center for produktivitet i byggeriet

Realdania
DEN EUROPÆISKE UNION
Den Europæiske Fond for Regionaludvikling
Vi investerer i din fremtid

center for productivity in construction

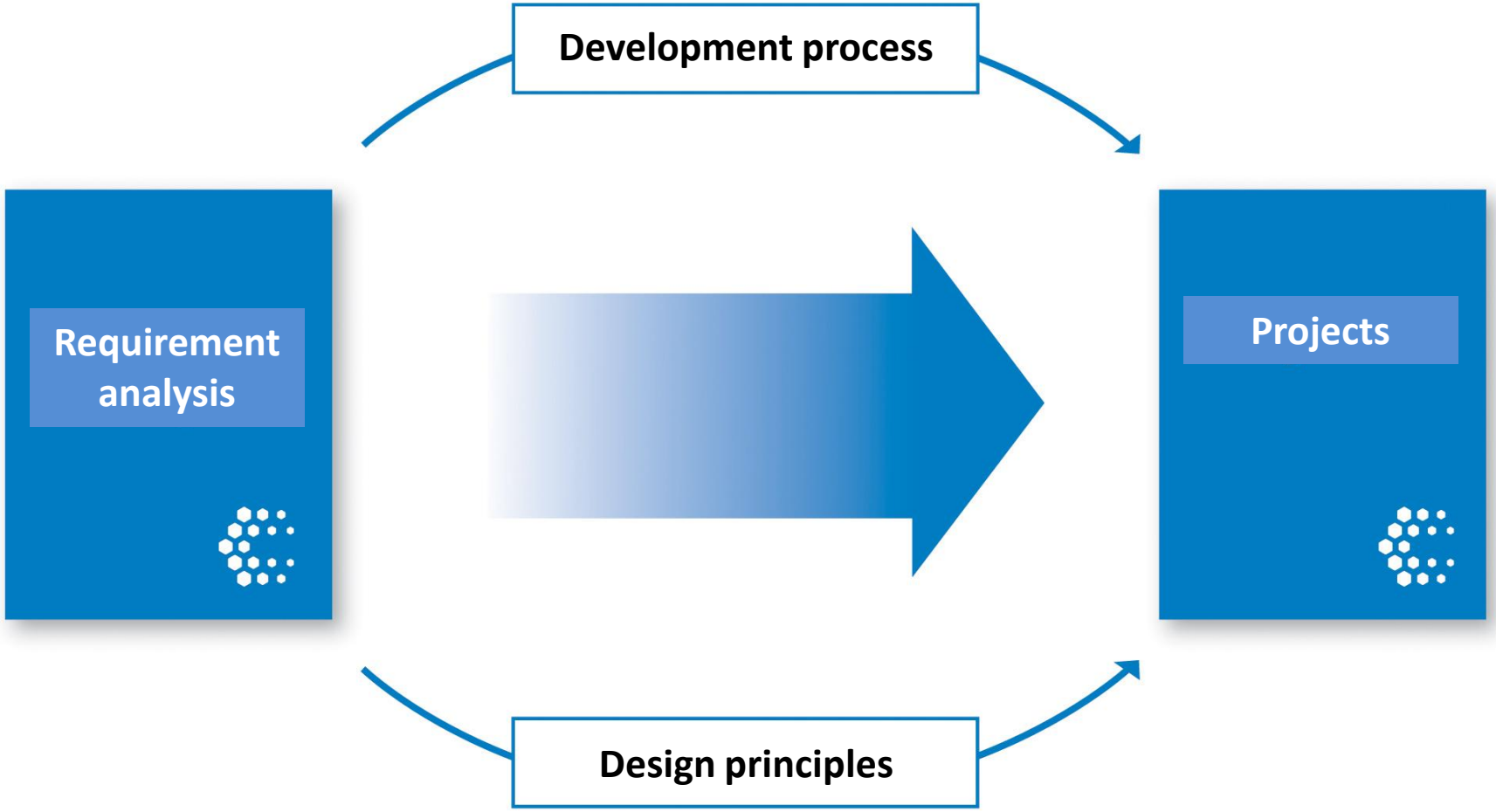
Friday April 13th 2012
RESTA 2012

Classification of Construction Information

Agenda

- Classification and properties
- Results from key projects
- Where are we going from here?

The impact of the requirement analysis on cunecos work



The purpose of the requirement analysis

As a basis for the development cuneco wishes to acquire knowledge about:

- Where do the industry require standards for digital data exchange?
- In which areas can such standards create greatest value?
- Which solution scenarios are demanded by the market?

- within the frames of cunecos for areas of focus.

Method

13 focus groups with a total of 72 participants from each link in the construction value chain

- An advantage of this approach is a close dialogue with the participants

- A drawback is that the results are not statistically significant (but 72 participants are quite a lot…)

Our conclusion is that cuneco has had an adequate contact with the users in order to state, that we have identified the basic needs

Analysens tre trin

Trin 1
Requirement 1

June + August 2011

Focus
- Roles

Content
- Background in research
- Main requirements
- Main processes

Trin 2
Requirement 2

October 2011

Focus
- 4 main phases

What
- Issues
- Processes
- Barriers
- Creation of value

Trin 3
Solutions

November 2011

Focus
- Digital scenarios

What
- User scenarios
- Demand
- Value estimates

Status for digitalization

- The digitalization is well on the way!

- But the construction industry is working on very different levels depending on:
  - Place in the value chain
  - Company size
  - Type of projects (new construction vs. renovation)

- Therefor there is a mixed digital praxis with the use of building models alongside 2D drawings, pdf-files and Excel sheets

Barriers for data exchange

- Different levels of IT expertise and implementation between contract partners and internally in the organisations
- **Insufficient knowledge of the data needs of project partners**
- **Inconsistent praxis – structure and standards for data exchange are missing**
- Cooperation culture – lack of tradition for open exchange
- The formal description of the services from the consultants does not match the model based approach
- The distribution of responsibility in regard to measurement, quantity take-off and building information models
- EU procurement rules
- Incompatible it-systems
- Lack of it-qualifications

Main requirements within cunecos areas of focus

- Consistent information levels
- Consistency and structure through the entire construction process
- Greater possibilities for reusing data
- Classification
- Property data

Main requirements within cunecos areas of focus

- Consistent information levels
- Consistency and structure through the entire construction process
  - Structure for gathering data from operation and user demands for use in the programming phase
  - Uniform perceptions of areas and spaces
  - Uniform use of measurent rules and quantities take-off
  - Structure for tendering documents
  - Uniform requiremends for documentation for operation
- Greater possibilities for reusing data
- Classification
- Property data

Main requirements within cunecos areas of focus

- Consistent information levels
  - We require common clear guidelines for which data is to be exchanged when and in what detail
  - We need a common language which will make it easier for the parties to understand each other and align expectations for deliveries and services
- Consistency and structure through the entire construction process
- Greater possibilities for reusing data
- Classification
- Property data

Main requirements within cunecos areas of focus

- Consistent information levels
- Consistency and structure through the entire construction process
- Greater possibilities for reusing data
  - Architect model → Construction model
  - Procurement with quantities → production planning
  - Delivery of as-built documentation → Operation
- Classification
- Property data

Main requirements within cunecos areas of focus

- Consistent information levels
- Consistency and structure through the entire construction process
- Greater possibilities for reusing data
- Classification
  - There is presently too much work in classification
  - A connection between classification, the building information model and the specifications is missing
- Property data

Main requirements within cunecos areas of focus

- Consistent information levels
- Consistency and structure through the entire construction process
- Greater possibilities for reusing data
- Classification
- Property data
  - Consultants and contractors need structured product information which can be used directly in the building information model, production information, as-built information etc.
  - Building materials aren’t uniquely specified
  - The owners require operation objects and property sets which can be associated with operation and maintenance functions

cunecos design principles

According to the users cuneco must develop standards and products which:

- Are simple and easy to use
- Must work now (but also make sense in 5 years time)
- Helps the industry to take the small steps ahead
- Are relevant for and usable by the whole industry:
    - Large and small companies
    - Front runners and all the rest
    - Owners who use their own buildings and owners who let
    - For both public and private projects
- Are available on the Internet
- Is integrated in the software used in the industry
- Works in an international context

How is the vision carried out?

Relevant usable products:

- Qualified project participants
- Testing of the products in the industry
- Close contact to the users

Internationalization:

- cuneco works on the international perspective through the work on the ISO-revision and cooperation with buildingSMART

It-suitability:

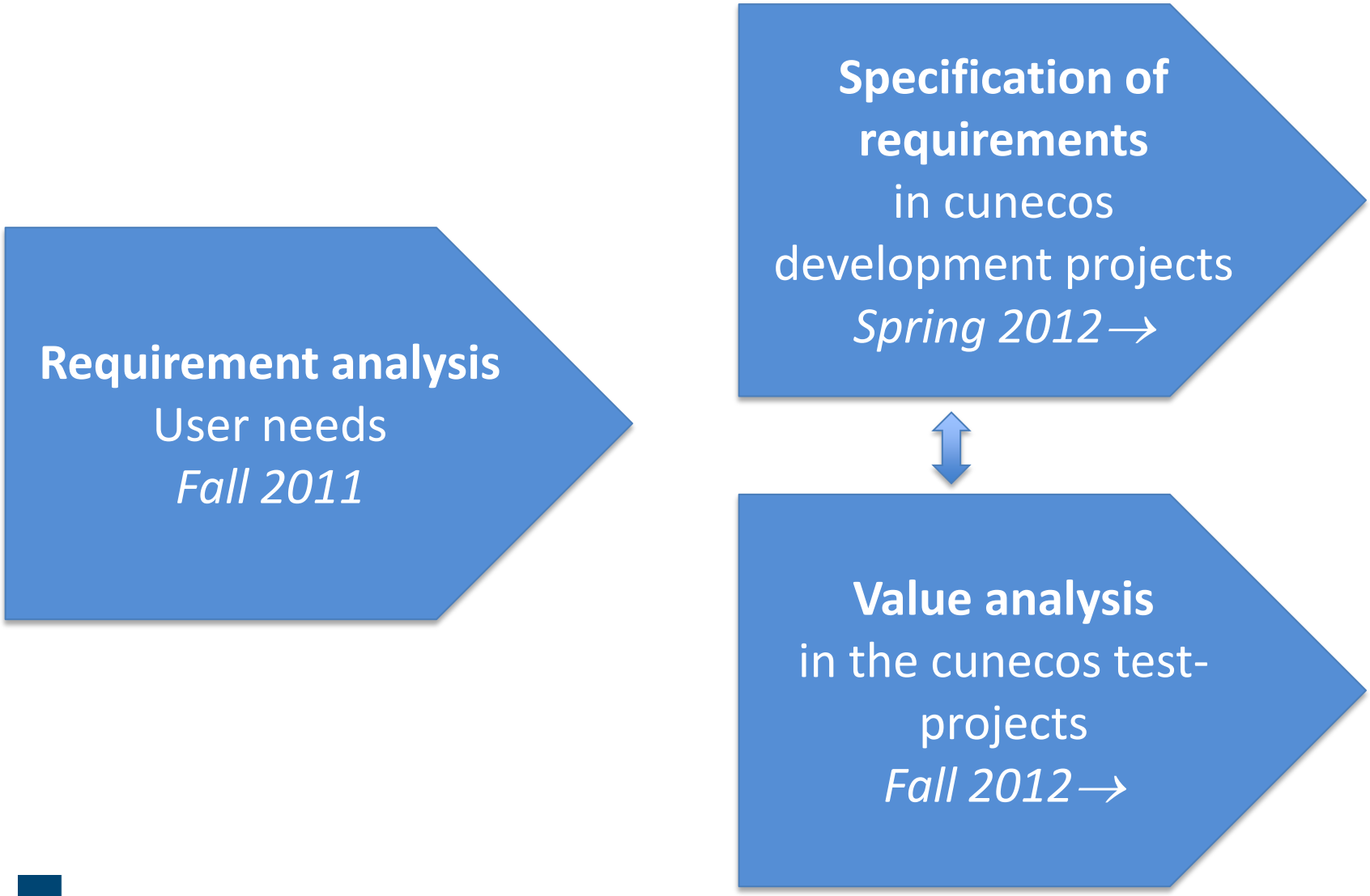
- Close contact with the software vendors
- Software representatives in the cuneco project groups
- Software representatives in bips' it-forum
- The cuneco-server will make cunecos products available on the Internet and easy to access for users and software applications

The cuneco development process

According to the users cuneco must:

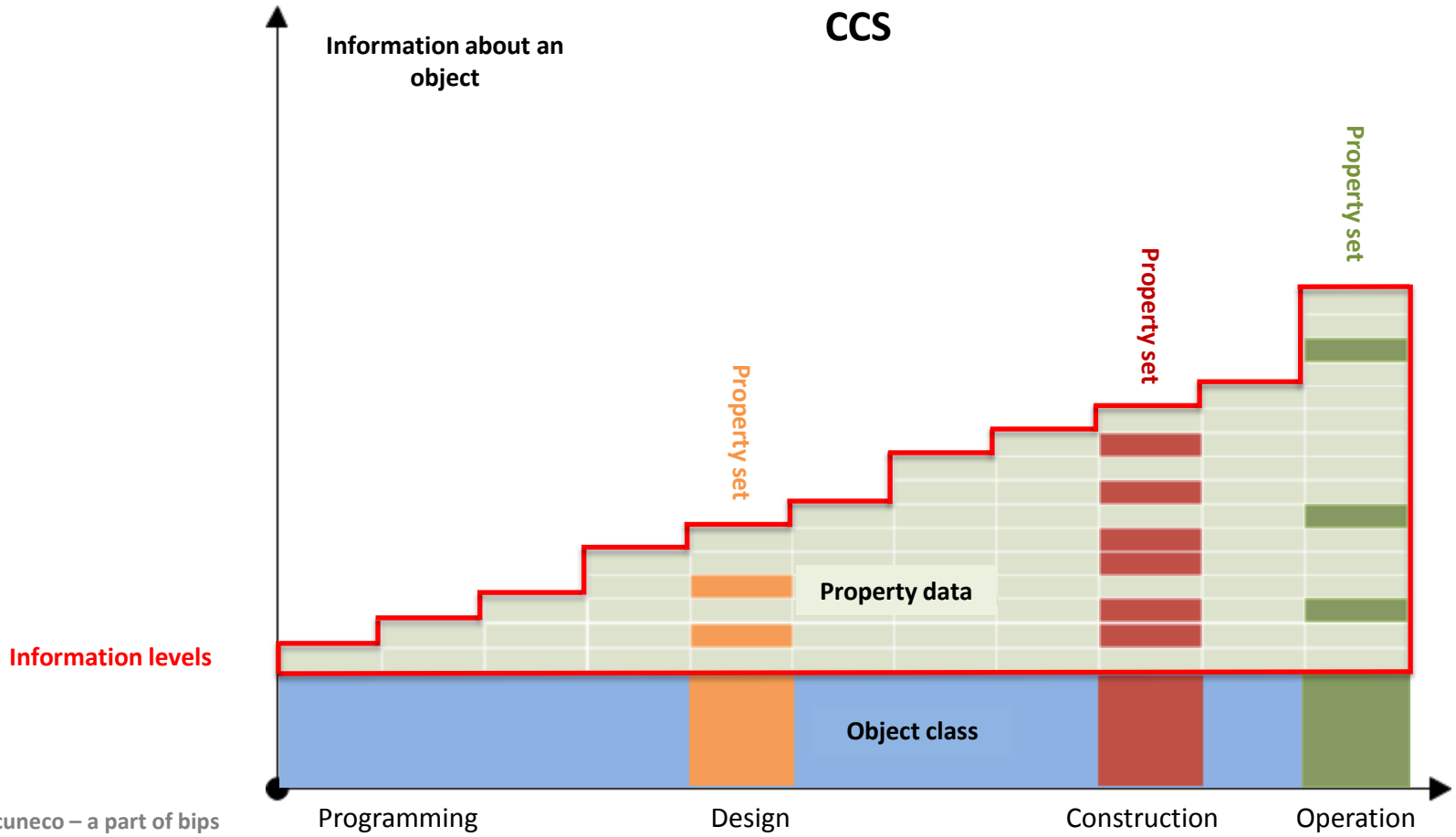
- Communicate openly in a language that everyone understands
- Make use of experiences in the business
- Align the development to other development projects
- Successively test the products
- Have an open eye for barriers outside cunecos own scope of interest

Future perspectives for the analysis



CCS standards

When data is exchanged between actors property sets, which specify selected properties for the object, are used



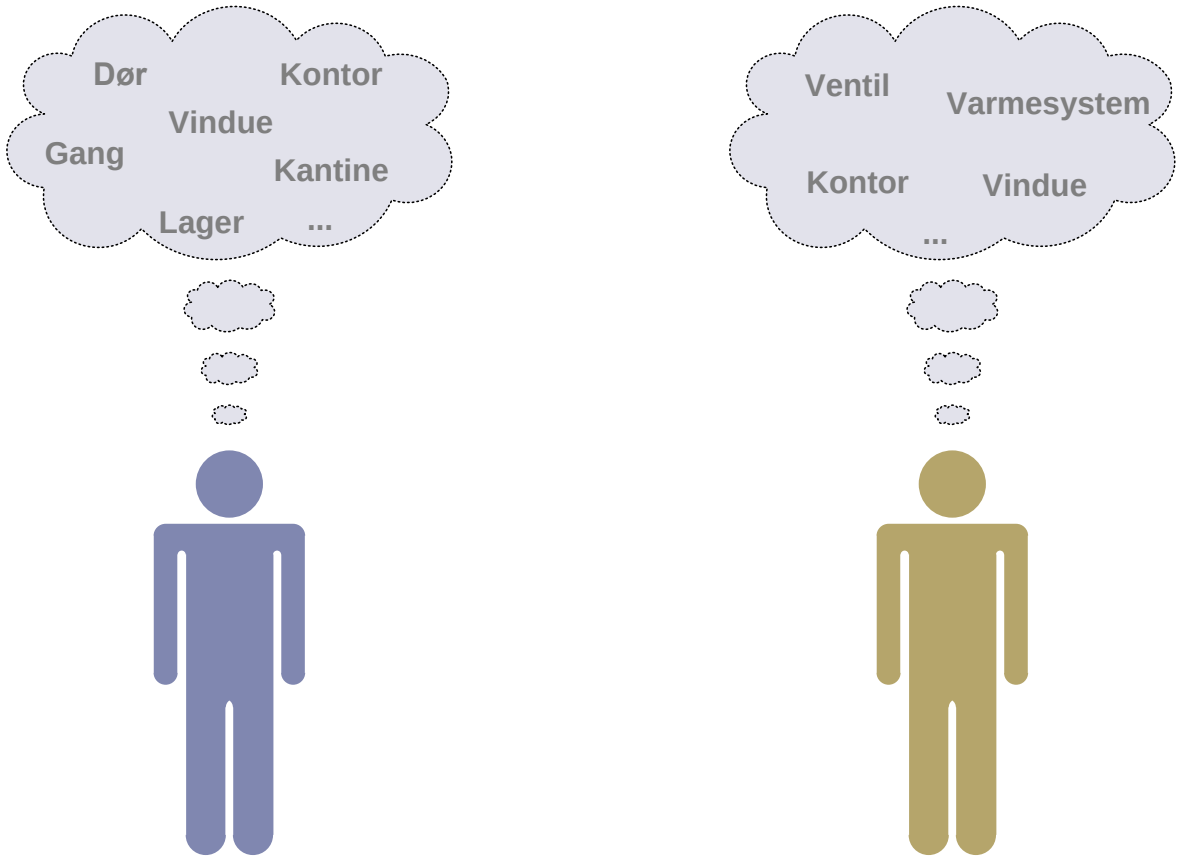
Uniformat Detailed Classification (UK)

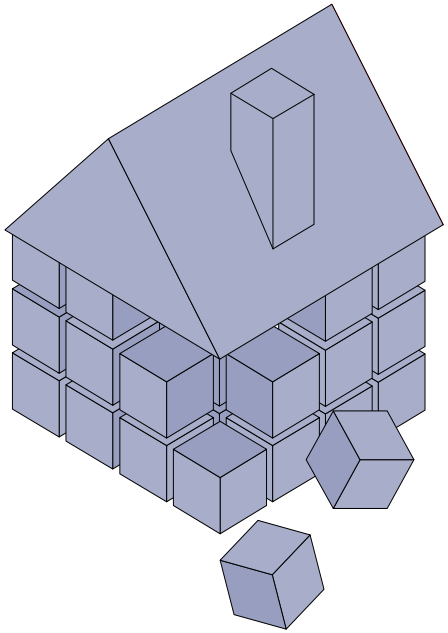
Uniformat Classification	
No classification	
A - Substructure	
A10 - Foundations	
A1010 - Standard Foundations	
A1010200 - Foundation Walls	Walls
A1010210 - Foundation Walls - CIP	Walls
A1010220 - Foundation Walls - CMU	Walls
A1010230 - Foundation Walls - Wood	Walls
A1010400 - Perimeter Insulation	Walls
A1010410 - Perimeter Insulation - Rigid	Walls
A20 - Basement Construction	
A2020 - Basement Walls	
A2020100 - Basement Wall Construction	Walls
A2020110 - Basement Walls - CIP	Walls
A2020120 - Basement Walls - CMU	Walls
A2020130 - Basement Walls - Wood	Walls
A2020200 - Moisture Protection	Walls
A2020210 - Foundation Dampproofing	Walls
A2020300 - Basement Wall Insulation	Walls
A2020310 - Basement Wall Insulation - Rigid	Walls
A2020400 - Interior Skin	Walls
B - Shell	
B10 - Superstructure	
B1010 - Floor Construction	
B1010200 - Upper Floor Framing - Vertical Elements	Structural Columns
B1010210 - Bearing Walls - CIP	Walls
B1010215 - Bearing Walls - Block	Walls
B1010220 - Bearing Walls - Drywall w/Studs	Walls
B1010225 - Bearing Walls - Plaster w/Studs	Walls

72 options *Wall*

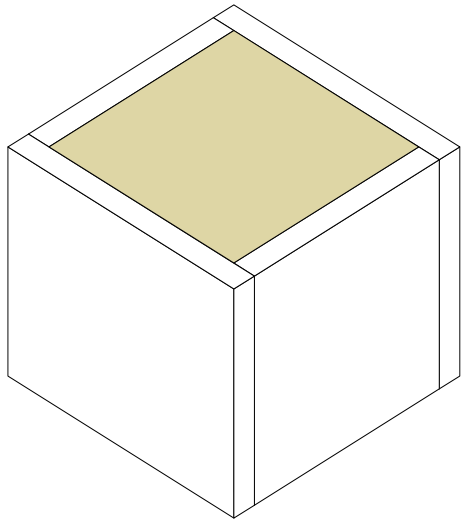
Structure and syntax for Classification of Results

Finding your way around information



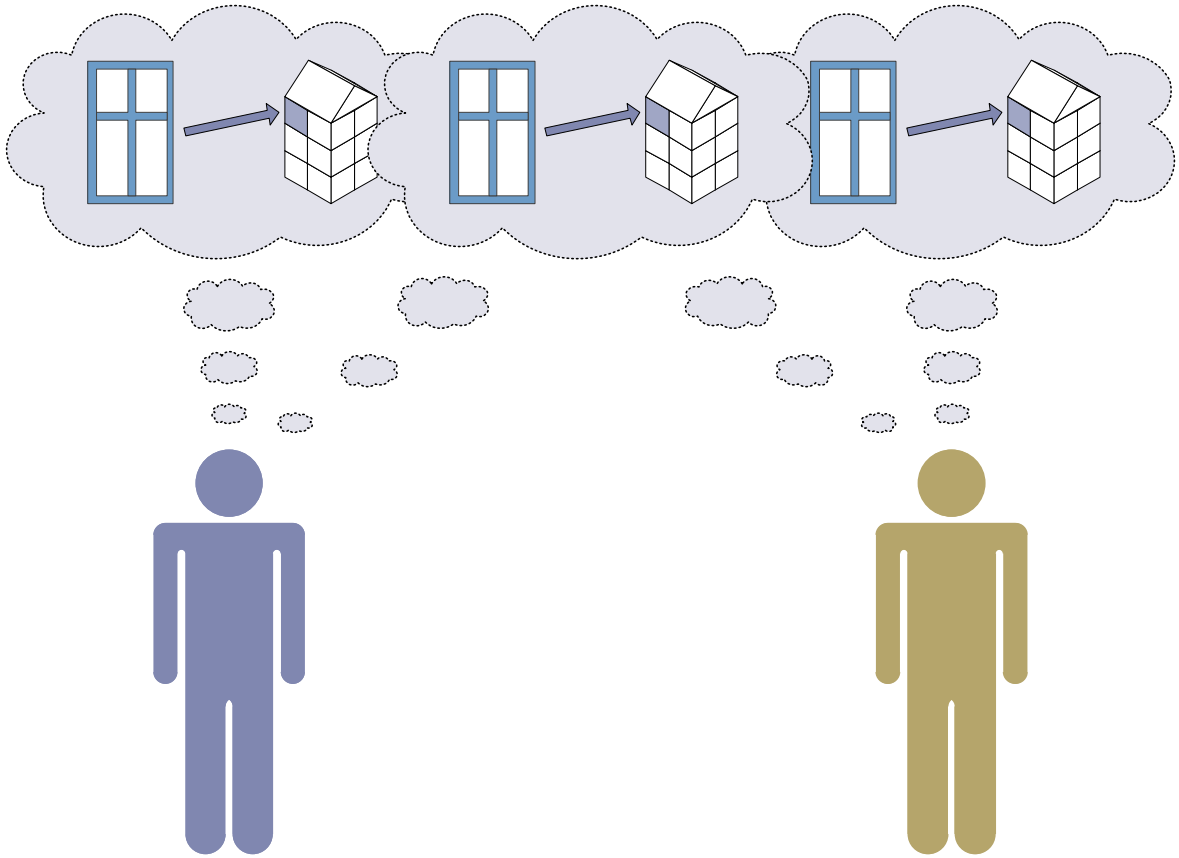


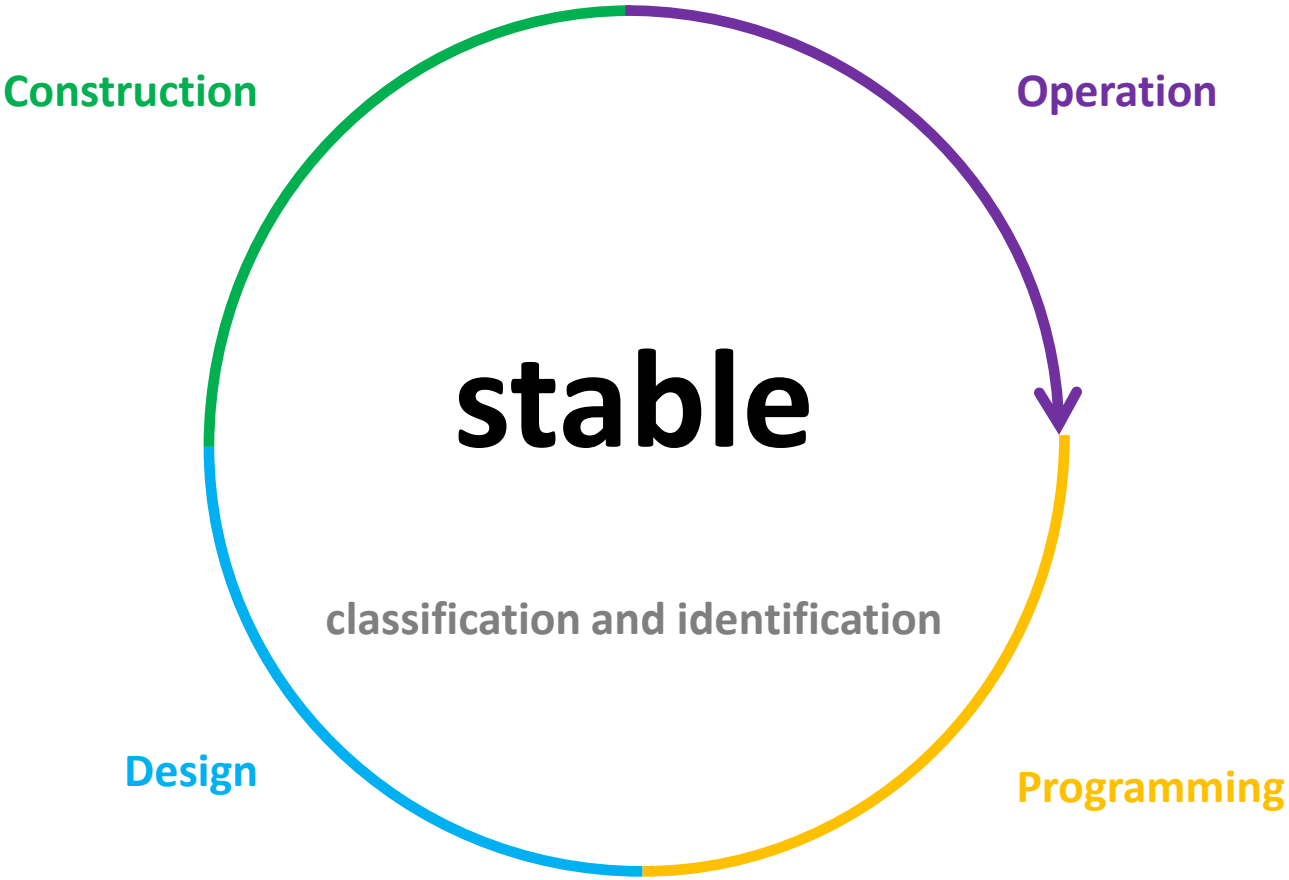
Construction elements



Spaces

Sharing information

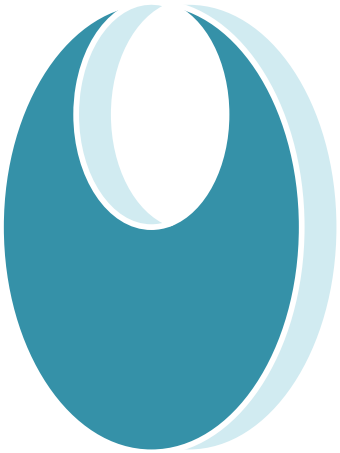



Construction
Operation
stable
classification and identification
Design
Programming

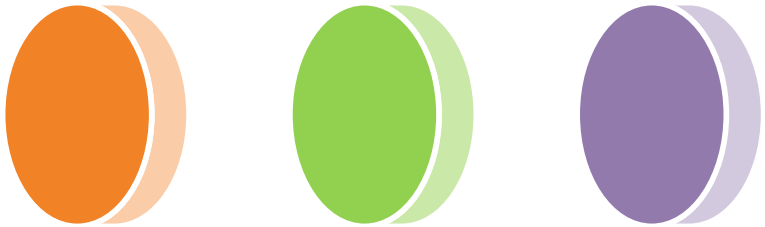
objects

… the construction elements and spaces we are working on

Object occurrence
eg. “door”



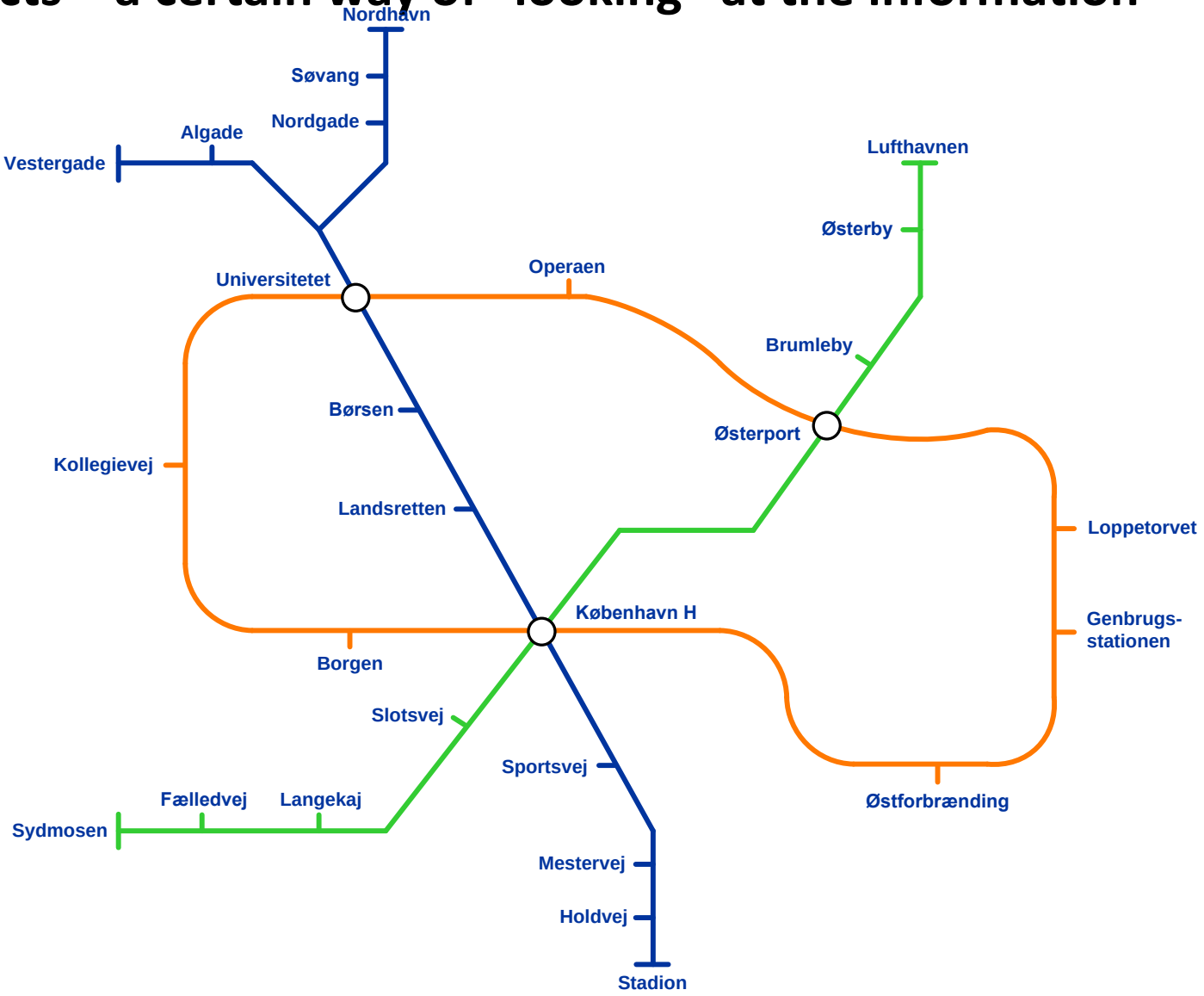
Object individuals
specific make of door



aspects

… in order to make the information sharp, exact and accessible to you

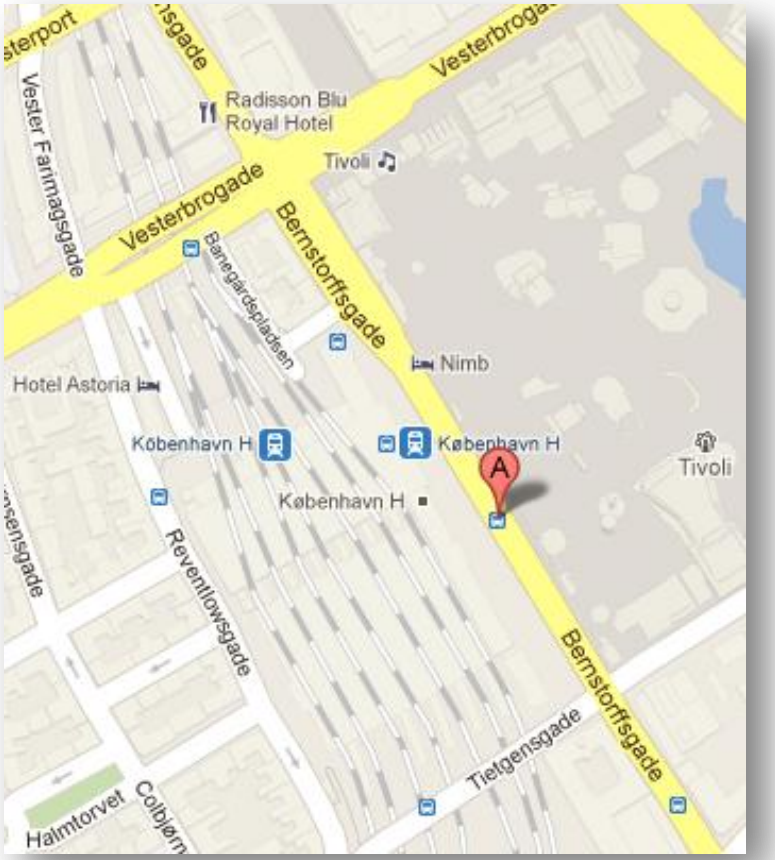
Aspects – a certain way of “looking” at the information



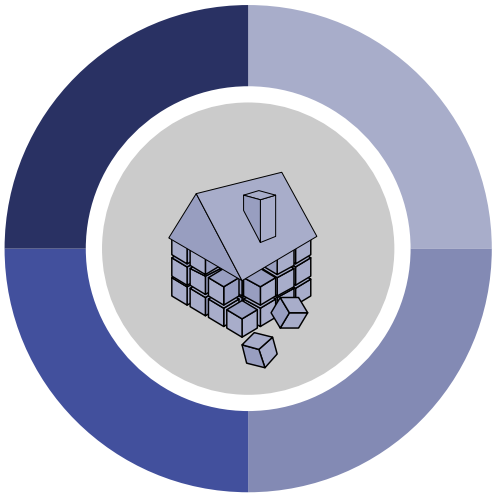
Other aspects

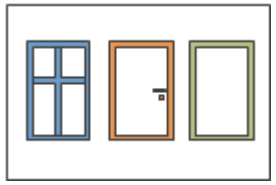
C Klampenborg

↓		↑
06 16 26 36 46 56	Klampenborg	49 59 09 19 29 39
08 18 28 38 48 58	Ordrup	46 56 06 16 26 36
10 20 30 40 50 00	Charlottenlund	44 54 04 14 24 34
14 24 34 44 54 04	Hellerup	41 51 01 11 21 31
16 26 36 46 56 06	Svanemøllen	39 49 59 09 19 29
18 28 38 48 58 08	Nordhavn	37 47 57 07 17 27
21 31 41 51 01 11	Østerport	35 45 55 05 15 25
23 33 43 53 03 13	Nørreport	32 42 52 02 12 22
25 35 45 55 05 15	Vesterport	30 40 50 00 10 20
28 38 48 58 08 18	**København H**	**29 39 49 59 09 19**
29 39 49 59 09 19	Dybbølsbro	25 35 45 55 05 15



Aspects for CONSTRUCTION ELEMENTS





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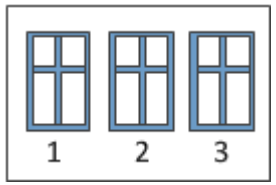
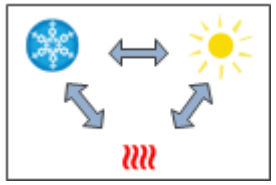
Classification



#

Simple product



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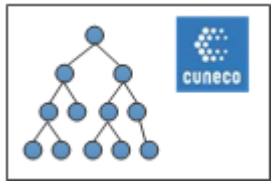
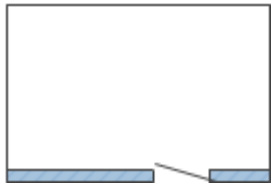
Function



-

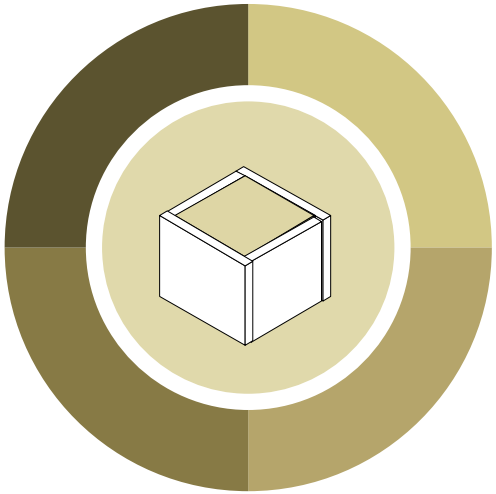
Structural product

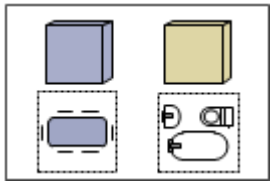


+

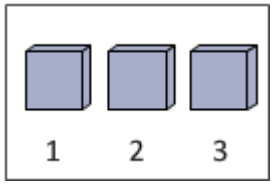
Location

Aspects for SPACES

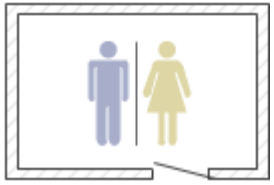




%% Classifikation

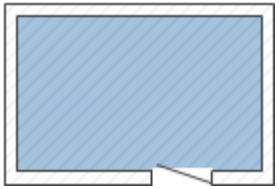


Simple product



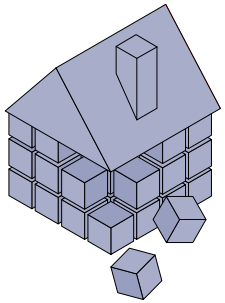
== Function

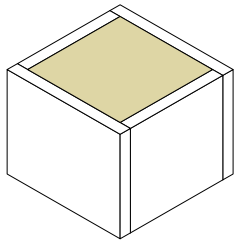
-- Structural product



++ Location

CCS coding rules





PREFIX	%	#	-	=	+	%%	##	--	==	++	**IDENTIFICATION**
CLASSIFICATION	A	B	C	D	…	A	B	C	D	…	
NUMBERS	1	2	3	4	…	1	2	3	4	…	

numbers 1, 2, 3…

… are to be used within a project

classification A, B, C…

… makes it possible to recognize objects across projects

Three different aspects of doors

%JB1	Door type 1
#JB102	Door no. 102
-MB3.JB2	Wallsystem no. 3 .Door no. 2

Revision of ISO standard

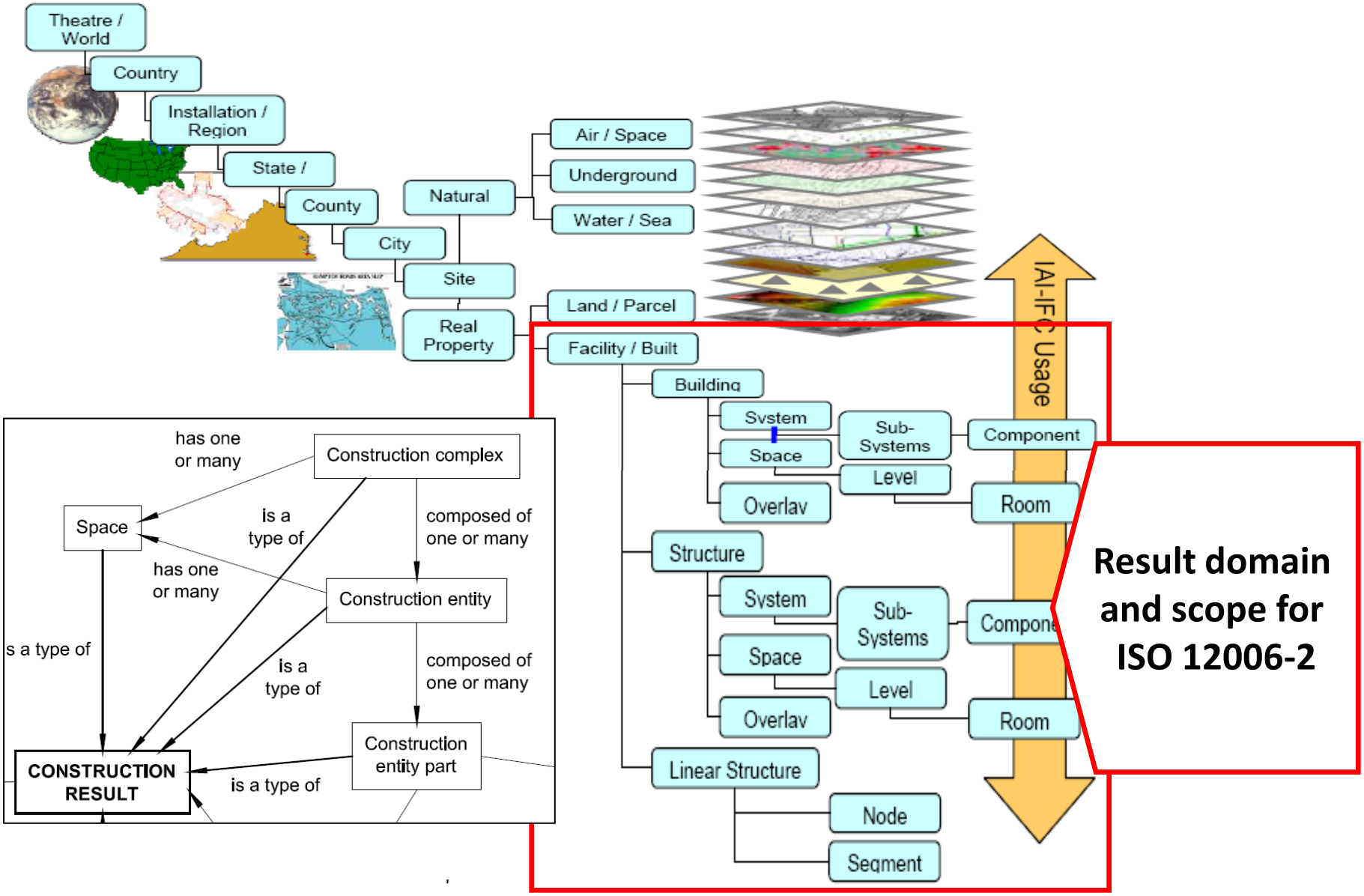
Experiences and learning from

- the DBK ”part of” classification work in Denmark
- Swedish reports on evaluating the Danish DBK result and of mapping between the DBK and the Swedish BSAB classification
- Initiatives in other countries

The need for further development

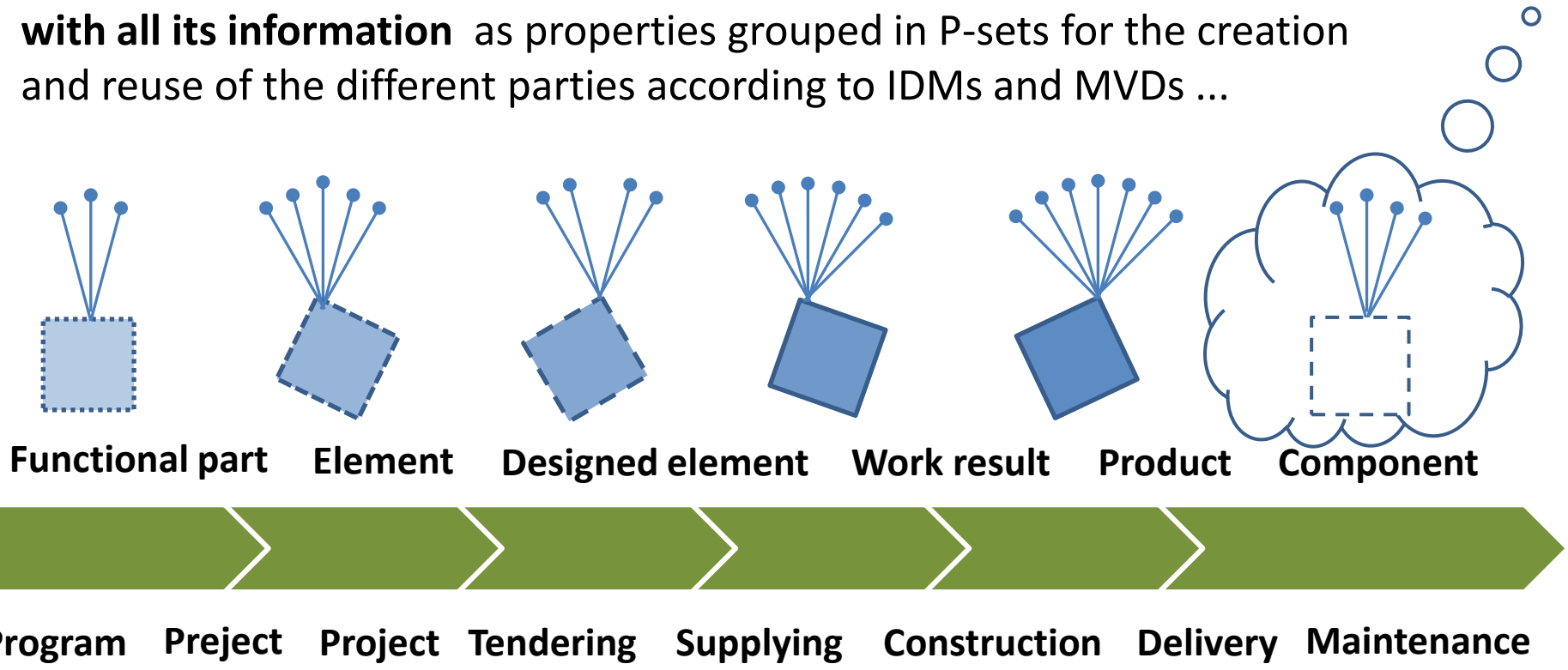
- ISO 12006-2 – theoretical and conceptual work has to be done after the discovery of ”a missing link”
- DBK – in the cuneco-project by bips, Denmark
- Harmonization of new classification efforts across countries

The domain and interface of a classification system according to ISO 12006-2 and to object based information

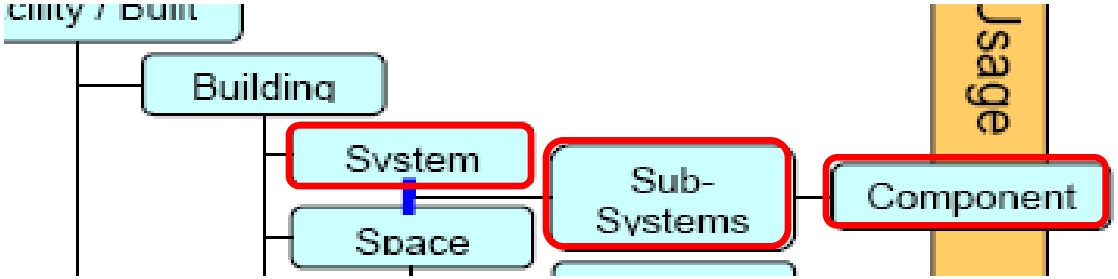


1st challenge: The object and its information over time

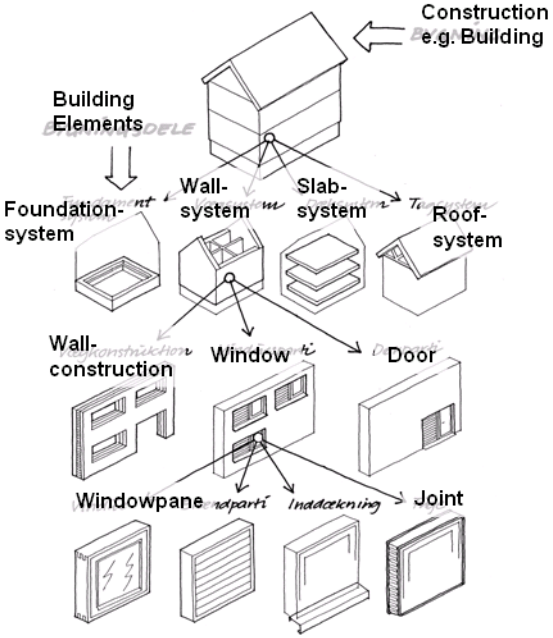
Instead:
It might be named as a construction entity part or **a construction element with all its information** as properties grouped in P-sets for the creation and reuse of the different parties according to IDMs and MVDs ...



Model- and objectoriented structuring in relation to BIM



We used the Reference Designation System technique for organizing of Elements according to IEC/ISO 81346

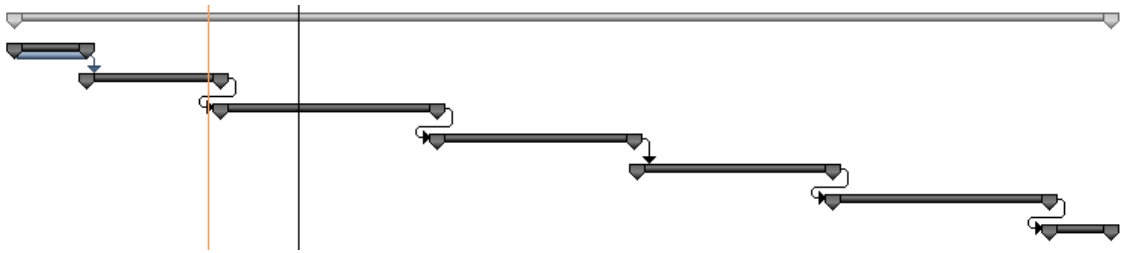


- Foundationsystem
- Wallsystem
  - Wallconstruction
    - Column
    - Beam
    - Grid structure
  - Windowset
    - Window
      - Pane
      - Frame
      - Section
      - Fittings
    - Windowsill
    - Joint
- Roofsystem
- Heatingsystem
- Ventilationsystem

Project plan

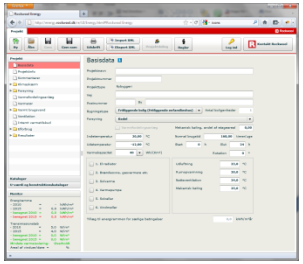
- Task force is established - housed by Danish Standards
- Henrik Balslev is convenor for the revision

11111 Revision af ISO-standard	480 dage	to 01-12-11	ma 16-12-13
Opstart og bemanding	30 dage	to 01-12-11	on 18-01-12
WG2 Taskforce projekt	60 dage	to 19-01-12	to 19-04-12
Work draft 1	90 dage	fr 20-04-12	to 13-09-12
Work draft 2	90 dage	fr 14-09-12	fr 25-01-13
Commitee draft (CD)	90 dage	ma 28-01-13	ma 10-06-13
Final Draft International standard	90 dage	ti 11-06-13	ma 04-11-13
Evaluering	30 dage	ti 05-11-13	ma 16-12-13

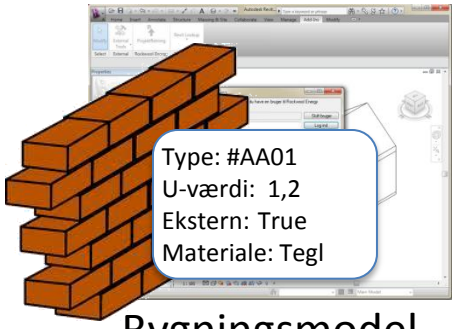


- Finland, Norway, England, Sweden and Denmark is currently participating in the work

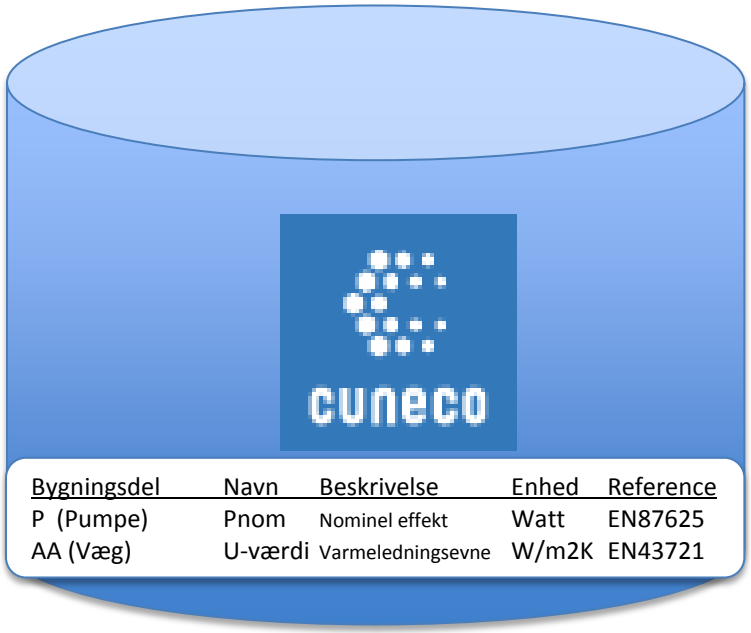
Structure for Property Data



Energiberegning

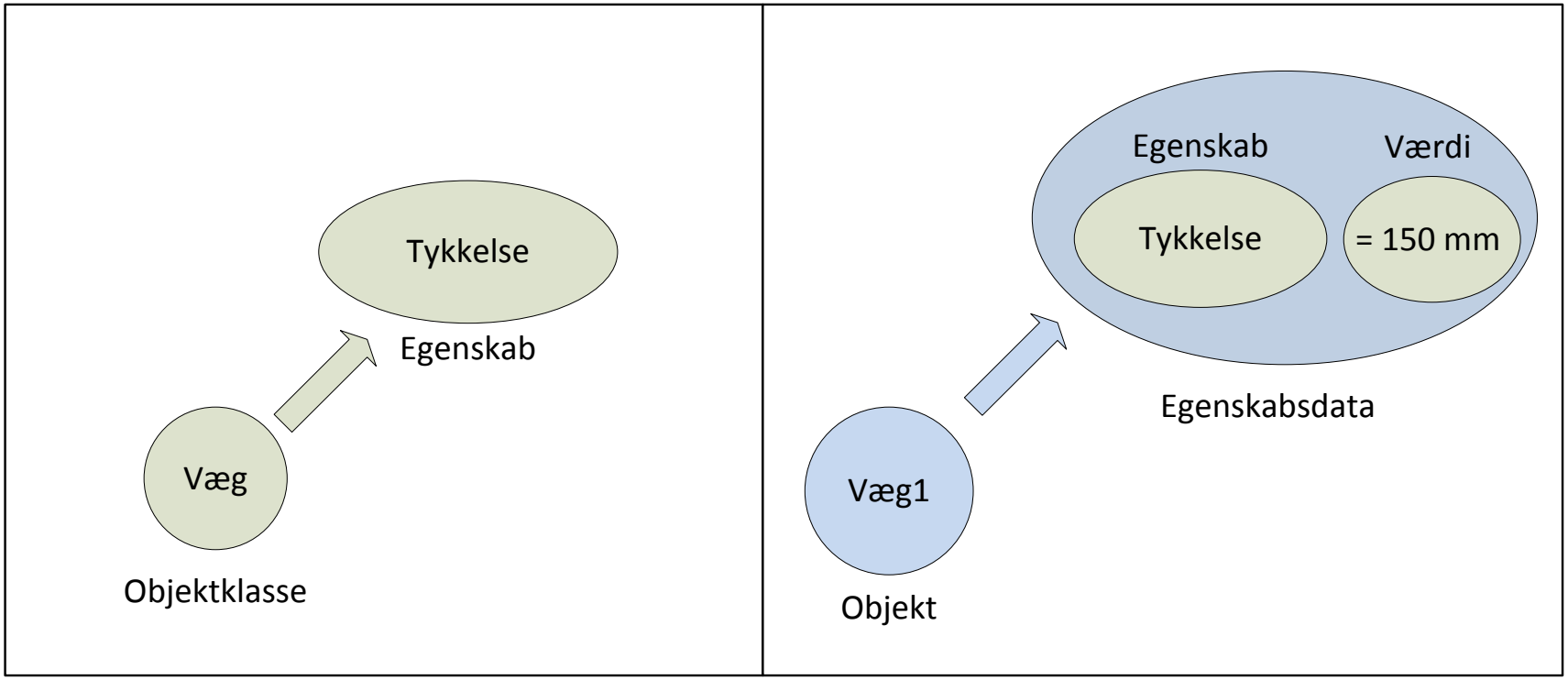


Bygningsmodel



Bygningsdel	Navn	Beskrivelse	Enhed	Reference
P (Pumpe)	Pnom	Nominel effekt	Watt	EN87625
AA (Væg)	U-værdi	Varmeledningsevne	W/m2K	EN43721

The property data concept

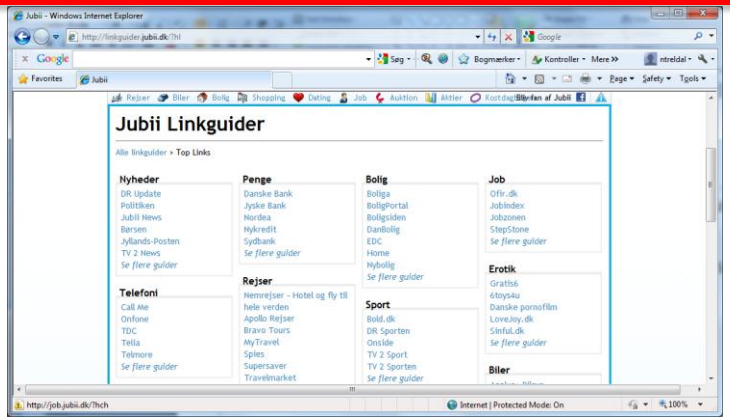


Issues

- Naming conventions
- Classification
- User defines properties
- Versioning of properties
- The classification property
- Metadata for properties
- Properties at different stages
- The ‘State’ property
- The property database

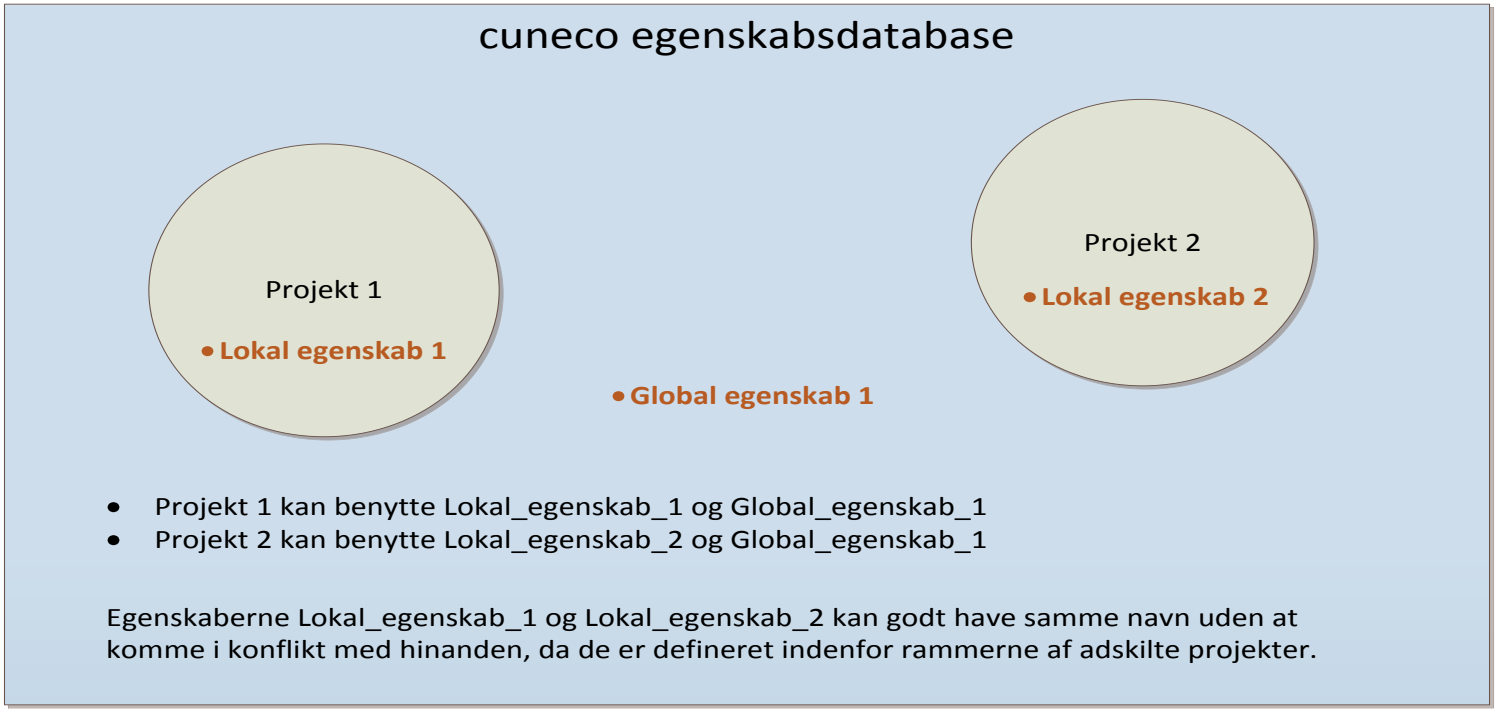
Classification of properties

- The properties can be placed in a classification structure.



- The description for the property is searchable.

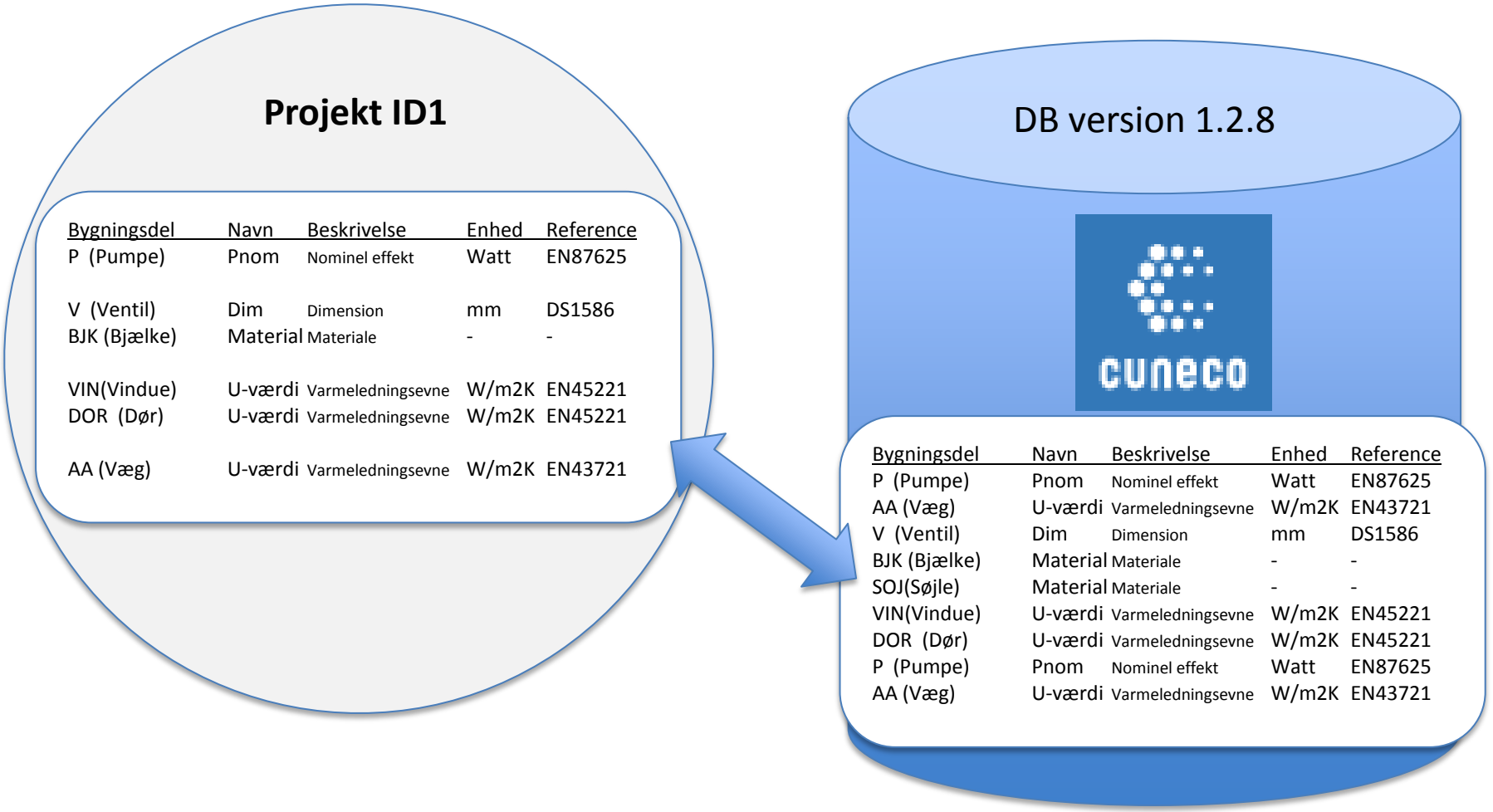
User defined properties



- Local properties, which are specific for a project
- Suggestions for global properties to be evaluated by cuneco

Versioning of the property database

Other properties are selected for the project as they are used and linked to a certain version of the database



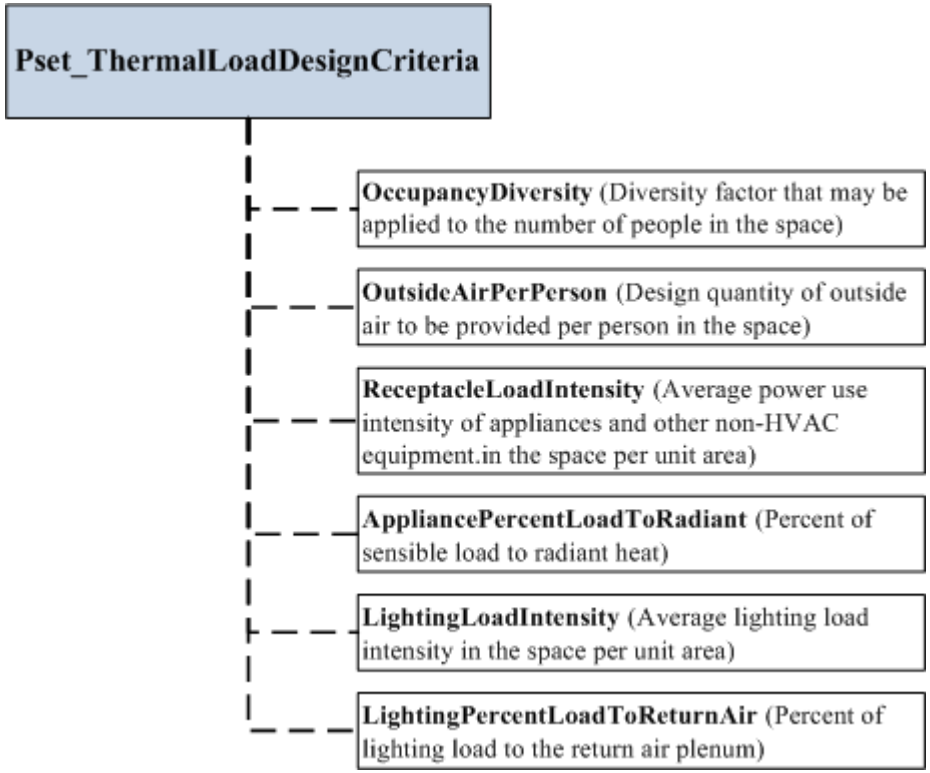
The ”Classification” property

Classification properties are associated with all objects:

- CCS code (CCS_code)
- Alt. RDS-kode (AltRDScode)

Naming conventions for properties

- According to ISO/IS 10303-41:1994 like IFC, SPie and IFD



Metadata for properties

In time metadata for properties should be implemented; the notation could be:

property.unit

property.reference

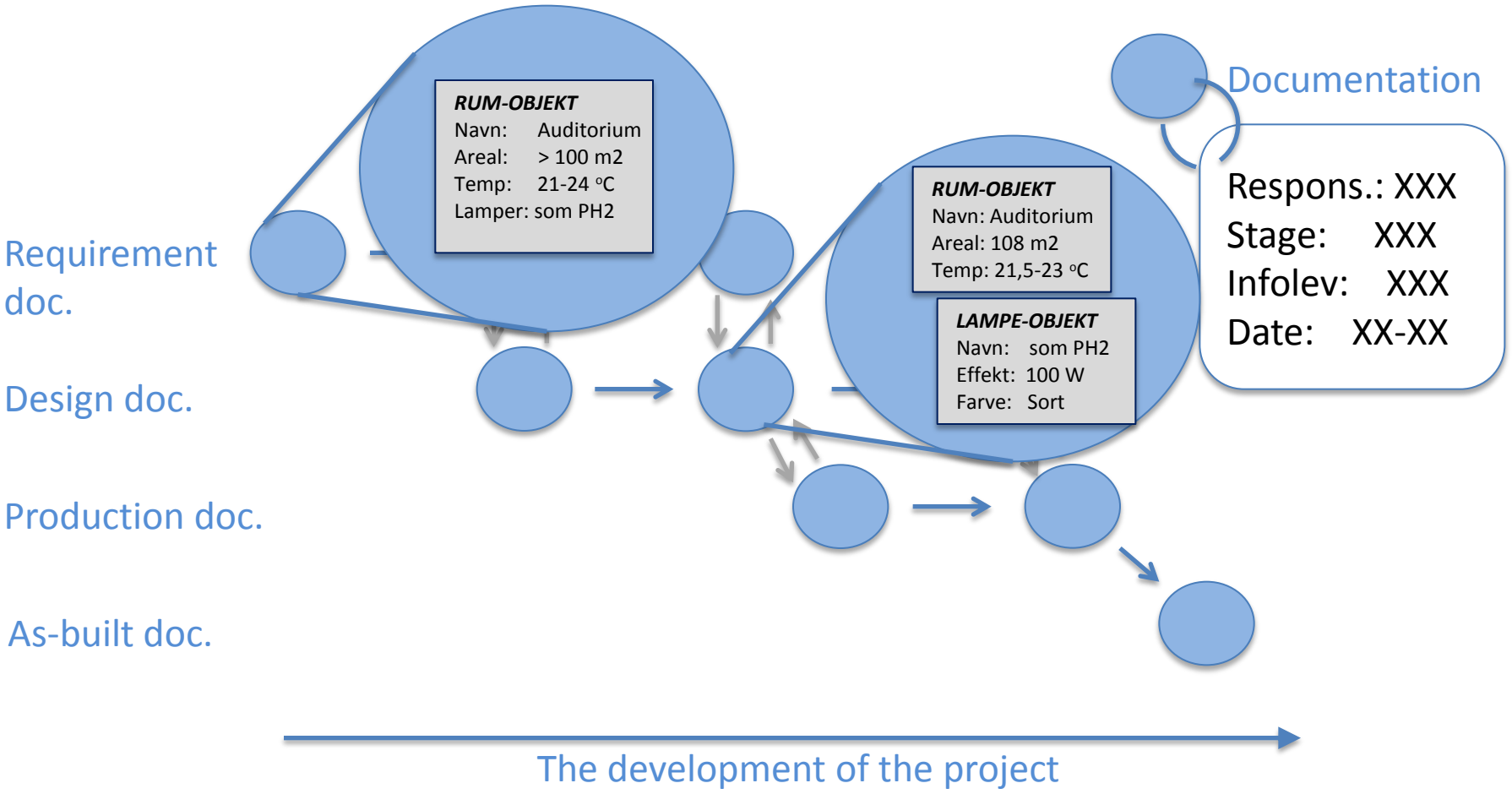
property.status

Default values should be used so when e.g. the metadata ‘unit’ isn’t set the default value is ‘mm’.

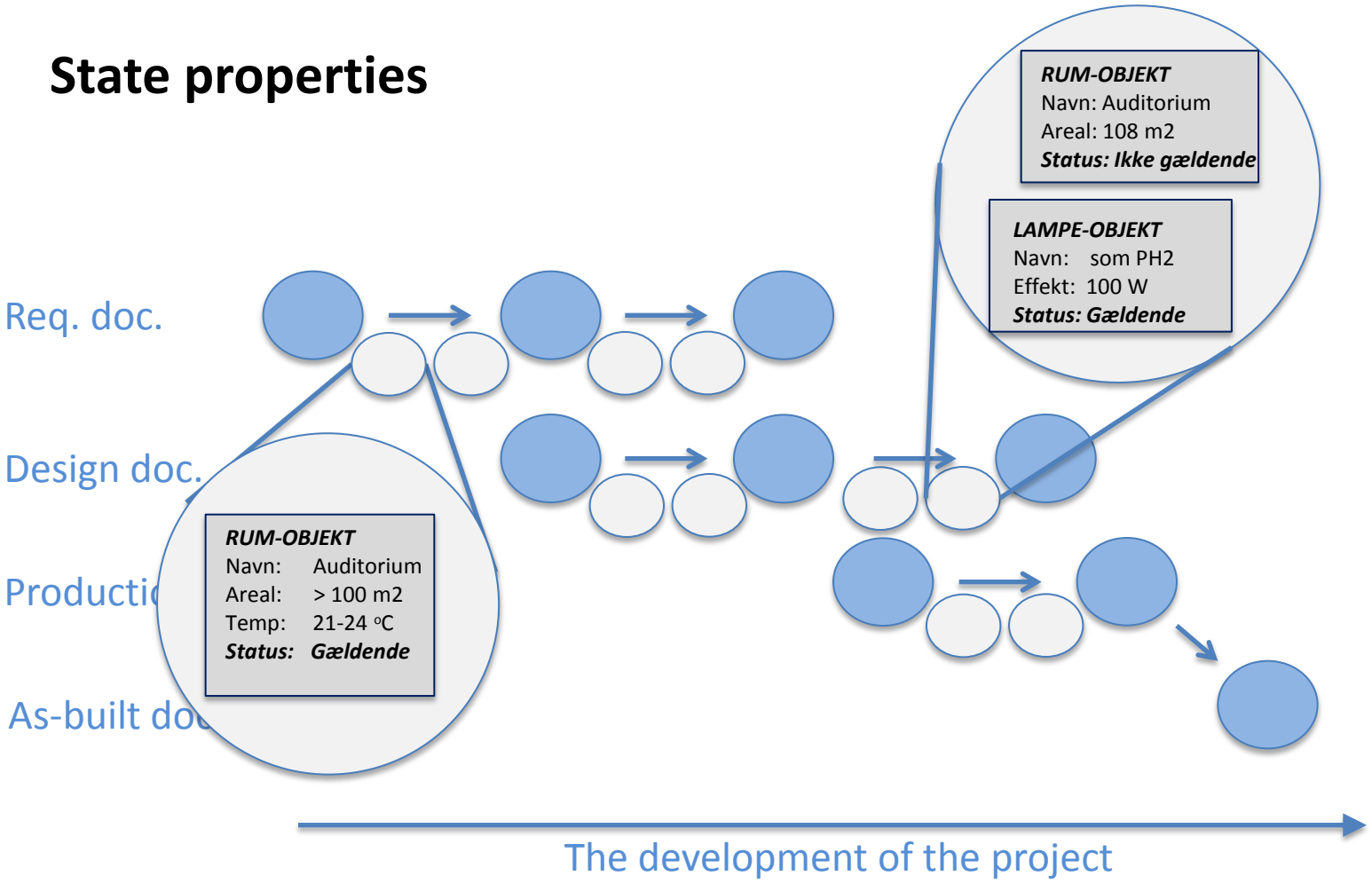
In the short term deviances can be handled by creating new properties using the notation:

”property_reference”

Properties at different stages

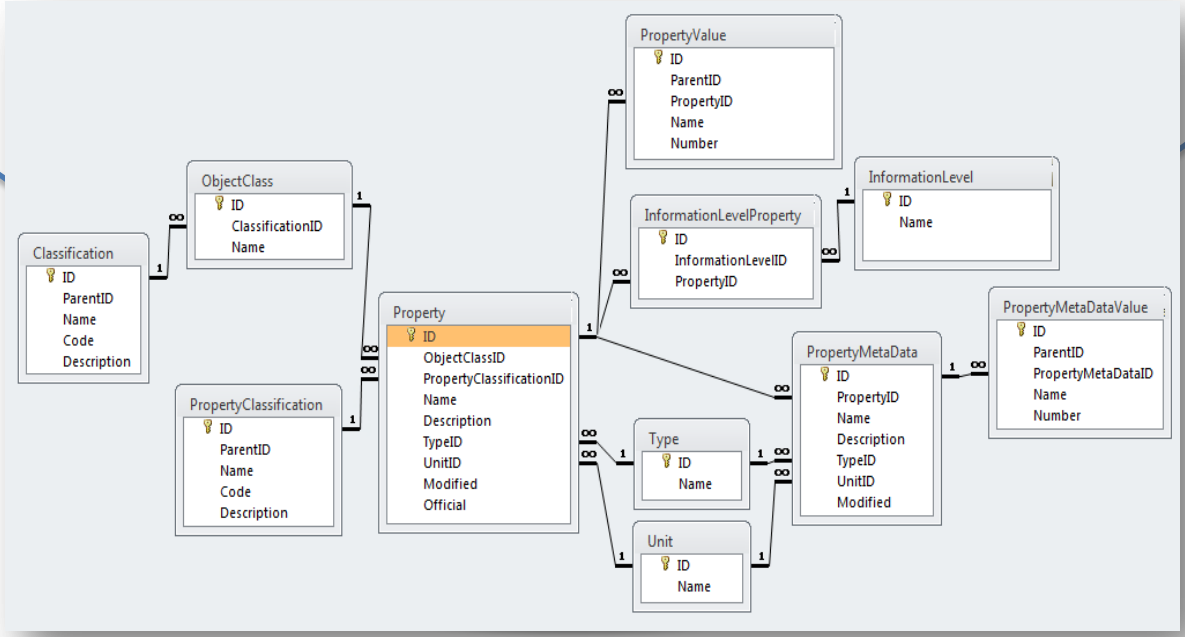


State properties

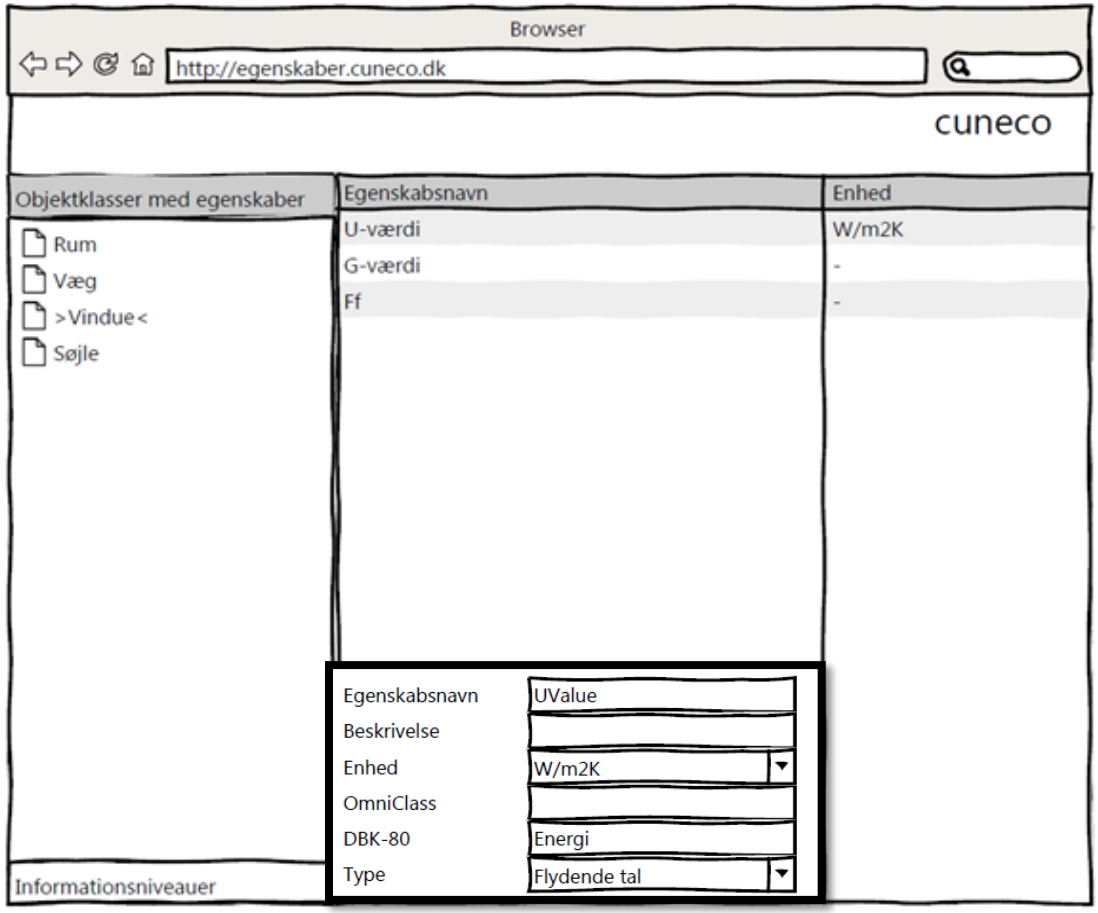


The cuneco property database

Bygningsdelstype		Egenskabsbegreb, -navn og definition				Reference		DBK-egenskabsklassifik.		bSM Data Dictionaries (IFD)			IFC			Værdi	
Bygning/Byg-ningsdel/Rum	DBK	Egenskabsnavn (DK)	Synonym (DK)	Eng. egen-skabsnavn	Definition (DK)	Reference/ standard	Reference-betegnelse	DBK-EGN-klassifik.kode	DBK-EGN-betegnelse	IFD-name	IFD-definition	IFD-GUID	IfcProperty	IFC Property_Set	IfcDefinition	Tilladte værdier	Enheds-betegn.
Dør	-EK	Europæisk brandklasse	Brandklasse	FireRating	Brandmodstands-evne for døre	EN 13501	Brandteknisk klassifikation af byggevarer og bygningsdele – baseret på brandprøvning	EGN02.3.2.01 -	Sikring mod brand	FireRating	Fire safety classification	2va13as21sa5k	IfcFireRating	Pset_DoorCommon	Fire rating for this object. It is given according to the national fire safety classification.	EI2 30-C	-
Væg	-AB	U-værdi	Varmeledningsevne	ThermalTransmittance	Væggens samlede U-værdi.	EN 10456	Varneledningsevne for vægge	EGN02.6.5.03 -	Thermiske egenskaber	ThermalTransmittance			ThermalTransmittance	Pset_WallCommon	Thermal transmittance coefficient (U-Value) of a material	X,X	W/m2K



Access to the cuneco property database



Test project - DNV Gødstrup

Test project - DNV Gødstrup

Bygherre:

Region Midtjylland

Totalrådgiver:

CuraVita

Arkitema Architects + AART Architects + NSW Arkitekter & Planlæggere A/S
Grontmij A/S
Moe & Brødsgaard A/S + Arup
Hospitalitet A/S

DNV GØDSTRUP – Det Nye hospital i Vest

Test project - DNV Gødstrup

DNV GØDSTRUP

Test project - DNV Gødstrup

Tidsplan	Programmering	Jan. 2012 – Juni 2012
1. etape	Dispositionsforslag	Juli 2012 – Dec. 2012
	Projektforslag	Jan. 2013 – Juni 2013
	Hovedprojektering, start	Juli 2013
	Ibrugtagning, akutområde	Dec. 2016

DNV GØDSTRUP

Test project - DNV Gødstrup

Tidsplan	Programmering	Primo 2014
Efterfølgende etaper	Ibrugtagning	2018 - 2020

DNV GØDSTRUP

CURAVITA

Test project Gødstrup

- The organization behind the DNV-Gødstrup hospital project has demanded that the consultants on the project used the digital standards from cuneco
- The reason for this was solely to get a smoother building process and more value for money
- cuneco has cooperated with DNV-Gødstrup in order to make templates for the agreements in this regard

Project organization for full scale test of cuneco standards

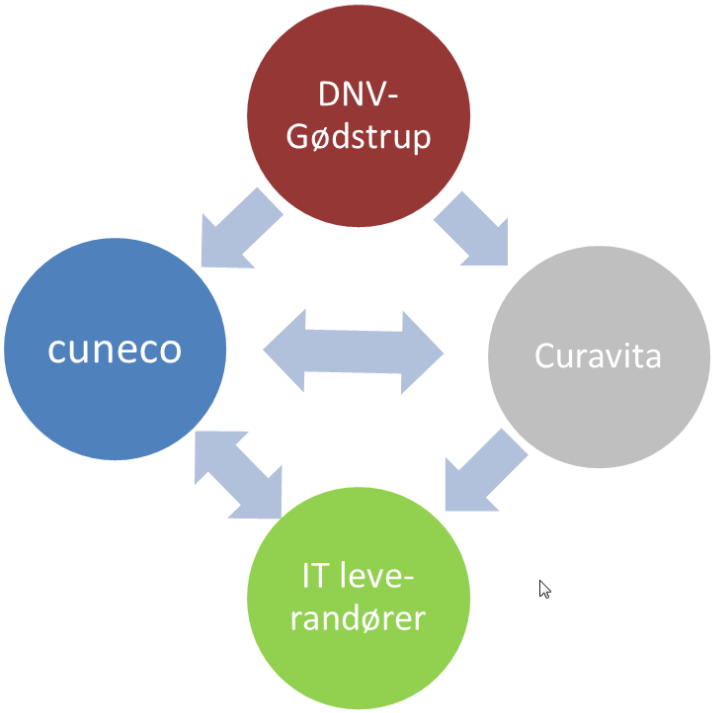
Participants in the test are:

- DNV-Gødstrup
- Curavita
- cuneco
- IT-vendors

A steering group is formed with a representative from DNV-Gødstrup as chairman.

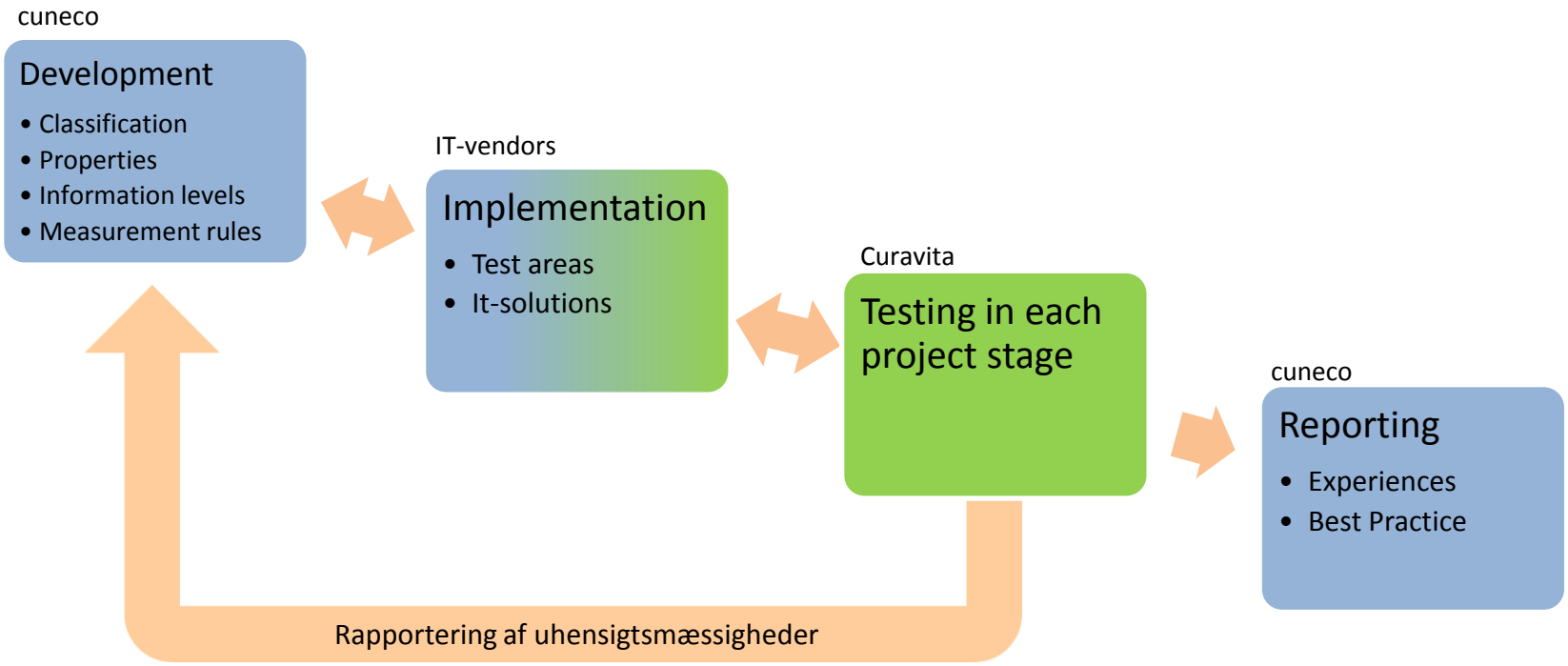
A work group is establish in order to coordinate with the IT-vendors.

cuneco handles the coordination between the participants.



The test method

The test method is cyclical as the standards are being adjusted while the test is ongoing.

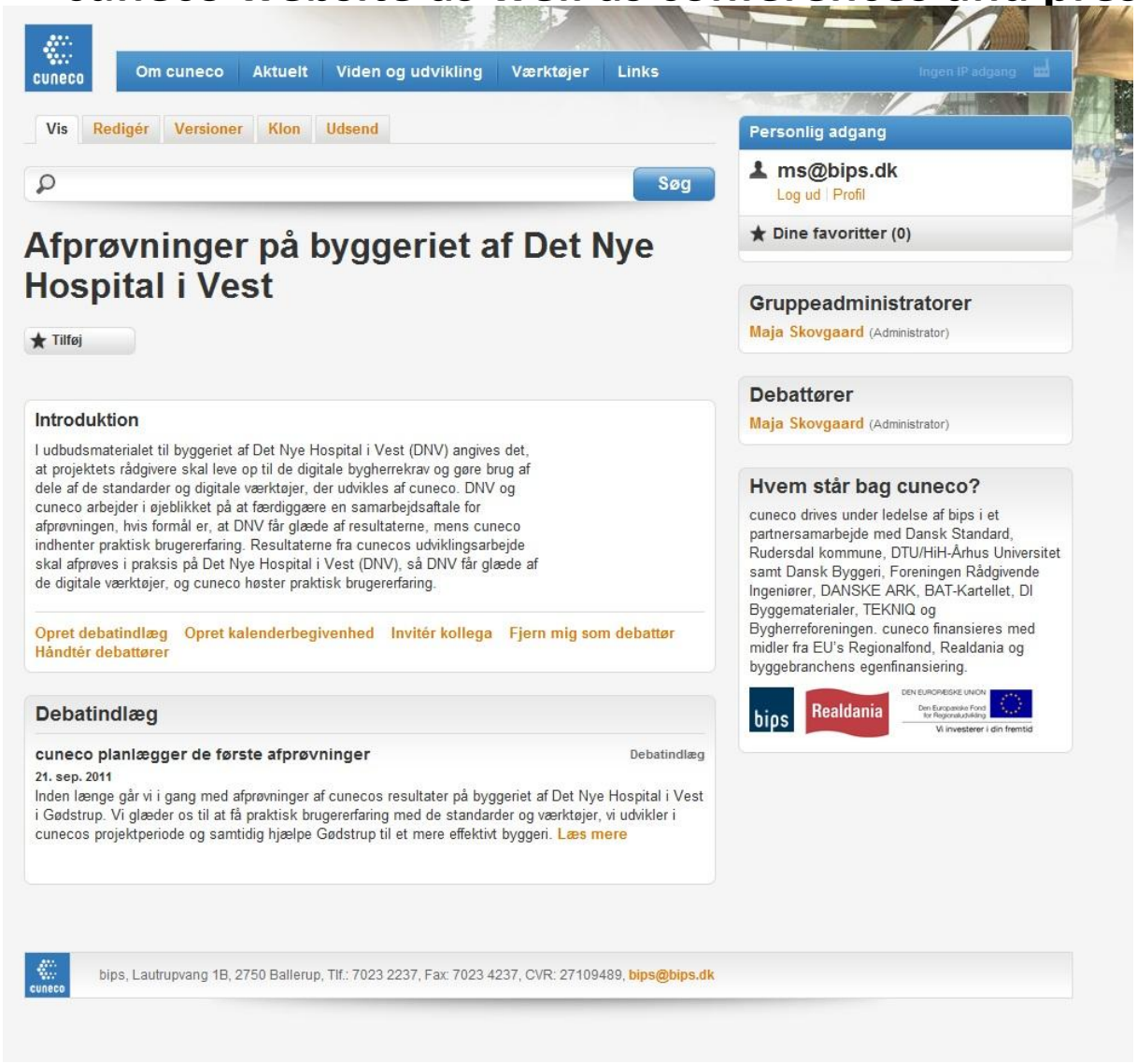


Finalizing activities

When the testing is done all the experiences will be processed into a report which will be published.

DNV-Gødstrup will continue to use the cuneco Digital Standards through stage 2 of the project.

Information about the test will be shared through the cuneco website as well as conferences and press material



IT-vendors

The role of the IT-vendors is to:

- Implement the cuneco standard in the it-solutions, which are to be used in the project.
- Test the implementation in the Curavita and DNV-Gødstrup IT-solutions.
- Successively adjust the IT-implemantion according to the adjustment in the cuneco standards.
- Support Curavita and DNV-Gødstrup in the use of the IT-implementation of the standards.
- Share the experiences regarding the implementation of the standards with cuneco.
- Contribute to the external communication (articles and conferences) regarding the implementation experiences.

Next steps?

- Establishing an online database with properties
- Define common properties and making it possible for users to define and suggest new properties
- Making tables with classification tables available online
- Creating user interfaces for properties and classification
- Making web services to enable the support in IT-solutions
- Continue working on classification tables, property sets and information levels
- Suggesting adjustments to the buildingSMART and standardization communities