FROM INSTRUMENT TO INTERFACE

The change of the relationship between the designer and the media of Architectural design

CHUANFEI YU
School of Architecture, Southeast University
Si Pai Lou 2. Nanjing. China (210096)
Email address: yuchuanfei@seu.edu.cn

Abstract. Different from the traditional tools for architectural design, the new design media provides higher efficiency and quality by use of a set of digital techniques. The more important is that the relationship between the designer and the design media has been changed. The changes described here mainly lies in two aspects: firstly, compared with the traditional drawing tools which can only be used as a “pure” instrument with single direction response, the integrated digital design media provides an interface which generates great interaction between designer and the tools; secondly, through the interface with a broader sense, the digital media can join a design process itself by linking the architects with other designers, or even the whole AEC industry, through the ways like collaborative design and/or Internet Aided Design, which the traditional media never could accomplish. Thus with the changes from instrument to interface, the thinking mode and the process of architectural design currently are quite different from the traditional one. And the relationship between architects and relative professions like engineering and construction has also been enhanced through the system based on BIM1 or CIBS2. In addition, the cause and outcome of such a change should also be emphasized in the architectural education.

1. Characters of the traditional tools as an instrument

The media for architectural design has been changed with the development of the relative technologies in different phases of the society. In lots of lectures, they have been described mainly in four types: professional term system (language media), drawing system (paper media), physical models, and the latest integrated digital media. The first three types have been used for over hundreds of years, and still are working in most of our working processes. Here we generalize them as “traditional tools”3 for architectural

1 BIM, Building Information Modeling.
2 CIBS, Computer Integrated Building System.
3 The earlier CAD (Computer Aided Drawing, not Computer Aided Design) can also be placed into “traditional tools” here, because it was only an extend of a kind of drawing instrument; while the series of the latest computer systems which based on BIM and relative net-based software and hardware, are much more close to the “integrated digital media” here.
design, and try to compare them with the digital media used in the process of architectural design. Based on this comparison, with the analysis on the change from traditional design tools to digital media, the change of the relationship between the designer and the different kinds of the design media will be discussed.

Before the drawing system started working in the architectural design, the main professional information for architecture was transmitted among the craftsmen who constructed buildings mainly with language media. And because of the limitation of the oral way, such information in language media had always been condensed in a set of professional terms, like Orders of the Columns in western world, while called “Dou Kou” in the system of Chinese archaic building.

This kind of media had been popular in the field of building for thousands of years, till the drawing system replaced it. And the drawing system can convey the more complicated information directly, visually, and accurately. From initial sketch to final working drawing, architects can use the professional visual graph with plan, elevation, section, and perspective etc. to generate, refine, and illustrate the plan for a building.

Have to admit that the process of the architectural design with drawing system had been generally separated into two phases: the freehand draft, and the drawing with tools like rulers.

Figure 1. Design sketch for a Science and Technology Museum. (Source: Drawn by the writer, 1998.)

Usually, in the first phase, the designers use paper and pencil to develop their idea in a holistic way, drawing freely to have a “design conversation” with the design object, and of course, the designers themselves. (Figure 1.)
This part of the design action also has been considered as “graphic thinking”, a communication process. (Laseau, 1989)

As for the second phase here, in a sense, the drawing with ruler just reflects directly what the architect want to express, while the media itself does not join the design during the process. Such a phase always was considered as just a process of representing the result of a design. The representation of the design idea and the illustration of the design plan, unfortunately, had always been “frozen” in the process of drawing which occurs with pen and ruler, or even with computer aided drawing system. The drawing for a plan, an elevation, a section, or even a perspective rendering, just like snapped photos, only catch one of the side shows for a building.

The situation became much more serious with the popularity of Computer Aided Drawing. Because of the principle of computer system and its characters, the images on monitor screen are naturally accurate, and difficult to contain any unset information. Exactly like its ancestor from paper, the lines are just lines. Although they represent the professional information such as walls, windows, and so on, each element in the drawing is independent, and the relationship between them still needs professionals to unscramble and recombine in their mind.

Once the accurate and clear architectural drawing replaced the multivocal concept sketch, once the separated working drawing replaced the holistic graphic thinking, the interaction between an architect and the design media was cut down, then the only thing left was a single direction response: from the designer to the design object. Traditional drawing tools have become a kind of “pure” illustrating instrument.

2. Interface between architects and the digital design media

Compared with the traditional drawing tools we mentioned here, the latest integrated digital media in architectural design creates an interface between the architects and their plans.

A good interface should allow the user to choose different ways to get what he/she wants. We can even take this point as a criterion to judge whether a design media has the interaction we need or not. The self-discussion with paper and pencil gives an architect unlimited chances to draw what he wants about the design concept in his own way with his own style, while pen and ruler bring all the possibilities into a set of rigid drawings – each time the modification for a plan will take terrible many hours. On the contrary, an integrated digital media keeps the chance to refine the plan of a design at any time in the process, almost without any cost, just like freehand sketch. Meanwhile, it is more accurate than the working drawing by hand.

Of course, it’s not enough for us if the interface brought by the digital media only gives us a working process with higher efficiency and lower cost. The digital media has turned the process of design and drawing into a process of design and communication – a communication between designer and the media he/she used. From conceptual studies, modeling and rendering, to digital hybrid analysis, such a new process integrates almost all the phases of architectural design. (Uddin, 1999)
Different from the earlier drawing tools which are only the replacement of paper and ruler, some applications like 3DS VIZ® (Autodesk Inc.) and SketchUP® (@last software) are working in a familiar way for architects. Although they are not going to replace paper and pencil in architects’ hand completely, at least they can help the designers to create almost any form they image easily in cyber-space, especially to create those that are difficult to be generated with traditional physical models. The interface from this kind of digital media extends the border limited by the traditional drawing tools which mainly prefer the Euclid geometry.

Furthermore, the software system such as Microstation TriFroma ® (Bentley System), ArchiCAD® (Graph-soft, Inc.) and Autodesk Revit ® (Autodesk, Inc.) which are based on a platform like BIM can provide an interface where architects no longer need to draw a line to represent a wall. The technologies including object-oriented and so on make it possible to generate the object itself in such a system – a wall does be a wall, a window does be a window. And each component has not only the geometric information but also the information related to the realistic properties such as type, material, etc. (Novitski, 1999) Such kind of information will be able to build up an all-around database for a building in design process, which can be shared by not only the architects themselves, but also the relative professionals from almost all aspects of construction.

3. Interface among the different designers and the different aspects of AEC industry

According to the reference from Compute Integrated Manufacturing System (CIMS) in manufacturing, the integrated digital media for architects also can provide an interface among the different designers and the different aspects of Architecture, Engineering and Construction (AEC) industry.

A mass of the architectural information in traditional working drawing needs different professionals to read and redraw most parts of the drawing and deal with the information severally for their own professional purposes. The work of the repeating and recreating had split the process of design and construction into several “single information islands”. While with the help of integrated digital media like CIMS, such a situation has already been changed in the field of manufacturing. So can the field of architecture.

For the same reason, Computer Integrated Construction System (CICS) has been brought into use by some of the design studios and construction companies. Although integrating the whole industry into one system still needs lots of works, the concept about Computer Integrated Building System (CIBS) has been introduced by many researchers. (Youguo Qin, 2003) Besides to build up an interface which can provide a solution for the construction, CIBS contains Computer Integrated Building Information System (CIBIS), Computer Integrated Building Administration System (CIBAS), etc. (Figure 2.) CIBIS is a concept like BIM, which should be a core or platform for the other systems. The main purpose of using CIBS is to create an interface which will be used by different professionals in different phases of the design, construction, and even the administration of a building (like CAFM). And with the help of internet (intranet) services and the
relative application service providers (ASPs), architects will be able to bring
design collaboration into a full circle. (Laiserin, 2001)

It is well known that Frank Gary and other architects have already linked
the design and the construction with digital system like CATIA. Despite that
the generating of his plan was still based on his sketch and the physical
model, without question, the realization of the building could not leave the
interface of the digital media. As for the design plan which is totally evolved
in digital media, especially like the work of Peter Eisenman, Greg Lynn, and
many other pioneers, the role that the digital interface played was quite
different from Frank Gary’s. The integrated digital media’s effect on Gary’s
work is just an approach to realize the form drawn by the designer; while on
Eisenman, the concept and the form mainly come from the interaction
between architects and the digital media.

4. Impact of the change on the design mode and the architectural
education

With the change of the relationship between architects and design media, the
design mode in architecture has also been changed. And as an expected
result, the impact on the architectural education is hard to be ignored.
Unlike the linear sequence of the design process with traditional drawing tools, a new design mode which develops in parallel ways is possible. As we have known, the digital media enhances the efficiency and the accuracy, while the flexibility in design process has not been reduced like the working drawing does. Also benefit from the interface provided by the integrated digital media, the collaboration between architects and the relative professionals has been changed dramatically as well. The new design interface integrates the lengthways and transverse thinking clues. Architectural design is not drawing (design) plan (and elevation, section, etc.) anymore. Architecture never equaled to the drawing pictures, although the misleading fact that the design was confused with drawing did once exist in some degree. All the design actions will be the interaction between architects and the digital information model for a building, while printed working drawing is just a byproduct from the database like BIM.

In the field of architectural education, lots of new options have been added in the professional contents of teaching and studying. Besides skills on traditional drawing board and models, more and more students are eager to learn and grasp the usage of the latest digital media. The problem, however, is that the less they are asked to control with the traditional drawing tools, the more new kinds and versions of different software they need to handle. They seem willing to (or have to) trade speed for creativity. (Steele, 2001) It’s no doubt that, as time goes by, as the digital interface keeps developing, the unrestricted mind will also be able to dance fluently on computer screen, just like the freehand sketch still keeps its role in design. And the exciting fruition of “paperless design studio” which Columbia University has established does not just mean the disappearance of paper in the architectural design. We’d better try to distinguish the advantages and limitations of the digital media, and use the interface brought by the change adequately.

References


