

Smart Buildings & Smart Cities: Balancing Technology and People

Deadline: 25 September 12:00

Objective of the programme

As part of Innovation Fund Denmark's effort to support innovation and growth in Denmark, the Fund - in collaboration with Realdania - now seeks to strengthen innovation and growth in the industry supplying solutions to the built environment. The joint ambition is to ensure that more companies within the industry improve their ability to combine experience-based and knowledge-based elements in their innovation efforts. Therefore, Innovation Fund Denmark and Realdania are supporting a practice-oriented, cross-disciplinary research cluster under the innovation and growth hub BLOXHUB. BLOXHUB is Denmark's new innovation and growth hub aimed at supporting sustainable, global urbanization through the development of innovative solutions within architecture, design and construction. Read more about BLOXHUB here:

www.bloxhub.org

Project areas

Through approximately 10 industrial research projects Innovation Fund Denmark and Realdania wish to examine the impact of new, business-challenging technologies on cities and buildings and their effect on and involvement of people or users. Which opportunities does it create for further developing Denmark's reputation and competitiveness with regard to developing sustainable cities with a high quality of life? New technologies here refer to e.g. advanced robotics, digital fabrication, Internet of things, intelligent and circular materials, renewable energy and storage, which can contribute to developing new ways of structuring, building, developing and living in the city. The list is not exhaustive.

A project may e.g. focus on:

1. Optimisation opportunities created by structures and materials able to report on their condition or change form and composition depending on functionality.
2. Which new sustainable business and earning models will emerge as a result of the technological development and opportunities when the city and buildings are integrated in the virtual economy.
3. How the new patterns of behaviour resulting from the introduction of new technologies change us as citizens and users, and how this can be taken into consideration at design and development stages.

We are therefore looking for industrial research projects which – adopting an application-oriented and critical reflective approach – seek to develop and concretise the area of *Smart Buildings & Smart Cities* in a Danish context. Application-oriented: So the project develops and concretises new types of solutions with business potential as regards productivity, sales and export. Critical: So the project develops and concretises the field of research relating to cities or buildings by adopting a problem-oriented approach to how technology interacts with the built environment and thus affects the people who inhabit it.

The starting point is new technologies, but it is vital that the analysis, the problem area and the solution are centred on the human and user perspective.

The field of research is buildings and/or cities. The specific educational background, theoretical approach or tradition of the projects are not important. Instead, it is important that they are able to contribute with critical reflection, innovation and application-oriented solutions.

A main parameter is that the projects have commercial and business potential. For projects focused on developing new products or services this programme represents a unique opportunity to receive up to DKK 200,000 per project for concrete real-life testing, living lab prototypes or interaction with users or citizens as part of the research project. The overall aim is to support the application-oriented aspect. Your application must explain why and how you wish to use this opportunity.

The selection of projects will focus on ensuring that the cross-disciplinary projects supplement each other, and that as one portfolio of projects they comprise a main foundation for Danish companies' focus on *Smart Buildings & Smart Cities* as an international growth area.

Other preconditions: Knowledge exchange under BLOXHUB

Innovation Fund Denmark and Realdania assign great weight to cross-disciplinary knowledge sharing and sparring with a view to creating a dynamic cluster of researchers within the same field. The approximately 10 industrial researchers (and their university and business supervisors) will thus, in addition to forming part of BLOXHUB's newly established Science Forum, represent a cluster of researchers who develop knowledge in dialogue with other researchers and who exchange knowledge and experience with companies and other actors on an ongoing basis. It is thus a precondition for being approved for the programme that you and your supervisors are prepared to become part of the research cluster consisting of the around 10 projects, all of which are expected to start in early 2018. Projects approved for the programme will therefore be involved in activities for both the industrial researcher, the company and the university, respectively:

- A joint kick-off event in the form of an inspiration trip lasting a few days will be held in the first quarter of 2018, where you as an industrial researcher participate alongside the remaining researchers in the cluster.
- The cluster venue will be BLOXHUB's offices in Copenhagen. About once each quarter you as an industrial researcher must participate in cross-disciplinary knowledge sharing, collaboration and sparring in a form agreed on with the other researchers in the cluster.
- You as an industrial researcher must be prepared to share the general knowledge you gain in the course of the project with other researchers in BLOXHUB's Science Forum and with BLOXHUB's other members. You must contribute to a small number of communication events in the course of the project and towards the end in order to ensure that the ambition of knowledge sharing and inspiration for the industry in general is fulfilled. For Industrial PhD candidates, the mentioned communication activities will be included in the dissemination requirements for the Industrial PhD candidate.
- Besides, it is expected that the company supervisors and the university supervisors share knowledge and cooperate. Specifically, this will take place based on the portfolio of projects

within the cluster where there will be a small number of events where you as a supervisor will be expected to qualify other projects than your own.

- Finally, as an industrial researcher you will have access to the open offices of the hub and may use them as your third workplace – besides the company and the university – e.g. in-between meetings or courses in Copenhagen, in connection with testing, etc. or as a creative oasis.
- It is likewise expected that the Industrial PhD candidates in the cluster participate in some of the same PhD courses as far as it is practically feasible.

All matters concerning cross-disciplinary knowledge sharing, cooperation and sparring will be facilitated under BLOXHUB.

This is how you apply

The application shall be submitted through the ordinary application entry points for industrial researchers. On the application form you select 'Smart Buildings & Smart Cities' at the first level following the introduction.

Following receipt of the application, Innovation Fund Denmark will assess whether your application fits within the called theme. If the application is better suited for the general industrial researcher pool and thus does not fit the conditions of this call, we will contact you in order to move the application to the appropriate pool, prior to the final decision. We do not move your application without your approval.

You may apply for both an Industrial PhD and an Industrial Postdoc, and it is possible to apply for up to two per company. Likewise, it is possible that two or more companies share one industrial researcher, as long as there is one main supervisor company.

Other conditions

The applications shall adhere to the guidelines for the type of industrial researcher project applied for – Industrial PhD or Industrial Postdoc. Thus, the applications must meet all requirements in relation to Industrial PhD and Industrial Postdoc, respectively. The requirements are specified in the guidelines for Industrial PhD and Industrial Postdoc. Here you will also find a description of the project structure, requirements to participants and project, conditions for funding and the assessment process. In addition to the assessment criteria described in the guidelines, the final selection will emphasise the importance of a cross-disciplinary cluster of projects, supplementing each other within the academic breadth described above.

Funding

Projects approved in connection with this call will receive funding from both Innovation Fund Denmark and Realdania. The funding by Innovation Fund Denmark adheres to the guidelines for Industrial PhD and Industrial Postdoc, respectively. The additional contribution by Realdania is DKK 10,000/month for salaries and up to DKK 200,000 for real-life testing, prototypes in living labs or interactions with users/citizens per industrial researcher.

In concrete terms this means that the company will receive up to DKK 27,000/month as a subsidy for the Industrial PhD's salary or DKK 32,000/month in relation to an Industrial Postdoc. The company must cover all remaining costs of the project.

There are no expenses for the industrial researcher's and the supervisors' use of BLOXHUB's open offices or meeting rooms. Travel expenses in relation to the mentioned inspiration trip are covered by the subsidy from Realdania while transportation costs for meetings at BLOXHUB's office facilities in Copenhagen must be covered by the company.

Background: Smart Buildings & Smart Cities: Balancing Technology and People

Why Smart Buildings & Smart Cities: Balancing Technology and People?

Smart Cities as a concept stems from a practical and political interest in solving a number of urgent social problems in relation to the cities. The concept embraces a number of technical, financial, social, political and physical approaches to the way in which the many subsystems of the city may be coordinated and create a financial, social and environmental balance. The concept is used in natural sciences, social sciences and humanistic research environments which – each with their own emphasis and perspective – are preoccupied by the interaction between the city, the information and communication technology and the individual.

The growing need for sustainable cities is one of the main reasons for the upsurge of the Smart Cities concept. This is due to the core role of the cities in the global struggle against climate changes, in the need for social inclusion, in increasing the operational efficiency of the cities and in creating growth, at the same time reducing the resource and energy consumption.

However, the built environment and its professional competencies play a surprisingly small role in the literature about smart cities. At the same time, the literature about 'smart cities' is characterised by the absence of critical discussion. Often, the emphasis is on the way in which the 'smart initiatives' improve the city, i.e. on the final effect, rather than on a description of how the technology interacts with the physical environment in its entire lifecycle from idea, to realisation, operation and removal. Often, the emphasis is more on the incorporation of technologies and extraction of data in the well-known city and less on the fact that the conditions and processes of the city are undergoing fundamental changes and on the needs that follow from these changes.

Smart buildings are part of the Smart Cities concept which more concretely focuses on the built environment. To a certain degree, the *smart buildings* agenda is driven by suppliers interested in selling technology. Often, the result will be that the word 'smart' is used to describe virtually any new technology or system. Less product-driven definitions of *smart buildings* expand the concept and comprise wellbeing and productivity as well as *life cycle costs* and *total costs of ownership* with the consequence that genuinely smart buildings are those which provide better environmental, social and financial results. Finally, the building level is relevant and close to people's lives, contributing to a concrete field of applications and implementable solutions.

In the work with 'smart initiatives' it is, however, a risk that the human aspect is underestimated and in the end does not deliver as expected. Thus, there is evidence that due to the introduction of a new technology, energy savings do not always deliver the expected results. One reason is that the users have not been sufficiently included. In order to achieve a desired effect, it may be necessary to use the individual and not the technology as a starting point. Besides, in the research literature it is necessary to focus on balancing technology and people. There is a need for new knowledge and a better understanding of user practices and user understanding, drawing on a wide range of humanistic/social sciences and technical sciences.