ICT I Dansk Högskoleutbildning

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Aalborg University
http://it.civil.auc.dk

Lärarkonferens - ICT i byggande och förvaltning.
Lunds Universitet. 8 december 2003

CONTENT

- Who are we - AAU?
- ICT Building education in Denmark
- The AAU model, PPBL
- ICT Building Courses AAU
- Experiences
- Motivations and success criteria
- References

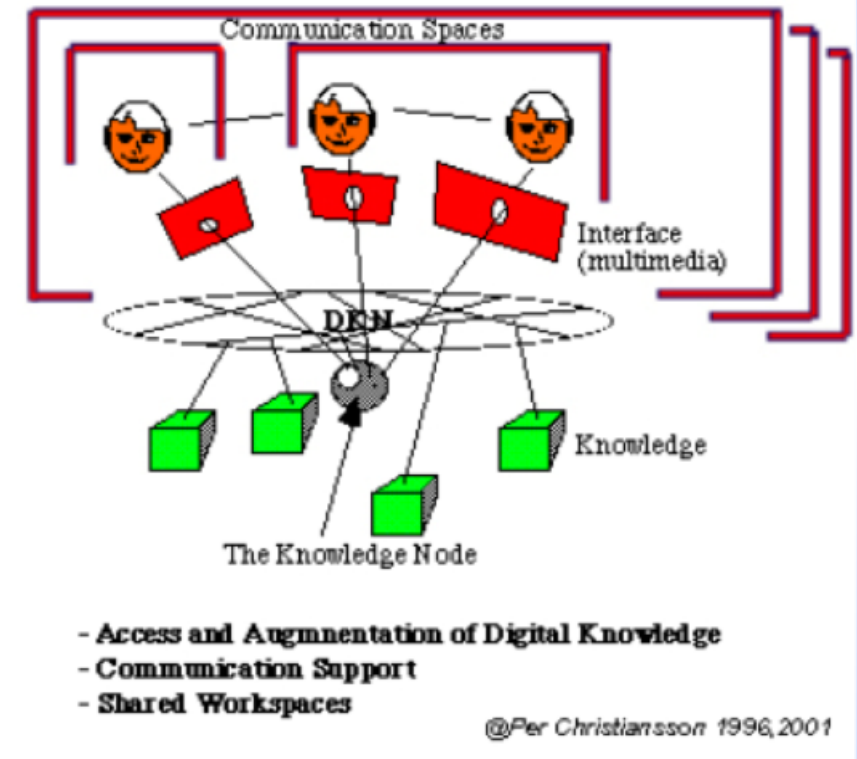
IT IN CIVIL ENGINEERING AAU

IT in Civil Engineering AAU

Inaugurated in 1974, Aalborg University now has about *13,000 students*. Teaching and research are conducted at the highest level in the fields of engineering, natural sciences, social sciences and humanities. The university's annual budget is in excess of *750 million Danish kroner*.

RESEARCH FOCUS

The Knowledge Node Concept



- ***Participants***; number of, type (persons, agents
- ***Collaboration subject/context & Form of interaction***; design, reviews, purchase, learning, brainstorm, negotiation, discussion,
- ***Communication content*** to support interaction; e.g. speech, sound, images, music, video, whisper, body language, 3D objects, control information;…..
- ***Meeting spaces*** and room definitions; physical, virtual, static, dynamic, mobile and combinations.
- ***Collaboration artefacts***; communication channels, user applications, and information containers

R&D at IT in Civil Engineering
Aalborg University

http://it.civil.auc.dk/it/projects/

Research areas at IT in Civil Engineering

VIRTUAL BULDINGS AND IT-SUPPORTED COLLABORATION

KNOWLEDGE MANAGEMENT AND KNOWLEDGE TRANSFER

INTELLIGENT BUILDINGS AND DIGITAL CITIES

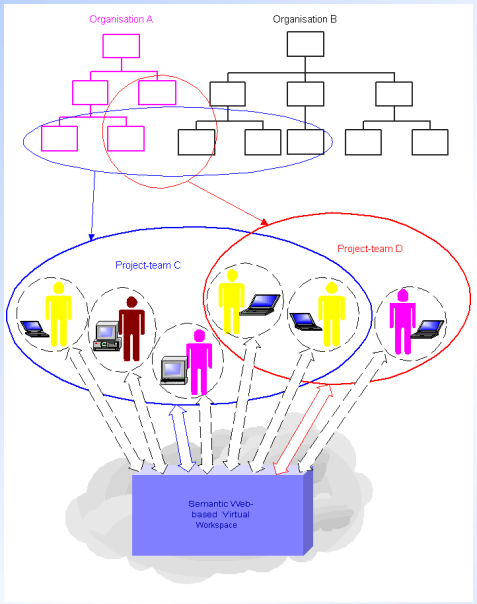
Master thesis examples

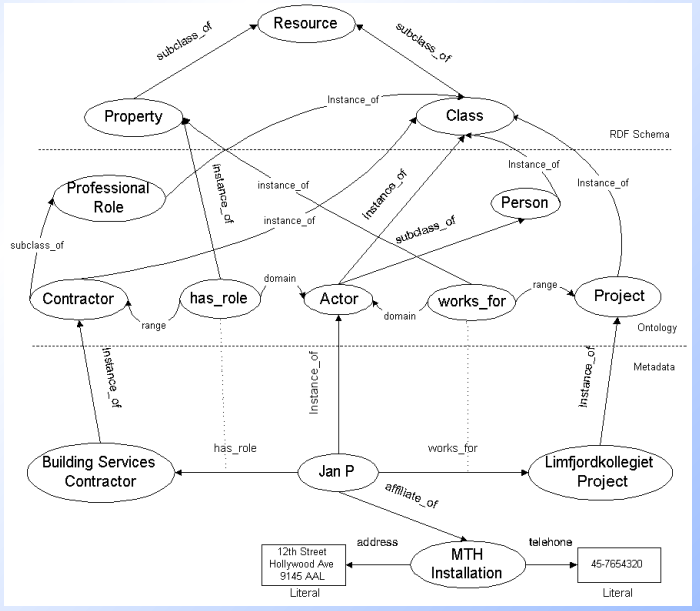
- Anvendelse af metadata I byggeprocessen
- Optimering af leverancekæden i byggeriet
- Knowledge Management in the building process
- Fremtidens digitale byer og bygninger

R&D at IT in Civil Engineering 2/3

VIRTUAL BULDINGS AND IT-SUPPORTED COLLABORATION

- **IT in Collaborative Building Design.** PhD project Yoke-Chin Lai within Danish Center for Integrated Design. CID



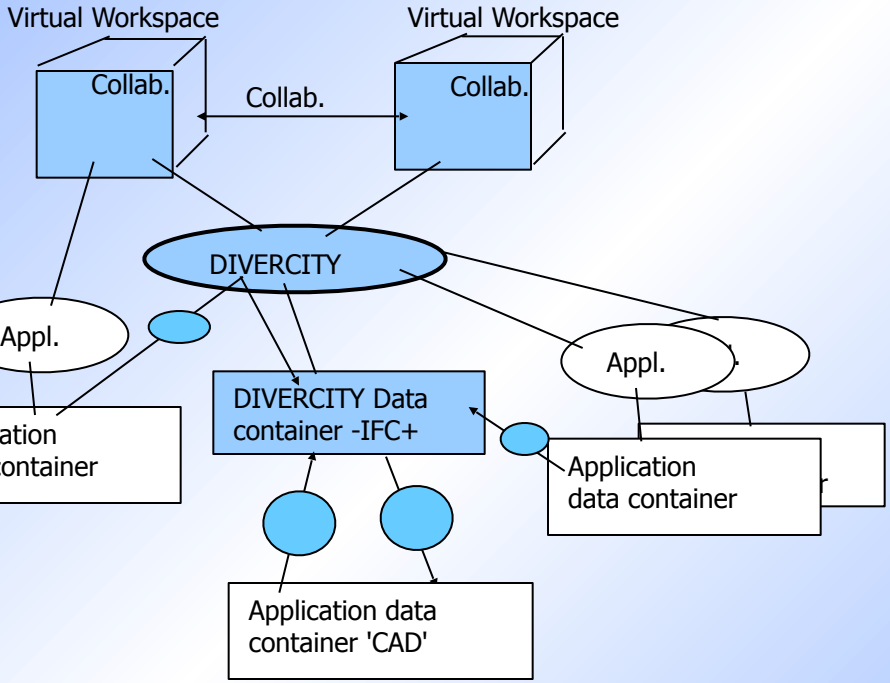


- **IFC-modelserver- en platform for integreret informationshåndtering i byggesektoren**

- **Distributed Virtual Workspace for enhancing Communication within the Construction Industry - DIVERCITY** (EU project)

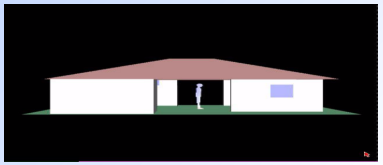
DIVERCITY project infrastructure

DIVERCITY function, form, content, behaviour

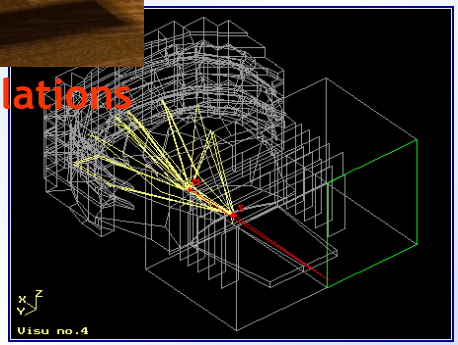


Client briefing

Lighting Simulations



Thermal Analysis



Acoustics

Building Model (IFC,...)

4D building site

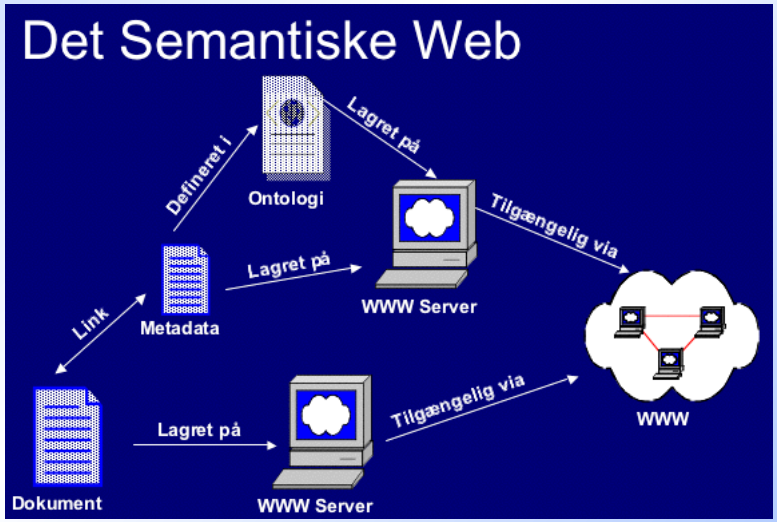
DIVERCITY project data

Distributed Virtual Workspace for enhancing Communication within the Construction Industry
EU 'IST-1999-13365
http://www.e-divercity.com/

- Shared cost RTD project - Key Action II.2.2
  (New Methods of Work / Workplace Design / Team Work)
- Project period March 2000 - September 2002
  Expected duration: 30 months
- Total cost: 3 M Euro (app.) -
  Commission funding: 2 M Euro
- Consortium (10 partners - 5 countries):
- Objective : Design & Develop a Distributed Virtual Workspace adapted for the Construction Industry

R&D at IT in Civil Engineering 3/3

KNOWLEDGE MANAGEMENT AND KNOWLEDGE TRANSFER



- **Future Building Industry Knowledge Management Systems.**
  (PhD project Mads Carlsen)

- **IT på byggepladsen (**Ministeriet for Videnskab**).**
  AAU, Vitus Bering, BYG Byggeriets IT,
  4 bygge- og anlægsvirksomheder

NATIONAL COLLABORATION

Det Digitale Byggeri (Erhvervs- og Boligstyrelsen)

- **Byggherrekrav**

  ”Byggherrekrav - Digitalt Udbud”,

  ”Bygherre krav - 3D modeller”

  “Projektwebs for alle parter i et byggeri”

  (Digital aflevering)

- Det Digitale Fundament

- Bedst i byggeriet

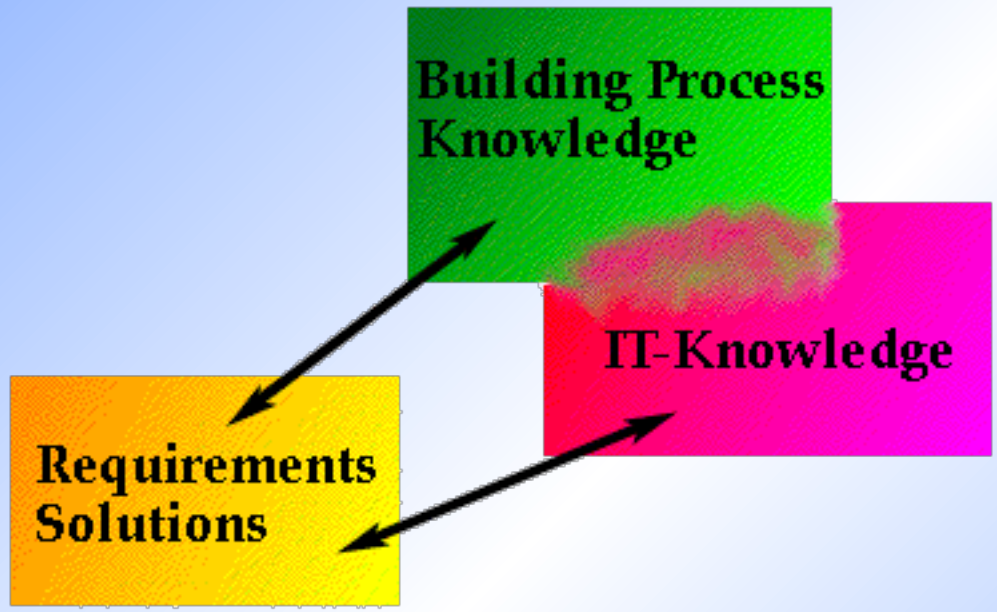
ERFA-gruppen objektorienteret bygningsmodel

University collaboration

Collaboration with industry in projects

International collaboration

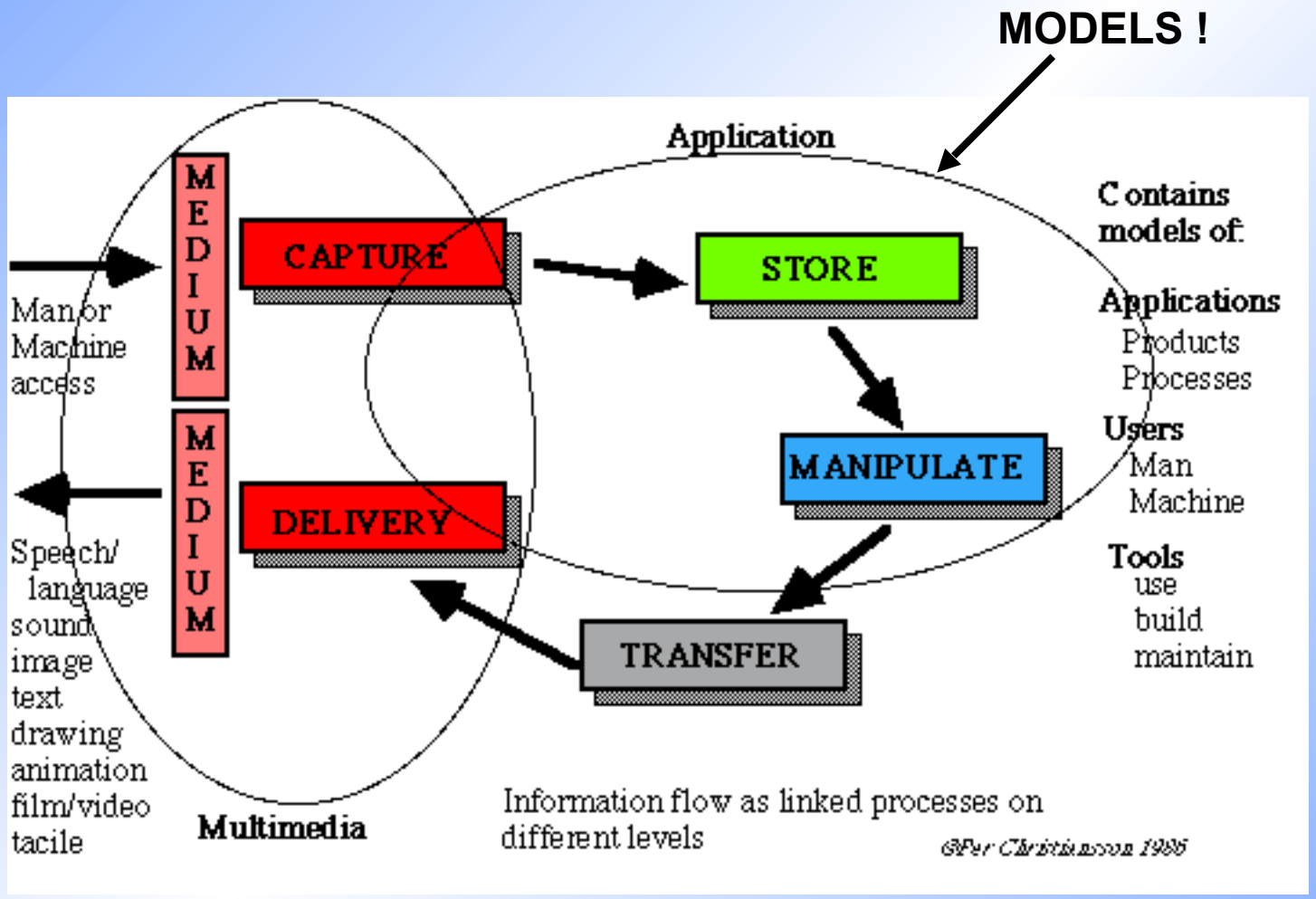
ICT BUILDING EDUCATION IN DENMARK



Builders must have ICT competence 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.

IT (ICT) Definition



ICT Building Education

AALBORG UNIVERSITET

http://www.auc.dk/

IT in Civil Engineering

http://it.civil.auc.dk/

ARKITEKTUR & DESIGN

http://www.aod.auc.dk/

Arkitektskolen i Aarhus

http://www.a-aarhus.dk/

DTU

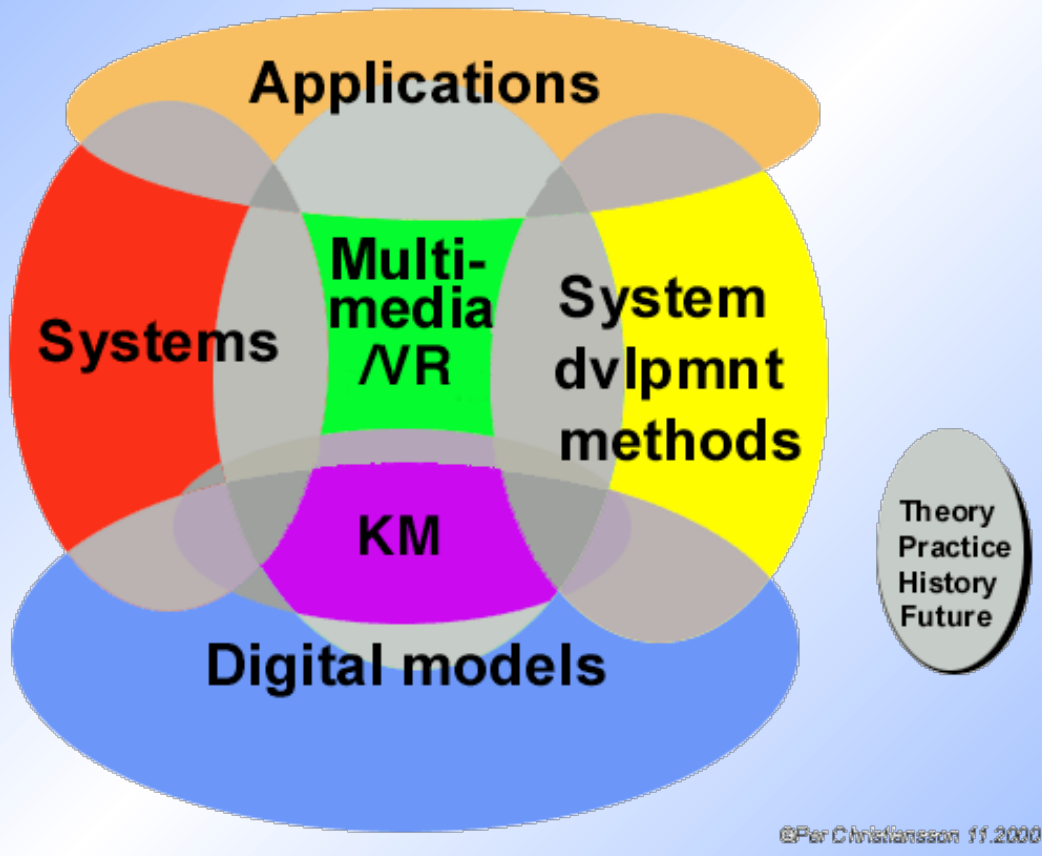
http://www.dtu.dk/

BYG•DTU

DTU Department of Civil Engineering

http://www.byg.dtu.dk/

Learning Domains



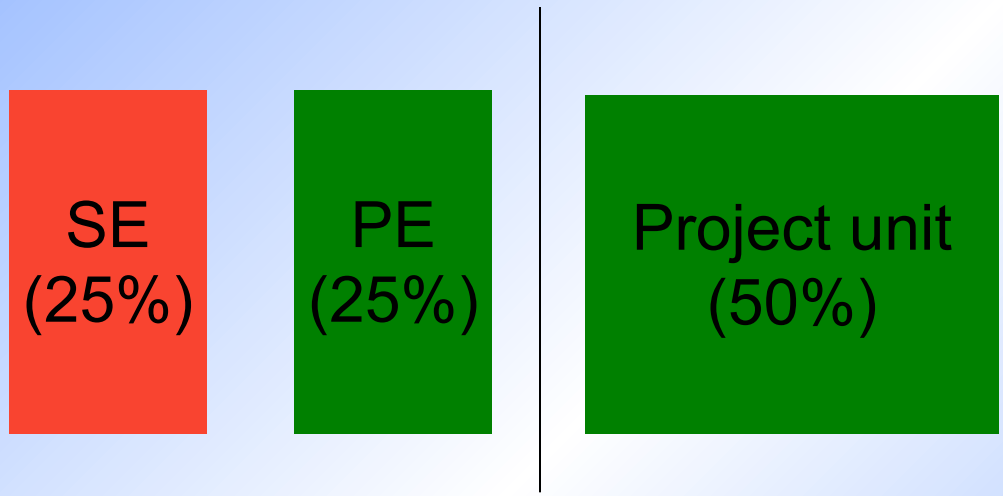
Overall education domains across which ICT courses are defined.

Learning Domains examples

- General overview ICT in Building
- Virtual Buildings
- Building Process models and simulation
- User Environment Design, HCI, Usability Engineering
- System design
- CSCW
- Knowledge Management
- Intelligent Buildings

The AAU model and PPBL

Project and Course layout



Group size 5-6 students

Studieenhedskurs (SE) (with individual examination)

Projektenhedskursus (PE) (evaluated through project presentation)

[Ex: 2M = moduler (ECTS-point),
10*(2 hour lecture, 2 hour exercise, own work]

‘PPBL’, Project organised Problem Based learning at AAU

Studierne på Det teknisk-naturvidenskabelige Fakultet ved AAU er baseret på den problemorienterede og projektorganiserede arbejdsform.

“På Aalborg Universitet er projektarbejdet problemorienteret. Det er ikke emneorienteret. Det går heller ikke ud på at løse opgaver.

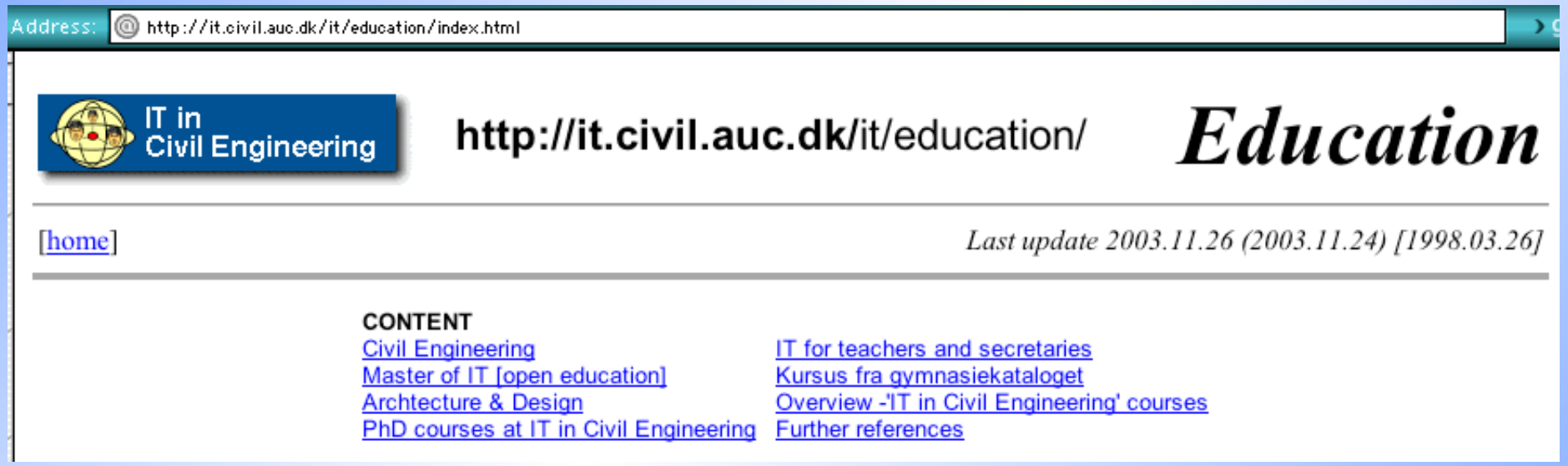
Om problemorienterede projekter kan man sige:
- **Et problemprojekt er en udfordring til hverdagsbevidstheden**
- **Et problemprojekt kræver tværfaglighed**
- **Et problemprojekt giver mulighed for at arbejde med teorier i en sammenhæng**
- **Et problemprojekt giver mulighed for at udarbejde nye teorier**
- **Der findes ikke en formuleret fremgangsmåde for løsning af et problem.”**

From Keiding T B, 1999, ‘Kompendium til kurset I samarbejde, læring og projektstyring’ (37 sider)

See also
Kjersdam, Finn. (1994). “The Aalborg experiment”. Aalborg: Aalborg Universitets Press.
http://www.auc.dk/fak-tekn/aalborg/engelsk/

ICT BUILDING COURSES AAU

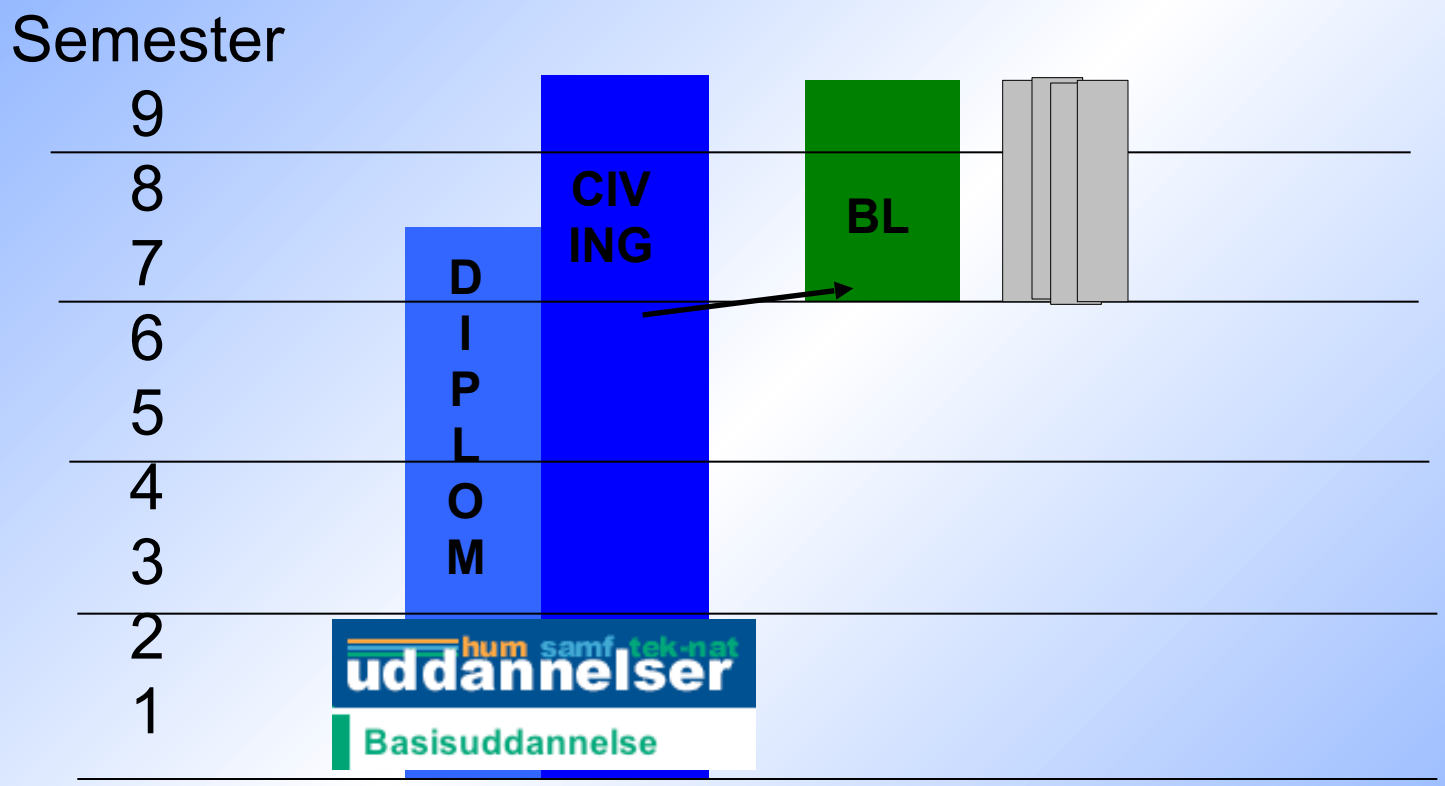
AAU ICT Building Courses Domains



Since 1998

Civil Engineering AAU

See also http://www.civil.auc.dk/b/, B-STUDIENÆVNETS homepage.). .



Master of IT

The Bologna Declaration

"Adoption of a system essentially based on two main cycles, undergraduate and graduate. Access to the second cycle shall require successful completion of first cycle studies, lasting a minimum of three years. The degree awarded after the first cycle shall also be relevant to the European labour market as an appropriate level of qualification. The second cycle should lead to the master and/or doctorate degree as in many European countries;"

BASIC YEAR ('BASIS')

- **Fagets Informationsteknologi – IT som værktøj, 2M (**also on AAU streaming web server with slides**)**
  (Unix, html, Excel, Access, SQL, MatLab, JavaScript, VisualBasic, PHP)

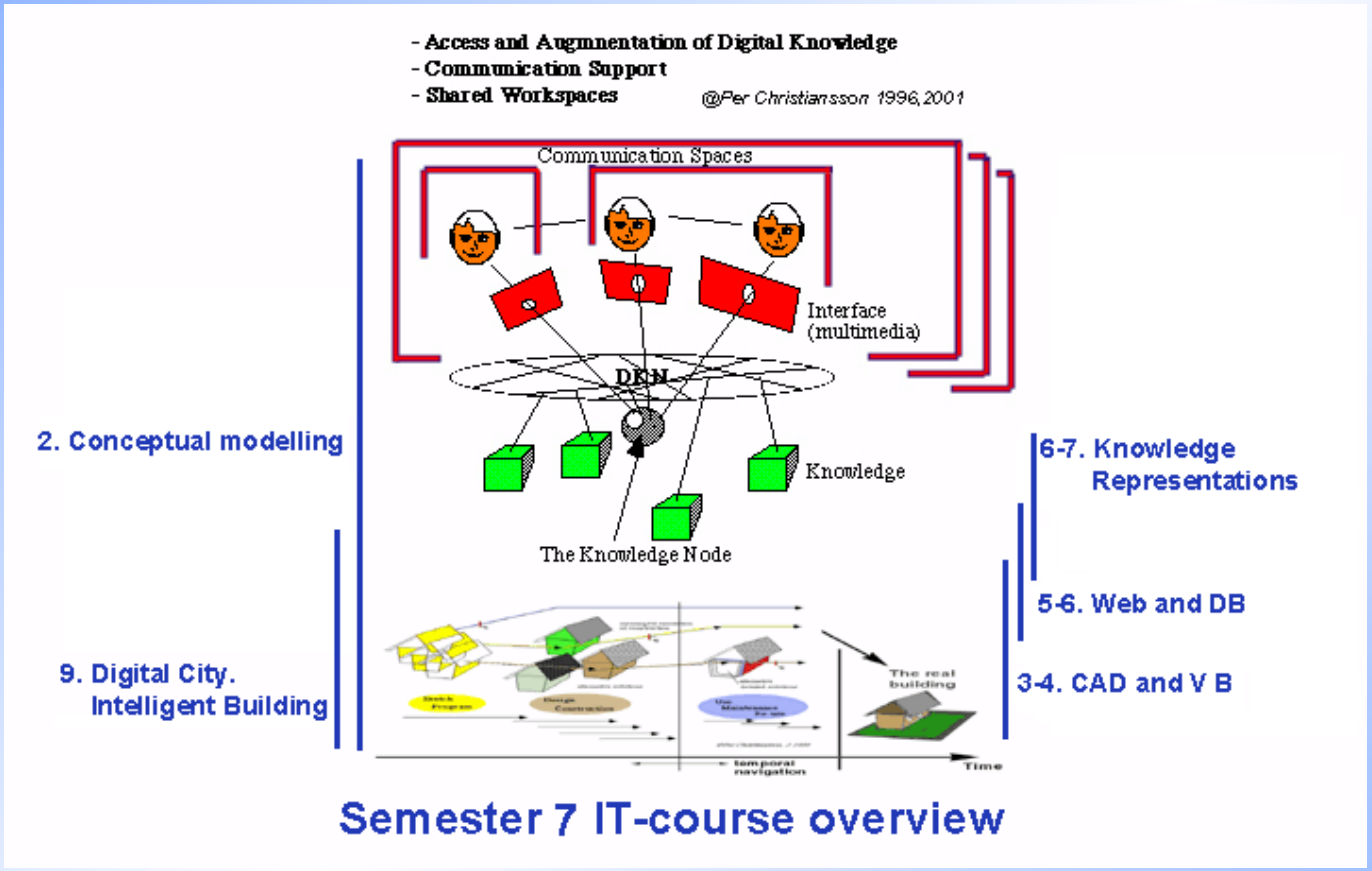
- **Kursus i Samarbejde, Læring og Projektstyring - SLP**
- **Metodelære** (ML)

IT in Civil Engineering courses

- **Civil Engineering**
  - IT in the Building Process (semester 6)
- **Building Management/Byggeledelse**
  - Virtual Buildings (sem7)
  - Udvikling af software (sem7 Produktion)
  - IT-tools, Multimedia & Knowledge Management (sem8)
  - Udvikling af Informationssystemer (sem8 Produktion)

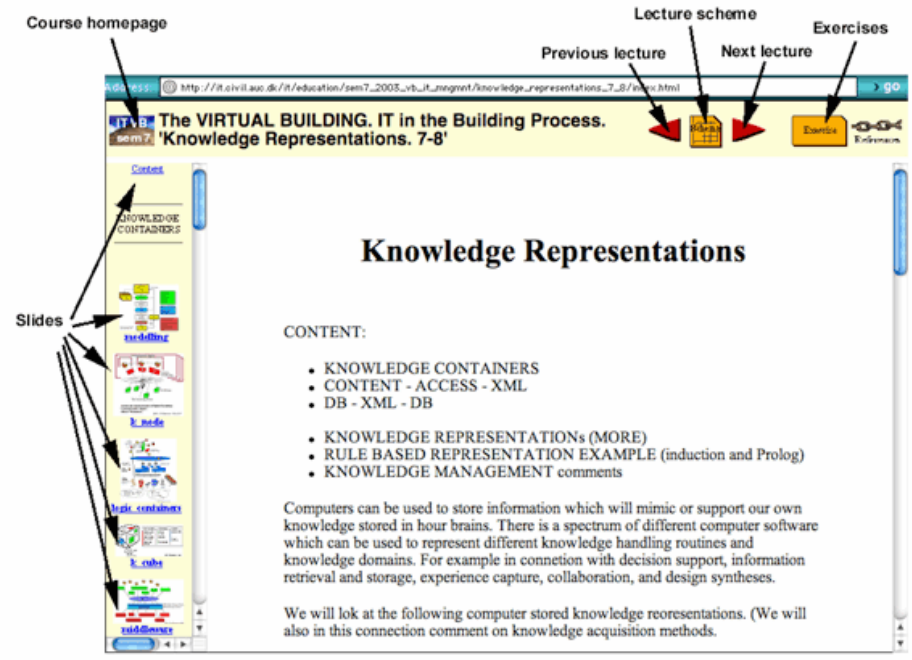
- **Architecture & Design**
  - Intelligent Models (sem6)
  - Computer Aided Design

Virtual Buildings course, Byggeledelse



The goal of the 'IT in the Building Process - The Virtual Building' course is to mediate knowledge about fundamental concepts, technologies and methods to analyse and develop models which describes a building, the building process and the digital infrastructures from design to application.

Virtual Buildings course cont!



http://it.civil.auc.dk/it/education/

- **Conceptual modelling**
- **CAD and virtual buildings**
- **WEB and databases**
- **Kowledge representations (XML, html)**
- **Digital city and Intelligent Buildings**

VB sem7 Byggeledelse cont!

Exercises

Exercise A on your scenario of the future ICT supported building process

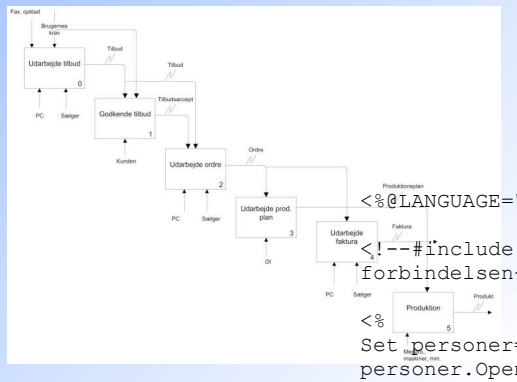
Exercise B on conceptual modeling of your semester 7 project

Exercise C on building and handling IFC based product models and components

Exercise D on database design and web access

Exercise E on meta structuring of information using XML and RDF

Exercise F on new services in digital cities and intelligent buildings

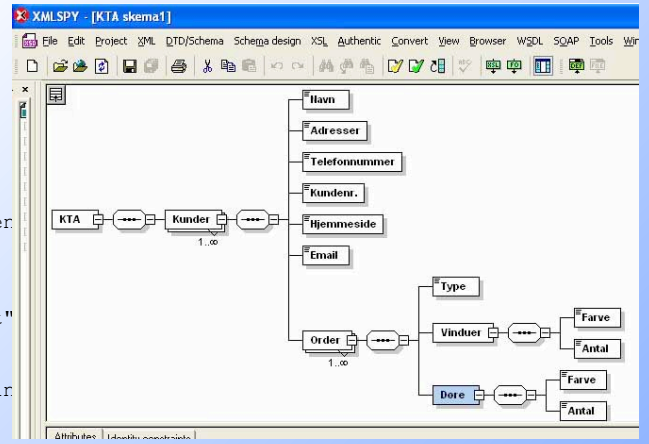



```
<%@LANGUAGE="VBSCRIPT"%>

<!--#include file="forbindelse.asp"--> <!--#Her her
forbindelsen-->

<%
Set personer=Server.CreateObject ("ADODB.Recordset"
personer.Open "SELECT personoplysninger.navn,
firmaoplysninger.firmanavn,
stillinger.Stillingsbetegnelse FROM (personoplysnin
firmaoplysninger ON personoplysninger.Firmaid =
firmaoplysninger.Firmaid)
INNER JOIN stillinger ON personoplysninger.Stillingsid =
stillinger.Stillingsid", database
%> <!--Her beskrives hvilke "keys" der skal bruges-->

<html>
<body>
…..
```



VB sem7 Byggeledelse cont!

Miniproject

Address: http://130.225.55.42/stud_asp_example/lejlighed/opstart.asp

Andelsboligforeningen Ladegård i Visse

Velkommen **Per**

Hjem

Foretage valg

Se valg

Ændre valg

Projektet

Andelsboligforeningen Ladegård
Klokkebo, Visse
20 andelsboliger

En smuk bebyggelse
tæt ved by og natur

Indtast dit personlige ID:

Bruger ID:

Adgangskode:

Tryk her

Address: http://130.225.55.42/stud_asp_example/lejlighed/valglejl.asp

Andelsboligforeningen Ladegård i Visse

Velkommen **Per**

Hjem

Foretage valg

Se valg

Ændre valg

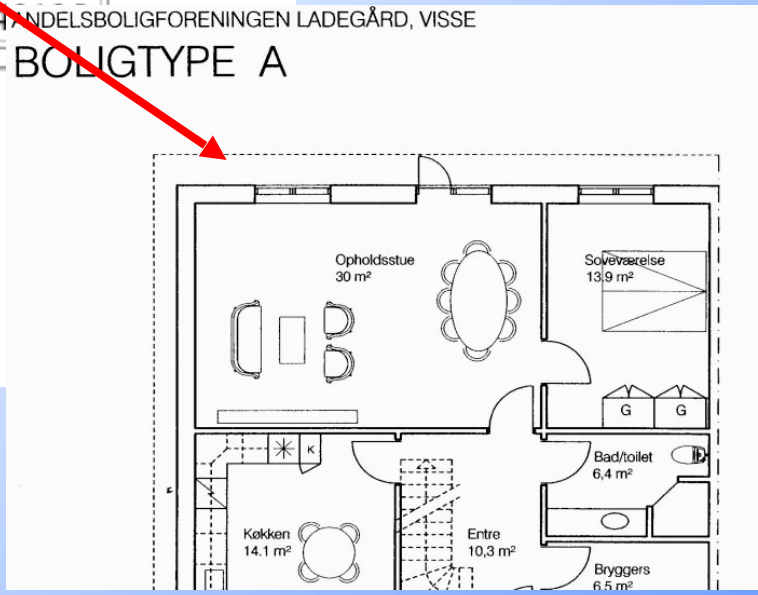
Projektet

Her skal du vælge lejlighedstype:

Type navn	Beskrivelse	Tegninger	Pris
A	Se beskrivelse	Se tegninger	345000
B	Se beskrivelse	Se tegninger	348500
C	Se beskrivelse	Se tegninger	34

Nu skal du vælge hvilken type du vil have:

Valg af Lejlighedstype : A OK



Partner 2001

Velkommen til "Partner 2001"
"Partner 2001" er et IT-system til understøttelse af erfaringsopsamling fra byggesager.

Det er rammerne for en systematiseret registrering af erfaringer og en videre opsamling af disse.

Der kan noteres erfaringer med udgangspunkt i problemområder og problemparter.
Der kan søges i allerede nedfældede erfaringer og knyttes kommentarer hertil.
Der kan løbende tilføjes nye problemområder.
Systemet venter blot på dine erfaringer!

Tryk her for login!
(Bruger ID: mc, mm, kst, rme, lko, rvf
tilsvarende adgangskode)

VB sem7 Byggeledelse

Miniproject cont!

Personlige oplysninger
Faggruppe: Bygherre
Initialer: mm
Dato: 05/12/2003

Problemområde: Samarbejde

Medvirkende problempart: Vælg problempart

Forfatter: Vælg forfatter

Søg Nulstil

Til skriveside

Du har indtastet følgende data:
Problemområde: Samarbejde
Problempart:
Forfatter:

Søgeresultater:

ProblemID	Probelmområde	Problempart	Forfatter	Emne	Dato
85	Samarbejde	Ingeniør	Mads Carlsen	Lusker	22/11/2001
89	Samarbejde	Bygherre	Mads Carlsen	Brugerinddragelse	15/01/2002
			Malene		14/03/

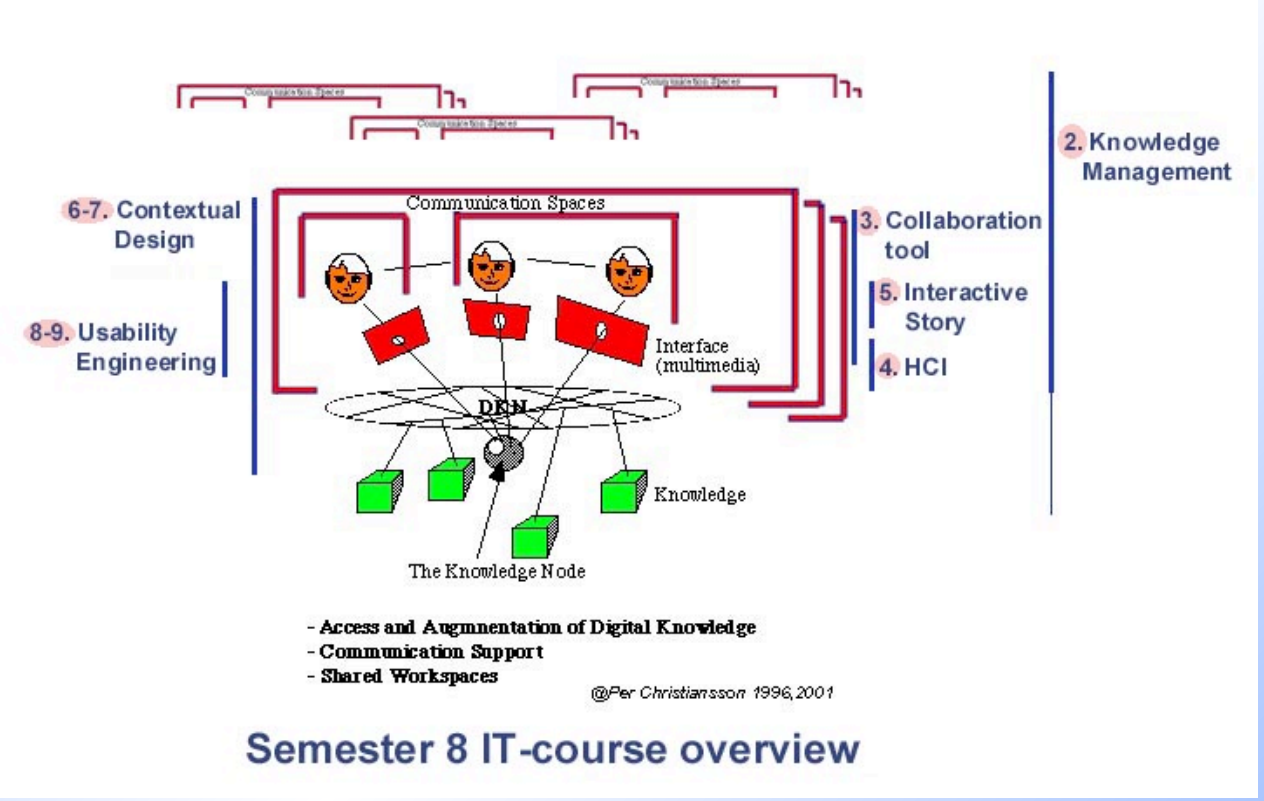
ProblemID:	81
Forfatter:	Randi Muff Ebbesen
Dato:	22/11/2001
Problemområde:	Samarbejde
Problempart:	Ingeniør
Emne:	Interesser
Tekst:	Ingeniør hytter sine egne kartofler

Tilføj kommentar til problemID 81

Til top

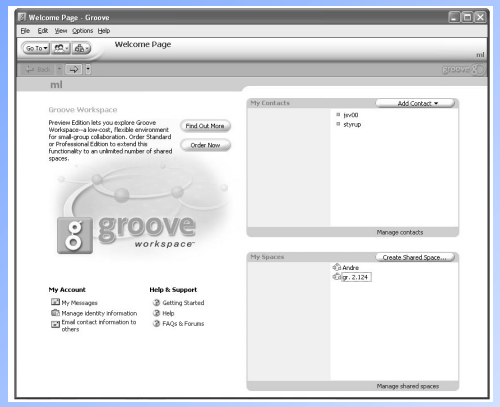
22. november 2001 ©2001 BL7 gruppe 3.120 Redigeret af MM, MC

Multimedia and Knowledge Management course, Byggeledelse sem 8



The goal of the 'IT in the Building Process - IT-tools' course is to mediate understanding of methods and technologies for multimedia human machine interface design, computer supported collaborative work, graphical decision support as well as mediation of knowledge about how the future services, systems, and infrastructures for information transfer (knowledge management) can be built and integrated.

MM and KM course cont!



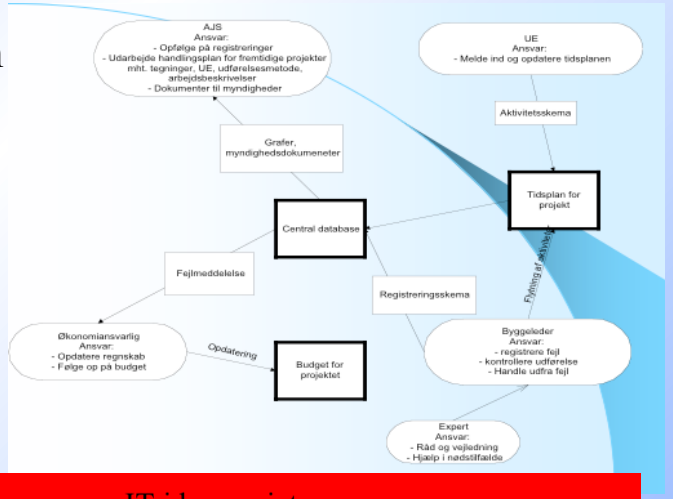
http://it.civil.auc.dk/it/education/

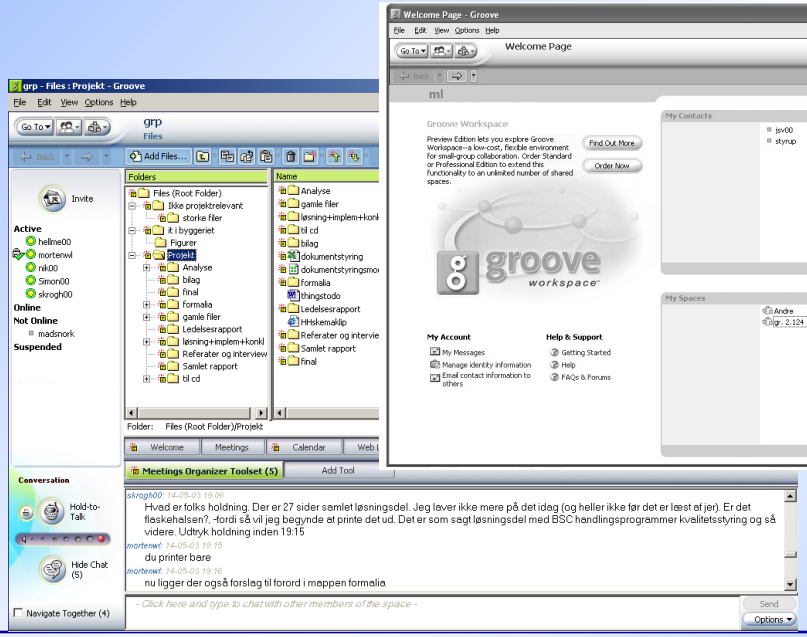
- **Knowledge Management**
- **User Environment design**
- **Collaboration tools**
- **Human Computer Interaction**
- **Interactiv Story Telling**
- **Usability Engineering**

MM and KM course cont!

Exercises/Miniproject

* Contextual design methodology
* Human computer interaction, HCI, and user interface design
* Collaboration tools
* Usability testing
* Web 3D
* Handling multimedia content
* Interactive story telling





Master of Informationsteknologi

http://www.mii.auc.dk/

http://www.it-vest.dk/

- Proceskontrol
- Byggeriet
- Distribuerede Realtidssystemer
- Industriel Produktion
- Systemadministration

Master of Informationsteknologi - MII, distributed open education 1/3

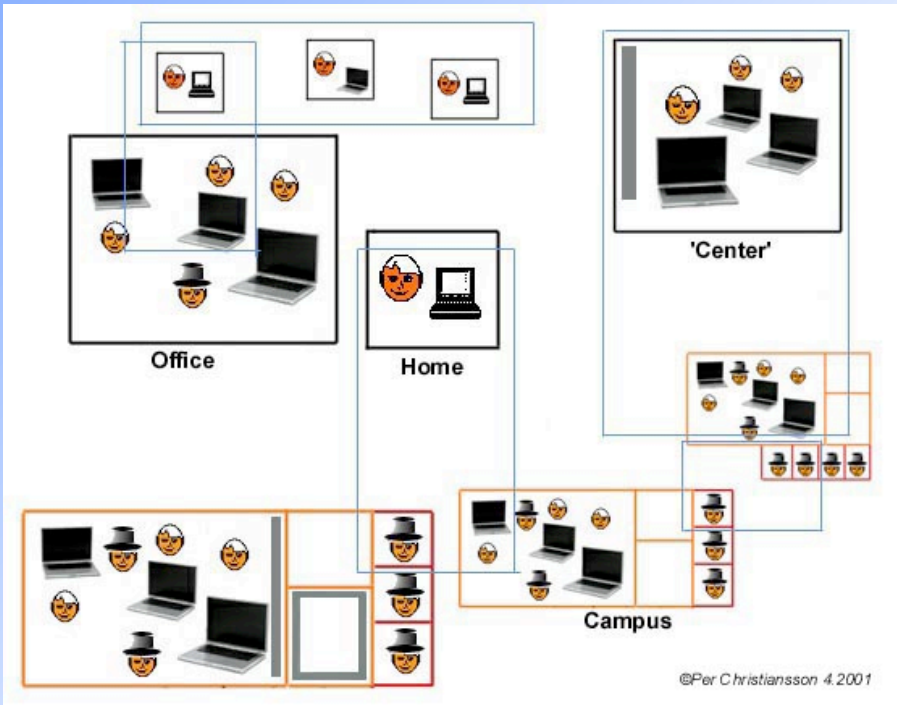
(3*1/2 years -> 2*1/2 years)

- Human Computer Interaction, HCI (year 1)
- CSCW Computer Collaborative Work (year 1)
- Multimedia Interface Design and (year2)
- Knowledge Management within Companies and Projects (year2)
- Intelligent Buildings and the Digital City (year3)
- Virtual Buildings (year2-3)
- Building Simulations (year 3)

MII calendar examples 2/3

EXPERIENCES

Distributed learning



WHAT IS DISTRIBUTED LEARNING?

"Distributed learning takes place in a virtual learning space that expands the conventional study chamber and classroom in time and room with regard to learning style and interaction modes as well as learning material and learning methods".

Per Christiansson 6.1999

Teaching the teachers

Remote lecture and application sharing between Aalborg and Lund Universities 1999 in teacher/secretary course (parallel ISDN based video communication and Internet based application

Structuring Learning Systems

CHALLENGES

Virtual learning spaces

Distributed project groups

New interaction tools

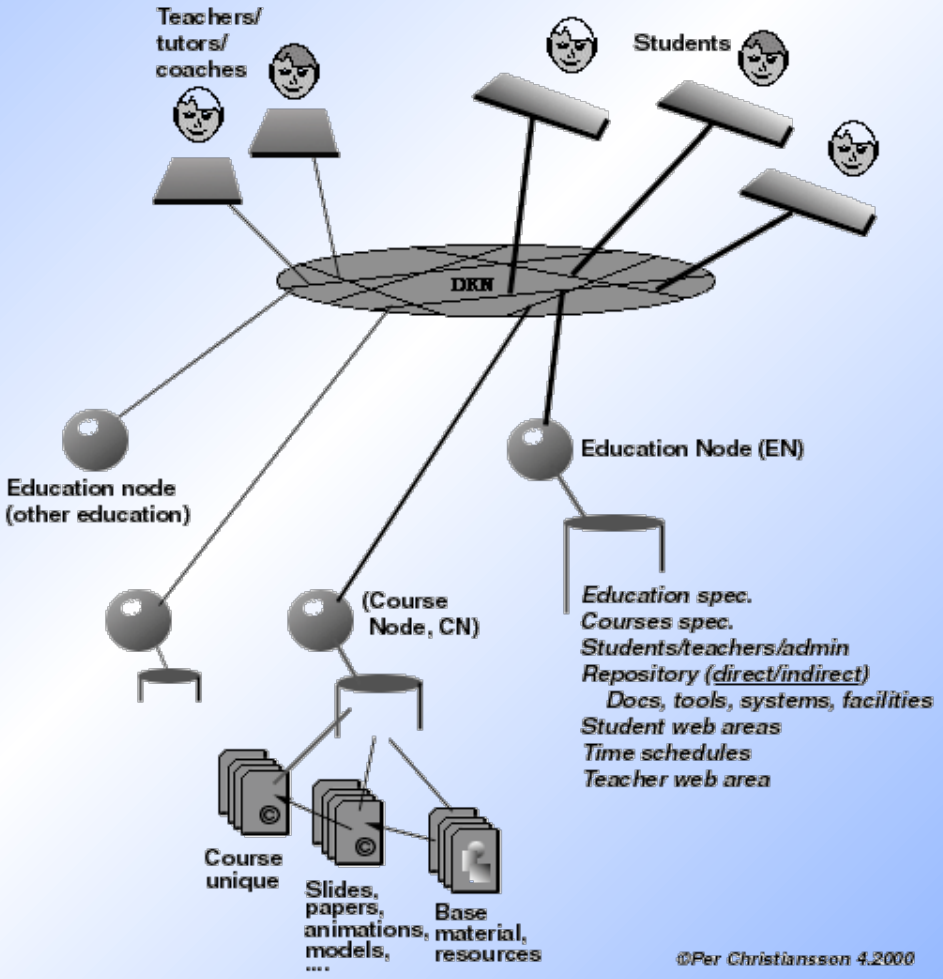
Changed pedagogy

Changed tutor roles

Adapted learning material

Distributed learning material

New management tools



Experiences 1/2

* students and teachers are not all familiar with the possibilities ICT -supported collaboration provides (e.g. groups continuously documenting project progress, teachers using the student project web to follow progress),
* guided exercises are still important for students learning by doing in small steps
- teachers must be highly accessible tutors and problem solvers especially during project kick-off and to make injections when group activities fade (search the problems). This poses special problem in a highly physically distributed environment,

* some groups want to have intranets only available for the group (they see a risk for improper result spread before the project is ready),
- discussion forums will not be used unless actively triggered by tutors.

* follow up costs is often underestimated (e.g. new skills needed, change of working methods and organization structures, server maintenance, long term course material and student documents storage),
* strive for client computer platform independence (Mac, PC and Unix).
* it may be necessary to differentiate between video (ISDN) and shared workspace (TCP/IP) physical communication channels . TCP/IP best handles only sound and still images today,

Experiences 2/2

- be aware of the very different requirements posed by learning context, pedagogical methods and knowledge content,
* create four user levels for the learning environment - students, teachers, course administrator, system admin,
- course material typically supports self study and assessments, lectures, individual and group exercises, project work, and social contacts,

* teacher HTML knowledge is required for optimal course development performance (high level WYSIWYG HTML editors are not good enough),
- student HTML knowledge is required to make project webs (not enough with copy-paste from good examples on the WWW),

* be open for using English instead of your national language,
- create good user feed-back facilities,

- system availability must be100% (QoS)
- actively involve end users in the needs and requirements phase of system design
- end user competence to support requirements formulation is often low (both on IT and methodological issues),

MOTIVATION

UNDERSTANDING COMPLEXITY

PARTICIPATION IN CHANGE PROCESS

Success Criteria 1/3

- ICT ***must not*** be regarded as one of these tools that we only have to learn to use but as an integral part of the company and project knowledge management system.

- Increased knowledge transfer and *ICT competence. Knowledge communication* crucial (companies, schools, public services).

- Acquire *deep understanding* of ICT influence on organisation, work methods, user environments, information handling, and ICT strategies.

- Increase of *awareness* on fundamentals and methods for a beneficial change of building processes and organisation (knowledge exchange and management, demonstrations, implications, participatory design).

- Increased *international* project participation.

- Basic research, applied research and development activities are *all* required.

We are all involved in a continuos change process and design of the future together (with constant re-assessments). Great possibilities and time to do some creative, bold, and holistic inceptions at both universities and industries

Success Criteria 2/3

- The formulation and refinement of digital *models* of the building process must be driven by the end users. (Products, processes, components, tools, users/teams)

- Participatory design (industry - university) of new *tools* and *services* that in many cases are not yet defined.

- *User participation* in User Environments and systems development The *building community* must and will actively participate in the *needs and requirements capture*, *design*, *try out*, *evaluation*, and *implementation* of *new IT tools* (for collaboration, communication and information handling) to support high quality building products in a life cycle perspective. *Client*, building product *users, and suppliers* with increased influences in the design process.

We are all involved in a continuos change process and **design of the future** together (with constant re-assessments). Great possibilities and time to do some creative, bold, and holistic inceptions at both universities and industries

Success Criteria 3/3

- Development of *scenarios* (from idea to demolition of building) encompassing credible ICT tools.
- Utilisation of changed *communication networks* on all levels.
- Utilisation of increased possibilities to build (low cost) *Virtual Worlds/rooms* and *Virtual Buildings* (with partly redundant knowledge representations, meta data, temporal and 'intelligent' properties).
- Agreements on *vocabularies* and *concepts* within and between stakeholders starting with meta project level and more detailed team and component deliverers specifications.

We are all involved in a continuos change process and **design of the future** together (with constant re-assessments). Great possibilities and time to do some creative, bold, and holistic inceptions at both universities and industries

REFERENCES

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see also http://it.civil.auc.dk

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http://w78.civil.auc.dk
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