

Summary

Universal design and public transport - an evaluation of the light rail and buses in Bergen city

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Authors: Eva-Gurine Skarland and Kåre Skollerud

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Predictability is important for people with disabilities because it gives them the opportunity to adjust to, and overcome the problems they meet. The light rail in Bergen is a predictable system because it has few lines, high frequency and universally designed stations. The buses in Bergen are available to people with disabilities, but the system itself is flexible. Bus stops and road quality varies, and there is a higher risk for failure when it comes to service and communication between passenger and driver. Because of this people with disabilities are more likely to meet challenges while traveling by bus, than they would traveling by light rail.

Summary

This report was commissioned by the Delta Centre and Hordaland County Council and consists of an evaluation of universal design in light rail (LRT) and trunk lines for buses in Bergen. The report aims to provide a picture of how disabled people handle the various stages involved in trips with light rail and buses. Eventually we will compare universal design on bus and light rail. The project also aims to uncover whether and how organizations for people with disabilities were involved in the planning of the LRT.

The project is carried out as a comparative case study, where LRT and trunk lines for buses in Bergen are studied. To investigate how universal design is implemented in the entire travel chain, we carried out studies in which seven people with disabilities were followed throughout individual journeys including both LRT and bus. The journey was bounded to the public transport system, from approaching the first stop to making a transit, and to the last stop. Conditions on the road from home to the station areas are topics for interviews carried out during the journeys. To get a picture of why the light rail project was an award-winning project for its interpretation of universal design, with the Innovation Award for Universal Design, we interviewed three key people from the Bybanen(LRT) project in Bergen.

Our studies show that people with different types of disabilities face different challenges both on both bus and light rail, yet some feedback from our informants coincides (see table S1). The table shows that the informants have a higher number of negative comments regarding the bus. One important factor that can affect this is that there are fundamental differences between a bus and the LRT system. In many ways, the bus's flexibility cause many disadvantages when it comes to universal design, differences in infrastructure and differences in bus designs can occur several times during a trip chain. In addition, the bus system is more vulnerable to human errors, especially in situations that requires special service from the bus driver. The inflexibility and overall design of the LRT is a major advantage when it comes to universal design, with a seamless and unified solution, a predictable system is near readymade, and passengers with disabilities are less dependent on service from the personnel. Compared with the LRT, the bus may therefore look like a poorer service for people with disabilities, still informants also asked for some alteration for the LRT.

Table S1 Advantages and challenges on bus and on light rail in Bergen

Disability	Advantages(+) and challenges(+) on bus	Advantages(+) and challenges(+) on light rail
Blind	<ul style="list-style-type: none"> ÷ The boarding / alighting if the bus when the bus driver don't drive into the bus stop ÷ Lack of petitions on some buses ÷ Difficult to validate ticket ÷ Hard to distinguish different buses from each other, want auditory information on buses and all stops ÷ Hard to find stop button because of several different types of buses + Auditory information is positive (on the buses that have it) 	<ul style="list-style-type: none"> ÷ Finding ticket validation machine + Auditory information is positive + There's only one line, so it is impossible to board the wrong LRT + LRT has a high frequency
Visually impaired	<ul style="list-style-type: none"> ÷ Want application with auditory information ÷ Lack of petitions on some buses ÷ Difficult to validate ticket ÷ Hard to distinguish different buses from each other, want auditory information on buses and all stops + Auditory information is positive (on the buses that have it) 	<ul style="list-style-type: none"> ÷ Advertising on display in face level is disturbing, would rather have relevant information here + Auditory information is positive + There's only one line, so it is impossible to board the wrong LRT + LRT has a high frequency
Impaired movement	<ul style="list-style-type: none"> ÷ The boarding / alighting if the bus when the bus driver don't drive into the bus stop ÷ Unsure if there is room on the bus ÷ May be difficult to get service when you bring friends / family ÷ Information Display only on one side ÷ Bus drivers driving poorly + People and drivers are often sympathetic / assist + Good service 	<ul style="list-style-type: none"> ÷ Information Display only on one side + No need for assistance + No extra preparation + LRT has a high frequency
Elderly	<ul style="list-style-type: none"> ÷ Noise and limited seating ÷ Difficult to use applications and computers to buy tickets and get route information ÷ Young people doesn't give up their seats ÷ Bus drivers driving poorly ÷ Not sure about driver's service duty + Good seats 	<ul style="list-style-type: none"> ÷ Uncomfortable seats ÷ Difficult to use applications and computers to buy tickets and get route information + Auditory information is positive
Dyslexia	<ul style="list-style-type: none"> ÷ Noise in the form of audio or attention demanding advertising makes orientation difficult ÷ Want custom watches to those with dyscalculia + Auditory information is positive (on the buses that have it) + The bus is perceived as nice to use 	<ul style="list-style-type: none"> ÷ Noise in the form of audio or attention demanding advertising ÷ Want custom watches to those with dyscalculia + Auditory information is positive + The LRT is perceived as nice to use