Introduction to Integrated Design (ID)
nZEB require ID

- Nearly Zero Energy Buildings (nZEB) are challenging
  - increasing energy performance requirements
  - integration of renewables
  - further sustainability criteria → sustainability certificates
  - cost-optimality over the life-cycle → need for comprehensive life-cycle cost assessment

- Integrated Design (ID) becomes indispensable for larger and complex nZEB
  - non-residential buildings
Why integrated design?

→ early design phases are decisive!
Focus on early design phases

Increase of workload in concept design

Increase of relevant know-how and competences
ID – let’s try a definition

ID is defined as a combination of:

1. Collaboration between stakeholders (client, architect and other consultants, and eventually users) from early on in the design process.

2. In achieving high energy/ environmental ambitions, the implementation of integrated architectural solutions or passive qualities are prioritized before active systems.
The ID steps - overview

THE ID STEPS

0. Project development
1. Design Basis
2. Iterative problem solving
3. On track monitoring
4. Delivery
5. In use
Step 0: Project development

1. Discuss project ambitions, and challenge initial Client Presumptions (initial brief)

2. Initiate ID process, and preferably make partnering contracts
Step 1: Design Basis

1. Select a multi-disciplinary design team, including an ID facilitator, motivated for close cooperation and openness

2. Make analyses of the boundary conditions

3. Refine the brief and specify the project goals and targets
Step 2: Iterative Problem Solving

1. Facilitate close cooperation between the architect, engineers and relevant experts through co-localization/ workshops

2. Use both creative and analytical techniques in the design process

3. Discuss and evaluate multiple concepts

4. Finalise optimised design
Step 3: On-Track Monitoring

1. Use goals/targets as means of measuring success of design proposals
2. Make a Quality Control Plan
3. Evaluate the design and document the achievements at critical points/milestones
Step 4: Delivery

1. Ensure that the goals are properly defined and communicated in the tender documents and building contracts

2. Motivate and educate construction workers and apply appropriate quality tests

3. Facilitate soft landing. Make a user manual for operation and maintenance of the building
Step 5: In Use

1. Facilitate commissioning and check that the technical systems etc. are working as assumed

2. Monitor the building over time regarding e.g. energy use, user satisfaction etc.
## Costs and Benefits of ID

<table>
<thead>
<tr>
<th>Tasks</th>
<th>Costs</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Concept and pre design</td>
<td>5 -10 % more</td>
<td>Based on experience</td>
</tr>
<tr>
<td>Detailed engineering</td>
<td>&lt; 5 % more the first projects 5-10% less in the next projects</td>
<td>Based on experience – smoother process caused by more detailed concept design</td>
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<tr>
<td>Building costs</td>
<td>5 – 10 % more</td>
<td>3-6 % for Passive houses</td>
</tr>
<tr>
<td>Operational costs</td>
<td>70 – 90 % less</td>
<td>Based on experience</td>
</tr>
<tr>
<td>Building faults</td>
<td>10 – 30 % less</td>
<td>Because of better planning and better follow up during construction</td>
</tr>
</tbody>
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Cost and risks of ID

● During design ID focuses on the early design phases (programming and concept design)
  ▪ need to define in detail the goals of the project (including energy performance, sustainability criteria and life-cycle cost)
  ▪ need to design and assess several different variants against the goals
  ▪ need to involve the whole range design competences already from the very beginning → additional organisational complexity
  ▪ independent cross-check of fulfillment of defined goals at defined check-points
  ▪ additional assessment needs (pre-check for sustainability criteria, LCCA etc.)

● Shift of work-load and costs
● risk for client increases due to higher upfront cost
Impacts on the scope of services

- **Programming (definition of project objectives)** → e.g. by using the criteria of sustainability certificates as „checklists“

- **Concept design**
  - Identification of different variants to achieve the defined objectives
  - Checking the impacts of the variants on:
    - energy performance goals → dynamic simulations
    - cost → Life-cycle cost assessment
    - other (sustainability) criteria → pre-check as required in the applied sustainability certificates

- **Technical design**
  - continuous on-track monitoring
  - focus on specific issues such as thermal bridges, air tightness etc.

- **Commissioning phase**
  - monitoring of real performance: e.g. blower-door-test, energy consumption monitoring etc.
## Changed roles and responsibilities

### Design team
- Higher input in concept phase → needs to get remunerated
- The thorough analysis of (innovative) variants → has to be covered by remuneration

### Client
- Clear definition of project goals
- More intensive engagement in the concept phase
- Event. contracting an ID facilitator

### ID facilitator
- Cost for programming, detailed definition of goals and required cross-checking have to be covered
- Event. additional cost for facilitating the process have to be covered
Just a few examples…

Power-house Sandvika, Norway

“All of this is known technology. The secret is the way in which we work and put things together. Because nobody can build a plus-house alone. The innovation lies in the collaboration.”

Project leader, Skanska (contractor).

Administration building
Bruck/Mur – district court and fiscal office, Austria

Focus on clear goals and on track monitoring beginning already with the architectural competition.
The GreenBuilding ID Award

- Giving European visibility to outstanding ID-processes
- Contributing to spreading the ID-approach
- Supporting the market diffusion of nZEB and highly sustainable buildings
- The awarded organisations are allowed to use the GreenBuilding/ID-Logo in their printed material and/or in their headquarters
How to submit to the ID Award?

- open call dedicated to all public and private organisations
- only non-residential projects
  - fulfil the minimum requirements of the GreenBuilding-Programm
  - design process covering (most of) the elements of ID
- ID process report according to a predefined structure
  - core data on the project (energy performance, sustainability, cost-effectiveness etc.)
  - composition of the work-team / communication among team members
  - Instruments applied to manage the ID process
  - Elements of the ID-Workflow
  - etc.
- call open till end of February 2014
Contact and information

The MaTrID project

[Logos of different organizations]

GreenBuilding ID Award

[Logo of the European Commission]

iet.jrc.ec.europa.eu/energyefficiency/greenbuilding

For further information on ID: www.integratedesign.eu

Klemens Leutgöb, 23 May 2013

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