

# Inclusive Design, a Perfect Solution?

Exploring possible challenges with inclusive design

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## ABSTRACT

The Norwegian Design Council is promoting inclusive design as the solution to all our societies upcoming challenges with an increasing number of old people. The last couple of years, inclusive design has been written into legislations both in Norway and Europe. In this article, possible challenges with inclusive design have been explored by looking into the debate about inclusive design in small apartments and new technology, like ticket systems. The two cases have shown that interpretation and implementation have a great impact on the success factor of inclusive design.

**KEYWORDS:** Inclusive design, universal design, Norwegian Design Council, TEK 10, ticket systems, individual differences

## 1. INTRODUCTION

Inclusive design, universal design and design for all are terms used to describe an approach of developing products, services and environments, which are usable and attractive for a large number of people regardless of age, gender, language and ability. The Norwegian Design Council<sup>1</sup> (NDC) has the last couple of years invested a lot of resources into promoting inclusive design to Norwegian business leaders, managers, marketers and designers. In 2005 a programme called *Innovation for All*, was established to demonstrate the potential of an inclusive design approach (Norwegian Design Council, 2013). Five years later, in 2010, the NDC published *Innovating with people – The business of Inclusive Design*, a book meant as a handbook in how inclusive design can be used as a strategy for better business. The site [inclusivedesign.no](http://inclusivedesign.no),

provided by the NDC, is solely dedicated to endorse inclusive design. Examples of success stories, a mythbuster and a quote library for inclusive design are just some of the features displayed at the site (Norwegian Design Council, c.2013a). On top of this, the NDC gives away an Innovation Award for Universal Design, on behalf of the Norwegian Ministry of Children, Equality and Social Inclusion. The award goes to companies, institutions, architects and designers who have successfully implemented the inclusive design method, and developed innovative solutions for the benefit of everyone. (Norwegian Design Council, 2011)

The programme, the book, the web guide and the award, presents inclusive design as a picture-perfect solution. The topic is given significantly more attention than other design approaches like for example sustainable design. At the same time there seems to be no room to discuss the flaws with inclusive design, if there is any. If it is true

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<sup>1</sup> "The Norwegian Design Council is a national strategic body for design in Norway mainly founded by the Ministry of Trade and Industry" (Eikhaug, 2010, p.96)

what the NDC promotes that “Inclusive design is a low-cost, high-return way to generate new ideas” (Eikhaug, 2010, p.8), why does not every company use it? The current presentation of inclusive design simply sounds too good to be true. The NDC is not the only one praising inclusive design. The Internet is filled with propaganda, toolkits and articles suggesting inclusive design as the answer to the increasing number of older people.

This article will explore possible challenges with inclusive design. Some questions to be asked are:

- Why do companies hesitate to adopt inclusive design?
- Can inclusive design be excluding?
- Is inclusive design as perfect as the NDC would like us to believe?

To discuss these questions, this article will first look into the debate about inclusive design in small apartments. Then, the implementation of new technology in public services, such as ticket machines, will be examined in terms of inclusive design. But first, some background information like the history of the ideology, and a description of the inclusive design strategy will be presented.

## 2. BACKGROUND

The three terms inclusive design, universal design and design for all, are today often used interchangeable. The principal behind them is basically the same, “to promote an approach to design that understands and respects the needs of a diverse range of users” (Clarkson et al, 2003, p12.) The terms are used in different parts of the world as a result of their origin. Even though the goal is primarily the same, methods have been developed with a close connection to specific terms. This article will mainly focus on inclusive design, since this is the term and strategy used and promoted by the NDC. The Norwegian government on the other hand, is using the term universal design in their action plan and regulations. For this reason, universal design has in many situations and public debates been used as a synonym to inclusive design. In these cases,

this article will also regard the two terms as equal.

### 2.1 History

The many wounded veterans from the two World Wars made disabilities visible in the society. Later, the young veteran soldiers from the Vietnam War protested on the second-class treatment they were receiving as disabled citizens. By claiming equal rights for all, The Black Civil Rights movement started the fight for disability rights, even though their main focus were to stop racial discrimination. With the American Civil Rights Act signed in 1964, a blueprint for future laws was created (Vavik & Gheerawo, 2009).

At the same time designers and architects started to consider a wider range of people in their work. The American designer Henry Dreyfuss taught the world ergonomics and promoted that design should benefit people. The architect Selwyn Goldsmith designed buildings also accessible for wheelchair users (Vavik & Gheerawo, 2009). In Europe, the Olympics in Italy 1960 were followed by an international competition for disabled athletes. 1976 was launched as the international year for disabled people by the United Nations (Vavik & Gheerawo, 2009). This was followed by a growing awareness around discrimination of people with disabilities.

The term universal design was first used by the American architect Ronald L. Mace in 1985. He was the one formulating universal design as “the design of products and environments to be usable by all people, to the greatest extent possible, without the need for adaption or specialized design.” (Vavik & Gheerawo, 2009, p.10) The first international conference for universal design was hold in 1992 in Japan. In 1997 the seven principles of universal design were established as:

1. Equitable use
2. Flexibility in use
3. Simple and intuitive use
4. Perceptible information

5. Tolerance for error
  6. Low physical error
  7. Size and space for approach and use.
- (CUD, c.2008)

The Helen Hamlyn Centre, focusing exclusively on inclusive design, was founded in 1999 at the Royal College of Art in London. One year later in 2000, the UK Government defined inclusive design as “products, services and environments that include the needs of the widest number of consumers” (Eikhaug, 2010, p.9). The United Nations Convention on the Rights of Persons with Disabilities was agreed upon in 2006. From 2009 Norway had an Anti-discrimination and Accessibility Act, and inclusive design had been written into legislation (Eikhaug, 2010).

In the beginning, universal design was closely connected to the view that disabled and older people required special design solutions. Today the attitude of inclusive design has shifted towards integrating everyone in the mainstream of everyday life. Vavik & Gheerawo (2009) predicted “Universal Design will be one of the strongest design trends in the 21<sup>st</sup> century”.

## 2.2 The strategy

The user pyramid (figure 1) displays how the market can be separated into four segments. The so-called average consumer can be found in the bottom segment with other healthy, able-bodied customers. In the next, and biggest segment, users with slightly restricted capabilities belong. This includes for instance people who need glasses, are left-handed or have dyslexia. People can also temporarily belong to this group by for example be carrying heavy luggage or pregnancy (Eikhaug, 2010). Inclusive design aims to reach these two groups with a bottom-up approach, which means making mainstream products also accessible for people with disabilities. (Dong et al, 2003) The top two segments are usually not viewed as primary markets for inclusive design, due to the large gap between their needs and the needs of the mainstream user (Eikhaug, 2010).

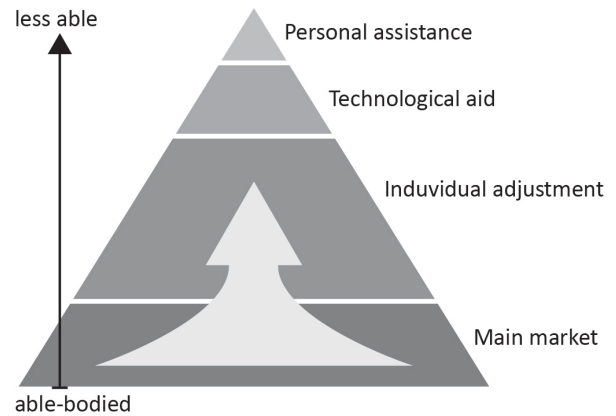


Figure 1: User pyramid with bottom-up approach. (Eikhaug, 2003 p.25) (Dong et al, 2003 p.115)

Inclusive design is a people-centered design approach according to the NDC. They emphasize close connection to lead users as the key to success. The inclusive design strategy highlights engagement in six to twelve lead users instead of numerical market research. First hand observations and inspirational stories can trigger new ideas and good solutions better than statistics. “Lead users are people who make greater demands on a product, system, service or environment and therefore challenge it in ways beyond that of average, mainstream users.” (Eikhaug, 2010, p.35). Typical lead users can for example be older people for testing flexibility and functionality for reduced strength, or cultural diverse groups for testing symbolism and context of use. Choosing the right lead users is essential. The lead user should be relevant to the design and its intended purpose. Hence, a lead user in one project can be an average user in another (Eikhaug, 2010). The intention with lead users is to collect insight that can be exploited in the development of mainstream products. The NDC warns against designing only for a particular lead user, as this may lead to excluding a wider audience. The design process can benefit from lead users in several stages, inspiring ideas as well as evaluating concepts.

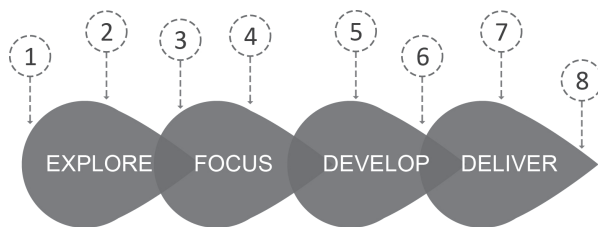
The NDC recommends eight activities to be implemented into various stages of a typical

development process (figure 2). These activities are:

1. Understand context
  - provide a foundation based on real life
2. Design research
  - plan what will be done with users
3. Discover needs
  - put the planning into action
4. Map insights
  - organize findings gathered from user research
5. Translate briefs
  - translate findings into design briefs
6. Scenario building
  - generate ideas from the point of view of the users
7. User feedback
  - evaluate ideas with real people
8. Resource building
  - collect and organize the valuable information

(Norwegian Design Council, c.2013b)

Tools like workshops, natural observations, research kits and interviews are suggested to make these activities fruitful.



*Figure 2: Inclusive design activities added in a design process (Norwegian Design Council, c.2013b).*

The NDC also links to the inclusive design toolkit created by the University of Cambridge. This site provides among other an exclusion calculator. By filling in which abilities a product or service require, the calculator can estimate the percentage of people in Great Britain that will be excluded (University of Cambridge, c.2013).

The UK Commission for Architecture and the Built Environment (2006) published five principles for inclusive design in buildings, places and spaces.

The principles are as follows:

1. Inclusive design places people at the heart of the design process.
2. Inclusive design acknowledges diversity and difference.
3. Inclusive design offers choice where a single design solution cannot accommodate all users.
4. Inclusive design provides for flexibility in use.
5. Inclusive design provides buildings and environments that are enjoyable to use for everyone.

(UK. Commission for Architecture and the Built Environment, 2006). These principles have some similarity to the principles for universal design established in 1997.

### **3. INCLUSIVE DESIGN AND SMALL APARTMENTS**

#### **3.1 New regulations**

In July 2010 Norway got new regulations regarding technical requirements for building works. These regulations will be referred to as TEK 10 from now on. Inclusive design is included in TEK 10. "Structures for the general public and work buildings shall be designed for universal accessibility pursuant to the provisions in the regulations, unless the structure or part of the structure is, given its function, unsuitable for people with impaired mobility." (Direktoratet For Byggkvalitet, 2010, § 12-1) This practically means that all apartments, in buildings that require an elevator, three storeys or more, need to be accessible with a wheelchair. However, the regulations do not apply for single-family houses or terrace houses, if not all primary functions are at entrance level. Included in primary functions are living room, kitchen, bedroom, bathroom and toilet (Norwegian Ministry of local government and regional development, 2010). A wheelchair requires a circle with a diameter of at least 1,5 m to turn, and 0,9 m<sup>2</sup> of free floor space to pass

objects (Christophersen & Denizou, 2010). For small apartments this can lead to a need for added areal or few options when it comes to floor plan.

### 3.2 Critic

Martin Mæland, CEO of the largest Nordic cooperative building association, OBOS, claims that the prize of a tiny apartment in the capital of Norway can rise with 360.000 NOK, as a result of inclusive design. His calculations are based on a 45 square meters, two-room apartment, that will need an extra 6 square meters added, in an area with 60.000 NOK per square meter. This could be enough to keep young couples from becoming homeowners, according to Mæland(Gisvold, 2013). This way, first time buyers can be excluded from entering the marked, by regulations of inclusive design.

An analysis conducted by AS Bygganalyse, supports Mæland's statement. The RIF-approved<sup>2</sup> consulting engineering company has analyzed the change in price of dwellings from 2003 to 2013. The report concludes that the price of small apartments will increase more than the price of other dwellings, and that inclusive design will be the main reason. Unlike Mæland, AS Bygganalyse gives no concrete numbers (AS Bygganalyse, 2013). However, scientists from SINTEF Building and Infrastructure have calculated the extra cost to be no more than 40.000 NOK (Christophersen & Denizou, 2010). They also state that TEK 10 does not require unnecessary large and expensive bathrooms, as critics have claimed, but that thought trough planning is key to good solutions (Christophersen & Denizou, 2010).

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<sup>2</sup> "RIF is the organization for approved consulting companies in Norway, and the Norwegian member association of the global consulting association FIDIC." (Rådgivende Ingeniørers Forening, c.2013)

### 3.3 Interpretation of inclusive design

In TEK 10, inclusive design has been converted to numbers and detailed specifications. Schmidt & Guttu (2012) argue whether this interpretation of inclusive design is correct. In their report, *Small homes – Universal design, domestic arrangements and usability*, they research if TEK 10 would ensure higher residential quality for all. With residential quality, they refer to the "residents' sense of satisfaction with their house or apartment, its fixtures and facilities" (Schmidt & Guttu, 2012). They are concerned that wheelchair accessibility has been prioritized to a greater extent than residential quality. As a result, both able-bodied and disable residents will find the apartment not fulfilling their expectations. Flexibility and the opportunity to furnish and use the apartment according to their own needs, are found important for both user groups (Schmidt & Guttu, 2012).

Inger Marie Lid (2013) points out in her new book, that the need for wheelchair friendly apartments are rapidly increasing, and that very few of todays apartments can be visited or owned by wheelchair users. On one hand, this justifies the requirements set by TEK 10, since everyone has a right to equal opportunity and equal treatment according to the Antidiscrimination and Accessibility Act from 2009. On the other hand she questions that the regulations require accessibility for small apartments, but not single-family houses with the master bedroom on second floor (Lid, 2013). As Schmidt and Guttu (2012), Lid (2013) also accuses the implementation of inclusive design in the regulation to go against one of the seven principles of universal design, namely flexibility. "Universal design should be flexible in use, and serve a wide range of individual preferences and abilities" (Lid, 2013, p.65). With the strict regulations on detail level, the user's choice is taken away. It can also be discussed if the government, by focusing on wheelchair users, has forgotten about all the other types of disabilities, when implementing inclusive design in TEK 10. Blind, deaf, and cognitive disability will

most likely each require a different approach.

## 4. TICKET SYSTEMS

With new technology, transportation providers like train- and buss companies have had the opportunity to streamline their services by having the customer buy the ticket in advance. This is usually done on machines at the station, through applications for mobile devices, or by SMS. Regarding these services, TEK 10 states "Information shall be easy to read and understand. There shall be a visible contrast between text and background colours. Important information shall be accessible via text and sound or Braille." (Direktoratet For Byggkvalitet, 2010, § 12-21)

### 4.1 Touch screens

The Norwegian Directorate of Health (2008) suggests in their booklet, *Self-service for all! Accessible self-service-machines*, that touch screens should be avoided if possible. This is mainly out of consideration of blind users, but also out of respect of older members of the society, who can find the new technology strange and complicated. If a touch screen is used in spite of this, the information is required to be accessible in an additional form, such as sound or keypad (The Norwegian Directorate of Health, 2008). The Norwegian Association of the Blind and Partially Sighted (c.2013) has developed guidelines for designing displays. Here they recommend few options per screenshot, the possibility to individually enlarge information and that keys are activated when the finger leaves the screen, as some measures to extend usability.

Ticket machines for NSB, Norwegian State Railways, have touch screen as operational panel. NSB practices a penalty fee if the traveler wants to buy the ticket from a conductor at the train. Out of consideration of the guidelines from The Norwegian Association of the Blind and Partially Sighted, this penalty fee does not apply for people with disabilities or customers above 67 years (NSB, 2013).

### 4.2 Placement

According to The Norwegian Directorate of Health (2008), a self-service machine needs to be easy to find and easy to access. This means signs and textural lines leading the way, in addition to enough space next to the machine for users in wheelchairs, with strollers or walking aids. Lighting and sound in the environment is also essential for the machine to function optimally. Lid (2013) explains how a couple arguing nearby or a street musician can prevent the user from hearing information provided with the sound function. In one of the interviews from Bjørkmann's Master Thesis (2010) a visually impaired person describes the joy of experiencing a display in perfect eyelevel. The display was in eyelevel of a grown man and made it possible for him to feel normal while reading. Contrariwise, the Norwegian Directorate of Health (2008) recommends that control panels are placed between 80 cm and 120 cm above ground level, to secure access for wheelchair users.

### 4.3 Smartphone applications

With the increased market of smartphones, transportation providers have been given the opportunity to offer extra information through applications and Internet. This information is usually not essential for the traveler, but often more updated than printed information and machines. In several cases only the most essential information is provided in printing, while explanations and additional information can be found online. This solution can feel ironic since the users who most likely need elaborated information are those who are least familiar with the technology, and then as well least comfortable with Internet and applications.

Older citizens have described how they feel excluded and left out of the community when news reporters announce headlines of stories that only can be found at the Internet (NRK.no, 2013). Parallels can here be drawn to other

situations where extra information is provided through Internet or mobile applications.

## 5. DISCUSSION

### 5.1 Why do companies hesitate to adopt inclusive design?

Vanderheiden & Tobias (2000) discovered after interviewing 68 European information and communication technology companies that “universal design is perceived by most companies as a special interest (i.e., people with disabilities)”. Considering that this research was conducted several years ago, it is reasonable to assume some improvement in awareness. Yet, the need for showcases and promotion from the NDC indicates that the misconception still exists. Vanderheiden & Tobias (2000) concluded from their research that implementing universal design in regulations would be the most effective motivator for companies to engage in universal design. At the same time they were concerned that these regulations would be used as both a minimum and a maximum by the industry. The debate about inclusive design in small apartments indicates that they had reason to be concerned.

While Mælan and AS Bygganalyse place the blame for expensive and unsatisfying apartments on inclusive design (Gisvold, 2013) (AS Bygganalyse, 2013), SINTEF points out that the problem lies in that minimum standard set by the regulations is used by the building business as maximum standard (Christophersen & Denizou, 2010). Resulting in halfhearted solutions that will not meet the requests of young couples nor disabled people.

Another explanation for why companies hesitate to engage in inclusive design might very well be the blurred line between inclusive design as a strategy, universal design as ideology and universal design interpreted in regulations. The public debate does not separate these terms, which can be seen in the objection against universal design in TEK 10. In media, the critics

express disapproval of inclusive design, even though what they actually have a problem with is the interpretation of inclusive design made by the government. Schmidt & Guttu (2012) and Lid (2013) also question if the interpretation is according to the ideology. Their main concern is connected to the priority of wheelchair users before users with other disabilities. Nevertheless, the alternative would be to allow possible exclusion of people in wheelchairs.

As many companies are most familiar with the version of inclusive design represented in regulations, their impression of inclusive design can be an expensive adaption for wheelchair users and other disabled minorities. This view might be based on experiences with adjusting products and services after they are finished instead of implementing the strategy.

The fact that the two terms inclusive design and universal design often are used interchangeable, might create confusion in the industry. While the first term, when used by the NDC, refers to a design approach for mainstream products to a wider audience, the latter term, when used by the Norwegian Government refers to an inclusion of the whole user pyramid (figure 1).

### 5.2 Can inclusive design be excluding?

The UK Commission for Architecture and the Built Environment (2006) gives following advice to developers of public places: “As an obvious first step, avoid steps. Replace them with a gentle incline between floors”. By replacing stairs with gentle inclines the walking distance increases dramatically. Here, The UK Commission for Architecture and the Built Environment automatically jumps to a conclusion and gives a solution, instead of encouraging insight in diverse disabilities of lead users. The solution will benefit wheelchair users but exclude those who have problems with inclines and distances. This example clarifies that when it comes to inclusive design, there is no standard solution. Each case needs to be evaluated and solved accordingly.

When designing for the whole population, it is important to remember the variation in degree of disability. TEK 10 only requires important information to “be accessible via text and sound or Braille” (Direktoratet For Byggkvalitet, 2010, § 12-21). This indicates that text and Braille are sufficient to fulfill the requirements of inclusive design, even though it excludes visually impaired users who do not read Braille. This is a quite large group of people as few bother to learn Braille when their vision is degenerated due to age.

In some cases different user groups have contradictory needs. This can be seen in the example with the visually impaired man in the Master Thesis of Bjørkmann (2010). For the man to feel normal and included, the display is placed out of reach of a short person or someone in a wheelchair. Total exclusion is considered worse, and the legal placement will therefore be way below what is comfortable for the visually impaired man. Contradictory needs can also be found in the diversity of residents of small apartments. Again, the avoidance of total exclusion is prioritized higher than a desirable floor plan. What these cases imply and Lid (2013) comments in her book are that the diversity of human abilities, makes it difficult to agree on one common standard.

A ticket machine with touch screen where the measures recommended by the Norwegian Association of the Blind and Partially Sighted (c.2013) are applied, can still be excluding for older people. The fact that these measures also benefit old users does not matter if they withhold themselves from using the machines by fear of new technology. This generation can be excluded by a machine, which fulfills the requirements of inclusive design set by the government. The feeling of exclusion can be exacerbated if the service is supposed to be inclusive design (Lid, 2013). As well can the feeling of failure appear when a so-called easy task seems impossible.

### **5.3 Is inclusive design as perfect as the NDC would like us to believe?**

What the NDC is describing when promoting inclusive design is “a people centered strategy for innovation” (Norwegian Design Council, c.2013a). Strategy can be regarded as a key word in this sentence. In all their material, the NDC is careful not to jump to conclusions, but rather emphasize the importance of user involvement. In many ways, the strategy the NDC is trying to sell is very similar to a traditional, thorough design process. However, the inclusive design process stands out when it comes to the choice of which users to involve. In opposite to a regular approach, the inclusive design method requires that the included users have characteristics that will demand more from the solution than an average customer. The NDC uses Stokke’s Tripp Trapp chair in one of their examples of successful inclusive design (Eikhaug, 2013). On one hand, this can be perceived as a bit misleading since the chair was designed long before the terms inclusive design and universal design was defined. On the other hand, the process did follow the principles of inclusive design, and is an excellent example of how inclusive design not only is about designing for people with severely restricted capabilities. This distorted view appears to be one of the reasons companies hesitate to implement inclusive design.

If inclusive design regulations are interpreted as avoiding touch screens at any cost, the overall offer to mainstream users can suffer. As touch screens have become one of the most preferred solutions for the young generation, a keypad will be a less lucrative option. Again the differences between regulations and the strategy are fundamental. The disabled interviewees from Bjørkmann’s Master Thesis (2010) did not like to focus on the term inclusive design or universal design. What they explained as important was the possibility to do normal activities with dignity. This requires solutions that work regardless of abilities, without holding the able-bodied back.



Whether inclusive design is a success or not depends on the execution of the strategy. Based on the NDC's focus on user involvement and qualitative data over quantitative data, it is interesting that the NDC suggests the inclusive design toolkit with exclusion calculator (Norwegian Design Council c.2013a). In several ways, the exclusion calculator goes against the philosophy of inclusive design as promoted by the NDC. Instead of real experiences, developers can test if their product include or exclude users in a staged environment (University of Cambridge, c.2013). Elton & Nicolle (2010) demonstrated the danger of testing use outside context. By testing everyday products in environments with various lightning and temperature, they indicated that the values given in the exclusion calculator could be misleading.

## 5. CONCLUSIONS

The findings from the two explored cases have shown that interpretation and implementation have a great impact on the success factor of inclusive design. Because users can have contradictory needs, even inclusive designed solutions can exclude users in some ways.

In the building business, several leaders are critical to inclusive design, and blames inclusive design for unsatisfying floor plans and increased apartment prices. What they really criticize is the interpretation of inclusive design made by the government. That inclusive design is being used as both the method and the standards might be one of the main reasons companies still hesitate to implement inclusive design. This might also be the reason NDC has chosen the term inclusive design to describe their method and strategy instead of universal design, which is associated with numbers in regulations. However, the difference is still not consistent and clear for the society and companies.

Products and services should not be advertised as inclusive design if they only fulfill the requirement of regulations. The demand should be a successful implementation of the inclusive

design strategy.

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