Resource Architecture – XXI World Congress of Architecture
22 to 26 July 2002 in Berlin

Workshop 09 David Sutherland

Name The Eureka Tower in Melbourne

Situated in the Southbank district of Melbourne, Australia, south of the Yarra River which bisects the city centre, the will be, when completed, the tallest residential building in the world. The site itself is in a prime location, although prior to Eureka it had a history of failed development aspirations. What is the logic of such a tall building? The underlying premise is very simple. At the time of purchase the site had current planning permission for two tall buildings adjacent each other along City Road, a major arterial road which borders the site to the south. Constructing the buildings in that manner would have exacerbated the already poorly considered location of a series of tall ish buildings thereby creating a wall of buildings to City Road. Nonda Katsaldis, a Principal of Fender Katsaldis Architects had the idea of, simply, putting one approved building envelope on top of the other, thereby creating a taller building that would provide a much slimmer profile, allowing light and space to flow into City Road, and creating a far more iconic solution.

When we first started work on the development, our approach was differentiated from that on other projects only by its size ; at that time the building was a little under 90 storeys high (it has since grown to just over 90 storeys). In other words, we commenced our work on Eureka using traditional approaches familiar to architects since the birth of the profession.(1)

As we progressed through the design and documentation processes, however, our delivery systems changed dramatically. How and why did that happen? That is the subject of this presentation. To explain that we will initially examine the changing environment within which architects in Australia and other countries are operating and then describe the place of our adopted methodology within that milieu.

We find ourselves working in a professional environment where we are expected to provide a greater level of information than in the past, but for a lesser cost. Other participants in the building procurement process are developing the tools and expertise to carry out some of the tasks traditionally associated with architects. That approach is being encouraged by large construction companies who, because of their financial base, are underwriting aspects of projects and, therefore, gaining a greater influence over the whole of the building procurement process. We are experiencing more and more pressure on the time available for us to do our work, yet the nature of the problems we are dealing with at a design level are complex, and require due consideration so as to arrive at an optimum solution. While we accept those pressures on us to do our work quicker, we also understand the underlying conundrum that, to derive the greatest value from our designs, our design methodology must be based on an iterative process and, indeed, we should be considering several strands of enquiry simultaneously. We know that the best way of doing so is by working in parallel with other participants, but we find that the time taken with the tools generally used in the construction industry means that that approach is very difficult to achieve. While we understand that the changing nature of this industry means that we will inevitably be concentrating on our core skills of design and management, and allowing other participants to provide much of the construction information traditionally associated with architects, in the back of our minds we are not necessarily convinced that we are able to appropriately test or prototype our designs. In fact we find that studies have shown that the greatest proportion of building failures result from design errors.

Clearly we need to work differently from our traditional approaches, and we need the appropriate tools to allow us to do so. And if we can achieve that we have the potential to reposition the architectural profession back to a central role in building procurement processes.

Our success with Eureka Tower has shown an approach which will help us achieve that aim.

The Eureka Tower project commenced its design development and construction documentation phase at a time when we were seriously questioning prevailing attitudes and methodologies inherent in the construction industry, and the resultant demands placed on in the architectural profession.

The revolution in information technology has until recently been of little benefit to architects. At our core activity of design, computer-based tools have generally replicated traditional methods of building analysis or description at the cost of a huge increase in complexity. That complexity has been allied with a loss of transparency and overview of the design activities and has brought with it an increased fragmentation and decreased cohesion of project teams.

The underlying basis of our approach to Eureka Tower (and now all projects within the practice) is to use 3D object oriented software that allows sharing of information.(1) That approach means that we simulate the building in three dimensions throughout the design and documentation phases. Interestingly, those phases are now distinguished from each other by the end objective of each phase rather than the processes adopted during them. As well as being able to design more effectively, team members can now collaborate cohesively as they are co-operating to craft the one virtual building rather than working on separate files or pieces of information. The architectural process can now be one of unified finalisation of design intent rather than that of increasing subdivision into design and documentation units. Rather than an office of segregated tribes, we have an practice of collaborating teams.

That approach means that instead of exchanging two dimensional data which is essentially limited to dimensional and locational information, we are able to share rich three dimensional information that not only has dimensions and locations, but can include descriptions of materiality and quality, provide specification data, allow analysis of environmental, financial and constructional aspects, and provide a visualisation of the proposed building. All of those benefits are derived from a single project database of information.

Therefore those outcomes are a by-product of that project database. The term "by-product" has become a mantra within our practice. We direct our primary efforts towards the activity of design, be it broad conceptual design, or the detailed design that is construction detailing, using our 3D software as our primary tool. From that database can be derived through automated processes the required 2D, 3D or text-based information.

If we consider that under traditional processes those who were involved in the design of buildings were generally directing their energies towards arriving at a design solution, and that those who were working at the description of that building for construction purposes were always working to produce a drawing, we can see that a process oriented around the idea of by-product means that now everyone is designing.

That approach is advantageous at several levels. Working on the 3D virtual database means that the underlying structure of information assists co-ordination in three dimensions. It also means that the co-ordination is ongoing and accumulative.By contrast, in traditional processes, that co-ordination was carried out by people who would compare disparate pieces of 2D information and then stitch that information together in their minds to create a three dimensional whole. Unfortunately, whenever a drawing was changed, that process had to start all over again- it was not accumulative. Our approach means that whenever a design is changed, the visual manifestation is updated automatically, whether that be design image or construction drawing. Critical to these processes is working through a single database of information.(3) Under traditional processes visualisations of designs tended to be aspirational in nature, produced in parallel with the documentation team who in meantime potentially were travelling down a different path entirely ;by contrast our visualisations show the building as it will actually be constructed. They are visual images of the prototype building.

Using a 3D approach allows us to understand the nature of the problem earlier, to be able to understand and evaluate our design responses quicker in the overall process, and to therefore be able to venture further into the resolution of the design without having to fundamentally reconsider our solutions. Using the 3D virtual building we are able to reduce interruptions between activities. In traditional modes of working, those interruptions were the exchange of 2D information, the need for each recipient to work through his or her understanding of how the received information formed part of a complex three dimensional jigsaw puzzle, and the need to wait for long periods of time for each participant to finish that aspect of work before again sharing their 2D information to others. Working in 3D facilitates the simple and immediate sharing of rich information, thereby reducing interruptions to the flow of ongoing design resolution.

The construction of the podium levels surrounding Eureka Tower has been completed, and construction on the Tower itself commenced earlier this year.

Footnotes

1 If we define such methods as being essentially defined by the use of lines and text intended to symbolise the desired building, and the co-ordination of that information is carried by manual techniques, then we can understand that 2D CAD falls squarely into the definition of traditional techniques.

2 The practice commenced that process using ArchiCAD version 6.0 by Graphisoft. Currently we are using ArchiCAD version 7.0. That is our core software tool for assisting us with design and construction documentation. The basic methodology adopted within the practice is to allow the ArchiCAD software to contain the underlying design information, and to use other software to represent that information in various ways, be they 3D visualisations, 2D documentation, or text-based data. When the underlying design is updated, so automatically are the representations of that information.

3 In this approach, the 3D database, or 3D virtual building is generally created and maintained by the architect. The 3D model stays active for the whole of the life of the building. It provides information for planning and cost modelling, and allows for creation and enrichment of data during the design, construction and operational phases by all parties involved in the project - simultaneously. The value of the 3D model, under this process, is increased and maintained throughout the life of the building; it becomes the central control document. This presents a key opportunity to reposition the architectural profession. By maintaining control of the information we revalue our position in the building procurement process.