Communicating Generic Process – Some Issues of Representation Related to Architectural Design

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Abstract

It is commonly the intent of an architect to represent the development of an idea from the early sketches to the final artefact, as well as to explain particular functions of its parts or complex construction processes. But the opening of the secret of generic process to the public - presenting a range of possibilities instead of one final solution and even involving external participants in the creation process - is brand new. The contemporary communication of architectural ideas presumes both – visual/formal representation and interaction. As a result of research in the field of communication in architecture, this paper is focused on generic process phenomena, in particular on issues of its representation. It is based on analysis of a wide range of examples that have appeared in recent years, either in electronic, printed or physical form. It offers a systematization of approaches to representation and discusses the potential and limitations of each type – series of physical objects, sequences of graphics (single, linear, planar and spatial) and animation, as well as their combinations (sequences of animations). A particular emphasis is placed on increasing the functionality of sequence-based representation (interacting, navigating…) and its interdependence with animation as a special case.

Finally, the author proposes a rethinking of the role of both the architect, who defines a system of possibilities rather than a single solution, and the information recipient, who becomes not merely a passive spectator, but a creative participant in the design process.

1. Introduction – Generic processes representation

Nature is probably the greatest source of generic processes and the best gallery for their presentation. Some of these processes we can easily follow (movements, day/night light change, lifetime of plants and animals, liveliness, etc.), while others remain hidden though we

are still conscious of them. Representation of the various generic processes in nature has been a challenge since man begun to communicate. One of the most outstanding works of cave art, The Scene of the Dead Man (The Cave of Lascaux, France) is an example of prehistoric man's interest in natural processes (Figure 1).

Figure 1 - The Cave of Lascaux, The Shaft of the Dead Man

"This panel's originality lies in its narrative possibilities, expressed just as much by the liveliness of the different players as by the distribution of the figures and principal themes expressed: man bison, rhinoceros..." [1]
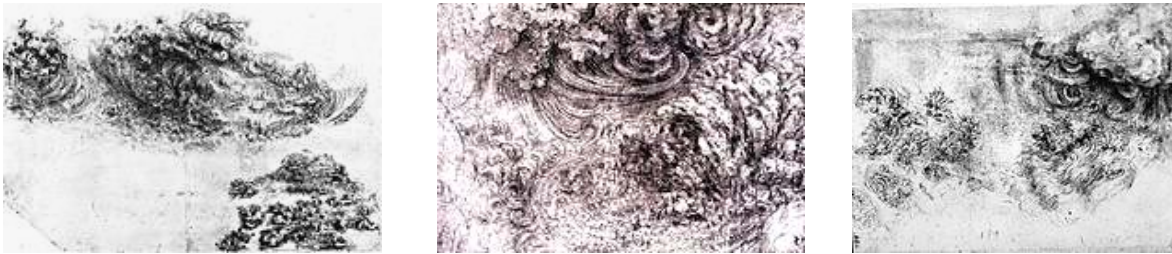

Figure 2 - Leonardo, Nature Studies, Storms

In the Nature Studies, Leonardo Da Vinci celebrates natural phenomena (Figure 2) and integrates some analysis of natural transformations in representation of generic processes for his paintings and sculptures (Figure 3).
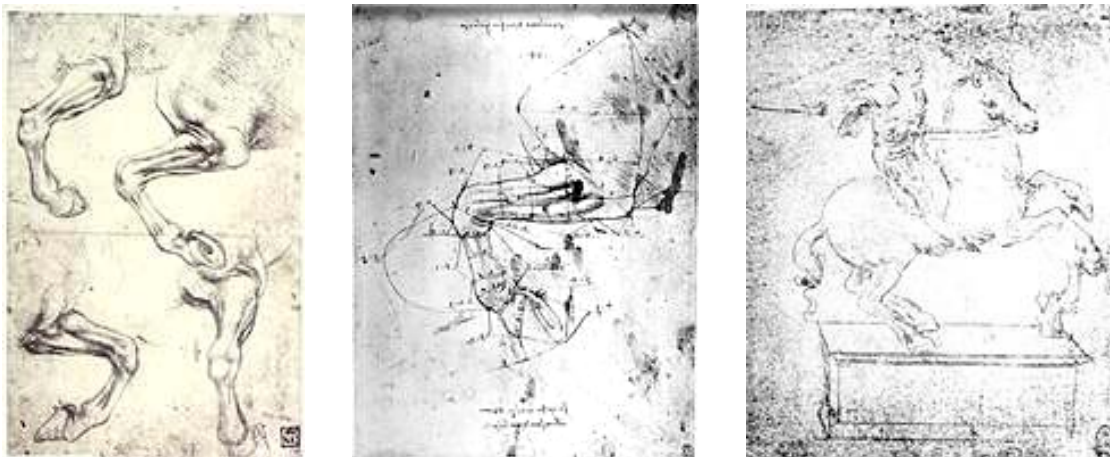

Figure 3 - Generic process, from a Nature Study to the artefact, Leonardo, The Sforza Monument

2. Analyse of the media

Before we start to discuss the representation of generic process, it is necessary to define the range of available media that we use to represent architectural design. Nowadays it has become quite difficult to separate physical and electronic information, so each type of information will be analysed for both its physical and electronic appearance.
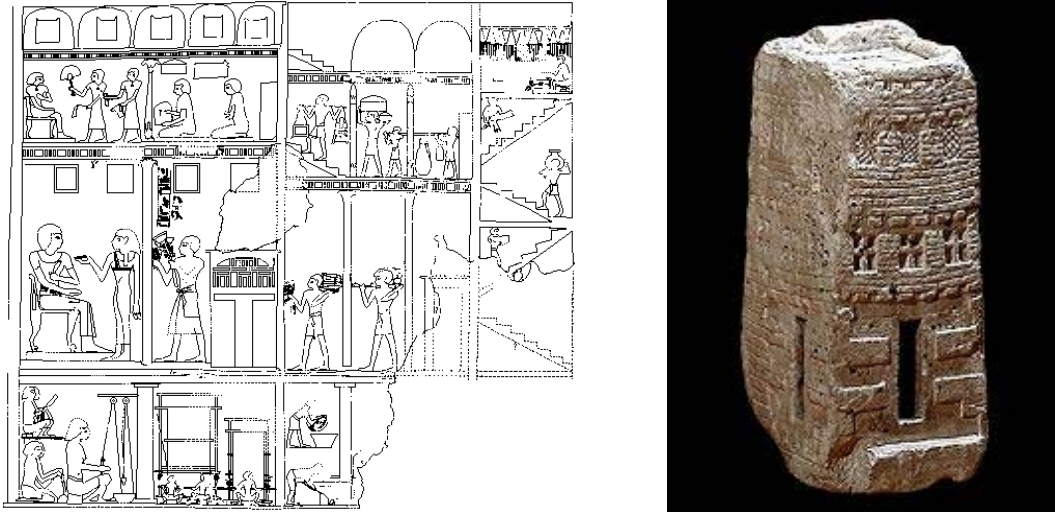

Figure 4 - Ancient Egypt, The House of Djehutinefer, cross-section, and Limestone model of a town house, British Museum

2.1. Physical and electronic model

Probably the most efficient way to represent architectural design is by built work. Although very illustrative and a significant source of information, the physical object is not, by itself, sufficient in terms of communication[1]. A building is sometimes the only source of information related to its previous design process, and everything that comes after is based on its existing physical appearance[2]. However design representation is, in the majority of cases, required long before the architectural artefact can be realised. Therefore other media need to be included in the process of communication. We will treat the architectural artefact as a special case of a physical model.

An architectural model is sometimes the best communication tool, but modelling can also be an expensive, time and space-consuming process. There are both numerous advantages and significant limitations in communication among participants in the design process.

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[1] For example it is necessary to photograph a building, to describe it textually and print that material if we want to communicate with a wide professional audience.
[2] The Roman Pantheon is the example of such a case.

It is almost impossible to communicate generic processes through architectural objects and quite rare to represent those processes with physical models. Electronic models however have become the basic media, not only for representation of the design process, but also for its definition and realisation.

2.2. Movies and animations

Both movies and animations are specific cases of other information resources. These are usually based on architectural objects, formal or electronic models, and on the "story" that they convey. That story can be walk-through, walk-around, lighting change and sound study, functional study, generic process study, etc. Additional sound information, narration, etc is sometimes required.

Representation based on movies or animations is an excellent means of distribution to a wide audience (through broadcasting, WWW technology, etc.), but has significant limitations for communication among participants in a design process (it isn't possible to discuss the building dimensions or to build something that is represented only by its animation).

In term of generic processes, an electronic animation is special case of linear sequence of graphics or images, and will be discussed later.

2.3. Graphics and images

Architectural design representation is most commonly achieved through graphic media. Any flat surface, be it paper, papyrus, stone or beach sand, could be a medium for design representation. The majority of technical documentation, magazines and books related to architecture, are based on printed graphics. Graphics has the potential to represent architectural freehand sketches, technical drawings, rendered images or photographs. In the case of spatial representation, being two-dimensional, the extraction of third dimension (plans, cross sections, elevations…) or inclusion of third dimension illusion (perspective, shadows etc.) is required. Printed graphics are still very often used as an additional tool to support electronic representation. Even very complex generic processes completed by electronic tools require printed graphics for their final representation to the professional audience[3].

Electronic graphics is the most powerful tool for generic process representation.

2.4. Text and hypertext

Text, either spoken or written, printed or electronically displayed as hypertext, could be a medium for architectural representation. However, textual information is certainly not sufficient to define architecture precisely and exactly. Therefore, in architectural representation, text and hypertext are used as additions, combined with other media.

The particular role of textual information supporting the definition of generic processes will be discussed later.

2.5. Sound

Defining architecture by sound is uncommon although sound might be a powerful medium to describe a space (church bells, door shutting, sound of human steps on a marble floor…) or environment (sound of the forest, ocean waves, city traffic, building site…). Inclusion of appropriate sound in architectural representation became possible after the development of electronic multimedia. Exploring the sound effects of a generic process could be a very interesting field for further research.

2.6. Combination of media

There is an infinite range of possibilities for the application and combination of all media described. The next illustration (Figure 5) is a set of snapshots from CD ROM Improvisation Technologies, created by the famous dancer William Forsythe, director of the Frankfurt Ballet. In this multimedia material, a combination of movie and animation is used to describe the generic process of virtual lines, surfaces and volumes, which have been generated by human movement.

Figure 5 - Lines, curves and volumes generated by human body movement, represented by combination of movie and animation – W. Forsythe

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[3] For more information see Contemporary Processes in Architecture, AD Architectural Design, Vol. 70 No3 June 2000, edited by Ali Rahim

3. Generic processes in architecture - Types of representation

The complexity of the architectural design processes results from the numerous demands that an architectural object has to meet. There are functional, environmental, historical, aesthetic, formal, and many other expectations that have to be considered in the creation of an architectural artefact. Therefore the architectural generic process starts long before it becomes possible to define an object or even the idea of the object. But in this analysis we will focus on that part of the generic process in which architecture is formalised and transformed from the author's meaning, to the available media, readable to a wide audience.

3.1. Generic process represented by formal objects

In the review of media already presented, it has been mentioned that representation of architecture by either an architectural object itself or a model can be very specific. However there are very interesting examples that illustrate the power and richness of using formal objects for representing generic processes.
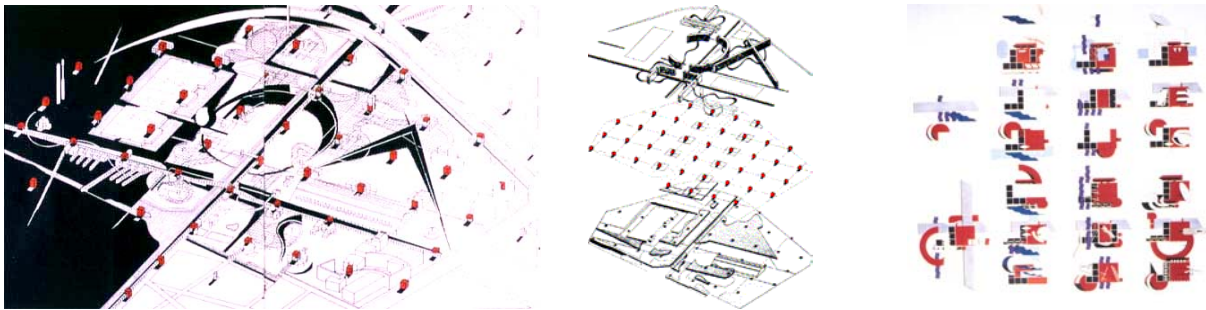

Figure 6 - Folies, Bernard Tschumi – Park de la Villette, Paris; Disposition and generic scheme

Figure 7 - Folies, Bernard Tschumi – Park de la Villette, Paris; Generated architectural objects

One of the most interesting examples of a generic process represented by architectural objects is certainly Tschumi's set of Folies in the Park de la Villette. The process is based on several

self-imposed rules, such as limitation to the use of the square footprint shape, red colour elements, deconstructivist approach to the form, etc. The result of the process is a rectangular array of extraordinary objects that attract numerous visitors of Paris. The illustrations show this unique example of generic process represented both schematically (Figure 6) and by artefacts on the site (Figure 7).

As with architectural objects, models are seldom used to represent a generic process, partly because they are expensive and time-consuming tools of representation, and partly because their display and future storage can be very complicated. Some architectural offices however, and some authors, use this method to explore the potential of their designs and to communicate with clients[4].

The following example from the Office of Ryue Nishizawa shows the generic process for the House in Kamakura, represented by a series of simple cardboard models, describing the development of the initial form. "I started by considering general conditions such as rooms required, their sizes, etc. From there I made a number of proposals and took them to the client, then reworked them to reflect the client's opinion. This process was repeated several times."[7]
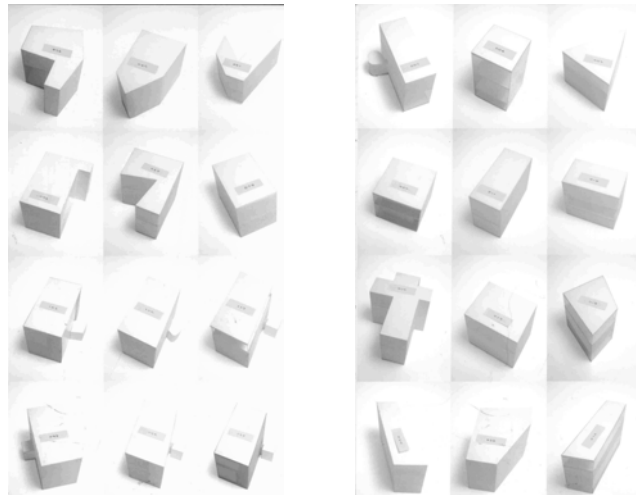

Figure 8 - Generic process represented by model series[5], House in Kamakura by Ryue Nishizawa

Using physical models for generic process representation is sometimes complementary to other representation techniques. An illustrative example is presented on the Web site of Greg ynn's Embryologic Houses [15].

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[4] For more information see the JA Magazine, Process, No 39, Autumn 2000, dedicated to
[5] The illustration reproduced with the kind permission from the Office of Ryue Nishizawa

3.2. Sequenced representation

Sequence[6] is the most powerful model of representation for any generic processes. Regardless of which media we use for its presentation (print, electronic screen or set of electronic screens) a generic process is always explained by its characteristic stages. The fact that all those stages are visible at once makes the communication of the genetic process extremely clear and effective.

Figure 9 - The sequence of Embryologic House development, Greg Lynn[7]

Single sequence

Single sequence is simply a special case of all other sequence-based representation models. It could be the source or the final result of the generic process. Representation by a single sequence does not offer the possibility of describing the process or of defining an applied rule.

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[6] Etymology: Middle English, from Medieval Latin *sequentia,* from Late Latin, sequel, literally, act of following, from Latin *sequent-, sequens,* present participle of *sequi*
Date: 14th century
1 **:** a hymn in irregular meter between the gradual and Gospel in masses for special occasions (such as Easter)
2 **:** a continuous or connected series: as **a :** an extended series of poems united by a single theme <a sonnet *sequence*> **b :** three or more playing cards usually of the same suit in consecutive order of rank **c :** a succession of repetitions of a melodic phrase or harmonic pattern each in a new position **d :** a set of elements ordered so that they can be labeled with positive integers **e** (1) **:** a succession of related shots or scenes developing a single subject or phase of a film story (2) **: EPISODE**
3 **a :** order of succession **b :** an arrangement of the tenses of successive verbs in a sentence designed to express a coherent relationship especially between main and subordinate parts
4 **a : CONSEQUENCE, RESULT b :** a subsequent development
5 **:** continuity of progression
Source: Merriam-Webster Dictionary - http://www.m-w.com/
[7] The illustration reproduced with the kind permission of Greg Lynn, Greg Lynn Form http://www.glform.com

Very often, a single sequence is combined with a linear set of sequences, which serve as a navigation tool[8].

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[8] See http://www.glform.com – Embryonic house project – Build your own Embryonic house

Linear sequence distribution

This is probably the most common model used to represent the generic process. The linearity of sequence distribution is, in fact, a rule applied continuously along the sequence (e.g. time line, transformation, viewpoint movement, light properties change, etc.). This rule can be described by an additional text and the array of sequences can be defined by indexes ((01, 02, 03…), (a, b, c…), etc.).

Linear sequence can be generated from a planar sequence (Figure 11). Superimposition of linearly distributed sequences is used as a base for the animation process.

In Web-based presentation the linear sequence is often used as a navigation tool, where each part of the sequence represents a link invoking the other segments of the presentation.
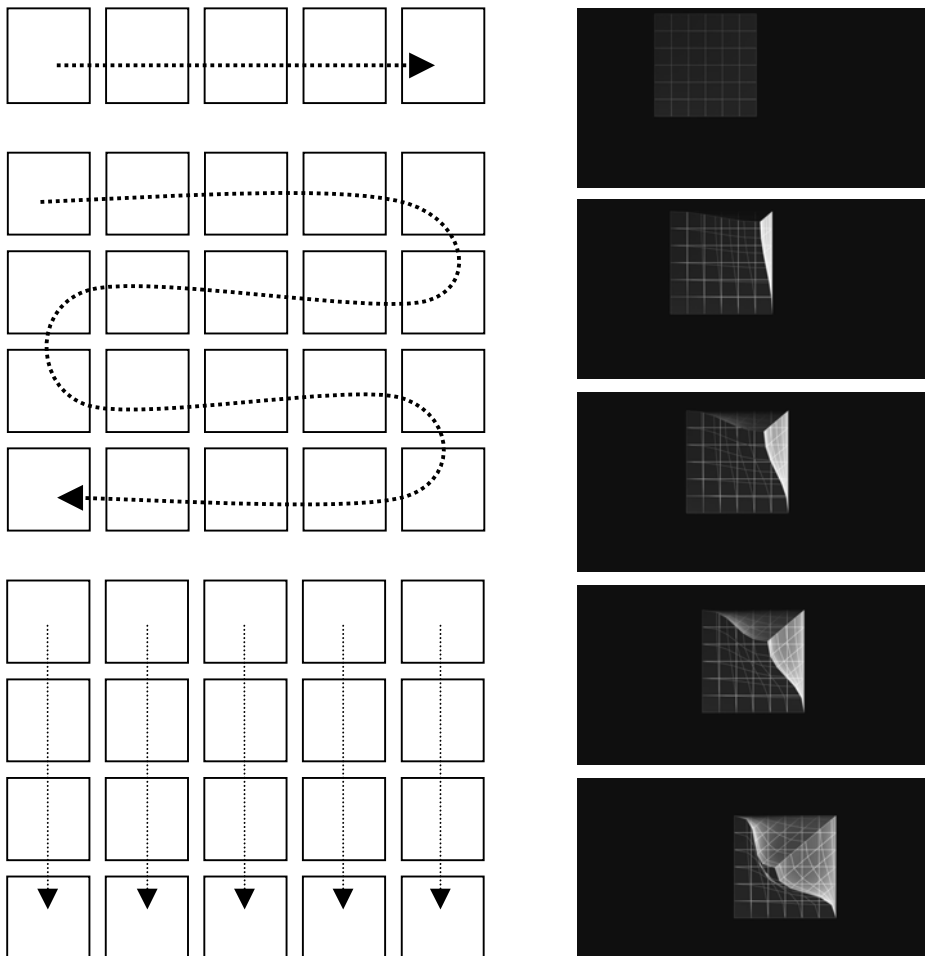

Figure 10 - Three different cases of the linear sequence distribution and an example of a form study

Planar sequence distribution

This kind of representation presumes two "rules" of generation, applied in horizontal and vertical directions in the resulting array of design solutions (Figure 11).

Planar sequence array is the source for extracting a linear sequence (Figure 10, third case), but also a result of extraction from the spatially distributed sequence (Figure 13).

Both, linear and spatial sequence distribution can be presented in any media, either electronic, or physical. The majority of examples published in books and magazines belong to these two groups.
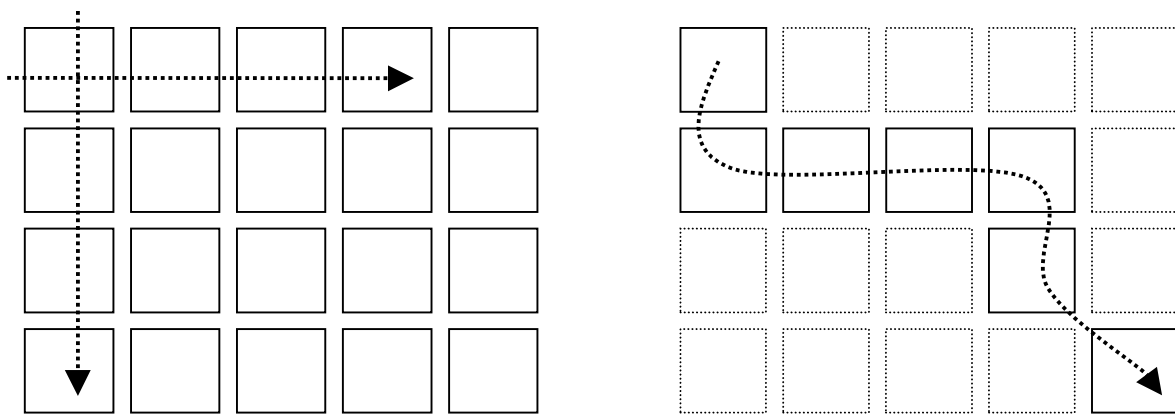

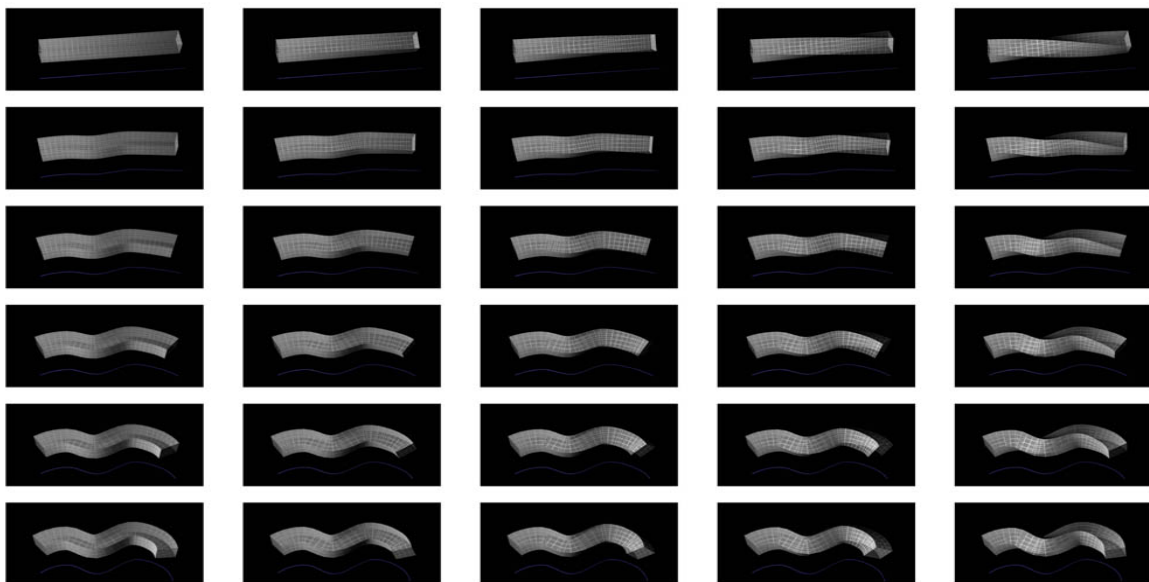**Figure 11 - Planar sequence distribution and a linear sequence extraction scheme**

Figure 12 - Form study, example of the planar sequence

Spatial sequence distribution

A set of design solutions generated by at least three rules (e.g. motion, shape transformation and colour change) represented on the following illustration (Figure 13) by three axes, form a spatial sequence.

While the linear and planar sequences can be easily presented in any media, either hard copy or electronic, the spatial sequence presumes the electronic database creation and navigation through it[9], or requires to be structured and presented as a set of planar sequences. It is also a source for an extraction of the planar sequence (Figure 14).
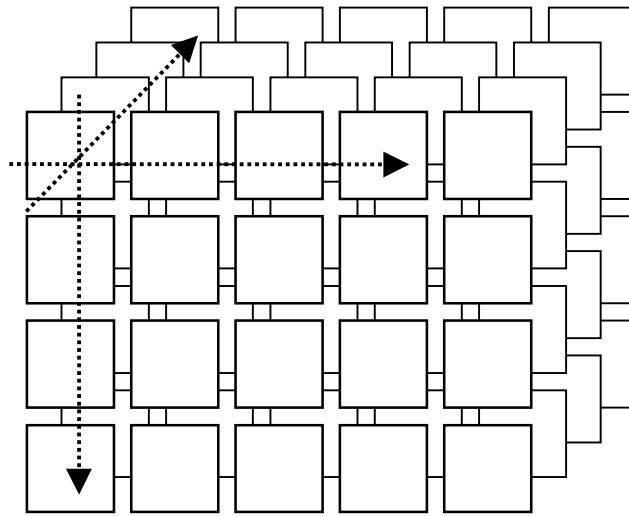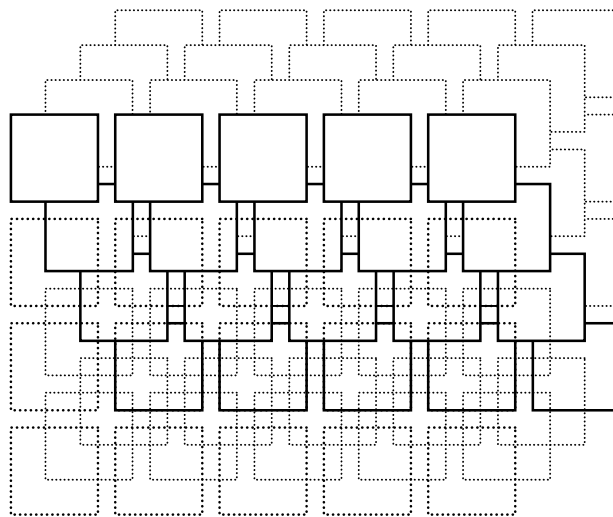
Figure 13 - Spatial sequence distribution scheme

Figure 14 - Extraction of the planar sequence based on the spatial one

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[9] The linear sequence is often used as the navigation tool between different levels of the spatial sequence.

Complex sequence based representation

The following illustrations are examples of combinations of different sequence types, applied on Web-based (Figure 15) and hard copy (Figure 16) presentations.
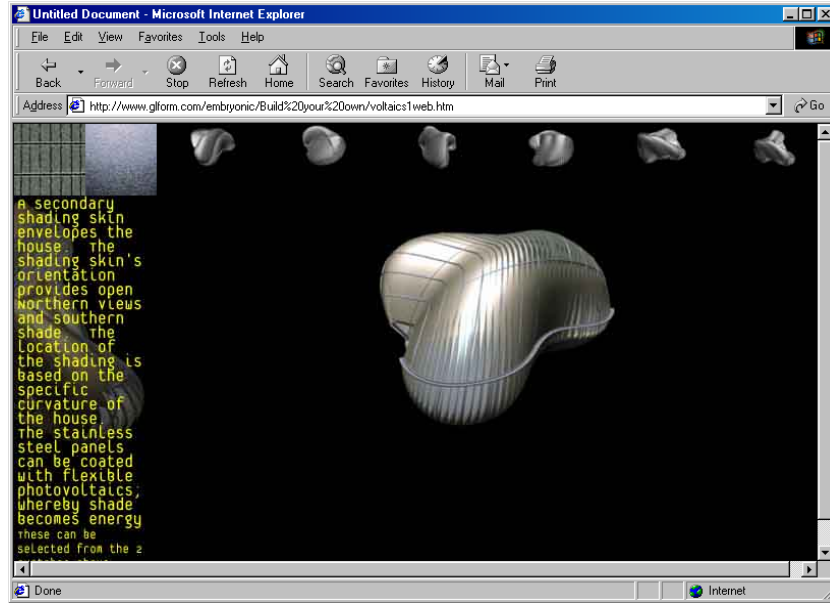

Figure 15 - The linear sequence used as a navigation tool, Embryologic House, Greg Lynn

Figure 16 - The Auckland City Urban Design Competition entry, M. Devetakovic, M. Radojevic

3.3. Animation

Animation is an illusion of process[10] resulting from the display of a set of images. The information base for animation is a linear sequence. In this analysis animation as a technique of representing the generic process will be treated as a special case sequence-based representation. The following illustrations (Figure 17) show the synthesis of animation based on different cases of linear sequence.
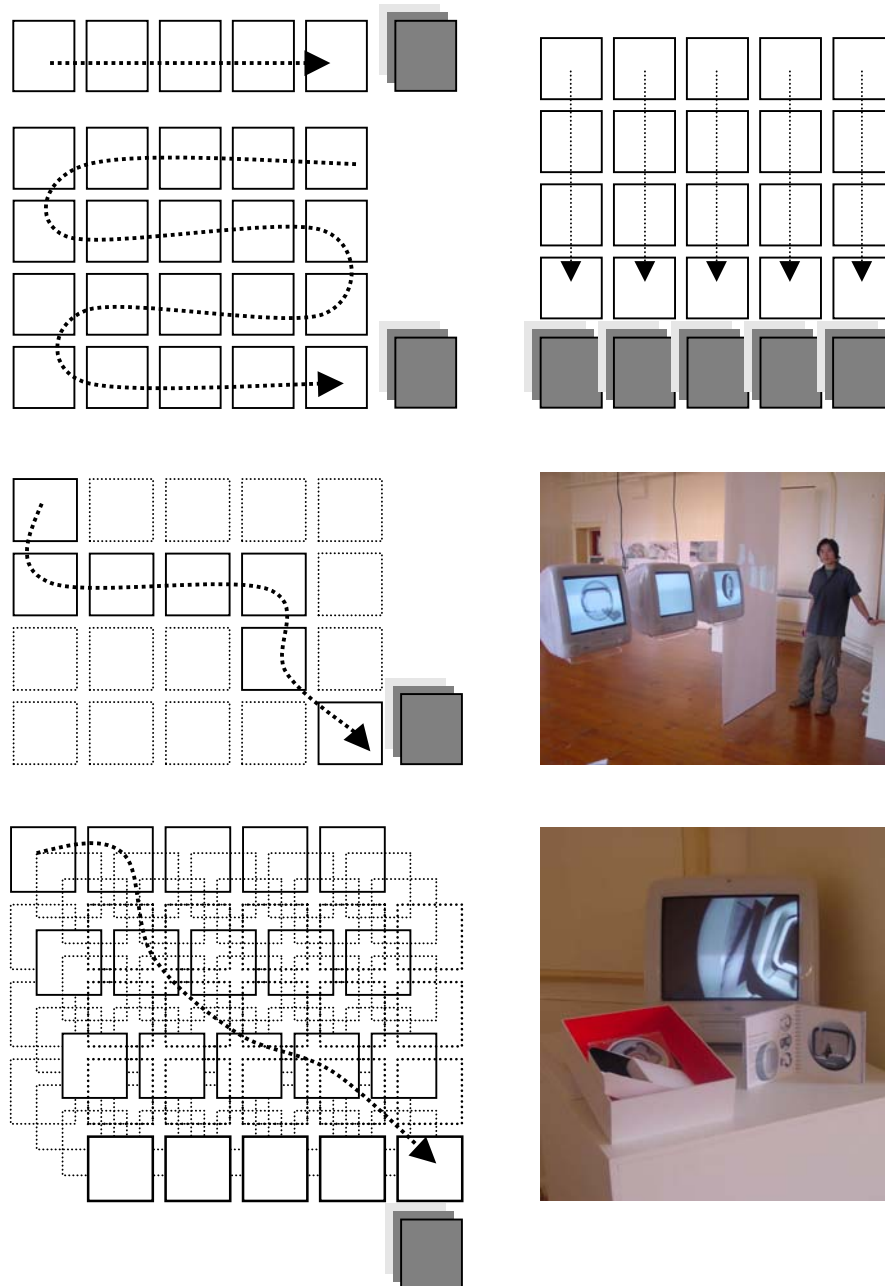
Figure 17 - The animation and the sequence of animation based on different linear sequences

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[10] Similarly a perspective is an illusion of spatiality transmitted to a flat surface.

4. Final discussion - Set of possibilities vs. a single solution

Once defined and clearly represented, the generic process of an architectural design results in a set of design solutions. All these solutions are more or less applicable to the design task, defined previously. Among them however is a set, which meets some other criteria (Figure 18). This set is extracted from the main array by one or several rules. The rules can be defined by the author of the main generic code, or by any other participant in the design process. The main challenge of the generic process representation is possibility of involving the other participants in architectural design, where architects create and present codes for architectural generation, instead of single solutions.
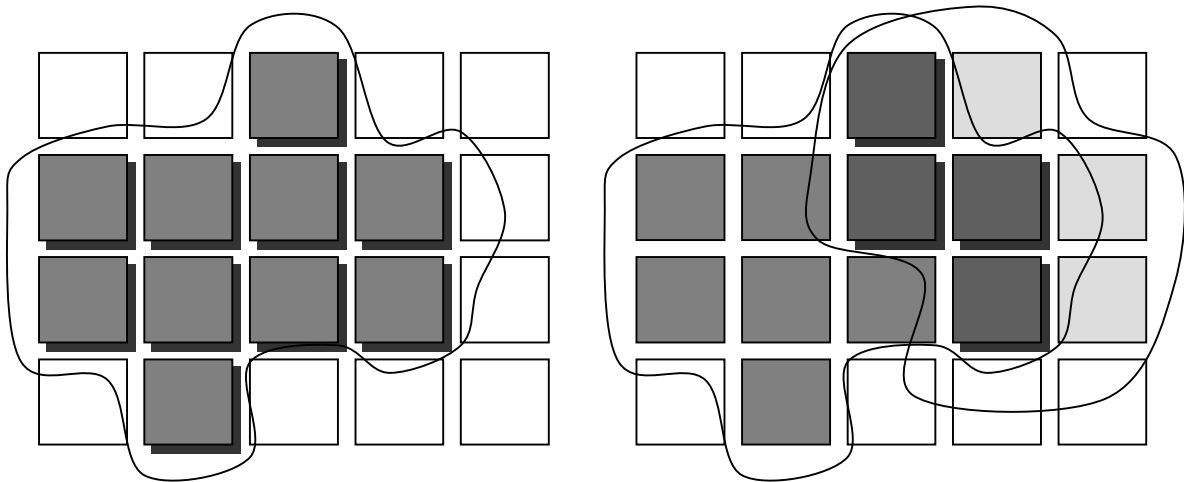

Figure 18 - Set of design solutions defined by application of one or two rules to the sequence of possibilities

5. Conclusion

Generic processes and their communication have been a challenge since people began to communicate. By representing the generic process of an architectural design, architects aim to communicate with each other as well as with the numerous other participants in the design process. Electronic communication, with a wide range of available media, offers the possibility not only of representing the complexity of the generic process clearly and effectively, but also of including different, even remote or unknown participants, in the design activity. Therefore, architectural design is not anymore the single proposal of one author or a team of authors, but a range of solutions shaped by a generic code, offered to a community of creative participants in design process.

6. References

6.1. Books and articles

[1]   Burry, M.: Beyond Animation, Architecture + Animation, AD Architectural Design Vol. 71, No 2, April 2001, pp 6-16

[2]   Chiba, M.; Abe, H.; Nishizawa, T.: What can be seen from process, JA, Vol. 39, autumn 2000, pp. 4 – 11

[3]   Ito, T.: Judge's Comments, Final House Compet., JA, Vol. 40, winter 2001, pp. 118 – 121

[4]   Graham-Rowe, D.: Designer Genes, Blueprint, No 186, August 2001-11-14

[5]   Lynn, G.: Embryologic Houses, Contemporary Processes in Architecture, AD Architectural Design Vol. 70, No 3, June 2000, pp 26-35

[6]   More, G.: Animated Techniques: Time and the Technological Acquiescence of Animation, Architecture + Animation, AD Architectural Design Vol. 71, No 2, April 2001, pp 20-27

[7]   Nishizawa, R.: House in Kamakura, Process, JA, Vol. 39, autumn 2000, pp. 44 - 53

[8]   Tschumi, B.: Event – Cities, Praxis, MIT Press, Cambridge, Mass., 1994

[9]   Venturi, R.: Iconography and Electronics Upon a Generic Architecture, a View From the Drafting Room, The MIT Press, Cambridge, MA, 1996

6.2. Internet resources

[10]   Bernard Tschumi Architects - http://tschumi.com

[11]   The British Museum - http://www.thebritishmuseum.ac.uk/

[12]   The Cave of Lascaux - http://www.culture.fr/culture/arcnat/lascaux/en/

[13]   The Drawings of Leonardo Da Vinci - http://cti.itc.virginia.edu/~pb4r/Leonardo/docs/intro.html

[14]   Generative Design Lab - http://www.generativedesign.com

[15]   Greg Lynn Form - http://www.glform.com

[16]   Intro. to the history and culture of Pharaonic Egypt - http://nefertiti.iwebland.com/

6.3. CD-Rom Editions

[17]   Forsythe, W.: Improvisation Technologies, Digital Arts Edition, ZKM, Karlsruhe, Germany, 1999