

Housing Federation Hub initiative – A collaboration between FM and Academia

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ABSTRACT

Purpose. The objective of this paper is to present the results from one approach in the Co-operative Housing Federation of Norway (NBBL) HUB activities, which consist of eight different feasibility study projects geared towards a potential contribution to Paris Climate Agreement. NBBL is a national membership association representing 41 co-operative housing associations (building co-operatives) managing 12.700 housing co-operatives and condominiums, counting 510.000 houses representing 1.020.000 members which is approximately 25% of total housing in Norway. The Norwegian building stock consists of approximately 400 million square meters gross area. Of this housing is app 67%. In order to reach the Paris Climate Agreement goals, it is not enough to concentrate on new constructions, the biggest potential lies within the existing buildings stock. Fostering changes towards more sustainable neighborhoods, we propose in this research to tighten the collaboration between FM and Academia to create a network of universities and local FM, following the goals and strategies developed at the strategical level. “Hjernringen” is an initiative from NBBL to co-develop new solutions and research topics for more sustainable urban communities in collaboration with Norwegian Universities and local residential FM.

Methodology/approach. This paper presents one case study in detail as an example of collaboration between FM and Academia. The methodology used are both qualitative and quantitative research methods. It was organized as a student summer school for four weeks working on site. A substantial part of getting information was to listen, inform, understand people’ needs and voices, ultimately creating a visual survey. Consulting with users was important to make an interactive platform with 3D models capable of collecting feedback and have a tailor-made communication of the benefits of sustainable renovation.

Results. The results of this research are showing that a tight collaboration between FM and Academia benefits both parties in the development of innovative solutions both from the academic and industrial perspective. It has also enabled to shed light on the importance of better communication between FM and users. The media coverage of the experience has also increased the attention given to the issue.

Practical implications. The research is important to increase the understanding of users’ involvement in sustainable building renovation and its potential to move towards a more sustainable society. For NBBL, together with their 41 co-operative housing associations, it is an opportunity to develop a new platform for decision-making in renovation projects of urban communities.

KEYWORDS: 3D model, communication, co-creation with residents, well-being.

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INTRODUCTION

As a signatory of the Paris Climate agreement, Norway had committed to reducing its overall Greenhouse gas emissions by 40% by 2030 compared to 1990 levels. In a recent statement, following the publication of the European Green Deal, the Norwegian government has increased this target to 50% and towards 55% by 2030. The country has expressed the will to take a leading role in helping to reach this goal at the EU level. In order to pave the way to success, major industry actors will have to take actions. With the building sector accounting for almost 40% of the global CO₂ emissions and 36% of the energy use, there is a big potential for these actors to make a significant contribution.

Housing in Norway accounts for 67% of the building stock, of this, the Norwegian Federation of Building Cooperatives (NBBL) represents 25%. NBBL is a national membership association representing 41 co-operative housing associations (building co-operatives (BBL)) managing 12.700 housing co-operatives and condominiums, counting 510.000 houses representing 1.020.000 member. As a major actor of the residential building sector, they have set ambitious goals and a visionary approach to contribute to the overall climate goals set by the Norwegian State. The initiatives developed are clustered in their "HUB project pool". The collaboration with Academia called "Hjernringen" is part of their "HUB" activities, through the organization of summer schools and the sponsoring of Master Thesis, a research project has emerged aiming to find new ways to engage citizens (i.e. residents) in the fight against climate change. Together with their 41 local co-operative housing association, they are aiming to engage their members into Sustainable Building Renovation (SBR). In this paper, SBR is understood as defined by Jensen et al. (2017) "a renovation of existing buildings that results in buildings that are more sustainable after the renovation than before".

While nearly half of the Norwegian population acknowledges "being scared of the consequences of climate change on them and theirs", it remains a challenge to motivate residents to engage into ambitious SBR projects. Indeed, the majority of people have already consented to change their behavior in many areas (transportation, food habits, recycling) but barriers remain when addressing their individual property. Social strategies focused on engaging citizens in formal and informal groups play an important role in achieving social behavioral changes for climate mitigation and adaptation (Temeljotov-Salaj et al., 2018). Hauge et al. (2013) points social mechanisms that efficiently influence human attitudes and actions, such as: social norms, competition, praise and acknowledgement, social-identity theory, pilot examples, social learning, attention from others, face-to-face stronger together and consensus. The latter was named by NBBL as a goal to reach when addressing their members and engaging in sustainable renovation of their neighborhoods.

In order to foster innovation in sustainable building renovation processes, Killip et al. (2013) through their study, suggest to focus on the three following aspects: quality of design, quality of physical work and quality of communication. They define the need for improved communication as an important factor for successful building renovations. They also point out the need for systematic feedback mechanisms while also naming it as a challenge to implement. By being involved in both the design and operational phases, Facility Managers have the potential to centralize the communication with end-users and improve it to collect feedback and react quickly on it but it remains a challenge to implement.

As a result of this challenge, NBBL decided to collaborate with the Norwegian University of Science and Technology (NTNU) in order to initiate a research project to facilitate communication of SBR's benefits in the specific context of the Karolinerveien Borettslag's Renovation project in Trondheim. This research is especially relevant for the groups identified as crucial for achieving the UN Sustainable Development

Goals within the building sector: facility managers, co-operative housing federations and associations (specifically NBBL and its local branch TOBB), the construction industry, citizens and other actors (public institutions, energy providers and academia).

The main Research Question explored in a summer school experience is “how can the collaboration between FM and Academia contribute to the development of innovative solutions for more sustainable neighborhoods?”

Hjernringen concept

NBBL decided to intensify its efforts towards the achievement of the relevant United Nations’ Sustainable Development Goals by collaborating with Academia on a “Hjernringen” (‘Brain Ring’ in English), as a part of NBBL “HUB” activities (NBBL’s Project Pool). NBBL has initiated a collaboration with six universities around the country, a network is created between NBBL HUB, students and housing development teams, with a goal to use the academic potential to foster the sustainable development in residential areas, and opposite to find the "bottlenecks" for reducing energy consumption by 10 TWh. Christian Fredrik Mathisen, NBBL’s innovation leader stated *NBBL HUB will provide assistance in making smart choices, increasing the pace of development and being ready for the future.* Thus, the interest of collaboration from both sides is seen as a large network with national focus; creating a collaborative project solutions network; using multidisciplinary knowledge for increasing attention of sustainable upgrading; linking students to "actual life problems" in housing area; to improve decision-making processes in housing cooperatives regarding sustainable and green transformation. NBBL organized a workshop, led by Daniella Axelsson, on which partners defined the strategic common topics, resources and activities in collaboration (Table 1). Both sides pitch into Hjernringen with a strong wish to collaborate and generate new knowledge to contribute to SDG.

Table 1 – Hjernringen strategic topics, resources and activities

Academia	NBBL
<ul style="list-style-type: none"> ● Competence, students and pilot projects ● Professional knowledge and credibility for greater influence ● National and international networks ● Innovation ● Research expertise and skilled researchers across institutions ● Act as mentor and promoter ● Analyzing data in a professional way ● Take Norwegian research about housing to the world - help the NBBL housing expert ● R & D base in NBBL ● Knowledge of what has already been done, where there are gaps 	<ul style="list-style-type: none"> ● Greater influence through the unique network ● Access to the "real" projects, case studies, themes ● Be <i>one HUB</i>-connect academia and Building Co-operatives ● Formal and informal dissemination ● Platform to show each other up ● Starting circular-economic projects ● Promoting green transformation ● Contribute to new business models ● Create interest among students ● Access to data and information ● Building confidence in Building Co-operatives ● Greater political influence

Besides, collaboration with Academia is identified as a very positive one as both parts can gain. More practically, various collaboration benefits are identified: bring experience; support research problem; set smaller group to consider a task; learning about climate problems from more applicable side; case studies, seminar assignments, bachelor -, master - doctoral theses; contributions from NBBL to teaching; project-pitches, thematic roundtables and discussion. NTNU has started a cooperation in June 2019 by

organizing two Summer schools and dedicated several master students and one doctoral student to Hjernringen. In the present research, the cooperation between NBBL and NTNU is presented through one case, which was focused on the problem of increasing the citizen engagement in sustainable refurbishment projects.

RESEARCH

Case study

Partners and context of the study

NBBL is the largest co-operative Housing Federation of Norway and represents here the Strategic level of Facility Management. Following the Paris Agreement ratified in 2016 and aligning with Norway’s ambitious goals announced in the Nationally Determined Contribution Act published in February 2020, NBBL has been proactive in defining a strategy to upgrade the existing stock of buildings.

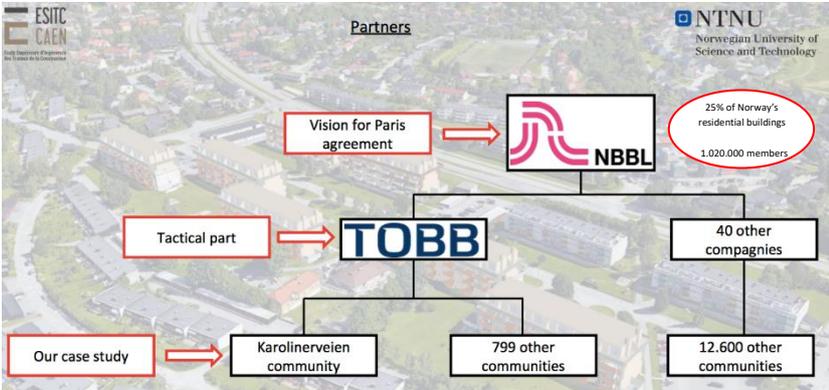


Figure 1 Organization of the Facility Management company made by the ESITC students, 2019.

The tactical level is represented by their local team, TOBB, responsible for the management and maintenance the Karolinerveien Housing Cooperative located in Trondheim, Norway.

This urban community has seven building blocks from 1967, with a total of 315 apartments and large outdoor areas. In order to comply with today’s standards, Karolinerveien needs to undergo renovation. NBBL seized the opportunity of this project to start developing a vision for a sustainable regeneration of the neighborhood together with an upgrade of the buildings’ performances.



Figure 2 Karolinerveien 1 and 2. Source: NTNU & ESITC

The NTNU’s Department of Civil and Environmental Engineering contributed to the development of a research project by organizing summer schools as well as semester courses and guidance of Master thesis related to the theme “citizen engagement in sustainable refurbishment projects”. The first

summer school, of which this paper presents the results, was organized in collaboration with the Caen Institute of Civil Engineering (ESITC). 5 students from ESITC together with 3 students and 3 researchers from NTNU participated to this 4-week workshop in June 2019.

First observations and initial development

Before the first day of the summer school, the students received the following statement from the NTNU and NBBL team: *“The Government has signed the Paris climate agreement. If Norway does not fulfill the requirements, the EU will give a penalty. But who is going to fulfill? Building owners. So, what is the potential within existing communities with dwellings? A case shall be examined - in Trondheim (Karolinerveien); what can be done to upgrade to a wellbeing area?”* (L. M. Bendiksen, 31.05.19).

The goal was set and communicated by the main coordinator of the NTNU research team as follows: *“Create a visualizing tool for sustainable communication, using Karolinerveien as a case”* (A. Temeljotov-Salaj, 31.05.19).

During the first week, the team focused on introducing the students to the Facility Manager’s role and the potential of Urban Facility Management to contribute to more sustainable neighbourhoods. A field trip was also organized to make the first observations on the Karolinerveien area. Having a civil engineering background, the first comments made on the spot were pointing to technical problems such as a poor condition of the balconies’ structures and the possible presence of asbestos. However, after being encouraged to also consider the social aspects, the students observed a lack of social meeting places and an under scaled playground area considering the size of the community.

After the first field trip and following a meeting at the local residential FM, TOBB, the students started developing ideas for improvements of the neighborhood. They structured their suggestions between “hard-services” and “well-being”, therefore combining technical solutions with more social intervention in order to improve the overall quality of life of the residents. In the meantime, the research team asked them to consider a communication plan or medium that could allow a transfer of knowledge from their engineering background to residents with various backgrounds and interests.



Figure 3 Students' first suggestions for improvement of the built environment. Source: NTNU & ESITC

A survey⁵ conducted by TOBB earlier in the year and analyzed by the students revealed the main concerns and challenges experienced by some of the residents. People were experiencing high humidity

⁵ TOBB (2019) Beboerundersøkelse Karolinerveien

level, bad ventilation, cold drafts from untight windows and doors resulting also in acoustic disturbance. 62.5% of the respondents said they had to open the windows in order to get satisfactory ventilation in their apartment. This clashed with one of the issues experienced by the respondents, namely the acoustic nuisance from seagulls in the summer. Indoor temperature also revealed itself to be problematic with respectively 77.9% and 58.1% of the participants reporting overall or partial excessive warmth in the summer and excessive cold in the winter.

A tailor-made communication tool

Reflecting on how they could have the best impact and maximize their chances of reaching out to residents, the students decided to split in two groups where one would be going on site and interact directly with people to let them know about the project and the purpose of their work, and another would start developing visual support and a web-based platform for better communication of SBR



Figure 4 From widely used images to tailor-made visual content. Source: NTNU & ESITC

benefits. The idea behind this process was to achieve a tailor-made communication tool where users would be addressed in a more personal and interactive way than a regular pamphlet about global benefits of Sustainable Renovation.

The group on the field started interacting with people and engaged them into a two-minute activity where they could pick a pictogram and write a few words on a white paper to express their experience



Figure 5 Examples of compositions produced by residents during a field trip activity. Source: NTNU & ESITC

of living in the Karolinerveien neighborhood. While the feedback was substantially similar to the results of the survey, the students also noticed the relatively young age of the residents. This led them to think that a web-based interactive tool could contribute to an improved communication.

The other group started building 3D models of the area as well of each type of apartment that could be found in the buildings to support the visualization of potential solutions. This, combined with the daily reported experience of the other group, led the research team to include co-creation and active participation in the final version of the tool. The concept of two “mini-games” emerged, one being a visual survey where people could point to specific areas in their apartments where they had challenges and the other one presenting what kind of improvements could be expected by upgrading different elements of the built environment. The name of the platform, “blimedOSS” comes from the Norwegian sentence “Join us” where “OSS” means “us” and stands for “Our Sustainable Society”.

One of the games, called “pick your picto” is collecting feedback on pre-determined issues in a more visual and playful way. The point being to increase the level of participation by providing an attractive interface. All five types of apartments identified in the blocks are available for people to choose the one they actually live in. They can then place pictograms representing different issues they might experience at home (noise, humidity, cold drafts, temperature, ventilation). The user composes its own picture of its “home experience” and can send the final result together with additional comments to the administrators of the site (i.e. the research team) anonymously.

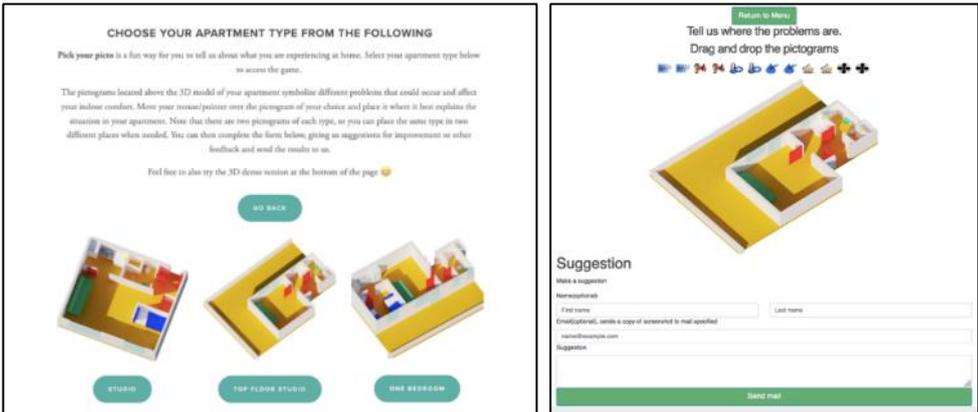


Figure 6 Landing page of the "pick your picto" game and interface for the "top floor studio"

The second game, “click and tip” aims to provide tailor-made information about the benefits of sustainable renovation of the block and its surroundings. The user can click on different magnifying glasses placed on specific elements of the building and its environment (façade, windows, ventilation, playground) to get information about how the situation could be improved. There is also a field to send suggestions or questions anonymously.

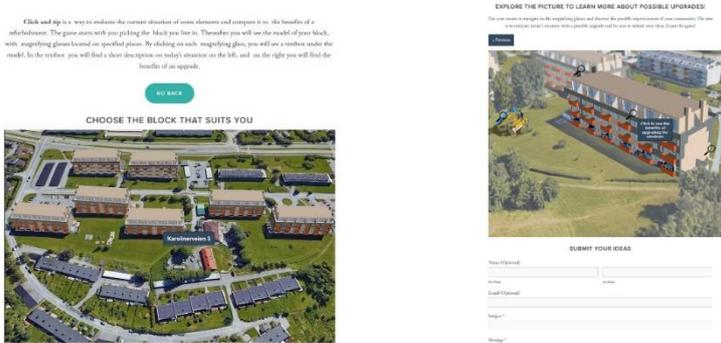


Figure 7 Landing page and interface of the Click and Tip game.

“Click and Tip” will evolve to a more interactive interface and the concept of a “SIMS-like” interface is being developed where people could create an avatar and fill in some information in order to receive information fit to their profile and priorities.

The residents could thereby see the effects of their decisions in the project on their different “levels” such as their environmental impact, well-being, economic, etc. This is motivated by the analysis of “successes and failures” in sustainable renovation of housing cooperatives which revealed that communication and transparency in the process were high on the list of users’ priorities. Challenges in



Figure 8 Simulation of the future interface of "click and tip" Source: C. Senior

communication and intervention of third parties during the pre-project phase were identified as important factors alongside the financial aspect and the lack of options for external funding.

The current version of the platform can be accessed now at www.blimedoss.com and has been presented to NBBL and TOBB. The representative from NBBL, in charge of the project expressed her satisfaction regarding both the final product and the overall fruitful collaboration. It is seen as an opportunity to create value for the local residential FM and their members as it can easily be adapted to more communities in order to engage more people into sustainable renovation projects. It has been presented to an extended audience at both academic and industrial conferences and received a lot of attention from actors in the field.

Continuing collaboration between NBBL and Academia-Semester work and Hjerringen

Building on the results of the 2019 summer school, the Karolinerveien case was used in semester courses at NTNU investigating the role of FM in renovation projects. A report produced by students investigated the successes and failures in similar cases in order to identify triggering effects in the development of sustainable renovation projects of urban residential communities. Interviews conducted with the communities’ board leaders and operational Facility Managers pointed out to breaches in communication and participation in the project. This also opened new paths to explore among which Universal Design, the impact of SBR on real estate value and the digitalization of decision-making processes.

The continuing collaboration between NTNU and NBBL has resulted in the development and financing of three master thesis projects to be submitted in 2020. These will serve both as a complement to and a kick-starter in the overall sustainability accounting strategy defined by NBBL. This sponsoring opportunity is also an incentive for students to write their master thesis on themes relevant to actors in the construction sector.

The experience between NTNU and NBBL through the Karolinerveien case also shows great results in communication and dissemination of the research. Articles published in specialized media and the

presentation of the project in relevant channels within academia and industry have increased the visibility of both parties.

Discussion and conclusions

The collaboration between NBBL and Academia, has proven through the NTNU experience to be fruitful and has allowed both parties to develop innovative solutions and processes for a wider acknowledgment of the SBR's benefits. By involving academia and its student workforce in their global strategy defined in the "BBL HUB", the Residential FM company is fostering deep changes and increasing the speed of their implementation. Indeed, the student work usually demands less time to plan and execute than corporate decisions and actions. The goal for both Academia and NBBL is to create a toolbox which both can pick from. The prototypes of these tools can then be further developed into practical solution implemented by the tactical level of FM.

During a Workshop gathering partnering universities at NBBL's headquarters, the participants to the session expressed their enthusiasm to work closely together, thereby also strengthening the university network and knowledge sharing between them. From the academic point of view, the Hjernringen initiative is seen as an opportunity to develop joint research projects based on the challenges and objectives defined by NBBL. The national network of both universities and local residential FM companies also enables replication and dissemination of the results at a larger scale.

The renewal of student participants in the project also guarantees a new set of eyes and fresh minds to foster innovation while the red thread is kept through the continuing engagement of the Hjernringen academic and corporate staff.

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