

State of Affairs - Digital Architectural Design in Europe

A Look into into Education and Practice – Snapshot and Outlook

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Abstract: *This paper updates a research project that tries to take a snapshot on the use of computers in the average architectural firms in two European countries. Our main interest is to see whether the digital design methods are starting to have an impact in these offices. First results of this research using an online web questionnaire have been presented at the eCAADe 2007 conference in Frankfurt and have been updated and presented at the Sigradi 2008 conference in Havana. At the moment we are working with additional interviews and we are preparing a rerun of the questionnaire to have an idea about the current developments. This paper is still based mainly on the findings we presented at the Sigradi conference to bring this information to the eCAADe community as well. We will be presenting the results of the new questionnaire in Istanbul.*

Keywords: *Digital design; early stage design.*

Over the centuries, architects have had a changing relationship with the 3D model. In the renaissance the physical model was core to the creative process, to the role of the master craftsman but with developments in artistic representation and depiction, it assumed a different role – that of the explanatory rather than exploratory and, as architecture developed as a profession, fine draughting skills were considered the essential design and presentation skill set. Indeed it could be said to have been considered an art form in its own right.

However if we look at 20th century architects, Gaudi worked almost entirely through his famous structural 3-dimensional models, espousing the use of conventionally drawn plans in the development of his designs, Eero Saarinen in the book “*Eero Saarinen on his own work*” describes his own design and visualisation process which looks back to the

renaissance, explaining that the plasticity of the form of the TWA terminal could not have been achieved purely through 2-dimensional methods, using clay to develop the form (Figure 1).

In architectural practice today, the use of computers is the norm rather than the exception, walk into an architect’s office and you will be faced by rows of computer screens rather than drawing boards. Naturally, all the technical drawings are done by computers and most presentations by architects large and small, famous and unknown are computer generated. Additionally, at the peak of our profession, more and more international designs are generated by ever more complex computational methods. Architectural magazines show the results of this kind of architecture and predict that this is the future of our profession. However, out in the “real world” we see a very different reality in the workflow of the

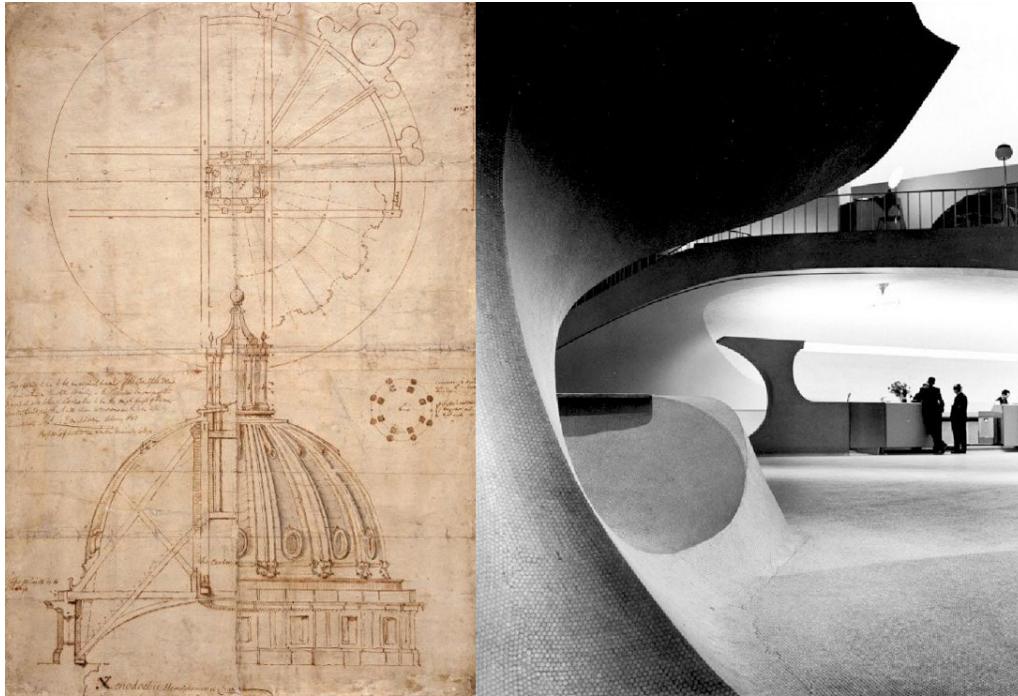


Figure 1
Sir Christopher Wren – design for dome of St Pauls cathedral and Eero Saarinen – TWA terminal

architectural profession. Digital Design Methods are still not used as much as you might imagine in looking at those magazines.

More recent developments in computing such as Generative Components allows designers to develop forms also not possible purely through 2-dimensional techniques. With these new developments, we are seeing a return to the model as design generator, albeit in a more abstract and less remote form. In Generative Components, it could be said that the sketch has been replaced with the symbolic diagram. To the designer using GC, the symbolic model can be as representative or evocative as a conventional sketch (Figure 2).

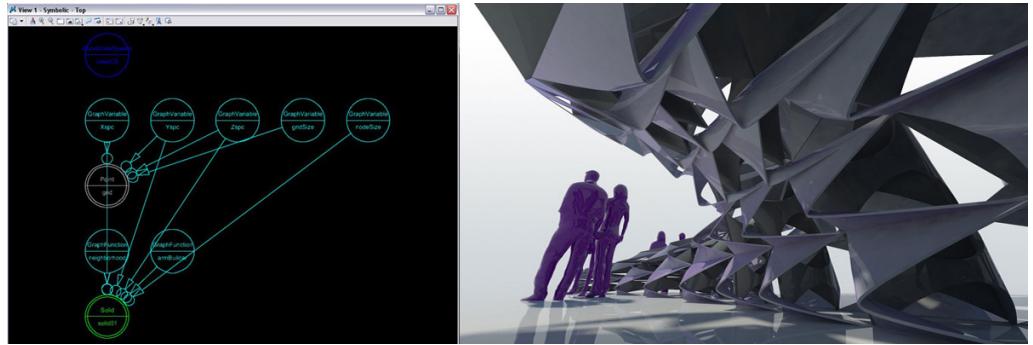
So why do so many architects still use the computer purely as a drafting device? Although most of them agree with the statement that it is possible to use the computer for design, only a minority really

use the computer as their primary design tool in the early design stages.

One of the reasons might be that the way in which we sketch / draw. Design development drawing can be seen as a shorthand in the mental development, a link between eye, hand and brain. Currently, the computer is not as immediate as the pencil, there is a barrier imposed by the interface and the multiplicity of options available. There is still no architectural software available yet that brings the simplicity of the analogue interfaces - pen, paper and cardboard – into the digital world.

Software developers, in the main are still concerned with ever increasing new features and facilities – feature bloat. And new demands like BIM are making the interfaces even more complex. Even a successful “simple” software such as SketchUp which has a deliberately small feature set and an easy to use

Figure 2
Generative Components



interface is becoming more and more feature-laden.

As both architects and teachers, we have for some years been interested in examining the current situation of design in architectural practices where the majority of our graduates will work after qualifying. It is very clear from the rise in demand for the submission of digital information for statutory approvals, even for the smallest of projects which might only use basic CAD draughting, that the digital realm is now mainstream. In fact, it could be said that to design or build without the use of a computer is now almost wholly limited to informal or vernacular architecture. At the other end of the scale, large commercial projects might utilise computers for all stages of the design process from conceptual development through to production information, construction and maintenance.

In the past years new EU-regulations, such as the energy passport even for very small projects increase the need to go not only digital, but to have the project in 3D digital form. So the need to have a proper 3D work flow in the architectural process has become more and more vital. Even long established offices with a very traditional workflow can no longer ignore these facts if they want to stay as viable firms in the market. This is sometimes a problem for the traditional small firms – big firms have the possibility to outsource and diversify to a certain extent.

On the other hand universities have to make sure that our graduates are fit and literate with this

new workflow to provide them with the necessary skills to survive in a very competitive market. The implications of this have influences on how and what we teach and implications for how we balance all the requirements within the limited time available within the syllabus.

To find out more about the reality of the use of computers in design throughout “small town Europe” we have been undertaking two different strands of research over the past four years. The first one is an educational experiment using first year students to find out about the differing qualities of designing with and without the computer. The second strand is a survey on practices in Europe to elicit their views on design and computing. We initially carried out a web based questionnaire and focused on a particular region of Europe. The results of both strands have been presented at previous conferences and gave us good insights into the educational realities for our students and the actuality of life in small architectural firms.

To investigate the situation in practice further and to see how much the situation changed in the two years between the first run of our survey, we are now focussing on the survey of practices to get a more in depth view in this respect. Because of the limited success of our web survey in England – a comparatively small amount of the offices submitted – we have been conducting additional structured interviews with a number of firms in the region and

widened the web survey to a nationwide survey. (In the first run 2007 we had two test regions, the RIBA North West region in England (500 offices) and the area of the "Ingenieurkammer fuer Steiermark und Kärnten" (600 offices) in Austria)

It is worth to re-evaluate the results of the initial survey at which we were quite surprised at some of the results. Several of the comments we received were very critical towards CAAD and expressed a traditional, long established picture of CAD usage. (i.e as a 2D drawing board tool). But looking at the results in more detail reveals significant changes. A substantial amount of offices already claim to use CAAD methods in the design process. (This does throw into question exactly what individuals class as 'design') A high percentage of the answers disagreed quite strongly that CAD is only for production drawings. Additionally already more than a quarter of the offices claimed already in 2007 that they originate their designs in a 3D environment (which was quite surprising because the main tool was still AutoCAD)

It was very clear that CAD systems have been still mainly used in their traditional ways as an electronic drawing board and 2D CAD information was still a major part in the building process.

It appears that the main software package is still AutoCAD even for 3D. Only a minority has been using more intuitive packages. So, the information about more intuitive, design based software is not really getting to users yet. Some of the comments give some indication of the possible reasons. Lack of time for the evaluation of software packages, coupled with the substantial costs of both purchase, training and support involved, are definitely factors that slow down the adoption process.

As has been previously mentioned, these results might be skewed by the small size of the offices in Austria. A very important statement is that the majority disagreed with the statement that it is not possible to design with CAAD. At least in Austria this marked a significant change - a few years ago the majority of architects claimed that it is not possible to design with the computer. It will be very

interesting to see whether these percentages have changed significantly over the past two years

As the number of responses from our initial survey from the UK were so low, we have taken a parallel track and have been interviewing a representative sample of practices, large and small, newly established and older firms. As with the web survey we structured the interviews into different sections between the background of the offices and their design routines. Interviews so far have elicited some interesting there are several interesting statements. It is evident in talking to architects of differing ages and background that the definition of exactly what constitutes 'design' varies greatly. One interviewee considered that the use of the bubble space planning diagram in Architectural Desktop to be the height of CAAD design, whilst for another, only 3D mass modeling with shadows studies would do. It was also becoming evident that the current economic downturn is starting to have a significant effect and that investment in any CAAD system is dramatically slowing.

Some views expressed in the interviews are to be expected and some are not so expected, for example.

- "of course you can design in AutoCAD, what do you think the space planning tool is for?"
- "Mainstream packages are too complex to design fully in, a pencil is simple and yet sophisticated. Computers aren't ... yet."
- "using the computer doesn't change design, drawing on computer is the same as drawing on the board. You sketch on paper, then draw it up ; manually or on computer, its just another tool"
- "Computers cannot design and hopefully they never will"
- "Computers cannot give the feel of pencil on paper"
- "Being able to sketch is what separates a designer from a space planner"
- "Being able to use a CAD package does not make a bad designer a good one, but can make a good one better"

What was evident in talking to practitioners is the new snobbery that is emerging. In the last century, when computers were still in their infancy, we saw architects proclaiming their CAAD skills and job adverts asking for good computers experience. Today, with CAAD skills taken for granted, we have architects proudly talking about their manual drawing skills. This attitude is also prevalent in academia and there is a danger of losing a balanced view.

The results of our research and our experience as teachers and architects leads us to the main question of how we can give recommendations on how to teach design the new generation of architects. In many aspects most of the teaching that is done in our faculties is still strictly divided into teaching design and teaching computer skills. The crucial question for architectural education is the implication of the ubiquity of the computer especially in the field of design.

We still intend to use the survey as a pilot project for a more wide ranging European-wide study. This seems to be quite important because although the ubiquity of the computer in architecture is not in question, most of the architects are still conservative in attitude when compared to other areas of design. Additionally the new rules of the European Union in the building industry will have a big impact. Without the use of BIM (Building Information Modelling) many of those rules cannot be introduced successfully. If architects ignore this fact, other professions will take over to do the job. There is no question that the larger firms in Europe are aware of this fact but there is only little evidence that the small architectural firms are aware of it. The recent shift away from AutoCAD towards Revit (at least in Austria) might indicate the beginning of a change. This is not explicitly documented in our statistical data but a known fact which is expected to become evident in a larger and more widely spread survey.

Currently, the research is limited to two European countries and we want to expand this to give a true European-wide and possibly world-wide picture, so the paper is also a call for interest to develop

this more widely. We hope that our research will help to widen the discussion and bring the topic also on the agenda of the smaller firms.

What we can say is that for the majority of architects, CAD as a tool is essential and all pervasive – one submission stated that working as an architect is unthinkable without CAD, but the reality of daily work in an architectural firm shows that the computer is ubiquitous. 82% of the submissions were from partners or project leaders which makes the 65% who claim to work with a CAD package more than 20 hours a week even more impressive.

Conclusions and way forward

The implications for our teaching are wide ranging. If we consider the results of our earlier academic experiments with the workshops the results of those that worked wholly in one medium or the other were not strong as those who worked both in the digital and analogue realms. This was largely reflected in both the web survey and in the interviews. Practitioners look for and value a balanced and rounded set of skills, one that is grounded in the past yet looks to the future. In the long run, this is the only way to avoid some of the pitfalls and bring the benefits of computers in design to our small architectural firms.

So we have to make sure that our students get the best training in both worlds – the digital and the analogue. There should be no conflict between the design tools – they should be trained sufficiently to work with all the tools available. To be able to decide on the right tool for the right time, they need to have proper information and skills. We hope that our research can help us to sharpen our academic profile in design and to give our graduates the possibilities to become good and successful architects even in these difficult times.

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