

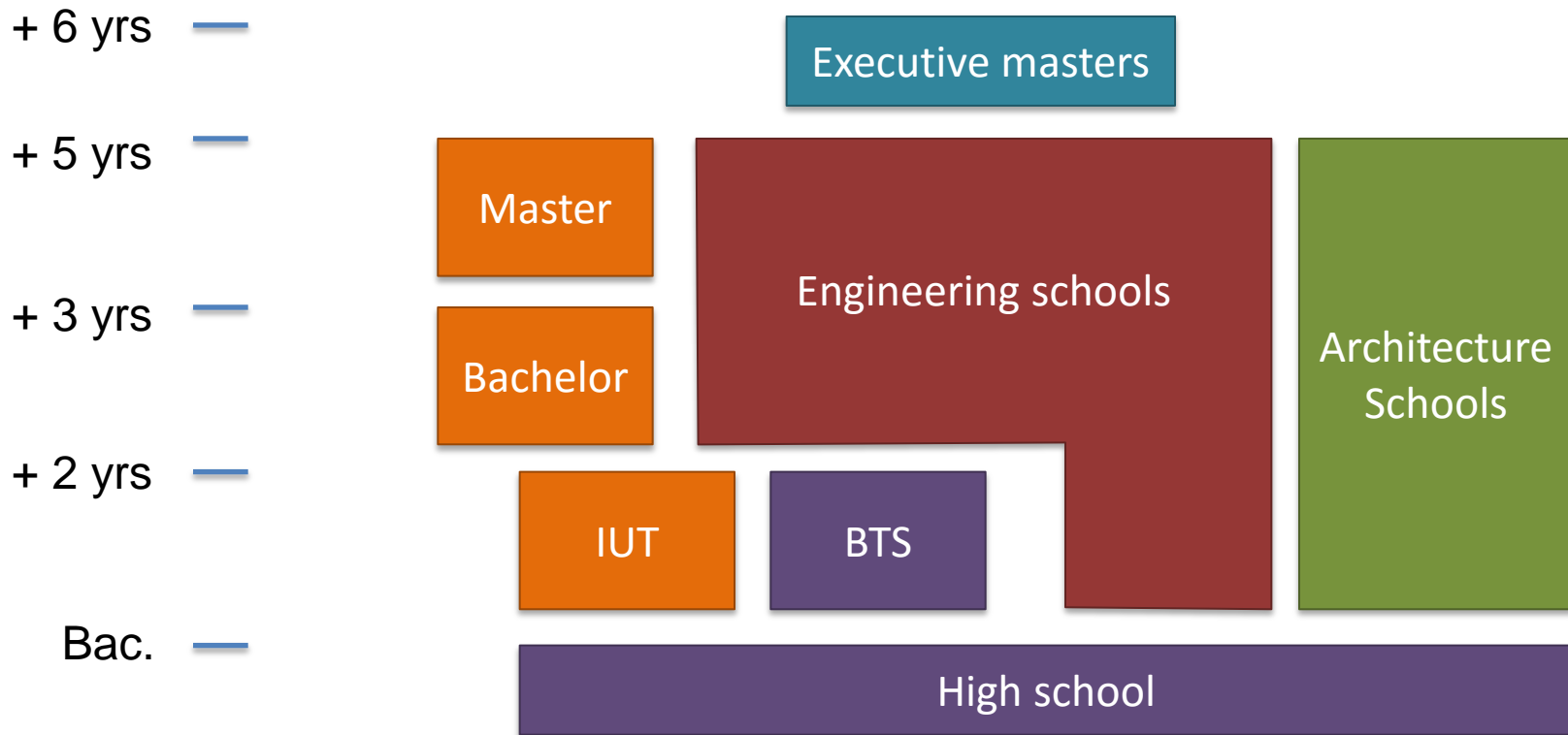
# Examples from Scandinavia

Peter Ireman

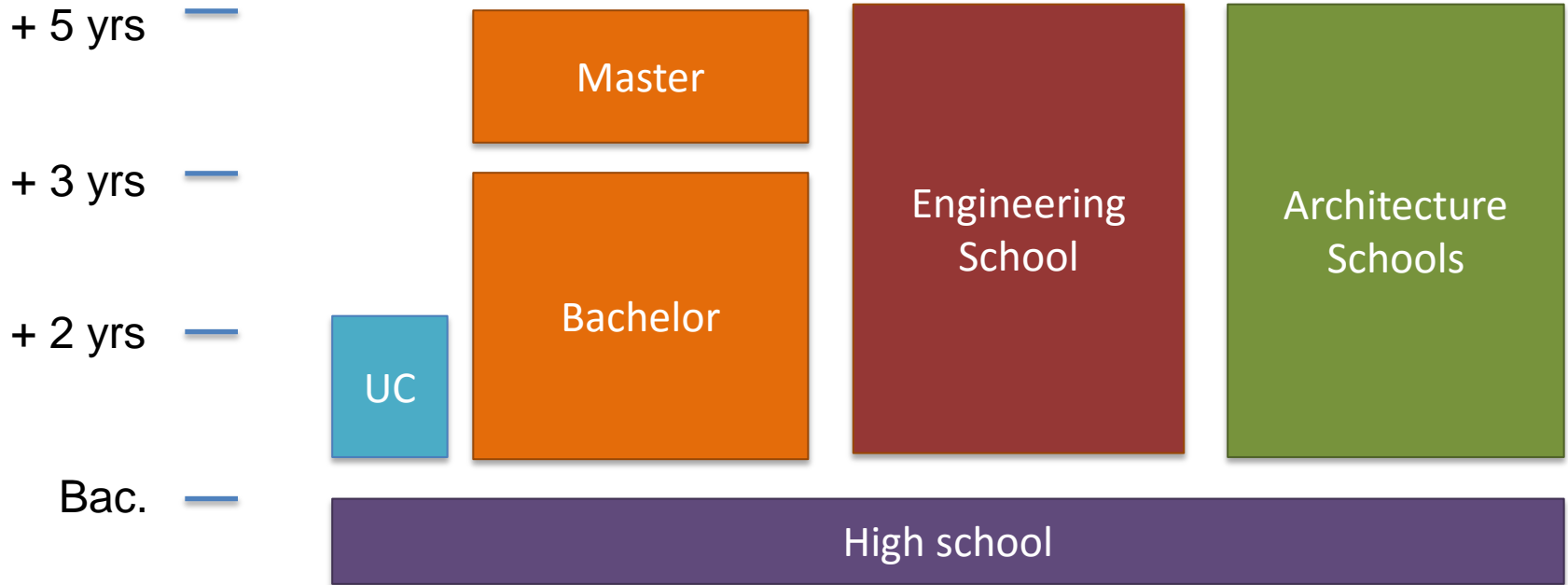
# Examples from Scandinavia

- Brief comparison of French and Scandinavian higher education in the AEC field
- National networking
- Example of a typical curriculum
- Example of a specific module development
- Example of a project based approach

# Higher education in the AEC field in France



# Higher education in the AEC field in Scandinavia (Sweden)



# Nordic networking



## Conference on open BIM in education

**Academia, universities, architectural schools, engineering colleges, schools and the academies of design and technology and other educational organisations play an important role in training students to benefit from, understand and take responsibility in the adoption of integrated information technology bases on open standards in the construction and facilities management industries.**

Academia, universities, architectural schools, engineering colleges, schools and the academies of design and technology and other educational organisations are invited to

- Share ideas, presentations, training material and building information models;
- Become part of an educational network on open BIM;

at the MSSCE conference/symposium focused on open BIM standards and working methods.

### Building Information Modelling

- **Open Data Standards in Civil Engineering (BIM), focusing on open BIM in education**

22-23 August 2016 at the Technical University of Denmark

When	Aug 22, 2016 09:00 AM to Aug 23, 2016 05:00 PM
Where	Technical University of Denmark
Contact Name	Jan Karlshej
Contact Phone	+45 4020 4608
Add event to calendar	vCal iCal

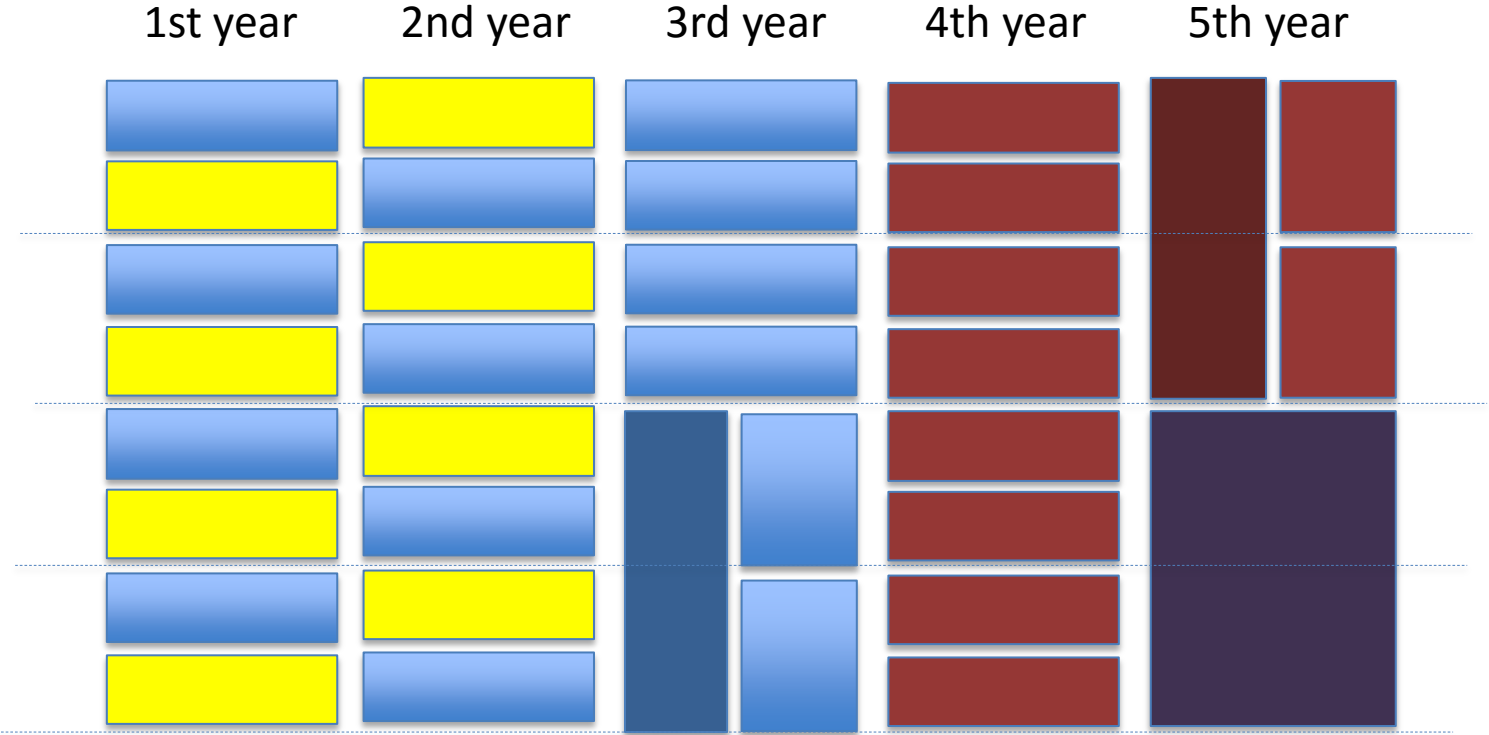
- Presentation of curriculum on open BIM;
- Presentation of educational material;
- Presentation of building information models in open standards;
- Demonstration of prototypes for educational purposes.

Cf. MSSCE conference

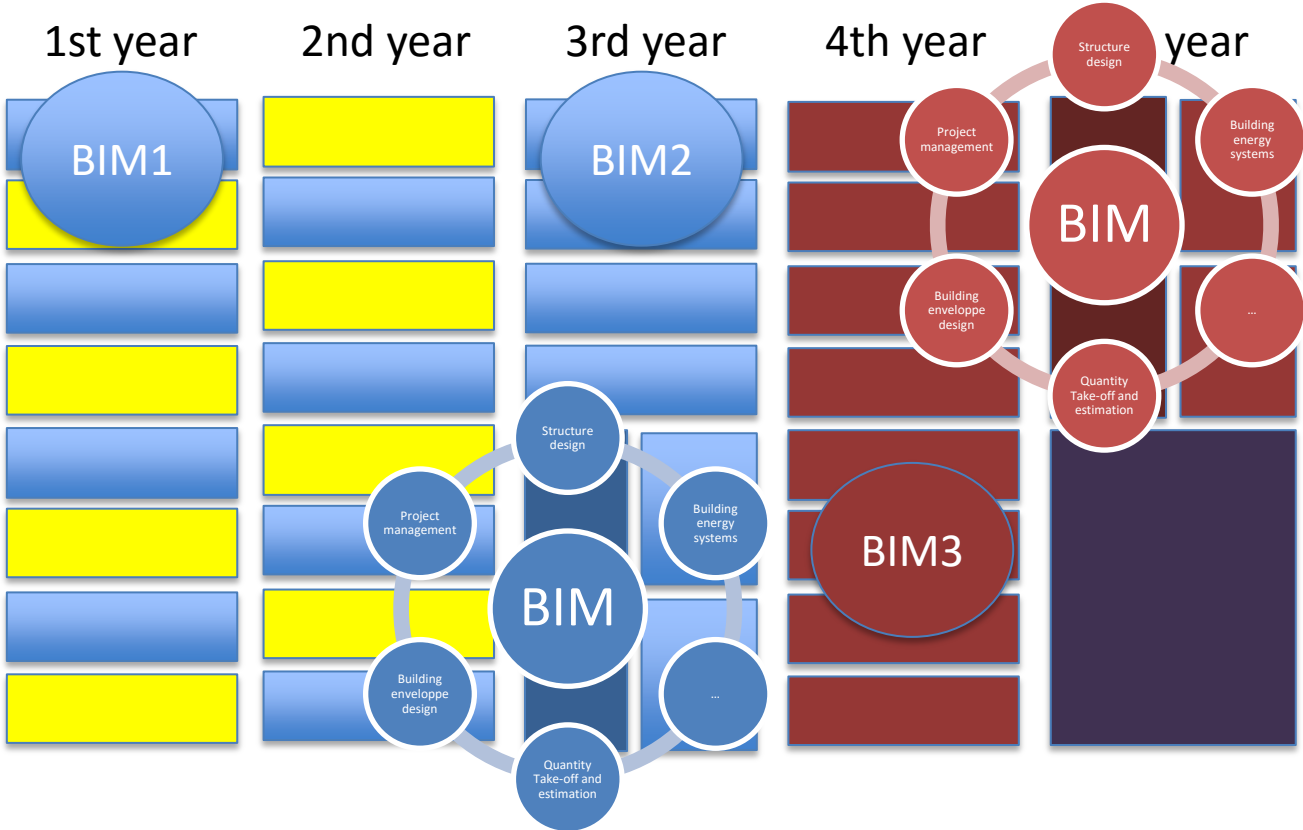
# BIM in Swedish higher education

- Module based education system
- Specific module development in combination with an embedded approach
- Tool centered at the basic level – process centered at the advanced level
- Much on BIM-uses in the design phase
- No specific programs at advanced level, some at basic level

# Typical 5-year engineering school curriculum



# Typical 5-year engineering school curriculum



Fundamental science
  Construction tech. and mgn
  Specialization



# Example Basic Module (1st year)

## AF1730 Building Information Modeling 7.5 credits

### Building Information Modeling

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#### Learning outcomes

Upon completion of this course, the student shall be able to:

- Draw and handle 3D objects
- Create and modify objects
- Dimension and display objects
- Create construction drawings
- Establish tables and lists based on models
- Manage views for presentation and use
- Export and import other formats
- Display knowledge of the theory behind Building Information Modeling (BIM)
- Manage model data and use databases in BIM design
- Show knowledge of sun studies and display of structure and materials
- Be able to use the new design method in which several disciplines work simultaneously on a project via a central file

# Example intermediate module (3rd year)

## AF273U BIM3, Design, Cost Estimation and Time Planning 7.5 credits

BIM3, projektering, kalkyl och tidplanering

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### **Learning outcomes**

Following completion of the course, the student will be able to:

- Explain when is meant by design, cost estimation and time planning
- Analyse profitability and investment assessments in the early stages of the construction process
- Be aware of the cost estimation and time planning tools associated with a computer model
- Analyse and assess which type of tool will support time planning and estimation
- Assess and have practical skills in profitability and investment assessment
- Create technical reports with resource plans, containing a profitability and investment assessment
- Assess ethical considerations in connection with a profitability and investment assessment

# Example advanced module (4th year)

## AI2805 Building Informatics and Logistics

### 7.5 credits

Byggandets information och logistik

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#### Learning outcomes

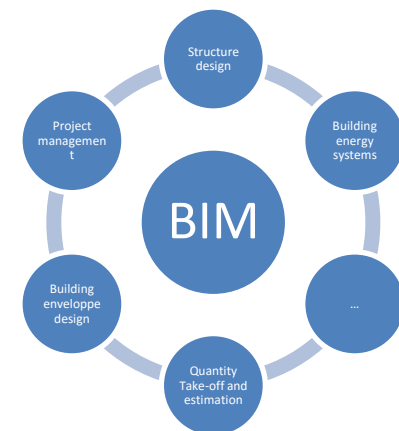
The aim of the course is to extend the students knowledge about IT from a organizational and strategic business perspective.

After the course the students should

1. Be able to describe and analyse the information handling in the design and construction process.
2. Be oriented in the field of classification, information systematics and information standards in design and construction.
3. Be familiar with common industrial IT-platforms for information sharing and delivery.
4. Be able to prepare an IT-strategy for a company and a project.
5. Be aware of different principles to organize and manage the information exchange in the design and construction process.
6. Be familiar with IT-based project management.
7. Be conscious about the relation between the implementation of information technology and the changeover of working methods, roles of different actors and the built results.

# Example of a project – VIA UC

- The INGRAD (Integrated architectural design) project runs over one full semester
- Refurbishment of an existing building + design of a new one
- 50 Students from 4th semester Constructing Architects and 5th semester Civil Engineering working in groups of 6
- 13 teachers from different disciplines
- BIM is one competence field among others (architecture, energy, structure, ...) that are assessed



# Extract from Project description

## PROJECT BACKGROUND

The main task is to renovate and refurbish the existing building in Mimersgade 4. The procedure of the project includes three different aspects of interest – design, energy, and structural. These tasks will be carried out by three individual parties – construction architects, energy engineer and structural engineers.

It is required that the renovated project would combine following changes and processes: adjustment of the design and functionality of the building, the arrangement of the outside areas and their purpose, improvement of the climate inside of building, structural checks for newly introduced constructions as well as stability improvements of the existing constructions.



# Extract from Project description

## PURPOSE OF THE PROJECT

- Redesign the green areas around the building
- Make a functional and safe design of the residential building
- Renovate the building to fulfil the 2015 energy frame
- Work in a cross-disciplinary team
- Provide a safe design of elevator shaft
- Carry out a static analysis and accordingly dimension structural members
- Fulfil all the client demands, Danish annex requirements and Eurocodes used in the process
- Be able to get an approval from the municipality
- Provide adequate and proper type of structural documentation
- Design the new built
- Ensure the stability of the new building
- Undertake the energy demands of BR2020 for the new building
- Design a green and self-sustainable building

# Extract from Project description

Purposes :

BIM

- How will the BIM help with the design phase?
- What will be the purpose of using BIM in the project in overall terms?
- Which parts of drawings can be processed through BIM programs?
- What could improve the usage of BIM in the project?
- The BIM process/ tools are used in the project. For the collaboration between contractual architects and engineers, we use a central file, and then we only use the parts of the project we need in our design so we do not have to manage around in a big project, when we only need a small part of it.
- Point clouds and analysis functions in Revit are used.

Methods :

- BIM – design phase to operation phase – from design brief phase to operation phase
  - Define BIM
  - Improvement of BIMs' implementation
  - Show practical implementation of BIM (drawings, energy, structures, construction management, quality assurance)

# Concluding remarks

- National framework for education and certification?
  - Yes, in Norway, but not in Sweden and Denmark
- Specific modules or embedded approach ?
  - Rather hybrid, some specific BIM modules in combination with embedding and integrated projects
- Specialized education programs ?
  - Yes, on operational level, but no MSc BIM
- Link to research ?
  - Strong in general
- Link to free soccer daily AEC industry ?
  - Through research and continuing education