

Architectural Adaptation as Praxis

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Abstract

Since industrialization, modern architecture has appropriated the notion of adaptation. Defined as the adjustment of a building to the environment and its users, architectural adaptation has been mainly carried out via a narrow technological approach. Thus, digitalization has emerged as the latest 'smart' update. The limits of technological adaptation become especially evident with architecture in aiming to solve an ecological and social crisis on both a global and local level. In this paper, we argue for reconceptualizing adaptivity in architecture to (re)integrate processual, social, and aesthetic dimensions. We propose a new architectural understanding of adaptivity that includes currently excluded agents and involves them in communication and adaptation processes. As we focus on the intertwining of technical developments and cultural practices, that is, the interactions of human and non-human agents in architecture, we seek to describe architectural adaptation as an inclusive spatial praxis. This may aid in inventing new ways of life built upon sustainable nature-culture-technology relationships within society.

Keywords

Adaptive architecture, Spatial praxis, Inclusive processes, Flexible interrelationships, Open mesh, Cultural technique

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Introduction

The house at Szumin is as much raised upon the ground as sunk into it. Begun by architects and artists Oskar and Zofia Hansen north of Warsaw in mid-1968, it remains ambiguous from all sides. The wooden structure is shaped by a pitched roof that extends to, or rather, from the ground. Following the Hansens' open form approach, it is programmatically uncompleted, a work in progress, strongly related to the artistic practices of happenings and environments in the 1950s and 1960s (Ulber et al. 2021). Similarly, the house at Szumin emphasises the process rather than the product, establishes close and flexible interrelationships between object and surroundings as well as interior and exterior spaces, and defies the hierarchy between producer and user of architecture through shared practices of (re)production and care. We will come back to this in detail.

While the house does not contain or envision technological elements today associated with adaptive architecture (Fox 2016, Kolarevic et al. 2015), we assert its capacity for (future) adaptation, understood as a shared process of adjustment within a local and global (natural) environment. Furthermore, we argue that Szumin is a model for contemporary concepts of adaptive architecture: it includes, in addition to technical, spatio-temporal as well as socio-aesthetic qualities and processes that allow for co-constitutive relationships between humans, technology, and the (natural) environment. As an 'open form' this house frames a small-scale architectural space in a rural setting, but it addresses a wider interrelatedness of things and beings.

Indeed, at the 1959 meeting of the CIAM (congrès internationaux d'architecture moderne) in Otterlo, the Hansens presented their architectural approach on notions of collectivity, process, and change. This proposition from the ranks of Team 10, a group of young European architects during the 1950s, directly opposed dogmatic modernist concepts (Scott F.D. 2014). Above all, they questioned the programmatic separation of urban functions in a city from a context defined as a geographical, historical, as well as a social and experiential site. We could add the spatial separation from the ground, regarding Le Corbusier's modernist designs on 'pilotis' (pillars that lift the building above the ground) in contrast to the house at Szumin. The Hansens explicitly criticised the concept of a literal 'machine for living': that is, the architectural object as a mass-produced technological product. Not only resulting from estranged labour, in a Marxian sense, they perceived modern industrialized architecture as equally separated from the life of its users (Woliński 2014, 22). In the Hansens' eyes, it was a closed form, disconnected from its site and its inhabitants, not able to integrate elements present in a given place or situation, nor to generate as full an understanding of their interactions as possible (Harrison 2013, 283). It is exactly this form of site-specificity that Bruno Latour has advocated as a pragmatic political ecology, refusing to reduce objects to discrete –separate– entities (Latour 2004). Adaptation, as we will argue, is based on the (spatial) experience and recognition of the interrelatedness of elements at a site and beyond.

Today's adaptive architecture is equipped with sensors, actuators, and digital controls aiming to adapt certain building properties (e.g. façade, structure, rooms) to the current environmental conditions of a site or to various user needs (Van Hinte et al. 2003, Kronenburg 2007, Fox 2016). However, as we will show, they prescribe a limited set of mostly instrumental interactions to their agents and enforce a static conception of 'nature' as distinct from humans. Not only in terms of performance, but also spatially and aesthetically, many adaptive buildings distinguish between humans, technology, and environment, the latter understood as the topographical and climatic conditions of the immediate 'outside'. They preserve or re-constitute 'nature', humans, and technology as 'others'. By doing so, they may be smart, but not part of adaptation.

Architectural Adaptivity

We can observe a conceptual separation of nature, humans, and technology in many recent adaptive buildings, especially in the following three ways: these buildings show rigid demarcations of architectural spaces, programmes, and roles; they exclude other agents by applying optimal technological 'solutions'; and they forgo the capacity for complex change in favour of instant responsiveness. Leaving out the question of their actual environmental and economic impacts, an analysis of which is beyond the scope of this paper, these observations address an architectural and design discourse. We build on social and ecological theories that regard the (conceptual) separation of nature, humans, and technology into 'closed forms' as a momentous reason for our exploitative and destructive relationship to the planet (Latour 2004, Morton 2009).

Sharifa-ha House in Tehran, a recent example of a highly technological design, is a modern five-story urban villa built from concrete and glass between two existing buildings. Only its narrow south front is provided with openings, with three wood-clad cubes located there. These can be rotated independently of each other by 90 degrees out of the façade. To reach their final position, a complex technological process including the vacuuming of seals and lowering of floor areas and railings is necessary. While this adaptive system promises to provide more space of different quality, the question emerges: what is gained through the immense technological effort? After all, even the furniture must be removed for the rotation. Moreover, the centre of the house is not opened through the rotation of the boxes; it lies too far behind the windows. Instead, the architects have developed a sophisticated lighting concept with LED downlights and spotlights as well as pendant lamps. The adaptive system results in maximum isolation of the interior from the environment. Only the three boxes have a view when turned outward. The residents of the introverted house do not even experience the changes in natural lighting or weather, as the artificial lights automatically take over, continuously levelling the conditions. Instead of a solution with an excessive use of technology and materials, the opening and closing of the façade could have been achieved with simple shading elements. Yet, the design of Sharifa-ha House focused exclusively on the development of computerized, black-boxed solutions. All adjustments are automated, meaning that residents are extremely limited in their actions, especially in relation to other adaptations of the house. They are assigned the role of passive users with two options: rotated or not.

Many current adaptive buildings include isolated functions that do not allow for, or worse, even prevent, flexibility in and adaptation to other situations. In this way, these objects might even be less responsive than non-adaptive architecture. Sharifa-ha House cannot be adapted to different uses, as the rotation system, including a whole engineering level on the sixth floor, limits the possibility for different distributions of functions, as well as of other spatial experiences and alterations. Moreover, it replaces the surrounding—in fact, the whole—urban context with technology, blocking diverse experiences and interactions. With its obsession with automation, Sharifa-ha House and other current adaptive architecture risk impeding adaptation as a process that, we argue, should be shared by all agents on a site.

Departing from the observations of Sharifa-ha House, we posit that architectural adaptation succeeds via the inclusion, not exclusion, of diverse human and non-human actors within an open-meshed interrelating building and environment. By (re)integrating technological processes as well as social, ecological, aesthetic, and cultural practices, architectural adaptation might be able to make interrelatedness tangible and the 'intimacy of the environment' perceptible. Timothy Morton uses this notion to describe the mesh of 'open-ended concatenation of interrelations that blur and confound boundaries at practically any level: between species, between the living and the nonliving, between organism and environment' (Morton, 2010, 275). In this sense, openly conceived architectural adaptation must go beyond automation—that is, exclusion—to include diverse ideas and agents in its incomplete mesh. If we thus, following the Hansens, understand

openness in technological as well as environmental, social, and cultural terms, architectural adaptation might emerge as a praxis encompassing different perspectives, the communication and negotiation of biological, social, and aesthetic heterogeneity. As an architectural praxis, it could encompass the actions of different actors (buildings, organisms, surroundings), collectively develop methods of mutual adaptation, maintenance, and care, and establish new forms of cohabitation. This praxis of architectural adaptation could ultimately support a reform of concepts and relationships, both relating to the natural and social environment and extending to an urban and global scale.

Learning for a praxis of architectural adaptation

To (re)develop a concrete praxis of architectural adaptation, that is, a cultural technique of architectural adaptation, it makes sense to take one step back and to investigate the history of pre-modern or anti-modern instances of architectural adaptation. This is a first act of (re)integrating excluded ideas (actors) into the architectural discourse. By tracing different spatial, temporal, cultural, and technical dimensions of architectural adaptation history, we unfold our visions on the qualities and performance of future architectural adaptation.

By discussing three diverse examples, we aim to understand the close technological and socio-cultural entanglement of adaption as a cultural technique: a closely interlaced relationship between space, technology, and implied (cultural) practice (Siegert, 2015). According to Siegert, cultural techniques describe 'a more or less complex actor network that comprises technological objects as well as the operative chains they are part of and that configure or constitute them' (2005, 11). Embedded in a spatio-temporal context, they include basic human practices such as writing or cooking, which require technical developments (pen, pot) and often also bodily techniques (hunting, preparing). Ignored by modernist technological approaches, in seeking to understand 'past' modes of adaptation that included social, cultural, and natural dimensions beyond technological ones, we aim to redefine a future concept and method.

Our selection of historic examples considers what was probably the first adaptive structure, the tent (Schmidt III & Austin, 2014.). With it, we discuss adaptations in the nomadic way of life of the northernmost Inuit, whose lives were and are closely interwoven with natural environments, including animals, climate, and landscapes over the course of seasons. By looking at non-European cultural practices, traditions, and specific habitats, we not only want to unfold the different dimensions of interdependence embodied in architectural (re)production, but also include diverse examples in a hitherto Western-centric architectural history. We further look at the traditional Japanese practice of living and building, exhibiting a multitude of mutual adaptations of buildings, residents, and environments in one place. Finally, we will return to the practice of Oskar and Zofia Hansen, discussing their Open Form as a methodological approach to architectural adaptation, including diverse actors and practices, new collaborations, and interactions in contrast to modernist concepts.

By analysing the close intertwining of social, technical, and spatial adaptation in these particular cases, we do not frame the past nostalgically, nor do we seek to develop a non-technological architecture. By contrast, we want to frame an inclusive concept for current and future architectural adaptation that strives to closely involve people in the design, construction, and adaptation of their dwellings, as well as new forms of post-human collectivity.

In the conclusion, we relate our insights to the adaptive high-rise building currently under construction in Stuttgart as part of an interdisciplinary research project to which the authors belong, and outline its possible

development to incorporate technological, architectural, and social adaptation strategies (CRC, 2017). In doing so, we seek to establish an interdisciplinary discussion on the notion of adaptation, addressing the roles and capabilities of all agents as well as a shared responsibility in the (re)production of space.

Ways of adaptation in architecture

With the first example, we trace a way of living and building as a continuous process of adaptation, directly embedded in the environment and characterized by common practices of (re)production, care, and maintenance. The northernmost Inuit of Canada, Alaska, and Greenland were closely adapted to their natural environment of woodless regions, changing seasons, and different hunting and fishing grounds. Their nomadic movements north of the Arctic Circle correlated with animal migrations. Until the beginning of the 20th century, the Inuit lived in *tupiq* (pl. *tupiit*) in the summer. These tents were suitable for their journeys to various food grounds, as the adaptive construction could be dismantled in structure and shell. Moreover, they developed a technique to transform them into sleds in winter (Faegre, 1980) (see Fig. 1).

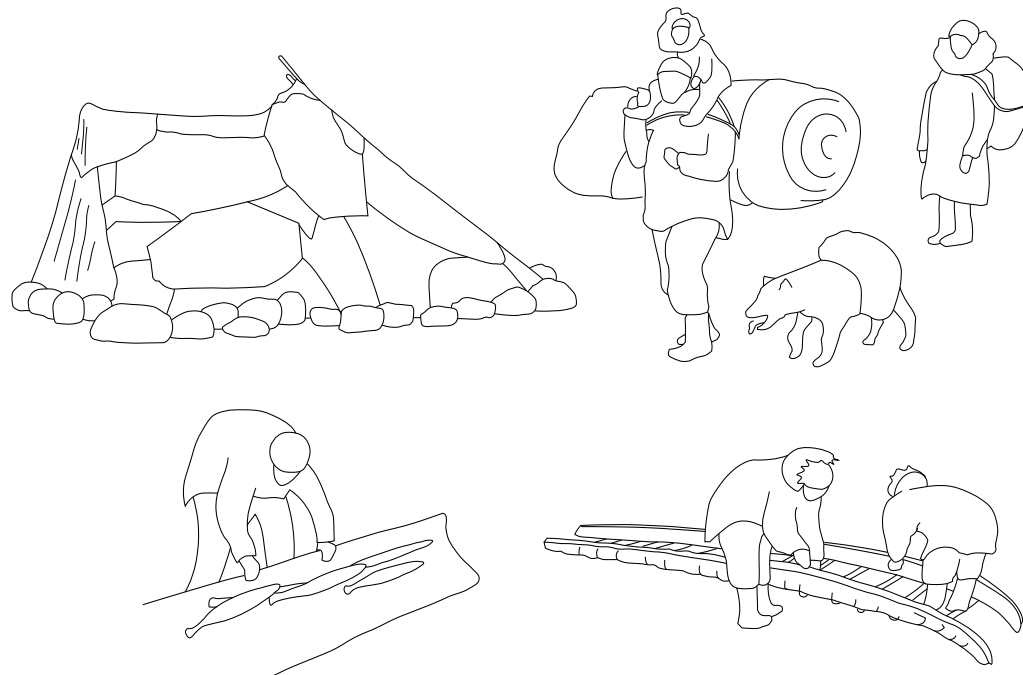


FIGURE 1 Tupiq summer tent of the Inuit, carried on nomadic migrations, transformed into a sled in winter. (© Ulber, Mahall, Serbest; drawings based on T. Faegre)

Life in families and tribes also included dogs that carried loads or pulled sledges on the migrations. The Inuit's understanding and skills were characterized by an extremely sustainable approach to their environment, using all components of the hunted animals (such as caribou reindeer) for their dwellings, sledges, clothing, boats, tools, toys, and jewellery. Due to wood scarcity, the Inuit sometimes built their tupiq tents exclusively from animal products with poles made from spliced whalebones and antler pieces. The ridge tent with a semi-circular end had a cover made of caribou or sealskins; these were scraped toward the entrance to let in natural light. Life in the tent was hardly separated from its surroundings; rather, the borders were temporary, e.g., cooking was done outside. Moreover, the composite mesh-like tent cover was permeable for light through the skins at the entrance and for glimpses through small holes. It moved

in the wind, was flexible in shape, and lacked fixed borders. The building hardly separated people from the environment; rather, building methods and sites were part of their environment as they were of animal origin or made of snow. In winter, the Inuit came together as a larger community. In addition to the family igloos, they built a large snow house to celebrate shared feasts with dancing and singing. In the dark polar nights, Inuit people sat around smokeless whale oil lamps and told the stories of their tribe, mainly eating the stockpiled food, repairing and making equipment and tools, or carving objects and toys. In many ways, Inuit life was closely interrelated with the natural environment. People developed cultural techniques and practices for making, remodelling, and transforming their dwellings with a sustainable use of resources. Thus, they were intensively, physically involved in the production, maintenance, and continuous adaptation of their way of living and building: for example, in hunting and processing animals, scraping or sewing together furs, or cutting snow blocks for winter dwellings. Life and building took place in sustainable cycles with the local ecology; changes and adaptations took place mutually. In this region and time period, living meant participating in the creation, rebuilding and care of dwelling, food, and community in close relation to the natural environment, which was always present and tangible.

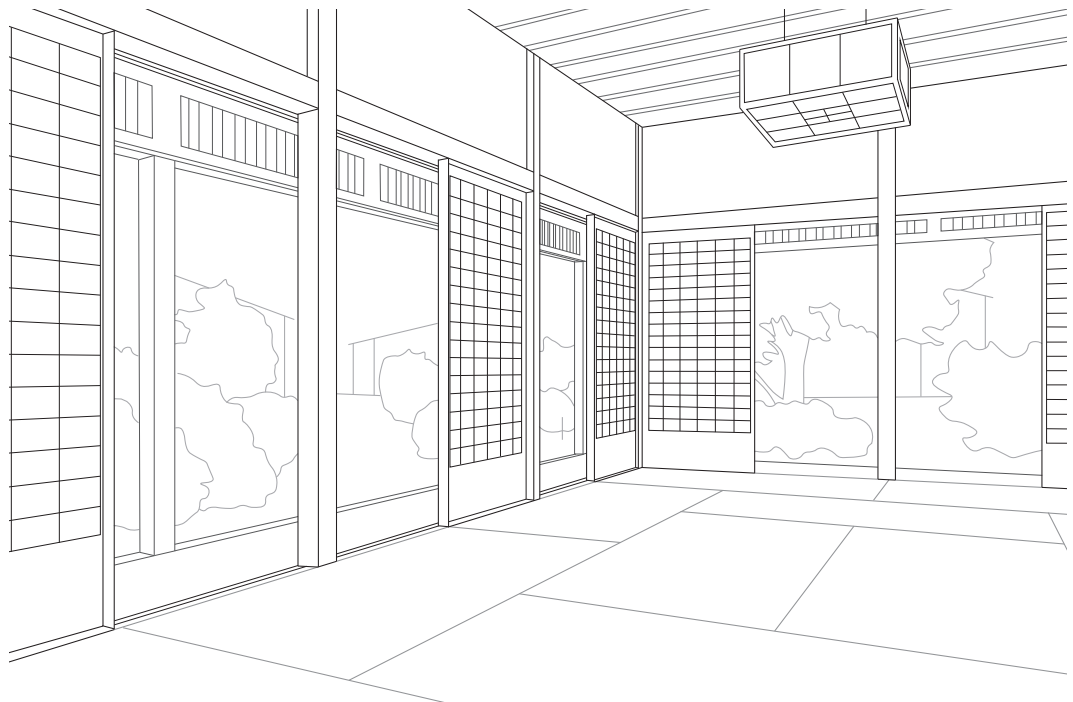


FIGURE 2 Dissolution of the interior-exterior separation in a traditional Japanese house. (© Ulber, Mahall, Serbest)

An adaptive example of settled architecture involving mutual climatic, social, spatial, aesthetic, and technical dimensions is the closely interwoven way of living and building in Japan evidenced up to the first half of the 20th century. The traditional Japanese house was located under an overhanging shady roof with terraces underneath (Tanizaki 1933/1977). This semi-open space around the house, *engawa*, extended the floor and ceiling of the interior and connected them with the exterior space. At the same time, it protected the spacious multifunctional living, dining, and sleeping room from sun, sky, rain, and wind. The interior spaces were opened with sliding elements, *shoji*, to the terraces on several sides and thus had a generous and direct connection to the surroundings (see Fig. 2). This dissolution of the interior-exterior separation resulted from and manifested a direct relationship of the residents to the natural as well as social environment, as it was a welcoming gesture for visitors and passers-by. The veranda-like *engawa* was an informal space for sharing tea and allowed the residents to adapt their house to the rhythms of the day and year, e.g., additional glass or wooden sliding elements on the outside provided protection in

winter. The inner *shoji*, covered with translucent rice paper, filtered the light inside the house and created a special atmosphere of gloaming when closed. The residents could divide the open main space of *tatami* floor mats made from rice straw using flexible wooden sliding walls filled with cardboard or cloth, *fusuma*. This reflects an overarching understanding of space in terms of diverse uses and a living community. The daily adjustments made by the residents in terms of openings, atmosphere, and subdivisions, but also in layout of seat cushions or the (un)rolling of futons, meant a high degree of bodily and ritual participation in a continuous process of adaptation, whether for climatic, social, or aesthetic reasons. The space system of the house was based on *tatami* mats (approx. 90x180cm) and rooms were sized according to this factor, e.g., 4 or 6 *tatami* mats (see Fig. 3).

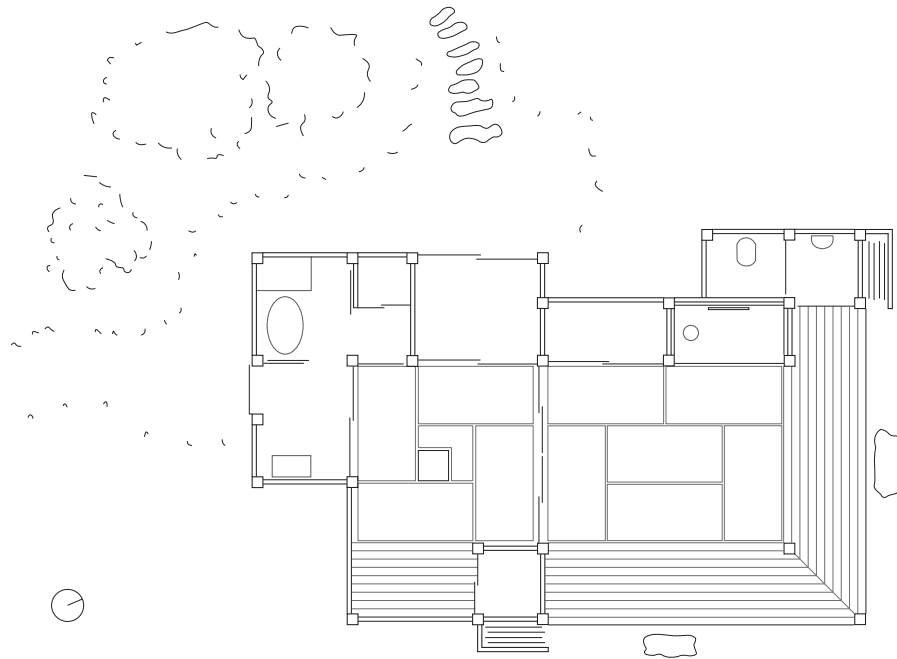


FIGURE 3 Space system of the traditional Japanese house based on tatami mats. (© Ulber, Mahall, Serbest; drawing based on B. Taut)

This enabled people to dimension their houses themselves, thus taking on the role of planners and making essential design decisions. A carpenter then built the house using post and beam construction with natural building materials, mainly wood, as this material was best suited to the Japanese climate (Young, 2012), as well as clay and rice paper. At that time, the roles and tasks of residents, architects, and craftsmen were not as separate as we know them today, neither in planning nor in construction. Moreover, the relationships between all living beings were close; there was hardly any distinction between guest and resident, and both slept in the same room. In summer, residents retreated to small northern areas of the house, leaving the sunny areas to silk spiders on numerous racks (Taut, 1937). Traditional Japanese culture exhibits close relationships with nature in material, spatial, and spiritual terms, with flexible or open boundaries, both between inside and outside (building and surroundings) and in terms of separating individual functions in the house. The living and building practice of this time brought together diverse organisms, natural materials, cultural objects, adaptive actions, and collective relationships in an open mesh to enable mutual and continuous adaptation to changing natural, social, and spatial contexts. The residents were able to spatially and aesthetically adapt their homes to different times of the day and year, and to connect them to their surroundings in varying degrees.

The two pre-modern examples show how the social, spatial, climatic, and technical dimensions of architectural adaptation were interwoven, including the bodily participation of the residents within flexible or permeable boundaries between inside and outside, giving the environment a meaning in their lives.

A method of architectural adaptation

Returning to Oskar and Zofia Hansen, we consider more closely the 'Open Form' as an alternative approach to modernist architecture, which they perceived as rigidly mono-functional and incapable of change. Starting in 1955, they analysed residential buildings of the 'large number' as 'closed forms' – unresponsive to individual residents, unable to react to changes, and obsolete even before construction (Hansen 2014, orig. 1961). In contrast, the Open Form proposed a reliance on appropriation, initiative, and change by the residents, on individual expressions in the collective, and on joint negotiation and processual development. The Open Form concept was tested and developed primarily in exhibitions and pavilions as well as with students at the Academy of Fine Arts in Warsaw. The Hansens were able to explore some approaches in realised residential projects. On the Slowacki estate in Lublin in 1961, they included the ideas of the future residents and designed different floor plans with balconies in various places and with varying numbers of windows (Hansen, 2005). To break up the uniformity further, some of the buildings were stepped and accented with colour, and the entrances were also spatially different. On the Grochowski estate in Warsaw in 1963, the Hansens, in collaboration with others, tested open corridors with a specially developed communication system. Different colours and symbols reflected the heterogeneity of the residents and allowed for communication between them. The semi-public corridors, open on one side, connected the individual flats and, like the Smithsons' 'streets in the sky', offered places for encounter and meaningful interaction. For all housing projects, the Hansens created meandering or stepped structures in the courtyard as a 'Theatre of Open Form'; residents could appropriate these and use them, for example, as flowerbeds, playgrounds, seating areas, or for performances (Hansen 2005, p. 84). These housing projects show how the Hansens tried to implement their approach and begin a heterogeneous practice of participation. In addition to today's classic participatory planning, incomplete open forms playfully and experientially invited residents to occupy these structures and, through them, to participate in the long-term process of collective adaptation.

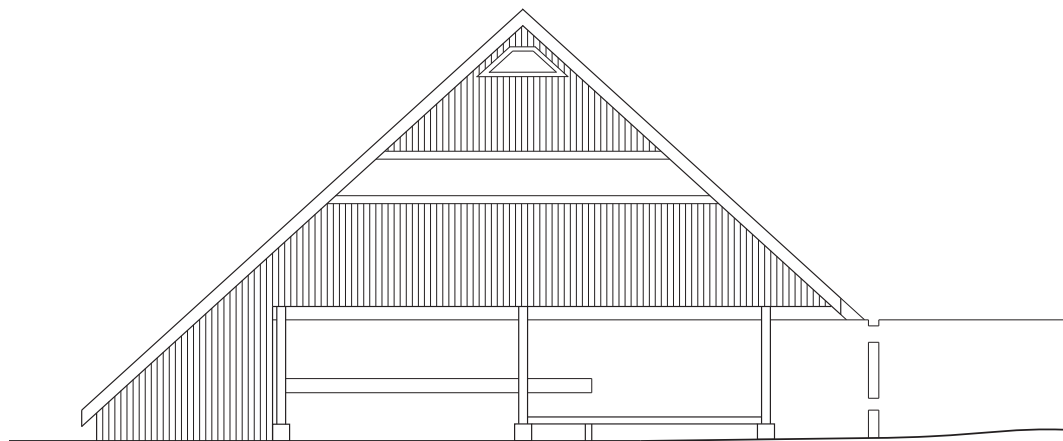


FIGURE 4 House Szumin with large roof and entrance wall as a background for passersby, inviting to pause on the bench or to enter the house. (© Ulber, Mahall, Serbest)

The processual and integrative Open Form approach was most extensively implemented in the Szumin Summer House, later the Hansens' main home (Wielocha & Kędziorek, 2016). Over a period of 37 years, collective interaction and ongoing change took place in an open process, with building and remodelling, spatial aesthetic experiments, care for the natural environment, and social collaboration. In 1968, they first built a piece of wall on a simple grassy plot only 60m from the river Bug. A part of this wall ran inside the house, on the outside it was a background for passers-by and visitors, inviting them to pause on a bench or to enter the house (see Fig. 4).

The adjoining building structure was erected in a first phase by 1970 and continuously extended and changed until 2005. Today, the house, which is mainly a large roof, still covers both open outdoor spaces and some interior spaces. On the ground floor, the central adaptable dining and working table extends from the interior 'kiosk' with attached kitchen to the covered outdoor area (see Fig. 5). Two lateral axes, one with social and one with service functions, connect the open and closed parts of the house with the open courtyard and annex buildings. On the upper floor, there are the only fully enclosed living and working spaces with gable-side bands of windows overlooking the surrounding landscape. The Hansens closely intertwined the building and its environment: they supported constant growth by planting trees on one part of the site, now a forest, growing fruit and vegetables in another, and cultivating a social garden area. Furthermore, the Hansens set up countless birdhouses in the garden, which guests were invited to bring along (Fudala, 2021). House Szumin was an open place for the village community, visitors, and many of Oskar Hansen's students and friends, and it was open to their continuous changes. The main table, half inside and half outside, could be adapted by the guests. Hansen continued his teaching there; various apparatuses were available for composition exercises but also for expressing emotions or finding a menu (see Fig. 5).

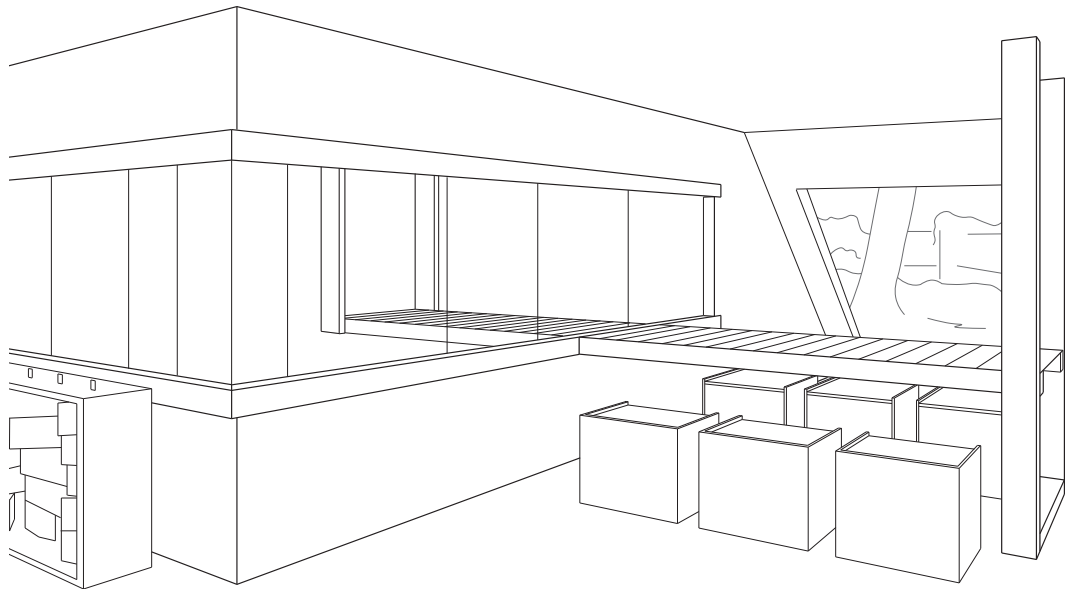


FIGURE 5 Hansens' semi-open space with adaptable table, half inside and half outside, and aesthetic apparatus. (© Ulber, Mahall, Serbest)

Coloured surfaces and compositions in the interior and exterior, especially those of the entrance wall, were continuously changed by the Hansens to welcome new guests. A diverse aesthetic emerged from a manifold appearance wrought by visual experiments, the interactions of human, plant, and animal actors, and by changes over time. The Hansens regarded their architecture as an 'absorptive background' for the life of people, animals, and plants (2005, p. 109). In fact, the house promoted experiences of the site and involved diverse actors in an open process via a connection to the ground and to the surroundings by means of the deep roof, the open wall and open corridors, the adjustable table, and various aesthetic apparatuses.



FIGURE 6 Adaptive high-rise under construction on the campus of the University of Stuttgart (© ILEK, Institute for Lightweight Construction and Conceptual Design)

The Open Form concept, which Oskar and Zofia Hansen advocated throughout their lives, stands for a processual understanding and practice of architecture. Buildings were never finished, so there is no final drawing of Szumin either. Open structures have been built without a final use and left to inhabitants for (re)production. Instead of a homogenous architecture, the Hansens aimed for a diverse and varied, above all, site-specific material use and aesthetic. Buildings were rather part of 'environments', with diverse inhabitants constantly changing in mutual correlation (Ulber et al., 2021). These open-ended, processual situations were models for enabling a practice of re-evaluating boundaries, roles, and concepts in the (re)production of space. Encompassing material, technological, social, and cultural dimensions, their adaptations supported both societal and technological change on a local and global scale. The global scale was not primarily addressed through a spread of technology, but rather through the transfer of a common praxis of adaptation.

Following this concept of praxis, if architectural adaptation is understood as a collaborative and open process of all agents, adaptive actions by buildings, residents, and the natural and social surroundings must be considered. Can we apply this approach to the adaptive high-rise under construction on the campus of the University of Stuttgart (see Fig. 6)? Phased planning and implementation is envisioned for it, as well as further adaptations during use (CRC, 2017). The initial developments are technical: the adaptive structure responds dynamically to storms and earthquakes; various adaptive façades on the floors regulate solar radiation, rainwater, wind, and energy. In addition, individually adaptive spatial qualities and an interactive interior structure are being developed.



FIGURE 7 Future scenario of the adaptive high-rise building; the open staircase structure is inhabited by plants and used by students for diverse encounters and collective events. (© A. Antonopoulou, S. Barati)

We have been investigating the potential of the high-rise building for open social, aesthetic, and environmental adaptations. Our processual approach is to enable students and the surrounding green space to take agency of the double of open stair tower and stacked spaces. Our aim in different scenarios is to continue to (re)develop the structure in collective and inclusive processes. On different time scales, over months or over years, adaptation will extend beyond the technological processes. Aesthetic and spatial experiences might become more diverse through the interaction of many agents. The stairwell, including its framework, could be inhabited by plants and animals, and used by students as a mixed space for diverse encounters and collective events (see Fig. 7). The individual rooms could be adapted to become study rooms or as community and experimental spaces. The ground floor serves the surrounding open space while further up, a terrace provides a space for the evenings. One level, as an open green space, provides a habitat for plants, birds, insects, and bats (see Fig. 8).

Interdisciplinary students can develop and test adaptations and conduct spatial experiments in relation to the environment and the building. For students, the high-rise can become a meeting place, enabling diverse interactions on campus; as a student-run centre, it can be frequently and continuously adapted. In this way, we can learn more about the processes and practices of architectural adaptation and its spatial, technical, and social dimensions. Following the Hansens' pedagogical method, students are actively involved in a collective process of negotiation and interaction with the building and the environment. Only through testing and experimentation, from accumulated experiences and acquired skills, can a praxis of architectural adaptation be established.



FIGURE 8 Future scenario where the ground floor serves the surrounding; students develop adaptations and spatial experiments in relation to the environment and the building. (© A. Antonopoulou, S. Barati)

Conclusion and Prospects

We have emphasised the spatial, social, technical, and environmental dimensions of architectural adaptation. Furthermore, we described it as an open process on different time scales and of diverse aesthetics. We have discussed it as a collective process of negotiations and interactions by heterogeneous agents on a site. Through this open process, roles and agencies of all participants shift continuously, including architecture performing actions and providing meaningful interactions. The architectural excursion revealed different seasonal practices of ecological adaptation among the Inuit, different time scales of adaptation in the Japanese house, the Hansens' method that enabled interaction beyond technical instrumentality, and spatial, technical, and social dimensions of the architectural adaptation process in and with an experimental building on the Stuttgart campus.

Since the first adaptive building, the tent, to the beginnings of modern architecture, mutual and collaborative adaptation has incorporated technical developments with interactions of people in their local environments. Therefore, architectural adaptation can be understood as a cultural technique that involves diverse materials and bodies, as well as technical and aesthetic performances, into a spatial praxis. By recalling the inclusive spatial practices of past adaptations and re-integrating social, natural, and aesthetic dimensions, buildings and cities can re-enable continuous adaptations on the part of their inhabitants and the environment. As a cultural technique, architectural adaptation will, moreover, contain characteristics of the technical and the symbolic. Through a poetics of diversity (Glissant 2020), that is, by visualizing the mesh of interactions, it might be capable of opening new ways for us to act on and understand the earth.

If architectural adaptation is understood as a practice, reproducing the mesh in the sense of Morten, then all human and non-human agents as well as bodies can participate in this open and interrelated process. The mesh is permeable and integrating, connecting buildings, people, and environment in a spatio-temporal heterogeneity whose mutual changes and adaptations result in an aesthetic diversity. Thus, all agents at a site can participate and interact with each other, ultimately forming new collectives with different species, organisms, and things.

Our meander through diverse architectural examples aimed to address interrelatedness in various dimensions: the spatio-temporal interconnection of inside and outside, the socio-aesthetic inclusion of all agents into a practice of heterogeneous collectivity, and processes that might be capable of facing current climate, social, and pandemic crises.

The projects discussed indicate the interrelationship between all agents of a site. They help oppose a separatist thinking of humans, technology, and the environment as materially, processually, and metaphysically closed entities. They exist as open forms opposing static conceptions of inside and outside, of building/technology and historical, social, and ecological contexts, as well as of production and use. By overcoming spatial-technical isolation and (re)connecting with the social and natural environment, we might be able to adapt our own actions, take responsibility, and ultimately initiate social and cultural change (Ulber & Mahall 2019).

In order to overcome a purely technological adaptation in architecture, buildings need to be part of an open and shared adaptation process including social, spatial, and cultural actions. This requires a new design approach that does not only provide 'prefabricated' technological solutions, but also possible adaptation scenarios for changing states. Significant transformations of the tasks and roles of architects and users, sharing a process of (re)production, are therefore necessary. For instance, residents should actively—and following the Hansens, even physically—be involved in the production process. According to the architects, this form of bodily participation would promote identification with and responsibility for reproduction and adaptation processes (Hansen, 2014).

To allow for social differences to exist in their multiplicity and heterogeneity, architectural adaptation must be radically inclusive (Nawrotek, 2015), allowing conflicts on the basis of solidarity and empathy. Disadvantaged persons could, for example, play a crucial role in the arrangement of non-violent, communal life in cities and houses. Architectural adaptation thrives on social and aesthetic diversity: the opinions, ideas, and needs of people who have mostly been excluded from architectural processes. They might have the capacity to add new perspectives through which different options and solutions become possible. Open development and the testing of new ideas and spatial experiments become possible by including, through the acts of hearing and seeing, diverse positions and allowing them to be a part of equal discussions. With the reconceptualization of architectural adaptation, we therefore outline a spatial practice that recognises processual, social, and aesthetic dimensions beyond the technical and enables inclusive processes of adaptation to face current and upcoming challenges. This architectural practice outlasts the design and integrates all actors (human and non-human) and agents (building, city, environment) with a shared responsibility in design, (re)production, and ongoing adaptation.

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