MAT URBANISM: GROWTH AND CHANGE

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ABSTRACT

The paper aims to re-evaluate a modern strategy of formal organization in architecture and urbanism called 'mat-building', exploring its potential to contribute to the contemporary discourse of sustainable built environments. The discourse of mat-building emerged from the Smithson's fascination with the traditional Arabic Kasbah (Smithson, 1974). In her search for signs that identify 'mats', Alison Smithson goes back to Katsura, Sinan, Honan, the vaulted constructions of Greek and Arabic architecture, as well as Mies van der Rohe's work in America. The Kasbah also embodies a metaphorical reference: "full of starts and stops and shadows… with a high degree of connectedness to allow for change of mind and the in-roads of time" (Ibid). Team 10's work in the late 1950s and during the 1960s became heavily influenced by mats, their urban structure, environmental identity, patterns of mobility and transformability. The influence of the Kasbah can be seen in Candilis-Josic-Woods's project for the reconstruction of central Frankfurt and the Free University of Berlin in 1963, both proposing horizontal buildings that Shadrach Woods referred to as 'groundscrapers'. Mat-building is a process, a growing structure of additive elements characterized by a delicate interplay between variations and repetitions of form. Retracing the formal evolution of mat-buildings, this paper tries to point to the typology's relevance in the contemporary discourses of sustainabile urbansim and land-use planning.

Introduction

Mat-building emerged in the late 1950s as a consequence of the debates within CIAM over principles of functional zoning. A group of younger architects, called Team 10, suggested an alternative to the functional city described in Le Corbusier's Athens Charter (1933), in which the four functions of daily life — living, working, circulation and recreation — were segregated from one another. Alison Smithson described the mat concept and defined mat-building as follows: "mat-building can be said to epitomize the anonymous collective; where the functions come to enrich the fabric, and the individual gains new freedoms of action through a new shuffled order, based on interconnection, close knit patterns of association and possibilities for growth, diminution and change." (Smithson, 1974)

It is through their insistence that modern urbanism could express a higher degree of particularity and identity that Team 10 argued for a greater individual focus over the universalizing approach of the functional city (Figure 1). Instead of a static architectural composition, mat-architecture is the installation of a generative structure: urban forms shaped by the unique characteristics of particular places, specific patterns of human association, open to transformation, respectful of local nature and climate. The mat was intended to provide flexibility in planning for a range of functions over time, thus assuring its own longevity; its very realization is spread out over time and subject to revision and adaptation. "The systems will have more than the usual three dimensions," argued Alison Smithson, "They will include a time dimension." (Smithson, 1974)

Mainstream mat-building became visible in Team 10's work with the completion of the project for the Frankfurt-Römerberg center (1963) and the Berlin Free University (1963) by Candilis-Josic-Woods, where their work attempted to demonstrate the environmental responsiveness of mat-building in the context of a large and rapidly evolving institution (Figure 2, 3). The principles of these and other mat structures are now reappearing in the contemporary debates on sustainable architecture and urban development. According to Hashim Sarkis, "today mats are appearing everywhere. We call them fields, grounds, carpets, matrices. The mat answers to the recurring calls for efficiency in land use, indeterminacy in size and shape,

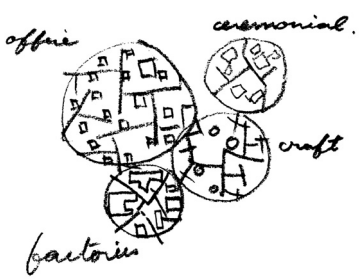


Figure 1. Cluster of overlapping functions. Source : Smithson and Smithson, 2005.

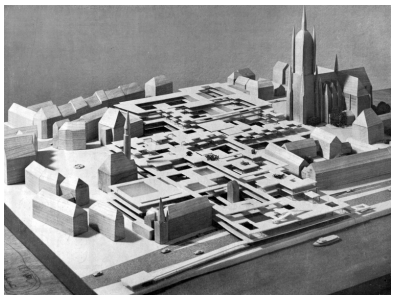
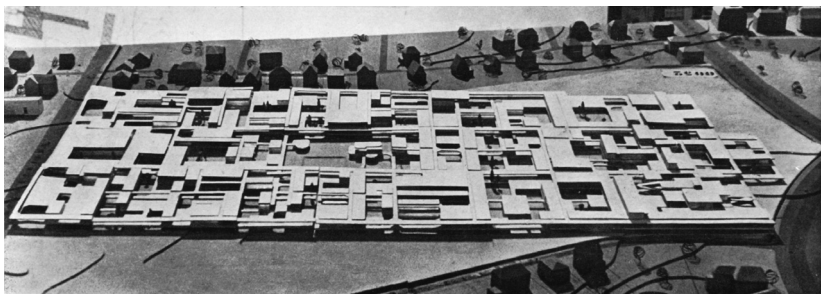


Figure 2. Competition for the reconstruction of Frankfurt-Römerberg centre, 1963, Source: Joedicke, 1968.

Figure 3. Competition design for the Free University, Berlin, 1963, Source: Joedicke, 1968.



flexibility in building use, and mixture in program. In the face of these challenges, and in every other design published in every other magazine, the mat claims to address a wide range of problems preoccupying contemporary architecture" (Sarkis, 2001). Stan Allen has recently also re-evoked mat-building principles to meet the design challenges of contemporary architecture and urbanism, characterizing mat-buildings as "a shallow but dense section activated by ramps and double-height voids, the unifying capacity of a large open roof, a site strategy that lets the city and the landscape flow through the project, a delicate interplay of repetition and variation and the incorporation of time element as an active variable in urban architecture" (Allen, 2001).

This paper aims to re-evaluate the mat-building strategies of formal organization in architecture and urbanism, exploring their potential for contemporary sustainable environments. The paper traces a formal analysis of mat projects in the following thematic order: from cell to cluster, from cluster to stem and from stem to mat, presenting worked examples by Candilis-Josic-Woods and Alison and Peter Smithson.

From Cell to Cluster

The re-conceptualization of the urban tissue in Team 10's work started with a single dwelling cell. The cell — an individual building or space that accommodates human activities — was organized through the 'from cell to cluster' principle, which separated the urban tissue into its smallest components, cells, and re-assembled them so as to establish intricate spatial variation between private and public space (Figure

4). This essential characteristic of the traditional European city was put to practice by Candilis-Josic-Woods in their extremely diversified low-rise, high-density courtyard housing in Aulnay Sous Bois, France (1960) and in their competition entry for semi-urban housing in Algeria (1960), which the authors considered "an attempt to discover structuring principles which might be applicable to the organization of the physical environment" (Avermaete, 2005). The typology, which was forward-looking in its innovative treatment of vehicular traffic and site climate conditions, used the courtyard house as the organizing cell of the development, and the courtyard itself as a vital center and climate regulator of the house. The courtyard plan can adapt to different climates – in hot areas, exposure to the sun can be avoided by keeping courtyards small and overshadowed by high walls, wide eaves and foliage. The exposure of vertical surfaces to the sun is minimized by sharing the external walls with neighboring houses. Thick walls and small windows of the courtyard layout keep interiors cool, while allowing cross ventilation with shady verandas and patios facilitate outdoor living. The resulting cluster typology creates a rich variety of spatial experiences and a formal framework for changing patterns of use.

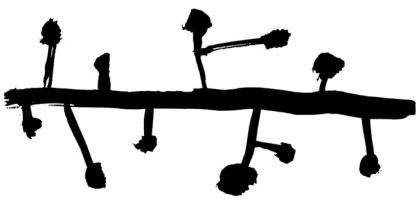


Figure 4. Cluster diagram of Fold Houses, 1955, Source : Smithson and Smithson, 2005.

From Cluster to Stem

In his declaration of the four functions of cities at the 4th CIAM Congress in 1933 – living, working, recreation, circulation – Le Corbusier proposed a comprehensive city desing framework for a Modern society. By the 1950s, the younger members of CIAM were advocating a planning approach that would better account for diversity — social, cultural, climatic and ethnic — in the built environment as well as its users (Statement on Habitat/Doorn Manifesto, 1954). Shadrach Woods, one of the opponents of functionalist zoning, argued: "The implantation of isolated housing projects or of dormitory towns makes as little sense as the building of educational or industrial parks. Public and private are contiguous and continuous, each supporting the other, but each limited to its own domain... when either clearly dominates over large areas, the fabric of life is discontinuous, creating zones of blight" (Woods, 1962). According to the Smithsons, "the forms and patterns derived from the garden city movement or the rationalism of the 30's [were] endlessly repeated in contradiction to the climate, human habit, location and common sense". For Team 10 architecture is not a 'magnificent play of form in light', as defined by Le Corbusier, but rather an attempt to create spaces for particular human activities over time. Architecture's aim is to define a 'carrying order', an infrastructural project capable of variation and growth.

In line with their response, the Smithson studied groupings of dwelling that would foster community and develop a natural relationship to their environment: “this might be termed the ecological concept of Urbanism, a concept of obvious value when we are dealing with the problem of ‘habitat’”. (Smithson and Smithson 2005) Re-thinking the basic relationships between social life and mechanization, they searched for new patterns of Habitat for a new urban reality. Their work suggested that the structure of cities lies not in their geometries but in the activities within them. These activities are articulated or materialized by buildings and spaces, by paths and places, and by the careful articulation of public and private control. In contrast to standardized architecture that ignores the particularities of its location and uses, they argued that architectural order should derive from comunity hierarchies and contextual associations. The system of relationships and patterns of encounter, which the cells and stems of the cluster generate, provide the spatial framework for these hierarchies and associations.

Instead of ‘new monumentality’, grand piazzas and the ‘hearth of the city’ presented at the previous CIAM by Sert and Giedion, the Smithsons put forward the streets of London’s working class neighborhoods as inspiration for a new form of architecture and urban design. The idea of the street as a stem of public life was developed further in their competition entry for a new housing block at Golden Lane in 1952. The project’s ‘street in the air’ concept was designed as an ample gallery that gives access to flats, but at the same time also functions as a place for human encounter

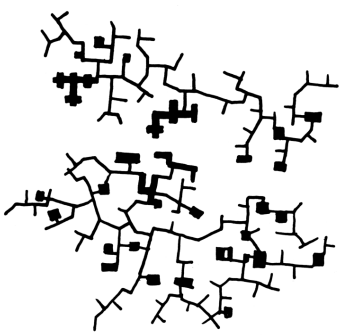
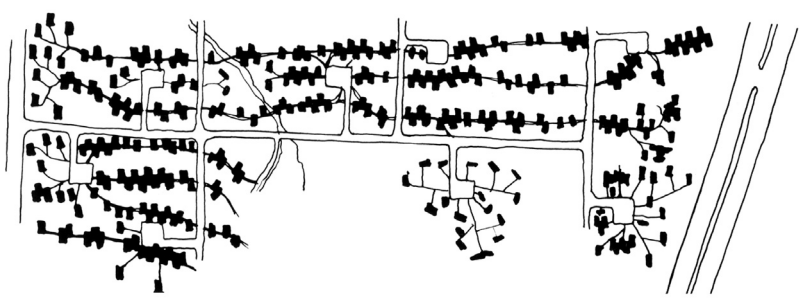


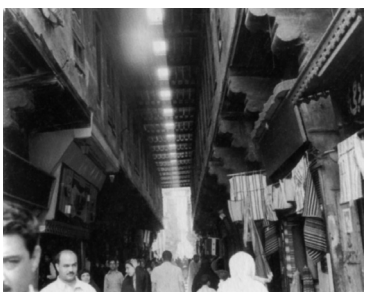
Figure 5. Diagrammatic plan of a small city from the Golden lane project, 1952, Source : Smithson and Smithson, 2005.

Figure 6. Cluster diagram of Close Houses from 1955, Source : Smithson and Smithson, 2005.



and play (Figure 5). Instead of the *rue intérieure* proposed by Le Corbusier in his Unité d'Habitation in Marseilles, the Smithsons proposed to move the circulation space to the façade of their buildings, thereby accentuating the public character and spatial autonomy of the stem.

Placing the stem along the periphery, rather than the center of the cells, also allowed the stem to grow or change with greater ease over time. The Fold House ideogram, presented in 1954 as an infill to the fabric of an existing city, connected dwelling units by a straight 'stem' that could grow, shrink or change in response to needs over time (Figure 4). The stem is also the basic structuring device in the Close Houses of 1955, where multiple parallel stems start forming a network of covered passages that link various dwelling types and activities in a loosely defined grid (Figure 6). The nucleus of the project, in each case, is a stem, rather than a 'hearth'.



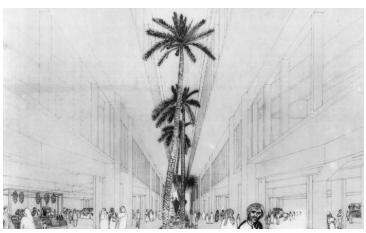


Figure 7. Interior of bazaar in Kuwait City and perspective of a gallery, 1968-72, Source : Smithson and Smithson, 2005.

From Stem to Mat

Eventually the concept of autonomous stems gave way to a two-dimensional network of stems and cells – a mat. Through its organizing network of circulation routes and support systems, the mat provides even greater flexibility for unifying diverse clusters of activity in multiple directions. It can grow along any of its stems in two dimensions, while stimultaneously maintaning a coherent and systematic interconnected order.

Mat-buildings were strongly influenced by the dense historical tissue of traditional cities. In parallel to their design work, the members of Team 10 studied the spatial structure and functional layout of traditional Islamic cities. As George Candilis pointed out, "in Morocco with Shadrach Woods, we began to work on an idea of a special conception to create place. Certainly the special concept was influenced by the Souks of Marrakech. These had two phenomena: two which always existed; spontaneity and diversity; with the 'main street' of the Souk as 'the skeleton'" (Risselada and Heuvel, 2005). For Candilis and Woods, the mat typology became the vehicle for generating the spatial and functional density of the traditional city. Aldo van Eyck described Woods' and Candilis' inspiration of the Arab city as follows: "Shadrach Woods and George Candilis, in a different way since they are so different, both tended to project their

experience – one in Morocco and one in Far East – into the souk and into the bazaar: they believed in the bazaar, in the souk and in the stem... We just used that one word 'casbah' as an image, as a poetic image. We were referring to any kaleidoscopic society where all the functions are more or less mixed, and always said the 'casbah' was the final limit. We don't have to literally make a casbah, imitating a period of human history when things were mixed and closed knit, but we need to be a little more 'casbahistic', by putting things together: and letting things penetrate into each other again. That is what we meant by casbah." (Tuscano, 2005)

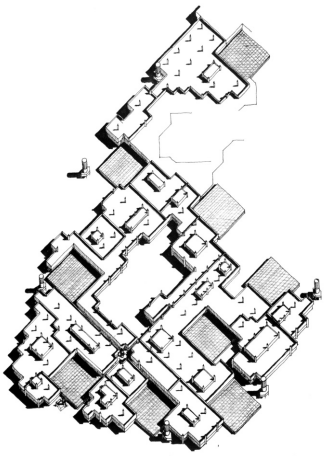


Figure 8. Peter Smithson presents the model of the mat-building to the Crown Prince of Kuwait, Source : Smithson and Smithson, 2005.

The Smithsons too were fascinated by the traditional Arabic casbah, its rich texture, "full of starts and stops and shadow… with a high degree of connectedness to allow for change of mind and the in-roads of time" (Smithson, 1974) (Figure 7). Building on the spatial qualities of the 'casbah', mat buildings became condensed into continuous structures of interlinked stems. The Smithsons even had an opportunity to propose mat structures in an arabic context as part of their 1968-72 Kuwait Urban Study (Figure 8)[2].

The mat's structuring concept of mobility and connectivity was developed in collaboration between the Smithsons and Peter Sigmond in their competition entry for Hauptstadt Berlin (1958). Through its particular focus on urbanity and mobility, the project emphasizes the inseparable relationship between an individual and the city, between the part and the whole. The project illustrates the Smithsons' ideas about mobility networks in post-war cities; instead of divisions, which characterize CIAM's previous concepts of functional cities, the Smithson's suggest that new forms of mobility demand physical patterns of connectivity. According to the Smithson's, "the urban forms of Berlin Hauptstadt have as their basis the idea of mobility, of absolute maximum mobility, achieved by a layered movement pattern that separates the various means of expression and gives to each its own geometry, its own formal expression." (Smithson and Smithson, 2005) The mat's indefinite circulation network is the project's generator.

The proposed pattern can flexibly accommodate growth and changes in use over

time. The Smithson's emphasized "the feeling for change, so that buildings, roads and services can develop freely according to their own laws without compromising the development as a whole" (Smithson and Smithson, 2005), which the two-dimensional circulation network of the mat generously provides. There are two interrelated

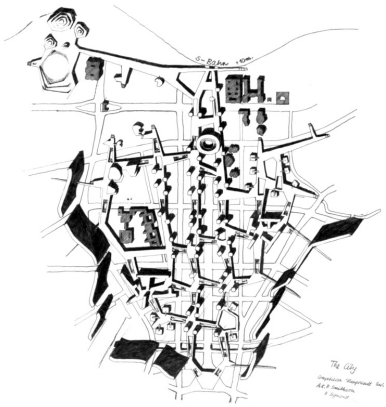


Figure 9. Competition for Berlin Haupstadt, 1958, Source : Smithson and Smithson, 2005.

geometric systems of movement — the upper-level network for pedestrian paths and — platforms of vistas that integrate existing historical remnants of the city, and which are accessed by escalators over the street grid; and the lower-level fabric of vehicular streets (Figure 9). By overlaying movement systems, the Berlin Hauptstadt project jointly addresses the relationships between mobility, growth and change, producing an urban network that anticipated the mat concept. "Architecture and planning", argued Woods, "which are each part of the other, are concerned with the organization of places and ways for the carrying out of man's activities. The architectural process begins with a way of thinking about organization in a given place-time, then establishes a system of relationships and, finally, achieves plastic expression." (Woods, 1962)

In Candilis-Josic-Woods' competition entry for the reconstruction of Frankfurt-Römerberg centre (1963), an area that was destroyed in the Second World War, the spatial organization also takes the form of a multi-level grid of pedestrian walkways that link public activities at the lower level with the private dwellings on the upper levels (Figure 2). The project brief asked for the reconstruction of a historical city centre in a ruined area between the city hall and the cathedral. For Candilis-Josic-Woods, structuring of new urban development in a historical urban tissue called for new spatial practices: "Such diversity of activities needs to be housed, that if all of these had to be considered separately, the result would be chaos. These diverse elements must be made into a whole, a single organism." Using a mat typology enabled the partners "to organize the multitude of activities called for in the program, into a clear, comprehensible, adaptable order." (Candilis, Josic and Woods, 1964)

The Frankfurt mat was not only meant to accommodate growth and change within its limits, but to also adapt to its surrounding context. Despite the apparent complexity of its grid, the scheme demonstrates that the scale, grain and traces of the surrounding urban fabric are reinterpreted on the ground level of the project as an attempt to harmonize the project and the neighboring urban tissue. The circulation grid of the mat corresponds to the existing network of pedestrian walkways on the site. Relationships with context are further intensified by the sequence of interrelated open spaces, courts and patios that permeate the entire project.

The structuring concept of the mat was developed further in Candilis - Josic - Woods' design for the Free University in Berlin (1963). The project was handled as a 'city in miniature' that is structured around an orthogonal double-level pedestrian grid, with most public functions located on the ground floor (Figure 3). The scheme proposed a series of wider pathways, stems, which serve the most active areas of the building, with a secondary system of perpendicular pathways serving the less trafficked areas of the building. The resulting 'groundscraper' organization ensures abundant opportunities for communication and exchange between various parts of the mat without sacrificing their autonomy. Ample pedestrian pathways, ramps and escalators connect clusters of rooms into a two-layer mat that extends over the entire project site. The juxtaposition of platforms, open spaces and covered pathways generates a continuous and spatially diverse structure. Alison Smithson later recounted that: "the Berlin Free University makes mat-architecture recognizable" (Smithson, 1974). She defined the term "mat-building" as a structure whose order is based on three parameters: interconnectivity; relational patterns; and opportunities for growth, decline and change (Ibid).

Discussion

By exposing the evolution of mat structures in the work of Team 10, this paper has tried to outline advantages of mat configurations that may offer renewed interest for contemporary architecture and urbanism. The mat concept is a critique of both the functional separation of urban land uses in post-war Europe and the widespread adoption of high-rise buildings during the same period. It was a reaction, common to many Team 10 contributors, against the orthodox zoning of cities into discrete functional areas, advocating that urbanism be more than merely an organization of buildings and activities into coherent zones with limited connectivity. Rather than giving it definitive form, the mat is a planning instrument that allows the urban environment to be mixed and structured over time (Avermaete, 2005). As an effort to escape from earlier CIAM dogmas, the mat typology signaled an emerging awareness of the complexity and richness of the urban fabric, evident in historic vernacular environments, but lacking from mainstream Modernism.

The mat typology also offers a flexible framework for relating to a site through

an uninterrupted continuation of the urban fabric into its own spatial network. The network of pathways, courtyards and platforms allow the neighboring urban or natural fabric to flow seamlessly through the project. Mat-buildings thus establish a system of relationships, present and potential, between the built and the natural. The spaces of transition and connection offer 'poetry of movement' and a 'sense of connectivity'. The very essence of mats is urban: architecture made of relationships rather than form.

Future Research

Mat-typologies have been realized in large-scale institutions, such as the Free University and Massachusetts Institute of Technology, as well as in housing projects, such as the Agricultural City by Kisho Kurokawa (1960). The typology has been recently re-introduced in Foster and Partners' plan for the Masdar City in Abu Dhabi (2007-2023) as a structural blueprint for sustainable development[3]. The typology has thus been mainly applied in singular institutional projects, and it remains unclear whether mats could be equally suited to more decentralized forms of development that are shaped by multiple owners over time. The case of Masdar City, which will need to transcend multiple institutions, might provide a partial answer to this question. Yet, it is also unclear whether mat-structures are bound to remain unique and rare for large-scale development, or whether their benefits can attract larger interest and adoption in dispersed, small-scale developments in rapidly urbanizing cities. Due to a number of challenges, mat buildings have not yet entered mainstream urban design practice. The need for costly up-front infrastructure investment compared to conventional patterns of development, and the procedural difficulties involved in separating the permanent infrastructure from the more flexible and adaptable parts, have so far limited the widespread adoption of mat structures. More research is required to understand and desirably overcome these challenges.

ENDNOTES

[1] The Kasbah is a dense historic urban development typology encountered in many Islamic cities.

[2] Four international architecture teams were invited by the Emir of Kuwait in 1968 to participate in the Kuwait Urban Study. Besides the Smithsons, participants included Candilis-Josic-Woods; Reima Pietilä; and BBPR. Jørn Utzon, whose proposal won first prize in a restricted competition for Kuwait National Assembly, also proposed a growing mat structure. For Jørn Utzon "traditional Arab architecture will have an enormous influence on the future architectural development of the world and it is, therefore, a natural thing that the concept of the Kuwait National Assembly complex has been based on some of the major elements of traditional Arab architecture, such as the covered street -the bazaar street- the interior courtyard, the succession of structural arches" (Ferrer Forés, 2006).

[3] Though no provisions for long-term growth and change have been outlined in Fosters & Partner's project.

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