INTEGRATED DESIGN SOLUTIONS – SUMMARY REPORT FROM THE CIB IDS WORKSHOP IN MARCH 2006 IN ANKARA

Attached a summary version of the IDS Workshop Report produced by Prof. Salahattin Onür. A 70 page full version of the report can be made available upon request.

Prof. Onür may want to elaborate upon the outcome from the Ankara IDS Workshop and Prof. Galloway may want to provide a preview on the Atlanta IDSS Workshop.
IDS Workshop Ankara ’06 held on March 14th, was the consequence of an idea that was put forward by Peter Barrett two years ago in Brussels CIB Program Committee’s Meeting of September 2004. This idea is, in short, the inception of a new CIB proactive theme, namely “Integrated Design Solutions”. It was recapitulated in Madrid CIB Meeting of April 2005, and in Tokyo CIB Meeting of September 2005, led to the decision to organize consecutive workshops on the proposed theme during the following CIB Meetings of March 2006 and September 2006 in Ankara and Atlanta, respectively.

Rationale behind this idea, and thus the theme itself, which was introduced in Brussels, was elaborated in a paper with the title “Strategic Issues for the CIB Programme Committee” presented by Peter Barrett in Madrid. This new theme would be a strategic tool for an objective of creating a common focus for the disparate areas of research by the CIB Working Commissions and Task Groups, around 60 in all, especially for those which do not have strong connections with the other already existing CIB proactive themes of “Sustainable Construction”, “Re-valuing Engineering”, and “Performance-Based Building”. “Integrated Design Solutions (IDS)” was put in conjunction with these latter themes, showing how it would complete a quadrant, “filling in a hole”, as expressed by Peter Barrett, that would be formed as a coherent medium of common foci for the CIB groupings. Also the interest of the different external stakeholders across these proactive themes, including the IDS, were mapped out.

Based on this background, the Ankara Workshop, which was decided in Tokyo, aimed to bring together a variety of stakeholders to dwell on, interpret, and discuss IDS in terms of its meaning and potentials to be a theme of priority for CIB. Out of the 60 persons invited to the Workshop 43 participated. Among those who participated 14 were from research institutions on building and construction, 12 from manufacturing and construction companies, and 19 academicians; many of the researchers associated with research centers also teach at related academic institutions. All were informed about the subject, and were sent beforehand the paper by Peter Barrett mentioned above. Initially the aim was to incorporate a wider variety of participants, including people from policy-driven bodies, client and user groups, and maybe even more important, researchers from those CIB Working Commissions and Task Groups considered as having strong connections with the theme. However, this aim could not be fulfilled.

In his opening remarks of the Workshop, Wim Bakens, the CIB General Secretary, after informing the audience about CIB, and especially about the three current priority themes, stated that the themes so far have been very much top-driven, by society or by market needs. He proposed instead the adoption of an approach from within the construction industry to perform better, and benefit from new technologies better, asking what the construction industry can develop with the knowledge and technology it has as, different from what the society demands. This he suggested to be behind the new theme, IDS. He mentioned that there were different interpretations of and many question marks around the latter, so there was need for inputs and opinions to come to a definition of a concept or framework.

Presentations followed, with views on integrated design solutions from two academic institutions, METU Department of Architecture, in Ankara, and Georgia Tech College of Architecture in Atlanta. Then there were two separate sessions on client requirements
introduced and conducted by participants from the University of Salford; first one on nD modeling and interoperability, and the second on users’ perspective. The Workshop was finalized with a panel session on IDS.

In her presentation of “Role of Algorithmic Thinking and Software Architecture in Architectural Design in Developing Integrated Design Solutions”, Arzu Gonenc Sorguc (METU) asserted that since architectural design is multi-dimensional, today the impact of information and computational technologies (ICT) are quite strong. The tools and the disciplines involved in the multi-dimensional process of design and the requirements are very many. There has to be found ways to combine all these requirements in design. Mathematics is considered as a means of thinking that will help in that. This role of mathematics in architectural design and also algorithmic thinking is asked to be questioned in terms of the use of digital media, i.e., ICT, in design.

Algorithms and algorithmic thinking can be employed in any design field to define problems, constraints and the procedures to solve them in a controlled and optimized way, which is very suitable for integrated design solutions combining different knowledge domains. Besides developing the algorithmic thinking, architects need to cope with the rapidly developing tools and media. These require a new interface for implementation. This interface is to be a new discipline called software architecture, which is defined as a high-level design abstraction moderating requirements of different users and customers. It also provides suitable tools for the development of software by different groups and disciplines. These mean going beyond the use of ICT as drafting tools to using it to make architectural design process interactive with collaboration of different disciplines over a real 3D model.

Under the impact of ICT we are forced to change our minds, and for that respect education has to change to lead students to cope with the changes in design and design process. Mine Ozkar’s presentation of “The Changing Face of Architectural Design Education at METU: The Problem of Integrated Design” took off from this argument. The notion of integrated design is to start from very early on in design education. One way to integrate this understanding is through exercises at the very first stages of design education, whereby the student is introduced to an idea of computable design. The idea of computability of design develops a sense for manufacturing and process technologies. As well as mentioning the course developments in the undergraduate and graduate curriculum, some basic design exercises were shown as exercises in computing at METU. The idea is to make understand the use of tools through their underlying formal structures, hence, geometry in its productive utility, Euclidean transformations and Boolean operations, the theory of shape grammars and the notion of visual rules for an evolving architectural education with integrated systems.

In his presentation of the practices, experiments and experience at Georgia Tech, another academic milieu, Thomas Galloway declared three areas of their involvement that have relevance to the question of IDS. A key involvement has been to restructure the undergraduate program to integrate architecture, engineering, and construction; they have a full-year common curriculum. Also interdisciplinary groups are encouraged in the graduate program. Other than that, there is not an institutional framework in the academy to get over the “stove-piping” of different disciplines. Considering the extent of collaboration and partnering, industry is more integrated than the academy. Second is their quite early on practice with Building Information Modeling related with interoperability in the building delivery process and the efficiencies involved on and off-site. The third is fabrication or CAD-CAM, seeing to an iterative process from design to fabrication. They are getting their research centers
involved in the academic programs and also deputing design computing and digital manufacturing and fabrication within the undergraduate and graduate programs. The latter was illustrated with some projects realized by students, each with a different material, whereby the student understands the connectivity between design, fabrication, and assembly.

In the discussions that followed difficulty of integration across the disciplines and that it required real dedication were pointed out. It was reminded that integration should cover all stakeholders during the life-cycle of the project and that it should include the users and the owners. Algorithmic thinking related to the 3D model (meta-model) were questioned from several aspects. One of them was that with mathematics we represent, we do not think. Another was related to the sufficiency of the designer developing this type of thinking, while, given the fragmented nature of the construction industry, others used other ways. This might even stifle the process, if it led to centralization in terms of software. Another was the danger of narrowing down and focusing only on computing and design which would not solve the larger social and economic issues.

Following these presentations and discussions there were two working sessions, each of which were introduced and conducted by participants from the University of Salford. The first was on “Fulfillment of Client / Stakeholder Requirements – nD Modeling and Interoperability” with Ghassan Aouad and Joseph Tah, both in the area of construction information technology, Yiu Lam in acoustics, and Tuğba Kocatürk in digital design in architecture, leading it. Ghassan Aouad, who found the previous presentations very similar to his own research and as having set the context, warned against hasty definitions of IDS. They have been doing their research in the areas of ICT, management, and environment more than a decade, but only a few years ago they have realized that they had been doing this within ICT isolated from management and environment. The idea to bring their research activities together has led to their development of the nD modeling, in which they see the future of IDS. There are new design issues emerging that require rethinking our ways of designing (i.e., design against terrorism, crime, and natural disasters). The multiplicity of issues that are making the design process extremely complex requires development of tools to see and understand the trade-off between different parameters and present a list of options to be decided on. This has been the whole idea behind nD modeling. Since more than a decade now they have developed various building information models with which one can interact. Addition of any aspect or parameter to the model initially upon demand by the industry gave them the idea of nD modeling, with the building information model at the center and various participants of the project interacting and retrieving information from it; technology is plenty and working, but the problem is cultural, social, and process related education. One can look at technologies from an IT point of view and from construction point of view; the new paradigm shift may be in terms of design and design processes. nD is mentioned also as a new way of working with different disciplines brought together to work together in an interdisciplinary way.

One of the contributors in the development of the nD model, Yiu Lam presented the role of acoustics, one of the design parameters in the nD model, in design and the areas that it is involved in the design process. In the first stage of the design process already acoustic requirements can be looked at, since you may end up having to do something expensive. Choice of site, architectural form of the building, its size and shape, all have impact on the acoustic requirements.
In her presentation “How to Model the Emerging Knowledge”, referring to process modeling, Tuğba Kocatürk asked how the process model could be adjusted, when there is a change in our assumptions of a certain process or of established design knowledge. New knowledge emerging from new forms of technology and means of production (digital design; computer controlled fabrication) create a shift not only in design concepts (i.e., grids and symmetries), but also in the relations between the stakeholders. From the social and organizational point of view and considering the intellectual property issues, there is a need to define the roles of those from different disciplines all working on the same model in the center, which will be open to data exchange, as to the extent each can affect and change the form.

In the discussions that ensued, Thomas Galloway asked the question of who the IDS is for. He asked who would most likely be served best by the promotion of the quality of life built. Thus the ownership of the model proposed was interrogated. The answer to this question was considered critical for IDS.

The second working session, “Operational Fulfillment of Client / User Requirements Through Built Solutions – Users’ Perspective in Development of the Integrated Design Solutions Theme”, was introduced and conducted by Marcus Ormerod, who is also one of the contributors in the development of the nD model, and Sezgin Kaya, both again from the University of Salford. In his presentation of “An Inclusive Design Approach to Develop A Better Environment for People” Marcus Ormerod explained how the term “inclusive design”, which is similar to “design for all” in the European context, and to “universal design” in US, differed from others like “transgenerational design”, “barrier-free design”, “life-span design”, and “accessible design”. “Inclusive design” is a way of designing products and environments, such that they are usable and appealing to all, regardless of age, ability or circumstance, by working with users (encouraging user participation and involvement in design) to remove barriers in the social, technical, political, and economic processes that underpin design. The barriers, regarding those that we may be able to influence, can be physical, sensory, cognitive, or psychic. And the greatest barrier would be the ignorance, complacency, and even prejudice of the professionals. The idea is to enable a good “fit” between person and product or environment; and the thought of it starts at the outset of design process. User (client and customer) dissatisfaction with the products and environments, disability discrimination acts as in UK, and the unnecessary cost of remedial alterations are some of the big business drivers for “inclusive design”.

Under the title “Creating the Useful and the Beautiful” Sezgin Kaya presented some case studies related to “inclusive design”. Examples were about how usability affected the environment and the people; referring to these examples, and from a certain respect, he thinks that useful is beautiful.

Final session with the panel on “Workshop Theme and Its Prospect” took place with the participation of those who made the presentations and Peter Barrett, and contributions from Rodney Milford, Frits Scheublin, Haluk Pamir, Soofia Ozkan, Jacques Rilling, and Leyla Ozhan.

Thomas Galloway stated as the answer to the question of who IDS is for the members of the CIB as one, and owners as stakeholders of influential impact on the realization of IDS as another, but not overlooking the designers and planners. Individual presentations in the Workshop provided key elements which needed to be sorted for the most important ones, whether they be technologies, domain areas of knowledge, processes, users, or stakeholders.
Rodney Milford reminded that there were no answers yet; some thoughts were being put in perspective. He asked to reflect on the difference between priority theme and commission, saying that there were commissions working in this area. Another question he wanted to ask ourselves was what IDS was; and whether a wide or a narrow spectrum wanted. His third question was who IDS was for; who would be interacted with and what would be achieved. Peter Barrett answered those three questions in order. IDS differed from a working commission, because it was much more generic; it provided a potential to connect back to a lot of working commissions which did not have a natural connection to the existing three proactive themes. It would bring them together to work through the CIB to make an international impact with exciting results in the short and long term, affecting the whole construction industry by involving the stakeholders. As to what IDS was he described it as a very general idea, rather than defining it very closely, lest it might start excluding people; instead people must be engaged in the discussion to turn into something that would make sense for them. It is a broad notion about how it would fill a void at the moment. He answered what IDS was for as leadership in setting the agenda through smart ideas and creating opportunities and working with and involving the stakeholders to create a change in the industry and the built environment within a decade.

Thomas Galloway explained why we should be interested and devote energy, by the profound impact that technological change would have on design and building industry and, as its corollary, on the educational programs of the disciplines concerned with the built environment. Ghassan Aouad added to the impact of technologies, that of the newly emerging design issues which are increasing the complexity of the design process.

Frits Scheublin told that he found development on nD modeling as the most actual subject to be included in IDS, since construction industry was very much focusing on it. He also thought that since there is no task group or any working commission totally related to IDS or to multi-dimensional concepts, it would be of no use to create an umbrella about something that did not exist. A task group could be started with some people or teams already working on multi-dimensional concepts and who can invest their funds. Peter Barrett disagreed saying that if such a group was gone for, then we would not be talking to all groups in the same way.

Yiu Lam brought up the issue of providing a common language that would be needed for people to be able to think together and communicate for IDS. Peter Barrett preferred people particularly interested to come together and to try and actually develop a capacity to communicate; for this, opportunities needed to be provided for people to come together. Ghassan Aouad saw IDS as addressing the gaps between the different disciplines in the built environment. He, like Arzu Gönenc Sorguç, would like to think that everybody owns IDS.

Upon Soofia Ozkan’s suggestion for the exposure of the different disciplines (i.e., architecture, engineering) in the academy to one another, Wim Bakens informed about existence of such practices in many universities that he knew, and that CIB could do an inventory of best practices in this respect. According to Thomas Galloway, CIB could play a role in creating the notion that there is a “built environment professionals, as a set of professions”.

Jacques Rilling asked whether the IDS was for owners or occupants of the building for the life of the building, or for the moment it was built. If thought early on for the life of the building with the changes that would take place, there might be quite a different design. Thomas Galloway thought it central to IDS to be looked at in a multi-faceted way in the long run.
Arzu Gönenç Sorguç informed about CAX which is equipped with product life management systems; something similar could be developed for the built environment purposes.

As a final word Peter Barrett put forward his observation that the discussions revolved around what he said could be an agenda for IDS, namely technology, organization, and people, the well known “TOP” model. ND tools, knowledge, language (technology); delivering to the owners or users, those who pay for it (organization); those in different disciplines who can work together moving from multi-disciplinary to interdisciplinary way (people).

**Some excerpts from comments that may reflect the nature of the Workshop ’06 at METU, Ankara:**

“...If I knew that there is something I know what we are gonna achieve, personally, at personal level, I wouldn’t have come really....” Ghassan Aouad

“....I came into this notion of IDS very much unsure as to whether or not this thing could have substance that could form a foundation for a thematic theme for CIB. And I have come away from this day, with the feeling that there is substance that IDS can be very important not only to our individual programs and individual research institutions, but in the broader sense of an international global network.....” Thomas Galloway

“.....this is an interesting meeting, because we don’t know what the outcome would be is rather a good way of looking at it. Makes a change, doesn’t it, from the meetings where we are pretty sure who we are going to meet and what we are going to say? I think we need to create a process that has such characteristics; so that is a journey towards something we are not quite sure about...” Peter Barret

Selahattin Önür

**Working Session 2:**
*This session will consider opportunities for user participation in the design process and the drivers for professionals/business to adopt an inclusive design approach. It will present CIB W111’s work on ‘usability’ with case examples from the UK, Norway, Finland, Sweden and France.*