

Top 5 themes to promote architectural information technology and top 5 obstacles to decelerate it

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The objective of this paper is to scan a few interesting themes, features and ideas of current information and communication technology (ICT) to promote their wise use within the fields of architectural practice and architectural education. The core idea is to prepare for the future by understanding the future relevance of the dominating themes.

The meaning and significance of the selected and presented common ideas is evaluated to strengthen a realistic future basis for the design discipline.

The author finds organizing, structuring and sharing architectural design data with digital tools the most future-relevant ICT-theme, that should be supported with R&D-activities and taught in architectural ICT-education.

The obstacles of digitalization to produce negative impacts to architectural profession seem to be of mental nature rather than technical. The human mind, juridical agreements and long-lived design traditions are possibly the most threatening and restrictive obstacles in the future.

The selected top 5 methods in evaluating existing trends and features has been used for instance in futures studies as one systematical approach to chart history and current times as informants of the future (Bell, 1996) [1]. A pragmatic and personal approach has been used in selecting the themes.

Keywords: *architectural information and communication technology (ICT), ICT-trends, future studies, future relevance*

Prolog – some historical remarks

Digital tools mass production enabled the digital revolution. The expansion process, which started around 1978..80, has made the computer a common multi-purpose tool. Currently the digital media and culture has its roots widely in human activities all over the western world (Negroponte, 1995) [2], also within the architectural discipline.

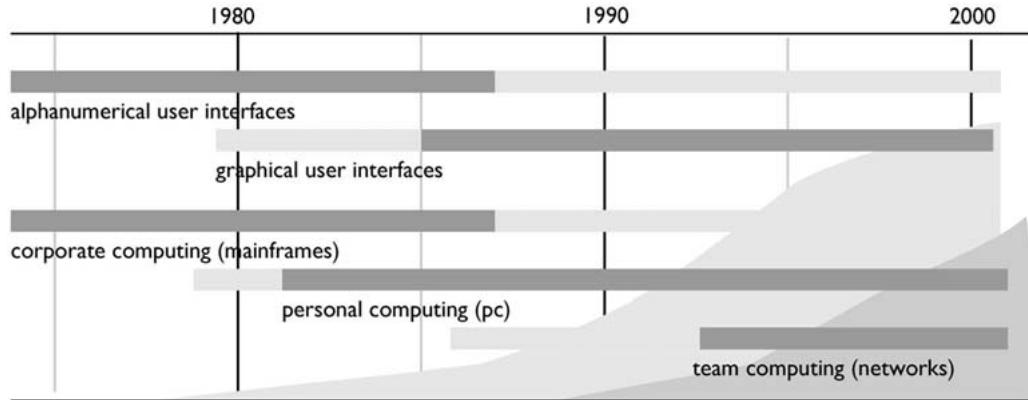
The early days of our digital history (from the 1940's to the 1970's) were ruled by alphanumerical keyboard controlled hardware tools. From designers

viewpoint, the technology leaped giant steps towards usability with the evolution of the graphical user interface. First invented at Xerox PARC late 1970's, then mass-produced and distributed for instance by Apple and Microsoft during the 1980's and the 1990's.

Not only the mass production of computer hardware and software, but also the heavy marketing of customer-oriented software products has accelerated the widespread use of digitalization during the 1990's. Let Microsoft and AutoDesk be some examples of it.

Together the mass production and a graphical

Figure 1 (right). The digital revolution has changed the working environment during the last two decades. The trends have merely added new features to existing trends than replaced some others.



user interface have sealed the inevitable fact, the success of architects' digital tools during the last two decades – one can hardly manage to run an architectural practice nor education without digital gadgets any more.

The well recognized fact within computing has been a communication aspect and networking during the 1990's. The personal use of digital tools seems currently to develop towards team and group based activities. For instance every third ecaade-paper in Paris 1998 dealt with networking, Internet or team-work.

Top 5 positive themes to promote it [ICT] within architecture

The presented themes have been selected purely from personal basis and experience. The intention has been to find out the most important ideas of our technology driven times, to support positive evolution of architectural practise and education.

1. The "invention" of an object

First there was digital text, then somebody created a digital line – a most simple and perhaps therefore also very efficient graphical entity to express architectural ideas with bits and bytes.

An object is a natural step in the chain of digital

data structures' evolution: alphanumeric – vector – object. An object gathers "related things" into a single conceptual entity, which can be used in design.

Objects lead us towards more useful design information management. Objects became available during the 1980's. Not only high-end tools such as professional CAD, but also common market office-software seems to develop towards object-oriented features currently.

I regard the future relevance of designing with objects high, due to their natural character. Architectural entities, not only graphical but also conceptual, can easily be modeled with objects.

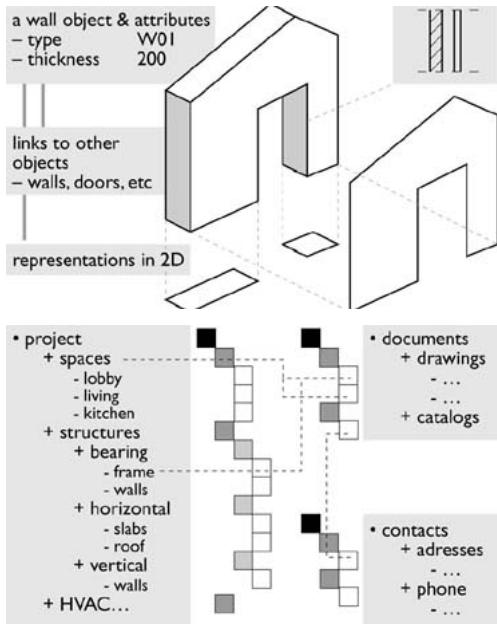
2. Organizing data

Organizing data with hierarchy

A positive and usable application of hierarchy is the outlining-feature of some software (More/Mac, Word & PowerPoint). The outlining allows the user to organize and structure his thoughts ideas and data to create a logical structure, although the outlining does not seem to be too widely used.

Outlining features could be even more usable, if arbitrary cross-reference links could be used.

One drawback in the use of outlining is its strict hierarchy, which I regard mainly a negative feature (see further). Therefore the dualistic nature of hierarchy reminds us of the reality "out there" – the



real world is not black-and-white, it is possibly grey.

Organizing data with layers

Layers are used to organize and structure design and building information into flexible, modifiable and desired patterns. Layers are currently definitely one of the most important digital themes within the area of architectural design and CAD.

Layers have been available practically in all CAD-packages. Recently layers have been adopted as have other graphical oriented software tools (such as PhotoShop, Freehand, Illustrator...).

Could the layers also be adopted into alphanumeric or object oriented software tools?

The future relevance of information structuring tools and methods is definitely even more remarkable in the future than it is today. Large construction field R&D efforts, both international [3] and national Finnish Vera [4], have been raised during the last 10 to 15 years.

If just one relevant future theme should be

selected, I would choose data structuring the most important and promising for architecture of the next millennium.

3. Sharing data

Sharing data with programs

Combining traditional data types – a/n, vector & pixel graphics – into a multimedia mixture, is highly usable in traditional architectural context.

This feature is available for instance in multi-purpose software (Claris Works, MS/Office, etc.) and in several graphic packages (Corel, Freehand etc.).

A close relative to multimedia is the ability to link conceptually relevant topics and things together. Linking started to flourish in a wide sense in hypertext, hypermedia and in the www-environments during the 1990's.

Sharing data with other users

Team-work-based methods have been a natural constellation within the architectural design tradition. Despite the glorious triumph of personal computing in 1980's, team-based working methods with computers have become available for the masses just recently.

In the digital pre-history (1960's and 1970's) "time sharing" used to be "the big thing" due to computing capacity restrictions. In the digital near-history (1970's and 1980's) "data transfer" was the key issue because data had to be transferred back and forth between separate applications. Currently (1990's) our tools can "share data" with our other tools. Even more



Figure 2 (far left top). An object is a highly usable and natural package of digital data.

Figure 3 (far left bottom). Hierarchy can be used in structuring ideas and information.

Figure 4 (bottom left). Layers are the most popular data structuring method in organising architectural information.

Figure 5 (right). Natural evolution of data transfer, sharing data between personal applications and team-work information management.

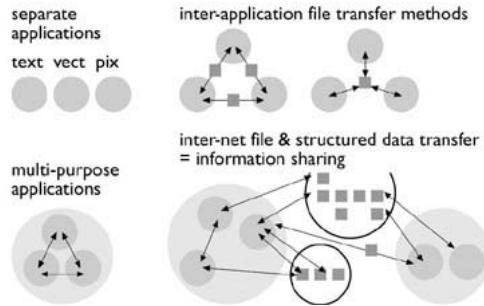
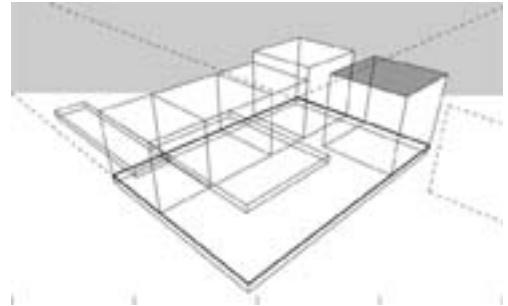


Figure 6 (far right). Spatial design and walkthrough – virtual existence inside the sketches.



remarkable is that we can share data also with the others – the fruits of networking.

The future relevance of information and data structuring tools and methods is definitely remarkable in the near future. We are still more accustomed to produce and deliver documents with ICT, rather than structuring and sharing design information. The importance of architectural data is essential, since it has always contained the most precious core of the building data, the basis for the whole construction process.

4. Spatial design with 3D-modeling & VR-technology

The evolution of computing hardware and software finally enabled one of the most profound architectural needs – the spatial design & visual analysis – during 1990's.

Flexible spatial design features are currently available in modeling tools and walkthrough software (Virtus, ArchiCAD 6, 3DS).

The evolution of 3D-modeling will quite obviously present methods of real time VR-modeling to masses soon.

5. Viewing several patterns simultaneously – transparency

One architecturally promising feature of 3D-themes has been transparency – the possibility to view several conceptual layers of information at the same time or just “see through things” as it appears in 3D.

Transparency resembles traditional architectural sketching media, and therefore it is a natural designer's choice. Transparency theme is also a distant relative to organizing data with layers.

I feel that the constantly growing modeling capability of the digital machines will be well adopted among the traditionally thinking architects.

Top 5 obstacles to decelerate it [ICT] within architecture

Not only positive ideas, themes and trends form the future of architectural ICT, but also negative features threaten the potential evolution and development.

1. The human habits

Our deep-rooted habits within architectural practice and professional problem solving often tends to restrict the innovative use of digital technology.

Or perhaps our habits are not really an obstacle – perhaps it is the computerized media that is just too far away from our architectural tradition?

2. The fundamental difference of the disciplines – architecture vs. ICT

The information technology follows its own well structured procedural logic. Us human beings on the other hand tend to act, not always so rationally, but more simultaneously and in an arbitrary way. The new tools also seem to be just a bit too complex for us.

Not only the constantly multiplying complexity of

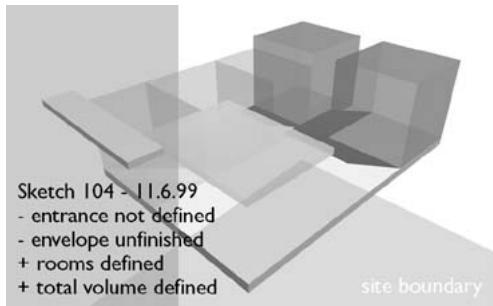


Figure 7 (left). Transparency method allows the architect to combine separate data structures.

digital technology, but simply it's fundamentally different nature with the architectural tradition, may limit an active combination of these two areas.

Spatial 3D-modeling and easy, natural virtual presentation could bridge the gap between traditional architectural design discipline and digital high-tech culture.

3. Hierarchy

While doing design work, human beings tend to link their thoughts into arbitrary networks, rather than using hierarchy in organizing things (Alexander, 1965)

Luckily we finally seem to have also some human structuring tools, for instance at the operating system level (advanced find features, aliases, links, etc.). Definitely, my mind does not want always to go back to the root-directory.

4. The widespread use of vector graphics

CAD has so far been used basically in drawing and documenting for a few decades – like very traditional architectural presentation tools. Therefore, we certainly have not used the best possible features of CAD-systems yet.

5. Dominating market leaders

Due to their huge commercial benefits, the dominating marketing leaders, especially in software business, do not always support the most innovative or clever practice, but rather mediocre ordinary use of their tools.

On the other hand it is contradictory, that the leaders also promote the use of ICT with their products (see the first positive idea). A coin has always two sides.

The method used

The presented themes have been clearly visible and obvious during the last two decades. By systematically observing and evaluating them, we begin to form our near future as actors, not passive outsiders. The scanning of some weak signals – possible hints of vague and still invisible trends – could also help us today in preparing our architectural community for the future.

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