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Public Housing

User needs and benchmarking of economy

CREDIT Case DK03

Danish Building Research Institute
AALBORG UNIVERSITY

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Construction and Real Estate -
Developing Indicators for Transparency

Public Housing

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Contents

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)
- Pekka Huovila, VTT.
- Päivi Hietanen, Senate Properties
- Ole Jørgen Karud, SINTEF.
- Magnus Hvam, SKANSKA.
- Bengt Hansson, Lund University.
- Kristian Widén, Lund University.

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Department of Construction and Health
June 2010

Niels-Jørgen Aagaard
Research director

Summary

This case study of public housing – user needs and benchmarking of economy looks in the first chapter at U2 – a renovation project of a public housing area in Copenhagen. One of the main objectives in the U2 project was involving end users and capturing their wishes and needs. In the second chapter the study looks at how one of the consultants WITRAZ Architects uses these and other assessment in their work. Finally the report looks at a national system BOSSINF for handling applications for public support to public housing and the key figures that is the out put of this system.

Buildings (WP4) summary
The renovation of U2 -a public housing area in Copenhagen shows that there are available methods and tools at hand for user involvement and capturing user needs as well as experience with the employment of these methods in the public housing sector. These methods are primarily intended for the strategic pre-analysis and briefing in the CREDIT Carpenter model.

The assessment of how well the project had fulfilled the criteria for success that the residents had agreed upon through the user involvement process include both concrete data such as output from statistical registrations to feelings and sensations that must rely on a personal judgement.

The assessment of both process and result relate to indicators in the CREDIT Indicator Classification (2.1 – Location and address, 2.2 - Plot opportunities, 2.3 - Spatial solution and property aesthetics, 2.4 - Surrounding services, 2.5 -Social value, 3.1 – Category of building, quantity, size and area, 3.2 – Safety and security of burglary, 3.3 – Usability and adjustability, 3.9 – Feelings and sensations, 6.5 – User involvement)

The case points at the importance of being aware of the many different assessment methods that have to be employed (questionnaires, statistical data, observation, interview) and as well the many types of indicators when assessing end users view and experience.

Enterprises (WP5) summary
WITRAZ Architects has developed a conceptual model for user involvement with three levels; the information level, the decision level, creative involvement level. This model seems in relation to CREDIT to be a very useful tool to understand the different levels and types of user involvement.

The elaborate toolbox of methods to involve end users in the planning process and capture their opinions and needs WITRAZ apply in many different projects. This shows that the tools at hand for user involvement are broadly applicable.

The WITRAZ case shows that there is a need for project evaluations internally in the firm to secure that what they learn in one project can be used on the next both in relation to process and result. Besides, there is a need for benchmarking of some kind on firm level that relates to this special kind of enterprises, to get ideas from other architectural firm about how to improve income and efficiency. They do not use output from existing benchmarking systems such as BOSSINF.

National benchmarking (WP6) summary

The BOSSINF system has a very high coverage in the field of public housing because the application from the housing organisations for public financial support is at the same time input data to the system. In relation to CREDIT this connection between delivering input to the system in order to receive support seems to be a very reliable way to secure input data to a system.

The indicators that are registered relates to CREDIT Indicator Classification 1.1 - capital, investment, construction and commissioning costs, 2.2 – Plot opportunities, 3.1 – Category of building, quantity, size and area, 4.1 – Building parts, quantity, size and area, 7.1 – Resource use.

Data is submitted three times, in relation to the CREDIT Carpenter model after briefing, design and construction.

The system is primarily intended for the management of applications and control of economy and the projects compliance with legal requirements. Therefore it influences only the conduct in the public housing projects in that respect.

The key figures are primarily a monitoring and decision making tool for the public administration to follow the prices on public housing and decide the amount of money to be allocated in the budgets for public housing.

However, it's high coverage of the field and the broad range of input data from different stages in the process points at the possibilities to let a system like this have a greater impact on the conduct in projects by including a broader range of input.

1. Introduction and objectives

1.1 Objectives 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

U2 is a renovation project of a public housing area in Copenhagen. The aim of the project has been to involve the end users and capture their needs and opinions. Along with this aim, another objective has been to optimize the building process. Through the planning and building process there is planned an evaluation of the product (the design, the properties and the execution of the renovation) and of the planning and building process.

These evaluations are compared with the information that is delivered to BOSSINF when planning and building new-built public housing. BOSSINF is a national system monitoring building costs of public housing projects, run by the Ministry for Social Welfare.

The purpose of this particular study of an evaluation of a public housing renovation project is to see:
– how users needs and opinions are captured and pursued through the building process
– how the process is assessed through the planning and building process
– how these assessments match the assessments from the BOSSINF system
– to describe the implications of implementing benchmarking by using a governmentally driven index.

1.3 Research design and methods applied in the case study

This case study of evaluation of a public housing renovation project and benchmarking of economy relates to all three levels in CREDIT information model.

Chapter 2 describes how the user's needs and opinions are captured all through the building process of the U2 renovation project. This chapter relates to WP4 (Assessment methods and tools used in assessments on projects and real estate) in the CREDIT information model.

Chapter 3 describes how WITRAZ Architects use these evaluations and other input from the building process in their development of their firm and services. This chapter relates to WP5 (Performance indicators and internal company assessment) in the CREDIT information model.

Both chapters are based on interviews with Tina Saaby from WITRAZ Architects, sub-report on the evaluation of U2, the final evaluation report of the U2 project, report on value creation in the building, concept presentation of the evaluation of product and value creation and account of the U2 demonstration project of value creation and product evaluation.

Chapter 4 describes the BOSSINF system, and this chapter relates to WP6 (International benchmarking and national information systems) in the CREDIT information model. This chapter is based on interview with Karsten Gullach and Allis Ougaard from the Ministry of Interior and Social affairs, the BOSSINF user guidance, the application form for economical support for public housing, the key figure report 2006, and the website Bossinf.dk.

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 (see **Fejl! Henvisningskilde ikke fundet.**).

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

2. Buildings – assessments in construction or real estate processes

This chapter describes the methods to involve and capture user needs and opinions that were applied in U2 - a renovation project of a public housing area in Copenhagen.

2.1 The actual building, building parts and processes

The U2 project is a renovation project of a public housing area on Amager - Urban Planen - near the centre of Copenhagen. The planning of the renovation started in 2003 and is expected to be finished in 2010.

It includes façades, gables, new windows, balconies, roofing, and a new layout for the exterior areas.

It was a part of the renovation project to develop four elements:
– A model for value creation in the building industry
– Optimization of product and process on the level of building parts
– Education on the building site
– Value creation and optimization in all phases of the building process.

The client for the project was a cooperating team 'Partnerskabet' (the partnership) with members from 3B (the housing organisation) and from different organisations from the local area and municipality.

Figure 2. Drawing of the planned changes in the out door area in Urbanplanen, WITRAZ arkitekter.

2.2 The applied assessment methods and tools in the processes

A number of tools and methods were used in U2 project in order to involve the dwellers in the area and get insight into their wishes, opinions and knowledge about the area. This includes surveys, workshops, and happenings/events. The results of the workshops and happenings were documented and communicated through exhibitions, a catalogue of ideas, a newspaper and a notice board on the internet.

Survey

Survey of the dwellers (the end users) in the housing area included – a questionnaire done by telephone, a questionnaire distributed to all households and semi structured interviews with different focus groups. This was done in the preliminary process as a part of the pre-analysis and the functional briefing in 2004 in order to:

– To have views from the a representative part of the dwellers in the area
– To get some benchmarks that the result of the building process eventually can be assessed by.
– To get wishes and initiatives that could qualify the planning process
– To get opinions from so many different groups of dwellers as possible.
–

The survey was done by a third part.

A corresponding survey is planned when the building process is finished.

Workshops

3 workshops were held as a part of the strategic planning in the initial phase:

– A 4 day long workshop was arranged for the dwellers (end users). They were divided in 4 groups each with its own theme; recreational space, buildings, common functions, the identity of the area. The 4 workshop groups were chaired by 4 different architectural offices in Copenhagen. Here the participants could come with their ideas and wishes for the area
– A 1 day workshops about the playgrounds were held twice for the children in the area (end users) in the age between 7 – 14 years.
– A 1 workshop about a pathway 'livsnerven' (the vital connection) through the area.

These workshops were held in the initial phases of the planning process in order to involve the dwellers (end users) and to get their ideas for improvements and their knowledge of the area incorporated into the brief (In relation to the CREDIT Carpenter model the strategically pre-analysis).

A just as important output of the workshops was to agree about what the objectives or aims of the renovation project should be (see 2.3). The workshops were organised by the client in cooperation with the process facilitator (WITRAZ Architects).

The result from the workshops was documented in exhibitions for all the dwellers of the area and later on in an idea catalogue.

These ideas were discussed and decided with a vote on meetings in the different departments of the public housing. The children voted as well about the different play ground solutions.

Whether these objectives are achieved with the finished projects an evaluation of the final building project will show. This will be assessed with data from the housing organisations administrations files, and from interviews and observations.

Figure 3. Participants at one of the workshops, WITRAZ arkitekter

Figure 4. Exhibition in Urbanplanen as a part of involvement of users, WITRAZ arkitekter.

Evaluation of the process

The 4 day workshop was evaluated by the participants with a questionnaire concerning their satisfaction with the workshop as a whole and the different elements in the workshop.

The involvement of the dwellers, communication to the dwellers through the whole planning and building process and the cooperation between the parties in the process are evaluated by an impartial third part (PKE-Consult). In this evaluation the documentation from the user involvement, the evaluations made in connection with them, the communication elements such as exhibitions, catalogue, workshops, meetings, newspapers and notice-board was assessed after the briefing and again after the building process is finished.

This evaluation was based on interviews with central players in the project such as chairmen of the residents' board, registrations of attendance, questionnaires and the evaluator's judgement of the goal achievement with the different events.

2.3 Cost and performance indicators applied in the assessments

Survey

In the user survey the questions in the questionnaire and interviews of focus group meetings was about main themes satisfaction with qualities in the area and the social capital in the area.
The questionnaire included questions about:

- The design of the flat
- The location
- Access to public transportation
- Vicinity to family and friends
- What kind of place is it to live?
- The service from the caretaker's office
- The rent
- The quality of the playground for children
- The reputation of the area
- The shopping possibilities
- The demography of residents in the area
- The outdoor spaces
- The maintenance
- Identity of the area
- Social contact in the area
- Sense of security in the immediate environment and in the other areas.

These questions relate to 2.1 – Location and address, 2.2 - Plot opportunities, 2.3 - Spatial solution and property aesthetics, 2.4 - Surrounding services, 2.5 -Social value, 3.1 – Category of building, quantity, size and area, 3.2 – Safety and security of burglary, 3.3 – Usability and adjustability, 3.9 – Feelings and sensations in the CREDIT Indicator Classification.

Workshops

The results of the workshops (4 one week workshops held simultaneously, 2 one day workshops for the children, and 1 one day workshop) were documented in an exhibition in the housing area and in a catalogue of ideas that was an important element in the latter work with the brief.

The list of objectives with the U2 project, developed in cooperation with the dwellers of the area, is the benchmarks the finished project eventually is going to be assessed with.

This list includes:

- More dwellers at the meetings
- Good publicity in the media
- Few complaints

– Content residents
– All residents are informed about the changes
– Less damages
– The vital connection is realised
– The result of the renovation becomes a reference for other renovation projects.
– More people are visible in the area
– Proud tradesmen
– Proud residents
– Increased possibilities for each resident to have influence on his/her dwelling
– Project will stay within the budget
– The quality of the new facade and out door areas will last.

These indicators relate primarily to 2.5 – social values and 3.9 – Feelings and sensations and 6.5 User involvement in the CREDIT Indicator Classification.

Whether the project has reached these goals, some of the process evaluations are testing.

One of these is the evaluation of the workshops that included questions about the arrangement as a whole, the presentations and excursions, the workshops and the results and the meals. These questions relate to 6.5 – User involvement in CREDIT Indicator Classification.

2.4 Relation to different enterprises and national benchmarking

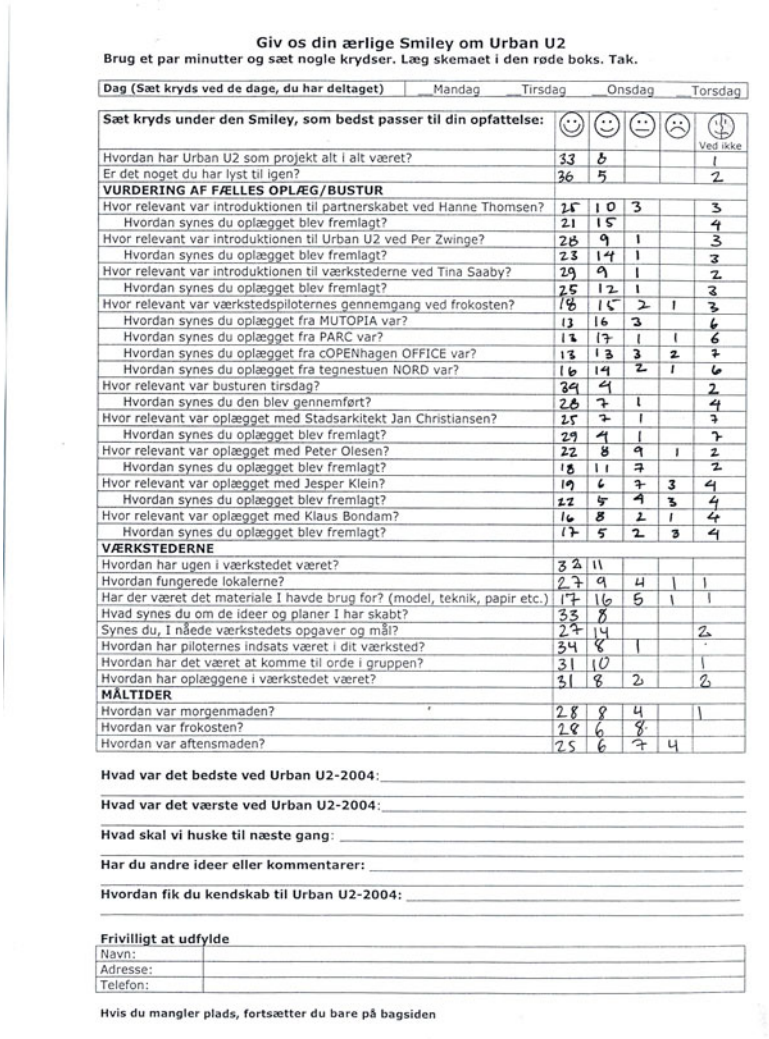
U2 is a demonstration project for the innovation network for public housing organisations (Almennet) and the local authority in Copenhagen and therefore some of U2 project's aims and objectives were defined at that level.

The assessment methods and tools for involving and capturing the users' knowledge, opinions and wishes were developed by the 'partnership' (the client) and the process consultant WITRAZ Architects during the planning and building process.

The experience and knowledge gained form this demonstration project will be used and disseminated by Almennet to other housing organisations. It is primarily the methods and tools for involving and capturing the users need and the assessment of whether the building project has succeeded with realizing those needs that will be used in other public housing projects.

The experience from the project with user involvement and user innovation and the developed tools are as relevant for enterprises such as process consultants, architects as they are for the housing organisations. The experiences from the project have been disseminated in publications on user driven innovation with architects as the target group.

Figure 5. Questionnaire from the evaluation of the workshops, WITRAZ arkitekter



Giv os din ærlige Smiley om Urban U2

Brug et par minutter og sæt nogle krydser. Læg skemaet i den røde boks. Tak.

Dag (Sæt kryds ved de dage, du har deltaget)	Mandag	Tirsdag	Onsdag	Torsdag

Sæt kryds under den Smiley, som bedst passer til din opfattelse:	☺	☺	😐	☹	Ved ikke
Hvordan har Urban U2 som projekt alt i alt været?	33	8			1
Er det noget du har lyst til igen?	36	5			2
VURDERING AF FÆLLES OPLÆG/BUSTUR					
Hvor relevant var introduktionen til partnerskabet ved Hanne Thomsen?	25	10	3		3
Hvordan synes du oplægget blev fremlagt?	21	15			4
Hvor relevant var introduktionen til Urban U2 ved Per Zwinge?	28	9	1		3
Hvordan synes du oplægget blev fremlagt?	23	14	1		3
Hvor relevant var introduktionen til værkstederne ved Tina Saaby?	29	9	1		2
Hvordan synes du oplægget blev fremlagt?	25	12	1		3
Hvor relevant var værkstedspiloternes gennemgang ved frokosten?	18	15	2	1	3
Hvordan synes du oplægget fra MUTOPIA var?	13	16	3		6
Hvordan synes du oplægget fra PARC var?	12	17	1	1	6
Hvordan synes du oplægget fra cOPENhagen OFFICE var?	13	13	3	2	7
Hvordan synes du oplægget fra tegnestuen NORD var?	16	14	2	1	6
Hvor relevant var busturen tirsdag?	39	4			2
Hvordan synes du den blev gennemført?	28	7	1		4
Hvor relevant var oplægget med Stadsarkitekt Jan Christiansen?	25	7	1		7
Hvordan synes du oplægget blev fremlagt?	29	9	1		7
Hvor relevant var oplægget med Peter Olesen?	22	8	9	1	2
Hvordan synes du oplægget blev fremlagt?	18	11	7		2
Hvor relevant var oplægget med Jesper Klein?	19	6	7	3	4
Hvordan synes du oplægget blev fremlagt?	22	5	9	3	4
Hvor relevant var oplægget med Klaus Bondam?	16	8	2	1	4
Hvordan synes du oplægget blev fremlagt?	17	5	2	3	4
VÆRKSTEDERNE					
Hvordan har ugen i værkstedet været?	32	11			
Hvordan fungerede lokalerne?	27	9	4	1	1
Har der været det materiale I havde brug for? (model, teknik, papir etc.)	17	16	5	1	1
Hvad synes du om de ideer og planer I har skabt?	33	8			
Synes du, I nåede værkstedets opgaver og mål?	27	14			2
Hvordan har piloternes indsats været i dit værksted?	34	8	1		
Hvordan har det været at komme til orde i gruppen?	31	10			1
Hvordan har oplæggene i værkstedet været?	31	8	2		2
MÅLTIDER					
Hvordan var morgenmaden?	28	8	4		1
Hvordan var frokosten?	28	6	8		
Hvordan var aftensmaden?	25	6	7	4	

Hvad var det bedste ved Urban U2-2004: _____

Hvad var det værste ved Urban U2-2004: _____

Hvad skal vi huske til næste gang: _____

Har du andre ideer eller kommentarer: _____

Hvordan fik du kendskab til Urban U2-2004: _____

Frivilligt at udfylde

Navn:	
Adresse:	
Telefon:	

Hvis du mangler plads, fortsætter du bare på bagsiden

2.5 Visions and innovation for future improvements

The methods and tools for involving and capturing the end users opinions and needs is one of the experiences that is gathered and disseminated to be used in other housing organisations that is part of Almennet (Innovation network for public housing organisations in Denmark) as a part of the network's guidelines 'Beboerdemokratisk process 02' (Participatory democracy for the residents). The experiences are also gathered in a publication – 'A model for value creation in the building industry that was one of the planned results of the project.

This model and the guideline will be tested and developed further through the use of other housing projects.

The objective with Almennet is this to further learning processes in public housing, and to develop methods and processes that will improve the user's satisfaction with their dwelling and housing area.

The innovation strategy of U2 as well as Almennet is user driven innovation. It is the members themselves and their partners that initiate, develop and test new methods or processes and share their experiences with other members of the association.

3. Enterprises – assessments and indicators internally applied

This chapter describes how WITRAZ Architects, the process facilitator on the U2 project, uses the information and assessments they gather from the user involving methods described in the previous chapter and what other evaluation and assessments they use.

3.1 The actual enterprise, company and firm

WITRAZ Architects are an architectural office with a staff of 37. The office works with a variety of projects such as landscaping and improvements of neighbourhoods, public institutions, housing and with project management.

In the U2 case, they worked with project management having the role as consultant for the client and process facilitator.

The methods and tools for user involvement and capturing user needs are methods WITRAZ Architects have developed over a number of years. On the basis of that work WITRAZe developed a model of three levels of user involvement.

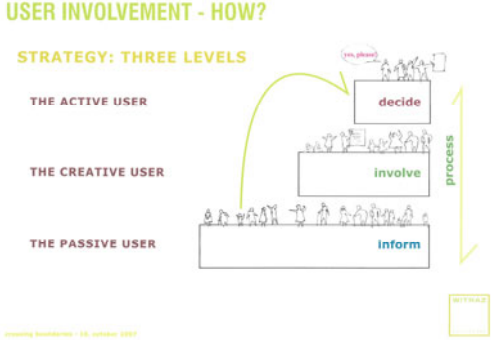
The basic level is the information level. A user has to be informed. If not before, then the day he moves in and start using the new or renovated building.

Besides the practical information, it is important to give the user insight into the thoughts and priorities that form the basis for the design decisions.

The next level is the decision level. This level is always included in public housing projects because of the mandatory participatory democracy in public housing. This place a demand on the architects to communicate to every resident what value the planned changes can have for him or her as well as over all idea with the project.

The third level is the involve level, where the users are active and creative participants in the process. To make such an involvement work the architects and other consultants must carefully communicate the possibilities and problems to the participants.

Figure 6. Three levels of user involvement, WITRAZ arkitekter



The experience from the U2 project resulted (as a planned part of the project) in a report 'Value creation in building'.

This report and the model it presents will be used by WITRAZ in coming projects as a conceptual tool in process and product management in other projects.

3.2 Assessment methods and tools applied in the enterprise

WITRAZ Architects uses a wide range of methods and tools in their work to involve users capture user needs and to assess the completed process or project.

In the initial phases of building projects (strategic pre-analysis and briefing in the CREDIT Carpenter model) they use interviews, questionnaires and observational studies to get closer and better understand the people that will use the place that WITRAZ are designing.

Workshops, exhibitions and study trips are the methods they use to involve the users of the projects and get insight to their wishes and knowledge in the initial phases. The result from such sessions are documented with photos, drawings, models and collages, and filed as a part of the project material. The results are used as an important basis for the brief and the further work with the project.

One of the main difficulties is to get access to people before the intervention is made their house or area. Therefore, WITRAZ uses campaigns, happenings, competitions, votes and games as methods to get in contact and speak with the coming users.

WITRAZ uses questionnaires to assess the participants experience and satisfaction with these user involving processes. In order to assess the result of the building project, they use questionnaires as well as observation studies and statistic information on e.g. how many that move away from the area.

All WITRAZ projects are evaluated by the in house project team when the project is finished. This is done at a meeting with all team members without a formalised evaluation form or agenda, but with a focus on the quality of the process and the product as well as on the man-hours spent on the project different phases.

Beside these methods to the gather qualitative knowledge about their projects and their own work, WITRAZ use quantitative methods such digital time registration on all man-hours spent on projects as well as data from account analysis. This data forms the basis for budgets for time consumption and economy both on project level and on company level.

3.3 Costs and performance indicators applied in the enterprise

The central indicators for WITRAZ are:

- Architectural indicators such as whether the users find the building/area beautiful, useable and technically well done, both on building/area level and the different building part (construction, rooms, functions).
- Social indicators such as the how the end users perceive the building/area. Do they feel save, do they fell that the area has an identity, are they proud of the place, do they know their neighbour? Is there less van-

dalism such as graffiti on the walls, are there less people mowing away from the area, than before the new building or renovation of the old?
– Process indicators such as users' or project participants' satisfaction with the cooperation, the user involvement, the project management. Economic indicators as costs, income, time consumption in relation to the different phases of the building process.

In the CREDIT Indicator Classification these indicators relate to:
2.3 – Spatial solution and property aesthetics,
2.5 – social values,
3.3 – Usability and adjustability,
3.8 – aesthetic quality of building and indoor spaces,
3.9 – Feelings and sensations,
6.2 – Resource control and project management,
6.6 – User involvement and cooperation.

3.4 Relation to building cases and benchmarking organisations

The assessments methods and the indicators WITRAZ Architects employ are developed in the projects they are doing, either by WITRAZ themselves or in cooperation with the other partners or the client.

WITRAZ uses the experiences with the different methods and the assessments (workshop, happenings, exhibitions, questionnaires) from one project to another to build up their knowledge and expertise.

They do not use information from gathered in benchmarking systems, and the assessments they make is only used by themselves or by the client or the other partners on their projects.

A book with benchmarking of a number of Danish Architectural firms with focus on their project management, resource consume and economy has been interesting reading for the management at WITRAZ.

3.5 Visions and innovation for future improvements

WITRAZ Architects have plans about formalising the current internal project evaluation that is done by the project team after every completed project. The formalisation will consist of a series of questions that the all evaluations should come around in order makes the evaluations less depended on the persons participating personal focus and to make it easier to compare different projects internally.

The methods and tools WITRAZ Architects use in their projects are continually improved or changed to be useful in another context or work better in contexts where they have been used before.

Furthermore, WITRAZ Architects will increase their focus on time consumption, project management in relation to economy in the future.

4. National benchmarking – indicators, assessment and organisation

This chapter focuses on the organisation, assessment methods and applied indicators of BOSSINF, a public benchmarking system monitoring the costs of public housing.

4.1 The actual benchmarking organisation and its purpose

The BOSSINF system is an electronic reporting, management and information system for the administration of public funded housing. BOSSINF started in 1992 in order to establish a consistent foundation for reviewing and handling applications for public financial support to built public housing by the local authorities in Denmark. The establishment of BOSSINF was a part of the decentralisation of the handling of the funding applications in relation to public housing. Today it is still the local authority that handles the applications, on a consistent foundation defined by the Ministry of interior and social affairs.

The Ministry of interior and social affairs manages the system.

The purpose of the system is to manage the funding of public housing, monitor the acquisition and building costs and the projects compliance with the legal requirements.

Figure 7 Chart with the average acquisition costs on public family housing distributed on site costs, constructions cost and expenses. The numbers in the top are the average costs in Copenhagen. The numbers in the middle are the average costs in municipalities with 50.000 inhabitants or more. Below are the average costs for municipalities with less than 50.000 inhabitants. At the bottom the average costs for the whole country.

Tabel 1.1 Gennemsnitlig anskaffelsessum fordelt på udgiftstype samt anskaffelsessummens spredning for **nybyggede familieboliger** fordelt efter beliggenhed. Kr./kvm

(opdateret 23.02.2006)	Anskaffelsessum opdelt på			Anskaffelsessum i alt		
	Grundudgifter	Håndværkerudgifter	Omkostninger	Gennemsnit	Nedre kvartil	Øvre kvartil
Hovedstadsregionen	3.098[1]	11.164[1]	2.383[1]	16.645[1]	15.878	17.083[1]
Øvrige land, kommuner med 50.000 indb. og derover	2.862	8.396	1.875	13.133	12.264	13.980
Øvrige land, kommuner med under 50.000 indb.	2.526	8.891	2.305	13.722	12.399	14.530
Hele landet	2.710	9.132	2.203	14.045	12.475	14.774

1) Anskaffelsesudgifterne vurderes at være for høje i det pågældende geografiske område til, at de beregnede beløb kan anvendes som pejlemærke.

BOSSINF covers only public housing (Youth housing and housing for elderly).The public housing in Denmark includes 541.500 dwellings. On aver-

age 5000 new dwellings in public housing has been built every year since 2000.

The BOSSINF system establishes consistent frame for handling cases, monitoring costs, correction of errors and gives the local authority an overview over the field.

It is mandatory to deliver data to the system in order to get public support to a public housing project; the application for public support is at the same time input to the system. Therefore the system covers all public housing, and public supported youth housing and housing for elderly.

The Ministry of interior and social affairs is the administrator of the system, KMD, an IT enterprise, takes care of the daily operation and administration of the system.

4.2 Assessment applied in the benchmarking organisation

The data to the system is collected by the local authorities. The housing organisation (client) submits the data as a part of the application to get public support to a housing project and building permission from the local authority. The data is delivered from the client three times:

– The first time application form A is delivered before the tendering of the housing project (before or during the design phase in the CREDIT carpenter model). The data in application form A is based on the estimate made by the consultants on the project. If the client gets acceptance from the local authority, the project for the housing can be put out to tender.
– When the tendering process is ended and the contractors chosen, the client delivers application form B to the local authority with figures based on the bid from the tender (after the design phase in the CREDIT carpenter model). These figures are calculated by the contractor based on prize lists or databases.
– When the building process is ended the client delivers form C with accounting figures from the different costs (after construction in CREDIT carpenter model) based on the client's accountancy of the project.

The procedure is digital. Either the data is entered directly in a digital application form by the client, or it is entered by the local authority with data from a paper application form.

When the entered data/ submitted application has been handled and approved by the local authority, the project changes status in the system. Afterwards the client can continue with the next steps in the building process.

4.3 Cost and performance indicators applied in benchmarking

The client enters input on following points in the application form, though a bit different depending on when in the building process:

– Building type (what kind of housing?)
– Building client
– Kind of building project (local authority project, a regional project or state project)
– Financing institute
– Accountant in the building phase
– Location of the site, the size of the area, from whom was it bought or rented.

– Experiment information
– Type of tendering (public, limited or confidential) and contract (general contract, trade contract or turnkey contract (all-inclusive)).
– The size (how many dwellings, the area of each dwelling, the number of rooms in the dwellings) and type of construction (new built, extension, conversion)
– Environmental and resource consumption (waste sorting, water, rain-water, waste water, electricity, heating and materials).
– Costs on site acquisition
– Constructions costs distributed on building parts and installations
– Expenses on consulting, insurances and investments
– Fees
– Grants
– Acquisition costs

The local authority has access to the projects within the municipality, but cannot compare the building projects in their municipality with projects form other municipalities.

The data from all municipalities are gathered by the Ministry of interior and social affairs. Until 2006 these were published in a report twice a year available on the Ministry of interior and social affairs' web site.

Figure 8. Chart with maximum financial support as D.kr. per m².

Årets prisniveau, kr. pr. m2 boligareal	Påbegyndelsesår 2009
Familieboliger	
Hovedstadsregionen	20.240
Århus, Skanderborg, Odder, Holbæk, Ringsted, Slagelse, Sorø, Næstved og Faxe Kommuner	17.260
Øvrig provins	16.280
Ældreboliger	
Hovedstadsregionen	25.130
Århus, Skanderborg, Odder, Holbæk, Ringsted, Slagelse, Sorø, Næstved og Faxe Kommuner	21.960
Odense, Silkeborg, Vejle, Fredericia, Kolding og Horsens Kommuner	20.830
Øvrig provins	19.650
Ungdomsboliger	
Hovedstadsregionen	23.810
Århus, Skanderborg, Odder, Holbæk, Ringsted, Slagelse, Sorø, Næstved og Faxe Kommuner	20.830
Odense, Silkeborg, Vejle, Fredericia, Kolding og Horsens Kommuner	20.830
Øvrig provins	19.650

The key figures related directly to the indicators in the application as the average (plus upper and lower quartile) acquisition costs distributed on site costs, construction costs, and expenses and differentiated between 4 different building types.

The three entries site costs, construction costs and expenses, are specified in sub entries and the percentage of the acquisition costs and the D.kr. per m² is given for each entry. The entries are:
Site costs:
– Purchase price
– Foundations
– Basis of the building
– Laying out of the open space
– Gas and sewerage
– Connection charges
– Laying of roads and footways
– Taxes, charges and interests.

Construction costs:
– Primary building parts
– Supplementary building parts
– Surfaces
– Plumbing and heating installations
– Electricity
– Fixtures and furniture
– Other construction cost
– Other expenses.

Expenses:
– Technical consultancy
– Other consultancy
– Fees for the accountant
– Board expenses
– Mortgage interests
– Desiccation
– Commission
– Fee to the municipality
– Insurance
– Tenancy and sales costs (distribution costs)
– Contribution to the Danish building defect fund
– Commitment commission.

The spaces for entering data in the application and the key figures are parallel to CREDIT Indicator classification 1.1 - capital, investment, construction and commissioning costs, 2.2 – Plot opportunities, 3.1 – Category of building, quantity, size and area, 4.1 – Building parts, quantity, size and area, 7.1 – Resource use.

After 2006 the publishing of these key figures have stopped. The reason is probably that there since 2004 have been a fixed maximum amount allowed for the cost pr. m² for public housing. Therefore, the figures on the acquisition costs pr. m² will be equal to the maximum amount pr. m².

4.4 Relation to enterprises, building project and real estate

BOSSINF is a governmentally initiated system established to ensure a consistent foundation for the local authorities when handling the applications for public financial support to public housing.

The key figures that are calculated on the basis of the entered data are primarily a monitoring tool for the State to follow the building costs on public housing. It has the function of a management tool and foundation to make budgets and decisions in relation to the Finance Act.

Interest groups such as The National Association of Local Authorities in Denmark and the Danish Construction Association, use the BOSSINF key figures for their political work.

Figure 9. Chart with the average costs given as percentage of the total acquisition cost distributed on building type and type of costs.

Tabel 2.1 Gennemsnitlig anskaffelsessum fordelt på udgiftstype og udgiftsposter for nybyggeri samt for ombyggede ældreboliger fordelt efter boligtype. Pct.

(opdateret 23.02.2006)	Familie-Boliger	Ungdoms-boliger	Ældre-boliger	Ombyg. ældre-boliger
Grundudgifter i alt	**19,3**	**18,4**	**17,8**	**21,3**
Heraf:				
Grundkøbesum[1]	8,8	8,7	8,2	17,1
Fundering og pilotering	1,3	1,5	1,6	0,8
Bygningsbasis	2,0	1,5	1,7	0,8
Anlæg af friareal	1,4	1,3	1,5	1,0
Gas- og kloakbidrag	1,0	0,8	1,0	0,0
Tilslutningsafgifter	3,1	3,6	2,4	0,9
Anlæg af vej og fortov mv.	1,6	0,9	1,3	0,6
Afgifter, skat og forrentning	0,2	0,1	0,1	0,1
Håndværkerudgifter i alt[2]	**65,0**	**66,9**	**68,5**	**64,8**
Omkostninger i alt	**15,7**	**14,7**	**13,7**	**13,9**
Heraf:				
Teknisk rådgivning	6,6	6,7	6,2	6,3
Anden rådgivning	0,6	0,7	0,8	0,7
Byggesagshonorar/forretn.før.	1,9	1,8	1,7	1,8
Bestyrelsesudgifter	0,1	0,1	0,1	0,0
Byggelånsrenter	1,1	1,3	1,6	2,0
Udtørring	0,4	0,4	0,4	0,3
Garantiprovision mv.	3,1	1,8	1,1	0,8
Statens promillegebyr	0,2	0,2	0,2	0,2
Gebyr til kommunen	0,2	0,2	0,2	0,2
Forsikringsattester og gebyrer	0,4	0,4	0,4	0,5
Udlejningsudg./salgsomkostn.	0,0	0,0	0,1	0,1
Bidrag til Byggeskadefonden	1,0	1,0	1,0	1,0
Stiftelsesprovision	0,4	0,6	0,3	0,2
Anskaffelsessum i alt	**100,0**	**100,0**	**100,0**	**100,0**

1) Grundkøbesummen ved ombyggede ældreboliger svarer til værdien af den eksisterende ejendom.
2) Håndværkerudgifterne er fordelt på udgiftstype i tabel 2.2.

4.5 Visions and innovations for future improvements

BOSSINF is a system that often is changed because of changes in the laws concerning public housing.

Currently there are plans for simplifying and modernizing the system:
- In the future it will be required that the client/ housing organisation enters data digitally.
- The spaces in the application form will be simplified. The specification of the different construction cost will be made less detailed, because it is inappropriate in its current form.
- The application form will include more data on life cycle costs with more detailed specifications based charts of account from the operation of the building.

The accounts for public housing follow a standardized chart of accounts and the accounts are submitted to the Ministry of the interior and social affairs. On the basis of these accounts the Ministry of the interior and social affairs publishes key figures for the facility management costs for public housing specified in 5 categories:

– Net capital costs
– Water and sewers
– Cleaning
– Net maintenance
– Remaining costs.

In 2007 key figures on contractors' were introduced in relation to public housing and 2008 key figures on consultants' performance were introduced.

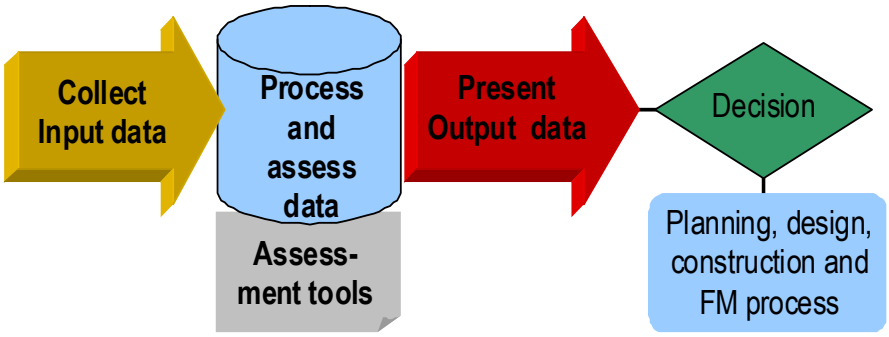
The client evaluates both the contractor's and the consultant's performance on a building project. The key figures for consultants relate only to the design phase, whereas the key figures for contractors are based on data from both the construction phase and data from an inspection of the finished building. On the basis of these data a mark for the performance is calculated (see CREDIT DK case 02). These key figures will be published on the Danish Building Defect Fund's web site.

The data in BOSSINF reflects what is needed in the management of the application for funding for public housing and secure the projects compliance to the legal requirement. Therefore, the focus is on acquisitions costs, and the management and tendering in project. But there is a growing wish to know more about the users/dwellers experience of the quality of the same buildings. In order to develop indicators that could sheet light on the experienced quality, a test was carried out in relation to a series of youth housing projects (see CREDIT Case DK01).

5. Discussions and conclusions

In this chapter the applied methods, indicators both in the described building case, enterprise and national benchmarking are related to the theoretical models of CREDIT, and lessons learned are summed up.

Figure 10. CREDIT information model in relation to decisions in the planning, design, construction and facility management processes



5.1 Buildings - lessons learned and recommendations

In the renovation project of U2 in Copenhagen a series of different methods to involve the residents and capture their needs were used in the initial phases (Strategically pre-analysis and briefing).

The methods included interviews/questionnaires, workshops and happenings and the results from these events were reported in exhibitions, newspaper on the internet, formed the basis for decisions taken at meetings in the 5 divisions of the public housing area and finally documented in the brief.

The case U2 shows that there are available and tested methods and tools for user involvement and capturing user needs and experience with the employment of these methods in the public housing sector.

The methods are primarily intended for the initial phases of a project (strategic pre-analysis and briefing in the carpenter model) and there seems to lack experience and tools to follow up during the building process.

The assessment of the criteria for success that the residents had agreed upon depended on many types of data ranging from concrete data that can assessed by output from statistical registrations to personal feelings that must rely on a personal judgement. This points at the importance of having an awareness of the many different assessment methods that has to be employed (questionnaires, statistical data, observation) and as well as broad range of indicators when capturing users needs and opinions and assessing process of user involvement. The applied indicators relate to CREDIT Indicator Classification 2.1 – Location and address, 2.2 - Plot opportunities, 2.3 - Spatial solution and property aesthetics, 2.4 - Surrounding services, 2.5 - Social value, 3.1 – Category of building, quantity, size and area, 3.2 – Safety and security of burglary, 3.3 – Usability and adjustability, 3.9 – Feelings and sensations, 6.5 – User involvement.

5.2 Enterprises - lessons learned and recommendations

The conceptual model for user involvement by WITRAZ with three levels; the information level, the decision level, creative involvement level seems to be a very useful tool both in the communication with the client when settling the level of involvement and in the work of consultants to navigate in the process.

The elaborate toolbox of methods to involve end users in the planning process and capture their opinions and needs that WITRAZ apply shows that there are tools at hand for user involvement. These tools are primarily intended for the initial phases (Strategically pre-analysis and briefing in the CREDIT carpenter model).

The indicators that WITRAZ employ to get insight into the users opinions and needs relates to indicators in CREDIT Indicator classification (2.3 – Spatial solution and property aesthetics, 2.5 – Social values, 3.3 – Usability and adjustability, 3.8 – Aesthetic quality of building and indoor spaces, 3.9 – Feelings and sensations, 6.5 – User involvement and cooperation.

The WITRAZ case shows that there is a need for project evaluations internally in the firm to secure that what they learn in one project can be used on the next both in relation to process and result.

WITRAZ does not use output from systems like BOSSINF or other systems. However WITRAZ describes a need for some type of benchmarking on firm level to get ideas from other architectural firms about management of the enterprise to improve income and efficiency.

In WITRAZ informal evaluations they come around questions that relate to CREDIT Indicator Classification: 2.3 – Spatial solution and property aesthetics, 3.8 – Aesthetic quality of building and indoor spaces, 6.2 – Resource control and project management, 6.5 – User involvement and cooperation.

5.3 National benchmarking - lessons learned and recommendations

The BOSSINF system has a very high coverage in the field of public housing because the application from the housing organisations for public financial support is at the same time input data to the system. The system is initially intended for that management of the applications and not as a benchmarking system. The benchmarking part is a spinoff of the application management. The connection between delivering input to the system in order to receive support seems to be a very reliable way to secure input data to a system.

Data is submitted three times, in relation to the CREDIT Carpenter model after briefing, design and construction. The BOSSINF system relates only to the acquisition costs and project management and therefore only to the construction bubble in the Don Ward model.

The indicators relates to CREDIT Indicator Classification 1.1 - capital, investment, construction and commissioning costs, 2.2 – Plot opportunities, 3.1 – Category of building, quantity, size and area, 4.1 – Building parts, quantity, size and area, 7.1 – Resource use.

BOSSINF is a governmentally initiated system, and the submission of data is mandatory therefore it belongs to the mode III - the public non profit benchmarking systems in the benchmarking typology.

The system is only intended for control of economy and compliance with legal requirements, therefore it influences only the conduct in the public housing projects in that respect. Over the years different focus areas such as life cycle costing, accessibility or quality management has been advanced linking the allotment of public funding with requirements of including these focus areas in the project.

After 2006 the key figures on acquisition cost distributed on different entries has ceased to exist apparently because of the fixed maximum for the costs pr. m². This fixation means that the costs pr. m² always will equal the maximum amount.

Nevertheless, the way the costs are distributed on the different expenses must vary form project to project as well as from one part of the country to another despite the fixed price pr. m². Such information could be as interesting as the former output form BOSSINF.

Besides, it's high coverage of the field and the broad range of input data from different stages in the process points at the possibilities to let a system like this have a greater impact on the conduct in projects by including a broader range of input.

Table 1. Questionnaire to evaluate CREDIT Indicator Classification.

CREDIT Indicator Classification

CREDIT Indicator Classification

Company:
Role:
Project: Country:
Date: Sign:

What indicators are registered or assessed in the case

Please use the following scale when answering:

2 Always - strategic and very important
1 Sometimes, depends upon the project
0 Not at all, unimportant

Cost and performance indicators	U 2 - survey	U2 – goals de-fined in the workshops	U2 – process evaluation	WITRAZ project evaluation	BOSSINF	Comments and other indicators recom-mended
1. Cost, price and life cycle economy (LCE)						
11 Capital, investment, construction, commissioning cost						
12 Building services related to operation and maintenance						
13 Business services related the activities in the building						
2. Location, site, plot, region and country						
21 Location and address						
22 Plot opportunities						
23 Spatial solution and property aesthetics						
24 Surrounding services						
25 Social values						
3. Building performance and indoor environment						
31 Category of building, quantity, size and area						
32 Safety and security of burglary						
33 Usability and adjustability						
34 Thermal comfort						
35 Air quality and health						
36 Visual climate						
37 Acoustic climate						
38 Aesthetics of building and indoor spaces						
39 Feelings and sensations						
4. Building part and product performance						
41 Category of building parts, quantity, size and area						
42 Safety						
43 Durability						
44 Thermal quality						
45 Impact on air quality						
46 Lighting quality						
47 Acoustic quality						
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						
52 Applicability of the facility						
53 Operation						
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						
65 User involvement and cooperation						
7. Environmental impact						
71 Resource use						
72 Emissions						
73 Biodiversity						

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Construction and Real Estate -
Developing Indicators for Transparency

This report describes the result of a case study of methods and tools for user involvement and a system of key figures on economy both applied in public housing.

The study is undertaken as a part of the Nordic and Baltic project CREDIT: Construction and Real Estate – Developing Indicators for Transparency.

The analysis is aiming at three levels: the project or building, the enterprise and the national benchmarking system.

The study concludes on project and enterprise level that there are methods and tools and indicators for involving users and capturing their needs and opinions that can be applicable in relation to CREDIT. And that the linkage in the national benchmarking system in question between the delivery of input to the system and financial support to the delivers of input, ensure the system a high coverage in the sector.

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