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## Towards Innovative and Inclusive Architecture

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**Abstract:** Acknowledging that the Danish Buildings Regulations is having an impact on the design of inclusive architecture, a Danish government agency focuses on new models for the accessibility requirements in the future Building Regulations supporting an innovative and inclusive architecture. In order to establish empirical material for the analysis and development of new models, architectural firms have been invited to workshops and group interviews to present their own experience of the challenges and the opportunities that they meet in their everyday practice as users of the Buildings Regulations. The prescriptive accessibility requirements were criticised for being too homogenous. A majority of the firms suggest a performance-based model in order to work with 'accessibility zoning' achieving flexibility because of different levels of accessibility in a building due to its performance. Paradoxically a minimum level is required in order not to lose accessibility.

**Keywords:** Design practice; inclusive design; accessibility; performance-based codes

### 1. Context

In a Danish context, accessibility is associated with the Danish Building Regulations. They play a role in the design practice just as the regulatory framework and architectural design are related in a complex network consisting of different actors. In order to understand this relationship knowledge is needed (Imrie & Street, 2011).

A Belgian study shows that the approach to accessibility varies from firm to firm (Wauters, Vermeersch, & Heylighen, 2014). A Danish study of 11 architectural firms, used to work with accessibility and inclusive design, supports these findings showing that one firm thinks of accessibility from day one while another one prefers to work with equality as a design parameter in order to structure their design process (Kirkeby, 2015).

Do we know anything about how do the actors of the building process experience the Building Regulations? In Norway, requirements to accessibility and inclusive design in housing are regarded as constraining the opportunities for creating architectural design of



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high quality because they are too strict (NAL, 2014). In Denmark, interviews with the actors of five projects showed certain reservations. It is not a reservation that concerns the accessibility requirements as such, but a few of them and the fact that they should be followed everywhere in a building. Some of the developers have reservations regarding the economy and want to prioritise between the requirements. Reservations occur when architects experience that the requirements can have a negative influence on the architectural quality and their own freedom to create a specific architectural expression. Furthermore, professionals experience that the focus on accessibility in the processing of building permits, issued by the local building authority, differs from municipality to municipality (Frandsen, Kirkeby, Ryhl, & Pedersen, 2012).

This difference was also experienced among architectural firms in another Danish study based on interviews with 10 architectural firms about how to ensure that the architectural designs comply with the requirements. In addition, one of the architects states that there is no room for the architectural firms to investigate, whether it is possible to create better designs because of the local building authority. Others suggested dialogue “star-meeting” with the local building authority and the professional representing the different specialties in the beginning of the process (Grangaard & Ginnerup, 2014). A previous dialogue with the local building authority offered by the Building Act is often seen in Scandinavia (Grangaard & Ginnerup, 2013). The possibility of addressing accessibility in the previous dialogue in Norway was rarely realised because the local building authority did not consider it necessary since accessibility was already a part of the Norwegian building regulations (Nørve & Øyen, 2004).

In 2013, the Danish Government launched a disability policy action plan 2013 ‘A Society for All’. In this handicap action plan, it is described that despite the clear and ambitious accessibility requirements in the Danish Building Regulations, it is a challenge to ensure the interplay between the requirements and the most recent technologies and solutions in the building sector in order to develop innovative and flexible design.

The Danish Transport and Construction Agency was aware of an interest in another model because a pilot project involving a group of persons with disabilities and a group of experienced architects and landscape architects within the field of accessibility and inclusive design revealed an interest in performance-based codes. Furthermore, the groups point out a growing need for knowledge and insight in the field of inclusive design supposing a new model for the requirements was implemented (Kirkeby, Ryhl, & Frandsen, 2014).

The project “An analysis of the accessibility requirements” was therefore commissioned by the Danish Transport and Construction Agency. The project studies which barriers the building sector in Denmark – primarily the architectural firms - meets in their everyday practice working with accessibility and inclusive design. Furthermore the involved professionals are encouraged to contribute with their input about new models for regulation. It is a general term for the project that the level of accessibility should not be reduced.

Based on the project “An analysis of the accessibility requirements”, this paper presents the future model for Building Regulations which the professionals regard as a tool for supporting the design of innovative and inclusive architecture.

## **2. Theory**

Traditionally accessibility has been used as concepts in the Danish context while the concept of Universal Design has not yet been applied (Ryhl, 2012; Ryhl, 2009). Despite the fact that Universal Design as a concept is central to the UN Convention on the Rights of Persons with Disabilities, it has not been absorbed in the architectural field. In this paper, inclusive design is used as a united term for universal design (Mace, 1985), design for all (Bendixen & Benktzon, 2015) and inclusive design (Clarkson, Coleman, Keates, & Lebbon, 2003). Accessibility is regarded as a part of inclusive design.

In Denmark, the requirements to accessibility were applied to the Building Regulations in 1972 and tightened in 1977, 1995 (BR95) and 2008 (BR 08). The Building Regulations is traditionally based on prescriptive requirements, but over the years it has been formulated much more as performance-based requirements except in the case of requirements to accessibility.

In 2004, the performance-based fire codes were introduced because the traditional prescriptive requirements were becoming obsolete - tangible but also very rigid and primitive. Limited theoretical knowledge about among other things fire behaviour was the main reason for the survival of the prescriptive fire requirements in the Danish Building Regulations. When designing buildings appropriately for their use, the prescriptive fire requirements can be considered an obstacle. With performance as the basis for the new codes, it was the purpose to achieve a more flexible way of regulating and supporting flexibility and innovation in the building design. It is now possible to design e.g. open spaces and evacuation routes differently. The new field of fire-safety engineering has emerged as a result of the performance-based codes. Fire-safety engineering is about analysis and documentation of the fire safety of a building and therefore fire-safety-engineering is interrelated with the performance-based codes (Schjøtt Sørensen, 2014). In the field of energy consumption, the Danish Building Regulations operates with the energy performance framework which covers the total demand for energy supply in buildings. This model makes it possible to insulate in non-identical ways everywhere in the design, but to calculate the average energy consumption inside the framework.

Kirkeby distinguishes between context-independent knowledge and context-dependent knowledge in the making of architecture. The context-independent knowledge seen as building regulation and guidelines is criticised for being too prescriptive by architects used to working with accessibility or inclusive design. Especially in the first phase of a design process, it is the context-dependent knowledge that inspires the design but later in the process context-independent knowledge is used as a tool for quality control (Kirkeby, 2015).

### **3. Methods**

The empirical material reported in this paper was derived from regional workshops and group interviews with Danish architectural firms in the project “An analysis of the accessibility requirements”, a project which aimed at analysing and developing new models for future building regulations based on input from their daily users.

It was the intention to capture the challenges of everyday practice in relation to the accessibility requirements in the Building Regulations but there was no funding for a huge ethnographic fieldwork at the drawing table in different architectural firms like Cuff did (Cuff, 1991). The research design aims at coming as close to the practice as possible while at the same time involving as many professionals as possible from a user-centred perspective.

Every architectural firm in Denmark had the opportunity to be involved. Thus all the 700 members (architectural firms and landscape architectural firms) of the Danish Association of Architectural Firms plus a number of engineering companies were invited to workshops in different parts of Denmark. The 98 Danish municipalities were invited because we also wanted to involve the employees actually occupied with architectural design in the municipalities.

64 professionals were enrolled in the workshops for architectural firms and other building consultants representing 51 firms, but only 48 participated representing 41 firms. 23 employees from 15 municipalities were enrolled in the workshops, but only 20 of them did participate representing departments in 12 municipalities. The workshop groups were a mix of architects, landscape architects, construction managers and engineers.

Eight group interviews were conducted with architectural firms. It was the intention to involve highly esteemed architectural firms but in contrast with Kirkeby’s interviews (Kirkeby, 2015), none of the firms were recognised because of their work with inclusive design. Another criterion was to obtain a representation of different sizes and categories of building designs; culture, education, administration, hospitals, housing and care homes. The size of the firms varied from 19 to 278 employees. In this paper, they are named A19 – A278.

The approach to the workshops and the group interviews were qualitative in order to establish an understanding of the everyday practice. In order to facilitate reflection on own practice and to document specific experience in every group interview, the architectural firms were asked to select two realized projects; two cases that we visited and analysed in advance. It was not important for us to detect whether the requirements of the Danish Building Regulations had been followed, but rather we were curious about the mind-set and the concept behind the designs.

The workshops were structured around the challenges, possibilities and future models when aiming at an inclusive architecture of high quality. The group interviews were semi-structured. We asked how they work with inclusive design. Because we wanted to address other aspects of inclusive design than traditional accessibility, the interview guide consisted of questions about the users and quality of use (Høyland, Denizou, Woods & Christophersen, 2012), wayfinding and sensory accessibility (Ryhl, 2009a). Photos from the cases were

presented in order to create a physical common frame of reference. Finally, a reflection on future models was initiated.

Between one and nine professionals participated in each interview; architects, landscape architects and construction managers. One or two members of the management participated in four of the interviews.

Each workshop lasted three hours and each group interview lasted two hours. Both workshops and interviews were tape-recorded and transcribed. The author has translated the relevant quotes from Danish to English.

#### 4. The findings: a performance-based model

The participants distinguished between design of new buildings and alteration/renovation envisaging new models. A majority of the workshop-participants and the interviewed firms suggested a performance-based model known from the field of fire-safety but inspired by the energy-performance framework in the Danish Building Regulations in order to support innovation and architectural quality in the design of new buildings. Different aspects related to their practice and this future model like strategy, dialogue with the client, architectural competition, design-build contract, knowledge and examples were presented. In this paper, the focus is on the model of an accessibility performance-based model, and the argument for this model.

Initially the broadness of views by the group interviews on a performance-based approach to regulation of accessibility is presented. The arguments regarding zoning and differentiation for a new model are subsequently presented followed by input about a minimum level and the quality of the building control due to a new model.

##### 4.1 Positions

In the interviews, the firms were asked to reflect on the actual situation in their two cases if the accessibility requirements had been performance-based. The eight firms represented a broadness of positions.

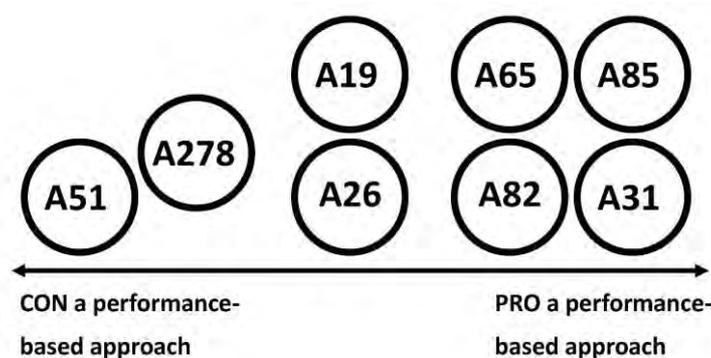


Figure 1 Different positions of a performance-based approach among the eight group interviews.

Three (A31, A82 and A85) of the architectural firms envisaged that a performance-based model would have changed the design of the two cases. One firm (A65) found that in one of the cases they had worked with the accessibility to such a degree that a model would only have affected the other case. The motive is the creation of options and room for manoeuvring in order to support the architectural quality of every design project.

“The feeling of having a palette so you can choose what is right for the project instead of having to hit a specific target using a specific requirement whether it is right or not for the projects as a whole or for the users or for the client” (Group interview with A82)

Two firms (A19 + A26) were not sure about an actual difference because they believed that they had got used to the requirements and found ways to comply with them. But at the same time, they were intrigued by this model. Two firms (A51+A278) did not think that a function-based model would have made any noticeable difference to the two cases. The firm A278 pointed out that they had worked together with an accessibility advisor in one of the cases. For them a design-build contract was a greater challenge than the Building Regulations. A51 would not complicate the requirements unnecessarily with a new model.

“... how difficult can it be. Well, there aren't many pages about accessibility in the Building Regulations. It is something with some threshold, some heights and some ramps, well...” (Group interview with A51)

Among the majority of the firms, there is a clear idea about a new model supporting their work practice.

#### *4.2 A request for differentiation and zoning*

Especially among the interviewed firms there was a huge interest in a possibility for differentiation. The existing prescriptive accessibility requirements of the Building Regulations were criticised for being too homogeneous and for being unreasonable. Hence the performance-based approach was seen as a way of dealing with these barriers.

It was regarded as an absurdity that the same requirements were applied to different types of buildings and sizes of buildings and for that reason the homogeneity of the accessibility requirements was problematised.

That the Building Regulations requires level access at all external doors, e.g. from an apartment to a balcony in a building without a lift, was mentioned as unreasonable in nearly all the workshops and group interviews. It was exemplified in different variations as a result of the interplay with other parts of regulation particularly in relation to roof terraces.

One problematic aspect was whether the requirements had the consequence that a terrace was deselected which should have added quality to the building.

”- The requirements can limit the potentials of a building. (...)

- Then all people should have the option and not these 10 % or 1 % who shouldn't have the option to participate.

- No, I agree. But I think the problem occurs when a client prefer to go without a roof terrace. Then you can say that we exclude 100 % from this option.” (Dialogue between two participants of a workshop)

A lift to the roof terrace created another triggering challenge in the category of unreasonableness due to the interplay with other regulations; calculation of open spaces (a lift takes up too much room) and the district plan made by the specific municipality, which did not allow the lift towers to be too conspicuous.

“In this building complex one roof terrace is very small about 30-40 square meters but should be included in the calculation of open spaces. But this roof terrace can only be included if there is a lift to it regardless of that there is a lift to the other two roof terraces. Some wheelchair user should in reality be offered access to all levels. But it would perhaps have made sense if it had been possible to deselect and say that this particular terrace is not accessible.”(Group interview with A51)



*Figure 1 Snapshots from the cases; a public school, an art museum and a university college. Photos: Lars S. Pedersen, SBi.*

Another theme was the requirement to a toilet with level access at the entry level of a dwelling. The firm explained that the Building Regulations did not prevent them from installing an extra toilet on one of the other floors in row houses, but it was not cost-effective according to the budget for social housing.

“... this is a schism because fortunately it is only a tiny part of the population who is disabled. There is still 99,9 % left who can walk on stairs and who finds it attractive to have stairs. That is why there is a problem for us. (...) What I raise objections against it that the excellent Danish tradition of row houses is being spoiled completely.” (Group interview with A26)

The possibility of zoning and thereby working with different kinds of accessibility level in relation to the use and the users in a building was pointed out as a possibility for discussing and set priorities and avoid unreasonableness.

“... if there is some well-chosen spots where you can enter, then it is perhaps okay that you can't enter through the full range of 20 doors in this building. But if there is five and it makes sense, then it is fine. Then it is possible to prioritise and define the level in general.” (Group interview with A31)

Public access was another, but central, parameter mentioned by several firms. Apparently it was easier to imagine a disabled guest than disabled employees.

“.. and maybe you can slacken some other places. Places where it is not realistic that there is a need for accessibility. (...) in the project XX it makes quite a lot sense to define a higher level than the minimum requirement in the Building Regulations the places where the audiences go.” (Group interview with A85)

It seems that the participants were aware of the ethical and inclusive aspect of accessibility and inclusive design but only within limits. When it would be too complicated, they drew a line because of other priorities.

#### 4.3 Application categories and inspiration from a performance framework

It was obvious that fire-safety was a part of the participant’s frame of reference, and that they saw a parallel to accessibility and inclusive design. The concept of application category known from fire-safety was suggested as a tool for differentiation because every type of building would belong to a category defining a specific level of inclusive design.

“Well, you can again compare with the fire codes differentiated according to type of building. There you have six application categories. That could quite easily be applied to accessibility. Obviously, a care home is another category than a single-family house.” (Group interview with A82)

The application category is seen as a tool for bringing clarity to the project showing the level of accessibility similar to fire-safety engineering.

“I think it would be interesting with these application categories as when we start on a project. Then we find out that a nursery, there can’t the user rescue themselves. That implies that we are in a category six and then we know, that we have to follow this.” (Workshop)

It was also assumed that a performance framework would create a differentiation in relation to a specific building or a complex of buildings and their function making it more reasonable and support a kind of architectural freedom. A firm was inspired by this concept and imagined that an area of housing could be seen in the lens of a framework. Thus it would offer them a flexibility enabling them to work with a palette of types of row houses with and without a toilet at the entry level.

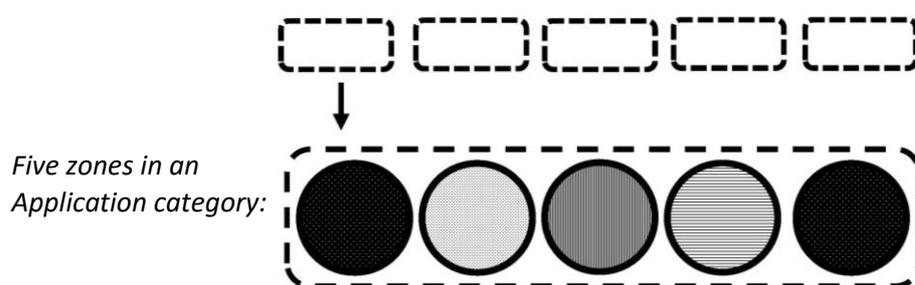


Figure 2 Application categories as a tool for creating differentiation and zoning in a building or building complex because every application category consists of a framework defining different zones and levels of inclusive design.

Initially when a new model inspired by the performance framework was discussed in the workshops, it was emphasised that it could not be a question of obtaining a total score because that would not guarantee a certain level of quality and could result in an absurd situation.

“I think this accessibility framework is difficult to define if you have to attain a certain score. In other words it can prove when you say that we don't have room for a lift, it is left out but on the other hand we design two wheelchair-accessible lavatories and 30 disabled parking spaces.” (Workshop)

But could zoning and the application categories become a menace or a threat to the quality and the inclusiveness of the architecture? In two of the workshops, the participants brought up that there is an element of unpredictability in architecture enabling future activities that at the moment we cannot imagine. Nobody should limit this capacity and quality by claiming that a place will never be used by a person with a disability.

“I don't think that you can specify exactly who is going to use a building. Maybe someone will use the building even through you never had imagined it. Well, what I try to explain is that we should stop saying: nobody who is in need of a wheelchair-accessible lavatory would visit this building; nobody who can't walk in stairs would visit this building. We don't know how people look.” (Workshop)

#### *4.4 A minimum level*

Even though the participants saw a lot of possibilities in a performance-based model, they were also concerned that the client, the developer or the design-build contractor would be unaware of his responsibility. Therefore they argued for a level of minimum requirements. The motives varied. Some firms thought this level would help them in the dialogue with a client, a developer or a design-build contractor to sustain a decent level of accessibility.

“...for example if you have a developer saying: but, why should we have a wheelchair-accessible lavatory. There should be a minimum to be respected and so that we can document that it isn't something we have made up, because it is a common requirement.” (Group interview with A19)

Another firm wanted this minimum level in order to prevent the players of the field to advance their own cause since the performance-based model would be too open for interpretation.

Furthermore, some participants were fond of the prescriptive requirements because they could respond to them, and consequently felt a kind of uncertainty about a performance-based approach to regulation in relation to their own work practice. Therefore they would accept a new model if they were guaranteed a kind of minimum.

#### *4.5 A new kind of building control*

A performance-based model should not stand alone but be supported by a new kind of building control because the participant regarded the practice of the client and the local building authorities as a barrier to a new model.

Therefore it would be necessary to reform the system based on more knowledge because a new model would require a competence boost and a lot of knowledge.

“We frequently see that developers and the building surveyors as well love the prescriptive requirements because they only have to respond to if a prescriptive requirement is followed or not. In that moment it becomes performance-based, as I think is a great idea, then an entirely new level of knowledge is introduced at the developers and the building surveyors as they are not prepared for today.” (Group interview with A65)

A tactile guidance path was an example of the rigid building control. It was difficult for the architectural firm to get permission to use the architecture as a natural guideline or to deselect the standard tactile guidance path. For example, a participant told how representatives from the Danish Association of the Blind had deselected some tactile guidance paths, but the authority claimed they should be brought back to the project. The participant thought it was because they did not dare to take the risk. Another participant experienced that it was a general tendency that these tactile guidance paths had been put on squares just in order to be safe – to wear both belt and braces.

Apparently the participants question the quality of the building controllers’ competencies. A firm suggested that the need for a new procedure for building control together with a new culture. Accordingly, a new model would require an open-minded approach to the building control because it would be more complicated without the prescriptive requirements.

”If a performance-based model, then the building surveyors should be prepared for letting it go that it is not an article that should be meet by an exact measure. When is something met? (...) I think that at any rate a way of managing this challenge should be developed at the building surveyors....” (Group interview with A82)

Table 1 Prescriptive requirements versus a performance-based approach

Prescriptive requirements	A performance-based approach	
Simple; only threshold, heights, ramps	Flexibility	
Too homogeneous - absurd	Differentiation	Zooning
Unreasonable	Application category	Framework
Security – wear both belt and braces	A minimum level is required	
Easy to control	Knowledge and competence boost is required	
Rigid building control	An open-minded approach are required	New culture

## **5. Conclusion and discussion**

Aiming at a more innovative and inclusive architecture, the empirical material has revealed an interest in a performance-based model instead of the prescriptive requirements of the current Building Regulations.

The concept of the framework should guarantee a possibility for differentiating within reason, described as zoning and application category due to the specific project; its size, function and user group. Where the prescriptive requirements will often lead to rather standardised solutions, a performance-based model is considered more flexible giving possibilities for designing new innovative solutions tailor made for a specific building programme and context. Nevertheless some of the participants see a risk of not prioritising the accessibility. Consequently they endorse a minimum level in a future model. The performance-based model with a minimum level represents a paradox. Because on one hand, the firms assume that such a model will create a kind of architectural freedom but on the other hand the minimum level would impose a kind of restriction on architectural freedom.

We have seen how the professionals are questioning the building control system, but without questioning their own practice and level of competences when it comes to inclusive design; the perspectives of the users, equality as a design parameter etc. They found that a new model would require another procedure, culture and a boost of competencies at the local building authority.

The requirements of the Building Regulations can be characterised as context-independent. Especially the prescriptive requirements are context-independent because they are applicable in any situation. But when the participating firms in this study demanded differentiation as an individual point of departure, it can be considered that individualisation tends to a more context-dependent approach. But we do not know enough about what this tendency actually entails or requires from all the actors of the network of regulation. It would presumably require a shift in work practice and more knowledge.

But we can ask whether a performance-based model would create more inclusive architecture? Presumably not, because this study indicates that the architectural firms' view of humanity and view of users are quite rigid. It is accepted to talk about that not everybody should have access to a roof terrace. Furthermore the view of a disabled person is very limited. As an example, nobody imagines that a disabled person could work backstage at an arena. This attitude will probably be transferred to the work within a new model.

Fire-safety has emerged as a consequence of the performance-based codes and has changed the practice of architecture. Similar to fire-safety engineering, inclusive design could emerge as a field architects could be specialized in order to create an innovative and inclusive architecture where the accessibility is integrated in the architectural idea from the start as a driver. But it would require a shift towards a more comprehensive understanding of ethics, equality and the users' perspectives. More knowledge about the specific context could be attained in a more user-centred design process.

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