



## Report for Working Group 2: Building a Civil Design Community

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# Report for Working Group 2: Building a Civil Design Community

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## Introduction

The purpose of the second working group was to determine how to build and sustain the emerging civil design community. Topics discussed included the goals, format, and location of future meetings; how to increase involvement from industry and architecture; plans to offer professional education and outreach to colleagues who are interested in design in civil and environmental engineering; and the long-term possibility of creating a civil design society.

## Goals of Future Meetings

Because design is not generally considered to be a discipline in civil and environmental engineering, there is little understanding of or support for design research and education in traditional CEE departments. One of the primary goals of this workshop, and those that follow it, is to serve as a manifesto for civil design – outlining the lack of design thinking within civil and environmental engineering and providing a statement of purpose for students, professors, researchers and practitioners with an interest in civil design.

The working group participants hope that this and future workshops will allow the creation of a civil design community without the difficulty in convincing traditional civil engineers of the value in doing so. For colleagues with an understanding of and vision for design in civil and environmental engineering, it is hoped that this and future meetings will (1) help connect and facilitate communication between groups and individuals who are interested in civil design; (2) provide a forum to share successes and lessons learned at other institutions which may help to open doors at our own organizations; (3) create a community which would support its members in increasing related activities and discussions within civil engineering departments and institutions around the world; and (4) develop a common vocabulary for discussing design in a civil and environmental engineering context.

For colleagues who are new to the concept of design-as-a-discipline, particularly in civil and environmental engineering, it is hoped that the workshop and associated events will provide opportunities to learn about different views of design and design research in order to approach design in a more confident, effective and systematic way.

## Planning for Future Meetings

The nature and format of future meetings was discussed at length during the second working group. Multiple options were suggested for how to move forward. One proposal was to try to incorporate the DCEE workshop into an existing meeting (like those hosted by ASCE, ASEE, CDIO, ICAD, the Design Society, the Society for Design and Process Science, the Academy for Transdisciplinary Learning and Science, etc.). A second option was to try to associate the DCEE workshop with another group and run the meetings back-to-back. A third option was to continue the DCEE workshops with the expectation of eventually forming an independent international society which would organize activities independently or in cooperation with other societies. The fourth option was to continue the DCEE workshops with the expectation of developing into a larger DCEE conference.

The working group participants agreed that it was important to strengthen the ties between the attendees of the first meeting and to use that as the foundation for a larger civil design community. Thus, there was a strong preference for continuing with the DCEE workshops as an independent entity with the expectation that the meeting would eventually develop into a larger conference. In addition, there was a strong preference for holding the workshop every year, rather than every other year, to maintain the momentum of the group.

During the working group session, different formats for publishing the workshop proceedings were debated. Although all of the participants agreed that it was preferable to publish the DCEE

proceedings as a special edition of an established journal, there were also concerns about reaching the desired audience. If the special edition was published in an engineering design journal, then it might not reach a civil engineering audience. If it were published in a civil engineering journal, then it would likely only reach individuals in one area (specialty, application, or silo). Ultimately, it was decided that the first workshop proceedings would be published as a book. Attendees and key members of the civil engineering community would receive hard copies of the proceedings by mail, while an electronic version of the proceedings would be made available on the internet to reach a wider audience. As the community and its literature matures, we will continue to pursue the possibility of a special edition journal or the creation of a dedicated civil design journal.

The working group also discussed the logistics of organizing the next workshop. It was decided that an official steering committee would be formed to share the vision of design-as-a-discipline in civil and environmental engineering, begin to define the goals of the community, and to organize the next workshop. It will take time for word about the DCEE workshop to spread. Thus, the next few meetings are expected to be small with perhaps 30 to 50 participants from at least 5 countries. The format of the presentations and proceedings at the next workshop were discussed and a number of models (papers vs. posters, number of presentations, format of presentations and discussions, etc.) from different meetings (EUSPEN, ICED, etc.) were presented. In the end, it was decided that the format of future meetings would be determined by the steering committee.

There were many offers and alternatives proposed for the venue for the 2nd International Workshop on Design in Civil and Environmental Engineering including: DTU, KAIST, MIT, NTU, WPI, and Texas Tech. The group agreed that it was important for the next workshop to be held outside of Asia to increase international visibility. It is likely that the second DCEE workshop will be held at DTU in Denmark with the hope of hosting the third workshop in the US and the fourth again in Asia (perhaps at NTU).

### **Increasing Industry Involvement**

The attendees of the first DCEE workshop came exclusively from academia or academic backgrounds. However, it was widely acknowledged that it is important to increase involvement from industry. Prof. Lotte Jensen noted that design thinking is an important part of management in large civil engineering firms. Thus, the group believes that there would be support from civil design firms for the civil design initiative. Unfortunately, this understanding does not extend to the engineering levels of the same

companies. This can be frustrating for graduates from civil engineering programs like DTU that expose their students to design thinking. And it underscores the need for increased dialogue with all levels of industry. It was also noted that "analysis generally belongs to academia but design belongs to industry." Thus, the importance of design-as-a-discipline may not be recognized by academia until industry joins the discussion.

### **Increasing Involvement from Architecture**

Although design-as-a-discipline in engineering is strongest in the field of mechanical engineering, design in civil and environmental engineering may ultimately have a much closer relationship with architecture than ME because of the nature of the problems that both groups address. Thus, the participants of the working group believe that the DCEE workshops may need to strengthen the involvement of architects in related activities and discussions. It was noted that architectural design and architectural engineering are different. One colleague asked if the group shouldn't focus its efforts on civil engineering rather than increasing the scope of the discussion. However, Prof. Lotte Jensen mentioned that there is a group of Nordic faculty members made up of architects who teach in engineering departments and engineers who teach in architecture departments. Members of this group may have very relevant and helpful insights into the DCEE community's challenges and interests. Thus, the next DCEE workshop may be scheduled to allow this group to attend.

### **Outreach and Education**

One of the major obstacles in building a civil design community is the lack of shared context when discussing design. Because the term "design" is not well defined within civil and environmental engineering, perceptions of civil design are often influenced by the strengths of other nearby design communities. For example, many members of the KAIST Department of Civil and Environmental Engineering associate civil design with Axiomatic Design Theory because of the strong ties that members of the department and the university president have with AD. Similarly, the views of many colleagues at Stanford University have been strongly influenced by the work and philosophy of the Hasso Plattner Institute of Design at Stanford (also known as the D-School).

It was proposed that a tutorial or series of tutorials be developed and offered to introduce colleagues in civil and environmental engineering to different views of and sub-disciplines within (engineering) design. These tutorials could be held before the next workshop to gather more participants

and help them to better understand the content and goals of the workshop, or they could be held in conjunction with the next workshop (perhaps a day or two before). Prof. Christopher A. Brown offered to hold a tutorial on Axiomatic Design for civil and environmental engineers. Prof. Derrick Tate offered to hold a tutorial on TRIZ. However, Prof. Chung Bang Yun from KAIST suggested having the tutorials focus more on design applications from civil and environmental engineering and not just on design theory. He noted that it might be easier to couple CEE with more design-orientated disciplines (like ME, industrial design, and architecture) once we had attracted the attention of other groups and individuals within the civil domain.

The group concluded that it would be nice to have 1 day of pre-workshop tutorials before the next meeting. It was suggested that perhaps 15 - 20 people would be needed to hold successful tutorials and that it might be wise to particularly target Ph.D. candidates rather than solely focusing on faculty members and engineers from industry.

### **Forming a Civil Design Society**

During the second working group, there was also an extensive discussion about where the DCEE community would ultimately live. Should a new civil design society be created? Or should the DCEE members become a sub-community under the umbrella of an existing organization? And if so, which one?

The Design Society was given as an example of an organization that presides over different groups and meetings like the International Conference on

Engineering Design (ICED). It was suggested that this might be a very good model as ICED also has a number of special interest groups, some of which are very active and meet for workshops at the ICED congress every other year. Another option would be to join an existing civil engineering organization like the Korea Society for Civil Engineers (KSCE) or the American Society for Civil Engineers (ASCE). However, there was some concern from the participants that we were hoping to create a truly international organization and that ASCE may not be international enough for that purpose.

It was noted that being associated with a larger organization would have a number of advantages, including increased visibility and better publicity. However, joining another society would also add constraints to our activities, tie the organization of our activities to the parent organization's staff, and require all interested parties to pay dues to the umbrella organization. There was an additional concern that existing academic societies might be a hindrance when trying to form relationships with industry.

In the end, the group concluded that the formation of a civil design society or the linking of the DCEE community to another organization was not urgent and that the decision should be made at a later time. For now, the focus on this group should be on the organization of the second workshop, particularly since the group is currently too small to need an official organization and it may be possible to gain the exposure that a larger society would bring without formally joining one.