

Article

Publicising Plastic and Plasticising Public in Ralf Schüler and Ursulina Schüler-Witte's 'Indapt System' (1970-72)

Alexander Davidson

Hochschule Anhalt. Private: Residenzstraße 80, 13409 Berlin. alexander.davidson@hs-anhalt.de

(Submitted: 7 January 2017; accepted: 14 August, 2017)

Abstract: In architecture, external factors are often seen as the cause of a work not being brought to completion. I believe that often the reasons for a scheme not being implemented are to be found not externally but rather in the fine detail of the job itself. I will consider the case of Ralf Schüler and Ursulina Schüler-Witte's 'Indapt System' (1970-72) and show how the contributors, the work produced, and the research project's structure may have contributed to BASF's decision not to build the plastics megastructure. This decision has been attributed to the Oil Crisis of 1973. Instead, I will outline a causal relationship between the protagonists - Schüler, Schüler-Witte, Robert Jungk, Norbert Adrian, and Otto Walter Haseloff - and their plans for modular plastics housing, and their failure to instruct BASF on what type of polymer to use. With that, the group members proposed a view of plastic less as architectural material and more as social ideal, something also reflected in the contributors' various specialisms. The 'Indapt System's' model had greatest impact outside the architectural community. Interpreting this finding, the work will end by contending that, rather than producing architectural knowledge, the principle aim of architectural research should be to create public knowledge of architecture through communication or restoring publicness in architecture.

Keywords: *Ralf Schüler, Ursulina Schüler-Witte, Robert Jungk, future workshops, plastics architecture, megastructure, modular architecture, 'Indapt System', BASF.*

1. Introduction

The 'Indapt System' was the outcome of research commissioned at the end of the 1960s. Noted futurologist, Robert

Jungk, had had some success running future workshops for employees at West German companies through his Institute for Futures Research, and had proposed a similar arrangement with BASF. However,

Bernhard Timm, the CEO of the German chemical company, declined Jungk's offer.^[1] Instead, BASF opted to pilot their own visionary research project, inviting Jungk, as well as a social psychologist, and in 1970, two architects, Ursulina Schüler-Witte and Ralf Schüler,^[2] to conceive of an ideal housing scheme for the end of the century. 'Wohnen im Jahr 2000' was then a research project which would allow BASF to exploit the vogue for future workshops and explore the confluence that had emerged between the materials of radical architecture and their own polymer products. Therefore, it was interesting that the 'Indapt System' did not advance a particular plastics product. The people running the research project ascribed no limits as to which type of polymer or composite was to be used if it reached production, propounding instead a concept of plastic, less as an architectural material, and more as a social ideal.

Schüler-Witte has stated that BASF did not put the 'Indapt System' into production because the economic effects of the oil crisis of 1973 made its dominant materials, plastics, too costly.^[2] Whilst this was mutually expedient, providing BASF with grounds not to implement the proposals and the architects a reason beyond their control to move on from polymers, this causation does seem to be inductively reasoned. By which I mean to say that, if the oil crisis had been a conditioning factor, then, to some degree, it ought to have formed an impediment to other projects using large quantities of factory-produced plastics. This does not seem to have been uniformly the case. Well after the embargo, the Finnish Company Polykem continued to make Matti Suuronen's fibreglass-reinforced polyester plastic (FRP) 'Futuro House' (1968-78),

and the British architect James Stirling was generous in his use of prefabricated fibre reinforced polyester panels for his 'Southgate Estate' in Runcorn New Town, Cheshire, England (1970-77).

I believe that the reasons for this proposal not being implemented lie not in external factors but rather in the fine detail of the job itself. With reference to Schüler and Schüler-Witte's papers at the Berlinische Galerie, I will give greater focus to the people involved, their work, and the structure of the research project. How far were those involved conducive to good outcomes? Were the architectural proposals more practical or theoretical in their architectural detail and material selection? What aesthetics were they espousing and how may this have affected BASF's decision? What can the research project's structure tell us about the 'Indapt System's chances of being built? Whilst there is a risk of creeping determinism in this approach, the pre-existing suggestion of causation requires that architectural historians build inwardly-related proofs that do not take us beyond the type of archival material that we are equipped to comment on.

2. The protagonists

Competition judges or clients may and often do select projects that hold minor interest to architects, just as highly motivated architects might spend untold hours working on a proposal, only to see it be rejected. If disputes born of irreconcilable beliefs and personalities lead the work to have a particular character where another would have been of greater assistance in persuading the assessor, then the likelihood of the scheme being executed would be made worse.

**DER ZUSTAND UNSERER
STÄDTE STELLT EINE
HERAUSFORDERUNG DAR,
DIE MIT KONVENTIONELLEN
DENKWEISEN,
VERFAHRENSFORMEN
UND PLANUNGSTECHNIKEN
NICHT MEHR SINNVOLL
BEANTWORTET WERDEN KANN**

Figure 1 The 'Indapt System' catalogue. It reads: "The challenges posed by the state of our cities cannot be addressed with conventional thinking, planning, or procedures".^[3]

The non-architects involved in the 'Indapt System' project had divergent beliefs. By his own account, Jungk drew on technological theorists such as Lewis Mumford, Günther Anders, and Herbert Marcuse. He was essentially an optimist. He believed that a more just world would emerge if ownership of science and technology was placed in the hands of the people.^[4] Norbert Adrian also worked on 'Wohnen im Jahr 2000' for a period. He had been part of the anti-atomic weapons movement and, as a member of the SDS, was immersed in the student demonstrations of 1968. All this might seem intentionally antagonistic to the "market researcher" who served as the third protagonist.^[5] Yet, Otto Walter Haseloff, a professor of psychology, was able to demonstrate his own New Left credentials. An address he gave at a

futurology conference in Frankfurt piqued the interest of Stefan Waldruff, a founding editor of the *Arch+*, the 'Zeitschrift für Architektur und Städtebau' (Journal for Architecture and Urban Development). Waldruff asked Haseloff to repurpose his speech as an article for the nascent journal which had emerged from student discontent in Stuttgart. Haseloff's vision, of power and capital usurping the state's influence in forming social structures, spoke in a language familiar to the magazine's readership.^[6] However, his predictions as to the role consumption was to play in society at the end of the century also set out some clear points of difference, which overwhelmed whatever common worldview the protagonists might otherwise have shared.

Even accounting for the self-mythologising acute to this generation,

there was variance too in the group member's personalities. Jungk was the kind of person who had absorbed Adorno's famous dictum about orientating every thought and feeling so that Auschwitz never happens again. He thought of himself as a constructive agitator for whom future workshops were a means of reworking market economies, turning the people he believed they affected into active decision-makers.^[7] Adrian was a lifelong philosophy student, never graduating because he feared becoming one of the professors he had criticised.^[8] He thought of his non-productivity as an attempt to undermine the effect of concentrated power. In contrast to this agitation, Haseloff was at ease with consumerism, as well as being self-assertive and capable of giving a good account of himself in unfamiliar situations. Throughout their careers, Schüler and Schüler-Witte became adept at balancing reason and radical gesture, staying alert to new tendencies in architectural schools in West Germany and drawing talented assistants from the pool of junior architects. They were diligent enough to get large public schemes built, navigating the forces of local politics to realise the 'Internationales Congress Centrum' (ICC) in Berlin. In 1970, they were still relatively young in architectural terms and were already making plans for the ICC.

Equally varied were the non-architects' motives for taking part in the project. Jungk had some hand in bringing the idea of future workshops to BASF's attention and, after an exchange of words with Timm in the press, may have felt obliged to participate. The 'Wohnen im Jahr 2000' working group was composed of architects and professors, protagonists of an entirely different social status to the unskilled workers and tenants that Jungk was used to dealing with in his future workshops.^[1] Therefore he was probably curious to see

whether the basic notion of a group of individuals coming together to conceive an ideal future could have a more far-reaching impact with participants usually seen as agents rather than subjects of institutional power. For Adrian, the research project, viewed as an exercise in pure thought, may have held some intellectual appeal. Haseloff's body of work made him seemingly the most amenable of the non-architects to BASF's aims for 'Wohnen im Jahr 2000'. In his speech at the futurology conference in Frankfurt, Haseloff foresaw that, by the end of the century, architects of mass housing were going to favour modular plastics systems.^[6] He would have been flattered at the chance of having his vision implemented and would have had little moral quandary about working with a commercial enterprise.

The architects' motives were more apparent. Having already undertaken studio work on plastics housing after hours at their employers' office in 1968, Schüler and Schüler-Witte were keen to see this personal interest receive the benefit of support from the industry. It was a chance to see whether, with the backing of a chemical company, they were able to push plastics beyond the single dwelling and apply the materials to mass housing. In this, they would have been encouraged by BASF's sponsoring of one of the period's prominent figures in plastics architecture. With BASF's assistance, Rudolf Doernach had built a prototype of stackable containers using expanded polystyrene concrete panels at the Hannover building exhibition 'Constructa '70'. Schüler and Schüler-Witte were aware of his work and perhaps thought they could build on it by achieving greater modularity with plastics.^[9]

These differing beliefs, personalities, and motives for participation led to discord within the working group. Schüler-Witte

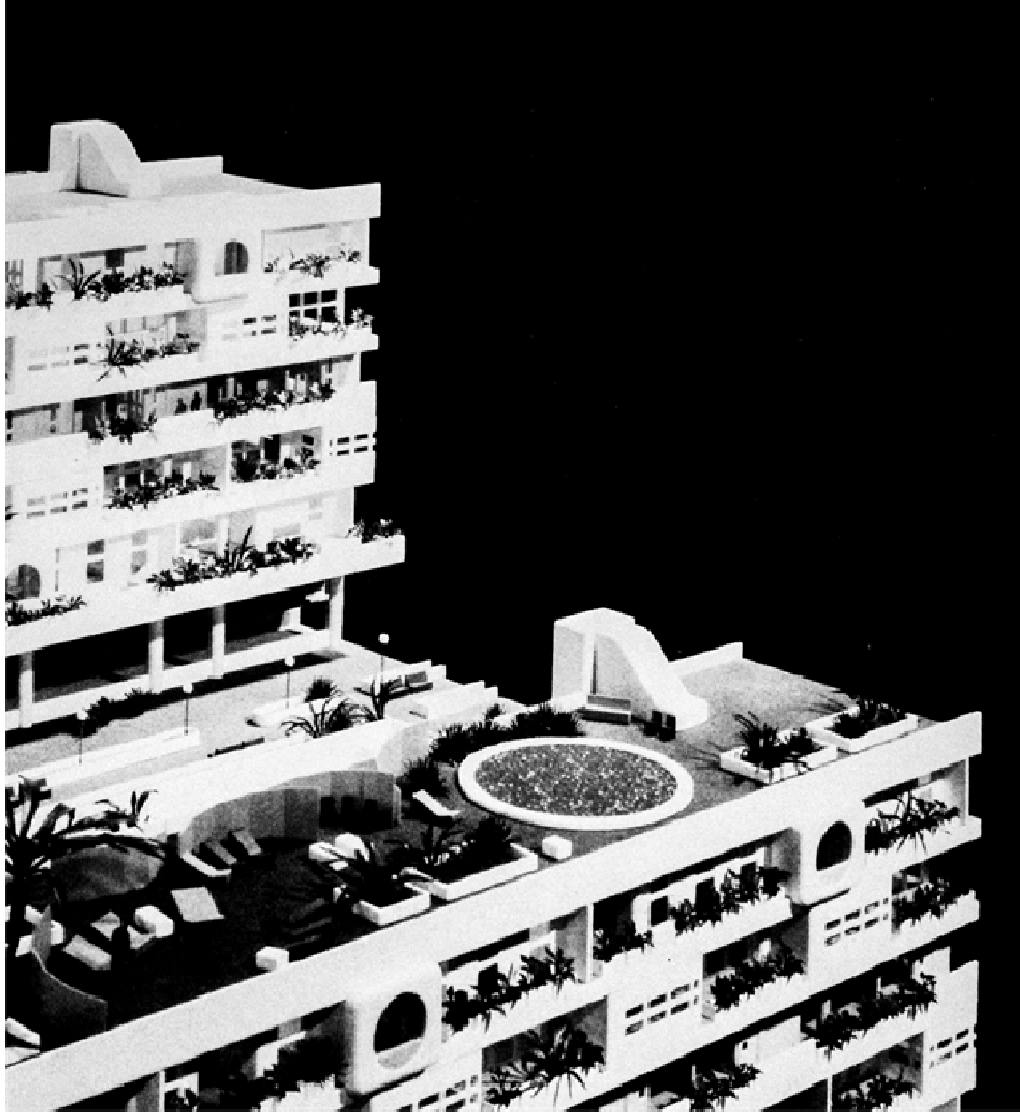


Figure 2 Ralf Schüler and Ursulina Schüler-Witte, 1972: Model of 'Indapt System' housing. Built by Siegfried Johné, Wolfgang Schlüter, Klaus Wenzel. Photograph by Gunter Wolf. Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur.^[10]

has spoken of torturously long disputes as ideological tension became unbearable.^[11] Whilst all five members of the working group would have broadly agreed on the social predictions, Jungk thought it unconscionable that consumption should be a means of self-expression for an expanded leisure class and that private enterprise provided the basic necessities. The various paradoxes involved in Jungk's association with 'Wohnen im Jahr 2000' were too great and he walked away. Adrian replaced him and would have offered a little more comfortable presence

during discussions. However, this interpersonal tumult impacted on the work which arose from the research.

2. The work produced

The non-architects' backgrounds meant that the 'Indapt System' was strong in social scientific theory. The members of the working group predicted that, as had begun to happen over the last twenty years, social structures were going to become ever more fluid, with young people moving in and out of shared apartments and families downsizing after

their children left home. In order to accommodate this looser social order with individuals grouping in transient clusters, the protagonists proposed a system of modular housing constructed from prefabricated polymer parts, which the residents were able to configure according to the size of their household. This encouraged the residents to critically engage in the architectural process, exploring formal arrangements until they found one appropriate and appealing. In their closing statement, the working group members emphasised that they were challenging the total solution in architecture and promoting a popular aesthetic.^[3]

In the model and cross-section for the 'Indapt System' (cf. Figures 2 and 3), we can see polymer sheeting compression-moulded to form smooth panels on the face of the slab blocks, creating an appearance associated as much with mass-produced consumer products as with construction.^[10,12] The architects used materials and manufacturing methods to invoke a popular view of plastics as both enduring and disposable, conveying to the residents that the 'Indapt System' was a transitory structure with permanent parts, to be reconfigured or even disposed of when an arrangement had outgrown its original purpose.

It was also intended that the design be easily understood. The partial model does not depict the massing shown in the cross-section which is legible and singular in cadence.^[10,12] The symmetrical housing reaches almost its full height in two equal steps, with the upper two-storeys creating a smaller recessed plateau at the top. With this approach, the architects set themselves the hard task of breaking up large expanses of wall surface, something which the finely-drawn plastic detailing performs well enough. Invoking a prevailing view of plastics with materials and manufacture does not necessarily

mean that the massing need be similarly and immediately comprehensible. More strength of vision in that department, with a larger degree of rhythmic nuance in the ascent, may have been more persuasive to the BASF assessors.

Another conceptual aspect of 'Wohnen im Jahr 2000' was the analysis of existing plastics houses.^[13] The survey had some background in Schüler-Witte and Schüler's studio work of 1968, for which they transferred photographs of iconic examples of plastics architecture to build context for their work.^[14] At that time, the Swiss architects Casoni & Casoni's 'Rondo' house (1968), with a helix of living pods latched to a central support, had been formative to Schüler and Schüler-Witte's additive approach in single or multiple storey variants with bevelled living segments attached to a hexagonal central core and no apparent parameters for growth. For 'Wohnen im Jahr 2000', Schüler and Schüler-Witte revised this list, assigning new metric scores for variability or openness of system. Arthur Quarmby's signal boxes for British Railways (1961) achieved the highest marks due to their capacity to be made larger and smaller through the addition of middle sections.

Just two of the projects considered in the survey surpassed the single dwelling. Casoni & Casoni's work performed well in the analysis, but it was quite different from the modularity the architects were envisioning for the 'Indapt System'. It was only the arrangement of plug-in pods on the 'Rondo' which were alterable, not the dimensions of the dwelling itself. Myra Wahrhaftig and Bernd Ruccius' 'Home Container' (1969) was reconfigurable both at the level of residence and the combination of residences.^[15] The repetition of cuboids to produce an oblong slab was a good model for one aspect of the 'Indapt System' in particular. The residential blocks, which the architects intended to build over pre-existing

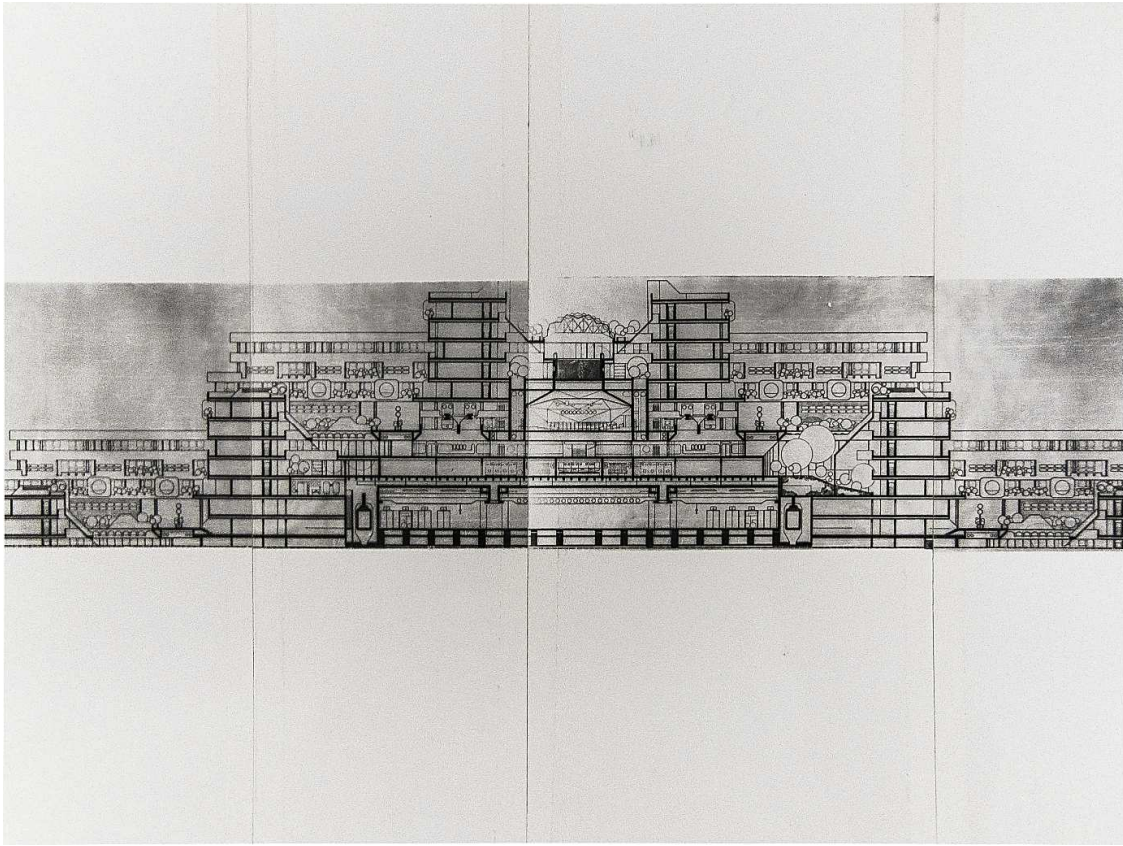


Figure 3 Ralf Schüler, Ursulina Schüler-Witte, 1972: Cross-section for 'Indapt System'. Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur.^[12]

transport lines, forming a vast A-frame profile. They were in effect applying plastics to an existing field: the mega-structure as ribbon development. Considering the total effect of the scheme, non-plastics projects such as Günther Domenig and Eilfried Huth's 'Überbauung Ragnitz' (1965-69) or Paul Rudolph's 'Lower Manhattan Express Way' (1970), with their spans of housing over motorways, might have been just as instructive to their formal intentions. With BASF's sponsorship and Haseloff's and the architects' known predilection for the materials, the participants positively prejudiced cases for their use of plastics.

Schüler's pencil sketches of the functional layout, wispy clouds latched to a central strip, became a diagram, showing twelve residences in each block, which, along with the cross-section, began to elucidate this eighteen-storey scheme.

However, the section was drawn at such a scale that it is not apparent quite how it all was to hang together. Even the model only depicted one 'step' of the A-frame.^[10] Had they shown the 'Indapt System' in its completeness, the model would have better conveyed the pyramidal geometry they were proposing. The proposal's level of elaboration is perhaps explainable by the fact that the ICC was already absorbing much of the architects' energy. Ulrich Conrads had published their plans for the conference centre in *Bauwelt* prior to the 'Indapt System's' completion. Schüler and Schüler-Witte did what BASF required of them, meeting with the other group members at their office and overseeing their assistants, but there were more pressing matters for the architects to attend to.

Whilst the analysis of existing buildings gave large weighting to plastics

architecture, the model and plans invoked a more general understanding of the materials. The prefabricated plastics building system meant the design of 47 different components, some T-shaped, some angled, and others forming junctions and a few with punched, rounded windows (cf. Figure 5). Siegfried Johné, Wolfgang Schlüter, and Klaus Wenzel made a number of parts for a prototype at a smaller scale than the anticipated final version, and Schüler and Schüler-Witte asked Gunter Wolf to photograph them as miniature assemblies. Wolf captured some against a background of trees, emphasising the curative effect a life lived outdoors was to have in this synthetic landscape, and others against a black backdrop, these sets estranged from all natural context.^[3]

Reasoning that the plastics building system fulfilled the residents' needs for shelter but not for sanitary equipment, Schüler and Schüler-Witte designed a separate sanitation unit which the estate management were able to install where necessary in the apartments, providing warm water and washing facilities etc..^[16] With that, the architects echoed Reyner Banham's contention, one which may have come to them via Quarmby or Doernach's monographs, that architecture was not only shelter but an enclosure plus services. Strangely enough, it is the services in plastics architecture which have outlasted the enclosure. Plumbing is one field of application where architects today appear to trust polymers' effectiveness over the alternatives. This is largely due to the stock of empirical knowledge which manufacturers have accrued for this usage over the last seventy years.

The 'Indapt System's' positive public reception may have counter intuitively contributed to BASF's decision. Johné, Schlüter, and Wenzel's 1:100 partial

model of the scheme, appearing to have been made from acrylic sheeting, certainly looks brittle, as though the miniature trees, cladding panels, and translucent awnings are in danger of being swept away. The model must have had some robustness to it too because it toured extensively, appearing at 'K 71' - the plastics exhibition in Düsseldorf - and at an exhibition on future planning strategies for West Berlin at Tegel Airport. It was by all accounts well received. There was good press in plastics journals and the German daily newspapers.^[5] Ulrich Conrads too published the group members' closing statement and Wolf's photographs of the model in *Bauwelt*.^[17] All this publicity was probably enough for BASF. Their outlay for the research project had, without manufacturing the results, already born certain tangible results in public relations.

But what type of plastic did the architects envisage for the 'Indapt System'? Despite Schüler and Schüler-Witte's known inclination for fibre reinforced polyester (FRP), using it before for concrete shuttering and their studio work, the architects gave no clear instructions as to the material that BASF should select to manufacture the 'Indapt System'. In my view, this was due to the fact that there was no BASF presence on the 'Wohnen im Jahr 2000' working group. It was this broader understanding of plastics that leads me to reason that the chemical firm had not placed someone who could guide the architects towards a particular polymer, composite, or indicate what moulds were available at specific production plants because BASF had from the outset no clear plans to manufacture the proposals to emerge from the research project. The fact that, when Schüler and Schüler-Witte attempted to secure a patent for the plastics building system, there was no challenge from the chemical

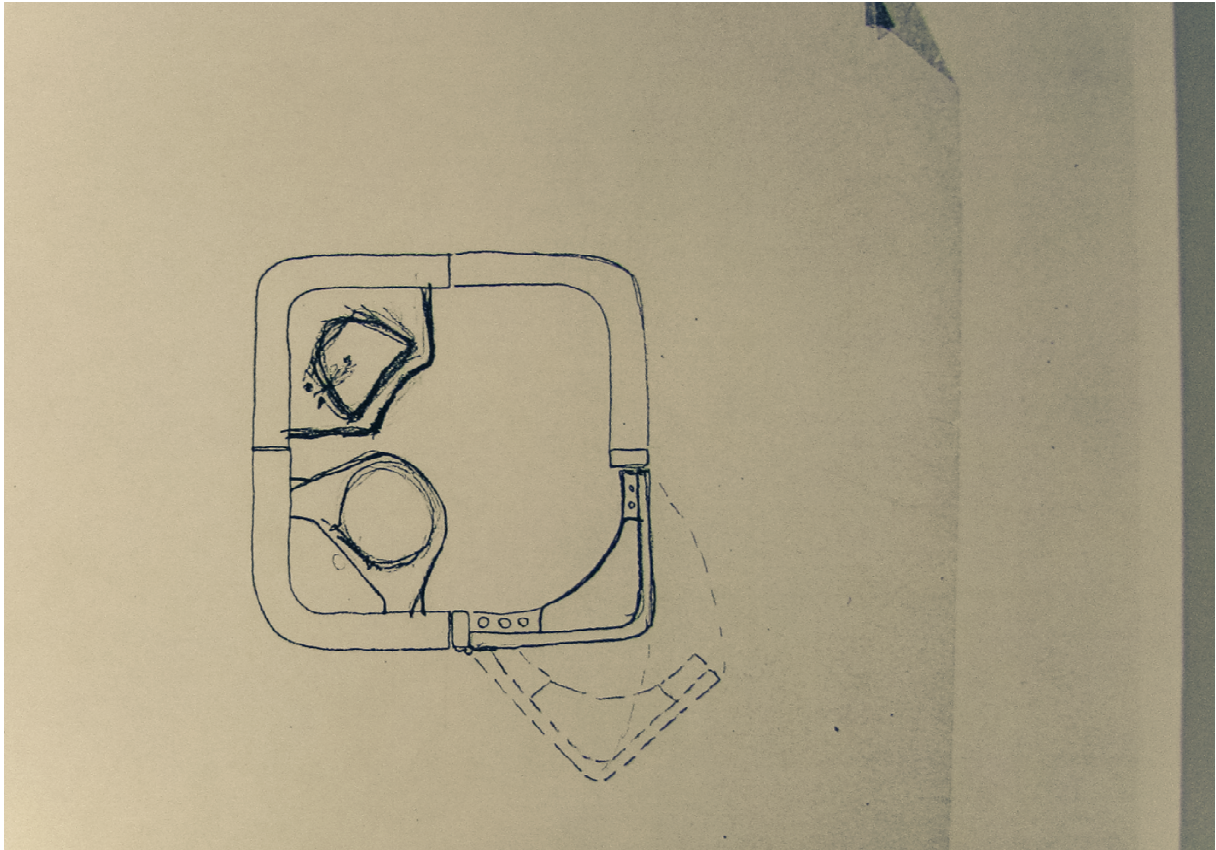


Figure 4 Ralf Schüler, Ursulina Schüler-Witte, 1972: Sketch of sanitation unit. Drawn by Schüler during discussions for 'Wohnen im Jahr 2000'. Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur.^[18]

company, appears to give weight to this reading.^[19]

3. The structure

As 'Wohnen im Jahr 2000' was a piece of commissioned architectural research, its success or failure should not be predicated upon whether or not it was realised, but by a quite different set of criteria. In his classic position paper on the subject, the British architect, educator and writer Jeremy Till contends that architectural research should be regarded a success if it envisages architecture as a pure discipline and if it produces new architectural knowledge.^[20] By the first measure, the 'Indapt System' would be deemed a failure, although some historical qualification is required. The notion that architecture is a pure discipline was not as

universally accepted then as it is today.

Instead, a dichotomy which had long been there strengthened after 1968, with some architects propounding that the subject should be viewed in isolation, and others arguing that it was architects' belief in their own exceptionalism that had caused the schism in the first place. Possibly a means of justifying their own variety of specialisms, the contributors to 'Wohnen im Jahr 2000' were plain in articulating their belief that architecture is enriched by perspectives from other fields, in this case: social psychology, futurology, and philosophy.^[3] This approach was widespread. Many architectural research units in the United Kingdom and West Germany had a contracted or permanent sociologist on the staff and there was a

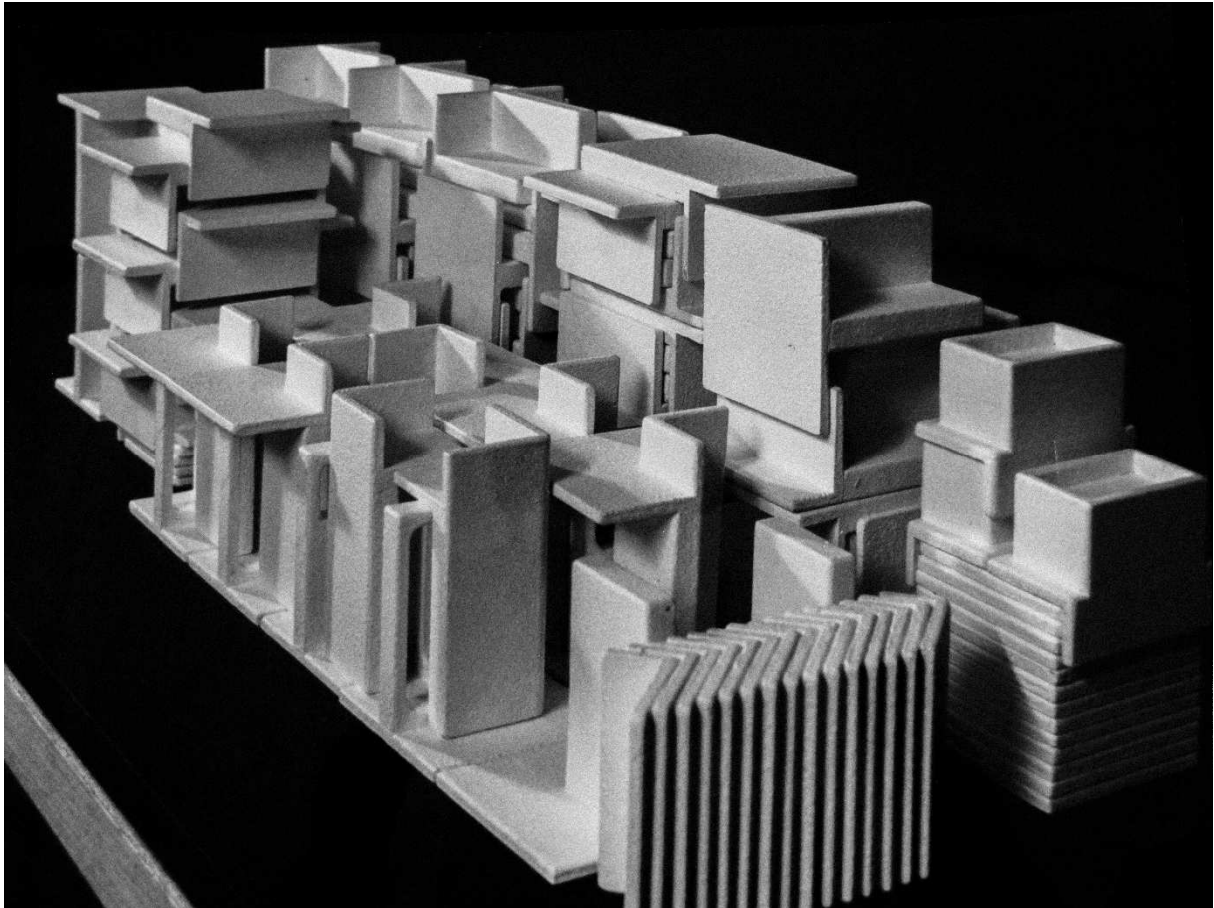


Figure 5 Ralf Schüler, Ursulina Schüler-Witte, 1972: Miniature assembly of plastic components. Built by Siegfried John, Wolfgang Schlüter, Klaus Wenzel.^[21]

prevalence of socio-economic readings in architectural departments. Since then, some disentangling has occurred and a consensus has emerged that favours architecture's purity. I believe that we should not judge the 'Indapt System' by the terms of a debate which was at that time still unresolved but instead by a metric which will be drawn out from Till's second point and define the limits of their findings.

The research project shows itself to be marginally successful on producing new architectural knowledge. Whilst the architecture was formally more receptive to new tendencies than formative, Schüler and Schüler-Witte did apply polymeric materials to an existing form in a way that was itself novel. Establishing a base of knowledge on plastics architecture was

important, but, if they had wanted to embellish form too, research into non-plastics megastructures would have been equally constructive, allowing them to see what architects had already achieved in this field and where Schüler and Schüler-Witte might make their contribution. It is here that the fact a chemical company commissioned the research becomes important, their survey of modularity in architecture was conditioned by the existence of BASF's large range of polymer products.

5. Conclusion

The 'Indapt System's' impact on the architectural community was moderate but more pronounced in the public sphere, where the modular concept spoke to post

war aspirations for a society of classless individuals determining their own course of action in a rational system. Perhaps then architectural research should proceed with the intention of creating public knowledge. Architectural research which disperses accumulated knowledge on a subject through popular channels or restores publicness to existing structures through physical interventions or cautious procedural ones, like David Roberts' collaborative workshops for residents before the refurbishment of Erno Goldfinger's 'Balfron Tower' (1965-67),^[22] might help to resolve the dichotomy, propounding a purity of discipline with measurable social achievements.

6. Schlussfolgerung

Die Auswirkungen des Indapt-Kunststoffwohnbau-Systems auf die Architekturwelt war relativ bescheiden, wurde dafür aber stärker von der öffentlichen Meinung wahrgenommen. Hier sprach das modulare Konzept die Nachkriegshoffnungen auf eine klassenlose Gesellschaft an, mit individueller Bestimmung der eigenen Handlungsweise in einem vernunftbestimmten System. Vielleicht sollte deshalb Architektur mit der Intention antreten, öffentliches Bewusstsein und Wissen zu erzeugen.

6. References

-
- [1] Claus Grossner, *Der Machtkampf um die Denkfabriken: Zerstrittene Zukunftsforscher*, Die Zeit, September 19, 1969, sec. Politik.
URL: www.zeit.de/1969/38/zerstrittene-zukunftsforscher
- [2] Ursulina Schüler-Witte, *Bausysteme aus Kunststoff, 1967-1974*, in Ralf Schüler, Ursulina Schüler-Witte, „Eine werkorientierte Biographie der Architekten des ICC“, Lukas Verlag, Berlin 2015, pp. 152–153.

-
- [3] Design and layout by Duscha Sypereck. Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur. Ralf Schüler, Ursulina Schüler-Witte, *Die Indapt-Systeme*, Self-published, Distributed by the BDA, Berlin 1971.
- [4] Robert Jungk, *Altering the Direction of Technology*, CrossCurrents 20 (1970), p. 134.
- [5] Ursulina Schüler-Witte, *Bausysteme aus Kunststoff, 1967-1974*, loc.cit., pp. 152-156.
- [6] Otto Walter Haseloff. *Wie werden wir wohnen?*, Arch+ 2 (1969), pp. 67-75.
- [7] Robert Jungk, Norbert R. Müllert, *Zukunftswerkstätten*, Hoffmann und Campe, Hamburg 1981.
- [8] Kerstin Decker, *Norbert Adrian*, Der Tagesspiegel, September 29, 2006. www.tagesspiegel.de/wirtschaft/norbert-adrian/757556.html
- [9] Rudolf Doernach, Berthold Burkhardt, (eds.), *Bausysteme mit Kunststoffen*. Deutsche Verlags-Anstalt, Stuttgart 1974, p. 19.
- [10] Ralf Schüler, Ursulina Schüler-Witte, *Anschauungsmodelle*, Photograph, 1972. Ralf Schüler and Ursulina Schüler-Witte Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 44, M, 2.2, 1, F1
- [11] Ursulina Schüler-Witte, Personal Interview, 25 August 2016.
- [12] Ralf Schüler, Ursulina Schüler-Witte, *Querschnitt*, Facsimile of India ink on transparency, 1972. Ralf Schüler and Ursulina Schüler-Witte, Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 44, P, 1.6, 58.
- [13] Ralf Schüler, Ursulina Schüler-Witte *Dokumentation Kunststoffhäuser - Wertungstabelle 1 - Fremdprodukt Analyse*. Facsimile of India ink on transparency, 1972. Ralf Schüler, Ursulina Schüler-Witte, Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 44, P, 1.6, 78.
- [14] Ralf Schüler, Ursulina Schüler-Witte, *Reproduktion aus der Literatur*. Photographs, 1968. Ralf Schüler,

-
- Ursulina Schüler-Witte, Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 32, 1968, KH, F, 3.A, 4
- [15] Ralf Schüler, Ursulina Schüler-Witte, *Dokumentation Kunststoffhäuser - Wertungstabelle 2 – Fremdprodukt Analyse*, Facsimile of India ink on transparency, 1972. Ralf Schüler, Ursulina Schüler-Witte, Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 44, P, 1.6, 80.
- [16] Ralf Schüler, Ursulina Schüler-Witte, *Sanitärelemente*, Facsimile of India ink on transparency, 1972. Ralf Schüler and Ursulina Schüler-Witte Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 44, P, 1.6, 66.
- [17] Ralf Schüler, Ursulina Schüler-Witte. *Die Indapt-Systeme*, Bauwelt 62 (1971), p. 1223.
- [18] Ralf Schüler, Ursulina Schüler-Witte, *Skizze Sanitärelemente*, Facsimile of pencil on transparency, 1972. Ralf Schüler and Ursulina Schüler-Witte Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 44, P, 1.1, 98.
- [19] Pfenning, Meinig & Partner, Letter to Ralf Schüler and Ursulina Schüler-Witte, 25 March 1994.
- [20] Jeremy Till, *What is architectural research? Architectural research: three myths and one model*, Position Paper, London, RIBA 2005.
URL:
www.architecture.com/Files/RIBAProfessionalServices/ResearchAndDevelopment/WhatisArchitecturalResearch.pdf
- [21] Ralf Schüler, Ursulina Schüler-Witte, *Elemente-Lager*, Photograph, 1973. Ralf Schüler and Ursulina Schüler-Witte, Architects Collection, Berlinische Galerie, Landesmuseum für Moderne Kunst, Fotografie und Architektur, Architektur-Archiv, Berlin, 50, 28.
- [22] David Roberts, *Make Public: Performing Public Housing in Ernő Goldfinger's Balfron Tower*, The Journal of Architecture 1 (2017), pp. 123-150.