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**Master of Science in Architectural Engineering**

**A Study on Design Process Methods of  
Architecture Using Design Intelligence  
of Michael Speaks**

**-Focusing on Digitally Driven Architectural Design-**

February 2014

Seoul National University

The Graduate School

Department of Architecture & Architectural Engineering

**Hye Rim Lee**

# A Study on Design Process Methods of Architecture Using Design Intelligence of Michael Speaks

-Focusing on Digitally Driven Architectural Design-

지도교수 최 두 남

이 논문을 공학석사학위논문으로 제출함

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위 원 장 백진 (인) 

부 위 원 장 최두남 (인) 

위 원 이혜림 (인) 

## **Abstract**

# **A Study on Design Process Methods of Architecture Using Design Intelligence of Michael Speaks**

**-Focusing on Digitally Driven Architectural Design-**

**Hye Rim Lee**

**Department of Architecture & Architectural Engineering**

**The Graduate School**

**Seoul National University**

The purpose of this thesis is to study architectural design process methods and digital fabrications using Design Intelligence of Michael Speaks, focusing on digitally driven design process of architecture due to digital media and emerging technologies. The new digital techniques through architectural experiments suggest various modes of design process methods that would shape the territories of design and build in architecture. The specific design process methods of rapid prototyping and scenario planning are discovered and much more detailed using Design Intelligence. Collecting data, information, feedback and producing knowledge by thinking as doing are also very important factors to use best of the two digitally

driven methods. The various forms of design knowledge such as Classification System, Design Models and Versioning are to be studied and discussed. Furthermore, the young architects who implement designs with the use of computers and Design Intelligence are to be discussed to find out what opportunities and limits to a certain extent Design Intelligence has.

A significant design paradigm shift for architecture has been recognized because of the fundamental nature of the challenges confronting architectural study and practice in a world increasingly dominated by technological change and marketization. If we see the fast growing number of digital media and newly emerging technologies as well as their impact on design research, analysis and production in architecture, the challenges are quite convincing.

The use of computers has brought new possibilities for architectural design and construction that digital media and newly emerging technologies are rapidly expanding what we conceive to be formally, spatially, and materially possible. In result, the shapes, forms and structures have become much more complex and dynamic that they are neither predictable nor reached with the conventional design methods. As for the complexity of architectural designs increases, research on new materials are more than critical to realize them. Today, they are easily manipulated, tested and fabricated both virtually and physically that it is inconceivable to imagine designing buildings without the use of computers. The computers are now used at every step of the architectural design process from idea making to building construction.

Accepting the significance of digital technologies and techniques, architects are much more focusing on exploiting digital tooling to expand design and construction possibilities in their architectural study and practice. Their attitude towards a new design paradigm shift may be no longer one of those options that they can take, but rather more likely a responsibility that they need to take in tune with uncertainty. Although the architects have done an adequate job exploring new digital tools and bringing new designs, they have failed to develop an intellectual culture that would enable them make the best use of digital tooling. Thus, it is a must-do task to research on a new intellectual framework which would maximize the potentials of digital tooling.

**Keywords:** Design Intelligence, Intellectual Framework, Knowledge, Thinking, Doing, Prototyping, Scenario Planning, Design Process Methods

**Student ID Number:** 2012 – 20563

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# Chapter 1. Introduction

## 1.1 Background of Study

Over the past several years, a significant shift in the field of architecture both academically and practically has been detected. Michael Speaks <sup>1</sup> who is an innovator of Design Intelligence argues that changes for architecture are inevitable largely because of the two reasons that a world increasingly dominated by technological change and marketization. If we see the fast growing number of new digital media and technologies as well as their significant impact on design research, analysis and production in architecture, his argument is quite convincing.

The use of computers has brought new possibilities for architectural design and construction that digital media and emerging technologies are rapidly expanding what we conceive to be formally, spatially, and materially possible. And the capability of digital techniques has been reshaping a design culture of architecture especially by challenging the conventional way of design process. As Neil Leach emphasizes in *Digital Morphogenesis*, it is a moveaway from architecture designed based on theoretical ideas or visual concerns towards architecture justified by its performance, but rather an approach to architecture designed with the secondary concerns such as structural, constructional, economic,

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<sup>1</sup> Michael Speaks, “Design Intelligence” innovator is Dean of the School of Architecture at Syracuse University in New York. More recently, he is at the center of debates about the importance of innovation and prototyping in architectural design arguing for the rise of a new intellectual paradigm.

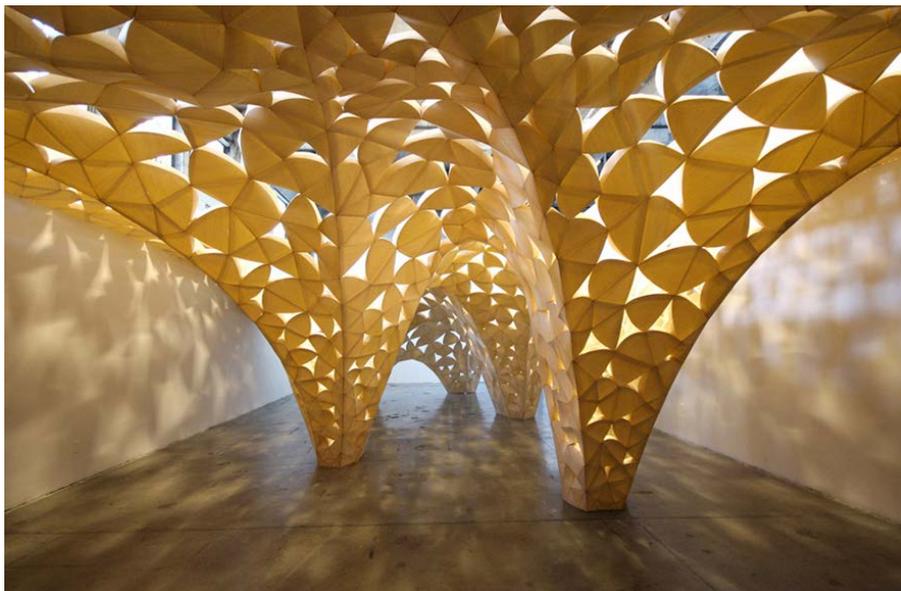
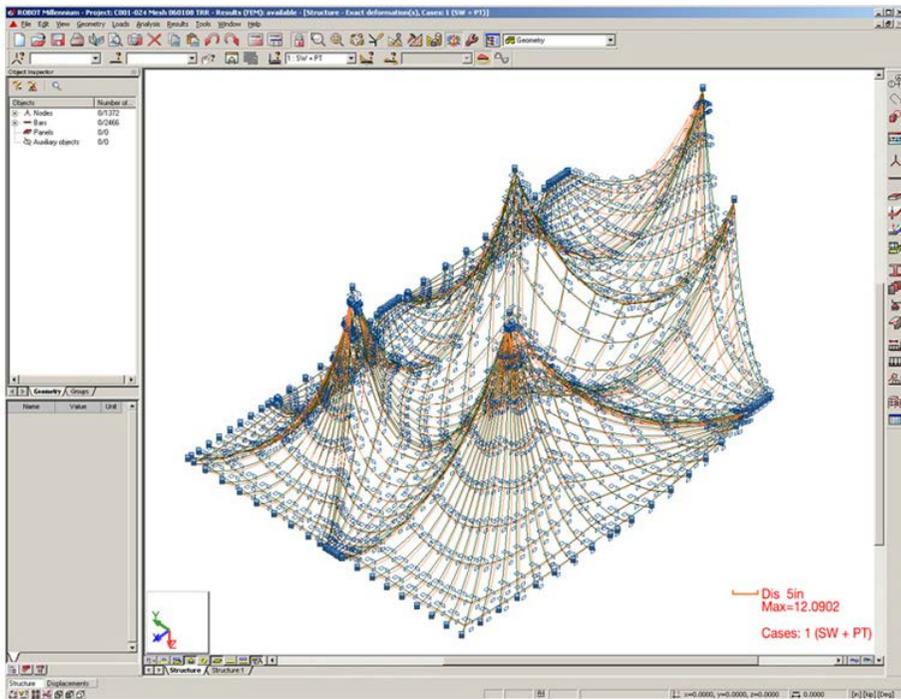
environmental and other parameters that are now considered as the primary producing positive inputs during design process until the final. Today's architecture is seemingly no longer preoccupied with style or appearance of which have been proven by the master architects for centuries. It is rather a reflection of the world we all live in.

Have newly emerging digital technologies found more than interesting in architectural research and practice, today's architecture has become much more complex against Cartesian grid in terms of shapes, forms and structures. Shown from the small scale installation projects to the mega scale building projects, new possibilities for architecture have emerged. These new possibilities are opportunities that are actually tangible because as much as digital techniques of design and analysis become sophisticated, techniques of fabrication are far more developed than realized. Being the shapes, forms and structures challenged, scholars and architects are now seriously searching for an answer to how much limit they allow for designing and building architecture, and how much significance they allow the use of computers for a thinking process and decision making.

If we see the progression of architectural designs controlled by digital techniques; for example, datascape, blobs, folding architecture and generative architecture, the shapes, forms and structures have become much more complex as mentioned. It seems to be almost inconceivable to imagine designing architecture without the use of computers. More recently, this tendency has been at the center of debates. Now, the adoption of digital tools seems to be no longer one of those options to take anymore, but rather more likely a responsibility for architects to take

in tune with uncertainty.

As much as a demand on new design grows, a development of advanced digital technologies and digital techniques of which have already become a new design tool as well as new design media to the architects in the domain of architectural design and construction, is not avoidable especially when a world is increasingly dominated by technological change. Such development has become one of the main driving forces to output new shapes, forms and structure in architecture that the architects could never predict and articulate with traditional design methods. A newer version of software and techniques is released to the design market at a daily basis and they have come too significant to just overlook for the progressive architects. The rapidly growing number of those architects using digital tools and techniques has already started to shape a fundamental culture of architecture. Architecture designed through a digitally driven process; however, is somewhat weak to name it as a new paradigm largely due to two reasons that it would still seem to remain in favor of visual aesthetics and to lack an intellectual background to support a new approach using the idea of digital.



[Figure 1] Voussoir Cloud, SCIArc Gallery, Los Angeles, 2008  
(IWAMOTOSCOTT ARCHITECTURE)

## 1.2 Subject and Purpose of Study

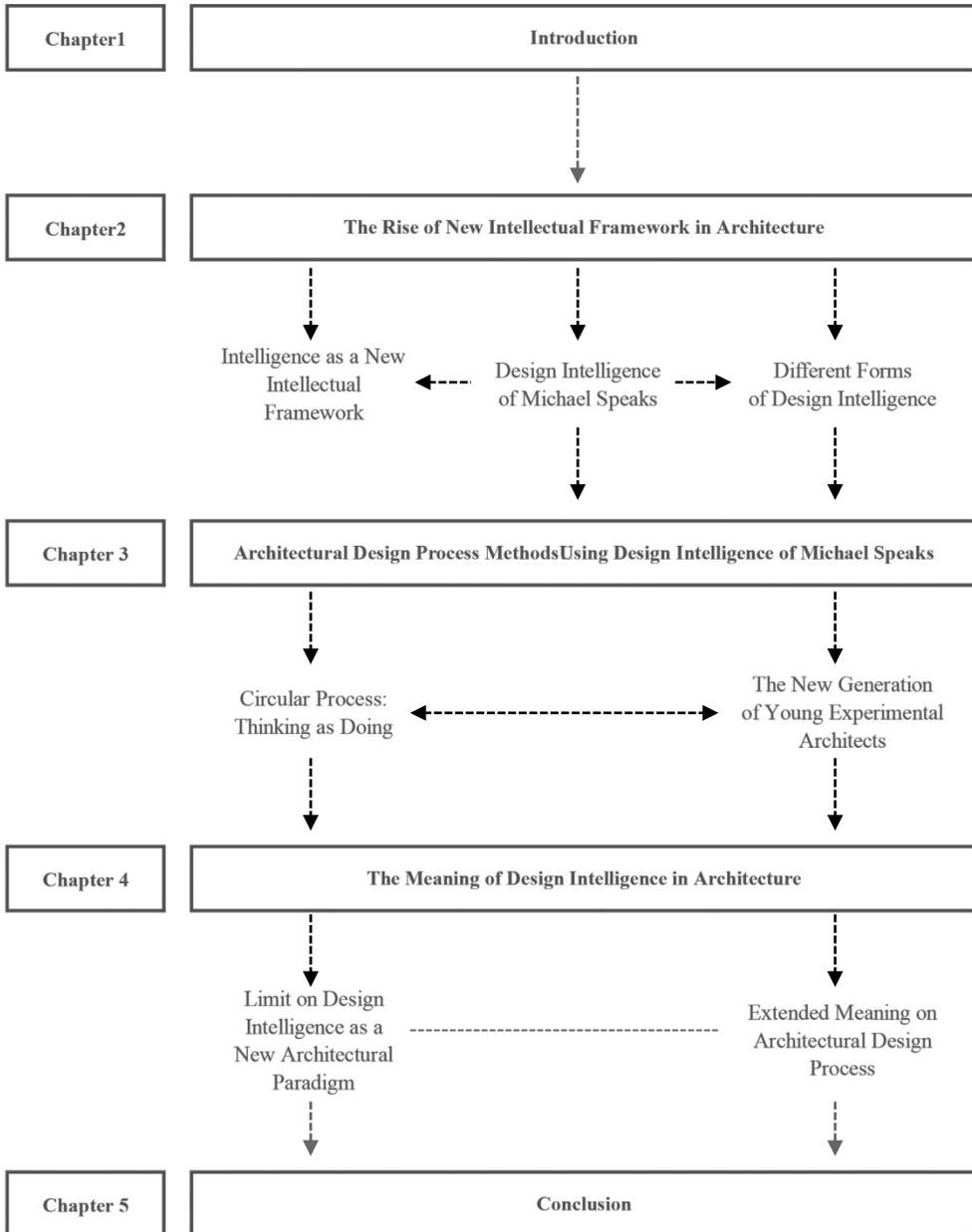
Very few architects or architectural theorists have come up with a new argument for the challenges confronting today's architecture. If naming them, Jeffrey Kipnis, Patrik Schumacher and Michael Speaks are the ones which try to innovate architectural design and practice. Their ideas are as follow:

1. Jeffrey Kipnis emphasizes the significance of theory for architecture and at the same time acknowledges the potentials brought by the use of computers.
2. Patrik Schumacher acknowledges the significance of digital media and emerging technologies. Favoring in Parametricism, he argues that one unified style can shape a new architectural paradigm.
3. Michael Speaks also acknowledges the significance of digital media and emerging technologies which challenges the conventional way of design process. Therefore, he argues that architecture needs a brand new intellectual framework besides theory to support a new way of thinking and doing of the digitally driven.

Design Intelligence of Michael Speaks is considered as unfamiliar subject matter for most of the architects because it has been yet concretely fixed as a new architectural paradigm or as a new intellectual framework shaping architectural

design and practice. This is still an ongoing subject matter discussed at the debates. And research on its potentials largely for architecture is in the middle of process. Although the rise of a new intellectual paradigm is not fully agreed, it is at least worth to start considering it because we have witnessed the changes in terms of architectural shapes, forms, structures and materials as well as design methods conducting whole design process.

### 1.3 Diagram of Thesis Structure



[Table 1] Diagram of Thesis Structure

## **Chapter 2. The Rise of New Intellectual Framework in Architecture**

### **2.1 Intelligence as a New Intellectual Framework**

Humans fundamentally differentiate from animals because humans have the ability to think and to speak. Their particular abilities are very much to make themselves intelligent. Intelligence for Michael Speaks is a new intellectual source. It is a replacement of architectural theory as for a primary intellectual framework of architectural theory during postmodernity has declined by the dominant of digital media and emerging technologies increasingly challenging the traditional way of thinking and making in terms of design process.

Thinking and speaking – thought and language – are the two basic structures of intelligence. First, language both spoken and written is the composition of words that are patterns in the world as are melodies, cars, and houses. It is pure analogy, and through it, we can cause our generations to experience and to learn about things they may never actually see as Jeff Hawkins describes in *On Intelligence*. Language is a means of communication. Its communication tools have transformed to new forms and to new technologies since science quickly developed – from spoken to printed, from printed to electronic. They all allow sharing knowledge with millions of people around the world, and the enormous amount of knowledge is easily collected. Such collected knowledge creates another layer of intelligence which is

inclusive of feedback on that knowledge. This iteration of process continuously produces intelligence. Second, thought is normally considered as received or learned but thought is, in fact, memories stored in human brain. And those memories as patterns <sup>2</sup> return back to the world. Therefore, thought and memories are associatively linked, and random thought never really occurs as described in the following:

“Inputs to the brain auto-associatively link to themselves, filling in the present, and auto-associatively link to what normally follows next. We call this chain of memories *thought*.” <sup>3</sup>

Thought, then, in this perspective can never be a creation of new thought because thought itself is reliant on the memories built up from experiences and patterns of what we see, what we hear, and what we touch, what we smell and what we taste.

The linguistic impression of the word ‘intelligence’ gives is that being a smart person like one is good at mathematics, wise in decision-making or highly educated. As mentioned, we do demonstrate human intelligence through speaking, writing and acting but only to a point. Intelligence is something more than happening in our head. It is not simply a matter of thinking or acting. Unlikely, intelligence means, on the other hand, the act of understanding which builds

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<sup>2</sup> Humans have five senses: sight, hearing, touch, smell and taste. We hear sound, see light, feel pressure, smell fragrances and taste flavors but inside our brain, there is not any fundamental difference between these types of information. These momentary spikes are identical regardless of what originally caused them. All our brain knows is patterns. And those patterns build perceptions and knowledge. (On Intelligence, 2004)

<sup>3</sup> Jeff Hawkins and Sandra Blakeslee, *On Intelligence: How a New Understanding of the Brain Will Lead to the Creation of Truly Intelligent Machines*, New York: St. Martin’s Press, 2004, 75.

perceptions and knowledge. And those perceptions and knowledge give the ability to think abstractly for dealing with new situations. If a person does thinking and acting simultaneously, then he becomes more intelligent in the situations which have not yet happened. In that sense, we may say that action is a manifestation of intelligence. Here, the new or unfamiliar situations of which have not yet to happen require predictions to deal with them properly. Prediction <sup>4</sup>, the primary foundation of intelligence, is followed by the chains of memories. It is not, therefore, newly created, but combined of the invariant memory recall of what should happen next with the details pertaining to this moment in time. For example, an architect is about to design a new building. He can predict how the whole design process will be conducted. He will be able to predict an overall picture of the final design including drawings and models based on his chains of memories and his design and practice experience in the past. Every act he makes during the design process is a creative behavior that it is predicting the future by analogy to the past. Therefore, intelligence is linked with knowledge accumulated through the memory-prediction system in human brain.

“Intelligence is measured by the capacity to remember and predict patterns in the world, including language, mathematics, physical properties of objects, and social situations. Your brain receives patterns from the outside world, stores them as memories, and makes predictions by combining what it has seen before with what is

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<sup>4</sup> Prediction is not just one of the things your brain does. It is the primary function of the neocortex, and the foundation of intelligence. The cortex is an organ of prediction. If we want to understand what intelligence is, what creativity is, how your brain works, and how to build intelligent machines, we must understand the nature of these predictions. (On Intelligence, 2004)

happening now.”<sup>5</sup>

A demand on new design values rather than on new designs has been increasingly growing high; and thus, the architects have had to challenge themselves to deliver the demand in their practice along with globalization. The new modes of communication, globally networked society, advanced technologies and an economic downturn are the most current phenomena of globalization. Due to the global changes and development, we are now more connected sharing all kinds of knowledge and billions of pieces of information are easily collected. A Management pioneer, Peter Drucker once mentioned that the accession of modern capitalism to world system status was enabled by a fundamental change whereby knowledge was no longer concerned with philosophical or religious truth but with doing, with action.<sup>6</sup> Such new knowledge has created a new knowledge based society that we are no longer dictated by religious beliefs, philosophy or These inevitable changes are something that architecture can avoid. Theory; therefore, is no longer fast enough to deal with the changes and especially for the digital technologies and the digital techniques are

If we look at the history of architecture, there has always been an intellectual framework guiding thinking and making. Largely, the two intellectual dominant frameworks are found that philosophy was the intellectual dominant of early twentieth century vanguards and theory was the intellectual dominant of late

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<sup>5</sup> Jeff Hawkins and Sandra Blakeslee, *On Intelligence: How a New Understanding of the Brain Will Lead to the Creation of Truly Intelligent Machines*, New York: St. Martin's Press, 2004, 97.

<sup>6</sup> Peter Drucker, *Post-Capitalist Society*, New York: Harper Business, 1993, (As cited in Michael Speaks, 2007).

twentieth century vanguards, shaping both architectural design and its practice. Martin Heidegger, Jacques Derrida and Gilles Deleuze; for instance, left the significant impact on architecture, and they may still be. Their linguistic form, linguistic meaning and language itself in context are the origin of architectural ideas borrowed by master architects and those received ideas are replanted when designing.

## **2.2 Design Intelligence of Michael Speaks**

### **2.2.1 Michael Speaks**

An educator, researcher and editor, Michael Speaks has been named Dean of the School of Architecture at Syracuse University in New York. He is former Dean of the College of Design at the University of Kentucky, and founding director of Metropolitan Research and Design Postgraduate Program at Southern California Institute of Architecture. Teaching at the most prestigious schools in States and abroad, he has lectured and published the influential writings on art, architecture, urban design and scenario planning. He was the founding editor of the cultural journal Polygraph and a former editor at Architecture New York and a + u Tokyo. The series of articles on “Design Intelligence” published by a + u in Japan are the most read in history internationally. Currently, he is a contributing editor for

Architectural Record.

Heading Big Soft Orange, a Dutch-American urban research group based in Rotterdam and Los Angeles, Speaks is one of the first to introduce a new generation of Dutch architects and planners through essays and exhibitions in the 1990s. He has been at the center of debates about city branding, alternatives models of city planning, writing a number of essays and advisory studies as well as overseeing scenario studies commissioned by city and regional governments in the Netherlands. More recently, he plays an important role in debates about innovation and prototyping plays in design claiming that a new intellectual framework of architecture has arisen after theory.

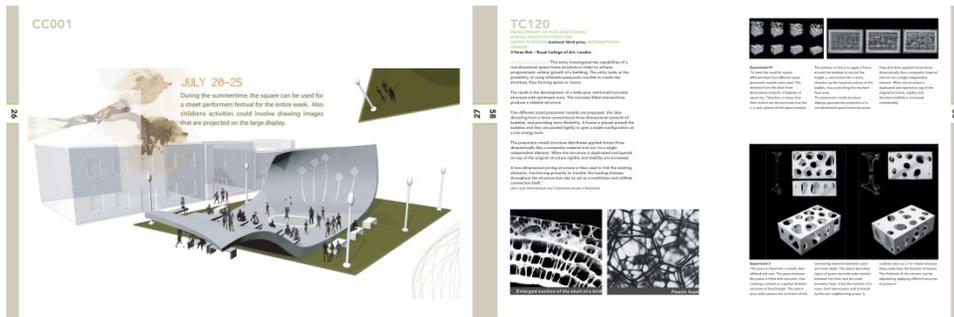
Michael Speaks, “Design Intelligence” innovator, emphasizes the need of a new intellectual framework of which would support innovation for architecture especially when the fundamental culture of architecture in terms of design and practice is changing due to technological development as well as marketization engendering new values to the world. In order to achieve the new intellectual framework, he argues that architecture should not be organized under a certain style or technology but generated by thought. This thought he stresses is a concept or an idea but a form of action which returns to thought.<sup>7</sup> He encourages do thinking and doing at the same time. This approach is to blur the boundaries between thinking and doing but to interlink them more. It is not a linear process of ‘from thinking to doing’, but a circular process of ‘thinking as doing’ that thinking does not dominate

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<sup>7</sup> Michael Speaks, “Design: Intelligence vs. Ideology,” 03 February 2012, Online video clip, The University of Hong Kong, Accessed on 14 November 2013, <<http://fac.arch.hku.hk/event/michael-speaks-design-intelligence-vs-ideology/>>

doing.

Speaks, to bring innovation to architecture, argues that it is important to research as well as to collect knowledge by doing, by making which creates opportunities during design processes. The various forms of design knowledge or design intelligence are in this aspect produced by making during the circular process, not received from philosophy or theory. Such intelligence as he argues, offers a new intellectual framework to design new architecture which is not just about new designs but design values. We have proved ourselves that we are capable of making new designs of good and bad. Now, we are more concerned about what those new designs bring to us and what they do for us rather than simply what is new. Stressing the importance of innovation and prototyping in architectural design, his argument has increasingly drawn great attention in recent debates both academically and practically since the economic downturn of 2008. His new approach to design research and prototyping is, in addition, exposed in the first *International Concrete Design Competition for Students 2003/2004 – ROBUSTNESS*, in short CDC 2003/2004, which was directed and curated by Speaks himself, sponsored by a consortium of European cement producers.



[Figure 2] Two International Winners in CDC 2003/2004 from right to left  
(ROBUSTNESS)

### 2.2.2 Design Intelligence of Michael Speaks after Theory

If one were to categorize core intellectual frameworks which had shaped the paradigms of architecture for design and practice based on a history of architecture, we can come up with largely philosophy and theory. They had been surly fundamental roots to guide architectural study. The rise of theory as the intellectual dominant in the late twentieth century signaled a farewell from Modernity to Postmodernity. Philosophy was the intellectual dominant of the early twentieth century conducting architectural thinking during Modernity.

Theory, a set of translations of mostly French, German and Italian philosophies arrived in the United States in the late 1970s, was a new mode of contemporary

thought.<sup>8</sup> Had theory replanted in States and sold to the world eventually, it became a powerful intellectual engine attached to any field of studies such as art, literature, film and architecture. The use of theory in architecture began in earnest to dictate action towards architectural work and writing by the vanguard architects, 'the post-'68 generation', from the 1970s to the late 1990s. It provided a fast philosophy and engendered a new style of architecture, Postmodernism, Deconstructivism and Critical Regionalism, Folding, and Parametricism. Form and ideology as driving forces to design architecture by connecting them in that particular time period somewhat remained in the same circle by criticizing it which did not actually add or produce anything new. Sometime in the late 1990s an attempt to replace style of architecture with another style emerged because it no longer concerned not so much about reconnecting form and ideology desired by the avant-garde, but rather 'form began to melt into blobs and fields of data while ideology loosened up while and became reconfigured as identity branding and lifestyle'.<sup>9</sup> Drawing a close to a form of knowledge collected from theory, from ideology with uncertainty as computational technologies and branding became imperative issues, architecture confronted challenges in design and practice. Theory started to loose its hold on the avant-garde due to the forces of globalization of which has triggered open systems and dotcom businesses along with the rapid development of computational technologies; and therefore, theory lost its role as a

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<sup>8</sup> Michael Speaks, "Intelligence after Theory," in *Network Practices: New Strategies in Architecture and Design*, edited by Anthony Burke, Therese Tierney, New York: Princeton Architectural Press, 2007, 212-217.

<sup>9</sup> Michael Speaks, "Two Stories for the Avant-garde," Accessed on 16 November 2013, <<http://www.archilab.org/public/2000/catalog/speaksen.htm>>

new mode of contemporary thought as for it was not free from thinking or quick enough to keep up with the pace of rapid global change. Architecture detaching from the idea of postmodernity has finally begun to write another story.

“In the 1980s and 1990s theory changed the practice of architecture. But today theory has lost touch and no longer has any consequences for the practice of architecture.”<sup>10</sup>

The ‘end of theory’<sup>11</sup> has taken a part of architectural history. Its absence has bloomed new possibilities and new opportunities ironically when contemporary architecture is not so much driven by great ideas and concepts realized in visionary form and shape anymore. Contemporary architecture is now; however, compelled by the need to innovate, to solve the problems including the problems which would have never been able to be stated or even to be predicted as Speaks argues. Researching, drawing and making the power of digital technologies and techniques are not resistible because the newer version of digital technologies and techniques is released almost at a daily basis. The use of digital technologies and techniques challenges the traditional way of architectural design process as computer aided design, CAD in short, challenged the hand drafting.

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<sup>10</sup> Michael Speaks, “No Hope, No Fear”, *Architectural Research Quarterly* (2003): 209, Accessed 16 November 2013, doi: 10.1017/S1359135503001714.

<sup>11</sup> *Ibid*



[Figure 3]  
Eyebeam Museum of Art and Technology,  
New York, USA (Diller Scofidio + Renfro)

Looking at Folding in Architecture written by Greg Lynn, the first sign of the three dimensional digital manipulation to open new design possibilities of a new architecture after Deconstructivism would seem to be appeared but it was not enough to be a new intellectual paradigm. Folding Architecture indeed was a pressing issue because the avant-garde architects had lost their way to guide architecture for the absence of an intellectual framework, and they recognized the new forces to design architecture. It would seem to work as an alternative establishing the groundwork for three dimensional digital tooling. Folding as implying meaning by the word itself was purely expressed in terms of shape and form. Although it was eye catching, it was not able to overcome an obsession of philosophical ideology, Gilles Deleuze's in this case, which would still lead to visual concerns towards an architecture justified by its performance. Nonetheless, the output of digitally driven architecture has been proliferating by the post avant-garde architects who are interested in design innovation and attempting to capture right problems by producing opportunities within design process. The design paradigm of today in architecture is not about new designs but new values embedded in design.

‘Design Intelligence’<sup>12</sup> as Speaks strongly argues is a must-have in order to accomplish something new for contemporary architecture. What makes Design Intelligence is various forms of design knowledge produced by ‘action’<sup>13</sup> within design process, not received from thought. Thought in this regard is a form of action of which returns to thought. Within the circular process, the boundary between thinking and doing is blurred. Such process is not limited to the traditional way of drawing and physical model making; however, the abundance of advanced digital technologies has already opened a new horizon for the fields of design including architecture for more opportunities in terms of quality and quantity are created. Every form of knowledge in Design Intelligence is unique because there is no central spine guiding thinking which is very distinguishing from the Utopian idea of modernity. Using subconscious knowledge, information and social value is critical. Scenarios planning as well as prototypes are the wellspring of Design Intelligence.

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<sup>12</sup> Michael Speaks refers to “Design Intelligence” as “Design Knowledge” in his articles and essays.

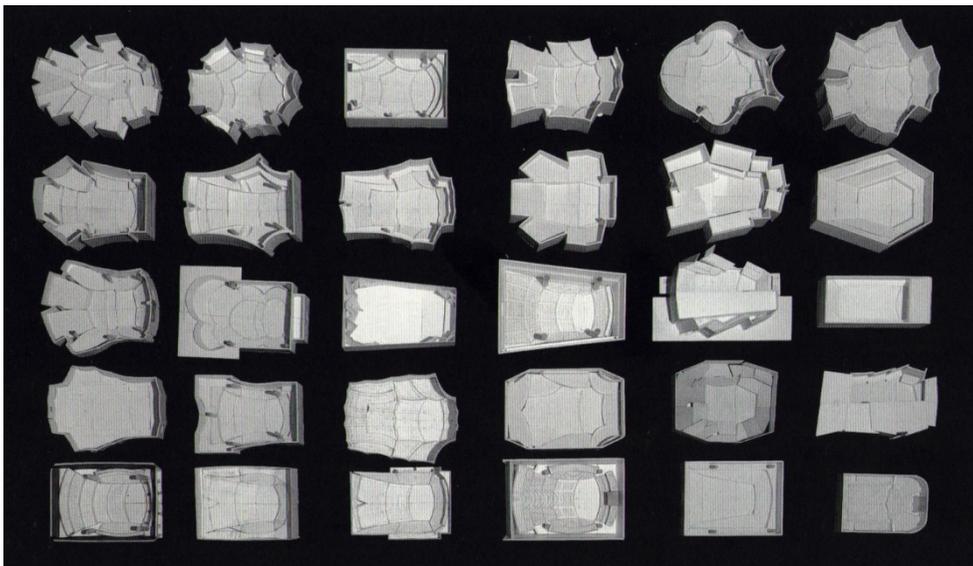
<sup>13</sup> Actions means doing, researching and making based on Michael Speaks argument.

Modernity	Postmodernity	<b>Supermodernity</b>
18 <sup>th</sup> Century - 1960s	1960s - 1990s	<b>1990s - Present</b>
Internationalization	Multinationalization	<b>Globalization</b>
Nation States	Multinationals	<b>Market State</b>
Provides Security against Risk		<b>Provides Opportunity for Innovation</b>
Industrial	Postindustrial	<b>Informational</b>
Goods	Services	<b>Knowledge</b>
Philosophy	Theory	<b>Intelligence</b>
Discover True	Uncover Repressed True	<b>"Chatter"</b>
Essence	Simulacra	<b>Plausible Truth</b>
TRUE	True/False	<b>"Little Truths"</b>

[Table 2] The Characteristics of Three Architectural Paradigms  
(Design: Intelligence vs. Ideology)



[Figure 4] De Young Museum, Golden Gate Park, San Francisco  
A Series of Study Models Produced by Making Manually (Herzog & De Meuron)



[Figure 5] Studies of Different Disney Concert Hall Configurations, Los Angeles  
A Series of Study Models by Rapid Prototyping (O' Frank Gehry)

## 2.3 Different Forms of Design Intelligence

### 2.3.1 Foreign Office Architecture: Classification System

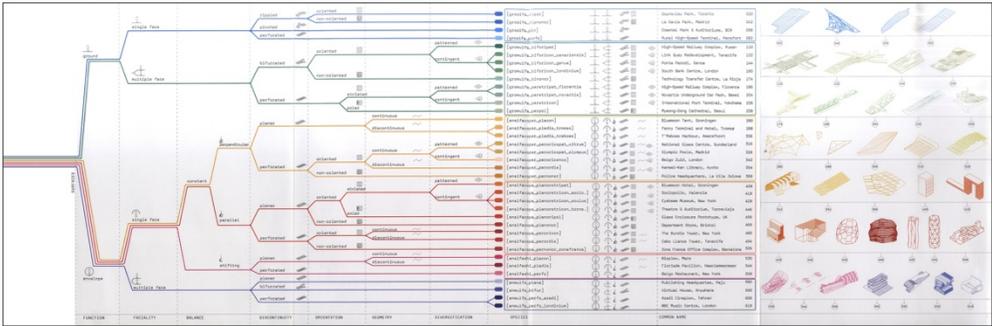
Foreign Office Architects, in short FOA, has documented the research of they had produced for the projects of their very own in “Phylogenesis: foa’s ark”. It contains not only interesting designs of architecture but also new design value which has been produced by their specific design knowledge derived from the idea of species of which eventually grow - called a phylogenetic process – in practice. The projects, as completed or working in progress, are approached mainly by prototyping during design processes, which produce loads of information and feedback. A transformation of such information and feedback, as Speaks argues in Design Intelligence, is design knowledge to produce the plausible opportunities. These opportunities are not considered as ‘a favor of final production’ but rather considered as the playful field of possibilities. They directly affect whole design in architecture as well as construction which require ‘consistency, material and organization’<sup>14</sup> as FOA describes in Complexity and Consistency.

Prototyping especially creates a shared design space which enhances collaboration and the unexpected variables of which is never conceived are considered leading to innovation. Fundamentally, a process is their main priority to output design innovation. Interested neither in preconceived effects nor ideas, they

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<sup>14</sup> FOA, “Complexity and Diversity: a Conversation with Farshid Moussavi & Alejandro Zaera,” *El Croquis* 115/116[I], 2004, 28.

are rather interested in constructing and engineering processes on different levels. Producing consistency in the process of construction and material exploration is important as well. A process to FOA means the ‘generation of a micro-history of a project, a kind of specific narrative where the entity of the project forms in a sequence.’<sup>15</sup> As seen in terrestrial life forms – geological, biological and human – temporal formation during their processes produce organizations of a complexity and sophistication that instantaneous ideas would never be able to produce. The temporal formation is the dynamic of a process. This process is even more stimulated by technologies involved as Alejandro Zaera – Polo of FOA describes; for example, the weight on the amount of technology that was used in designing the Yokohama International Port Terminal.



[Figure 6] The Classification System (Phylogenesis: foa's ark, 2004)

The classification system shown above that FOA has made from the projects identifies the genesis of the projects as the evolution of a series of “phyla” or abstract diagrams, actualized and simultaneously virtualized in their application to

<sup>15</sup> Jaime Salazar et al., *Verb processing: Architecture Boogazine*, Barcelona: Actar, 2001, 15.

the specific conditions where the projects take place in time and space. The classification includes seven transversal categories of the phylogenetic tree, where the project species are formed. The seven categories are Function, Faciality, Balance and Discontinuity, Orientation, Geometry, and Diversification.<sup>16</sup>

“The phylogenetic tree is about finding a way to classify projects into a series of different spatial organizations, mainly spatial formal organizations. The aim is never to repeat or replicate them exactly but to identify spatial characteristics out of the individual projects that one could possibly grow or cultivate in other ecosystems.”<sup>17</sup>

This design knowledge of the phylogenetic tree is very specific to the projects articulated by FOA and thus no other practices may be adequate to classify their projects as FOA has done.

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<sup>16</sup> Foreign Office Architects, *Phylogenesis: foa's ark*, Barcelona: Actar, 2004, 12-15.

<sup>17</sup> FOA, “Complexity and Diversity: a Conversation with Farshid Moussavi & Alejandro Zaera,” *El Croquis* 115/116[I], 2004, p.20

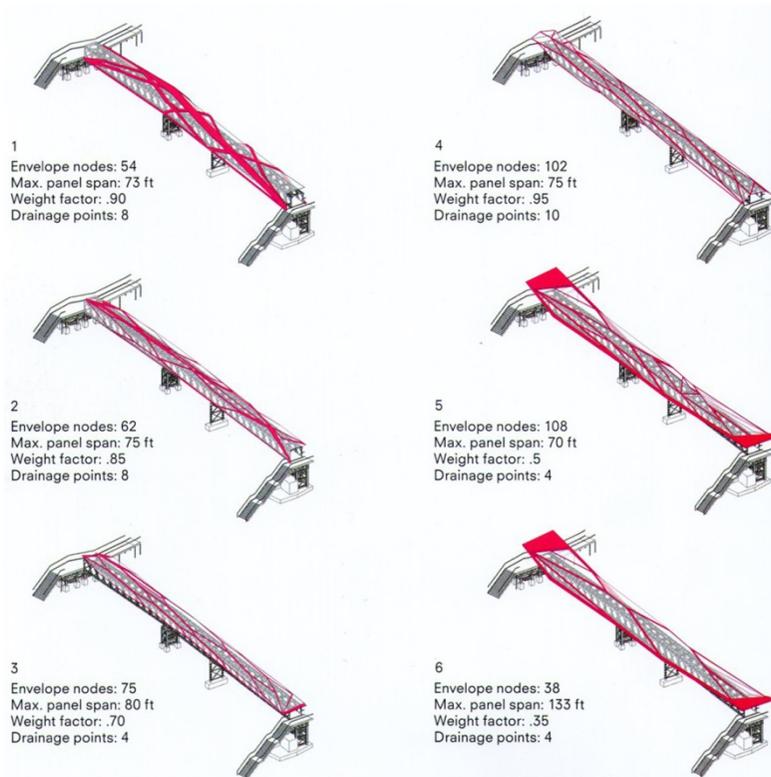
<b>Function</b>	
ground - envelope	
<b>Faciality</b>	
single face - multiple face	
<b>Balance</b>	
constant: Parallel/ perpendicular - shifting	
<b>Discontinuity</b>	
planar-rippled - pinched - perforated - bifurcated	
<b>Orientation</b>	
oriented: striated/ polar - non oriented	
<b>Geometry</b>	
continuous - discontinuous	
<b>Diversification</b>	
patterned - contingent	

[Table 4] The Seven Categories of the Phylogenetic Tree (Phylogenesis: foa's ark, 2004)



as the semi-automatic result of the interplay of an arbitrary selection of not always appropriate parameters, often leading to amorphous, academic results that do not translate into feasible constructions. The solution presented here is based on our experiences, as architects of both failed and realized projects and as educators, which have convinced us that architects can train themselves to generate their own design models that summarize a set of principles to help them select and implement the right parameters and remain true to their own vision. Using design models can contribute to acquiring a new form of control in digital design practices. Design Models represent a new approach to architecture. Buildings and projects no longer matter. Rather, our focus is on models that are able to generate whole series of projects, models that are designed to be instrumentalized directly as they contain in their very cores the enduring ingredients of architecture.

### 2.3.3 Shop Architects: Versioning



[Figure 8] Versions of Pedestrian Bridge at Ground Zero  
(Shop Architects, 2012)

Versioning, as emphasized by Shop Architects is an operative term meant to describe a recent, significant shift in the way architects and designers are using technology. It is about attitude rather than ideology. If we see the aerospace and automotive industries, they have fostered a rich legacy of performance driven design. Likewise, Shop Architects use a similar data driven process to measure and evaluate their formal proposals.



[Figure 9] Pedestrian Bridge at Ground Zero in progress  
(Shop Architects, 2012)

## 2.4 Chapter Conclusion

A significant shift in the field of architecture both academically and practically has been detected. Michael Speaks who is an innovator of Design Intelligence argues that the changes for architecture are inevitable largely due to the two reasons that a world increasingly dominated by technological change and marketization. His argument is quite convincing if we see the fast growing number of new technologies and its impact on design research, making and production; for example, in film, fashion and industrial design. Each market; therefore, quickly changes at the same speed of new leading trends. The deployment of those technologies which bring new techniques along is now more than critical from design to production. Architecture is no exception.

# **Chapter 3. Architectural Design Process Methods**

## **Using Design Intelligence of Michael Speaks**

### **3.1 Circular Process: Thinking as Doing**

Knowledge has been the dominant motivation to conduct overall architectural design during process until the final. It has been continuously shaped in intangible forms with three different paradigms of modernity, postmodernity and 'supermodernity'.<sup>18</sup> In modernity, for instance, knowledge had been received from philosophy, generating thinking and thinking then led to discover universal truths. Truths were considered as an essential manifesto to guide doing during design

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<sup>18</sup> Hypermodernity or supermodernity is a type, mode, or stage of society that reflects a deepening or intensification of modernity. Characteristics include a deep faith in humanity's ability to understand, control, and manipulate every aspect of human experience. This typically is manifested in a forward-looking commitment to science and knowledge, particularly with regard to the convergence of technology and biology. The emphasis on the value of new technology to overcome natural limitations lends itself to a diminution or outright repudiation of the past, since yesterday's knowledge can be considered 'less' than today's. If distinguished from hypermodernity, supermodernity is a step beyond the ontological emptiness of postmodernism and relies upon a view of plausible truths. Where modernism focused upon the creation of great truths, postmodernity is intent upon their deconstruction. In contrast, supermodernity does not concern itself with the creation or identification of truth-value. Instead, information that is useful is selected from the superabundant sources of new media. Postmodernity and deconstruction have made the creation of truths an impossible construction. Supermodernity acts amid the chatter and excess of signification in order to escape the nihilistic tautology of postmodernity. The Internet search and the construction of interconnected blogs are excellent metaphors for the action of the supermodern subject. Related authors are Terry Eagleton *After Theory*, and Marc Augé *Non-Places: Introduction to an Anthropology of Supermodernity*. (<http://en.wikipedia.org/wiki/Hypermodernity>)

process. Postmodernity likely as in modernity was driven by theory which would offer knowledge. Knowledge generated thinking to uncover repressed truths and following critiques on these truths would reveal other new truths within the same intellectual framework – ‘theory was critique turned on itself, unremitting critique chasing its own tail without purpose or end’.<sup>19</sup> The relationship between thinking and doing is therefore linear; in other words, thinking has to be progressed to reach a certain point to activate action and action then leads to a final model. If the final model does not serve the purpose of design intentions, whole process returns to a starting point. This linear design process; however, has started to lose its weight on architectural design because it does not meet the challenges posed by the forces of globalization that the purpose of design is now not necessary about finalizing. If problem-solving were a main goal to achieve in favor of design within in the parameters of a problem given in the past two paradigms of architecture, approaching to innovation by finding the right problems which would never be predicted in advance is now a main purpose to accomplish by making plausible opportunities through prototyping and scenario planning during design process.

In supermodernity, the whole design process of architecture works different from the linear process by emphasizing the role of doing that doing actually produces design knowledge – ‘a bias for action’. Thought is no longer something an architecture would do first in order to reach action; but instead thought is a form of action which then returns to thought. This process is called the circular process in which the boundary between thinking and doing becomes blurred.

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<sup>19</sup> Michael Speaks, “After Theory,” *Architecture Record*, June 2005.

As “Demo or Die!” – an unofficial credo of the Massachusetts Institute of Technology’s Media Lab – captures the prevailing belief that ideas must be demonstrated, the demo culture is not about lingering in the great ideas but transforming them into objects. Such articulation is only possible by action and Speaks describes the significance of action in the following:

“Making becomes knowledge or intelligence creation. In this way of thinking and doing, design and fabrication, and prototype and final design become blurred, interactive, and part of a nonlinear means of innovation.”<sup>20</sup>

A famous structural engineer, Peter Rice, who dedicated his life to innovation as well as to bridge the gap between engineering and architecture, once said that the engineers innovate by finding right problems which highlights the significant role of action. Action – researching, doing and making – leads to much iteration of prototypes and these prototypes themselves become research to solve the problems reaching innovation which would work vice versa as well. The idea of prototyping implemented in the circular process differs from its ordinary use if considering; for example, the practical fields of the airplane, the animated motion picture, financial derivatives and even architecture. As commonly known, a prototype refers to its original form made at an early stage; especially it refers to a mockup to evaluate shape, design, compatibility or performance in engineering. A prototype in the circular process means more than just a physical mockup that it carries ‘the load of communicating how organizations use media to manage their

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<sup>20</sup> Michael Speaks, “Design Intelligence and the New Economy,” *Architectural Record*, January 2002.

innovation processes'.<sup>21</sup> The prototypes; therefore, are sensational management media for stimulating new thinking, new doing and new practices in innovation metrics. They are also a physical tool for communication which bears loads of information and every piece of information becomes design knowledge.

Modernity	Postmodernity	Supermodernity
Ideals	Ideology	Intelligence
Thinking > Doing		Thinking <> Doing
Truths guide action	Critique reveals new truths and Theory provides new truths	"Little Truths" but more opportunities
Modernist Manifesto	Postmodernism Deconstructivism Folding Critical Regionalism Dutch Architecture Parametricism	Design Intelligence
Utopian Vanguard	Theory Vanguard	Design Intelligence Vanguard

[Table 4] The Relationship between Thinking and Doing

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<sup>21</sup> Michael Schrage, *Serious Play: How the World's Best Companies Simulate to Innovate*, Boston: Harvard Business School Press, 2000, 7.

### 3.1.1 Rapid Prototyping

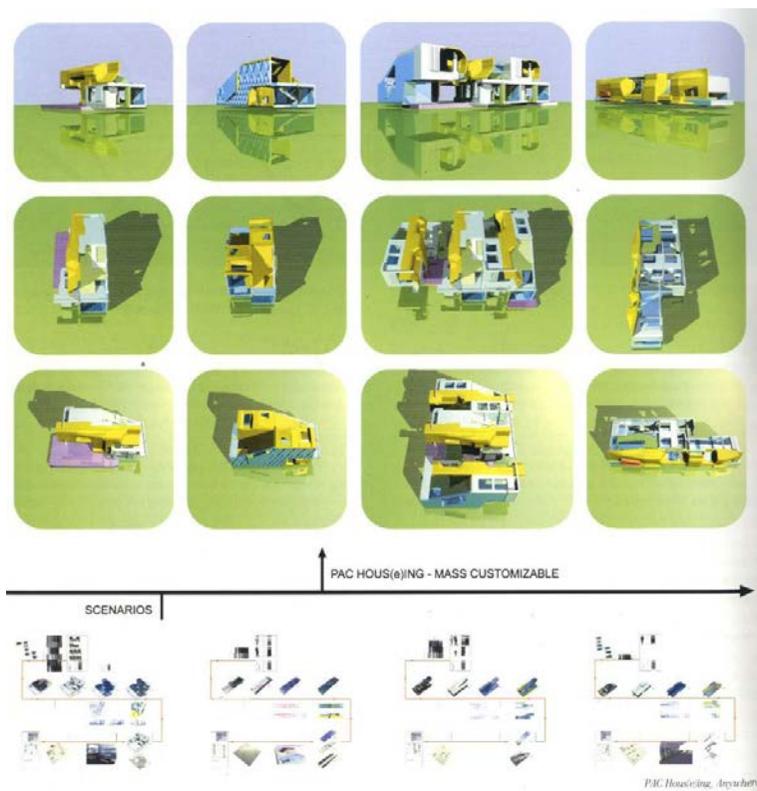
Feeding CAD files to computer driven machines, this process of machine made model making is just one of the emerging technologies, called rapid prototyping. A process of machine made model making Rapid prototyping allows dozens of schematic massing models produce.



[Figure 10] Schematic Massing Models for a Courthouse at Morphosis

### 3.1.2 Scenario Planning

Scenario Planning is a strategic way of telling stories often used for architectural study and practice. It is a tool for providing a framework for developing ideas as well as designs of future further. Scenario Planning, especially for architecture, requires a rational analysis of certain constraints such as clients, budgets, site condition, programs and other parameters. And research on social issues, cultural trends, design values and precedent studies is primary concerns not to overlook in the process of planning stories.



[Figure 11] PAC Housing, Mass Customizable (LAWPC)

### **3.1.3 Digital Fabrications**

Architects have been drawing digitally for nearly thirty five years. The amount of efficiency contributed by the Computer Aided Design programs is enormous that CAD programs have the capability of producing billions of drawings. They are an everyday tool that the architects are almost inconceivable today to imagine designing architecture without the use of computers. Architecture; nonetheless, has been continuously confronting difficulties in terms of the translation of two dimensional drawings into three dimensional buildings, the final outcome. Perhaps it is because the architects tend to start a design process on a two dimensional platform – drawing diagrams, plans and sections – which has a limit to three dimensionally articulate space. However, the gap drawn from the difficulties has opened new design territories of innovation in the domain of architecture because of the development of digital techniques, leading to digital production.

Digital production is a generative medium that has its own restraints and possibilities. It has the high potential to narrow the gap between design and making. But there are still difficulties to overcome between digital production and the traditional ways of making because these traditional ways of making may lead to produce the final outcome that the architects have not intended to make in digital production. Heading to design innovation, the proliferating architectural practices are now accelerating the experiments in the ways to merge the gap between design and making, between digital production and actual making.

Lisa Iwamoto, the author of Digital Fabrications says that architecture is

continually informs and is informed simultaneously by its modes of representation and construction especially when digital media and emerging technologies are rapidly expanding what architects conceive to be formally, spatially and materially possible.<sup>22</sup> ‘Digital fabrication’, exploring new methods of making virtual and physical models, new materials and material techniques leads to architectural invention as well as innovation. Iwamoto describes digital fabrication as:

*“Digital Fabrication: Architectural and Material Techniques documents architecturally innovative projects realized through digital design and constructive processes.”*<sup>23</sup>

## **1. Architectural Techniques**

Computers are powerful tools that architects never imagine themselves designing without the computational authority in their practices. It may not be too much to say ninety percentages of design process until construction including construction administration are generated by the use of computers. If this is an inevitable culture to avoid in the profession, it is perhaps then wise to accept the shift and take responsible for it. They are quite a few numbers of architects who have already exploited the dominance of technologies; for instance, Frank Gehry’s

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<sup>22</sup> Lisa Iwamoto, *Digital Fabrications: Architectural and Material Techniques*, New York: Princeton Architectural Press, 2009, 4.

<sup>23</sup> Lisa Iwamoto, *Digital Fabrications: Architectural and Material Techniques*, New York: Princeton Architectural Press, 2009, 5.

use of CATIA, Norman Foster and Herzog Demeuron.

Architectural techniques as technologies increasingly develop are explored by experimental oriented designers and firms. These techniques were deployed first in small scale designs and exhibitions in which they were neglected in favor of final design rather than emerging value during process. More recently, the tendency of the paradigm shift from conventional to innovative – from analog to digital – by changing attitude accepting advantages of digital technologies and techniques has been seemingly undertaken in design practice regardless of scale.

The five notable architectural techniques along with material explorations as introduced by Iwamoto are sectioning, tessellation, folding and contouring, forming as shown below. These techniques have been researched and studies by making both virtual and physical models for many years. They for sure produce a dynamic design process and also an atmosphere for interactive collaboration which would seem to shape the fundamental design culture.

<b>Sectioning</b>	
<p>Orthographic Projections - that is, plans and sections - are one of the most valuable representational tools architects have at their disposal.</p>	 <p style="text-align: right;">Frank Gehry, Easy Edges</p>
<b>Tessellating</b>	
<p>Tessellating is a collection of pieces that fit together without gaps to form a plane or surface.</p>	 <p style="text-align: right;">Thom Faulders, Airspace Tokyo</p>
<b>Folding</b>	
<p>Folding turns a flat surface into a three - dimensional one.</p>	 <p style="text-align: right;">Chris Bosse/ PTW Architects, Watercube</p>
<b>Contouring</b>	
<p>Construction material typically come as sheets.</p>	 <p style="text-align: right;">Urban A &amp;O Bone Wall</p>
<b>Forming</b>	
<p>Formed objects are all around us. Packaging, plastic toys, cell phones, car bodies...</p>	 <p style="text-align: right;">Servo, Nike "Genealogy of Speed"</p>

[Table 5] The Summary of Five Digital Fabrication Techniques  
(Digital Fabrications, 2009)

### **3.2 The New Generation of Young Experimental Architects**

Pursuing the next phase of architecture, the second generation of young architects has now begun accelerating their experiments in design process methods that would bring opportunities rather than remain as possibilities along with the development of new digital technologies and digital techniques. It is for sure to say that these new technologies and techniques are not a must-have medium to conduct whole design processes until final production; however, we have witnessed enough that the silent advent of the new design medium has made a compelling impact on the nature of architecture.

The fundamental design culture has been reshaping by the forces of digital revolution and this digital paradigm shift applies to design fields of art, film, fashion and industrial design, architecture and so on. As for the emergence of the digital revolution, there is from the beginning till now a bias towards the pursuit of form-making when designing. Though architects and designers did not or do not actually intend to make curvilinear-like forms that are complexly intertwined, but perhaps they focus more about generating forms which would never be reached in conventional way. The different level and scale of complex structures, shapes and forms forged during generative processes based on ideas such as topological spaces, isomorphic surfaces, dynamic systems, keyshape animations, parametric designs and genetic algorithms using digital tools are more likely 'accidental' rather than planned in control of architects. Contrasting contemporary architecture, these new designs of architecture are still controversial at the center of debates for the

authorship of designs that how far the architects allow computers to perform in decision making during design process. For those architects who doubt about ‘accidental results’ – this does not necessary mean that they deny design possibilities brought by the digitally driven ideas – ‘accidental results’ are not as rational as the planned because emerging designs are considered as abstract forms of immature plays which lack potential to become real space. Despite of having this controversy not yet been resolved, the use of digital techniques has taken them one step further by experimenting in their complex structural logics, form and shapes as well as by constructing them.

If a computer were considered as a digital tool generating new forms of architectural designs until the very recent time, this tool then has begun to role as a thinking tool largely due to two reasons: ‘digital architecture’ is no longer only initiated in virtual space that there are modes of fabrication methods to actually build it in real space in spite of its complex structural logics and forms. We have witnessed enough cases that the new tools are an undeniable part of the product. These tools have given us new ways of seeing and making – possibly a new future – almost to the point where we can think digitally.

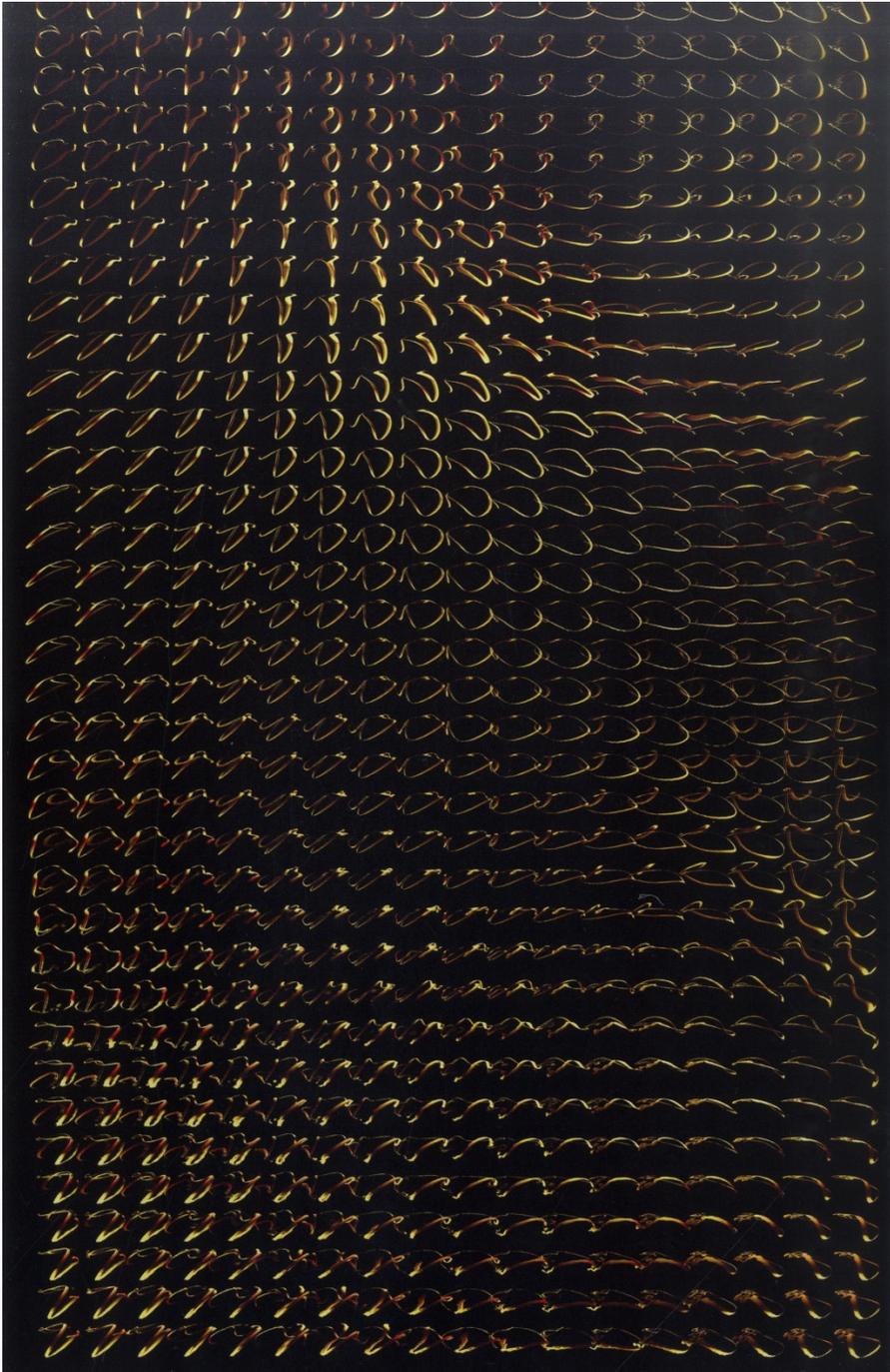
“Architecture need no longer be generated through the static conventions of plan, section and elevation. Instead, buildings can now be fully formed in three dimensional modeling, profiling, prototyping and manufacturing software, interfaces and hardware, thus collapsing the states between conceptualization and

fabrication, production and construction.”<sup>24</sup>

What has been missing though while developing digital techniques is a new intellectual framework that would guide a new architectural paradigm as had philosophy and theory guided architectural design and practice. Considering the general process, the ideas are used to be ‘received’ from the two intellectual frameworks whereas ideas should be ‘produced’ based on Michael Speaks’s argument in *Design Intelligence*. If we look at digitally driven design process methods, the boundary between having ideas and making ideas is indistinct. The new ideas are realized when thinking and making occur at the same time. Neither thinking nor making is prior to one another. This interesting thought on the relationship between thinking and making is what the second generation of young architects considers to develop in their architectural experiments and practices.

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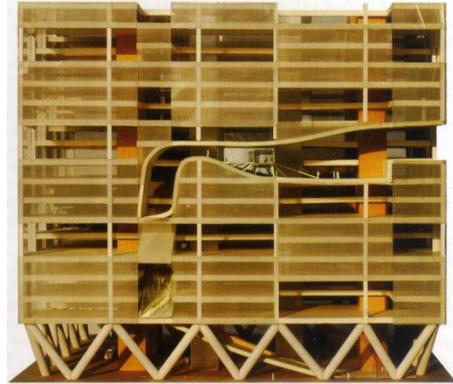
<sup>24</sup> Peter Zellner, *Hybrid Space: New Forms in Digital Architecture*, New York: Rizzoli International Publications, 1999, 13.



[Figure 12] Hystera Protera: cyclical series of three-dimensional glyphs  
(Architecture in the Digital Age, 2003)

### 3.2.1 George Yu Architects

An architect, George Yu who used to run a design office in Los Angeles signifies the importance of research. This research he mentions; however, is different from a kind of research usually done in the general process. If research were a form of action done before starting making, research to Yu is making that it is maybe even the other way around.<sup>25</sup> His way of

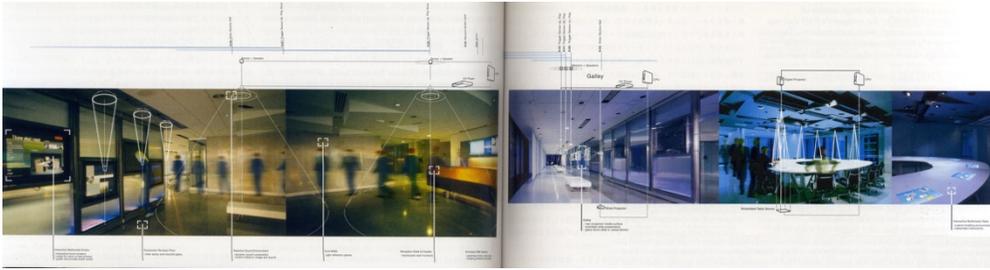


[Figure 13]  
Continuous Ground: Presentation Model  
(A + U, 2003)

design process is very different from how the general design process works. The general design process progresses in order that researching relevant data or information and spending a fair amount of time on case studies come before producing drawings and models. Researching in this case is preparation. The design process on the contrary to Yu does not progress according to priority but according to 'a bias for action'. This research does not isolate itself within the parameters of the problems given, and in fact, it extends to a new way of collaborating, new techniques and new materials.

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<sup>25</sup> Michael Speaks, "Design Intelligence: Part 2: George Yu Architects, Concept and Interview," A + U: Architecture and Urbanism no.1 (388), January 2003, p.151



[Figure 14] IBM Centers for e-Business Innovation 1999 – 2001  
Sequence of Video and Audio Spatial Experience (A + U, 2003)

The project shown above, IBM Centers for e-Business Innovation, is a series of customer spaces and meeting spaces where information would be exchanged working with IBM and corporate customers. This project provided the first opportunity to break away from conventional collaboration that Yu worked with Imaginary Forces, a Hollywood-based film design company whereas the conventional team usually consists of architect, engineer and consultant. The direct interaction with the client created a series of environmental experiences for the e-business centers – created architecture, motion graphics, sound, music and as well as all the content that would be delivered in the centers. The material research was also an important matter because it is about understanding and being in control of the total production process; in the broader sense, being in control of how you design, fabricate, present and rationalize a project. Regardless of his scale of practice, a number of significant projects he designed become larger for project sizes and more complicated. Those projects are the results produced from research and accumulation of design experiences through researching and experimenting has become design knowledge that identifies only George Yu Architects.

### **3.2.2 LWPAC**

Lang Wilson Practice in Architecture Culture, in short LWPAC, is a multidisciplinary design firm based in Vancouver. LWPAC is young and very collaborative working with the clients intensely that the firm pursues innovation. They propose an integrated process for design options and knowledge creation is viewed as the principal means of design intervention.

A wide range of computer-aided design data to produce digital tooling and collect it again, that enables utilization and construction as mentioned above tooling itself is research into digital. The research in the process of being formed in a form of a prototype produced steadily new forms can be created. The Rapid Prototyping - the use of digital technology in the virtual space, the design of complex shapes feasible step further through the low budget production, digital production techniques refers to the way - ahead to create the prototype allows complex shapes formed by the existing conventional method is much shorter than the time in the experiment and the number of design alternatives is capable of producing strong advantages. Furthermore, where you create and control digital virtual reality space of the existing practical way to invest more than a short period of time can make the result can be found in the benefits. Identify structural defects in addition to Work Process Solutions to your problems because you can present a security in advance so that the data collected did not recognized during the presentation of the problems and find solutions to the big role. Vancouver architect Oliver Lang is operating in the construction process, rapid prototyping is actually actively used.

“The scenario exercises utilized in earlier projects have become extremely important in helping us test the building and its ability to adapt. We got the job, in fact, because of our approach to phasing and time based design with scenarios... Platform design and rapid prototyping have been invaluable in developing this aspect of the project. All the research and intelligence generation that we have been developing over the last several years is now paying off and indeed has made it possible for a small, Vancouver-based office like ours to take on such immense and complex projects as these in China.”<sup>26</sup>

He suggests several alternative prototypes through scenario planning approach that can be applied to the mentioned Speaks simply looking for an answer to a given problem solving rather unexpected result, Intelligence needs created by using the results to make out. Scenario planning as implied writes the story in the form of one arbitrarily subject can be developed in a number of forms and is also available as needed for mass production.

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<sup>26</sup> Michael Speaks, “Design Intelligence: Part 6: George LWPAC, Concept and Interview,” A + U: Architecture and Urbanism no.1 (392), January 2003, p.126

### 3.2.3 Shop

#### 1. Dunescape



[Figure 15] Dunescape, 2001 (Shop: Out of Practice, 2012)

Dunescape in New York was an urban beach installation, winner of the first MoMA/P.S.1<sup>27</sup> Young Architects competition in the year of 2000. Shop's design approach on Dunescape was manipulating the idea of promenade by blurring the distinction between art and the viewing public for a summer courtyard installation. This winning design provided a space to lounge, socialize, sunbathe, wade in pools, or to be cooled by a spray of mist as walking through. The heightened parts of the structure provided shade and functioned as seating areas as they were closer to the ground. The installation was configured as a landscape in

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<sup>27</sup> "MoMA PS1," Accessed on 24 November 2013, < <http://momaps1.org/yap/> >

The Museum of Modern Art and MoMA/P.S.1 present the MoMA PS1 Young Architects Program, in short YAP which is an annual series of competitions. This competition offers emerging architects the opportunity to build projects conceived for MoMA PS1's facility in Long Island City, Queens. In 2011, MoMA and MoMA PS1 partnered with an institution of MAXXI in Rome. The objective of the competition is to provide visitors with an outdoor recreational area for the summer—a much-needed refuge in an urban environment—making the best use of the pre-existing space and available materials.

which structure, program and enclosure were collapsed into a singular form articulated by triangulated frames of two by two inch cedar sticks. Every piece of structure has the different angle, depth and locus of triangulation changes in surface and use. Typical architectural drawing methods could not analyze or convey this complex geometry for construction purposes; instead, full scale color coded templates from the digital model were exported to realize it. The frames were cut and assembled directly on the template sheet and then joined with wood screws to the ever-growing structure. The templates and materials arrived on the site each day as required. This simple system allowed us to build the project on a low budget, with relatively unskilled labor, in a short time.

A good example of this merging and perceptual elevation is Dunescape, the project that on MoMA/P.S.1's Young Architects Program the year before Massie's Playa Urbana/Urban Beach. Designed and built by Shop Architects, Dunescape is an architecturalized landscape built completely as a series of parallel, stacked dimensional lumber. While manual labor was required to cut, assemble, and fasten the pieces in the actual construction, the methodology was completely digitally driven. First, the digital model was sectioned at intervals that were established by the given material thickness. The resulting section drawings were then plotted at full scale and used as templates on which to lay out and position each wood piece. Not insignificantly, Shop used this very same technique to make a scaled model in the digital file submitted for the competition presentation – a convincing testament to this particular technique's fluidity, scalability, and credibility.

### 3.2.4 FOA

#### 1. Yokohama International Port Terminal



[Figure 16] Yokohama International Port Terminal, 1996 – 2002  
(Phylogenesis: foa's ark, 2004)

Foreign Office Architects, FOA in short, won the competition for the new Yokohama International Port Terminal in 1995. The idea of this project was driven by typologies. This project was realized by a close collaboration between architects, engineers, contractors and client. The proposal for the new terminal will be a mediating device between the system of public spaces of Yokohama and the management of the cruise passenger flow. The components are used as a device of reciprocal de-territorialization: a public space that wraps around the terminal, and a

functional structure, which becomes an a-typological public space, a landscape with no instructions for occupation.

Using the ground surface to create a complementary public space to Yamashita Park, our proposal will result in the first perpendicular penetration of the urban space within Yokohama Bay. The ground of the city will be seamlessly connected to the boarding level, and from there it will bifurcate to produce a multiplicity of urban events.

The terminal's column-free structural system consists of essentially two parts: folded steel plates for transverse loads and steel girders for longitudinal loads and support of the cantilevers. The transverse component was initially designed as two flat plates sandwiching steel webbing, but as the project developed, the bottom plate was eliminated and the webbing replaced with triangulated folds of sheet steel. The entire transverse system evolved from a composite resembling corrugated cardboard to an assemblage more akin to origami. The girders are basically large scale folds. Trough-shaped and hollow in cross section, these members house a network of ramps. But achieving the necessary combination of structure and function was no easy feat. Given this geometric complexity, the architects designed the building with computer generated local vector systems. But the move from design to construction introduced other complications.

Folding in the construction of theoretical concepts and design techniques by creating aka making fold or wrinkle that do not result in a loss of the intrinsic characteristics within the new area or have a new space makes convincing . In this context, a new area or a new area of the deconstruction unlike those elements

relative to all the elements and at the same time recognizing the characteristics of these boundary area or space created by the disappearance means. For example, the exterior and interior of the building is blurring the boundary between the fluid and the flow of the program of the basic elements of the floor space, walls, columns and other structural boundaries are disappearing.

Lisa Iwamoto Folding another representative of the above claims FOA project as an example of the Yokohama International Passenger Terminal is backed into credible. As with Eyebeam Project Yokohama International Passenger Terminal Building envelope and by folding the two-dimensional space is translated into a three-dimensional surface and the structure itself is translated into a three-dimensional space can be shown the potential to be good. In other words, each space constituting a program of one of the building envelope by being essentially its boundary and disappear as well as fulfilling the role of the structure below that can be seen through. In particular, each iteration is a section that has a different shape. This has been studied by using the digital tools digital been produced by applying a production method to configure a three-dimensional real space is deliverable.

Folding is; therefore, created in the building as a new result, computer-assisted design techniques. Digital experiments have been built through the end of yet another architectural language that is not even an exaggeration. Based on this, many architects and scholars digital architecture was awash with a new architectural paradigm, the current design methodologies are not common to take advantage of digital techniques to approach the building has been changed radically, building area of this design to a variety of directions presented.

### 3.3 Chapter Conclusion

Using Design Intelligence of Michael Speaks, the two most significant design process methods of architecture discovered and exploited further by those firms mentioned in chapter three are rapid prototyping and scenario planning. These two forms of action formulate a hypothesis that something might be true rather than something is true based on a new intellectual framework of Intelligence. This new attitude stimulates architectural design process and brings a wide range of design opportunities in architectural study and practice.

The main interest in the circular process of ‘thinking as doing’ is not about finding an essence of truths or uncovering repressed truths but about looking for something that might be true. Such process outputs production of the plausible opportunities and these opportunities become the various forms of knowledge or design intelligence. The relationship between thinking and doing is not hierarchical in which thinking is doing and doing is thinking. This circular process promotes direct feedback on each other and a transformation of feedback becomes design knowledge.

The technical limits that had not even been far reached by the architects who are not in favor of computation start to produce new inputs to design. It is not because these limits are greater than architect’s capabilities of designing but because the limits are not found in the traditional way of design process. Ironically enough, they have started to come to the surface since the architects actually deployed the

digital techniques in their design process.

The abstract forms of truth justified by philosophy, theory or even science is not so much concerned. Today, new design knowledge is more concerned with 'getting things done' – with action such as researching, doing and prototyping. These forms of action produce plausible truths during the design process and the plausible truths offer a way to test thinking, ideas or concepts by doing, by making them.

## **Chapter 4. The Meaning of Design Intelligence in Architecture**

### **4.1. Limit on Design Intelligence as a New Architectural Paradigm**

#### **4.1.1 Absence of Design Methods for Space Making**

Design Intelligence of Michael Speaks is various forms of design knowledge produced by thinking as doing and this is a new intellectual paradigm of architecture produces plausible opportunities. The two significant methods supporting this argument are rapid prototyping and scenario planning. Approaching to design innovation as well as to new design values, they are the most adequate methods to conduct architectural design process. Their capabilities are limitless in terms of producing new architectural design of shapes, forms and structures. And a meaning of final design is meaningless because they produces iterations of prototypes as final designs. They do not necessarily favor in finding one solution to the problem given. Rather, they search for design opportunities by making problems, not by solving the problems. Therefore, Design Intelligence is quite convincing to become an intellectual framework encouraging a thinking as doing process towards newly emerging architecture which is digitally driven. However, what it lacks is

design methods for space making. For example, if we consider modern or postmodern architecture, especially ones that are realized, they have a solid to void relationship, doors, windows and walls, columns, program layouts differentiating private and public and so on. They are both tangible and intangible architectural elements to consider actually to design and to build spaces of architecture. The design process methods constantly highlighted by Michael Speaks in Design Intelligence do not specifically contain such elements for space making or the ways to articulate them during architectural design process. Therefore, it has a limit to produce new space, which is a next challenge to overcome to become a new paradigm shaping architectural design and practice.

## **4.2. Extended Meaning on Architectural Design Process**

### **4.2.1 Prototypes as Final Designs**

Using Design Intelligence of Michael Speaks, the two most significant design process methods of architecture discovered and exploited further by those firms mentioned in chapter three are rapid prototyping and scenario planning. These two forms of action formulate a hypothesis that something might be true rather than something is true based on a new intellectual framework of Intelligence. This new attitude stimulates architectural design process and brings a wide range of design

opportunities in architectural study and practice.

If we compare rapid prototyping and scenario planning to the conventional design process methods of physical model making and concept design, rapid prototyping and scenario planning are much more to accelerate researching, thinking and making with the use of computers which maximizes their effect to lead a process to produce design opportunities, but not necessarily favoring in finding a final design solution.

Accepting the advantages of generative design processes driven by digital techniques, ideas are quickly tested by actually making simulations, mockups and prototypes – finding right problems to come up with not only right solutions but better solutions – and those tested prototypes become feedback into themselves. The feedback, then, accumulates a load of information and an accumulation of information for years directly outputs design knowledge. Design knowledge becomes a design itself creating another layer of design opportunities. Such process is iterative but the outcome of a process is never the same. After all, making is not a next task to do for the architects and the designers after their thinking process on what to articulate and how to realize articulation is done. Any form of making such as prototyping, modeling and simulating, is not just a part of the process but it is actually the essence of the whole process stimulating an innovation which is never expected, planned on purpose or a solution to the problem given in advance.

Prototypes do not change the fundamental definition of what a final design means or overcome the inevitable obsession with the produce of final designs. What they bring though to the market and to the consumers are much more options to

choose. Typically, the prototypes are considered to be made as study models or mockups to test and then to construct to answer questions about the following:

<b>speed</b>	<b>reliability</b>	<b>manufacturability</b>	<b>training</b>
<b>cost</b>	<b>appearance</b>	<b>feasibility</b>	<b>usability</b>
<b>user interface</b>	<b>functionality</b>	<b>maintenance</b>	<b>new materials</b>

[Table 6] The Questionary Criteria for Prototypes  
(Serious Play, 2007)

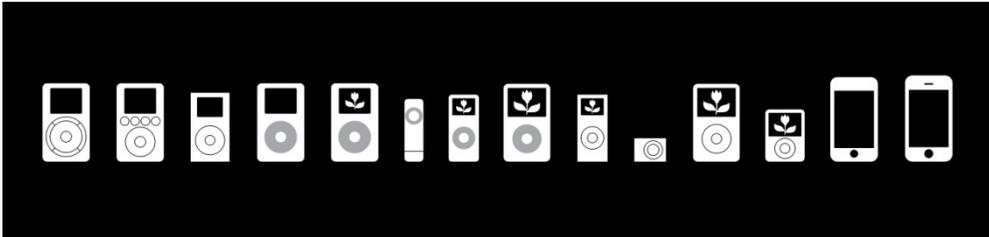
According to Michael Schrage in *Serious Play*, prototypes can do more than answer questions that they can also raise questions that had never been asked before. Playing with a prototype can stimulate innovative questions as surely as it can suggest innovative answers. The best and most powerful models are provocative, and the unexpected questions that a model raises are sometimes far more important than the explicit questions it was designed to answer.<sup>28</sup>

Apple, for instance, launches new products with an idea of generation. We have witnessed the first, second and third generations of new products constantly released to the market, keeping pace with the social and cultural changes at a rapid speed in the global market. A new product is seemingly the final design each time when it is out to the market. As a matter of fact, each of the final products is a prototypical design which is more than qualified to be released to the consumers as a final product to sell. The fundamental definition of a final design and its

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<sup>28</sup> Michael Schrage, *Serious Play: How the World's Best Companies Simulate to Innovate*, Boston: Harvard Business School Press, 2000, 77.

significance may still be the same but the typical nature of prototypes in design culture and the way to reach final designs have been surely transforming.



[Figure 17] The Evolution of Prototypical Products Designed by Apple

The deployment of prototypes in reality has succeeded to attract the market whether satisfied or dissatisfied. Apple, in turn, has been able to collect extensive data, information and feedback directly from the product users, and those collected knowledge are again applied when designing a next generation of new products. Such form of interactive action leads to meet the consumer's demands better, to create social as well as cultural values.

Architecture is neither as trendy as nor as light as commercial oriented products are. However, what can be adapted from them is the fact that making is a key to generate design processes. Making itself is research, interactive communication and design knowledge. In this aspect, a process is a design.

As strongly stressed by Design Intelligence of Michael Speaks, by the experimental architects and designers, making is the future of design research to reach innovation which blurs a clear distinction between a prototype and a final product. After all, design is not a final product or a final object. It is a creative process that is a powerful engine to achieve innovation especially when we are approaching to the

design of the world, not the world of design. The meaning of process in this perspective is somewhat extended. This creative process is also applicable not only to industrial design but also to architecture. It can change neither the role of final design nor its definition but it can for sure engender unlimited design possibilities. Therefore, prototyping is worthwhile to continuously pursue during architectural design processes.

#### **4.2.2 From Problem Solving to Problem Seeking**

Accepting the parameters of a problem given, mostly one of the main purposes during architectural design process is to reach a solution to the problem, a final design in result. This final design we used to refer to has been challenged because the design culture of However, the meaning of a final design has been somewhat expanded because of digital media and newly emerging technologies, especially challenging the conventional way of architectural design process and final production. In addition, a demand on new design values rather than new designs of shapes, forms, structures and materials is increasingly growing. Economy, social and cultural trends are the primary concerns. Architecture is no longer reliant on grand ideas or concepts of which are given by theory in advance as for theory has reached its limit and it is not fast enough to keep pace with digital tooling for thinking as doing. when there is absence of theory according to Michael Speaks' argument, but it seeks opportunities for innovation to bring new design values rather

than new designs. These new opportunities are brought by finding right problems that cannot be predicted within the parameters of the problem given. In other words, problem solving works within a given paradigm to create new solutions to known problems; on the other hand, innovation risks working with the existent but unknown in order to discover opportunities for design solutions that cannot be predicted in advance.<sup>29</sup>

The abstract forms of truth justified by philosophy, theory or even science is not so much concerned in this aspect. Today, new design knowledge is more concerned with ‘getting things done’ – with action such as researching, doing and prototyping. These forms of action produce plausible truths during the design process and the plausible truths offer a way to quickly test thinking, ideas or concepts by doing, by making them. Thus, process is design and it also works vice versa.

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<sup>29</sup> Peter Drucker, *Innovation and Entrepreneurship*, New York: Harper Business, 1985, (As cited in Michael Speaks, 2007).

## Chapter 5. Conclusion

More recently, a significant shift in the field of architecture both academically and practically has been detected. Based on Michael Speaks, it is engendered largely due to two reasons that a world increasingly dominated by technological change and global marketization. If these two phenomena are what architects are confronting in architectural practice now, it is then necessary not to just put them aside of the table but to question how new technologies specifically have impacted on architectural design and where architecture should be actually going. The adoption of new digital techniques and its application to designing have started to shape a culture of architecture especially challenging the traditional way of design process. It is a moveaway from an architecture designed based on pure ideas or visual concerns towards an architecture justified by its performance, but rather an approach to an architecture designed with the secondary concerns such as structural, constructional, economic, environmental and other parameters that are now considered as the primary producing positive inputs within design process until the final. Architecture is seemingly no longer preoccupied with style and physical appearance in such aspect which has triggered the rise of a new intellectual framework. Moreover, the abstract forms of truth justified by philosophy, theory or even science are not so much concerned anymore in this aspect. Today, new design knowledge is more concerned with 'getting things done' – with action such as researching, doing and prototyping. These forms of action produce plausible truths

during the design process and the plausible truths offer a way to quickly test thinking, ideas or concepts by doing, by making them. Thus, process is design and it also works vice versa.

Design Intelligence is various forms of design knowledge produced by thinking as doing and this is a new intellectual paradigm of architecture produces plausible opportunities. The two significant methods supporting this argument are rapid prototyping and scenario planning. Approaching to design innovation as well as to new design values, they are the most adequate methods to conduct architectural design process. Their capabilities are limitless in terms of producing new architectural design of shapes, forms and structures. A meaning of final design is meaningless because they produce iterations of prototypes as final designs. They do not necessarily favor in finding one solution to the problem given. Rather, they search for design opportunities by making problems, not by solving the problems. Therefore, Design Intelligence is quite convincing to become an intellectual framework towards newly emerging architecture of which is digitally driven.

## Bibliography

1. Jeff Hawkins and Sandra Blakeslee, *On Intelligence: How a New Understanding of the Brain Will Lead to the Creation of Truly Intelligent Machines*, New York: St. Martin's Press, 2004.
2. Michael Schrage, *Serious Play: How the World's Best Companies Simulate to Innovate*, Boston: Harvard Business School Press, 2000.
3. Michael Speaks, "Intelligence after Theory," in *Network Practices: New Strategies in Architecture and Design*, edited by Anthony Burke, Therese Tierney, New York: Princeton Architectural Press, 2007, 212-217.
4. Peter Zellner, *Hybrid Space: New Forms in Digital Architecture*, New York: Rizzoli International Publications, 1999.
5. Lisa Iwamoto, *Digital Fabrications: Architectural and Material Techniques*, New York: Princeton Architectural Press, 2009.
6. Foreign Office Architects, *Phylogenesis: foa's ark*, Barcelona: Actar, 2004.
7. Shop Architects, *Shop: Out of Practice, USA: The Monacelli*, 2012.
8. Ben van Berkel and Caroline Bos, *UN Studio: Design Models Architecture Urbanism Infrastructure*, London: Thames & Hudson Ltd, 2007.
9. Jaime Salazar et al., *Verb processing: Architecture Boogazine*, Barcelona: Actar, 2001.
10. Naomi Pollock, "Yokohama Port Terminal," *Architecture Record*, November 2002.

11. Michael Bordenaro, "Designers Get More Information Earlier and Faster via Affordable Rapid-Prototyping Tools," *Architecture Record*, June 2005.
12. Michael Speaks, "After Theory," *Architecture Record*, June 2005.
13. Michael Speaks, "Design Intelligence and the New Economy," *Architectural Record*, January 2002.
14. *Versioning: Evolutionary Techniques in Architecture*, Published in Great Britain in 2002 by Wiley-Academy, Vol 72 No 5 Sept/Oct 2002
15. *Archilab's Earth Buildings: Radical Experiments in Land Architecture*, edited by Marie-Ange Brayer, Beatrice Simonot, London: Thames & Hudson, 2003, 164,168,172,173.
16. Michael Speaks, "Design Intelligence: Part 2: George Yu Architects, Concept and Interview," *A + U: Architecture and Urbanism* no.1 (388), January 2003, 151-155.
17. FOA, "Complexity and Diversity: a Conversation with Farshid Moussavi & Alejandro Zaera," *El Croquis* 115/116[I], 2004.
18. "ROBUSTNESS," International Concrete Design Competition for Students 2003/2004, Accessed on 14 November 2013, <[http://www.concretedesigncompetition.com/CDC1\\_downloads/CDC1\\_Book\\_on\\_ROBUSTNESS.pdf/](http://www.concretedesigncompetition.com/CDC1_downloads/CDC1_Book_on_ROBUSTNESS.pdf/)>
19. Michael Speaks, "No Hope, No Fear", *Architectural Research Quarterly* (2003): 209, Accessed 16 November 2013, doi: 10. 1017/S1359135503001714.
20. "BIG: Bjarke Ingels Group," Accessed 23 November 2013, < <http://www.big.dk/#projects>>

21. Michael Speaks, "Design: Intelligence vs. Ideology," 03 February 2012, Online video clip, The University of Hong Kong, Accessed on 14 November 2013, <<http://fac.arch.hku.hk/event/michael-speaks-design-intelligence-vs-ideology/>>
22. Michael Speaks, "Two Stories for the Avant-garde," Accessed on 16 November 2013, <<http://www.archilab.org/public/2000/catalog/speaksen.htm>>
23. "MoMA PS1," Accessed on 24 November 2013, < <http://momaps1.org/yap/> >

국 문 초 록

# 마이클 스피크스의 디자인 인텔리전스를 이용한 건축 설계 전개 방법에 대한 연구

-디지털 기법을 통해 전개된 건축 디자인을 중심으로-

지도교수      최 두 남  
서울대학교 대학원 건축학과      이 혜 립

현재 새롭게 등장하는 디지털 기법들은 실험을 통해 건축 디자인 방법을 근본적으로 바꾸고 이러한 디자인 영역을 구축하는 다양한 방향을 제시하고 있다. 새로운 기술의 유동적 잠재력을 디자인 과정에 적극적으로 이용하여 디자인을 진화시키고, 건축적 발명과 혁신을 통해 새로운 건축적 패러다임을 구축하려는 활발한 움직임이 포착되고 있다. 이러한 접근은 마이클 스피크스(Michael Speaks)가 주장하는 디자인 인텔리전스(Design Intelligence)로 정의 할 수 있다. 본 연구는 디지털 혁신으로 인하여 급속히 변화하고 있는 건축 디자인 프로세스 방법과 모형 제작 기법을 마이클 스피크스의 디자인 인텔리전스를 통해 구체적으로 관찰하고자 한다.

1990년대 후반부터 본격적으로 나타난 디지털 건축은 그 동안 볼 수 없었던 새로운 구조 그리고 복잡한 형태와 모양을 띠는 양상을 보이는데 이는 해체주의 이후에 나타난 새로운 건축에 대한 갈망, 형식적, 공간적, 재료적으로 감지하는 디지털 미디어의 발전과 디지털 기술의 확장으로 구현해낸 결과물로 분석된다. 특히, 현 디지털 건축은 디지털 제작(Digital Fabrication)기법을 활용하여 디지털 공간에서 머물고 있었던 3차원적 가상모델에서 물리적 인공물로 제작 가능하다. 이러한 건축적 발명과 혁신은 건축 디자인에 있어 분명하게 구분 지었던 디자인 영역과 시공영역 사이를 모호하게 만들었다. 즉, 건축가가 디자인과 시공과정을 자유롭게 넘나들 수 있는 가능성을 의미한다. 컴퓨터는 더 이상 설계 도면을 그리고 이 것을 바탕으로 디지털 공간에서 3차원적 모형을 제작하는 단순 도구가 아니라, 실질적으로 물리적인 공간을 만들어 낼 수 있는 그 이상이다. 이러한 건축 디자인 혁신과 활동의 적용범위가 프랭크 게리(Frank Gehry)와 같은 건축 대가와 실험정신으로 무장한 아방가르드(Avant-Garde) 건축 디자이너 끈임 없는 실험으로 늘어나고 있음에 따라 실질적으로 건축 디자인 프로세스에 적용 가능한 방법을 구축하는 새로운 패러다임이 필요하다. 그러므로 본 연구는 마이클 스펙스의 디자인 인텔리전스를 이용한 건축 사례를 디자인 프로세스를 중심으로 분석하고 이것이 새로운 건축적 패러다임으로서 앞으로의 가능성을 검토하고자 한다.

디지털 건축이 본격적으로 출현하면서부터 포스트모던 건축의 중심 틀 이었던 건축적 이론은 더 이상 사회적, 경제적, 지적인 측면에서 보았을 때 한계에 다다랐음을 파악 할 수 있다. 해체

주의 이후 건축적 대안으로 등장한 그레그 린(Greg Lynn)의 폴딩 건축(Folding in Architecture)을 살펴보면 컴퓨터를 이용한 3차원적인 디지털 조작(Digital Tooling)의 시작을 알렸고, 또 다른 디자인 방법론이 구축될 수 있는 기반을 마련하였다. 그러나 이 건축 디자인 방법은 질 들뢰즈(Gilles Deleuze)의 주름(Fold)이라는 철학적 이론의 틀에 여전히 국한되어있었고 빠른 속도로 발전하고 있는 디지털 기술과 디지털 기법을 이용하여 새로운 건축을 지향하는 건축가들의 지적인 공허함을 채우기에는 역 부족 이었다. 현재 빠른 속도로 변화하고 있는 건축 디자인 방법으로 인해, 지금 그 어느 때보다 혁신적인 패러다임 구축이 요구되고 있다. 현 시대의 건축이 단순히 디지털 조작으로 구현된 디지털 건축 극복하고, 더 나아가 영향력 있는 새로운 건축으로 거듭나기 위해서 마이클 스피크스(Michael Speaks)는 인텔리전스(Intelligence)라는 개념을 이용한다. 이 것은 건축적 이론이나 사상으로 인해 생성되는 것이 아니라, 잠재되어 있는 지식, 정보, 생각과 만들기를 바탕으로 한다. 즉, 새로움을 지향하는 현 시대의 건축은 더 이상 대단한 이론으로 운영되는 것이 아니라 필요에 의한 혁신과 지금까지 공식화되지 않았던 문제들의 해결방안을 모색하고 제시함으로써, 인텔리전스만이 기존의 한계를 극복할 수 있는 새로운 대안이라는 의미를 시사한다. 또한, 인텔리저스는 건축의 존재성에 대한 이유를 찾아 공간화 시키기 보다는 어떻게 필요에 의한 공간을 현실화 시키는가에 대해 건축 디자인 프로세스 방법을 구축하는데 무게를 두고 전략적이면서 실질적인 방법을 찾아내야 한다는 필요성을 함축한다.

현 건축은 디지털 혁신으로 건축디자인영역을 비롯한 시공 영역을 포함하여 큰 전환점을 맞이하고 있다. 본 연구는 컴퓨터를 이용한 단순한 디지털 건축을 넘어서, 마이클 스피크스가 말하는 디자인 인텔리전스를 이용한 건축사례를 디자인 프로세스 중심으로 분석하고, 이것이 새로운 건축적 패러다임으로서 앞으로의 가능성을 검토하였다. 그 결과 건축 연구나 실무는 분명 더 이상 기존에 보편적으로 사용된 디자인 프로세스 방식으로 운영되는 것이 아니라, 필요에 의한 혁신, 그리고 지금까지 공식적으로 거론 될 수 없었던 문제에 대한 해결 대안을 제안 함으로 그가 앞서 강조한 인텔리전스 - 즉, 리서치 컴퓨터를 활용한 수단을 넘어서는 디지털 조작, 이것에 합당한 디지털 제작방식 그리고 시나리오 플래닝 등은 더욱더 신빙성을 얻는다. 그러므로 건축에 있어서 혁신을 일으키기 위해서는 기존에 익숙한 이론이나 방법론에 안주하는 것이 아니라 새로운 무엇을 창출하기 위해 디자인 인텔리전스를 적극 이용할 필요가 있다고 생각된다.

**Keywords:** Design Intelligence, Intellectual Framework, Knowledge, Thinking, Doing, Prototyping, Scenario Planning, Design Process Methods

**Student ID Number:** 2012 - 20563

