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# UD knowledge creation

René Sørensen Overby <sup>1</sup>

<sup>1</sup> Affiliation 1; e-mail; ORCID (if applicable)

<sup>2</sup> Affiliation 2; e-mail; ORCID (if applicable)

\* Use \* to indicate the corresponding author.

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**Abstract:** This paper seeks to identify how users and architects through collaborations are generating knowledge on Universal Design (UD). Besides the need for architects to build a solid foundation of architectural knowledge, insight in users' life practices is essential in UD knowledge creation. Users' experience and perception of space offers a qualitative alternative to quantitative notions of space. Through thirty-two interviews, the paper contributes with a qualitative perspective on collaborative practice between users and architects. An unfolding of knowledge creation shows that accessibility as quantifiable measurements, seems to have taken root in collaborative practice, while knowledge on UD is still sprouting. The research also shows that interpretations of accessibility, as compensating solutions for a few, has an impact on both collaborations, knowledge creation, and architecture. Hence, increasing awareness of greater collective responsibility of inclusion and movement towards concepts such as UD and Inclusive Architecture, challenges architectural practices when expected to align with societal movements. If human diversity and architectural practice are to meet in UD ideals, advanced user-based knowledge, and awareness of social aspects of architecture, in line with legislation and technical insight, is suggested. In creation of space that are inclusive, and which increase possibilities for more, architects must seek nuanced knowledge of users and insight associated with their daily practice. The research point to, how UD knowledge, is created and put into action is crucial, to whether architectural design processes can respond to societal ambitions and international conventions.

**Keywords:** Universal Design 1; Participatory processes 2; Knowledge creation 3

## 1. Introduction

With societal and international movements towards concepts such as Universal Design (UD) and Inclusive Architecture, understandings of the term user and the concept of diversity are changing in Denmark. These movements are challenging the architectural practice, in which the built environment is expected to align with societal interpretations of UD and Inclusive Built Environments. It also challenges user-participatory processes that must relate to new interpretations of the term User, understood as All of Us.

The research indicates that the relationship between the built environment and the human body is still potential in knowledge creation. To gain comprehensive user-based knowledge closely related to user's body, user's experience, and user's perception new frameworks for collaborative work between users and professional actors is suggested.

UD responds to the awareness that accessible design solutions and Inclusive Built Environments should not only eliminate barriers for some but enhance participation and experiences for everyone [Author & Ryhl, 2018]. The research point to, how UD knowledge, is created and put into action is crucial, to whether architectural design processes can respond to societal ambitions and international conventions, such as the United Nations Convention on the Rights of Persons with Disabilities (CRPD).

In the CRPD, Universal Design is introduced as means to generate Inclusive Environments which reduce barriers and limitations. In article 2, universal design is defined as:

*the design of products, environments, programmes and services to be usable by all people, to the greatest extent possible, without the need for adaptation or specialized design.* [CRPD 2006, article 2]. This wording builds on the most accepted definition of UD, outlined by architect, Ronald L. Mace in the 1980s<sup>1</sup> [Ostroff, 2001].

When I use the term UD knowledge creation in this setting it is understood as co-production of knowledge between architects and users, meant to generate buildings, products and environments that are inherently accessible to all users, to the greatest extent possible, regardless of abilities. This is also how I understand the notion All of Us. I use the term Space as social construct, a structuring and dialectical actor for human life and I use Architecture as construction and design. Space is one of many elements of Architecture [Lefebvre, 1991].

## 2. Theories and Methods

Drawing upon selected studies from the PhD research project “Generating Inclusive Built Environments through User Driven Dialogue in the Architectural Design Process” I lay out a framework for understanding collaborative practice between user representatives from Disabled People’s Organisations Denmark (DPOD) and professional actors in the architectural field. In that, I seek to identify how users and architects through collaborations are generating knowledge on universal design.

I present chosen findings of the research covering thirty-two qualitative semi-structured interviews with a focus on collaborative work and knowledge creation: Twelve interviews with user representatives and eight interviews with professional actors from the architectural field. In addition, twelve representatives of DPOD Organisation were interviewed. Interviews with users from DPOD, represent groups of disabilities that are all interrelated in Requirements of UD and accessible design solutions in Danish Building Regulations (BR18). That is physical, mental, intellectual, or sensory disabilities such as people with visual impairments and/or hearing impairments, people with communicative and/or cognitive disabilities or people with mobility disabilities.

I reflect on the influence of quantitative and qualitative knowledge when collaborating in architectural contexts and hypothesises how qualitative knowledge can support innovative interactions between users and architects in collaboration on UD. Here after, I discuss the scope of reviewing existing knowledge creation and expanding the area of architectural knowledge, to respond to human diversity, including disability [Author, 2018]. If human diversity and architectural practice are to meet in UD ideals, the research suggests advanced user-based knowledge and awareness of social aspects of architecture. I describe a growing orientation towards nuanced understandings of special practice, including the relation between Social and Space. I do so with attention to Henri Lefebvre’s thoughts on Social Space and Inger Marie Lid’s model of UD knowledge [Lid, 2013; Lefebvre, 1991].

### 2.1. A Spatial Turn

In the following, I describe a theoretical turning towards nuanced understandings of space, including thoughts of the relation between Social and Space. I do so with attention to the phenomenon of Spatial Turn and the French sociologist and philosopher, Henri Lefebvre.

Within the last 20-30 years, an orientation towards new understandings of space has moved the humanities and social sciences. In the Spatial Turn, a wider arena of disciplines and research fields, in addition to architectural theory, have been rethinking spatial concepts and exploring the spatial dimensions of human life. The interest in human life and sociality as spatially situated has been growing across disciplines [Fabian, 2010; Lund Hansen, 2013].

One of the great theorists of spatial thinking is the French Marxist sociologist and philosopher Henri Lefebvre (1901-1991). Lefebvre is best known for his pioneering contributions to Socio-spatial theory. Especially his work *La production de l’espace* (The Production of Space (1974/1991) has had an extraordinary impact, and for many theorists in the Spatial Turn, the writings of Henri Lefebvre is a theoretical starting point [Lefebvre, 1991].

According to Lefebvre, space must be explained multidimensional and understanding space is therefore reflexive movements between physical, mental, and social dimensions,

<sup>1</sup> Ostroff, E. (2001) Universal Design: An Evolving Paradigm, In Preiser, W.F.E. and Smith, K.H. (Eds.) Universal Design Handbook pp 1.3-1.11, First edition, 2001,

as procedural spaces. In his writing, Lefebvre seeks to explain how physical, mental, and social spaces are produced between the logic of concrete space and the logic of abstract space. The logic behind the concrete space is formed by activities of everyday life, while the logic of abstract space is formed in intellectually conceptualised spaces. The concrete space is an interaction between body and space, while abstract space, according to Lefebvre, is affected and alienated from the body [Lefebvre, 1991].

Lefebvre's thoughts can be understood as a confrontation with space as materially created, non-moving and non-dialectical. Turning towards nuanced understandings of space, Lefebvre explains space as procedural and his studies of space is therefore not about the physical space, but about how space is thought, practiced and experienced [Lefebvre, 1991].

Henri Lefebvre points out that early quantifiable notions of space has followed Architecture through time, leaving its imprints in architecture as empty spaces [Lefebvre, 1991, p. 200]. Instead, Lefebvre's notion of space is a complex social construction based on values, everyday life and the social production of meanings that influence spatial practice. To understand that process, Lefebvre formulated a conceptual triad, the perceived-conceived-lived triad [Lefebvre, 1991, p.40].

1. Spatial practice, Perceived space
2. Representation of space, Representations and abstractions of space
3. Representational spaces, Lived space

The first moment [the spatial practice] is perceived space and signifies the spatial knowledge production of society. Spatial practice structures human life through interactions, routes and networks connecting places and people. It is historically and culturally conditioned and at the same time portrays the spatial and social characteristics of a society. Spatial practice is limited by existing knowledge, but it is still interacting with new realisations and understandings. In this way, spatial practice can operate only from the sources of knowledge found in a society [Lefebvre, 1991, p.38].

The second moment [representations of space] is understood as intellectual conceptualised space. This space is formed by the conceptual bodies of Society. It is theoretical and technological representations of the living space. Representations of spaces are not living spaces, they are abstract and intellectually conceived [Lefebvre, 1991, p.39]. Although representations of space are in their abstract, they have a role to play in political and social practice. Intellectual representations of space also have practical influence as they materialise through Architecture [Lefebvre, 1991, p.41].

The third moment [Representational spaces] is the living space. This space is directly lived and is created and recreated through peoples' various needs and modifications of space. The space of representations connects to social and cultural life, and it is space that humans through imagination try to change and align with their own life. The space of representations also add new layers on the physical space in the form of symbolism, poetry and sensuousness [Lefebvre, 1991, p.39].

#### 2.1.1. Dialectical characteristics of knowledge creation

According to Lefebvre, the basis for knowledge of space cannot be philosophical or mathematical alone. If one places knowledge of space in philosophical thinking, it will merely reach a quantifiable level, it becomes representation of space or an abstraction. In production of lived space knowledge must be understood as dialectical, movements between; how space is thought, practiced, and experienced [Lefebvre, 1991].

Norwegian researcher Inger Marie Lid has similar thoughts on UD knowledge. Lid's understanding of universal design is interactions between levels of knowledge. In her work, Lid has developed a model for knowledge in relation to Universal Design (Universell Udfarming<sup>2</sup>). Through the model, Lid explains three levels of knowledge that touch on UD, from overall value sets and conceptualisation at a macro level, technical regulations, and design principles at a meso level, and perceived quality of space and user knowledge at a micro level. In Lid's model, I see associations with Lefebvre's production of space as dialectical moments. However, Lid refers to creation of UD, where Lefebvre refers to production of space. Lid's understanding of UD is like Lefebvre's understanding of space, interactions between different levels of knowledge. As in Lefebvre's Spatial Triad, Perceived

<sup>2</sup> In Norway the term Universell Udfarming is used as translation of the term Universal Design [Aslaksen, F. et al. (1997) Universell utforming. Planlegging og design for alle. Oslo: Rådet for funksjonshemmede].

Space, Represented Space and Lived Space are reflected in Lid's matrix [Lid, 2013; Lefebvre, 1991].

Lid's Macro level frames knowledge of ethics, understandings of disability and thinking about human rights. The macro level operates with UD knowledge through politicisation, legislation and rights. This is the level Lefebvre identifies as Spatial Practice.

Meso level is an intermediate level covering knowledge of planning, implementation of technical regulations and collaborative processes. The meso level requires technical knowledge and skills to develop and implement UD. This is the level Lefebvre sees as Representation of Space, intellectual concepts, and abstractions of space.

Micro level identifies knowledge of the individual's perspective, knowledge of where and how barriers arise and who experiences the barriers. The micro level requires knowledge of the interaction between Individual and Environment [Lid, 2013]. This is the level Lefebvre sees as Representational spaces, the space of lived life. It is also this level that Lefebvre argues must be met by the other two levels to realise the practice of lived space in Architecture [Lefebvre, 1991].

### 3. Results

Space as social construct, a structuring and dialectical actor for human life, initiates an understanding of spaces as acting and performative. The physical constructs of architecture contribute to people's opportunities for expression in social constructs - actively shaping our daily practices and social structures.

At times, people find that architecture does not support the opportunities for action and development. One is finding that space as social construct is not responding to ones needs. In this way, architecture contributes to regulating how one as a human being can unfold and interact with others. Thereby, architecture also holds limiting properties.

In Denmark, Disabled People's Organisations Denmark (DPOD) is finding that people with disabilities are limited in social space. DPOD is experiencing, that members of the organisation encounter barriers in architecture, that limit the opportunities to act and participate on an equal footing with others. The experience of not being included in society arises from the fact that physical constructs hinder social constructs. As a result, the organisations have put political pressure on building legislation and construction practice. Furthermore, DPOD have engaged as user participants in architectural design processes and creation of UD knowledge.

With ambitions to influence development of UD in a broad sense, DPOD engage at all levels of Lids matrix. The intended return on this engagement is of an architectural and social nature [Author, 2018].

#### 3.1. Diversity Including Disability

From selected studies from the PhD research project, I now lay out a framework for understanding the collaborative practice and study how knowledge is created between DPOD user representatives and construction parties.

With ambitions, to influence Built Environments, user representatives from local DPOD groups engage to share their experiences of UD and accessibility with construction parties. Most often this engagement is positioned in the United Nations Convention on the Rights of Persons with Disabilities. Users participate in municipal construction meetings. Users also participate in architectural design processes, to inspire accessibility and inclusive designs. Together with the construction parties, DPOD have in this manner become significant actors in collaborative processes on UD and accessibility.

However, the research shows that knowledge of UD is still sprouting while long-term interpretations of accessibility as solutions for people with disabilities has taken root in knowledge creation between users and architects [Sørensen, 2018]. Interviewed user representatives do not refer to a practice of UD knowledge creation and interpretations of the term User, understood as All of Us. Nor do they mention UD as driving force in collaborative design processes.

*"Well, I have to admit that when we got the Convention on the Rights of Persons with Disabilities, and was introduced to universal design, I said yes, it is then a new word we must learn and remember. But when we talk about it in everyday life, it is not universal design"*  
- interviewed user representative

Interviews with user representatives show that knowledge of accessibility is understood as more tangible than concepts such as UD and Inclusive Architecture. Several interviewed refer to UD as "airy and indefinable" or something which is difficult to understand

and explain. Others state that UD knowledge is reserved for the field of architects. UD seems to be interpreted as knowledge that belongs to a conceptual world, what Lefebvre calls representations of space, the intellectual conceptualised space [Lefebvre, 1991].

The interviews shows that the collaborative practice is instead maintained with a predominant focus on accessibility, often based on and described in quantifiable details or mathematical representations. Several interviews with users and architects describe a collaboration, who together adhere to regulatory instructions and keep to Building Regulations and its codification. Accessibility is described in measurable details or referred to as specific paragraphs in technical regulations or supplementary standards.

*"That kind of thing is regulated by law in Denmark, so we react on a legal text and complies with it"*  
- interviewed architect

More specific, the collaborative practice is described with a focus on people with disabilities and quantifiable sub-elements of architecture such as accessible door widths, wheelchair ramps and arrangements of accessible toilet facilities. Also, this mathematical approach can be found in interviewed architect's conceptions of disability which tend to be influenced by a medical discourse, that considers disability as an individual condition to be treated or assisted. From that view, disability can be defined by means of measurable criteria and the solution to the condition lies in architectural assistance to the body's function.

Unintendedly, this notion encourages a design thinking which separates accessibility and architecture, so that accessible solutions appear as sub-solutions, often detached from architectural concepts. Interpretations of accessibility, as special solutions for a few, both influences the understanding of human diversity and architectural quality. The physical construct effects the social construct, and unintentionally results in differentiation of people.

These solutions are limiting by responding to impairment alone, as opposed to architectural solutions that include human diversity, inherently accessible to all users, regardless of abilities as UD understood in CRPD [Author & Ryhl, 2018].

#### 4. Discussion

The research shows that relationship between the built environment and the human body is rarely investigated explicitly in UD knowledge creation. In case the collaborative practice, do take the body into account, it is often through a mathematical or dimensional lens. Focus on abstractions and quantifiable representations, what Lefebvre names the second moment, leaves an absence of knowledge in the third moment, the lived space. This is knowledge of people's living space created, and recreated through various needs and modifications, an interaction between body and space [Lefebvre, 1991, p.39].

Knowledge, closely related to user's body, user's experience, and user's perception is what Lefebvre reasons must be met by the other two moments to achieve lived space in architecture. In a UD perspective, this is what Lid identifies as essential in creation of UD knowledge: knowledge of the individual's perspective, the interaction between Individual and Environment [Lid, 2013]. Because levels of knowledge are understood as interrelated in Lids matrix, absence of knowledge of the user and lived space, have consequences for other levels.

Lefebvre's ambition of exposing philosophical or mathematical abstractions of space was to distance himself from concepts of space that are non-real and cannot be experienced or sensed by humans. He saw the quantifiable understanding of space as co-creator of what he called "depeopled spaces" [Lefebvre, 1991]. Lefebvre notices the importance of daily life in spatial practice and emphasises that if spatial practice is to meet the user in architecture, it requires knowledge about perception and use of space, insight into the lived space. He argued how the architect's representations of space and the living space must approach each other. To avoid mathematical abstractions and architectural conceptualisation takes precedence over the living space, users must convey daily life experiences and professional construction parties must engage in knowledge of user's lived space. In collaborations on UD and accessibility Lefebvre's thoughts are no less valuable as acknowledgement of the relationship between body and environment, has led to development of design approaches like Universal Design [Heylighen, 2013].

According to Lefebvre, production of lived space cannot build on philosophical or mathematical knowledge alone, then it becomes an abstraction alienated from the body [Lefebvre, 1991]. In creation on UD knowledge and translating daily life into living spaces, there is a potential in looking behind technical representations and let numbers and measurements be supported by human experience. Also, moving collaborative practices further

than legislation on accessibility and current Building Regulations might open ways for new and subtle notions of Disability and Inclusive Built Environments.

Rethinking the term user and embrace processes which include a wider range of heterogeneous individuals could encourage new understandings of human diversity, including disability, and bring the architectural field closer to societal movements towards concepts such as UD and Inclusive Environments, as formulated in the CRPD [Author, 2018]. New sorts of innovative collaborations between users and the architectural field are suggested as possible means for a wider understanding of human diversity. Exploratory workshops, Co-design, Prototyping and Mockup Modelling are well known methods which interact body and space in knowledge creation. In creation on UD knowledge, these formats can still be challenged and enhanced in new experimental settings and meet even wider user groups, regardless of abilities.

*“There is architectural motivation and quality in designing architecture with a set of values that leans on a universal design mindset. There is a quality in architectural holistic thinking and accessibility, which is not a visible element that stands out from the rest of the architectural design”*  
- interviewed architect

Furthermore, in future UD knowledge creation lies the opportunity to turn the gaze from a focus on people's disability, to seek knowledge of people's various functional abilities. Understanding perception of spaces with different functional and sensory abilities is valuable for architectural practices. Through this type of knowledge, you as an architect can orient yourself towards spatial qualities which the user experiences. In future collaborations between users and architects one can imagine that the sensed and the experienced is favoured over the non-sensed and the non-experienced. As an example, a user who is blind will not only tell the architect what one does not see and the barriers that come with blindness in interaction with the environment. Instead, the user will tell or show how space is experienced and perceived without the sense of sight. Good acoustics are important as you use your hearing to a larger degree. Surfaces with texture can tell which room you are in and give a sensuous experience of the room. Through which senses and bodily experiences is space perceived when one does not see?

In attending to the bodily experiences of users with various functional and sensory abilities might reveal spacial qualities architects may not be familiar with and remind us that that architecture is not only seen but experienced by all senses simultaneously [Pallasmaa, 1996]. This is valuable knowledge and in this understanding of user participation, the user (together with the architect's professional insight) becomes central in translating lived space into architecture. Attention to bodily abilities and experiences of the user, and combining these with architectural objectives, is useful insight when designing spaces for people [Heylighen 2013].

Interdisciplinary Co-creation of knowledge, understood as collaborative and iterative processes involving different types of expertise and skills is another way to meet UD ideals. Interdisciplinary collaborations between practitioners, researchers, user panels, political actors etc. could point to new working communities in which diverse competences together generates UD knowledge and cross interdisciplinary perspectives. Co-creation of knowledge so that one can jointly respond to national and international ambitions, opens prospects of new constructions of an interdisciplinary nature. Lefebvre maintained that Space must be understood not only as a concrete, (material) entity, but also as an ideological, social, and lived one.

## 5. Conclusions

An ever-increasing societal and international awareness of greater collective responsibility of inclusion and movement towards concepts such as universal design and inclusive architecture, challenges spatial practice which is expected to align with international ambitions. It also challenges the user-participatory processes, which in the future must deal with new interpretations of user concepts, understood as All of Us. Inclusion of a diverse user group will require comprehensive knowledge of people's very different authenticities and meet the necessity for developing a practical applicability of UD.

The research point to, this development will set a new framework for collaborative practice between users and construction professionals and will require adapted knowledge creation. Challenges could be countered by increased focus on awareness of diverse user groups and their daily practices. In translating the concrete world of life into architecture, qualitative knowledge of life can strengthen the work of UD and ensure that users with different functional abilities are represented in the broad user definition.

If human diversity and architectural practice are to correspond with UD ideals, the research suggests advanced user-based knowledge and awareness of social aspects of architecture (in addition to quantifiable measurements and technical insight).

How UD knowledge is created and activated in architectural practice becomes indicative of whether collaborative practice can respond to larger societal ambitions and international conventions. Reflecting the need for furthering the comprehensive understanding of spatial implication of UD, the research point to wider arena of disciplines and research fields which in the future can create UD knowledge from interdisciplinary perspectives and bridge knowledge with international ambitions.

### Data Availability Statement

<https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html>

<https://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health>

### Contributor statement

Describe properly all author contributions and all types of contribution, see [Policies \(tudelft.nl\)](https://tudelft.nl/policies)

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