement towards a set of predetermined goals. A key figure in developing design rigour as a consolidated method is Alexander Klein. Though less known than his colleagues Ernst May, Bruno Taut and Walter Gropius, as head of Berlin housing department 1927–1933 he was tasked with giving solutions to the rapidly growing numbers of urban workers. His research implemented rational thinking together with rigorous techniques in order to determine the most efficient and therefore most affordable housing per conditions of ventilation, sunlight and floorplan ratios.

(b) Design premised on **disassembly and reassembly** involves taking something seemingly well-known apart, closely examining each of its pieces, keeping some, removing others, adding new components, and reassembling in a better way. The centrality of this design method for interwar modernists can be seen in the Bauhaus

syllabus in Weimar. Taking design education apart, it was disassembled into its basic parts and reassembled into a coherent staged syllabus.

Explorations of disassembly and reassembly in housing at the Bauhaus include the 'Haus am Horn' by Georg Munche for the 1923 first Bauhaus exhibition. This house-exhibition involves analysis of the elements of the dwelling, taking them apart, and rearranging them to produce a different spatial assembly. Comparatively, Le Corbusier's Dom-Ino house was occupied with disassembly and reassembly of the building's structural components rather than function or spatiality. Dom-Ino as a design idea involves breaking down traditional structures and reassembling them based on structural elements (floors, columns and stairways), and 'free' floor plans and facades. 'Attention has never been given to the serious study of the various units, and still less to that of the construction itself' wrote LC, offering 'the mass-production state of mind'.<sup>2</sup>

(c) Gropius identified housing as a problem in producing a **series**. Developed at the Bauhaus since 1921, 'serial houses,' were based on modular spatial units, 'Baukasten,' which can be assembled into multiple spatial and functional compositions. **Seriality vs. replication** was for LC the key design challenge for mass production houses, the direct objective of the Dom-Ino. 'Maison en serie'—translated to English as 'mass production housing'—embeds the series as a design problem far more complicated, and the Achilles' heel of mass production. Seriality as opposed to mere replication, depended on the method of disassembly and reassembly in determining the terms for variation.

Gropius later gravitated to exploring seriality via prefabrication of building parts for Stuttgart Weissenhofsiedlungen of 1927, and Hirsch-Kupfer copper prototype flat-pack houses of 1931. The series of panels made from steel, copper, or wood, would be manufactured in the factory, delivered by truck or train, and assembled into a house (or other small building) on the site.

While much scholarly attention has been given to Gropius' and others' explorations of industrialized building parts and construction systems, interwar 'serial houses' were arguably the most explored—evident in successful and even failed experiments, such as Georg Munche's and Marcel Breuer's 1924 explorations of 'apartment building' blocks. Type explorations were developed into Bauhaus Dessau Masters' houses and Torten

estate, and significantly at the Weissenhofsiedlungen as a fascinating exercise in seriality. Built for the Deutscher Werkbund exhibition in Stuttgart in 1927, the estate included twenty-one buildings comprising sixty dwelling units. Designed by seventeen different architects, the estate encompassed a series of 'type-forms' and standardization proposals.

(d) The **democratic** purpose of architecture, for Gropius, was deeply tied to mass production. Asking 'why is the Bauhaus so important?', Gropius declared 'because it faced the problem of good **design for mass production**'.<sup>3</sup> Modern interwar housing was produced primarily for urban workers, from Vienna's 'red' urban government to unions of sectoral workers. In line with ideas of the 'Arbeitsrat', for Gropius building was a 'social, intellectual and symbolic activity . . . to level class differences and bring layman and artist together'.<sup>4</sup> Housing meshed the Arbeitsrat statement that 'art shall no longer be a luxury of the few but should be enjoyed and experienced by the broad masses', together with the Bauhaus manifesto statement, 'The ultimate aim of all creative capacity is the building!'<sup>5</sup> The Arbeitsrat, Workers Council for Art (Berlin 1918 to 1921), was dedicated to bringing the current developments and tendencies in architecture and art to a broader population. Since its early stages, commissioning clients (workers) involved mass housing with ideas of needs-based design and collective decision making—affecting dis- and re-assembled elements, as well as the categories for assessing rigour in design.

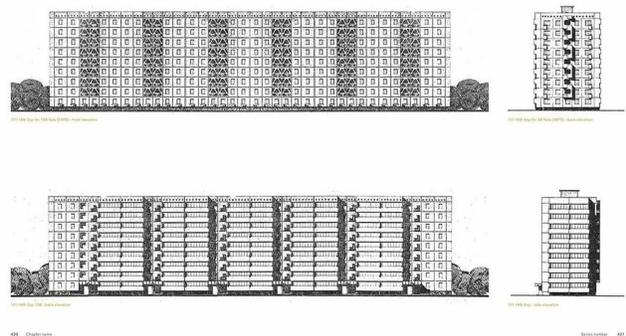
Addressing the 'problem of good design for mass production' housing was the cornerstone of the Bauhaus contribution to modern design methods. The design of modern mass housing continued to involve explorations of these four design methods, which have been evolving over time as housing as a design problem was rearticulated by economic, governmental and political processes.

### **Design Methods Over Time:**

#### Post-WW2 Mass Housing

Following WW2, the scale and purpose of mass housing as a design problem has changed dramatically, leading to changes in the design methods. In addition to much discussed changes in the bodies and institutions producing housing as social right and social good, housing has also been the arena for intense debates revolving the aims and methods of architecture, rearticulating and re-formulating the four design methods.

(a) **Design rigour** after WW2 addressed the acute housing shortage across Europe, the US, and new nation states from the Middle East to South-East Asia, addressing the need to stabilize societies by sheltering millions. French colonial urban planner Michel Ecochard, who was part of ATBAT-Afrique in Morocco, famously defined this challenge as design for ‘the greatest number’. Design rigour towards this goal involved assessment and consolidation of ‘best types’—effective mass production based on cost and construction methods. Its most well-known products are housing manuals-catalogues produced by many Ministry of Housing technical departments, mass housing estates like the Khrushchovkas or Israeli Shikunim, and to some extent American GI-bill suburbs. This concept of rigour arguably annulled explorations of seriality in favor of effective replication of ‘perfected’ solutions, with well-discussed sociopolitical implications.



Effective replication was deeply objected to at CIAM 9th meeting on habitats, where several groups proposed new rigour that included anthropological, social and cultural methods. These evolved into Team X’s critique of CIAM, premised on re-articulating modern design methods for housing. As opposed to the CIAM grid, MARS’s alternative grid for assessing design, by Alison and Peter Smithson, identified design rigour by house, street, district and city. While Van Eyck’s proposal for the Dutch group proposed identity as part of the design rigour for housing, Michel Ecochard’s Housing rid involved cultural and demographic aspects of dwellings. (b+c) The goal of producing quick and affordable mass housing involved two key explorations: kit housing and assembly-line housing. Both strategies involve a methodological mesh of **Seriality–Replication** and **Disassembly–Reassembly**, premised on disassembling house components towards

effective replication of building components for mass reassembly. Kit housing design disassembles the house into repeating built elements that can be reassembled into a series of products that adhere to the limitations of the assembled elements. Gropius and Wachsmann's panel system for the General Panel Corporation is one of the most well-known kit explorations. Their 'Packaged House' employed ten panel types, some with cut-outs for windows, some could be used as doors, others could be used for walls, floors or ceilings. The adaptability and flexibility of the panels depended on the ingenious invention of the wedge connector, which allowed the panels to be deployed in any three-dimensional direction in a closed system, eliminating the need for any other construction system. Even though these kinds of systems had a potential for fast cheap construction, the longer design process and complex site logistics turned kit housing into an upper class architecture endeavor rather than the intended mass housing solution. Conversely, assembly-line strategy disassembles the house into basic design elements and assembles them by repeating them over and over. The design elements can be whole houses like Levittown's suburban houses, or it can be an apartment or entire floor in block and tower estates. This construction-oriented method is very cost effective. While assembly line production was successful in creating a multiplicity of designed objects at high quality and affordability, in housing this design method promoted replicated monotone one-size-fits-all designs.

(d) Post-war designers largely assumed that mass access to housing, produced by the state for its citizens, is necessarily '**democratic**' design. Executed via public service at state or city level, a public enterprise funded by citizens' taxes and on behalf of egalitarian principles, democratic design was framed as a value, rather than a method.

#### Experimental Avant-garde Futurism (1960s-1970s).

(a) Primarily discussing technological imaginations of future architecture, the 1960s-1970s avant-garde was fascinated with alternatives to mass housing. Peter Cook framed the **design rigour** proposed by Archigram, SuperStudio and others—whose design vision relied on not-yet-available technology—as 'inevitable . . . experiment'.<sup>7</sup> **Experiment as rigour** critiqued post-war architecture's focus on technologies of replication, proposing science-fiction iconography as means for expanding design thinking.

(b) Following interwar modernists, avant-garde architects—from Archigram to Habraken to Japanese Metabolists—**disassembled** mass housing estates of the post-war period (blocks and towers) by breaking them down to structural elements and infill elements. The principle involved technological elaboration on LC's Dom-Ino for the structural system and Gropius and Forbat's Honeycomb System for the housing unit and. Whether **reassembled** by Habraken as 'supports and infill', by Archigram as crane-like structural cores and plug-in units, or by Kurakawa's expanding dual system of structure and spatial units, avant-guard architects understood housing as a system composed of supporting structure and flexible/individual dwelling units, offering them as two distinct—while connected—design problems.

(c+d) Avant-garde experiments with habitats 'for the greatest number' therefore explicitly meshed the design problems of **seriality vs. replication** with **democratic needs-based design**. Rather than providing universal solutions, easily replicable or modified, they devoted architectural rather than ethnographic methods for user-defined needs. Lucien Kroll's work elaborated on Habraken's supports and infill system. Focusing design attention to developing methods for user participation in the design process, he produced user-shaped architecture rather than architecturally shaped users. De-linking structure from infill involved designing a kit system for 'infill' partitions to be selected by users per their spatial needs, reflecting via the façade the potential diversity of the dwelling unit. 'In order to create a type of politics unrealizable at present, we are trying out in advance the different methods which might one day bring about the political situation we have in mind. This is simply a matter of suggesting prototypes . . . and taking note of their possibilities and drawbacks', wrote Kroll.<sup>8</sup>

"Ikea": Contemporary Design Explorations.

(a+d) In recent years **design rigour** and **democratic design** started to consolidate one method that combines parametric algorithms and data collection from the public in the attempt to create a new design language. These attempts rely on data collected in the book "Life at Home in the Twenty-First Century", for instance, to construct models for data driven home design. Alternatively, disassembling design language and reassembling it into a design grammar for mass customization of houses based on historical precedents like Duarte's mass customization based on the grammar of Siza's houses at Malagueira.

(c+b) Methods of **disassembly reassembly** and **seriality / replication** also converge. The growing number of modular fabrication systems drives architecture from fabrication towards assembly design. Inspired by Gropius' attempts in the early twentieth century, this design methodology sees the role of the architect as an ensemble designer that should use off-the-shelf products for design. Kieran Timberlake's Cellophane House epitomizes this approach. As computer generated fabrication techniques become more prevalent, however, this approach is converging with fabrication methods into a unified method of mass customization. Still avant-garde, these approaches start to enter the mainstream as can be shown in the IKEA - Space 10 Urban Village and Building Blocks Projects.<sup>9 10</sup>

## **Conclusion**

This paper argues that the impact of modernist architecture—and the Bauhaus specifically—on contemporary design lies largely in developing design methods for addressing mass housing as a modern design problem, that (together with the city) drove the modernization of the discipline. The evolution of the four design methods across the history of housing design exemplifies the impact of the Bauhaus as a modern design laboratory and of housing as a pertinent design problem. Design rigour, Seriality vs. replication, Assembly-disassembly, and Democratic design continue to shape contemporary attempts to address the global housing crisis via design.

## **Bibliography:**

- 10, Team, Max Risselada, and Dirk van den Heuvel. *Team 10: 1953-81, in Search of a Utopia of the Present*. Rotterdam: NAI, 2005.
- Arnold, Jeanne E, Anthony P Graesch, Elinor Ochs, and Enzo Ragazzini. *Life at Home in the Twenty-First Century: 32 Families Open Their Doors*. ISD LLC, 2012.
- Bayer, Herbert, Walter Gropius, Ise Gropius, and Beaumont Newhall. *Bauhaus, 1919–1928*. Museum of Modern Art, 1938.
- Benros, D, and JP Duarte. "An Integrated System for Providing Mass Customized Housing." *Automation in Construction* 18, no. 3 (2009): 310–20.
- Bevilacqua, Marco Giorgio. "Alexander Klein and the Existenzminimum: A 'Scientific' approach to Design Techniques." *Nexus Network Journal* 13, no. 2 (2011): 297-313.
- Bergin, Michael, and Kyle Steinfeld. "Housing Agency System (Has): Multi-Criteria Satisficing & Mass-Customization of Homes." (2012).
- Chalk, Warren, Peter Cook, Dennis Crompton, Ron Herron, David Greene, and Michael Webb. *Archigram - the Book*. London: Circa Press, 2018.
- Cook, Peter. *Experimental Architecture*. London: Academy Editions, 1972.
- Corbusier, Le. *Toward an Architecture*. frances lincoln ltd, 2008.
- Corbusier, Le, and Eugène Claudius-Petit. *Vers Une Architecture*. G. Crès, 1924.
- Droste, Magdalena. *Bauhaus, 1919–1933*. Taschen, 2002.
- Duarte, José Pinto. "Towards the Mass Customization of Housing: The Grammar of Siza's Houses at Malagueira." *Environment and planning B: Planning and Design* 32, no. 3 (2005): 347–80.

Eleb, Monique. "An Alternative to Functionalist Universalism: Écochard, Candilis, and Atbat-Afrique." *Anxious modernisms: experimentation in postwar architectural culture* (2000): 55–73.

Gropius, Walter. "Internationale Architektur." *München, Langen* (1925).

Habraken, N John, and Jonathan Teicher. *The Structure of the Ordinary: Form and Control in the Built Environment*. Cambridge: MIT press, 2000.

Kroll, Lucien. "Architecture and Bureaucracy ". In *Architecture for People: Explorations in a New Humane Environment*, edited by Byron Mikellides. New York: Holt, Rinehart and Wins, 1980.

Marchesi, Marianna, and Dominik T Matt. "Design for Mass Customization: Rethinking Prefabricated Housing Using Axiomatic Design." *Journal of Architectural Engineering* 23, no. 3 (2017): 05017004.

Meuser, Philipp, and Dimitrij Zadorin. *Towards a Typology of Soviet Mass Housing: Prefabrication in the USSR 1955-1991*. Berlin: DOM publishers, 2015.

Milgrom, Richard. "Lucien Kroll: Design, Difference, Everyday Life." In *Space, Difference, Everyday Life.*: Routledge, 2008, 278–96.

Naylor, Gillian. *The Bauhaus Reassessed*. Van Nostrand Reinhold Company, 1985.

Sadler, Simon. *Archigram: Architecture without Architecture*. Mit Press, 2005.

Seelow, Atli. "The Construction Kit and the Assembly Line—Walter Gropius' Concepts for Rationalizing Architecture." Paper presented at the Arts, 2018.

———. "Function and Form: Shifts in Modernist Architects' Design Thinking." Paper presented at the Arts, 2017.

---

<sup>1</sup> Gillian Naylor, *Bauhaus Reassessed*, 9.

<sup>2</sup> Le Corbusier, *Toward an Architecture*, 232.

<sup>3</sup> Herbert Bayer et al., *Bauhaus, 1919-1928*, catalogue jacket.

<sup>4</sup> Magdalena Droste, *Bauhaus, 1919-1933*, 19.

<sup>5</sup> "Bauhaus Manifesto," 1919 and "Arbeitsrat flyer", 1919; See Droste, *Bauhaus, 1919-1933*.

<sup>6</sup> Model prepared for the "Architekturteilchen – Modulares Bauen im digitalen Zeitalter" at the MAKK – Museum für Angewandte Kunst Köln, 2012.

<sup>7</sup> Peter Cook, *Experimental Architecture*, 10.

<sup>8</sup> Lucien Kroll, "Architecture and Bureaucracy," 162.

<sup>9</sup> The Urban Village Project, <https://space10.io/project/the-urban-village-project-a-vision-for-liveable-sustainable-and-affordable-homes/>

<sup>10</sup> The Urban Village Project, <https://www.oeffekt.dk/urbanvillageproject>