Information and Communication Technology, ICT, in the Building Process - Competencies and change

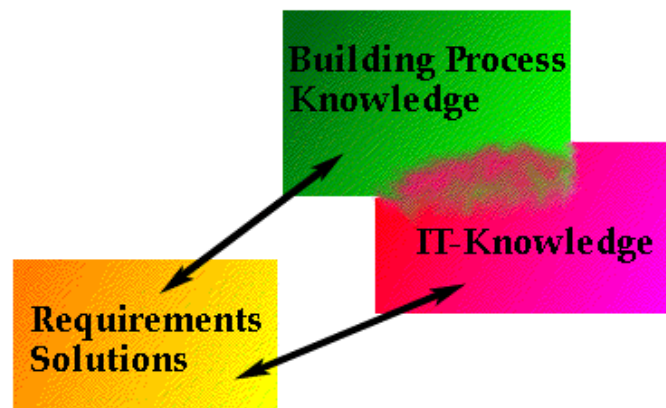**Prof. Per Christiansson**
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These pages
http://it.civil.auc.dk/it/presentations/ida_14_9_2000.pdf

Ingeniørforeningen i Danmark (IDA)
"Kvalificering af lærere ved ingeniøruddannelserne inden for IT-området"
København 14-09-2000, IDA

- Builders must know some basic IT to be able to formulate requirements on and participate in the design and implementation of tomorrows building process IT-tools.

- The IT community cannot (should not) by themselves build tomorrows AEC tools.

Aalborg experiences

Aalborg IT Building activities
- *Civil Engineering education. Open education. A&D.*
- *Teacher/secr. education.* Learn to produce learning material (lectures, exercises, self assessments, project work support). Changed pedagogics and ICT tools for tutoring and communication support with students
- *Courses material* development. Web supported. Support for design, analyses, simulation, planning, …
  Collaboration and project work support development. Communication, networking, application sharing, project documentation and delivery.

Use of IT in the building process.
- *The whole building process*. Sketch/concept, design, construction, operation&maintenance, use, recycling
Models/modelling - product, processes in product, external links to the design-build process (authorities, suppliers, transport, - GIS)
Improved IT-support. Knowledge management, communication on all levels, decision support, planning, information handling, intelligent building, collaboration, systems design and integration.

What is special with ICT in building?
- a very *complex* and non-stationary process. (The Big challenge for computer science in collaboration, Stanford experiences)
- *teamwork* involving many competencies put together for every project
- broad spectrum of *applications and ICT* support (analyses, simulation, modelling, logistics, embedded systems, visualisation, decision support, information handling, …)

What should the students learn?
- Skills in the *join* between ICT and Build knowledge domains
- *Specialist* skills in different areas
- *Team work*
- *Non engineering* subjects (e.g. cognitive science, computer science)

Needed teacher ICT building process competencies
- Handle new and/or changed *building process applications*
- *Improved working methods* . Pedagogics, collaborative learning, PPBL, distributed learning
- *Basic and special ICT tools knowledge* - databases, collaboration tools, digital publishing

IT definition
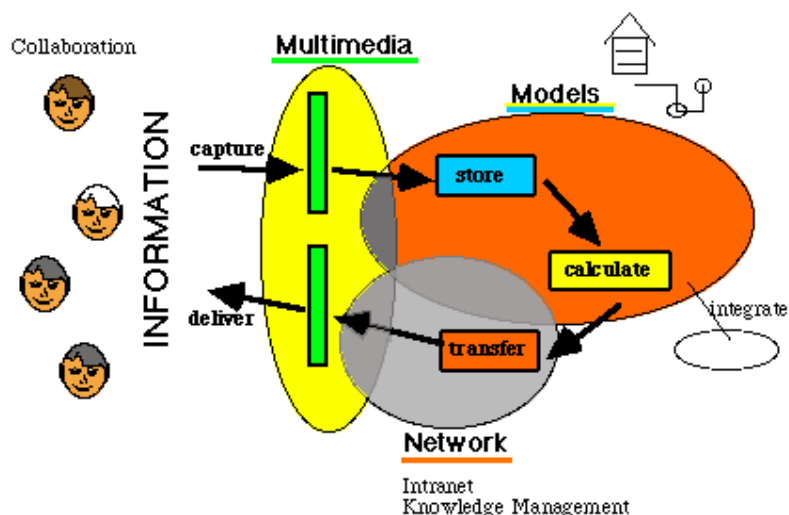
Per Christiansson 27.4.1998 [27.4.1998]

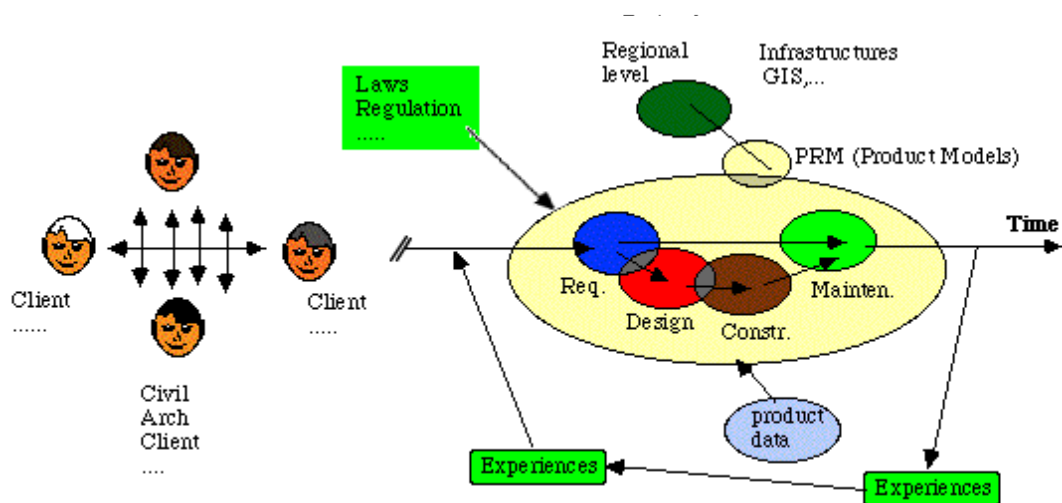## Working areas and qualifications of future engineers
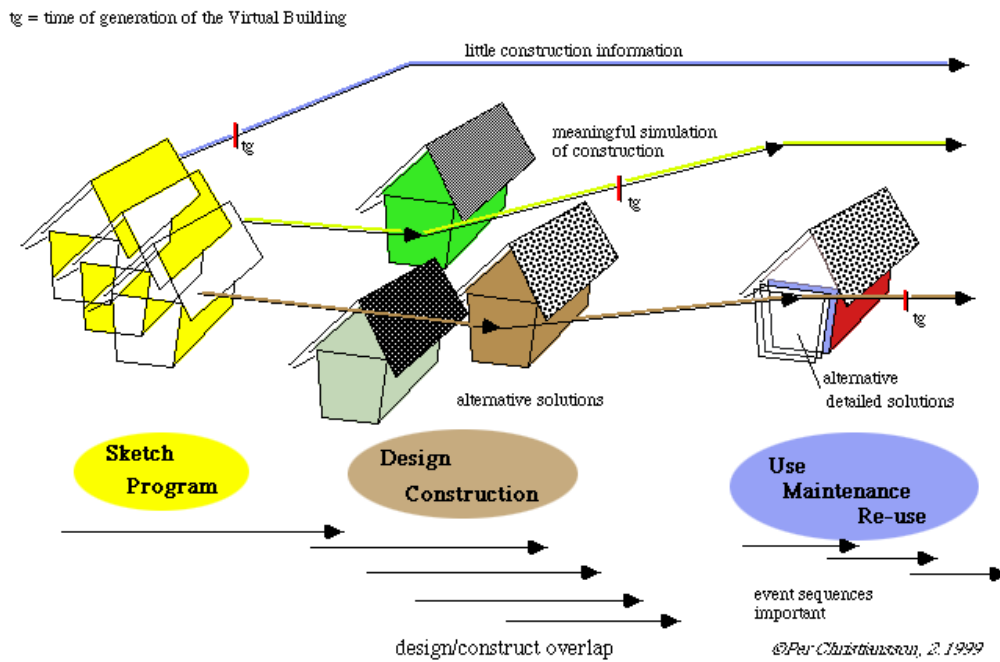
Working areas (from IT perspective)
- IT strategy formulations
- requirements analyses
- vision formulations
- knowledge management
- conceptual and data modelling
- data structuring
- intelligent artefacts (buildings) design
- product life cycle analyses
- IT tools design and integration
- collaborative multidisciplinary design

Qualifications (from IT perspective)
- knowledge representations (types, properties, usage areas, integration)
- modelling (including meta-modelling and temporal properties)
- IT tools knowledge (including multimedia interfaces, communication formats)
- routine/innovative/creative design
- organisation change management
- cognitive science (user models, language, thinking)
- human computer interface, HCI, design
- learned to learn
- deep understanding of principles
- global approach and holistic views
- collaborative work, team building, and project work
- understanding the global market demands
- understand and accept other specialities (also horizontal)

Whole Process

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tg = time of generation of the Virtual Building

little construction information

meaningful simulation of construction

alternative solutions

alternative detailed solutions

Sketch Program

Design Construction

Use Maintenance Re-use

design/construct overlap

event sequences important
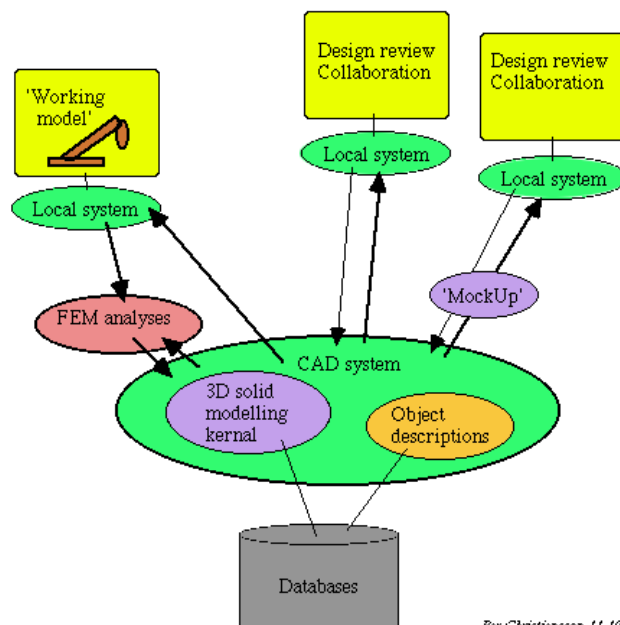
©Per Christiansson, 2.1999

It is envisioned that the Virtual Building, VB, will

- be used during the *whole* virtual and real life of the building

- be *regenerated* ('tgen') at different time points during design

- contain information about the final building product on certain detail *levels* and for *alternative* solutions/versions

Per Christiansson 18.5.1999 [18.5.1999]

'Working model'

Design review Collaboration

Design review Collaboration

Local system

Local system

Local system

FEM analyses

'MockUp'

CAD system

3D solid modelling kernal

Object descriptions

Databases

Per Christiansson 11.1999

Manipulating Virtual Protoypes.

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Lund University 1996. Distant collaboration over Internet with video over CuSee me reflector.

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     theme year 1: Distributed Information Systems
     theme year 2: Models and Communication
     theme year 3: Integrated IT in the Building Process

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