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Creation of a New Centre in a University

Analysing management of end-user needs and
ensuring performance in the building life cycle

CREDIT Case SE01



Danish Building Research Institute
AALBORG UNIVERSITY

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Construction and Real Estate -
Developing Indicators for Transparency



Creation of a New Centre in a University

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Preface

This report describes the results of a case study undertaken as part of the Nordic/Baltic project *CREDIT: Construction and Real Estate – Developing Indicators for Transparency*. The case study is part of the work in work package 4-6 with respect to project assessment tools, application in firms and national benchmarking systems.

CREDIT includes the most prominent research institutes within benchmarking and performance indicators in construction and real estate, namely SBI/AAU (Denmark), VTT (Finland), Lund University (Sweden) and SINTEF (Norway). Further, three associated partners have joined CREDIT. The three associated partners are the Icelandic Center for Innovation (Iceland), Tallinn University of Technology (Estonia) and Vilnius Gediminas Technical University (Lithuania).

The project has been managed by a steering committee consisting of the following persons:

- Kim Haugbølle, SBI/AAU (project owner).
- Niels Haldor Bertelsen, SBI/AAU (project coordinator).
- Päivi Hietanen, Senate Properties (chair of Finnish steering committee).
- Pekka Huovila, VTT.
- Ole Jørgen Karud, SINTEF.
- Magnus Hvam, SKANSKA.
- Bengt Hansson, Lund University.
- Kristian Widén, Lund University.

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Danish Building Research Institute, Aalborg University
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August 2010

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Summary

This case study presents an end user driven project for creation of a new centre in university environment. It highlights some difficulties in managing the end users and creating an efficient communication in construction projects. The project started 1994 and was finished 2007. The construction exists of a new build house connecting three existing buildings that were renovated.

The purpose of the case study is to explore how end users are managed in a construction project.

The whole project started with a well formulated vision for the project. The vision was created by the end users. The vision was a great help for the end users when taking decisions so that they could focus on the whole perspective and not get lost in details. The methods used in the process of understanding the end users needs and requirements were; study tours, meetings, checklists and workshops, working groups focusing on different aspects such as library, laboratory, lecture halls and cafeteria. The end users were supported in their work by a local planner during the whole process (the persons were though changing but the function of having a functional planner was there). In the early phases were an expert on end user requirement and a consulting architect involved.

The project lasted for a decade and not many people remember the whole process. All most every person on every professional position changed during the project. It became clear in the case study that strong personalities with visions were the driving forces for the project; from both the end user organisation, from the local planner, the architect and project leader side.

Many end users express that it would have been good to have the same contact person during the whole project. The end user organisation worked very hard both with organisational, practical and financial questions. The project manager for the end user organisation explains that the decision process was though a bit unclear.

One of the real estate company represents believes the end users should have an organisation with a steering group with rights to make decisions. Every department involved in the project should have their own represent in the project group otherwise there is a risk for distrust and that their interests are negligee. A more professional questionnaire for students should be made. Today, they are never asked of how well the buildings fit their needs.

1. Introduction and objectives

This case study presents an end user driven project for creation of a new centre in university environment. It highlights some difficulties in managing the end users, organisational changes and creating a working communication in construction projects.

1.1 Objectives and work packages of CREDIT

Sir Winston Churchill once said, “We shape our buildings, afterwards our buildings shape us” (28th Oct 1943). This quotation underlines how strong a building can influence an occupier or a user. Providing complex public facilities for example hospitals, schools, universities and libraries that are able to meet both the internal and external stakeholders’ needs and requirements is not without complications. The aims and demands of different stakeholders within a project can sometimes create conflict with each other’s interest. Understanding the needs and requirements of these stakeholders are essential to remain competitive in today’s market. A client that pays attention to the needs of the end-users will be rewarded with a high-performance property. Simultaneously, this shift seeks to solve many ills associated with inadequate building conditions and resulting in poor building function.

Due to the amount of both public and private money being invested in delivering public and private facilities, strong actions must be adopted. Collaboration with the relevant stakeholders will help building owners in identifying the required performance indicators to create high-performance facilities. The project aims to define a model for the implementation of performance requirements, which ensure the fulfilment of the various types of users’ and stakeholders’ needs and demands. The model shall also allow for the continuous measuring of the effectiveness of the used requirements and the model as such so that it may be improved as more knowledge and experience of it is achieved.

Following the themes of the ERABUILD call closely, the aim of CREDIT is to improve transparency on value creation in real estate and construction.

Thus, the objectives of CREDIT are:

- To capture end user needs and requirements in order to identify and quantify – where possible – value creation in real estate and construction.
- To develop compliance assessment and verification methods.
- To define and develop benchmarking methods and building performance indicators in real estate and construction.
- To set out recommendations for benchmarking internationally key building performance indicators.

Consequently, the deliverables of CREDIT are:

- 1. The establishment of a network of Nordic and Baltic researchers for benchmarking and performance indicators through frequent interactions in workshops across the Nordic and Baltic countries.
- 2. A State-of-the-Art report, that will identify and critically examine a number of existing tools, databases, mandatory reporting, approaches and benchmarking schemes to capture and measure end-user needs, client and public requirements on performance and value creation.

- 3. A strategic management and decision making tool to guide the definition and development of benchmarking methods and building performance indicators in different business cases.
- 4. A comprehensive performance assessment and management tool with associated key performance indicators to capture end-user requirements and to continuously measure and verify the compliance of performance throughout the lifecycle of an actual building project and linked to building information models.
- 5. Recommendations as to how sectoral and/or national indexes for performance indicators can be designed in order to allow for international benchmarking of construction and real estate.
- 6. Dissemination of the lessons learned and tools developed through news articles, press releases, workshops with actors in the real estate and construction cluster etc.

1.2 Background, purpose and focus of the case study

The case study is looking at a construction project on a university in the south of Sweden. A number of divisions in the same topic field had a poor local situation in the beginning of the 1990. The number of students was increasing and there was a need for more efficient and functional locals. The project started 1994 and was finished 2007.

The purpose of this study is to explore how participating end-users through the whole construction process are managed

The objectives of case study SE01 is:

- To explore the characteristics of the end-user involvement process in a university building
 - Methods and tools for capturing end-user requirements
 - Efficiency of communication and interaction
 - How/if lessons learned are followed up
- What indicators are used for ensuring fulfilment of end-users requirements

1.3 Research design and methods applied in the case study

The case study is mainly focusing on the building level but a complementary interview was held with the marketing manager, concerning the use of indicators within the enterprise. The case study primarily uses two types of data:

- Documentary material, minutes, sketches
- Qualitative research interviews with 13 persons involved or affected by the project see Table 1.
- Participating in a following-up meeting with professionals and end-users.

Persons Interviewed	Number
Architect	1
Project manager	2
Real estate manager	1
Local planner	2
End user participating	4
End user not participating	2
Expert on end user management from the real estate company	1

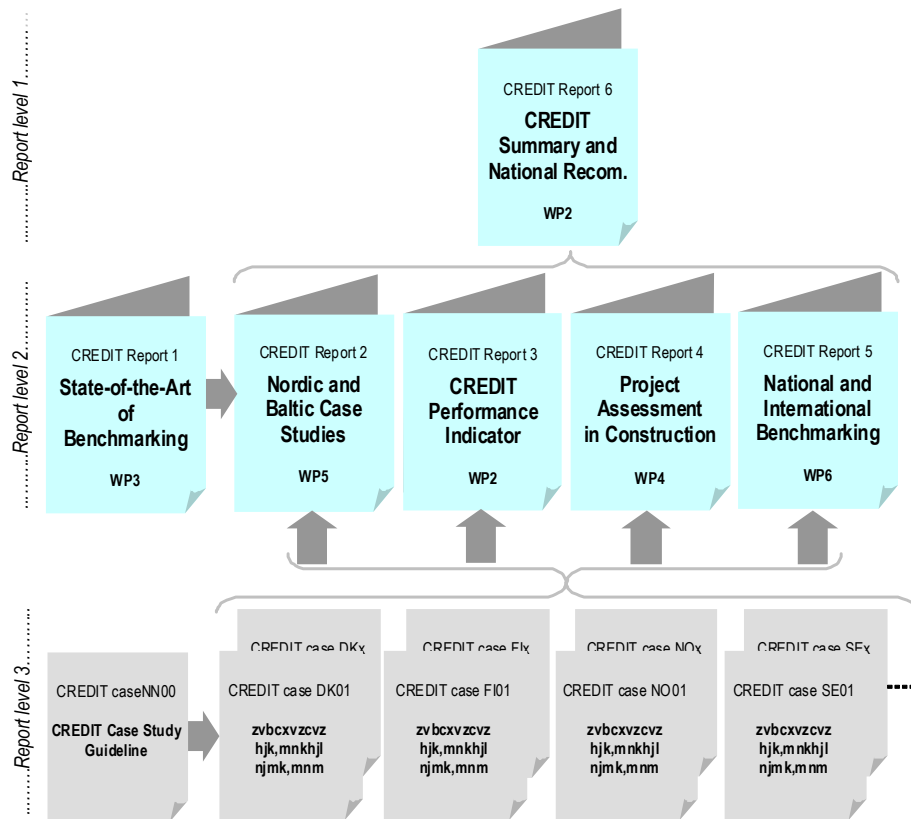
Table 1. The persons interviewed in the case study

1.4 Reading instruction

Chapter 2 in this report addresses issues relevant to WP4 on assessments at project level. Chapter 3 addresses issues relevant to WP5 on the application of assessments in firms. Chapter 4 addresses issues relevant to WP6 on sectoral, national or international benchmarking systems. Chapter 5 discusses and concludes on the lessons learned with respect to the three levels of projects, firms and systems.

The work of each work package (WP) is documented in various other reports, articles etc. Below, a graphical illustration of the hierarchy and linkages between the individual reports is given.

Figure 1. Graphical illustration of the hierarchy of the CREDIT reports.



2. Buildings – assessments in construction or real estate processes

The building project was chosen to illustrate a building project where the end users organisation was considered to be very ambitious and driven and the result was considered to be very successful by the participants in the project.

2.1 The actual building, building parts and processes

Description of the building and project

- The project is located in the south of Sweden.
- The buildings are in university environment
 - Rebuild of three building with
 - Offices, lecture halls
 - New build of one house including
 - Library cafeteria and laboratory
- The centre offers 521 courses and 6 master programs
- The first visions for the project were born in the early 1990s by the end users and in the summer of 2004 were the first the first people moving in.
- Construction started in November, 2002, and was completed in June, 2006
- Non-residential floor area 20 200 m² BTA, 16 200 m² LOA
- Project cost 245 MSEK
- Energy investments
 - Energy layer in the ground to decrease the energy consumption of the buildings
 - Demanded controlled ventilation with motorised supply air terminal devices
 - HF-fitting for lighting control

The study covers the following phases; needs analysis, briefing, design, construction and FM and occupancy. The evaluation of the different phases is performed by user, investor (university), local planner, project leader from Real Estate Company and architect.

2.2 The applied assessments and tools in the processes

The whole project started with a well formulated vision for the project. The vision was a great help for the end users when taking decisions so that they could focus on the whole perspective and not get lost in details. In the early phases was the main purpose to create a common reference frame and a common language among end users, architects and technicians but also to show the possibilities of a new centre. This was performed with study tours and meetings and workshops. In the early phases was an expert on end user requirement from the real estate company and a consulting architect involved in some of the meetings and workshops. The end users created a special project organisation, with a help of the local planner. It consisted of different working groups that were focusing on different aspects of the building such as library, laboratory, lecture halls and cafeteria. They received checklists from the local planner as a help in their work. The end users had

an own project leader and a reference group with represents from teacher, researchers, students and administrative personnel. They had no money at all from the beginning so during the whole building process were they applying for money from different foundations. General meetings for all end users were performed ones every semester; those were not very well visited and thereby not very productive. They did a small quite unprofessional survey and asked students and staff about what they thought was the most important for a centre to fulfil. Every drawing or program was going on a remiss to the different departments so they got an opportunity to express their opinions. During the building period they had meetings with the building workers to explain for them whom they were building for and the vision of the centre. This was performed twice. To let the end users get a feeling of how the offices and furniture would appear a show room was built. Every end user had the chance to sit by the computer in their desks and chose what chair they preferred (had two to choose between). The moving carousel was planned from an early stage and a logistic division in the university was consulted. Where different departments should be placed was closely connected to the moving carousel but also through careful analysis of connections between the divisions. This work was analysed of the end users, the local planner, the architect and an external consulted architect as well. After the building was occupied, several meetings were held between the end users and the project leader and real estate leader. During the meetings were problems with the building discussed to better meet "child disease". The real estate company arranged a following-up meeting with key persons in the centre to get input on success factors in the management of end users to use in a project they were to starting up. The meeting was held four years after the first persons moved in to the building.

Though the project lasted for so long many persons were ending and replaced during the project. It became clear in the case study that strong personalities with visions were the driving forces for the project; from both the end user organisation, from the local planner, the architect and project leader side. The end users own project leader mandate ended when production started. This created a quite inefficient situation for the end users. The former project leader had to be both a project leader and performing his normal work. This did not work; the time was limiting the involvement and occurred an uncertain situation to the remaining end users. The clarity of responsibilities was absent; who should participate in different meetings etc.

The vision of the centre acted like a guideline for decision making when uncertainty occurred. When the building was finished was between 15 following up meeting held between the project leader from the Real Estate Company, real estate manager and representatives from the end users. No specific measuring of the fulfilment of requirements has been done more than talking to the end users.

2.3 Cost and performance indicators applied in the processes

No indicators were included in this study. The company usually measure Satisfied customer index in occupancy, but the new centre had not been included in the measurement exercise yet. When using it the questionnaire is sent out to randomly chosen end users. They as well perform interviews with a several chosen persons. They send out indoor climate questionnaires. The company hires another company to create the questionnaires and analyses the result.

2.4 Relation to different enterprises and national benchmarking

No benchmarking systems were used. The project arranged a parallel sketch competition for the design and in this work they used two other projects in university environment as a reference both for formulating the competition and evaluate the different proposal. In this evaluation work they as well used a checklist from a KBS report. When the building was completed a meeting was arranged to feed forward lessons learned into a new project. In the meeting were end users, Real Estate Company, architect, local planners' organisation, the expert on end user requirements and end users for the new project present. This can possible be seen as some kind of comparing/learning exercise.

The construction projects in university buildings usually have this three organisational unit organisation; end users, local planner and project leader from Real Estate Company. The thought of using the local planner is that this person should guide the end users to set their needs and requirement and support them by having knowledge of the building process. The end users have to talk through the local planner and the local planner further discuss with the architect, the project leader from the real estate company etc.

2.5 Visions and innovation for future improvements

One of the real estate company represents believes that it would have been good if the company always were involved in an early phase of the project. It is very important that the brief includes visions of the future. There are seldom visions with clearly stated goals in the briefs. The end users should have an organisation with a steering group with rights to make decisions. Every department involved in the project should have their own represent in the project group otherwise there is a risk for distrust and that their interests are negligee. A more professional questionnaire for students should be made. Today, they are never asked of how well the buildings fit their needs.

3. Enterprises – assessments and indicators internally applied

This part describes the indicators in use in the Real Estate Company.

3.1 The actual enterprise, company and firm

The company is owned by the Swedish government and offers/owns 3 million m2 rentable spaces in Sweden for higher education and research activities.

3.2 Applied assessments and tools in the enterprise

No text.

3.3 Costs and performance indicators applied in the enterprise

The Real Estate Company measures topics in every area of indicators. Most aspects are not measured like an indicator, but they consider them in one way or another.

3.4 Relation to building cases and national benchmarking

No text.

3.5 Visions and innovation for future improvements

No text.

3.4 Relation to building cases and national benchmarking

No text.

3.5 Visions and innovation for future improvements

No text.

CREDIT Indicator Classification

Company:

Role: property developer

Project:

Country: SE

Date: 090817

Sign: BK

To which degree are the following indicators preferred?

Please use the following scale when answering:

2 Always - strategic and very important

1 Sometimes, depends upon the project

0 Not at all, unimportant

	Public demands	Internal project demands	Measures during building process	Measures when finished project	During facility management	Comments and other indicators recommended
Cost and performance indicators						
1. Cost, price and life cycle economy (LCE)						
11 Capital, investment, construction, commissioning cost		X	2	2		SEK/m2
12 Building services related to operation and maintenance		X		2	2	SEK/m2
13 Business services related the activities in the building		X		1		interview
2. Location, site, plot, region and country						
21 Location and address						
22 Plot opportunities		X				Early analyse
23 Spatial solution and property aesthetics		X	2			Space efficiency
24 Surrounding services						
25 Social values						
3. Building performance and indoor environment						
31 Category of building, quantity, size and area		x	2	2	2	
32 Safety and security of burglary						
33 Usability and adjustability		x			2	NKI (SCI)
34 Thermal comfort	x	x			2	
35 Air quality and health	x	x		2	1	
36 Visual climate					2	
37 Acoustic climate	x	x		2	1	
38 Aesthetics of building and indoor spaces		x			2	NKI (SCI)
39 Feelings and sensations						
4. Building part and product performance						
41 Category of building parts, quantity, size and area		x	1	2	2	
42 Safety						
43 Durability						
44 Thermal quality		x			1	
45 Impact on air quality						
46 Lighting quality						
47 Acoustic quality	x	x	1		1	
48 Aesthetic quality as form, surface, colour and details						
49 Feelings and sensations						
5. Facility performance in operation and use						
51 Category of tenancy and operation and area of space		x			2	
52 Applicability of the facility						
53 Operation		X			2	
54 Services						
55 Social performance						
6. Process performance in design and construction						
61 Category of process, supplier and organisation						
62 Resource control and project management						
63 Health and safety and work environment						
64 Quality management		X				
65 User involvement and cooperation		x	1	1	2	NKI (SCI)
7. Environmental impact						
71 Resource use	x	x			2	
72 Emissions		x			1	
73 Biodiversity						

Table 1. Questionnaire to evaluate CREDIT Indicator Classification.

4. National benchmarking – indicators and organisation

This study does not include any national benchmarking system

5. Discussions and conclusions

The discussion and conclusion includes lesson learned for WP4 and WP5.

The discussion attempts to answer the objectives of the study:

- To explore the characteristics of the end-user involvement process in a university building (WP4)
 - Methods and tools for capturing end-user requirements
 - Efficiency of communication and interaction
 - How/if lessons learned are followed up
- What indicators are used for ensuring fulfilment of end-users requirements (WP5)

5.1 Lessons learned in construction and real estate processes and recommendations for WP4

General characteristics of the process

The project lasted for a decade and not many people remember the whole process. The project had three project managers from the real estate company, four local planners and two project managers from the end user organisation. The president of the university changed and the chairman of the district. All most every person on every professional position changed during the project. This was both a bad and a good thing. Bad though knowledge and information was lost and many end users express that it would have been good to have the same contact person during the whole project. Good though some of the changes brought in new and drifty persons to the project that kept it alive and moved it forward. The end user organisation worked very hard both with organisational, practical and financial questions.

The project manager for the end user organisation explains that the decision process was a bit unclear. The suggestions had to be established to many persons on different levels to ensure that decisions could be made. The lobbying required a lot of time and could possible be more efficiency made.

Methods and tools for capturing end-user requirements

Methods and tools for capturing end users requirements in the project were for example working groups, study tours and questionnaires used. The study tours were seen as very fruitful from every actor's perspective; end users tend to relate to what they have and therefore it is a need to increase their perspectives to be able to create more innovating and better suited buildings.

Efficiency of communication and interaction

The three unit organisation (end user, local planner, Real Estate Company) of the project seemed not to be fully effective, especially the communication chain end-users-local planner- project manager. This communication chain occurred frustration as the end users experienced that the process became quite ineffective. One of the end users explained that he felt that he had no power to act when the communication with the local planner did not work. He saw the project "failing" but had no power to manage the situation.

5.2 Lessons learned and knowledge building from the project

Though the organisation of project involves many instances and the collaboration between them did not always worked efficiently: the knowledge creation process was not always initiated. One of the project managers explained that the gained knowledge was not commonly shared. The experiences could be systematically shared and thereby increase the possibility for knowledge creation.

5.3 Lessons learned in enterprises, companies and firma and recommendations for WP5

Used indicators

The Real Estate Company measures topics in every area of indicators. Some of the aspects are not measured like an indicator, but they consider them.



This case study presents an end-user driven project for creation of a new centre in university environment. It highlights some difficulties in managing the end users and creating an efficient communication in construction projects.

The aspects under study is the characteristics of the end-user involvement process. A third part, a local planner was used as a interpreter and translator between the end-users and the project manger to improve the interaction. The study showed difficulties in achieving efficient flows of communication, information. But also some useful tools like study tours to over bridge barriers to effective interaction.

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