Architecture and Systemics: A Brief Outline

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Abstract Architecture is a complex subject in itself, as it shapes the built environment where people live, answering to human needs, expressing the manifold levels of values which define society in its culture, economy, and politics. During the twentieth century, a number of design theories, both in Europe and in the USA, linked Architecture and Complexity drawing inspiration from Systemics, Information theories, and Cybernetics. Thus, being closely connected to industrial production, the main goal was to reduce uncertainty in the design process, promoting optimization. In the industrial design process, a sequence of requirements defines the exact level of fitness-for-purpose of a product. Such ideas proved to be unsuitable for many architectural design purposes: "functional optimization" can be applied to an object, a device, and a machine; it seems to be useless, and even dangerous, when applied to an evolutionary entity as the built environment seems to be.

This chapter endeavours to trace an outline of this difficult relationship.

1 Complexity Made Simple?

The very nature of Architecture is complex. The understanding of such complexity has accompanied the development of theory since the Vitruvian Triad. To name just one masterpiece of twentieth century architectural criticism, the integrated theory of architecture expressed by Christian Norberg-Schulz's *Intentions in Architecture* (Norberg-Schulz 1965) represents a truly systemic comprehension of architecture without ever naming the word.

More specific references to Systemics and systemic thought and language came in when the industrialization of building process approached its maturity, after WW2, even if some clues could be traced back to the industrial revolution, when a

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L. Urbani Ulivi (ed.), *The Systemic Turn in Human and Natural Sciences*,
Contemporary Systems Thinking, https://doi.org/10.1007/978-3-030-00725-6_5

number of completely new problems faced the architectural profession and challenged the theory.

For centuries before industrialization, Architecture had represented a high-rank applied art, quite often supported by highly refined formal prescriptions, always supported in the construction phase by robust technical knowledge improved by experience during time. The practice of Architecture was destined to major buildings, promoted by public interest or wealthy clients, representing multiple social, civic, and religious values. The main part of the ordinary built environment (Rudofsky 1964, 1977; Habraken 1998) grew up in layers over time—without neither architects nor engineers—taking shape according to the geo-climatic peculiarities of the place and to the local resources, activities, customs, and technical skills. At all scales, the construction process was slow, the means and materials mostly local, the knowledge and techniques improved over time by trial and error and handed down by tradition, through apprenticeship.

Industrialization, speeding up all human activities, undermined the foundation of architectural culture and knowledge. At the end of the 19th Century, massive urbanization forced architectural culture to face unusual problems, under different aspects. An important and much-debated question was how to express the new aesthetic and symbolic values of the industrial age. The most unusual problem was how to design large quantities of low-cost housing of acceptable quality, new services, and urban equipment to meet the collective needs of a changed society. Most architectural culture, after World War 1, was committed to defining the minimum housing requirements to accommodate masses of new clients, both numerous and unknown.

The studies by Alexander Klein in Berlin, those by Grete Schütte-Lihotzky in Frankfurt in the 1920s, to name just a few, tried to integrate Taylorist-inspired ideas into the design process, with the objective of giving everyone an efficient, comfortable, and pleasant home despite the financial constraints. These designers analysed the usual activities that take place in the house, measuring time and ergonomic relationships between movements, paths, and equipment, committed to the idea of improving the efficiency, the health, and the well-being of their unknown and anonymous "clients". This meant applying the industrial conception of functional analysis and organization to the production and reproduction of labour power to the activity that customarily take place in the environment where a family lives.[1]

In order to satisfy the housing needs of this new *mass-entity*, it was not possible to investigate the needs of a specific client. It became essential to trace—or to imagine—the significant elements common to countless, faceless individuals whose customs and ways would be increasingly levelled out by life in the industrial city. These people were identified as "users", expected to find satisfaction by living in well-equipped functional spaces. The study of repeatable typological solutions, suitable for buildings constructed by means of fast techniques and new materials available through industrial production, implied the "construction" of an average user, whose

[1] Studies on the *Existenzminimum*, as it was termed in German, were carried out in the 1920s both in capitalist Europe and in the newborn Soviet Union, with different degrees of insight about the women's role.

uniform behaviour and aspirations represented the foundation of the industrial and rationalist idea of *standard*.

"All men have the same organism and the same function. All men have the same needs", claimed Le Corbusier (1923) while, as early as in 1932, Hitchcock and Johnson (1932) criticized the idealism of the European functionalists, remarking that they aimed to satisfy the needs that one should have, rather than actual ones: "Functionalism is absolute as an idea rather than a reality (…) The Siedlungen implies preparation not for a given family but for a typical family. This statistical monster (…) has no personal existence and cannot defend himself against the sociological theories of the architects (…) Europeans build for some proletarian superman of the future".

Sigfried Giedion's *Mechanization Takes Command* (Giedion 1948) focused the question of mass-production of buildings and bore a significant sub-title: "a contribution to anonymous history". Giedion examined the effects of mechanization in everyday life, tracing the outline of a social history of technology, which at the time represented a critical breakthrough. He invoked the creation of "chairs of anonymous history" in the University and blamed as "murder of history" the destruction of documents about the early stages of industrialization, claiming that inventions, mass-production, and the work of ordinary people in the industrial era "are continually shaping and reshaping the patterns of life" in an unprecedented way, at every possible level. Giedion also suggested to open a research field to find an answer to the question: "what does mechanization mean to man?", and to investigate such topics as the dangers of losing human control over products and of increasing dependence upon industrial production, in a situation where, in general, "man is overpowered by means".

Marking a significant distance from his previous work (Giedion 1941), *Mechanization Takes Command*, published shortly after the apocalypse of WW2, suggested the analogy between mass-production and mass-destruction, and recalled the horrors of organizational efficiency applied to extermination. Thus, while claiming a well-balanced attitude towards the historical condition of "mechanization", Giedion questioned the optimistic, positive aura surrounding the idea of progress itself: after WW2, "men have become frightened by progress, changed from a hope to a menace (…) before our eyes our cities have swollen into amorphous agglomerations. Their traffic has become chaotic, and so has production". Giedion would not reject the notion of mechanization; he rather aimed to defining mechanization's place in history, society, and in culture, while rejecting the mechanistic conception of the world. Such conception, he argued, had been swept off every cultural domain already—from physics to biology, psychology, and art. He rather suggested a systemic, *holistic* way of conceptualizing "domains having to do with the human organism" and closed his book with a list of "new balances" required: balance between individual and community, between the world as a whole entity, and local issues, between the spheres of knowledge, and "between the human organism (…), its organic environment and its artificial surroundings".

Heavy traces of a "mechanistic systemic thought" show in the 1950s and 1960s rational design theories developed in the USA and the UK, drawing on the experience gained in industry to reduce errors, uncertainty, risks, costs, and time.[2]

During the 1940s and in war production, a number of techniques of analysis and control for various processes—planning, industrial design, and production—had been developed. Reduction of error entails the capability to integrate and manage the relationships and information flows between different actors in a complex process. Decision-making techniques were deployed along the lines of Operational Research (OR), which represents a method of mathematical analysis to identify and break down one specific general problem in sub-problems, in order to define a sequence of decisions capable of achieving *performance improvement* in both the process and its final product. Thus defined, the decision sequence can be summarized in a mathematical model that allows evaluating different solutions by modifying certain variables (Broadbent 1973).

The rational methodology, as applied to the programme/project/production flow, refers to information theories and cybernetics[3], the science of control and communicationin animals and machines (Wiener 1948; Ashby 1956) and focuses its analysis on the relationships between the elements of a system and their role.

During the 1960s, the ideas of *input, output,* and *feedback* became familiar to rational architectural design, with different regional variations between European countries and the USA. Morris Asimow (1962) outlined a method describing industrial design in terms of information process, whose steps subsequently gather, handle, and organize information in a creative way. Such process has an iterative character and prescribes the derivation of decisions which must be optimized, communicated, and *"tested or otherwise evaluated"*.

Accordingly, rational design processes were generally structured in phases modelled on a decision sequence with feedbacks, often represented by flow diagrams.[4]

Complexity more directly approached the world of architecture via the Hochschule für Gestaltung established in Ulm in 1949.[5] The Ulm School promoted a system-based, formalized approach to architectural design, combining the Bauhaus commitment to artistic production for the industrial age and the optimization aims of Operational Research. Along this line, the relationship between humans

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[2] Main studies in the Anglo-American area were: M. Asimow, *Introduction to Design*, 1962; J.C. Jones, "A Method of Systematic Design", 1963, in: *Design Methods*, 1970; S.A. Gregory, *The Design Method*, 1964; L.B. Archer, *Systematic Method for Designers*, 1965.

[3] Cybernetics, recalling the assertions of contemporary science on the impossibility of studying complex systems by reducing them to their simplest components, searches for methods capable of analysing and controlling systems of *extreme intrinsic complexity*.

[4] Broadbent (1973, p. 257).

[5] Tomàs Maldonado, professor at the Ulm school from 1954 to 1967 directed it from 1956 to 1960, establishing the disciplinary and academic field of *Environmental Design*, within the frame of a wider "design philosophy" based on analytical methodologies. He had a fundamental influence on design theories in Italy; he was professor of Environmental Design at the University of Bologna (1976–1984) and at the Politecnico di Milano (1985–1994) where he greatly contributed to establish the school of Industrial Design.

and human-designed-and-built environment at different scales entailed scientific analysis and a design approach where a number of variables link the corresponding users' needs—which are closely connected to their environment—and the functional requirements of their activities.[6]

The approach called *metadesign*[7] represented a formalization of the design process which could generate models of design behaviour apt to deal with uncertain and changing situations. It was conceived as an "ordered set of operations to achieve congruence between premises and conclusions, through systematic processing tools, and to knowingly define the limits of design alternatives compatible with the problem" (Boaga and Giuffrè 1975). The procedure takes into account both the analytical phase and the synthetic, conceptual one, providing "the organization of a system of spatial requirements descending from human activities, both specific and in their mutual relationship, which by concretizing and quantifying these requirements in relation to any specific context, brings forward a field of design variations (dimensional, typological, etc.) from which solutions can be derived that correspond to the general objectives of the customer and user" (Magnaghi 1973).

Generally speaking, the rational design approach proceeds from the preliminary analysis of the users' needs according to the system of activities to be provided, to the definition of a programme containing specific requirements, to the construction of a model representing an environmental spatial system which properly meets the requirements of the organization of the established activities. The environmental subsystem of spaces, and the technological subsystem physically containing it, represent a complex *building organism*: a dynamic system that, in performing its functions, continually processes matter, energy, and information that flow in and out of its physical boundaries.

At this stage, rational design theories[8] agreed that the designer's goals should be expressed in terms of *performance* which had to be specified in a set of criteria. The conjoined terms of *need-requirement-performance* were at the core of this idea.

Under a different point of view, the need of a more formalized method to help design accomplish the new tasks posed by mass-building production represented an updated version of the old debate about Architecture being disputed by the realms of Art and Science. J.C. Jones wrote: "The method is primarily a means of resolving a conflict that exists between logical analysis and creative thought. The difficulty is that imagination does not work well unless it is free to alternate between all aspects of the problem, in any order and at any time, whereas logical analysis breaks down if there is the least departure from a systematic step-by-step sequence (…) so systematic design is primarily a means of keeping logic and imagination separated by external rather than internal means".[9] Jones's assumptions were widely shared, in a

[6] In Italy, this approach to design in architecture gave life to the academic discipline "Tecnologia dell'Architettura" (Architectural Technology), established in 1969.

[7] Andreis Van Onck brought forward the idea while at ULM in 1963.

[8] Broadbent (1973, p. 293).

[9] Quoted in Broadbent (1973, p. 257).

time when the idea that logic and imagination, as well as reason and feelings, represent worlds wide apart within the human mind, was commonly accepted.

By applying this distinction coherently, most rational design theories did not take into account the issue of *form* as priority. The layout contrived by the meta-design process could do as a sort of "generative cue" for the building plan. As for the building's morphology and appearance, the commonplace idea was that it should represent its purpose, complying the slogan "Form Follows Function".

2 Form and Function Between Reason and Nature

In a famous article written in 1896, "The Tall Office Building Artistically Considered", Louis Sullivan (1896) argued that contemporary American architects in their profession must face "something new under the sun" because a specific evolution and integration of social conditions resulted in the demand for a new typology of buildings: namely, tall office buildings were "a new grouping of social conditions [that] has found a habitation and a name".[10]

From this rational approach, Sullivan proceeded to explain the architectural nature of the problem: "How shall we impart to this sterile pile, this crude, harsh, brutal agglomeration, this stark, staring exclamation of eternal strife, the graciousness of those highest forms of sensibility and culture that rest on the lower and fierce passions? How shall we proclaim, from the dizzy height of this strange, weird, modern housetop, the peaceful evangel of sentiment, of beauty: the cult of a higher life?"[11]

Sullivan highlighted the architect's own task: that is, finding answers to questions that are both aesthetic and ethic. The problem of giving form to the habitation of this "new grouping of social conditions", that is, the modern office, is unprecedented. Therefore, in designing tall buildings, architects cannot resort to traditional rules, to the established "working tools" of the current profession. Instead, one should follow one's "natural instinct" and, after establishing the functional and technological structure of the tall building, one shall understand which parts of the building will need a special aesthetic connotation, within a harmonious overall composition, according to their own purpose and to their relationship with the city. Sullivan advocated "the erection of buildings finely shaped and charming in their sobriety", against any academic ornamentation, but his article has not the polemic tone and the dry wit of Adolf Loos's famous invective (Loos 1929)[12]. He rather includes decoration in the formal issue, which represents a higher order of enrichment, entailing a moral character and edifying aims. In fact, formal accomplishment allows the designer to advance the stage of the economic—functional programme, which left alone would produce "the sinister building of the speculator-engineer-builder combination". Once the material

[10] Sullivan (1896, p. 403).

[11] Ibid.

[12] A. Loos, *Ornament and Crime,* 1908.

aspects of the construction are resolved in the design draft, the architect must reason on the aspects concerning the spiritual nature, and therefore the feelings and emotions, that this kind of building should express and arouse. To accomplish this goal, architects should get rid of academic teaching. They should rather observe nature and consider the wonderful variety of natural forms: "All things in nature have a shape, that is to say, a form, an outward resemblance, that tells us what they are, that distinguishes them from ourselves and from each other. Unfailingly in nature these shapes express the inner life, the native quality, of the animal, tree, bird, fish, that they present to us; they are so characteristic, so recognizable, that we say, simply, it is natural. (…) Whether it be the sweeping eagle in his flight, or the open appleblossom, the toiling work-horse, the blithe swan, the branching oak, the winding stream at its base, the drifting clouds, over all the coursing sun, *form ever follows function, and this is the law*".

The three F's cliché "Form Follows Function" is an utter simplification which totally betrays Sullivan's ethical and poetic stance, but it became very popular in the mainstream culture of post-War architects and, apparently at least, in the practice of speculative building developments all over the world. Thus, it represented an easy target for the "anti-modern" reaction which burst out in the late 1960s. In his *Form Follows Fiasco,* author and architect Peter Blake (1977) proclaimed: "Most of the time the form is nothing but a probable hypothesis of the function. Most of the times in good (or more likely in bad) the form follows the current rates of the bank loan. Most of the times in modern architecture, the form is anti-functional. Most of the time these three assertions can be true".[13]

3 Good Fit, Permanence, Co-evolution: A Matter of Time

Rational design research was at its peak when Christopher Alexander published the work that gave him international fame (Alexander 1964). He was deeply involved in the search for a rational, formalized process in architectural design. In his research, he put *form* at the centre of the whole process: "The ultimate object of design is form". By this statement, he meant that any successful constructive process should result in a well-defined, well-shaped form, which necessarily responds to a number of environmental stresses, the way it happens in natural processes. So that there is no subjective judgement about what is good and bad because "good form" is the only possible one, the rational response to environmental forces.

In this, he referred to the studies of biologist and mathematician D'Arcy Wentworth Thompson, about how physical environmental forces shape the morphology of the living things in the course of their evolutionary growth (Thompson 1917). Alexander, a mathematician and an architect himself, underlined that D'Arcy W. Thompson even defined *form* as the *diagram of forces* for the irregularities that mark the relationship between living entities and their physical environment.

[13] Blake (1977, p. 40).

Following this line of thought, he explored the morphological development of human settlements according to the physical conditions that allow their birth and growth over time. He argued that a totally regular and homogeneous world would be completely amorphous, without any forces nor forms. Irregularities in the world's fabric are responsible for entities form, as *form* is the result of the world's entities efforts of *fitting* into an irregular environment. Accordingly, design cannot take into account a single object and its form alone, but "the ensemble comprising the form and its context". In fact, all design problems can be defined as "efforts to achieve *fitness* between two entities: the form in question and its context. The form is the solution to the problem; the context defines the problem". Alexander calls *good fit* the property of such an *ensemble*, which represents the design goal. In a famous example, he explains the problem of designing a traffic sign as the necessity of fitting the demands made on the sign by a driver's eye because "the ensemble is a truck driver plus a traffic sign".

Alexander's idea of function is far more complex than the representation given by the diagrams of system engineering, which shaped functional programmes in the rational design process and characterized the early phases of Systemics applied to architectural design. For him, *form* is the very focus of the problem.

"In a problem of design—Alexander argues—we want to satisfy the mutual demands which the two [elements of the ensemble] make on one another". How can we find the good fit for the ensemble of a human settlement plus its physical and social context? Our context is far too complex for a thorough operational description, "yet we certainly need a way of evaluating the fit of a form which does not rely on the experiment of actually trying the form out in the real world context. Trial-and-error design is an admirable method. But it is just real world trial and error which we are trying to replace by a symbolic method, *because real trial and error is too expensive and too slow*. (…)".[14]

Alexander looked for the formal rules of aggregation that could be abstracted by analysing "real life" human settlements and trying to translate their complex relationships into formal terms, using graphs and set theory, in order to discover their underlying order. His early efforts proved unsatisfactory and he quite early rejected some of this approach (Alexander 1965). Nevertheless, and in spite of this failure in defining a proper design method, his work brought into full light some very good points and questions: "Understanding the field of the context and inventing a form to fit are really two aspects of the same process. It is because the context is obscure that we cannot give a direct, fully coherent criterion for the fit we are trying to achieve (…) How is it, cognitively, that we experience the sensation of fit?". The consideration implies that we will never be able to make an exhaustive and finite list of positive requirements, which in real life represent a potentially infinite set. To approach the question, Alexander suggest a simple way of picking a finite set of requirements, by thinking of them in terms of *misfits*. He claims that it is easier to understand how and where a situation is not satisfactory: "This is because it is through misfit that the problem originally brings itself to our attention. We take just

[14] Alexander (1964, pp. 15–27).

those relations between form and context, which obtrude most strongly, which demand attention most clearly, which seem most likely to go wrong. *We cannot do better than this*"[15] This represents a sort of "fuzzy approach" towards the properties of good design: not a rigid list of requirement/performance prescriptions, which could never be very exhaustive, but rather a path of good advice against events "most likely to go wrong".

In "A City is not a Tree", Alexander recognizes that the vast majority of people, and a good number of architects as well, prefer old buildings and old cities to new ones. He calls new cities, deliberately planned and designed, *artificial cities*, while *natural cities* are "those cities which have arisen more or less spontaneously over many, many years".[16] He demonstrates that the formal organization of "natural cities" is a *semi-lattice*, the structure of living things where different activities can overlap and interact while belonging to different subsets, in opposition to the structure of "artificial cities", which can be represented like a *tree diagram*, where every subset separately stems like the branches of a tree. Alexander does not elaborate the issue of time; he just notes that also planned cities may become "natural" over time—like Liverpool and New York. In fact, a number of Roman towns had their origin as military camps, which is a typical tree organization, and nevertheless, "over many many years" they acquired the more subtle and more complex structure of a semi-lattice. Alexander does not openly indicate Time as one of the entities—or forces—that give the built environment its form. Nevertheless, when he writes that any living reality, any real system whose existence actually makes the city live, must be provided a physical receptacle, he implies that Time, flowing "over many many years" provides exactly the opportunity of physical receptacles for systems that had not been anticipated in the original plan.

Everything changes over time: Time, as a shaping force, destroys material things and overturns social structures—it breaks the boundaries that prevent overlapping. Alexander seems to admit that there is no possibility of planning a semi-lattice structure "because designers, limited as they must be by the capacity of the mind to form intuitively accessible structure, cannot achieve the complexity of a semi-lattice in a single mental act (…) for the human mind, the tree is the easiest vehicle for complex thoughts". Nevertheless, "the city is not, cannot and must not be a tree. A city is a receptacle for life (…) if we make cities which are trees, they will cut our life within to pieces".[17]

In the 1970s, important studies in the UK investigated the entities that give form to the built environment, focusing on flows of energy and matter which shape human settlements according to the local environmental characters (Martin and Steadman 1971; Martin and March 1972; Steadman 1975). These studies were intended to understand the urban morphogenesis in relation to the dynamics of the observed environmental variables and to develop operational models using topology applications, graph theory, functional interaction matrices, and other geometrical and mathematical techniques (Diappi 2004-2016; Broadbent 1973), thus providing "good design rules".

[15] Alexander (1965, pp. 58–62).

[16] Ibid.

[17] Ibid.

In Italy, architect and author Saverio Muratori (1959, 1963, 1967) investigated building typology and urban morphology according to their geographical, historical, and functional peculiarities. He researched the logic of morphogenesis in human settlements, with the main goal to provide a design tool for new developments in old cities. His *operante storia urbana* ("operational urban history") reconstructs the organic link between human groups and their human-made environment combining material history and geography theories along with intensive field work in Venice and in Rome. He studied typology and morphology in their material layering over time, in the process of constructing the built environment. Muratori recognized an "organic" relationship between human social groups and their settlements. Such relationship slowly produces physical and long-lasting transformations in the territory. In his view, the material construction of the built environment in subsequent, continuous layers within the mould of local geography, over time consolidates and selects morpho-typological characters, which condition later transformations and are in turn continuously transformed. Typology and morphology embody and express motifs which are formal, functional, cultural, and symbolic; their persistence is an indication of both adaptability and generative power. Muratori applied the results of his *operante storia urbana* in a project that won the competition for the CeP-Barene housing project in Venice Mestre (1960). Here, he designed the new development for public housing according to two alternative versions, using either the court or the linear type, both derived from the analysis of the historical Venetian built fabric.[18]

In this case, as in Alexander's, Time plays the role of the great Master Builder to which human settlements owe their most durable, *best fit* configuration. Thus, the durability of building forms appears to be an evolutionary quality, given the evolutionary nature of the urban phenomenon itself, whose dynamic morphology represents the material expression of flows of processes (Batty 2005; Marshall 2008; Batty and Marshall 2009).

4 Metaphors Aside: Feedback, Performance, Affordance

We can see that from early 20th Century to present days, many references to systemic thought can be found in the design field. Ludwig von Bertalanffy himself (von Bertalanffy 1968) wrote, as Sullivan and Alexander did, that every organic form is the expression of a flow of processes, persisting only in a continuous change of its

[18] Muratori's studies prompted typological studies by Giuseppe Caniggia (1981) and Pierluigi Cervellati (Cervellati and Scannavini 1973). Cervellati, an urban architect and town planning councillor for the municipality of Bologna from 1964 to 1980, was the promoter of the recovery of the historic centre of Bologna on the basis of the typological method, in an experience that had great international resonance. In the same years, building upon a completely different line of thought, Aldo Rossi (1966) investigated the "*logic of urban facts*" through the analysis of the cities' historical structure, in search of a *non-arbitrary* way for the construction of their future.

components, and that it can be considered as an expression of a pattern of processes of an orderly system of forces.

Currently, urban contexts are widely recognized as emerging and adaptive phenomena, inherently unstable because they exist in a continuous state of flux (Batty 2005).

A society's conceptual representation of its environment defines theories and tools to modify it. Thus, society promotes changes in the built environment according to the prevailing representation of environment within its "widespread culture". Italian geographer Eugenio Turri (1974) stressed the role of *systemic regulator* that culture can play: "As a biological ecosystem collapses when its use by the organism that inhabits it destroys its survival conditions, so its anthropological equivalent—the built environment—collapses when the balance between natural and human resources and the needs of its inhabitants are upset. (...) In this case, culture fails in its role of mediator between society and the environment, not being able to direct social behaviour and the actions of political and administrative institutions".

Today, unlike 40 years ago, it is perhaps easier for our society's widespread culture to accept the idea of the built environment as a specific and co-evolutionary eco-environment of the human species (Magnaghi 2000). Environmental failures and risks due to urban spread and overgrowth are all too obvious. On the other hand, the huge development of information technologies also help systemic references exit the metaphor, by developing methods and tools to analyse and model phenomena of increasing complexity. Architects should be aware that any design problems, as Alexander argued, should satisfy the mutual demands, which the two elements of the ensemble—design form and its environment—make on one another.

Actually, people and the built environment continuously exchange flows of matter, energy, and information. This should allow the idea of *feedback* properly entering the realm of architectural design.

Feedback regulates systems by integrating the information derived from the action-reaction circuits. In real-life built environment, this means studying its performance in relation to the needs, desires, and aspirations of the people who live and use it. For architects, this means learning from experience, recognizing and analysing mistakes and appreciating and disseminating success. Methods, techniques and tools have been developed over many years (Preiser et al. 1988) to analyse and evaluate the multi-faceted ways in which people react to buildings, spaces, and landscape. Performance-based evaluations developed increasingly their methods integrating ergonomics, proxemics, environmental psychology, anthropology, and sociology (Zeisel 2006; Preiser and Vischer 2005), which apply to different scales: buildings, urban neighbourhoods, landscapes (Mallory-Hill et al. 2012). Such sophisticated techniques make it possible to appreciate the relationship between people (individuals and social groups, their culture, expectations, social and economic conditions) and places (natural and built environment, resources, climate, use) in terms of physical and psychological perceptions, pleasure, satisfaction, preferences, and to express them in statistical form.

Performance-based approach to design may prove too "hard" and inadequate at wider space-and time-scales, when dealing with the ever-changing human built environment, which results from activities of generations over time. There is no fixed design system of controlling such flows, of eliminating uncertainty and flaws in their way.

Nevertheless, the relationship between the "users"—people, communities, human groups, and single beings—and the actions that shape our eco-techno evolutionary environment do require some kind of conceptualization to help appraisal for decision-making in the realm of common good.

A softer and promising approach to the ensemble "humans plus their physical and social context" seems to be the idea of *affordance,* coined by environmental psychologist J.J. Gibson (1979), who defined the *affordances* of the environment as the opportunities that it offers and provides to its inhabitants, according to their own specific characteristics. Affordance depends upon the physical properties of an environmental component, which are fit for the properties of an animal and allow the animal to use it in its ecological *niche.* Affordance characterizes the relationship between observer/user and its environment in terms of *opportunities* and involves cognitive, cultural, and social issues that are increasingly complex according to the species.[19]

The built environment in its development is subject to the shaping forces of human activities over time, with all the constraints and possibilities that Time and Nature put in its way. Over time, it becomes a goldmine of ever-changing *affordances.* The collective organizations of the human animal—communities—should be able to identify them to promote the species' survival.

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[19] In the design realm, the idea has been popularized by D. A. Norman, *The Psychology of Everyday Things*, New York, 1988, and simplified to define the degree of interaction between a designed object and its user.

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