Intelligent design

Associate Professor Geir K Hansen and his team have developed a innovative framework that brings the end user back into the picture in architectural design.

Could you provide a brief outline of your department’s research objectives and learning activities?

The Department of Architectural Design and Management at the Norwegian University of Science and Technology covers all aspects of architectural design, from concept to completed building and building in use. Our main research and learning activities are architectural design and management, housing, environmental aesthetics, real estate and facilities management. These are seen in a life-cycle perspective, where good architecture is the sum of functionality, technology and aesthetics. The value of the physical environments seen from client’s and user’s perspectives is central in our work.

I am also strongly involved in the Centre of Real Estate and Facilities Management, whose principal objective is to provide high-quality education and knowledge for solving problems of strategic value for real estate owners, proprietors, facilities managers and developers, contractors and users.

Why is it important to assess buildings for usability?

Our use of the term ‘usability’ is based on an International Organization for Standardization (ISO) standard relating to ergonomics of human-system interaction. We define buildings as products that should be effective, efficient and contribute to user satisfaction. By considering the building as a tool or means, we are interested not only in how the building functions as a technical structure, but more importantly in how it creates value for the user organisation.

How does the usability of buildings designed for different purposes evolve and change?

The usability of a building is defined by context. This means that a building’s usability is never solely dependent on the building itself, but must be understood as a relationship between the building and its users. Not only is context dependent on variables such as location, market, technology, cultural values and perceptions but, because these change, today’s solution may not be the same as tomorrow’s. Therefore, one of the main objectives of our work on usability is to understand the concept’s underlying factors and mechanisms, and to develop a methodology to evaluate the usability of the building.

What is USEtool and how was this methodology developed?

USEtool has been designed to gain insight into user experiences of a building and a building’s ability to support the core business. The USEtool methodology has been developed in close collaboration with three Norwegian partners in an R&D project. All partners have large building portfolios that they manage and develop on behalf of their user organisation. The objective was to develop a set of easy-to-use tools that yield both an overview and more in-depth knowledge for facilities managers evaluating the usability of their buildings. Each partner provided a case for testing and developing the methodology and tools. Researchers and partners were engaged in participatory workshops to fine-tune the project’s aims, approach to evaluation and possible indicators.

To what extent has USEtool been successful?

Two of the three partners involved in the development of USEtool have used the methodology in their organisation, both in developing existing facilities and programming for new buildings. USEtool has also been used by a large Norwegian telecommunications company as a strategic tool, as well as several other projects and student assignments to assess usability in office buildings, schools, university colleges, kindergartens and even for public outdoor spaces.

Our case studies and tests suggest that the described methods and tools are successful in assessing usability within the given context, with special focus on the effectiveness of the facilities and their ability to support value creation for the organisation. The value of usability evaluations lies in the ability to understand user experiences, intelligently adopt or adapt the research, and translate this into adequate products and solutions.

Can usability evaluations drive innovation?

An important question has been whether or not our usability evaluations have improved practice and driven innovation, new solutions and new contexts of use. After several years’ experience developing evaluation tools, we asked four different building owners – including one which had first-hand experience of USEtool – if the tools were used and if they make a difference in practice. The study showed that innovation is possible if the usability evaluations are a part of a larger development project. Such evaluations can be drivers of innovation where there is urgent need for change and key stakeholders have a good understanding of the project and their requirements.
Building success

Buildings serve a purpose, be it domestic, educational or commercial. However, a building’s design does not always best reflect its function. Now, experts at the Norwegian University of Science and Technology are developing a tool to evaluate and optimise the usability of indoor spaces.

HUMANKIND IS ONE of a handful of species on Earth with a complex conception of functionality. By employing imaginative thinking, humans have developed an intuitive notion of causality, and can understand that one action can lead to another to achieve a desired result. As such, humans attribute purpose and value to objects: a hollow form becomes a cup or bowl, while a stick of wood becomes a walking aid. An object’s functionality is wholly dependent on how users perceive and interact with it.

FUNCTIONAL AND USABLE BUILDINGS

Buildings are no exception to this rule. However, a building’s usability is never dependent only on the building itself, but must be understood through its relationship with its users. The context depends on several aspects, such as location, market, technology, time, culture and values, and the user’s history, experiences and perceptions. This means that what can be regarded as usable in one situation or for one organisation is not necessarily valid in another situation. And indeed, the right solution today may not be the same tomorrow.

All too often, buildings fail to support their main users in a satisfactory way. Occasionally, a lack of insight into complex and changing user habits at the design stage leaves parts of a building redundant or inefficient, leading to a negative user experience. Furthermore, traditional post-occupancy evaluations (POEs) have tended to treat buildings as static constructs, ignoring the dynamic and evolving nature of the business, organisations and users that inhabit a certain space.

For all organisations, a failure to understand and cater for key audience segments when designing or redesigning a building can have serious economic implications. By seeing buildings as tools which support the activities taking place within them and understanding the relationship the building needs to have with its users at the planning and design stages, organisations have the potential to maximise a building’s effectiveness and the satisfaction of its users. A more holistic and process-orientated approach to building could support the user organisation and create value for the end-user.

A STRUCTURED SOLUTION

Bringing the user back into focus in building construction is a primary goal for the Department of Architectural Design and Management at the Norwegian University of Science and Technology (NTNU) in Trondheim. Headed by Associate Professor in Architectural Management and Facilities Management, Geir K Hansen and Professor Siri H Blakstad, a team at NTNU has been developing a framework to evaluate the usability of buildings. “One of the main objectives in our work on usability is to understand the concept, underlying factors and mechanisms, and to develop a methodology to evaluate the usability of a given building,” reveals Hansen.

Helped by Hansen’s extensive experience as an active member of various International Council for Research and Innovation in Building and Construction (CIB) working groups – including W96 (Architectural Management), W70 (Facilities Management) and W111 (Usability of Buildings) – the team has developed USEtool, a framework to evaluate the usability of a building as a basis for improving existing premises or as an input when planning new buildings. Developed through a programme of research comprising case studies and workshops, both carried out under the aegis of the CIB and in several national studies in Norway, France, Denmark, Sweden, Finland and the UK, USEtool answers the call for a much needed planning and design framework shaped by end-user experience. The tool takes the form of a five-stage consultation guide, complete with CD and accompanying materials.

POSITIVE RESULTS

Thanks to methodological fine-tuning, USEtool has so far been successfully adopted in the improvement and construction of office buildings, nurseries, schools, universities and public outdoor spaces. Hansen attributes the success of USEtool to its broad perspective and strategic potential: “Usability evaluations provide unique insights into users’ experience of their workplace and relate this to the organisation’s overall objectives and strategy, and not only to individual perceptions of satisfaction”.

Yet the concept of usability developed by NTNU in the guise of USEtool is likely to have positive applications beyond the planning and design of buildings. Evidence-based insight provided by such structured investigations into the connections between people, technology and facilities could help increase productivity, effectiveness and efficiency in other areas, and ultimately assist organisations in meeting future challenges.

NEED FOR CHANGE

“Climate change, economic crises and large-scale environmental catastrophes in many different areas mean that we are forced to seek solutions outside the paradigm that has created these problems,” Hansen explains. “To be able to relate to the challenges of our time, architects need to develop skills, knowledge and approaches that can adjust to rapid change.” As a result, the NTNU Faculty of Architecture and Fine Art, in collaboration with the Unit for Educational Development, has launched the ‘Transformative Learning in Architectural Education’ (TRANSark) project. TRANSark seeks to help architects oscillate between microscopic detail and ‘the big picture’ of environmental, economic and sociocultural change by crossing traditional disciplinary boundaries.
To frame the challenge of complex and rapid change, they are aligning new theoretical perspectives with novel methodological and didactic approaches. Several project- and problem-based methods have already been implemented, such as the Live Studio approach, which brings students into real-world situations in order to provide them with insights, skills and understanding in areas such as social responsibility and ethics that cannot be learned within a classroom environment.

FUTURE PLANS

With a clear vision for a more dynamic, adaptable and agile field of architecture, Hansen and his colleagues have ambitious plans for future developments. In cooperation with 12 companies representing various parts of the construction value chain (including clients, architects, engineers and contractors) as well as five related associations and networks, the Norwegian Building Authority, Bygg21 and others, NTNU has submitted a proposal for eight years of funding totalling NOK 216 million (approximately €26 million) towards the development of a Centre for Research-based Innovation (SFI), named SYMBIOSIS.

If the proposal is accepted, the vision is that SYMBIOSIS will become a leading national and international hub for interdisciplinary and research-based building process innovations. By facilitating innovation in the construction industry and using the industry as a living lab for long-term research, cooperation and knowledge transfer, Hansen and his team would be empowered to make further valuable contributions to the field of user-orientated architectural development and, ultimately, the centre would enhance construction processes nationally and beyond.

SAVE THE DATE

CIB Facilities Management Conference
‘Using facilities in an open world – creating value for all stakeholders’

21-23 May 2014
Copenhagen, Denmark