

Snow, buses, and mobile data services

by

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1. Foreword

Development and advancement of Information Society¹ is on an agenda of many nation states today. As scholars, we can contribute to the effort by attempting to reconcile the official rhetoric with the real life situations of “netizens”².

This paper is inspired by the publication of Leonard Jessup and Daniel Robey [2002], in which the authors use anecdotes to demonstrate what advanced service possibilities are afforded by ubiquitous technology as contrasted to the residue of social behavior.

This story illustrates that the success of establishing Information Society should not be measured by the number of available services to citizens over the wireline and mobile Internet. The ultimate measure for success must be the extent to which people are aware about the availability of relevant content and are using the services [Daniel and Wilson, 2003, p.285].

1 Information Society, National Information Infrastructure, Information Technology Revolution – all these concepts center around the issue of building *pervasive* national information *processing and communication infrastructures* [Castells, 1996, p.29]

2 The citizens of Information Society [Hauben and Hauben, 1997]

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1. Foreword

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2. Setting the stage

Every year, Information Society Index (ISI) shows ever growing measures for nation states' abilities to participate in the Information Revolution [The WorldPaper, 2003a] (Table 1). Denmark has been topping the list since 2003 [The WorldPaper, 2003a, The WorldPaper, 2003b]. This means that Denmark is one of the few countries which has been visibly successful in development of ICT⁵ infrastructure and promotion of the diffusion of ICT in all spheres of social and economic activity.

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4 The citizens of Information Society [Hauben and Hauben, 1997]

5 Information and Communication Technologies

Table 1. The 2003 Information Society Index

Country	Rank				Overall		
	Comp.	Telco	Web	Social	2003	2002	2000
Denmark	3	5	4	5	1	5	5
Sweden	7	6	1	3	2	1	1
Netherlands	1	10	13	9	3	6	10
Finland	15	11	6	1	4	8	3
Canada	5	25	3	6	5	14	12
Norway	12	13	5	4	6	3	7
U.S.	2	23	8	8	7	4	4
Switzerland	10	12	9	11	8	3	7
U.K.	8	15	12	12	9	7	6

Source: IDC, (The WorldPaper, 2003a)

The recent statistics on Internet and mobile communications use in Denmark show high diffusion rates of both these technologies. The number of mobile subscribers in Denmark surpassed that of Internet-enabled PCs. In 2004 it reached high 95%. The same year, 83% of the population had access to the Internet either at home or from work [Danmarks Statistik, 2004]. Whereas only 7% of the population had fast Internet access in 2001 (e.g. ADSL), the figures for 2004 read an impressive 32% [Danmarks Statistik, 2004].

The number of data-enabled phones at the end of the same year was 43%. Having made a tremendous leap forward from only 3% in 2003, the gap between PC- and phone-enabled Internet access terminals is closing rapidly. At the same time, communication and information continue to be the most popular purpose for use of the Internet by the Danes.

Another benchmark on the advancement of the Danish Information Society is the ITU Digital Access Index (DAI). DAI measures the overall ability of individuals in a country to access and use Information and Communication Technology. It takes into account five variables: infrastructure, affordability, knowledge, quality, usage (Table 2).

Table 2: ITU Digital Access Index: Top 10 countries

Country	Index	Country	Index
Sweden	0.85	Netherlands	0.79
Denmark	0.83	Hong Kong, China	0.79
Iceland	0.82	Finland	0.79
Korea (Rep.)	0.82	Taiwan, China	0.79
Norway	0.79	Canada	0.78

Source: [\[ITU, 2003\]](#)

All benchmarks combined, official rhetoric portrays Danish citizens as being well equipped in terms of availability of both technical infrastructure for provision of advanced data services, knowledge on how to access and use these services, and means to pay for it. However, the anecdotes we often observe in the everyday life of “netizens” may tell us otherwise.

3. The story

January 20, 2006 was just another day in the capital city of Copenhagen in Denmark – country which prides itself, not unreasonably, with sound achievements in the field of Information Society.

It was a winter day, not particularly typical winter day for inhabitants of Copenhagen city. What was making this day different was a snow. Snow which was falling for a third day in a row, and which, apparently, city authorities were not well prepared to cope with. While reason for unpreparedness is simple and well grounded in trivial economic considerations (it is cheaper for the city to have few days of “bad road conditions”, than to keep a fleet of snow removing machinery and personnel), the effects the snowfall was causing were several. One effect to mention, was that roads were not cleaned properly, causing traffic congestion, accidents, and apparent dissatisfaction of public bus drivers with the road conditions. More so, the bus drivers were blaming the city authorities for not cleaning the roads properly (it looks like no one told them the trivial reason for that). The dissatisfaction grew proportionally to the amount of snow on the streets, reaching its apogee in a form of a bus driver's strike. Either due to the social mindfulness of unions, or

simply by a fiat, only the inner city bus lines – also called A-lines – were closed that day.

I happened to be waiting for one of the buses which did not go that day. It was the morning rush hour, and the bus line was 4A. The bus stop I found myself at, was a busy traffic intersection with several other bus and train lines. The time interval for 4A is 5 to 7 min throughout the day – this was clearly stated on the timetable displayed at the stop (see Figure 1). After waiting for some 10 minutes, I started to pay attention to what was going on around me – people, approaching traffic, etc. Few observations I made I find interesting to report on.

Figure 1: Bus stop, line 4A



Observation 1: people are patient

The first important observation I made was that I was not alone. At least 10 other people at the same stop, and the number was increasing over time. As everybody's patience was tried by the absence of a bus, people were more

often looking into the direction where the bus should be arriving from, jealously looking at people passing by in cars or in other buses (no one of those had a stop at where we were waiting). Now and then somebody would look at the electronic display (see Figure 1), which normally would display the number of minutes until the next bus' arrival⁶. The display was dead. This caused people to turn away and continue looking into opposite direction – where the bus should be arriving from. As the time was passing, some people were hesitantly taking their cellular mobile handsets into their palms, as if not knowing how to take use of this technology.

Observation 2: people use their mobile phones to tell their are late
Some, though not many people, made phone calls. Few were typing short messages. I did not pay attention to the exact content of the conversations, although from the facial expressions of those talking I could guess that they were talking to their friends or colleagues, rather than calling to the transport authorities to make inquiries on the fact of non-arrival of a bus. Following the suit, I called my wife and complained about the fact that I had to wait for a bus, and that the weather was lousy. I felt better after having somebody listening to how much trouble I had, hang up, and continued to wait. So did the other owners of mobile phones, some of them continuing to use the technology to kill the time.

Observation 3: people just walk away

As people were starting to loose patience, they'd either waived to a passing taxi, or walked away from the stop. After some 40 minutes of waiting at the bus stop, I walked away, too, going in the direction of my school. After walking three blocks, I took another bus, which was a different line, but was going in the same direction. 20 minutes later I was entering my office. The first thing I did in the office, I asked my colleagues whether they could explain me why I had to wait for 40 minutes for a bus. "There is a strike", was the answer. The answer struck me by its simplicity, and by the fact that I most likely could have found out about the strike earlier, while at the bus stop, by

⁶ The display on the picture indicates "1".

the means of what is acknowledged to be a ubiquitous technology – a cellular mobile telephony. Why haven't I done so? Why haven't the others?

4. Snow, buses, and advanced data services

One logical conclusion a reader may come to after reading the story, is that the public transport authority of the city of Copenhagen (they have several, the one in charge of public buses is called HUR⁷) does not offer advanced on-line information services to its citizens. This is not true. Indeed. HUR offers remarkably advanced services accessible over a remarkable number of media: Radio, TV text, billboards, Internet, cellular mobile data services, SMS, to name few (Table 3).

Table 3: HUR service information offered through different media channels

<i>Priority #</i>	<i>Media channel</i>	<i>Information push / pull</i>	<i>VAS⁸</i>
1	Radio news broadcast	Push	free
2	TV Text	Pull	free
3	TV news broadcast	Push	free
4	Call center automatic voice response	Pull	free
5	HUR web page	Pull	free
6	HUR information boards in the downtown	Push	free
7	SMS automatic response	Pull	VAS
8	WAP (HUR's own WAP portal, and through 3 rd party service providers)	Pull	VAS

Source: Per Frederiksen @ HUR

Additional media channel, delivering “immediate” information to people at the bus stop, is an electronic display indicating remaining wait time in minutes (see Figure 1). Other channels are either accessible from home (TV, Internet pages), or from portable mobile devices: radio, cellular mobile handset.

The electronic display at the bus stop did not display anything on January 20th. Dead. Maybe out of order. Maybe for other reasons. How often do we take a dead display as a sign of non-availability of service? This, too, I leave out from

7 The Greater Copenhagen Authority (HUR) is a politically-governed regional organization covering the Greater Copenhagen Region: www.hur.dk.

8 Value Added Service – premium priced inquiry response system

my analysis to the reader's discretion. However, there were several media channels accessible by using cellular mobile handsets, which I would like to explore in more detail in the following section.

4.1. Voice

While observing how people were using their cellular phones at the bus stop, I came to the conclusions that they were merely talking to friends and colleagues, and not calling for bus service information update. The reason I come to this conclusion is trivial – should anyone called the HUR Customer Center (the phone number is displayed at any bus stop, see Figure 2), following a typical group sense-making behavior [Weick, 1993] this person would have informed the others, and everyone would leave seeking an alternative transportation.

Figure 2: Bus stop, line 4A: HUR transportation map and the Customer Center phone number



Ex-post data obtained from HUR indicate that the number of phone calls to the HUR Customer Center on January 20 was threefold, compared to the usual daily load (see Table 4). This means that people were indeed using the traditional and socially well accepted technology [Jessup and Robey, 2002] to get access to the information. Unfortunately, not anyone from my stop, though.

Table 4: HUR Call Center statistics for incoming calls number

<i>Days</i>	<i>Call statistics</i>
Normal day	1.700 - 1.800
Strike, January 20	5.461
Strike, January 25	6.453
Strike, February 20	3.261

Source: Per Frederiksen @ HUR

4.2. Short Messages (SMS)

While waiting for the bus, I remembered seeing HUR's ads on buses about the advanced information services I can get by sending premium-priced (this was in small text, of course) SMS to a specific number. Too bad, I did not remember what exactly I had to send and to which number. I looked at the various information posters at the bus stop – there was a map of city public transportation lines, several timetables, and some other information (see Figure 1 and Figure 2). No mentioning of SMS services. Of course, I could read about the service from the ad on a bus, the trouble is the bus wasn't coming.

4.3. WAP – cellular mobile data services

HUR hosts own WAP⁹ portal¹⁰. Looking at the services HUR is offering over WAP to cellular mobile subscribers, one must admit it is an easy way to find out traffic information on any of HUR's bus lines¹¹. From more than a dozen of cellular service providers in Denmark, most offer data services and data access portals with little variance in type of services offered. Two of the three largest service providers – Sonofon¹² (of Telenor) and Telia¹³ (of Telia-Sonera) – have HUR Traffic service embedded in their WAP portals¹⁴, accessible by clicking “online” button on subscribers' handsets. Table 5 presents the procedure for obtaining information which, should it have been followed on January 20, would make the person aware of the fact that line 4A was closed that date.

9 Wireless Access Protocol

10 Wap.hur.dk

11 Only time tables for A-lines are being updated in real-time for the WAP portal.

12 www.sonofon.dk

13 www.telia.dk

14 For other service providers' subscribers, access to HUR's portal is as easy as entering “wap.hur.dk” in the mobile handset's Internet (WAP) browser.

Table 5: Traffic information

<i>Action</i>	<i>Wait time after the action (sec)</i>	<i>Choices available</i>
Accessing Main menu (by pressing "Online" button on the mobile handset)	17	7 th choice in the menu: "Traffic"
Choosing "Traffic" from the main menu	6	3 rd choice: "HUR". Possible actions offered: - Enter the stop name or number - Enter the bus line number - Choose a bus line (a list of groups of lines provided)
Choosing "Choose a bus line", selecting group "1- 32"	8	4 th choice: "4A"
Choosing "4A"		The user is offered two choices: "OK" and "Cancel". I have to read through the text under the choices. The text warns that a fee of DKK 1,50 will be charged if I choose "OK".
Agreeing on the DKK 1,50 fee	15	Choice of the two directions for the line. In no time, a list of all the stops on the line is displayed
Choosing the stop name	5	A list of the next 10 departures from the bus stop of my choice.
<i>Total:</i>	51	

Only 51 seconds of wait time for the low bandwidth GPRS connection, plus my interfacing with the mobile handset, plus the awareness of the fact that DKK¹⁵ 1,50 will be added to my bill – an easy and affordable way to find out about the arrival time for the next bus. In the ex-post inquiry to HUR, it was confirmed that during the strike days HUR's WAP portal **was providing information on the cancellation of all A-lines (1A through 6A)**.

¹⁵The amount of DKK 1.50 approximately equals 0.20 €

5. Why have I (and some 20 more people) waited for that bus, which never came?

There is probably no simple and comprehensive answer to this question. However, I suggest that there are three lessons one can learn from this anecdote.

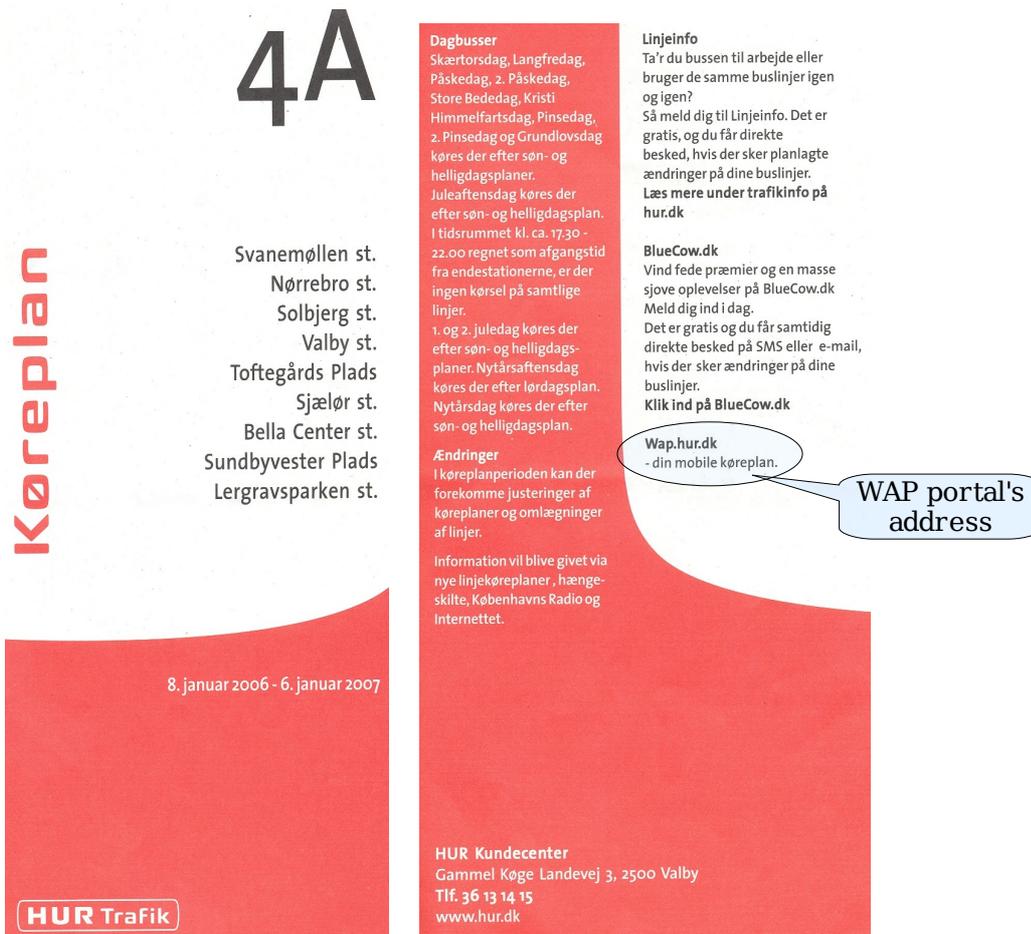
5.1. Lesson 1: awareness of availability of services

An obvious lesson we learn from the anecdote is that people at the bus stop (who, the statistics and reputable reports tell us, happened to be advanced citizens of advanced Information Society) were not aware about the strike. More so, they apparently were not aware of the fact, that their mobile handsets could be used as a tool to access the needed information through several media channels.

I omit the analysis of accessibility of voice service due to two reasons. First, there is a HUR Customer Center's phone number listed on each bus stop in the Greater Copenhagen area (see Figure 2), and the ex-post statistics on the calls received by the center show that people did use this information channel on the days of strike (it just that I haven't happened to be on a stop where one would come up with this brilliant idea!).

With regard to what we often refer to as “advanced data services”, HUR reported that they have had two ad campaigns for their WAP portal services during November-December 2005. The campaigns, however, were limited to the information printed on the time-table booklets available in buses (see Figure 3), and posted on HUR's web site. No information on availability of WAP services could be found at bus stops.

Figure 3: HUR leaflet available in a bus: the cover and back pages, and the WAP portal's address.



Advertisement of availability of “embedded” HUR portal through two major cellular telephony service providers is left to those service providers' discretion. I must admit here, I never received any ad leaflet from my service provider on services they list on their WAP portal.

5.2. Lesson 2: complexity of the service?

The example of HUR's WAP service illustrates an inherently complex setup, where availability of the service is Dependant on public-private partnership (between HUR and third-party service providers), is subject to political decisions (budget allocations for the promotion of HUR's own WAP portal), technology constrains (e.g., WAP-enabled phones where available to only 43% of the mobile users in Denmark by the end of 2004), and residual social behavior (using mobile phones for making phone calls is still the dominant

behavior, and not the access to data services).

Developing advanced data services and making sure that they are known and accessible by the intended user population requires not only appropriate technology to support the service offering, but the adequate institutional and social factors to be aligned with the technological capability [Fomin and Blechar, 2005, Geels, 2002]. This is likely to take time, before citizens of Information Society will use mobile data services as intuitively, as they use voice services today.

As anecdotal as it can be, a low-tech media channel available – the electronic display on a bus stop – was not displaying anything on the day of strike. This simple indicator of unavailability of service (as intended by the transportation agency) was not interpreted properly by the citizens. This illustrates that even simple technological solutions with very rigid functionality leave space for “interpretive flexibility” [Bijker, 1995], leading to contradictory outcomes in the technology-social interaction [Jessup and Robey, 2002].

5.3. Lesson 3: catching the consumer

The slow adoption of mobile data services in Europe emphasizes the criticality of what Silverstone and Mansell [1996, p.222] called “finding and catching the consumer” under the conditions of the uncertainty of demand for new ICT services [Fomin and Gao, 2005].

While HUR is hosting its own WAP site, the task of “catching the consumer” is to a large extent left to cellular telephony service providers. The latter, however, are facing “perpetual uncertainty of demand for new information and communication technologies and services” [Silverstone and Mansell, 1996, p.223]. Cellular mobile telephony service providers see the continuing growth of voice traffic, while data revenues are less than 3 per cent of the voice revenues [Fomin and Gao, 2005]. In the highly product-differentiated market, voice is still the main driver for service providers, and the main communication media for the users. Under those circumstances, priorities in the “catching of consumer” are probably not set on increasing awareness of

specific data services.

The ultimate measure for success of developing advanced information services must be not the availability of Internet-enabled handsets and statistics on mobile data traffic¹⁶, but the extent to which people are aware about the availability of relevant services [Jessup and Robey, 2002], are using the services [Silverstone and Mansell, 1996, p.223], and the percentage of population using the services [Daniel and Wilson, 2003, p.285].

While our case analysis clearly indicates that there were all technical means necessary for accessing the content, and that there is growing trend of usage of mobile data services in Denmark, the process of creating citizens' awareness of available services and their actual use still has a space for improvement. And snow, as rare as it is in Denmark, may be the missing catalyst for the faster advancement of Information Society.

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¹⁶ Cellular mobile data (GPRS) usage in Denmark increased from zero MB in the first half of 2002 to 323,564 MB in the 1st half of 2003, and to 5,939,650 MB by the end of 2004 [National IT and Telecom Agency, 2004b]. This growth is suspiciously proportional to the growth of the usage of Multimedia Messaging (MMS), which requires the usage of GPRS, and which grew from 0.5 million MMS in 2003 to over 8 million in 2004 [National IT and Telecom Agency, 2004a].

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