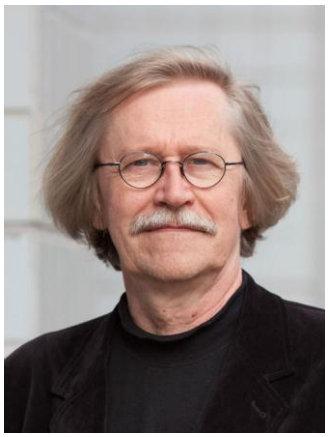

Intervista a Arto Kiviniemi

Professor Arto Kiviniemi, Head of Design Directorate in the University of Salford, has developed Integrated BIM in Finland and internationally since 1996. Internationally Arto's main activities have been related to the buildingSMART, but he is also a member in the Construction Industry Council BIM Forum in UK, ASHRAE's BIM Committee, and FIATECH's Academic, Interoperability and European Advisory Committees. Arto has been a member of Advisory Committees of CIFE at Stanford University 1999-2005 and the Chairman of Salford Centre for Research and Innovation 2002-2009. He has presented over 90 keynote and invited lectures in international events since 1996. In March 2009 Arto received FIATECH CETI Outstanding Researcher 2008 Award for his international merits in developing integrated BIM.

1. **Professor Kiviniemi, what does BIM do BETTER THAN THE TRADITIONAL DESIGN SYSTEMS…**

   The traditional design systems are based on documents; 2D drawings, schedules, specifications, etc. This creates two fundamental problems: 1) The complete information of any building component is scattered in several documents. Any change must be updated in all of them, there are a lot of changes in the process and the end result of this is that the design documents are not coherent. 2) Modern buildings are complex 3D products and coordinating the different design disciplines is using 2D drawings is very difficult and time consuming. Both these problems lead to mistakes and change orders, i.e. additional costs, and as we all know budget overrun is very typical for the construction industry. BIM provides a solution to both problems when used correctly. Any change in the model is automatically reflected in all documents generated from the model, which leads to coherent documents. Merging the different domain models - architectural, structural, mechanical, etc.- improves coordination. We can find the clashes easily, both visually and using automated clash detection which is available in several software products. Even checking the correctness of the content of the models - "spell checking for models" - is possible when using certain software, like Solibri Model Checker.

2. **What BIM is and what it is not?**

   We can define BIM in several ways: 1) Building Information Model, i.e. a digital representation of a building to facilitate exchange and interoperability of information in digital format. 2) Building Information Modelling i.e. the process of generating and managing building data during its life cycle. 3) Building Information Management, i.e. the process of creating, using and maintaining digital information for the integrated design, construction, operations and maintenance of buildings. To me the last one is the best way to approach BIM. Managing the information is the key issue. In addition, BIM is not about buildings only, so maybe we should actually speak about AIM - Asset Information Management - to cover clearly also the infrastructures.

   What ever is our definition, BIM is neither a shrink-wrap software package you can buy, nor a magic solution to the problems of our industry. As said above, the benefits require correct use of models. If we use models just to produce drawings, but do not change our working processes or collaboration methods, we gain only little of the potential benefits. BIM is a fundamental process change, an efficient communication media, a technology enabling improved integration, collaboration and management of information and making virtual prototyping of buildings financially feasible. However, it is only an enabler, most benefits require also changes in the processes and business models.

3. **Where can the construction industry go with BIM?**

To answer this shortly: Improved productivity and quality on lower costs. Other industries have used similar technologies for a long time and we can see the results for example in cars if we compare the current products and their quality and price to what we had 20 years ago.

The main point is that we must learn to collaborate and utilise the collective knowledge of the team. A great example of this is Integrated Project Delivery (IPD) which was originally initiated by Sutter Health in California and now emerging in USA. IPD aligns the goals of the project team by providing financial incentives to all participants to optimise the whole instead of the typical sub-optimisation and maximise the added value instead of trying to minimise each project participants' efforts, which is caused by the typical low bid culture in the construction industry.

4. **What benefits are we trying to achieve with BIM?**

This is a question each company must ask themselves. The answer depends on your business area and is different for architects, engineers, contractors and owners. Even within a domain there is no one answer to it. Do you want just to comply with the minimum requirements on the market place or achieve some competitive advantage? However, the main goal on project level should be clear. As the National Agency for Enterprise and Construction in Denmark put it: "I don't want a better model. I want a better house and more value for money!"

5. **Is BIM about technology or PEOPLE?**

As said, although technology is necessary, it is still only an enabler. The change is much more about the people and processes. BIM can make problems in the processes more transparent, but people must want to collaborate to solve the problems. Technology cannot do it.

6. **HOW CAN BIM POPULARITY BE SUPPORTED AND POSTED, IN SPITE OF ITS INITIAL DIFFICULTY AND THE RELEVANT INVESTMENT COST FOR LEARNING AND TRAINING ?**

In my opinion the initial difficulties and costs of BIM adoption is often exaggerated and used as an excuse not to start doing it. BIM is not rocket science. Anyone who can design buildings and manage a construction site can learn how to use BIM. It is more about the attitude than about real problems. Of course there are some costs, but compared to the benefits those are relatively small and the return on investment (ROI) can be very good. In one of our recent BIM seminars Skanska told that in one of their hospital projects in UK the ROI from BIM adoption was 5:1.

A typical mistake is to assume that all what is needed is to buy software and hardware. Doing that without proper education and training can be costly, because then the learning process can be really slow and in the worst case user problems can lead to rejection of BIM. Steep learning curve is essential.

7. **What about the BIM adoption in USA and Europe?**

Northern Europe, especially Finland and Norway, and USA have been early adopters of BIM and are very advanced in the use of BIM. However, currently UK is catching up very fast. Mainly because of the UK Government's new construction strategy which was published in may 2011. It requires fully collaborative 3D BIM with all project and asset information, documentation and data being electronic as a minimum by 2016. This has created great interest in BIM and all professional organisations and major companies want to position themselves high on the BIM arena.

8. **WHICH THE SPECIAL MOTIVATION FOR ITS ASSUMPTION BY THE SENATE PROPERTIES OF YOUR COUNTRY, FINLAND ?**

Senate Properties in Finland and GSA (General Services Administration) in USA were the first large owners starting to require BIM in their projects in 2007. Senate Properties started to test integrated BIM already 2001. The first project was the new main auditorium of Helsinki University of Technology (now called Aalto University). The project gave enough positive results to continue testing and in autumn 2006 Senate Properties made the decision to move to BIM. The first task was to define what was meant by BIM and what the deliverables in different phases should be. The main motivation to them was to support the decision making in the investment process, so we analysed the process; what information was needed and when, how BIM could improve the information and what was the market readiness, i.e. designers ability to use BIM to provide what was needed. The outcome was documented in the Senate Properties BIM Guidelines 2007, which was also translated in English and has been used as the basis of many other guidelines globally. In 2012 these guidelines were updated to COBIM 2012, Finnish National BIM Requirements.

9. **Is collaboration related to BIM possible between industrial and academic institutions? HOW and in which domains may occur and be promptly effective ….**

I would say that it is not only possible but absolutely necessary. The traditional roles are that academic institutions provide education and research to the industry. This is of course still relevant also in the BIM environment. However, BIM is developing very fast. Both the software products and their use in the projects change rapidly and many of the BIM innovations happen in the advanced companies, so the universities must also learn from companies. Using visiting lecturers from the cutting-edge companies motivates the students and gives plausibility to the message about the importance of BIM. The collaboration is needed on all traditional domains, but the new issue is the ability to collaborate on a much higher level than traditionally. It is important that the education also gets rid of the traditional "silos."

10. **How can BIM improve the decision making?**

The first main benefits are improved communication and shared understanding. Traditional drawings are very difficult to understand for typical clients and they had to rely on the explanations of the designers. BIM provides high quality visualisations which are easy to understand, so the clients can see and understand what they are going to get. The second main point is the possibility to analyse and simulate different aspect of the solutions; environmental impact, thermal properties, indoor comfort, acoustics, functions, investment and lifecycle costs, construction process... In the early stages this helps to compare the alternatives and the trade-offs between different, sometimes contradictory requirements like energy efficiency and investment costs. Later in the process analysis and simulation tools give the possibility to verify that the design follows

11. **Can you give us some examples of advanced use of integrated BIM**

This is a tough question. There are so many companies and projects using integrated BIM in advanced ways, that any examples inevitably ignore many equally advanced cases. So the following is not trying to establish the list of world's best BIM companies but just some examples. I can also highly recommend the 2nd Edition of BIM Handbook by Eastman et al. It documents several great examples of advanced BIM projects.

Skanska has their Global BIM Competence Centre in Finland. The reason is that they started to use BIM early and especially in their own residential production. This is somewhat exceptional because

most people still think that BIM is for complex mega-projects only. It is not true and Skanska's example shows that you can use very advanced BIM in small projects too. The points I want to emphasise in Skanska's case are 1) Systematic use of BIM to manage quality and reduce errors throughout the process - what they call zero error process. 2) Clear implementation strategy and defined BIM usage on different levels helping the business units to decide what to do in each project. 3) Use of detailed BIM in site and safety planning to reduce the risks and accidents. 4) Use of environmental analysis throughout the process starting simulation already in the early stages. According to Skanska the advanced use of BIM in the residential production has increased the profit margin by 45% and reduced waste by 45%. Skanska's BIM usage does not limit to their residential projects, their new Headquarter building won the latest Global Tekla BIM Award.

Another Finnish company I want to bring as an example is Granlund, the leading Building Services engineering office in Finland. They started to develop their BIM strategy in early 1990s and since 2004 have done all projects using very advanced BIM. The company has developed an integrated BIM platform for information management, covering the whole lifecycle from requirements setting to facility management. The company does not try to reinvent the wheel, so they are not developing any software that is available in the market, only the missing pieces to integrate different tools for their workflow and even for the Reporting Building concept, which merges the virtual and real building for facility management and operation. The strategy has led to collaboration with the leading universities and become a great business model providing the company clear competitive advantage and growth potential even in the financially difficult times.

The third example I want to bring up is DPR Construction in California. There are many contractors using advanced BIM in USA, but in my opinion DPR is clearly one of the most innovative organisations in the use of BIM. They clearly utilise their close relationship and location with Stanford University - an excellent example of mutual benefits of the collaboration between the industry and academia - and have moved from modelling just the end product into combining Lean Construction and BIM by modelling the production process on a very detailed level.