In-between and Through: Architecture and Complexity
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This paper draws on current research on complexity and design process in architecture and offers a proposal for how architects might bring complex thought to bear on the understanding of design process as a complex system, to understand architecture as a way of organizing events, and of organizing interaction. Our intention is to explore the hypothesis that the basic characteristics of complex systems – emergence, nonlinearity, self-organization, hologramaticity, and so forth – can function as effective tools for conceptualization that can usefully extend the understanding of the way architects think and act throughout the design process. To illustrate the discussions, we show how architects might bring complex thought inside a transdisciplinary design process by using models such as software engineering diagrams, and three-dimensional modeling network environments such as media to integrate, connect and 'trans–act'. 
1. Introduction: Traveling through realities

“We are now in a dynamic period in which the body is unstable, where time and space are perceived not as permanent, but as instances, as events. We have entered the nomadic era in which the discontinuity of space and the fracture of time is the modern condition.” [1]

Questions that emerged strongly in architecture in the 1990’s – related to fractal geometry, chaos, genetic engineering and so forth – mark the first years of this decade. It becomes evident when we analyze approaches concerning important architectural publications such as the titles ‘Architects in Cyberspace’ (1995) and ‘New science=new architecture?’ (1997). Questions discussed from theoretical and empirical approaches reflect a moment characterized by fostering a large and significant interchange between disciplines that are conventionally distinct – computer science, chemistry, physics, biology, philosophy and architecture. It was a crucial moment when questions originally from the 1960’s came back to be revised and improved. Issues raised by some authors, such as Robert Venturi, Jane Jacobs, Cedric Price, Archigram, Gordon Pask, Yona Friedman, among others, have been renewed and have regained importance indicating a new phase of architecture culture that is part of the Internet era.

Nowadays the following questions may have to be addressed: how are information and communication technologies used as media to create and transform the way we think and practice architecture? Are we experiencing a time where the architecture of process is more relevant than the architecture of objects? A possible answer to these questions may arise from considering ‘complexity’ as an important element of the architectural design process.

We believe that using complexity in architecture would force architects to leave behind their traditional role as top-down managers, and make them work more effectively and in a more horizontal way [bottom-up] with the different actors involved in the design process. Convinced that the ‘less is more’ attitude that typifies the greater part of contemporary designer creation is a false response to the growing complexity of our society, we argue that designers, nowadays, must be bold researchers, exploring in each project new realms of design and proposing innovative solutions to different contemporary problems. The result of such design dynamics should be creations that are generous, narrative and more ‘democratic’, embedded in ‘programs’ that offer actors the possibility of assuming different roles according to the situation.

2. Trans_action

Complex thought in architecture is not new; neither is it complicated, as many people think. It invites us to consider articulations of the whole and
the parts at the same time, as Edgar Morin – one of the most important
writers on complex thought today – explains. He proposes a method which
condenses an ensemble of ideas sufficiently powerful to treat complex
situations with various levels of organization, retroaction, emergence and
self-organization, in which the ‘whole’ is considered simultaneously as more
and less than its ‘parts’. This method, used in education and transdisciplinary
activities, is based on the so-called macro-concepts and three principles of
intelligibility, through which are articulated the ‘whole’ with its ‘parts’, the
global with the specific, in a restless coming and going. Basarab Nicolescu
helps us to understand the articulations between Subject and Object by
means of the flow of information and consciousness inside a complex
system in a transdisciplinary approach:

“Transdisciplinarity is the transgression of duality opposing
binary pairs: subject/object, subjectivity/objectivity,
matter/consciousness, nature/divine, simplicity/complexity,
reductionism/holism, diversity/unity. [...] The open unity
between the transdisciplinary Object and the
transdisciplinary Subject is conveyed by the coherent
orientation of the flow of information which traverses the
levels of Reality and the flow of consciousness which
traverses the levels of perception.” [2]

To make an analogy to the quote above, the Object would be the
architectural product – the whole – and the Subject would involve the
different interacting agents – its parts – exchanging information in a hopefully
coherent flow, which we could call design process. By accepting that the
whole is simultaneously more and less than the sum of its parts, perhaps, as
architects, we should reconsider the dynamics of the design process. This
would allow for interaction and Transdisciplinarity, rather than just
consulting, with other disciplines related to the different parts involved.

Edgar Morin suggests an approach to complexity combining three
theories: information theory, cybernetics and systems theory. According to
Morin, these theories “which are closely related and indeed inseparable,
emerged in the early 1940s and have had a far-reaching cross-fertilizing
effect on one another.” [3] As Morin puts it,

“The idea of feedback, introduced by the U.S.
mathematician Norbert Wiener breaks with the idea of
linear causality and introduces that of causal loop. The
cause acts on the effect and the effect on the cause, as in
a heating system where a thermostat controls the
operation of a boiler. This regulatory mechanism makes
the system autonomous, in this case ensuring that an
apartment has thermo autonomy from the colder
temperature outside. The feed-back loop may act as an
amplifying mechanism, e.g., in a situation where an armed conflict reaches a critical stage. [...] Very many instances of this sort of inflationary or stabilizing feedback can be found in economic, social, political or psychological phenomena.”[3]

In this context, an example of using a complex approach in architecture is the design process used by the English architect Cedric Price in his Fun Palace Project [1965] designed by a multidisciplinary team. As early as 1961, Price had already embarked on an enquiry into information technology, examining the relationships between location, communication and information. By integrating traditionally separated disciplines, as for example the cybernetics method based on feedback and circular process, the project was conceived by considering the possibilities of activities and their pathways and the flexibility of movement to define the spatiality rather than a predefined program of functionalities. The cybernetics method used during the design process is closely related to complex theory.

By this time he was already using the computer as a potential communication medium. Complexity in this sense was meant to be the interrelation between the different actors and the activities. The architectural object was an undisclosed recipient, which could change and adapt constantly during and even partially after the design process, responding to complex interrelations.

Some, who were in the 1960s, thinking about the implications of using computational environments to “inter-act” using a mediated design process, were also thinking about a way of introducing the user as an actor inside the process. In this sense, the paper in which Andrew Rabeneck discusses the aims of the design process, presents an interesting panorama:

“Work is in progress on the following techniques, all of which are compatible with the concept of user/production
dialogue: conventional modes allow client participation through direct, computer access. Simulation techniques to display any aspect of form, light and color. Integration techniques to accommodate changes and alert designer and client to their consequences. [...] How would the producers of hardware organize to respond to our needs? [...] Nevertheless, by forecasting technological diffusion we are not standing outside change, but participating in it.” [5]

Nevertheless, these discussions throughout the 1960s reveal some clues which allow us to imagine how three-dimensional modeling network environments could be used as a way to design interaction and to work with complex design processes.

Robert Venturi pointed out in his book “Complexity and Contradiction in Architecture” that orthodox modernist architects “have tended to recognize complexity either insufficiently or inconsistently”[6]. They did so by idealizing the primitive and the elementary, claiming the novelty of modern function, and working on the separation or exclusion of elements, giving to architecture a sense of uniqueness and distinction. For Robert Venturi, in architecture of complexity and contradiction, the ambiguity and the tension should be omnipresent. “[…] an Architecture of Complexity has a special obligation toward the whole: its truth must be in its totality or its implications of totality. It must embody the difficult unity of inclusion rather than the easy unity of exclusion. More is not less.” [6]

3. Architecture and complexity: the media, the message and the rules

“We need a third term beyond media and message. […] media and message would remain the same; only rules would change from a system to another.”[7]

What is new, since the time from which our examples are taken, is the way information and communication has evolved, enabling the creation of networks, the rethinking of working methods, allowing an even more effective interaction between different actors and their activities. In the 1960s, based on Norbert Wiener’s ideas, Marshall Mc Luhan spoke of the importance of the medium as message. Nowadays new information and communication technologies bring together methods of organizing complex activities while questioning traditional ways of working, inviting transdisciplinary approaches when it comes to design process, based on the fact that the science of information is elusive and radical and has the potential to alter the perceptions of whole disciplines.

Recently, many architects have expressed their reactions to the influence of the paradigm of complexity regarding their architectural thinking. In an
interview, Bernard Tschumi explains what the basis for an architecture of complexity would be:

“Architecture finds itself in a unique situation: it is the only one discipline that, by definition, combines concept and experience, image and use, image and structure. Philosophers can write, mathematicians can develop virtual spaces, but architects are the only ones who are the prisoners of that hybrid art, where the image hardly ever exists without a combined activity.” [8]

Combined activity could enable architects, in a certain way, to be coordinators of complex design processes, through interacting inside three-dimensional modeling networked environments, liberating themselves from coordinating the simplified or diminished processes frequently related to the modernist design method. Architects should, at least, be aware that their methods need to be revised, since the context of information and communication has changed. We could think about the rules for interaction, using three-dimensional modeling networked environments in complex design processes, such as in ICC [web-based Information, Communication, and Collaboration environments] as the experimental environment developed by the researcher project “A Tool Set for the Virtual AEC Company, 1996–2000” [Figure 2], which can manage and present data that is generated and exchanged in a collaborative design process. The publication “Bits and Space” presents some ways of using CAAD with networked teams, and the ability to design the physical as well as the virtual aspects of our environment. In David Kurmann own words, “The availability of new technologies is leading to new possibilities of interacting with space and time and surely designers should be among the first to use them. [...] To manage the complexity of three-dimensional modeling with the computer, new and different methods would have to be developed that differed from traditional drafting techniques and allowed for interactive designing.” [9]

In reviewing architectural design method, we should try to understand first what the meaning of complexity is. There are some crucial differences between what we understand commonly as complexity – a synonym of intricate – and a thought that unites distinction with conjunction, a thought that makes connections. What is the nature of our interest in complexity? First of all, we understand complexity as related to epistemology. According to this view, human systems, or the architectural design process, are not “inherently” complex: their complexity exists as a feature of our attempts to understand the world.

In order to consider the architectural design process as a complex system, we have to take into account the types of complexity found in
complex systems, looking for some broad features that characterize it. For the present proposal, we have picked out some of them:

- **Emergence**: implies that some behaviors and patterns emerge in complex systems as a result of the patterns of relationship between the elements;
- **Nonlinearity**: means that there are rarely simple cause and effect relationships between elements;
- **Self-organization**: implies the dialogue between order, disorder and organization, in a wide variety of forms, via countless feedback processes;
- **Hologrammaticity**: highlights the apparent paradox of systems in which not only are the parts present in the whole, but the whole is present in the parts.

If we accept the hypothesis that the architectural design process can be conceptualized as a complex system, it can be described as emergent, nonlinear, self-organized, hologrammatic, and so forth. The idea of complex thought is not to abandon the principles of classical science that were, by the way, the main lines of Modernism in architecture: order, separability and
logic. But the new media amplify possibilities of interaction. Interaction is a keyword implying decentralization, delegation of power, which favors a practice where various disciplines come together in a dynamic non-hierarchical flux of information oriented towards a common goal. The next step would be to think of architecture as a practice of designing “interaction”. A major question then arises: can information and communication technologies improve our potential for interaction? Can the media, which we are immersed in, be an enabling environment for complexity? In Asymptote architects own words,

“In relation to architectural and special practices, the use of digital technologies posits a number of interesting questions regarding notions of utility, conceptual artefact and representation. Even if we think of the computer as a ‘neural’ tool, embedded into the complex procedures of design, it is essentially still capable of dismantling our conventional modalities of making, reading, writing, communicating and inevitably, comprehending.” [11]

Digital technology is no longer a tool of expression, and can be seen as a media to interact, to make connections, to allow the flow of information in a complex way.

4. Designing a system

By using parameters identifying the architectural design process as a complex system, there are some ways to structure this process – with models, diagrams or concepts, through three-dimensional modeling networked environments. The Spiral Model and the Chaos Model, which are used in Software Engineering to organize the access and connection between subjects and objects help to improve the understanding of informational flow dynamics through the process itself. The question here is how activities can be organized by using models allowing flexibility in a complex process-system? The primary functions of a software process model are to determine the order of the stages involved in software development and its evolution, and to establish the transition criteria for progressing from one stage to the next. These models are also closely related to a constant evaluation during the design process, which might be equally applied to a complex architectural process.

4.1 Spiral model

In 1986, Dr. Barry Boehm created the Spiral Model which introduces the factor of “risk” into a life-cycle model. Like its name suggests, it is represented by the idea of a spiral. Each loop of the spiral from the x-axis clockwise through 360° represents a phase. One phase is split roughly into four sectors of major activity:

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1. Objective setting;
2. Risk assessment and reduction;
3. Development and validation;
4. Planning for the next phases.

Nevertheless, as Boehm points out, the spiral is not a method or a methodology, but, specifically, a model to structure the design process development.

"[...] a process model differs from a software method (often called a methodology) in that a method's primary focus is on how to navigate through each phase (determining data, control, or 'uses' hierarchies; partitioning functions; allocating requirements) and how to represent phase products (structure charts; stimulus-response threads; state transition diagrams). Why are software process models important? Primarily because they provide guidance on the order (phases, increments, prototypes, validation tasks, etc.) in which a project should carry out its major tasks." [12]

The Spiral Model introduces three process milestones, called anchor points [12], that help to establish the completion of one cycle around the spiral and provide decision marks before the software project proceeds. In essence the anchor points represent three different views of progress as the project traverses the spiral [12]. The first anchor point, life-cycle objectives (LCO), defines a set of objectives for each major software engineering activity. The second anchor point, life-cycle architecture (LCA), establishes objectives that must be met as the system and software architecture is defined. Initial operational capability (IOC) is the third anchor point and represents a set of objectives associated with the preparation of the software for installation/distribution and site preparation, and prior to installation, and assistance required by all parties that will use or support the software.

A spiral typical cycle begins with the identification of the portion's objectives of the product being elaborated (performance, functionality, ability to accommodate change, etc); then the alternatives which allow the implementation of this portion of the product (design A, design B, reuse, buy, etc.); and the constraints imposed on the choice of alternatives (cost, schedule, interface, etc.). The cycle ends with the evaluation of its stages.

In architecture, as in software engineering, the design is user-focused. What is the key point of the Spiral Model approach? The design process, structured in a spiral, organizes actions and the dynamics of interaction between actors during the design. This, for Boehm, is the key point to reduce costs and risks and to improve quality. In architecture, the main point to remember during the process is to rely on the information.
exchange between the different agents, constant feedback and evaluation during the stages by using, for example, prototypes and simulations. Designing using a three-dimensional modeling networked environment, where different actors could interact in a sort of ‘real-time design process’ – regardless of distance and time – emerges as a way of effectively working with ‘trans-’ realities and disciplines. In this way, every subject has a voice and possibility to act all together. The noise produced by interacting within this different environment could be structured – as in the Spiral Model – producing new levels of organization – architectures.

During the spiral cycle, the software designer aims to eliminate all kinds of ‘noise’, and this may be different from a complex architectural design process which might profit from noise, as an element of organization, if the system has the ability to self-organize. The metropolis, which could be understood through the emergence property, or the central nervous system, or other natural systems are examples of this kind of self-organization. As Henri Atlan argues,

“Within the framework of information theory, self-organization can be described as a process in which random perturbation or noise acting on channels of communication in an organized system are able to
produce not only dysfunction and disorganization but also can lead to a change in organization with more complexity and less redundancy. This is the so-called 'complexity-from-noise principle' which I have been using for a formal theory of self-organization.” [14]

The idea of noise could perhaps be related to the ongoing discussion in architecture of the use of the element of shock stated by Bernard Tschumi who works with the idea of introducing an unexpected event in the environment by inserting, for example, an architectural object in the metropolis, which would have the role of restructuring urban dynamics by creating tension:

“[…], we may have to say that shock is still all we have left to communicate in a time of generalized information. In a world heavily influenced by the media, this relentless need for change is not necessarily to be understood as negative. The increase in change and superficiality also means a weakening of architecture as a form of domination, power and authority, as historically it has been in the last six thousand years.” [15]

4.2 Chaos model

The Chaos Model, proposed by Raccoon [16], extends the Spiral Model approach, considering the software design process as a complex system, and combining a linear problem-solving loop with fractals to assure its complexity. The linear problem-solving loop involves four different stages: problem definition, technical development, solution integration, and status quo. Each turn around a loop begins with a Status Quo and returns to a new Status Quo. Technical development is only one aspect of problem solving. The problem-definition and solution-integration stages emphasize the human aspects of software development. The fractals enter to describe the structure between different stages of a project.

The Chaos Model differs from other models by imposing little organization on the development process and, at the same time, allowing other kinds of organization to evolve. The Chaos Model describes a flexible structure which reflects the intricate patterns that occur in real projects. The chaotic patterns between the levels of a project explain the complexity of software development.

“During problem definition, developers choose a specific problem to solve and determine its solution constraints. Sometimes users know exactly what they want and sometimes users are frustrated and have no idea what they want. Solving their problems may or may not be
possible. But the ability of people to describe their
problems is independent of whether their problems
should be solved. If the problem is to port a program to a
new platform, the problem definition can be very simple. If
the problem requires development of a new program to
solve a new application or use new technology, the
problem definition can be very complex. Developers must
decide whether a new user interface would suffice, what
to do about compatibility with previous systems, and
where the system should be in five and ten years.” [16]

This model combines a linear problem-solving loop with fractals to suggest
that a project consists of many interrelated levels and expresses the human
needs and the inherent complexity of software development. The Chaos
Model shows how users, developers, and technologies interact during a
process where the user’s needs define the goals and the technical resources
define the solutions.

Developers contest the users’ needs with the technical solutions in the
middle levels. As Raccoon argues, “defining the phases of the life cycle in
terms of fractals shows that all phases of the life cycle occur within all
other phases, throughout the life cycle.” [16] This model could be a way to
better understand the real possibilities of interaction through the design
process as a complex system. Actors and objects flow within a complex
process (which may be chaotic) in-between and through instable stages of
order -disorder-organization. We can understand this as a ‘trans-action’
using three-dimensional modeling networked environments where we can
structure the flux from order to a different level of organization in order to
structure the way we navigate through realities.
The power of the Chaos Model to structure interaction throughout the design process is such that it concisely unifies many of its facets. In software engineering as in architecture, the top levels of the project are defined by the needs of the user and tend to be outside the developer’s realm of control. While developers do help users understand their needs, they do not determine what users need: “the users’ needs can change over the course of a project” [16]. The resultant project is the outcome of interaction between actors, context, environment, time and technology through a dynamic chaotic information exchange process.

Nevertheless, we need to consider a short-circuit: the inability of designers to effectively translate users’ needs. This is the key point here: we may consider this short-circuit as noise – a noise acting on channels of communication – and, then, the possibility of producing not only dysfunction and disorganization, but also organization with more complexity. In the architecture of complexity, this short-circuit could be understood as a ‘jump’ to a more complex organizational level. As Charles Jencks explains in a compound definition of complexity,

“Complexity is the theory of how emergent organization may be achieved by interaction components pushed far from equilibrium (by increasing energy, matter or information) to the threshold between order and chaos. This important border or threshold is where the system often jumps, bifurcates or creatively interacts in a new nonlinear, unpredictable way (the Eureka moment) and where the new organization may be sustained through feedback and the continuous input of energy” [18]
If we assume this tension as an organizational noise, we may focus our attention on efforts to design interaction, structuring the ways feedback will occur, to control the information flow through an architectural process-system. We must, therefore, learn how to invent the design of the ‘jump’.

4.3 Diagrams as matrix structures

By focusing on the efforts to design interaction, another way to introduce complexity into design could be the use of diagrams to structure the flow of information, and interaction itself. The video artist Bill Viola discusses some ways to structure the data space, assuming that this spatiality is where the interactions between human and human, human and machine, machine and machine happens. We agree with Viola that the structuring of the data space is a way to improve interaction between actors – both human and machine – through the design process. As the artist puts it, the effort to structure a “data space” did not appear together with the new media but is an ancient human art:

“As we take first steps into data space, we discover that there have been many previous occupants. Artists have been before. Giulio Camillo’s Memory Theater (which he actually constructed [as a prototype] in wood, calling it a “constructed body and soul”) is one example. Dante’s Divine Comedy is another. Fascinating relationships between ancient and modern technologies become evident. […] Today, there are visual diagrams of data structures already being used to describe the patterns of information on the computer video disc.” [19]

As the main reference in the study of Mnemotechniques, the historian Frances Yates describes the Memory Theatre as a distortion of the Vitruvian Theatre Plan – where the seats were divided by seven gangways, and the upper classes sat in the lowest seats – reversing the normal function of the theatre – spectator stands where the stage would be and looking towards the auditorium.

On each of its seven gangways were seven gates or doors that were decorated with many images. The spectator gazed at the images on the seven times seven gates on the seven rising steps. These images were allegories that represented general concepts that, combined together, allowed spectators to form and express any possible concept, as it is possible to express any word with the limited set of alphabet letters. As Yates put it,

“The Theatre is a system of memory places, though a ‘high and incomparable’ placing; it performs the office of a classical memory system for orators by ‘conserving for us the things, words, and arts which we confined to it.’
Ancient orators confided the parts of the speeches they wished to remember to ‘frail places’, whereas Camillo ‘wishing to store up eternally the eternal nature of all things which can be expressed in speech’ assigns to them ‘eternal places’. [21]

By using metaphors, associating images with words, Camillo’s Memory Theatre could be interpreted as an ancient technology to interconnect data.
information – in a dynamic way. The theatre represents a kind of three-dimensional built diagram to structure the flow of data.

As an example of a modern visual diagram of data structures, Viola describes the “branching,” a term borrowed from computer science. As Viola puts it, “[...], the viewer proceeds from top to bottom in time, and may either play the disc uninterrupted (arrow), or stop at predetermined branching points along the way and go off into related material at other areas on the disc for further study.” [19] Nowadays the data itself has a hypermedia nature. We need to navigate through information which incorporates dynamic action, in-between and through words, sounds, images, video, light, energy, and so forth.

This is the key concept which could change the way we think the architectural design process: modeling together, immersed and integrated in a virtual three-dimensional networked environment, by structuring the interaction in-between and through users, designers, computer scientists, theorists, and so forth and by interacting in-between and through hypermedia structures of data – realities.

Bill Viola proposes other “diagrams/models” such as the “Matrix Structure” and the “Schizo Structure” to better incorporate the non-linear and interactive nature of information and communication technologies. The “matrix” structure is described as a non linear array of information where the viewer could enter at any point and move in any direction, at any speed, pop in and out at any place, interconnecting hypermedia content in a kind of conceptual structure mapped on the technology. As Viola puts it, “We are moving through idea space here, into the world of thoughts and images as they exist in the brain, not on some city planner’s drawing board” [19]. The “schizo” structure incorporates the dynamics of a flow where not only are all directions equal, but all are not equal, where everything is irrelevant and significant at the same time, where, as Viola puts it, “viewers may become lost [...] and never find their way out” [19]. For Viola, the “schizo” structure emerges as artists go deeper into the psychological and neurological depths in search of expression of various thought processes. This mental “schizo” method, could be understood as a natural diagram that represents a process as a system [for Viola, a mental system], which, as in the diagram of “Fractal Problem-Solving Loops in Practice” [Figure 4], looks chaotic to an unaware unadvertised viewer.

It’s easy to observe and conclude that the diagrams described by Viola are not diagrams of static data. These diagrams structure the flow of data – information, energy – through time and media. Assuming the architectural design process is a complex system, we can think about it by imagining a chaotic natural “schizo” structure where each step in this process interacts with the others. If we have no plan for the activities agenda, and if it will not be happen in a sequential and linear cause-and-effect way, we can observe the complex dynamic of interaction. And there is another key point: the
components of the process-system – usually referred to as agents – are themselves complex systems: in fact the human being is a complex system. The whole, then, reflects the parts – the design process reflects the way we think and thus interact.

5. Final considerations: process rather than product

Modern Architecture, by proposing methods which focused on the question of control as eliminating noise and organizing the design process as a top-down activity failed to consider complexity and diversity. If control is understood as transmitting the message and assuring the reception, and by organizing the design process as a bottom-up process, we could recover, through the use of models or diagrams which stimulate complex thought and interactivity, the much needed integration of our complex and diversity aspects of the design process. This would liberate us from disciplinary methods, to work together with others in a transdisciplinary way, allowing integration of our different competences. The use of models and diagrams together with information and communication technologies create transdisciplinary platforms of interaction.

We believe that a transdisciplinary interaction – organized by the support of nonlinear models such as Spiral or Chaos, in-between and through three-dimensional modeling networked environments – could be a way of using information and communication technologies to transform the way we think and practice architecture. Complexity could then be considered as a kind of ‘guide’. It is proposed that to understand complexity the designer should have a vision of design as a process rather than a product and a conception of it as fields of relations rather than as arrangements of objects. This would change our way of designing radically.

Nowadays, we have unlimited ways of communicating and interacting through all our senses, crossing borders and disciplines. By introducing complex method into the architectural design process, we are only recovering what was lost some time ago, while ‘less is more’ was assumed to be true, and we are replacing it with ‘complex is more’.

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