

Crisis? What Crisis?

Approaching information space: new dimensions in the field of architecture

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Abstract. *The paper describes the current situation concerning career opportunities in the field of architecture in developed western countries. Several aspects that are almost universal mark this situation. Firstly, there are too many architects chasing traditional work in competition with structural (civil) engineers. This is not surprising in consideration of the fact, that the architectural education industry produces far too many new architects for the economy to absorb. In Germany, the number is almost three times too many. Secondly, the needs of the building industry have changed over the past twenty years so that the skills that architects want to offer are not necessarily those that are sought. Lastly, the constant specialisation of work has continued unabated. Architects, as generalists, have idly watched their areas of expertise be usurped from neighbouring fields like civil and structural engineering*

The reasons for this crisis are manifold. In the schools of architecture, the discussions often deal with form or formal arguments, which, in fact, have little or no relevance to the building industry. This position was tenable so long as the clients were willing to accept formal arguments in order to receive buildings of high quality or current social relevance (i.e. current architectural fashion). With the dual aspects of globalisation and a shift to maintaining building stocks rather than producing new buildings, the tolerance for “architectural” discussions has been reduced even further. Indeed, the monetary pressures overwhelm almost all other aspects, including so-called green issues. What is more, most of the monetary issues are time based. Time represents, perhaps, the largest pressure in any current planning project. The clients expect expedient, accurate and inexpensive solutions. If architects are not able to produce these, the clients will (and do) go elsewhere. The authors argue that there remain serious problems to be solved for architects and the metier in general. Ever cheaper, ever faster and ever encompassing information technologies offer the architectural community a chance to turn recent trends on their head. By using information technologies to their full potential, architects can reassert themselves as the coordinators of building information and processes. Simply put, this means less photorealistic rendering

and more databases, which may be unappealing for those architects who have positioned themselves as “designers” and are able to talk long on form, but short on cost or logistics. Nonetheless, the situation is not lost, so long as architects are able to recognise what is desired from the point of view of the client and what is desired from the point of view of the architect. It is not a question of one or the other. Architects must be able to offer innovative design solutions that not only address the fiscal, legal and programmatic constraints, but also push the boundaries at to the position of architecture in the community at large. For educators, it must be made clear that the real potential architects possess is their encompassing knowledge of the building process including their expertise concerning questions of architectural form, function, history and art. Precisely while they are generalists are architects invaluable in a sea of specialists. The biggest hurdle to asserting this in the past has been the control of the vast amounts of information. This is no longer a problem and also no longer an excuse. In the education of architects, it must be made clear that their role dictates sovereignty over architectural information. Architectural Information Management is a necessary skill alongside the more traditional architectural skills. A brief outlook as to how this might come about is detailed in the paper. The authors propose didactic steps to achieve this. Primarily, the education of computer supported planning should not simply end with a series of lectures or seminars, but culminate in integrated Design Studios (which including Design-Build scenarios).

Keywords. *Architectural Information Mangement, Computer Supported Design Studios, CSCW*

Introduction

The architectural community is once again in a crisis. The chances for recent graduates are all but rosy. In Germany, for example, approximately 6500 graduates enter the job market each year. Independent of the current slump in the AEC industry, only 2000 to 2500 architects leave the field each year. True, the number of new students has been reduced over the past few years, but fierce competition has more or less remained. This, of course, has pushed entry salaries down while at the same time, raised the level of skills needed to even obtain employment. In order to be considered for a position, practical experience and excellent abilities in CAD are a must. In certain regions of Europe, em-

ployers better receive real-world experience than a fat portfolio full of design ideas. The demand is for generalists with specialist tendencies. Economic realities dictate these conditions.

In education, this has not gone unnoticed. To be sure, the number of architects entering the field is over-proportional for one that is more or less stagnant. Nonetheless, there is a continuous (albeit small) demand for knowledgeable, skilled and intelligent architects. This is in part due to the enormity of the building industry. In Germany, where the automotive industry dominates the economy, the building industry is approximately four times as large. Unlike the automotive industry however, the building industry is highly fragmented and thus, susceptible to large changes when economic

pressure starts to exert itself. As members of this industry, architects need to be able to cope with these swings and to act rather than react. Clearly, the question needs to be asked, what kind of architects do we need and what kind of skills should they be endowed with upon completion of their studies?

The long-term decline of the role of architects through the reorganisation of the planning and building process started after the Second World War. The continual usurpation of various tasks performed initially by architects has a long pedigree. Quantity surveying was one of the first; project management as well as site supervision are but the more recent tasks to be given up. The profession is marked by a continual “crisis”, which can be traced to social, economic and technical factors. In an almost tragic fashion, the profession has long had the problem of having to justify its existence and to document its worth to society. This does not mean that this trend is irreversible. In fact, it could be said that one of the effects of the long pedigree of “task usurpation” is, that architects have come to accept it as almost normal, or at least as an un-winnable position. The authors are of the opinion that this does not necessarily have to be so and that the current crisis contains the seeds for a renewed optimism, especially in the era of communication and new technologies.

Causes

The discussion within the field about the content and form of the architectural education has, in recent years, concentrated on the “designerly” aspect of architecture. Many schools of architecture have been honed to produce star-architects or “want-to-be” star architects. The universities and art schools have been especially hit with the accusation that they concentrate too much on design and educate the students for a job description that has never existed. The mainstay of the daily life of a typical architect has quite little to do with “artistic” endeavours. Applying for building permits, review-

ing shop drawings, calculating costs, coordinating schedules, meetings and the like make up the bulk of the architect’s work. For the architect looking for help or assistance, that is to say, an employee, it is quite clear what kind of skills are necessary so that the architect might enjoy some time to design. Potential employees with solid basic knowledge combined with differentiated practical experience are the ones who will be favoured.

These requirements are necessary, but not sufficient. The field does call for creativity and flexibility and an ability to work integratively. “Architects must be able to understand the problem, find a good solution among many different solutions within a team, communicate this to people outside the field and last but not least, transform it into a built object”. (Sauerbruch 2003) These demands require that future architects be educated over a wide yet interconnected spectrum of knowledge based on an integrated grasp of the profession. In addition to this, the advent of the information society has added a whole new set of demands for the profession and the education of its practitioners.

The integrated aspect of architecture is generally accepted. So too is the need to bring specific knowledge from other fields into the architectural education and to train architects to synthesize this knowledge in order to formulate built form. The discrepancy arises when creativity is considered as a skill that only architects master. Creativity, by its definition, is not limited to any one field or specific endeavour. Rather, it is the general ability to intelligently find solutions to problems. The smallest of challenges can be invigorating and indeed, enlightening. (Florman 1976)

Form

These challenges may or may not have to do with the overall form of a building, but it is exactly the affirmation of the predominance of form that has, in recent years, taken an overbearing role in the education of architects. Another view is to consider the form as the consequence of a synthe-

sis of all the building project information. The two views do not necessarily lead to solutions that are all that far from one another. The starting points for finding solutions are however, quite disparate. The former view has held sway, dictated in part by the argument that in “times like these”, we (architects and society in general) need new forms in order to express the “Zeitgeist”. This debate (or position) is certainly not new. What is new is the reason given for the obsession with form, which fuels the argument. Indeed, this argument has been used before.

In the 1920s, as concrete became a feasible building material for dwellings and public buildings, the debate centred around the argument that new building materials meant new form. (Banham 1986) The argument essentially gave the followers of the creed complete artistic freedom. Today, the argument runs that new design methods and new design tools mean that new form is needed. What is meant, of course, is that since we have computers and computer aided design (CAD) and computer aided manufacturing (CAM) and computer aided X (CAX -as some Institutes are called in the meantime), the form of the building must be new in order to reflect these changes. The “blobs” and other non-rectilinear forms that current design software and computer aided manufacturing enable are the best examples of the argument made real. The authors argue that this debate (as to whether we need a new form) is irrelevant to the future of the profession other than that it diverts the attention of architects and educators from the real problem: the growing irrelevance of architects and architecture in society. In order to counter this trend, its causes must be analysed and these appear, in part, to reside in the roots of architectural education.

History

The integrated education was first formulated in the École Polytechnique at the beginning of the 19th century. Characterised by a systematic course

organisation, firmly based in science and the social dimension of creative work, this model has served as the basis for almost all “western” architectural education (Pfammatter 2000). The trend in the last twenty years has been to successively depart from an integrated and rational model in favour of one that puts a strong emphasis on “design”. The question as what differentiates architecture from engineering is answered with the word “Design”. That is to say, the engineer calculates, but the architect designs! This can lead to the situation where students become seriously convinced that the architects can, as designers, solve complex problems -such as the built environment- by purely formal design. Put another way, the aesthetics of the building dominate the solution; technologies are just following and supporting the form. This is not to denigrate the importance of well-designed buildings, but that in education especially, the students need to be made aware of where the real importance lies in the field of architecture.

Precision

This trend is also seen in topics of research where the once clear definitions of research, practice and education have melted together. Recent conference topics include “Research through Design” and several recent research projects have analysed “designerly thinking”. This only helps to blur the definitions of research, education and practice. Students as well as laypersons may not fully grasp subtleties of the arguments behind this blurring. The students learn that precision is not necessary and external observers see a less-than-rigorous profession. Indeed, among co-researchers (that is, researchers from other fields of science and engineering), the meaning of research is clear. A debate among architects as to the meaning of research leads to the perception within related fields that the architects are either arrogant dilettantes or inconsequential artists. This is perhaps polemically worded, but the general message is that architects have seemed to take the creative li-

cence usually reserved for buildings and used it to justify non-rigorous methodologies and whatever is currently fancied.

Structural Changes

At the beginning of the 1990s, this trend was accentuated by hierarchical changes in educational programs. The architectural education could be, up until that time, mostly characterised as a structured and successively placed combination of necessary courses. Art history and architectural history, visual geometry, surveying, engineering, principles of construction, scheduling, logistics and economics were all considered as important components of an integrated professional education. The synthesis of this knowledge came together in the design studio. This multi-faceted aspect has in recent years been replaced with an accentuation on the design studio that emphasises its “artistic qualities”. This change has resulted in a reduction of the importance of other aspects of the curriculum. Indeed, it appears that within the faculties of architecture, institutes are only interesting if the words “and Design” are added onto their nominal title. Furthermore, it has signalled to students as well as to persons external to the profession where the focus of the profession lies.

True, design means integrating the various aspects of architecture into a concept for a built solution. However, the weight given to form during the studies is quite far from the reality in the architectural office. The emphasis on form (or concept) in the design studio reaches in some cases the level of fetishism. This has led to almost a liturgy of the design studio and with it a theology of architecture that is not necessarily representative of the profession.

This liturgy is not limited to just the scripture, if the almost church-like rituals in the design studio, and especially the crits are considered. Full-time professors who appear for one or two days a week at the school and then expound on architecture with the students in a cavalier manner do not go un-

noticed. This is perhaps their goal, but the effect is all but positive and at least even a question of morality, not least because of their impact in creating realistic assumptions about the profession for the students. In addition to this, the architecture community cultivates an internal star-status through glossy magazines. The stars and near stars are employed to teach further generations how to be stars as well. It is perhaps not entirely bad for architects to have some notoriety. When, however, this becomes the main goal of future architects, (build something in order to become famous), the central focus of the profession (architecture, the built environment, sustainability) suffers. At best, this merely hinders the progress of the profession to some degree. At worst however, the obsession with form and the notoriety form can bring add to the denigration of architecture in the society.

Challenges

Once the relatively robust economic conditions in the 70s and 80s changed, the role of beauty or aesthetics has played a definitely reduced role in the building industry. This is not entirely new. It was postulated in the 19th century, that soon all that architects would do is be the purveyors of good taste (Saint 1983). What is perhaps new is that economic conditions have, in recent years, brought an enormous pressure to speed up the planning and building process. This is practically only realisable with the help of new technologies such as databases and internet-based project organisation.

It must also be remembered that architects were never solely responsible for the form of a building and so form was never an end in itself. Architecture has always had a social dimension and this is better understood by the relationship of society to architecture instead of architecture (or architects) to society. This relationship can change quite quickly. In times of crisis or rapid change, as in the period after the Second World War, the importance of certain aspects of architecture had completely different values than they do or would

today.

The architects do not establish the relationship between architecture and society, but they contribute a great deal to it through their attitude to the built form and its role in society and as to where their responsibility lies. When the profession notices that society judges architects as being arrogant and badly educated, they are required to find out the reason(s) for this relationship. The current situation begs the question, "Is the crisis in architecture a result of economic conditions (external factors) or a result of self-inflicted misunderstanding and miss-belief (internal factors)? What can be done to possibly change this situation? What must be changed so that architects are accepted as being believable, knowledgeable and trusted? How can architecture (and architects) be made relevant once more?"

Architectural Information Management

The information management in the building industry is becoming a task, which is recognized as such. It can take many forms such as workflow modelling or shared databases. Through internet-based communication technologies this information is accessible at all times from almost anywhere, even the building site itself. The fourth and fifth dimensions of architecture, time and information, are no longer separated from the planning partners. This allows the whole of the planning team to participate in the information management and enables the multi-faceted communication and cooperation processes to be economically organised. This means that they can be actively and sustainably integrated into the building design process. The integration of information technology in the planning process does not happen by itself however. A specialist is needed to coordinate the integration and to steer the planning environment. The specialists who are suited to oversee this integration are architects because they are the ones who understand not only the separate aspects of buildings but also their relationships. Not least,

they are also answerable for the results of these processes: the finished building.

This, of course, has consequences for the education of architects. The use of applicable tools (or the adaptation of the tools or media necessary) must be taught and trained within an architectural education. This must not be done at merely an abstract level, but in practice-relevant situations such as integrated design studios that simulate the planning process. These allow the students to answer the design problems with clear and well-tempered design solutions or even to reformulate design problems that are relevant to the practice of architecture. The students also are able to develop a relationship to the additional dimensions (time and information) of architecture as a matter of course.

The use of information technologies in education cannot simply be implemented through the use one or another type of CAD software. Instead, the detailed modelling and simulation of the planning and building processes is needed. A real-world example: The building project is to be realised on a site in one city; all of the main planners are dispersed through other cities and have not worked previously together. The interesting (and perhaps most important) problem is to organise the internal and external communication, to structure the knowledge transfer, to bring this to life and all the while focus on the building project. The different components of such communication processes have been defined since the 1940s as follows: "Who says what with which media to whom with which consequences?" (Laswell 1948). In addition to this, the communication with contractors and authorities on the so-called third-level demands certain social competencies. The experience from the use of relevant technologies in professional practice and the experimentation with this in the design studio context (to which the authors also bring considerable experience) show quite strongly, that certain relationships in this planning methodology are not transferable with standard teach-

ing methods; they must be trained.

Attempts have been made to establish “virtual” design, “virtual design studios” and even “virtual schools of architecture” in order to enable the training needed to prepare future architects for the profession that awaits them. The word “virtual” has, however, been rather widely used of late and so can mean an immersive method to experience three-dimensional space or simply using the computer to draw and model the building (Selles 1999). Partly this has to do with the euphoria that accompanied the “new economy” and all that was digital that also spilled over to the schools of architecture. However, some of the more sedate internet-based education projects have shown to have a longer life than many highly rated and highly funded projects. Lessons can be drawn from these in order to establish infrastructures that truly support and foster a better education over the long term.

Will new technologies allow architects to recover lost professional terrain? Through the breathtaking speed of software and hardware development, the question is not whether the architect uses computer technology but how and to what degree information technology is integrated into the planning process. The replacement of the drafting board (but not the pencil) with CAD systems is no longer a question. Cooperation with planning partners (especially with the building owners on one hand and the field-specific specialists on the other hand) is where information technologies can assist the architects. Indeed, these partners can be effectively included in the planning process resulting in time saved and a potentially large reduction of misunderstandings. This is exactly the development that will allow the architect to reassume the role of leader and coordinator.

Naturally, the question as to what further consequences of an almost runaway development in information technology while have for architecture is relevant. Perhaps most important is the metamorphosis of the computer from tool to medium. This means that the computer is no longer (through

the use of the plotter as output medium) just a replacement for a pencil, a table and a straight edge. The alphanumeric and iconographic message has begun to free itself from material substance and to switch to the electromagnetic field (Flusser 1990). The difficulty therein is that we cannot follow the message completely: we are dependent on the medium to show what is “virtualised”. The computer is where the design resides, is structured and often where it is displayed. This de-materialisation (or virtualisation as it is often referred to) means that the architects have to maintain an even stronger vigil against seduction.

The images on the computer screen can become quite powerful as a method to convince planning partners of the value of an idea. There is the case where these images start become a sort of self-seduction. As Leach puts it: “In the age of MTV and Pop Culture, one must be brave to turn your back on seduction” (Leach 1999)

Visual and non-visual Information

As humans, we are rather dependent on our visual senses for the bulk of the information we take in. In the field of architecture, this is all the more so as a good deal of the information is not transferred as a written language, but as codified series of visual symbols: architectural drawings. The classical architectural drawings are not wholly the architectural information. In fact, when one considers the amount of spreadsheets, correspondence, specifications and tender documents, most of the architectural information is non-visual. That is, the information does not represent spatial geometry and is not graphically displayed. Furthermore, a good deal of the information is time dependent, a dimension rarely depicted in architectural drawings.

Time, as stated earlier, is perhaps where the construction industry is under the most pressure. The cost control is, as always, a fundamental factor that needs to be managed and controlled. The effective management of planning information through shorter or fast-track planning processes,

just-in-time processes on the building site, and faster construction methods all add to the increasing complexity in getting an architectural design built on time and on budget. When one adds the dispersed nature of current planning teams, one can see how the nature of the architectural information and especially how it is to be handled has changed.

The increasing volume of information that is produced by each planning partner as well as an increasing complexity can lead to information overload (Toffler 1968). The information needs to be managed, controlled, evaluated and then further dispersed. The problem is not unsolvable, but the advent and combination of several technologies may allow the architect to not only manage the information, but to play a dominant role in its management.

The Internet's widespread use means that there is a multi-channel communication medium available that all of the project participants can use. The quick adaptation of broadband technologies (ADSL) means that larger volumes of information can now be easily transferred. Thirdly, the combination of databases, websites and internet-based communication allows the project team to have a "virtual" or spatially independent platform upon which to work.

The factors mentioned above pose a unique chance for architects in that different aspects of society, the building industry and the perception of the role of the architect in both all are at a turning point. The concurrent march of information technologies has provided the tools with which architects can reassert their role as the shapers of the built environment. This, of course, must also be reflected in the education of architects in order to cement these skills.

Towards Architectural Information Management in Education

Two facts allow us to be optimistic about the field. Firstly, the Bologna Process will dictate some

forms of harmony across the European educational landscape. Secondly, the march of progress means that first semester students arrive for their studies equipped with laptop computers. Between these two mini-revolutions lies the potential for the renewal of the architect's role.

Within the next five years, almost all architectural studies will be conducted as Bachelor and Master degree programmes. We do not wish to delve into the politics or the relevancy of the six semester Bachelor of Architecture, however it should be noted that for educators, the revision of the architectural education as a consecutive degree system does have advantages.

Firstly, previous two-year lower-level architectural courses are now expanded to three years. This is especially welcome to practitioners of CAAD. The evolution of architectural education is relatively slow. In fact, the main aspects of architectural education have remained unchanged since the Ecole des Beaux Arts in the 1850s, (Pfammatter 2000). For educators of computer supported planning, the arguments for incorporating CAAD early into the curriculum are often still met with the response that there is no place or time for it. A six-semester Bachelor automatically allows more time and place for an integrated digital curriculum.

Secondly, the specialisation of the Master allows focussed computer supported coursework. The Master of Architecture will likely continue to retain the generalist aspects of the ten-semester architectural curriculum. However, the Bologna system means that specialisation is also possible in the fourth and fifth years. This is also advantageous as the digital curriculum can be tailored to the needs of each Master programme. Previously, a single curriculum must hope to meet the needs of a broader group. Within these specialised Master programmes, it is also possible to cultivate new generations of "digital masters" who show the way forward through innovative use of digital technologies or through research carried out to better the tools.

Thirdly, the modules prescribed in the Bologna process will, over the long run, create a much more universal curriculum. This does not mean a common content, but rather a common structure where specialized content can find a place in the personal choices of individual students. This can enable specialised aspects (eg. Rapid Prototyping, Intelligent Buildings, Virtual Reality) to find an audience and hence, continue to be developed.

At the other end of the dialogue between students and educators are the students who are armed to the teeth with digital equipment. In some ways, this is not necessarily desirable. Digital curriculums have previously relied on the scarcity of resources to control the content taught to students. Now, with mobile computers and ubiquitous internet access, it appears the danger is not a lack of resources, but too much. This means that aspects of the curriculum that were based on computer pool resources and 19th century didactical methods will need to be refined in order to take advantage of this situation and to prevent unwanted behaviour.

Most first year students are equipped with laptop computers (80% of the students at the author's university have a laptop computer by the beginning of the second semester). They have used computers in their secondary education to some extent and have what can be called better than rudimentary computer skills. However, their use of the computer has been previously limited to singular projects in secondary school and to personal use outside of their studies. Very few have used their computers as a tool and in the digital curriculum, they need to be professional about using the computer in the university setting.

It becomes clear that the initial course in a digital curriculum is not an "Introduction to CAAD", but "Good Habits with computers." The students need to plan how they structure their data, how to backup their work and how to effectively use the network. Once the students are inoculated with these types of good habits, they are then ready to

learn how to use various computer applications to support their work as architects.

The other aspect of the digital curriculum that is essential to convey is the idea of a building information model. More than just the three dimensional CAD drawing, the students need to be aware that their primary activity is not to manipulate bricks and mortar but to manipulate information. In a digital work environment, this means creating, maintaining and using information in ways that foster the long-term useability of the information.

This kind of integration is best taught directly in the design studios. By connecting the information management with the goal of creating good architecture, the students learn the interconnectedness of the two. Indeed, in dispersed networked design studios such as the Netzentwurf, this means creating not only information, but an information infrastructure for the project. These infrastructures must allow all of the planning partners to see and use the information transparently. And to enable the planning to progress.

Conclusion

Naturally, the infrastructure is only effective when it is used correctly. Architects, as stated above, are the natural partners to coordinate and steer the planning process methodologies. This means architects will need to know how to use the infrastructure and to convince the other partners that they have this knowledge.

This is only possible through the demonstration of competency in this area. It will not be an easy task as architects have previously shown a certain disregard for management in general. The recovery of this field will require work from three sides. For currently practicing architects, there is a definite need to acquire these skills, either through training or by simply "jumping in". Naturally, the architect's associations can play a major role in educating their members as to the short-term gains and the long-term advantages possible through

the use of internet-based technologies. Tactically, architects must do this in order to retain the control of the building process. Strategically, architects should do this to recover some of the territory lost due more to attitude than to competence.

The second side where architects need to work on the problem is in architectural education. It must be made clear to future practitioners that the overwhelming part of the architect's work is not just to design pretty buildings or to make pretty pictures of them. The candidates for the profession need to be made sensitive to the role of architecture in society and the consequences of their work. They also need to understand how complex the building process is, and how this complexity can be effectively mastered. This is not a single course, but a contiguous message that must permeate the entire curriculum.

Thirdly, architects should consider their work as a moral instance of creativity. Unlike other products or consumer goods, architecture has large and long-term consequences for the society in which it resides. The long life of buildings means that the responsibility of architects cannot lie simply with the impetus to be clever. The responsibility to the client and to the building's surroundings and users carry much more weight than any egocentric-driven reasons for choosing this field.

The Hippocratic oath governs doctors of medicine upon completion of their studies. Might architects also undertake such an oath? There are precedents. In Canada, each civil engineer is bequeathed with an iron ring made from pieces of a failed bridge, which resulted in the deaths of many of the workers attempting to construct it. The ring is worn on the small finger of the writing hand so that it often comes in contact with daily artefacts and serves as a reminder of the gravity of the engineers' work. True, such measures are symbolic, but they signify a moral contract leaving no doubt as to the practitioner's priorities. It is exactly this doubt that plagues the profession at the moment.

The potential answers to the current crisis re-

side partly in structural problems in the profession of architecture, and partly in the minds of the practitioners. A morally exacting application of the role of architects, supported by enabling technologies, might just be enough to lift the profession not only out of the crisis, but to elevate its relevance not from the perspective of the architects, but as seen from the culture, society and people that architecture serves.

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