

Building the Invisible

David Chadwick reports back on some of the many innovations unveiled and explored at SmartGeometry 2011, which this year took place in Copenhagen

The SmartGeometry conference is always one of the highlights of the AEC calendar, and this year's event was no exception. Even the location was well chosen - Copenhagen seems to be the venue of choice for European conferences at the moment, and this was my third visit in six months. This was also the first SmartGeometry conference 'under new management', the founding trio of John Parish, Lars Hesselgren and Hugh Whitehead having handed over the reins to Shane Burger and Xavier De Kestelier.

So it was nice to hear at first hand, before the conference got started, about some of the reasoning behind the decision to start down the GenerativeComponents road some 8 or 9 years ago - neatly summed up by John Parish, who stated that the GC experience changed his work in every building created afterwards. This was confirmed by Hugh Whitehead, who explained that the level of technology available at that time caused frustrating technical problems that could only be solved using logic, instead of just geometry.

CLUSTER WORKSHOPS

Sg2011 followed the usual pattern, with 10 clusters - each with twelve participants - working together to solve some interesting problems. Competition to run the clusters is growing, with a large increase in the number of highly qualified architects setting out how they propose to solve those problems, and hundreds of applicants to join the clusters. Competition was therefore rife, with only the very best from around the world being considered.

The clusters joined four days before the conference, and set themselves up in the Royal Danish School of Architecture, the hosts for the conference, where they could

work on their projects, preparing them for the conference proper. It is a measure of the importance they attached to their work that they achieved so much of value in a short space of time, working long hours, and in most cases through the night to be ready for the final presentations.

BUILDING THE INVISIBLE

The sg2011 concept is that vast streams of data offer a rich resource for designers. User data, energy calculations, embedded sensing, material and structural simulation all allow designs to be more responsive to people's needs - not separate from the environment but inhabiting an ecological system that is open, dynamic and interdependent. We now have the chance to instil design with an immanent intelligence, creating new relationships between the user, the build and its ecosphere. From the simulation of megacities to the solid modelling of material systems, design has the potential to be informed by the real.

And what a wealth of material was drawn out of such an abstract premise - exploring design using real world data! Following the workshops, a Symposium was set up in the IT University of Copenhagen, using a talking shop format that encouraged everybody to look at how data is used in design. When does data become knowledge, how do we generate data - and does data ever 'lie'?

The talking shop element extended beyond the conference venue, using all of the latest social networking tools - sgcommunity, sgvideos, even sgtweets via Twitter - to allow questions to be raised by anybody watching online or in the audience. Each project was presented by the Cluster leaders in turn around the 'Round Table', where they looked at

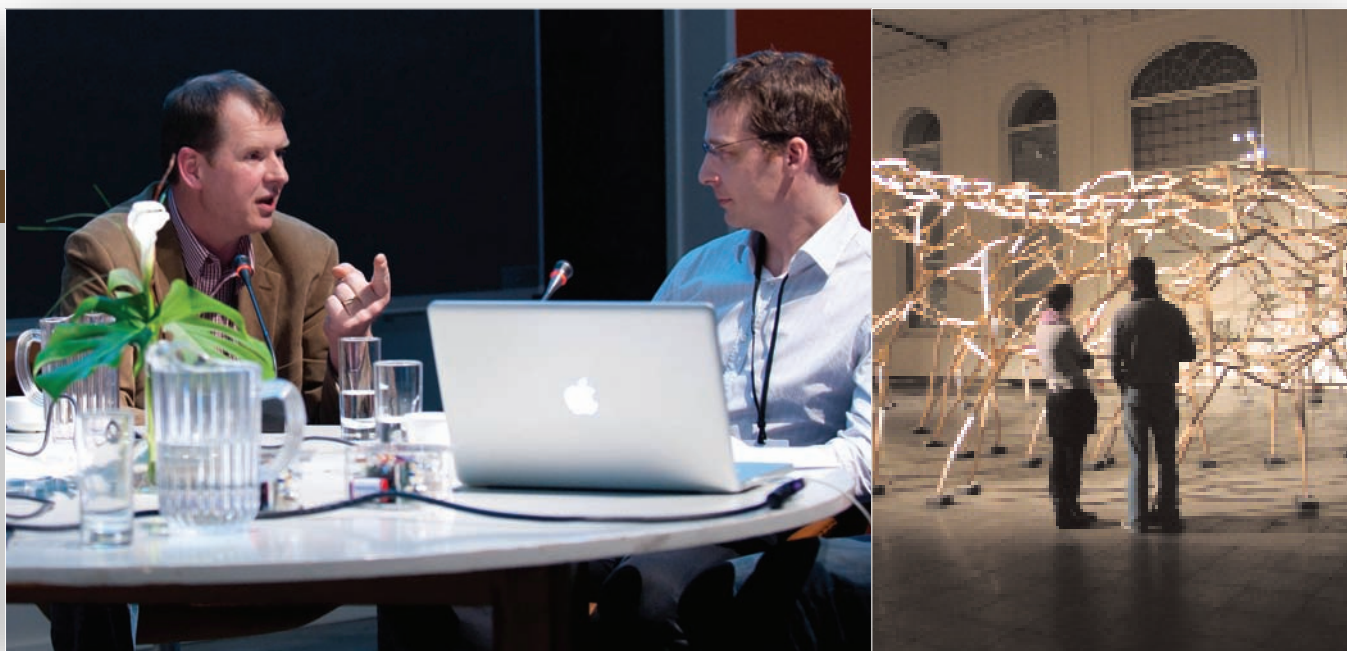
different aspects of 'Building the Invisible'. Getting through each Cluster project and fitting in presentations from other GenerativeComponents users, as well as conference sponsors, caused the same old problem as other SmartGeometry conferences - running out of time! - but there were few complaints thanks to the wealth of content in each presentation.

That also raises the problem of extracting the pure gold from the melting pot of each presentation. With so much 'data' being created and pumped out, the very best I can do here is to highlight a couple of areas that I found particularly interesting. You can however also watch full videos of each presentation on the official SmartGeometry 2011 website, www.smartgeometry.org.

PICKING THE PLUMS

Having a lifelong interest in maps, the first presentation by Bruno Moser of Foster + Partners was particularly interesting to me, as it discussed the way in which maps were somewhat distorted because of the limitations of their format. It was argued that besides showing the geographical positioning of data elements, they should also show data in different formats - maps based on the number of houses in an area, or on the values of each house, overlain over road grids, and which would look entirely different to what we're used to.

Besides being a handy phrase to impress your workmates with, 'Topology Optimization', as explained by Ole Sigmund of the Technical University of Denmark, is a technology that is used in Aerospace - discretisation using FEA to calculate optimal material distribution in something like a wind turbine, automobile body or even micromachines and



reconstructive surgery (sg2011 is not constrained to mere architectural issues) allowing high and low stress areas to be coloured differently. This results in an interesting phenomenon: the calculation proved that more weight could be saved on, say, a wing, by designing struts rather than resorting to the normal method of saving weight yet retaining strength, by cutting out a series of holes.

This was neatly demonstrated in the workshop models they built, and which everybody was invited to inspect at an evening reception during the conference. With the subtext 'Optimal is beautiful', they showed a topological optimisation flow-chart, looping the project through goals for engineering, topology, physical constraints, and also the architects vision until all were satisfied.

Kyle Steinfeld of UC Berkeley put forward a case for defining better parameters for data input into design, stating the obvious, but relevant fact that "Data is data because it is available." He initiated a discussion on sunshades and the use of solar data by referring to biochemically responsive buildings. From graphing overheated regions of buildings he was able to lead onto the design of different types of shades - windows, slats, shades and louvers, with examples of each. He commented further that climate data is consistently structured,

but often incompatible across formats, when what is needed is a user configurable parser to provide data on an open platform.

The presentation was followed by two leading Danish architects, 3XN and Bjarke Ingels Group (BIG), both of them working with green materials and advanced geometry to develop new ways of designing that are more appropriate to today's needs.

Guldager Jurgensen of 3XN made the valid point that the first 10-20 days of a project are of utmost importance, and explored how we quantify and qualify dialogue between architects. Armen Menendian of BIG asked the pertinent question 'what is the role of the designer if data drives the design?' Do quantifiable data sets get prioritised over more intangible qualities? They illustrated these views with examples from their own work.

Keynote speakers, Craig Schwitter and Gijs Libourel of Buro Happold spoke about their firm's work on low energy and high performance buildings - a key area of technology development across its worldwide portfolio of projects. Under Craig's direction the firm has developed the Adaptive Building Initiative and G. Works, both addressing today's critical low carbon and high performance building design issues.

A fascinating presentation was given

towards the end of the Symposium by another keynote speaker, Usman Haque, demonstrating his created responsive environments; interactive installations, digital interface devices and mass-participation performances that he puts on around the world. Check out his next performance in the UK, following a very successful one in Bradford that had groups of people stamping their feet together to create 'rainbow waterfalls'!

Besides designing interactive physical spaces Haque is also director of haque design + research and the founder of Pachube.com, which you really should visit, as it is a valuable source of environmental and other data from amateur and professional observers around the world.

CONCLUSION

A quick dip into a content packed conference then. You can visit the official conference website, below, for a fuller flavour of the event. Better still, book your seat for next years conference, which will be held in the Rensselaer Polytechnic Institute, Troy, in upstate New York from 19-24 March 2012, and become an active member of a unique gathering of the global community of innovators and pioneers in the fields of architecture, design and engineering.

www.smartgeometry.org