

IKT og Videnrepræsentationer - ICT and Knowledge Representations.

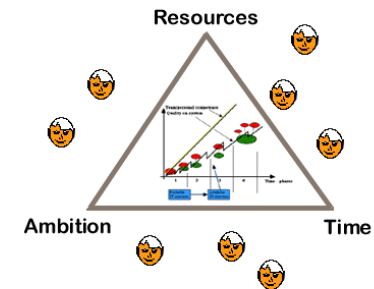
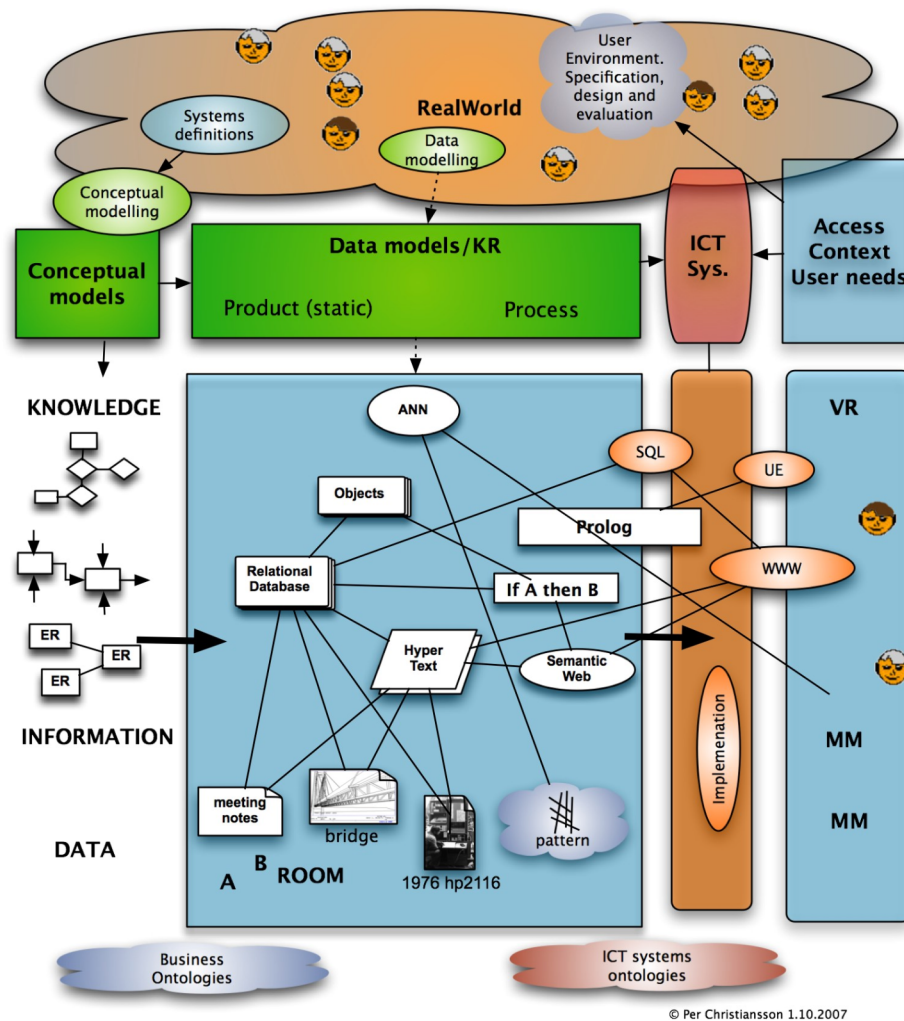
2a. Conceptual Modeling Methods

Cand. Scient. Bygningsinformatik.
Semester 2, 2010.

CONTENT

- Conceptual Modeling methods overview
- IDEF0
- E-R (Entity-Relationship model)
- UML (Unified Modeling Language)

SYSTEM DEVELOPMENT



Always achieve a good balance between Time, Ambition and Resources.

From the real world to implemented systems in use

CONCEPTUAL MODELING METHODS

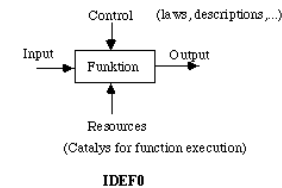
Conceptual modelling can be done in many ways. As a

- * free sketch or
 - o Rich Picture
 - o Mind Map
 - o Synopsis

- * functional/process modelling or
 - o IDEF0 (Data flow models. Functional models from Structured Analysis and Design Technique, SADT, function/activity decomposition)
 - o Business Process Modeling Notation (BPMN)
 - o Yourdon Data Flow Diagram.

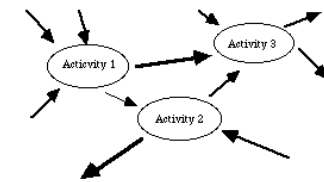
- * directed towards form/product/structure/geometric modelling or
 - o IDEF1/X (Information models, entity-relationship-attribute)
 - o E-R models (Entity-Relationship)
 - o NIAM (Nijsen's Information Analysis Model), 1977 (entity and attributes are nested)
 - o EXPRESS (-G)

- * as a combination of process and product modelling
 - o UML, Unified Modelling Language.
 - o Contextual Design

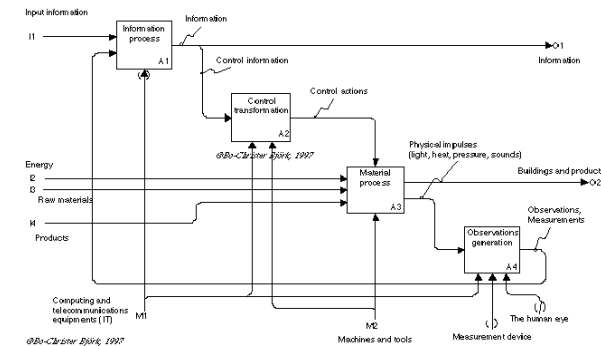


IDEF0

IDEF (Integrated Definition)
ICOM coding - Input, Control, Output och Mechanism.



SAM, Structured Analysis



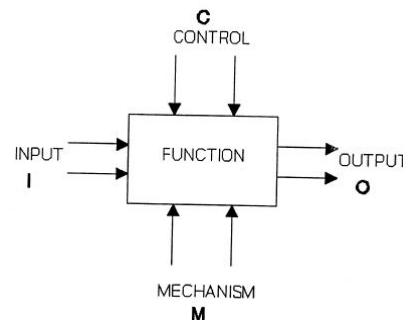
IDEF0

En MODEL er en repræsentation af et SYSTEM

IDEF0 benyttes til at generere en funktionsmodel, som er en struktureret repræsentation af funktionerne (=handlingerne/aktiviteterne) i et produktionssystem og dets omgivelser og af de informationer og objekter, som forbinder disse funktioner.

IDEF0 - konceptet er udarbejdet for at kunne beskrive systemer, når formålet fx er:

- * at analysere eksisterende produktionssystemers funktionelle sammenhænge
- * at konstruere den funktionelle opbygning af nye systemer (fx produktionssystemer)
- * at diskutere og kommunikere sammenhænge mellem funktioner i et system
- * dokumentere og specificere systemer

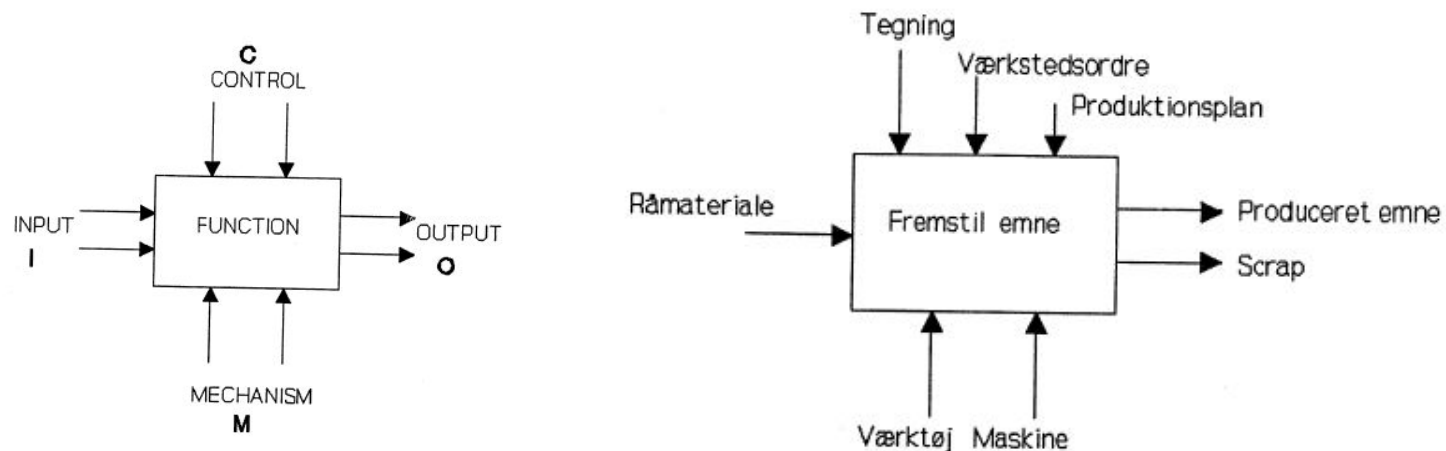


Litt: Rasmussen Annelise, 1996, "Introduktion til IDEF0 Version 1.1". Institut for Anvendt Konstruktion og Produktion. Danmarks Tekniske Universitet. Lyngby (30 pages)

IDEF0. Graphic representation

Box = funktion (udsagnsord)

Pil = data/informationer eller objekter (navneord)



Controls: Angiver data (betingelser, forhold), der styrer (og begrænser) aktiviteten i boxen

- Alle boxe skal have mindst én Control

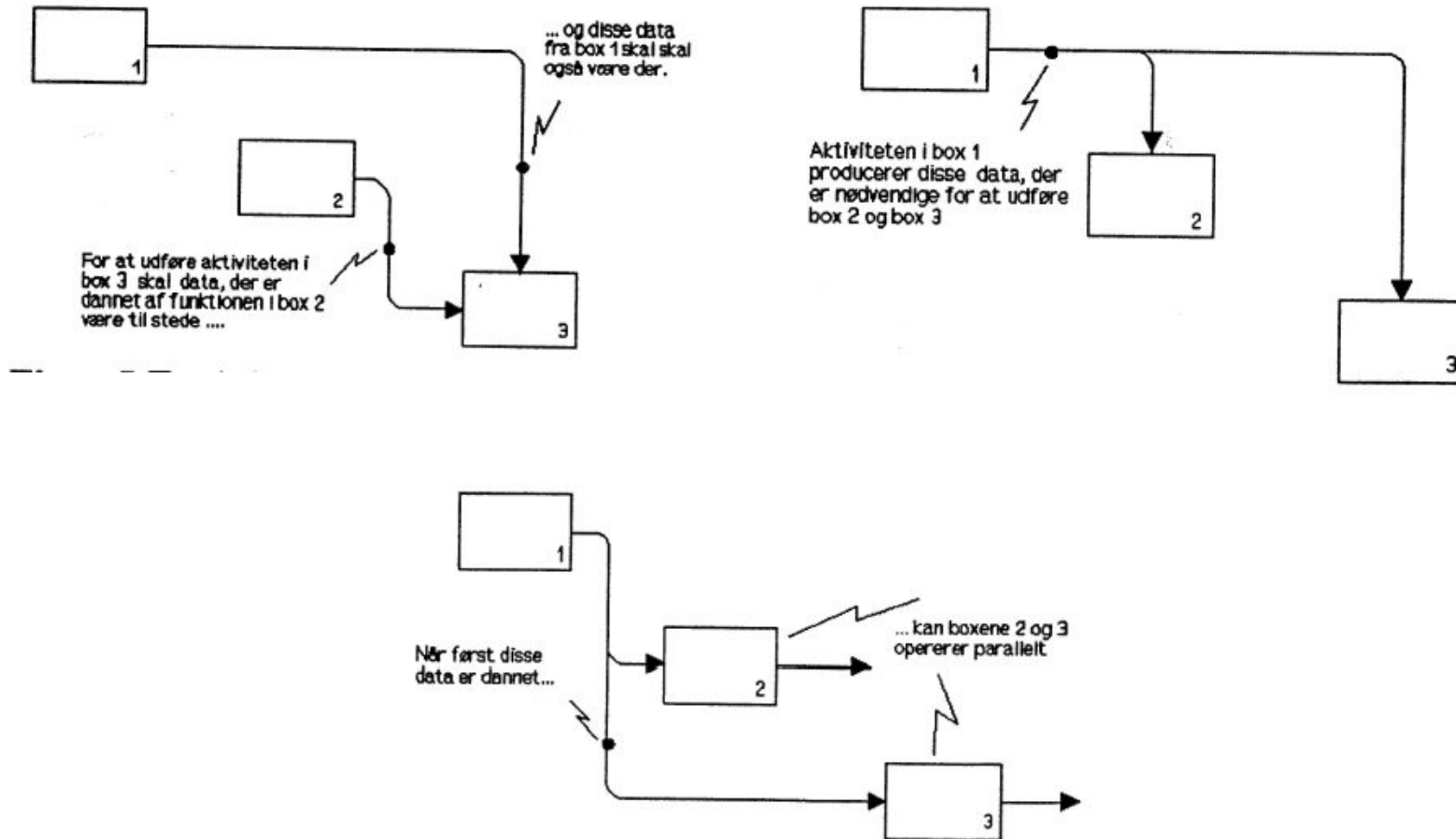
Input: Angiver de data eller objekter, som aktiviteten ændrer/transformerer.

Output: Angiver de data eller objekter, som aktiviteten resulterer i

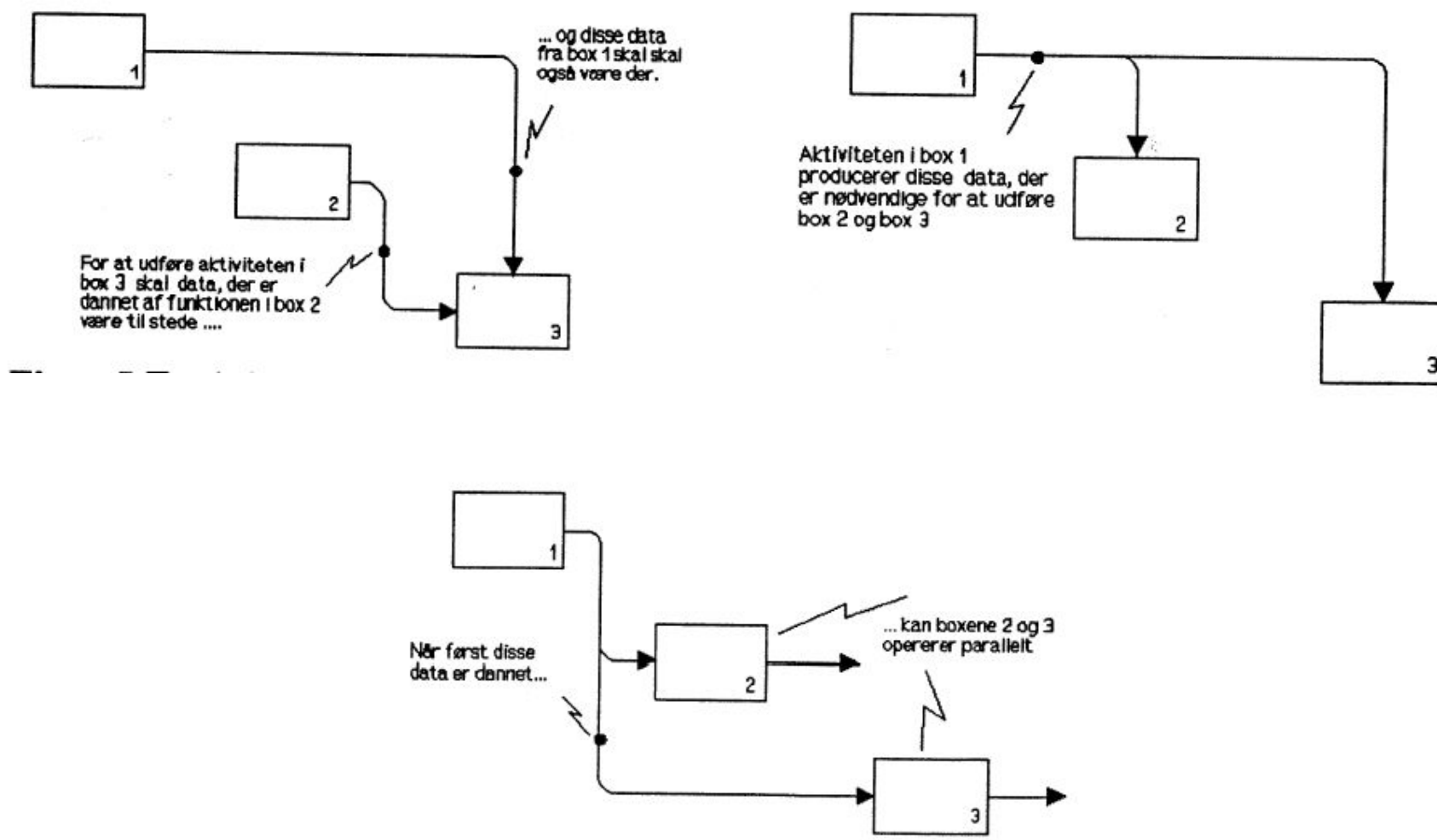
- Alle boxe skal have Output

Mechanism/Mekanismer: Angiver det udstyr, der anvendes ved udførelsen af aktiviteten

IDEF0. Relation between boxes and arrows



IDEF0. Relation between boxes and arrows



IDEF0. Structure

En komplet IDEF0-model består af en række diagrammer.

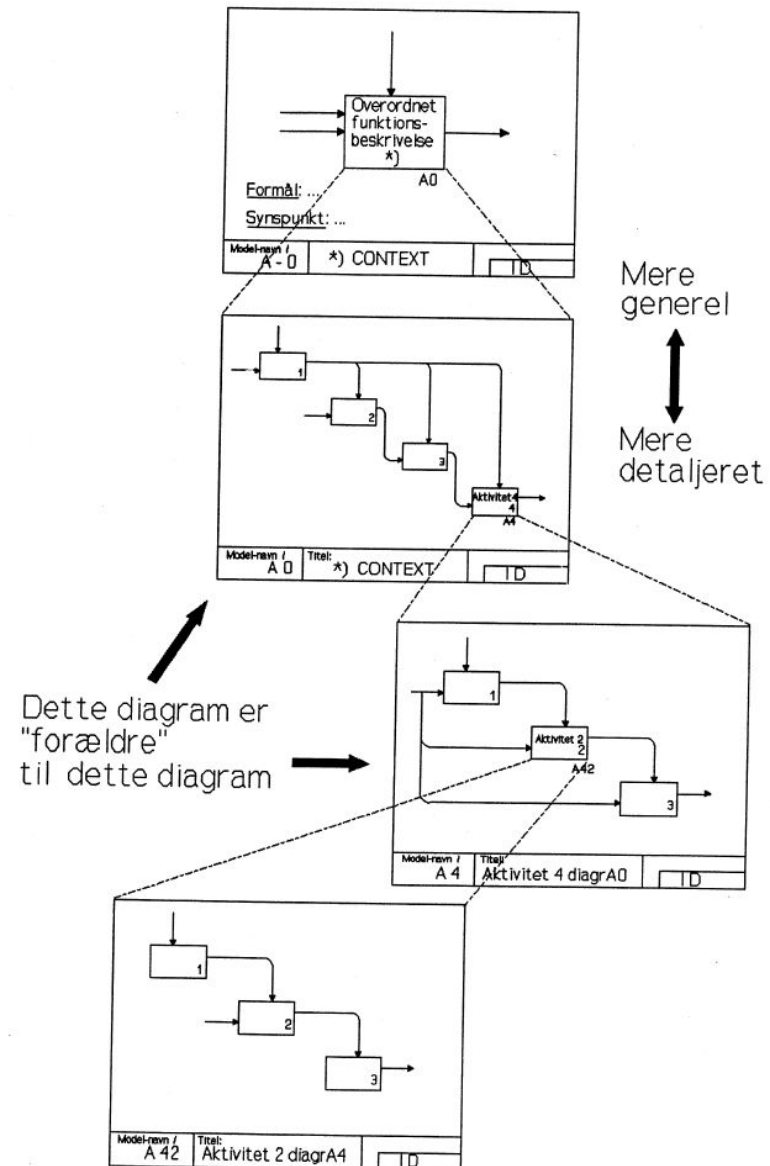
"Forsiden" A-0 diagrammet, karakteriserer det modellerede system, og "toppen af modellen", A0 diagrammet, viser de vigtigste funktioner i systemet.

Enhver af funktionerne/boxene i A0 diagrammet kan detaljeres i et diagram, hvor igen enhver af boxene kan åbnes i nye diagrammer.

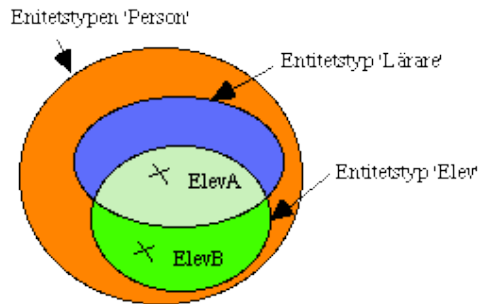
Man taler om **forældre-børn** diagrammer og "åbning" af en box ved dekomposition.

Eksempel:

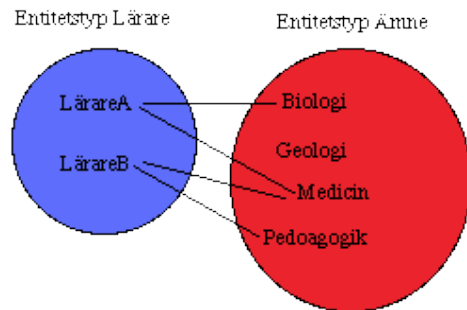
http://it.civil.aau.dk/it/education/sem7_2006_kr_it_mngmnt/exercises_results/final_3108.pdf



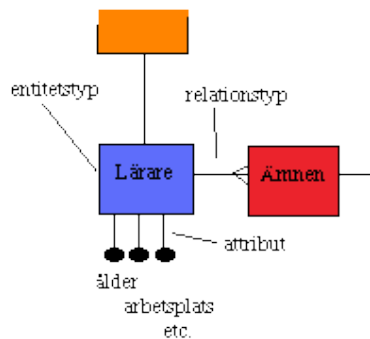
The Entity-Relationship model (E-R)



Entity, Entity types



Relations between Entity types

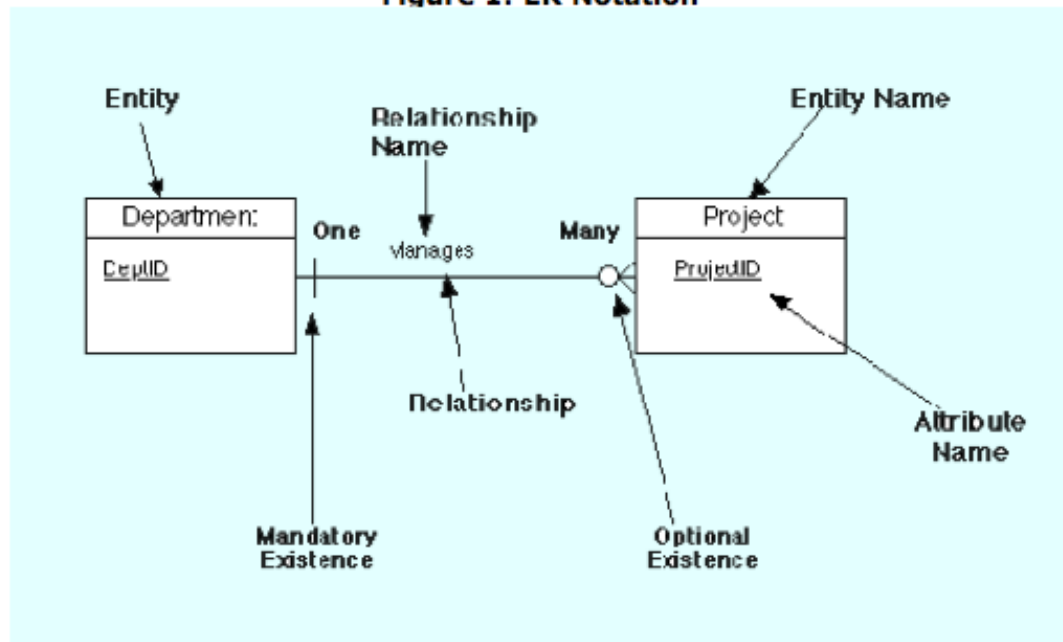


Attributes are tied to Entity types

There are different ways to graphically describe Entity types and their relations.

The Entity-Relationship model (E-R)

Figure 1: ER Notation

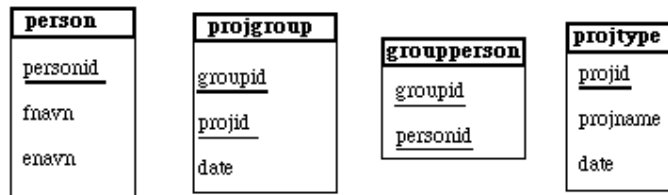


The Entity-Relationship (ER) model was originally proposed by Peter in 1976 [Chen76] as a way to unify the network and relational database views. Simply stated the ER model is a conceptual data model that views the real world as entities and relationships. A basic component of the model is the Entity-Relationship diagram which is used to visually represents data objects.

From "The Entity-Relationship Model". The University of Texas at Austin. 2004.

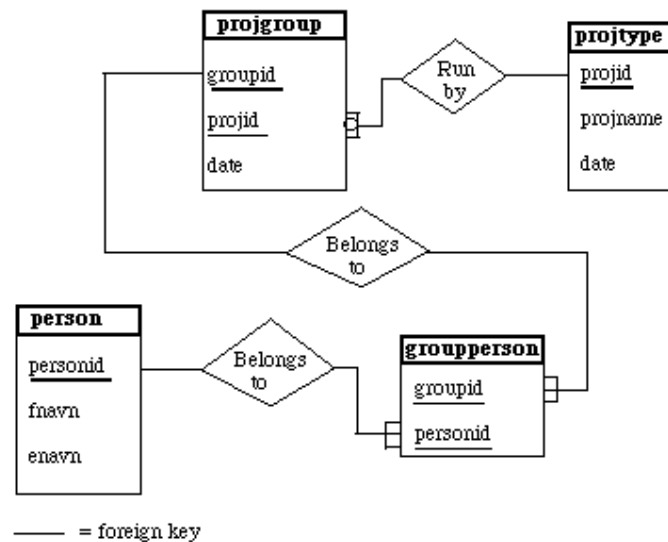
From "The Entity-Relationship Model". The University of Texas at Austin. 2004.

The Entity-Relationship model (E-R)



Example on entites and their relations.

We will come back to this type of diagram when we make E-R models that will be used in relational database models.

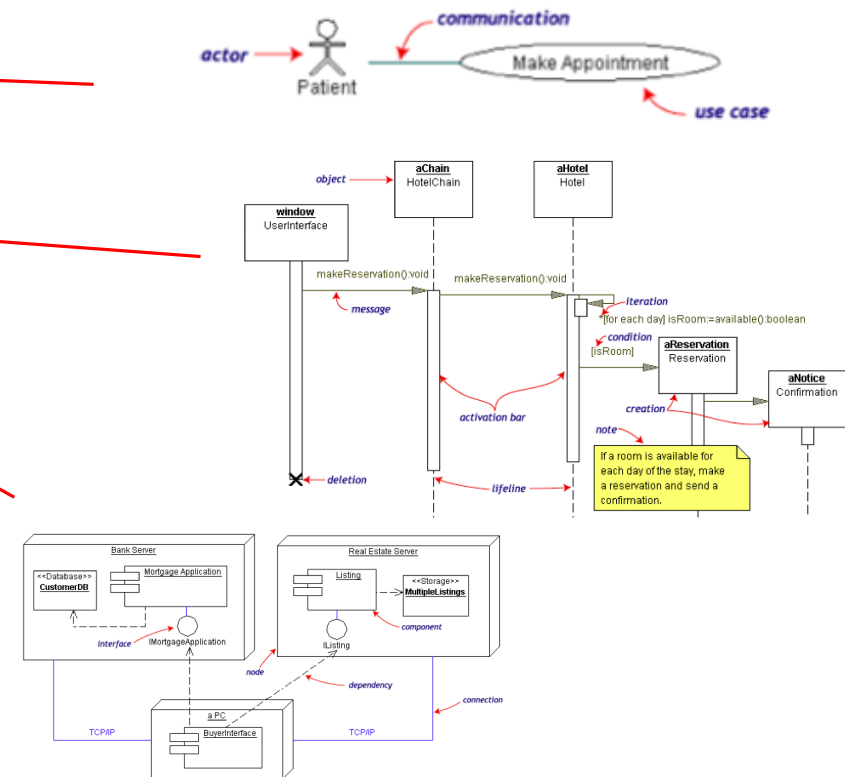


The Unified Modeling Language (UML)

From Miller R, 2003, "Practical UML: A Hands-On Introduction for Developers". Borland Developer Network.

At the center of the UML are its nine kinds of modeling diagrams, which we describe here

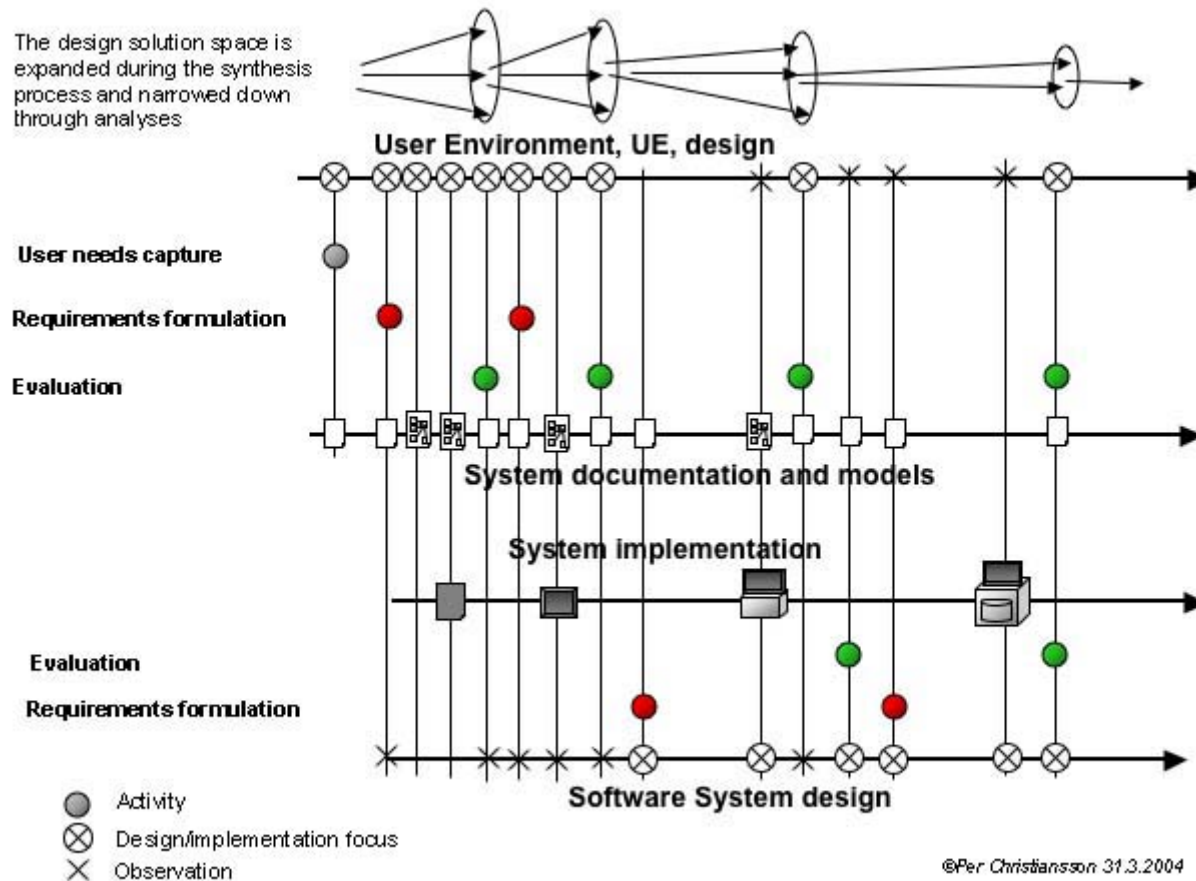
- Use case diagrams
- Class diagrams
- Object diagrams
- Sequence diagrams
- Collaboration diagrams
- Statechart diagrams
- Activity diagrams
- Component diagrams Deployment diagrams



END

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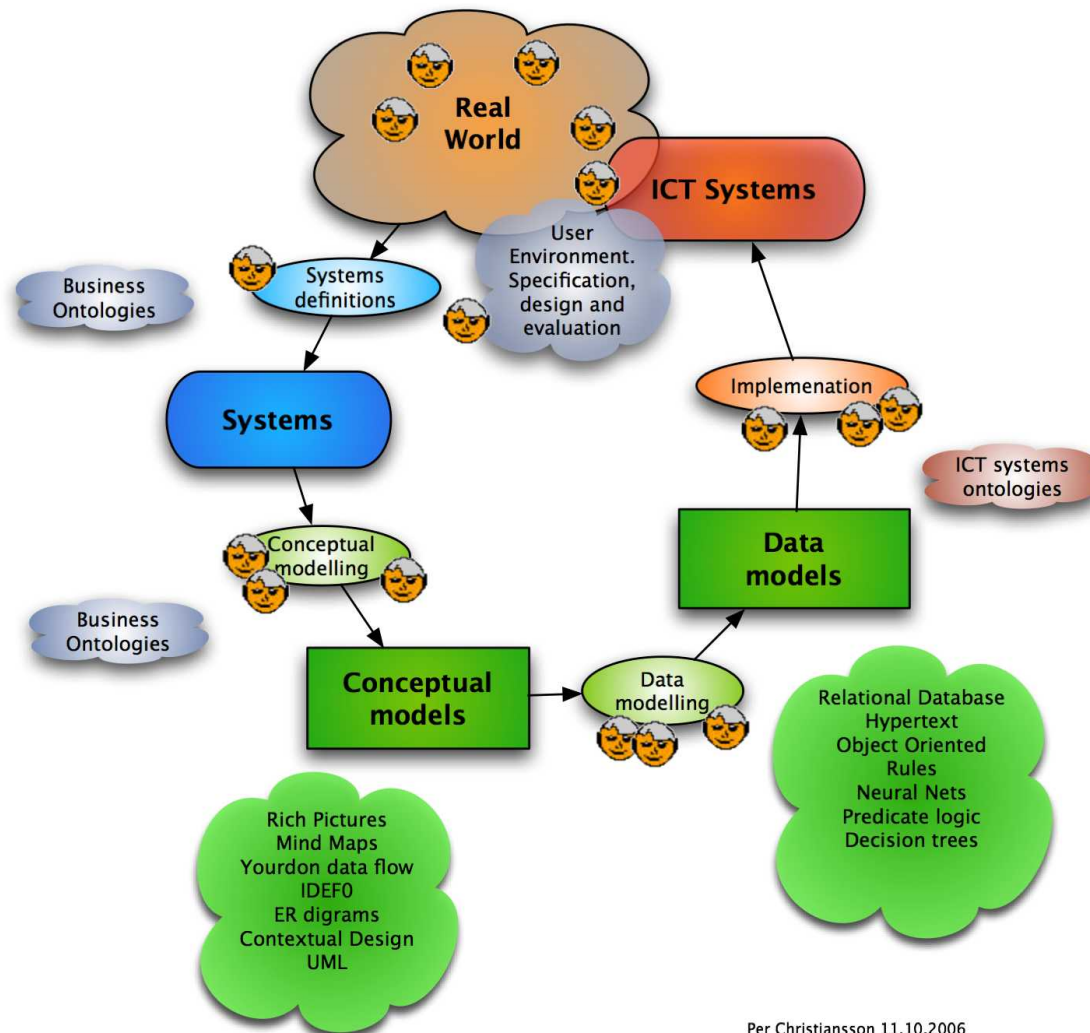
MODELS OF THE REAL WORLD



The early design process focuses on user environment, UE, design/implementation and the later phases on software development and implementation.

The UE design including user needs capture and user requirements formulations can be supported by contextual design methodology. Different evaluation paradigms can be used as design/implementation progresses.

SYSTEM DEVELOPMENT

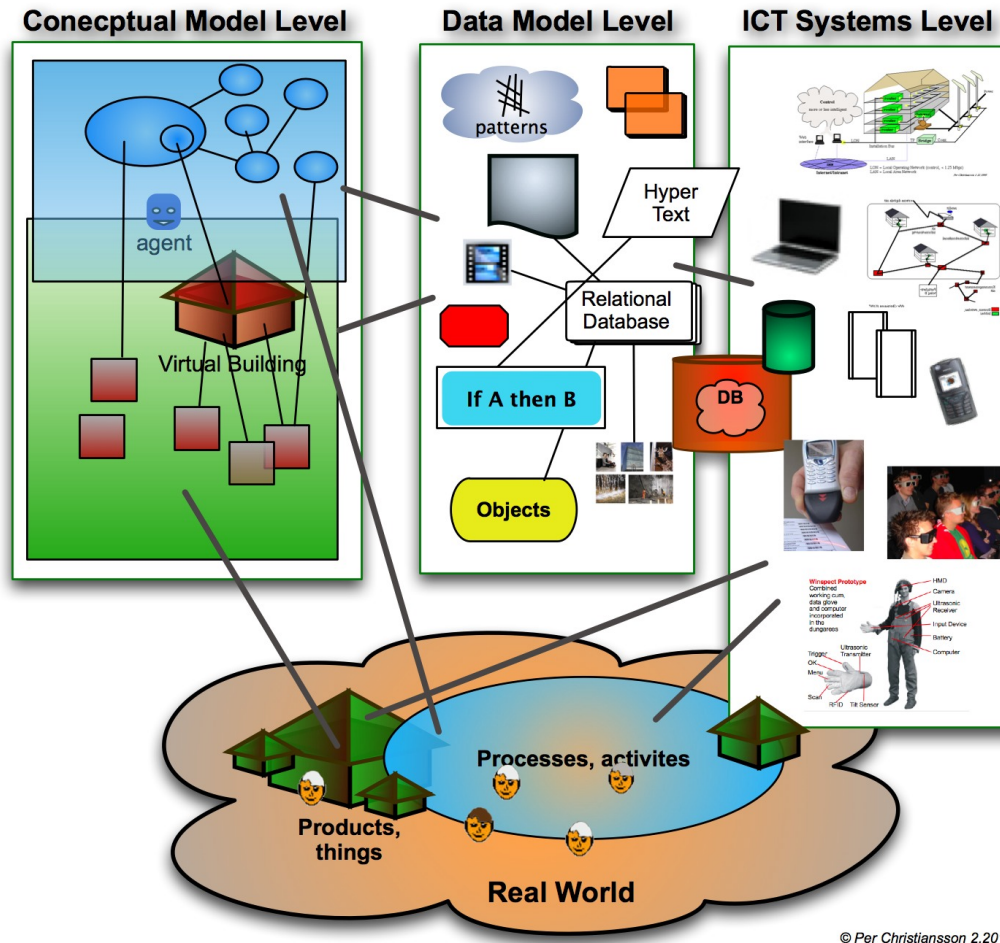


In the real world we identify activities, things, processes, context, and persons.

The real world can be described as (interrelated) systems (no de-facto structure is available today) to accomplish different functions e.g. a comfort system to provide personal living and working quality, personal transport system, load carrying building system, escape system, and communication systems (collaboration, knowledge transfer, mediation, virtual meeting).

MODELS OF THE REAL WORLD

The Real World, Models and Systems



The HOLISTIC view
The holistic view.

We use different kinds of ICT support in the building process and the built environment.

The ICT systems support different functionalities in the building process and built environment.

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