MaTriD
Market Transformation Towards Nearly Zero Energy Buildings Through Widespread Use of Integrated Energy Design

Co-funded by the Intelligent Energy Europe Programme of the European Union

Integrated Design Process Guidelines

This publication is compiled by Stefan Amann, e7 Energie Markt Analyse GmbH[1], Austria. The sections about ID processes are digests from the "ID Process Guidelines"[2], written by Anne Sigrid Nordby[3], developed within the framework of the MaTrID project. Hence, paragraphs are not quoted specifically.

Background

The IEE project MaTrID - *Market Transformation Towards Nearly Zero Energy Buildings Through Widespread Use of Integrated Energy Design* – aims at supporting the implementation of Nearly Zero Energy Buildings by 2020. In this context the building design phase is of particular importance[4]. Integrated Design (ID) in general is a valuable approach to reduce the complexity of the design process and facilitates the interactions between the members of the design team. For that reason a clear step by step explanation about the ID approach is necessary. This is one of the core outputs of the MaTrID project are ID process guidelines which comply with this requirement.

What is Integrated Design?

Integrated Design is defined as a combination between following two elements:

1. Collaboration between stakeholders (client, architect and other consultants, and eventually users) from early on in the design process. For the purpose of reaching high sustainability performance, the alternative building and technical solutions should be developed and discussed by an integrated, multidisciplinary team.
2. In achieving high energy/ environmental ambitions, the implementation of integrated architectural solutions or passive qualities are prioritized before active systems.

ID Process guidelines are mainly an explanation referring to point 1: How to ensure an integrated design process. Although the process guidelines need to be adaptable to different situations, there are some

[1] http://www.e-sieben.at/

[2] http://www.integrateddesign.eu/downloads/

[3] http://www.asplanviak.no/

[4] For a detailed description of the project please follow http://www.buildup.eu/links/35637.

common structural features that can be identified. In figure 1, the main steps of the ID process is visualized. The creative problem solving process (2) runs parallel in time with monitoring the progress according to the goals (3). This is rarely a straightforward process, and the phase should be kept open long enough for all necessary information to be integrated in the design. The need and scope for integrated design depends on the project complexity, type of contract and the level of ambitions.

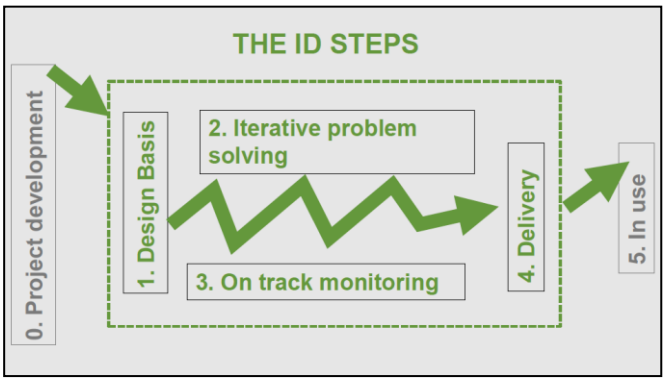

Figure 1: Overview of the ID process.

The need and scope for integrated design depends on the project complexity, type of contract and the level of ambitions. Goal setting is emphasized as an overall important step because the design process will depend on the goals and to which extent they are understood as a joint mission for the design team. A “design process facilitator” can be appointed to take a lead of the ID process to facilitate an effective coordination in the project organization .However, the outcome of the project is not necessarily dependent on the involvement of a separate facilitator; the important judgment criterion is rather whether or not the goals are reached.

Why Integrated Design

Integrated Design is not a new notion or concept, but rather an enhancement of good practice as design processes are moving towards greater complexity. The relevance of the concept is based on the well-proven observation that changes and improvements of the design are relatively easy to make at the beginning of the design process, but become increasingly difficult and disruptive as the process unfolds.

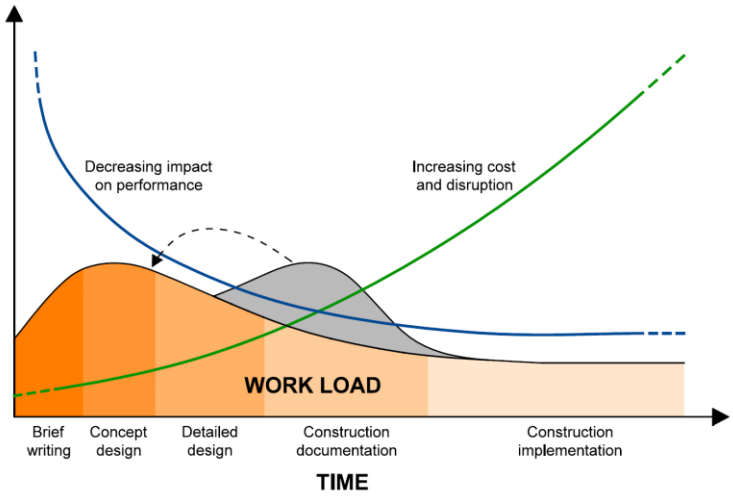

Figure 2: Workload shift.

Fig. 2 shows how early design phases offer opportunity for large large impact on performance to the lowest costs and disruption. Therefore, a shift of work load and enhancement to the early phases will probably pay off in the lifecycle of the building. Changes or improvements to a building design when foundations are being poured, or even contract documents are in the process of being prepared, are

likely to be very costly and extremely disruptive to the process. Late attempts of improvements are also likely to result in only moderate gains in performance.

A shift of approach emphasizes that the very early phases need more attention because well informed decisions here will pay off in the rest of the design process as well as in the lifecycle of the building. Well informed planning from the start can allow buildings to reach very low energy use and reduced operating costs at very little extra capital cost, if any. Considering the whole life cycle of a building, the running costs are higher than construction and refurbishment costs; thus, it becomes obvious that it is a shortsighted approach to squeeze the first design phase regarding resources. Experience from building projects applying ID shows that the investment costs may be about 5 % higher, but the annual running costs will be reduced by as much as 40-90 %. The process of ID emphasizes that the performance of buildings should be assessed in a lifecycle perspective, both regarding costs (LCC) and environmental performance (LCA).

Tasks	Costs	Comments
Concept and Pre-design	5 -10 % more	Based on experience
Detailed engineering	< 5 % more the first projects 5-10% less in the next projects	Based on experience – smoother process caused by more detailed concept design
Building costs	5 – 10 % more	3-6 % for Passive houses
Operational costs	40 – 90 % less	Based on experience
Building faults	10 – 30 % less	Because of better planning and better follow up during construction

Figure 1: Estimations of increased/ reduced costs connected to ID.

ID process guidelines step by step[5]

STEP 0. PROJECT DEVELOPMENT

0.1 Discuss project ambitions, and challenge initial Client Presumptions (initial brief);

0.2 Initiate ID process, and preferably make partnering contracts.

STEP 1. DESIGN BASIS

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

1.2 Make analyses of the boundary conditions;

1.3 Refine the brief and specify the project ambitions, preferably as functional goals.

STEP 2. ITERATIVE PROBLEM SOLVING

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

2.2 Use both creative and analytical techniques in the design process;

2.3 Discuss and evaluate multiple concepts;

2.4 Finalise optimised design.

STEP 3. ON TRACK MONITORING

3.1 Use goals/ targets as means of measuring success of design proposals;

3.2 Make a Quality Control Plan;

3.3 Evaluate the design and document the achievements at critical points/ milestones.

STEP 4. DELIVERY

4.1 Ensure that the goals are properly defined and communicated in the tender documents and building contracts;

4.2 Motivate and educate construction workers and apply appropriate quality tests;

4.3 Facilitate soft landing. Make a user manual for operation and maintenance of the building.

STEP 5. IN USE

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

5.2 Monitor the building performance over time regarding e.g. energy consumption, user satisfaction etc.

[5] For a detailed description of the ID process step by step please read ID Process Guidelines, URL: http://www.integrateddesign.eu/toolkits/process_guidelines.php.

APPENDIX

The appendix of ID Process Guidelines comprises three further documents. These documents accompany the ID Process Guidelines.

- **Client Brief[6]:** ID initially promotes early involvement from the core design team to investigate and refine the Client briefing documentation. The Client and core team then explore multiple concept designs that satisfy this brief through an iterative design process. ID has the capacity to deliver a more optimal building design solution than traditional design routes.
- **Tenants Brief[7]:** ID initially promotes early involvement from the core design team to investigate and refine the Client's brief and any associated Tenant's Agreement to Lease briefing documentation. The Client and core team then explore multiple concept designs that satisfy this brief through an iterative design process, regularly engaging with the Tenant throughout this process. ID has the capacity to deliver a better building operation and low energy design solution than traditional design routes.
- **Scope of Services[8]:** This document explains various contractual models and remunerations models.

Contact details

Stefan Amann

e7 Energie Markt Analyse GmbH

Theresianumgasse 7/1/8,

1040 Vienna, Austria

www.e-sieben.at and www.integrateddesign.eu

Legal disclaimer IEE

The MaTrID project is supported by the European Commission in the Intelligent Energy for Europe Programme. The sole responsibility for the content of this publication lies with the authors. It does not necessarily reflect the opinion of the European Union. Neither the EACI nor the European Commission is responsible for any use that may be made of the information contained therein. The MaTrID project duration is from June 19, 2012 – December 18, 2014 (Contract Number: IEE/11/989/SI2.615952).

[6] For a detailed description of the Client Brief, written by Andy Sutton (BRE), please follow: http://www.integrateddesign.eu/toolkits/process_guidelines.php.

[7] For a detailed description of the Tenants Brief, written by Andy Sutton (BRE), please follow: http://www.integrateddesign.eu/toolkits/process_guidelines.php.

[8] For a detailed description of the Scope of Services, written by Agris Kamenders (Ekodoma) and Klemens Leutgöb (e7), please follow: http://www.integrateddesign.eu/toolkits/process_guidelines.php.