

# “It’s Just Easier with the Phone” – A Diary Study of Internet Access from Cell Phones

Stina Nylander<sup>1</sup>, Terés Lundquist<sup>2</sup>, Andreas Brännström<sup>3</sup>, and Bo Karlson<sup>4</sup>

<sup>1</sup>Swedish Institute of Computer Science, Box 1263, 16429 Kista, Sweden

<sup>2</sup>Luleå University of Technology, 971 87 Luleå, Sweden

<sup>3</sup>Umeå University, 901 87 Umeå, Sweden

<sup>4</sup>Squace AB, Döbelngatan 48, 113 52 Stockholm, Sweden

stny@sics.se, teres.lundquist@gmail.com, c02abm@cs.umu.se,  
bo.karlson@squace.com

**Abstract.** We conducted a diary study of how 19 experienced users accessed the Internet from cell phones. Our data show that participants often chose the cell phone to access the Internet even though they had access to a computer, and the most common location for Internet access being the home. Reasons for choosing the phone over the computer were speed, convenience and a desire to use the phone for fun. Additionally, the phone is kept close and is always on which makes it convenient to use. The traditional motivation for mobile services “finding out something about where you are” only accounts for 15% of the user activity.

## 1 Introduction

Today, it is becoming more and more common to access Internet services from cell phones. The phone increasingly allows users to access online news, email, and other services in places and situations which were never possible using a traditional desktop computer.

However, the cell phone has several properties that make Internet access different than on an ordinary computer. So far, this has mostly been discussed in terms of restrictions: the small screen size and constraints on typing do limit the usability of the phone as an Internet access device. But there are other less tangible differences. The cell phone is not only mobile, it is also personal and communication-oriented in a way that computers are not. All of these aspects – the interaction abilities, the mobility, and the role of the cell phone as a personal communication device – will affect the usage patterns that emerge for the Internet on the cell phone. To shed light on how this might develop, we conducted a diary study of Internet usage on the cell phone to identify the emerging usage practices.

## 2 Related Work

Actual Internet access from cell phones has been little studied so far, but Lee et al. [7] have studied use contexts for the mobile Internet and their relation to types of services.

However, they did not investigate the influence of users’ motivations on their mobile Internet use. We believe that it is important to investigate the motivation when examining user behavior. We have also chosen to analyze the locations for mobile Internet use in a deeper way than Lee et al.. For example, Lee et al. only analyzed indoor and private locations; they did not look at the home separately. In our material the home turned out to be an important location. Additionally, they did not look at to what extent their participants had access to a computer at the time of mobile Internet access. Our participants often chose the phone even though they had access to a computer.

Sohn et al. [12] have also investigated people’s information needs when mobile, and how they met those needs. They found that people that had access to mobile Internet used it to meet many of their information needs, and those who did not have access to mobile Internet believed that it would have solved many of their information needs. Our material adds to this picture by showing that mobile Internet access also is used to meet information needs in many situations that are not mobile.

### 3 Method

The data for this study was collected using two methods. First, participants kept a diary of their Internet access from their cell phones for seven days and then were interviewed about their Internet habits in general and the study week in particular.

The diary method was chosen as a relatively unintrusive method to capture mobile Internet usage over extended periods of time during the course of everyday life. It has been used frequently to study usage of cell phone technology, see e.g. [4, 5], other mobile technologies [11], and mobile behavior [12]. The potential drawback of the method is that data from self-reporting is not always accurate and complete. However, an advantage is that diary entries act as triggers for reflection, generating rich narratives grounded in real life events which can be unpacked in the follow-up interview. We chose not to complement our diary data with log data from participants’ phones since our main interest was in these rich narratives and in what they revealed about user motivation and context of use, little of which could be captured by automated logging. In addition, the geographic spread of our participants would have made it cumbersome to install such software on their phones.

A pre-printed paper diary that had several examples completed was sent to the participants by mail. When participants could be expected to have received this paper diary we called them to confirm that they had received it and to clarify any problems. At that point, a time for the follow-up interview was scheduled. Participants were provided with preprinted, stamped envelopes to return the log to the authors.

The participants were asked to log every session of Internet access from a cell phone during seven consecutive days. That is a fairly short time to monitor user behavior but we did not want to burden our participants unnecessarily and risk that they would under-report their Internet use. Since they were frequent users we believe that we gathered sufficient data from the seven day period. The paper diary contained fields for time and duration, web page or application, location, surrounding distraction, concurrent activity, purpose, why the phone was chosen and not a computer, and if any problems occurred during the session, (see Figure 1 for an example). For each day of the trial, they were also asked to give examples of web pages that they used on the computer and not on the cell phone.

Datum: 11/6 **INTERNETANVÄNDANDE PÅ MOBILEN**

Tid	Tjänst	Var befann du dig?	Gjorde du något annat medan du använde tjänsten?	Vad hände runt omkring dig?	Hade du bråttom?
Start: <u>14:00</u>	<u>entire</u>	<u>i bilen (körde inte)</u>	<u>betade adress, kallade i karta + efter vägskyltar</u>	<u>stad parkerad i Gbg, inte mkt.</u>	<u>lite</u>
Hur länge (uppskatta): <u>5 min</u>					
Varför använde du tjänsten?	Hur använde du tjänsten? Vilka funktioner?	Varför använde du inte dator?	Stötte du på några problem med tjänsten?		
<u>beträdda adress (kontant laggen hemma + inläst svar hos kompis)</u>	<u>Sökte på entire</u>	<u>hade ingen</u>	<u>nej, funkade bra</u>		

**Fig. 1.** The diary was designed in Swedish. The entry fields were named as follows. Upper row from the left: Time, Estimated duration, Service, Where were you?, Did you do anything else while using the service?, What was going on around you?, Were you in a hurry?. Lower row from the right: Why did you use the service? How did you use the service? What functionality?, Why did you not use a computer?, Did you encounter any problems with the service?.

The follow-up interviews were semi-structured and conducted shortly after the seven days of data collection. Questions were asked about the information users had provided in the diaries, together with more general questions about their Internet habits. Since the participants were recruited over the Web, the geographic spread made it necessary to conduct phone interviews. The interviews were conducted in Swedish by two of the authors they were approximately 30 minutes long.

The analysis of both the diary and the interview material was guided by grounded theory [13] and consisted of categorising the raw data accordingly. We looked for repeating themes as well as conflicting ones and did not start out with fixed categories.

### 3.1 The Participants

Participants were recruited through a small web survey that was published on web forums with mobile technology themes, as well as blogs with many visitors. This survey was also distributed to friends and colleagues of the authors, in addition to a large mailing list dedicated to mobile web surfing. Based on this initial response, we were able to recruit participants for the diary study. The participants selected for the diary study all stated in the survey that they accessed the Internet daily from their cell phone. The main reason for limiting the diary study to people who already were using the Internet on the phone was that they had already developed a set of usage practices. That way, we avoided novice and learning effects in the study and were also assured of gathering sufficient occurrences of Internet usage to draw conclusions from the data.

Nineteen participants were recruited for the study, seven women and twelve men with an average age of 30 years (max 55, min 20, mean 28). See Table 1 for basic data about the participants.

Two of the participants could only report the make of their phone but not the model. Of the 19 participants, seven had phones with a touch screen, and of these, two participants had hacked iPhones (the iPhone was not yet released in Sweden at the time of the study). The majority of the participants were working, but two were students and one was unemployed. Five participants reported that their Internet access from the phone had a connection to their work.

**Table 1.** Basic data about study participants

Id	Age	Gender	Work	Mobile phone	Net speed
P1	55	M	Electricity Engineer	Nokia N95	3G
P2	35	M	Truck driver	SE P1i	3G
P3	41	M	Consultant	SE W910i	3G
P4	32	M	Teacher	SE K800	3G
P5	20	M	Unemployed	Nokia N95	3G
P6	31	M	Interaction designer	Nokia N73	3G
P7	37	M	Management	SE T650i	3G
P8	22	M	Student	HTC Touch Cruise	Turbo 3G
P9	21	F	Nurse	SE	3G
P10	24	F	Student	iPhone	3G
P11	27	F	Sales	SE K800i	3G
P12	45	F	Telecom Research	SE K800	3G
P13	28	M	Project Managemnt	SE P1, SE W660i	3G
P14	28	F	Interaction designer	SE W960i	3G
P15	20	M	Industrial mainten.	HTC Cruise	3G
P16	29	F	Secretary	SE W850i	3G
P17	26	M	Student	SE W850i	3G
P18	26	F	Web Designer	iPhone	2G
P19	27	M	Dev. engineer	SE	3G
n=19	30,2	12M, 7F			

Our participants were in general fairly technologically savvy. They had high-end cell phones and many of them had tried, and succeeded to, install applications on their phones such as Opera’s Mini browser or Gmail’s Java application. Two participants even had iPhones that were not released in Sweden at the time of the study but needed to be hacked to function with a Swedish carrier. Using the cycle of market adoption (described in [10]), we would categorize them as early majority since they, in the interviews, described their cell phone Internet access with a utility perspective rather than mainly for the enjoyment of the technology itself. They liked what they could do with Internet access from the phone, rather than finding pleasure in mastering the technology.

Anne and Tom are two typical though very different examples of our participants. Anne is 45 years old, works in telecom research and her employer pays for her cell phone. She has a SE K800i phone and surfed 15 times from her phone during the seven days of the study. She mostly used her phone for Internet access during early mornings, and late evenings, and she primarily accessed news pages and the pages of her children’s sports teams. Tom is 35 years old, works as a truck driver and pays for his cell phone himself. He has a SE P1i phone and surfed 12 times during the study. He mostly used his phone during the day to access news pages, map pages (to find customers’ addresses), and his Internet bank.

Bob was not a typical participant, surfing an amazing 40 times during the study. He is 55 years old, unemployed and pays for his cell phone himself. He has a Nokia N95 which he used solely for web surfing (he has another cell phone for calling). He used his phone primarily in the morning accessing mainly web email and news sites.

## 4 Results

### 4.1 Overview of the Data

In all, 260 occurrences of Internet access from cell phones were recorded in the diaries, with an average of 13.6 per participant (max 40, min 4). Each participant reported on average 1.9 occurrences per day, (max 9, min 0). Eighty-four different Web sites were visited, and five online Java applications were used.

The average duration for a session was 12.6 minutes (max 180 min, min 0.5 min). Fifteen sessions were reported to last for 60 minutes or longer.

In 3.8% of the occurrences, participants reported that the service they tried to access did not work or that they gave up waiting for it to load. We have included these sessions in our analysis of user motivation, access to computer, and location since they do not depend on the success of the session. Most of the unsuccessful sessions did not take place in the vicinity of a computer and therefore did not allow participants to attempt to access the Internet via other convenient methods.

**Table 2.** Categories of services used during the study with no overlap between categories

Type	
News	27.69%
Mail	21.15%
Info site	15.77%
Travel/contact info	14.62%
Blog/forum	7.69%
Transactions	5.38%
Media	4.62%
Chat	2.69%
Download	0.38%
Sum:	100.00%

Table 2 gives an overview of the kinds of services used by all participants over the course of the study. The most frequently accessed web page in our diary data was Aftonbladet.se, a Swedish newspaper, accounting for 10% of the entries in the diaries. Gmail was the most frequently used Java application, accounting for 1% of the entries. In total, news was the most frequently used service category on the cell phone, followed by email.

### 4.2 Services Accessed from Both Cell Phones and Computers

In the interviews we asked participants which services they used both on cell phones and computers. News, email, and travel information were the three service groups that were mentioned most often as being used on both devices, each by nine participants.

Nine participants reported in the interview that they read news both on computers and cell phones, and eight of them read news from the cell phone during the study.

Travel information and other contact information was a service category that was also used both from computers and cell phones by nine participants. The most

common service referred to was eniro.se, an online phone book/yellow pages service that also provides maps. Five of the nine participants that said they used travel or contact information retrieval services from both phone and computer used such a service from the phone during the study.

Email was the last of the three top services that were used both on cell phone and computer, also being mentioned by nine participants. All but one of them used email from cell phone during the study.

Seven participants reported using blogs or forum services from both computers and cell phones. Five of them had reported accessing blogs or forums from the cell phone during the study.

Online banking was reported by four participants as a service they used both from computer and cell phone. All four of them used their Internet bank from the cell phone during the study.

Several of our participants reported that all the online services that they used on their cell phone, they also used on the computer.

*“Everything I use on the phone, I use it on the computer too.” (P17)*

One of them described accessing common services from both cell phone and computer, while services he only used occasionally were accessed from the computer. He also checked new services out on the computer before using them on the cell phone.

*“I use all the regular services both on the phone and the computer, but services I only use once in a while or more by impulse [I use] on the computer.” (P2)*

In some cases, participants reported that they used a service on both computer and cell phone but different service functionality. Six participants report that they only read email on the phone and saved the writing part for the computer. Two participants report the same behavior on blogs (i.e. they only comment from the computer) and Facebook.

*“Well, email and calendar I only read on the phone. On the computer I write too.” (P13)*

Differences between how participants use the services on the computer and on the cell phone can also originate from the fact that services provide different functionality on the devices. Our participants reported this for example on the betting site sven-skaspel.se.

*“On the mobile page of Svenska Spel there are fewer kinds of bets you can place, less to choose from.” (P4)*

Restricted functionality on cell phones are sometimes due to lack of support for security procedures. Our participants reported that they could not pay bills through their online bank from the phone because the security procedures were not compatible.

*“Since, on the phone, you can’t log in with the little box [that generates a secure code] so you can’t pay.” (P16)*

The set of services our participants reported using on the cell phone was a subset of the services they use on the computer. Less functionality was used on the phone, in some cases because services offered restricted functionality on the phone, in other cases because interacting with the service on the phone was considered too cumbersome.

### 4.3 Services only Used from One Device

Participants only logged their habits of Internet access from cell phone over seven days, additionally providing examples of services they had used from the computer. This of course does not present a full picture of their Internet behavior but we would still like to note several details about the services that were only used from one device during the study.

Examples of services that were reported as only having been used from the computer during the study period were ikea.se (selling home furnishing products both online and in stores around the world) and hemnet.se (advertising real estate available in Sweden). These two sites share a heavy reliance on pictures to carry important information; nobody would be interested in buying a product for the home that they could not figure out how it looked from the picture, not to talk about a house. For these types of tasks, the larger screen of the computer is very important both to convey picture information and to facilitate collaboration.

*“If I am looking for a place to stay or a new car where it’s necessary with larger pictures it’s better to use the computer. I avoid that stuff on the phone.” (P7)*

In addition, our examples of services that are only used on the computer concerns matters that often include a large amount of comparison and thought before a purchase is made. Usually, some time and effort is put into the purchase of a house or furniture and the process of doing that might be better suited both to the technical capabilities of a computer and to the home environment. It is easier to switch between different sites on the computer and longer sessions on a small device outdoors or in transit would be cumbersome.

*“I feel like it’s easier to evaluate different alternatives [on the computer]” (P13)*

Two services were reported as only used from cell phone in this study, BBC World RSS and Jaiku. The two services were used by different participants, P11 and P6 respectively. BBC World is a news service and Jaiku is a microblogging service which allows users to update their status and follow their friends’ status from the cell phone as well as a web page. What these services have in common is that the information they contain is frequently updated, which seem to be a characteristic of many of the services that were accessed frequently from cell phone in this study. The cell phone can satisfy users’ need for constant updates, or simply sate their curiosity. It is highly possible that something new has arrived since they last checked, even if that check took place just minutes ago.

In the interviews, we asked participants if there was anything concerning Internet access or Web surfing that worked better on the cell phone than on a regular computer. Many participants could give examples of things that worked better on the phone, but no one preferred the phone over the computer in general. Two participants reported that it was quicker to access their email on the phone than on the computer, a fact that they greatly appreciated.

*“You get to the email really fast with a single button press instead of going to the computer and then go to the Yahoo home page.” (P10)*

Two participants mentioned location-based services as being more meaningful on the phone than on the computer, and one of them appreciated the Google Maps functionality that shows your position on the map. That functionality is only available on the phone.

*“Google Maps know where I am on the phone.” (P6)*

One participant also reported that the cell phone version of many web pages is not affected when the desktop version has trouble or is down.

*“Sometimes the desktop version is down but the mobile version is up.” (P3)*

Our purpose has not been to provide a full comparison between participants Internet use on computers and cell phones but our material suggests that visual and explorative services tend not to migrate from the computer to the phone, while frequently updated information and/or communication services do. Finally, several participants stated that the phone is not better than the computer, but more convenient.

#### 4.4 User Motivation

Much previous research on (and commercial development of) mobile services has focused on specifically mobile situations such as travelling or walking in a city [1], as well as providing information connected to such situations, information that is often tightly connected to a user’s location [6, 8]. In our data, we certainly found that kind of use, such as cases where our participants were in a location and needed to know something specific about it (for example exactly from where their bus would leave). This sort of use was most common in outdoors situations (25% of the outdoors occasions) but less frequent in the data as a whole (15%).

However, for the majority of cases where the Internet was used on the phone, users were not mobile and did not search for information that had to do with their situation. For example, the most common motivation for Internet access was reading news (see Table 3), and this was mostly done at home.

**Table 3.** Motivations reported for Internet access from cell phone

<b>Purpose</b>	
Reading news	20.00%
Passing time	19.23%
Checking email	16.54%
Situated info search	15.77%
General info search	15.00%
Transactions	5.77%
Other	5.77%
Troubleshooting	2.31%
Sum	100.00%



In fact the top three purposes or motivations were, *Reading news* (20%), *Passing time* (19%), and *Checking email* (17%), none of which were connected to mobility or the current situation (see Table 3 for details).

The category *Situated information search* (15%) contained occurrences where participants used mobile Internet access to find information about their current situation or activity. Examples were checking the location of the bus they needed to catch, checking if it was necessary to run to catch the right bus, or finding out exactly where a meeting would take place. Most of these occurrences took place under time pressure.

*“To see if I had to run.”* (P17)

Participants reported that the services they used on the phone for their situated information searches were also used on the computer. However, they often had a different purpose when they used maps or directory services on the computer. While the use from the phone was situated, the use from the computer was more connected to planning and finding information that would be needed for future travel.

*“On the phone it’s more ‘I wanna go from here where I am right now’ while on the computer it’s more ‘tomorrow I need to go to...’* “ (P13)

The category *General information search* (15%) contains occurrences where participants searched for information not specifically connected to their current location or activity. Examples include checking next week’s practice schedule for their kids’ teams, checking tomorrow’s weather, or finding information about a vacation destination.

*“I checked my son’s practice schedule for this week”* (P12)

The category *Transactions* (6%) contains those occurrences that concerned financial matters. We did not have any cases of participants using their cell phones to purchase something over the Internet but we did have examples of placing bets, booking tickets, moving money between accounts, and checking account balances.

*“Moved money from one account to another.”* (P16)

We also had a number of occurrences that concerned troubleshooting the stationary Internet. Those occurrences took place under special circumstances, all of them by a participant whose stationary Internet connection at home was malfunctioning during the study. He used his cell phone to access the web page of the ISP to find out if there was a general problem or if the problem was with his connection. Even if this does not seem to be a representative use of the mobile Internet we note that since most users have different ISPs for computer and phone, the phone can actually be used to make the computer work.

*“Troubleshoot the Internet... again!”* (P18)

As shown in 4, in the 3% of the occurrences when participants chose a cell phone over a computer, they simply stated that they picked the phone because they wanted to use it. A closer inspection of those occurrences shows that participants sometimes found it more fun to use the phone for Internet access.

*“It’s quicker and more fun with the phone” (P10)*

The motives for accessing the Internet from cell phones are thus connected to users’ specific location and activity in only 15% of our material. The remaining 85% had other motivations.

#### 4.5 Access to Computer

As described above, only a small part of our data concerns the use of location based services or otherwise situation based Internet use. To further investigate this, we looked at participants’ access to computers. Certainly, many instances of Internet access from cell phones took place because participants did not have access to a computer. However, in 51% of the occurrences where they used phones to access the Internet, they also had ready access to a computer. Fifteen of our participants reported in their diaries that they had used a cell phone to access the Internet even though they had a computer available.

The most common reasons stated for choosing the phone over the computer were speed and convenience (24%). This explanation was particularly common in cases where mobile Internet access took place at home, where all participants had access to a computer (with the exception of one participant with malfunctioning broadband connection during the study, see Table 4).

**Table 4.** Reasons stated for choosing to access the Internet from a cell phone. No overlap between categories.

<b>Reason for cell phone</b>	
No available computer	49.23%
Convenience	23.85%
Laziness	10.77%
Other	5.38%
Internet not working	5.38%
Wanted to use phone	2.69%
Restrictions at work	1.54%
Computer occupied	1.15%
Sum	100.00%

Participants found it quicker and easier to perform certain tasks on the phone since they had the phone readily available, and often had the page they wanted to access bookmarked. Due to those factors, they needed little time and few key presses to get what they wanted. In many cases participants reported that if they would have used a computer they would have had to take it out of a bag and start it up, which was considered too cumbersome and slow.

*“The cell phone was more convenient since I was in the kitchen.” (P17)*

A special case of convenience in our data was laziness (11%), which participants mainly stated as a reason for choosing the phone over the computer when they were at home. Our participants reported that they used the cell phone to access the Internet

because they did not have the energy to get up from the TV couch, or because they did not feel like getting out of bed.

*“Didn’t have the energy to go downstairs to the computer.” (P12)*

The phone also fit better with other concurrent activities such as household chores, brushing teeth, feeding children, and watching TV.

In 3% of the occurrences, participants stated that they chose the phone over the computer because they specifically wanted to use the phone.

*“Wanted to see how the blog looked in the phone.” (P1)*

In some of the occurrences this had to do with data stored in the phone, such as wanting to send a picture taken with the phone’s camera or storing a shopping list in the phone. Preferring to create data or manipulate data on the device where it is stored is well in line with the findings from Dearman & Pierce [2] where users reported that managing information over multiple devices and transferring data between devices was a frequent source of trouble.

*“I wanted the shopping list to be stored in the phone, my memory is so bad.” (P16)*

Interestingly though, some participants were not aware of the fact that they sometimes did use their phone for Internet access even though they had access to a computer. Four participants reported in the interviews that they never used a cell phone to access the Internet if they had access to a computer, but two of these still reported in the diaries that they did. One of them (P16) accessed a recipe site from the phone at home to create a shopping list and bring it to the grocery store. Alternately, P19 used a phone to read news twice very early in the morning and did not want to use the computer because that would have awoken other family members. Two participants reported in the interviews that they would not use a phone if they had a computer unless the circumstances were special

*“Well, I guess it could happen at work where everyone can see my screen.” (P14)*

Both participants that stated that they would only choose the phone over the computer under special circumstances did so during the study. One of them (P17) had five occasions in the diary where the phone was chosen over a computer due to convenience and speed. Those occasions took place at home or in transit. P14 had two occasions in the diary, one where the phone was chosen for privacy, and the other because the information was stored in the cell phone.

As described above, our participants often chose their cell phone to access the Internet even though they had access to a networked computer. This suggests that cell phones offer advantages, such as always being close at hand and being quick to connect to the Internet. These advantages seem to outweigh their low bandwidth and tiny screen. In our material, this seems to be especially important in private situations such as the home which will be discussed below (see Places for Internet access from cell phone). We also believe that participants found that the cell phone integrates better with other activities that they are engaged in, an observation which will also be discussed later (see Activities combined with the cell phone Internet access).

#### 4.6 Places for Internet Access from Cell Phone

Our participants recorded the location of their mobile Internet access in their diaries. An analysis of the locations shed further light on the Internet use that was not location-based or otherwise situated. The classification of the locations is shown in Table 5.

**Table 5.** Locations for Internet access from cell phone, no overlap between categories

Location	
Home	30.65%
Outdoors	23.37%
In transit	22.61%
Indoors	15.71%
Work	7.66%
Sum	100.00%

Much to our surprise, *At home* turned out to be the most frequent location for mobile Internet access (31%) even though all participants had a computer with Internet connection in their home. This suggests that, for our participants, the cell phone has its own role as a device for Internet access; it is not only used in situations where it is impossible to get computer access. The mobile world extends well into the home. This is in line with the results of O’Hara et al. [11] who found it common for their participants to watch video on mobile devices at home. However, they did not report how common the video consumption in the home was compared to other locations. The most common purposes for cell phone Internet access in the home were *Reading news* and *Checking email*. Interesting to note is that *Passing time* was a less common purpose at home (11%) than in the material as a whole (see Table 3 for motivation details).

A total of 23% of mobile Internet access during the study took place *Outdoors*. This category differs from the other location categories in that the most common purpose for mobile Internet use was *Situated information search*. This was due to situations such as looking for a restaurant while walking in a city and walking (or running) to bus stops or train stations being classified as outdoors situations. We also note that *Passing time* and *Checking email* was not as common as in other locations. It is worth mentioning that this study was conducted in Sweden in May, when the weather is fairly warm. We can speculate that if the study had been conducted during the winter, participants would probably have used their cell phones less outdoors due to the cold.

Not surprisingly, *In transit* was a common situation for mobile Internet access (23%). Our participants used the Internet from their cell phones in buses, subways, trains, tramways, taxis and cars (even while driving). The most common purposes for in transit situations were *Reading news* (27%), *Checking email* (22%), and *Passing time* (22%). Both types of information search were less common in transit than as a whole (8%) which is interesting. Our participants did not seem to search very much for information that pertained to with their traveling or their destination while in transit.

The *Indoors* category (19%) contains occurrences of mobile Internet access that took place in indoors locations that was not the participants’ home or workplace, e.g. stores, cafes, train stations, and at friends’ houses. *Checking email* and *Passing time*

were the main purposes for the *Indoors* mobile Internet access, while *News reading* was not as frequent as in the other locations.

Our participants rarely used their phones for Internet access at *work* during the study; only 8% of cases (20 occurrences) were reported in the diaries and they mostly concerned *Checking email*. In total, only five participants reported accessing the Internet from cell phone at work. We had participants with no computer access at work, for example a truck driver and a nurse, and they used their phones for Internet access. In the interviews, six participants reported that their cell phone Internet access had connections to their work, but only two of them used Internet from their phone at work during the study. One reason for this might be that the phone is a tool for them to stay connected to work while they are not physically at work. Those who did not state that their cell phone Internet access had anything to do with work but used the phone to access Internet at work during the study reported work restrictions on web surfing (two participants) and that the phone integrated better with their work tasks and did not cause interruptions in the work (one participant) as motivation. Other reasons for the low frequency of mobile Internet access at work are the fact that people have little time during working hours, that many of our participants spend their working time in front of a computer, and that mobile Internet use mainly related to leisure activities.

#### 4.7 Activities Combined with the Cell Phone Internet Access

Another aspect to examine is the extent to which participants reported being engaged in other activities while accessing the Internet from cell phones. This is an important part of the use context that helps explaining the non-mobile use found in our data.

A large portion of the reported occurrences of mobile Internet access is not combined with any other activities. In 24% of the occurrences, participants reported doing nothing else, and in 13% of the occurrences they reported doing very passive things such as resting or enjoying the sun (see Table 6). This is well in line with the top reasons for choosing the phone even if there was a computer available, *Convenience* and *Laziness* (see the section on Access to Computer).

**Table 6.** Activities that users reported they were engaged in during their Internet access

Type	
Doing nothing	24.47%
Home activities	18.09%
Relaxing	13.48%
Consuming media	9.22%
Walking	9.22%
Travel	7.45%
Sending SMS or calling	4.26%
Socializing	4.26%
Other	4.26%
Work	2.84%
Shopping	1.77%
Driving	0.71%
Sum	100.00%

Attending to various *Home activities* accounted for 18% of the concurrent activities. Participants reported accessing the Internet from their phones while doing laundry, eating, brushing their teeth, and even using the toilet. For example 6% of the occurrences took place while participants had breakfast, a time when they used the phone to find information they needed to start the day such as bus schedules or weather information for deciding what to wear.

*“Had breakfast and wanted to know when the bus or subway was leaving.”* (P8)

We believe that the cell phone gives users local mobility [9] which makes it possible to combine moving around the home and attending to various chores with Internet access, as also has been shown in [3]. Users are not tied to a specific place but can go about their business and move freely in the home while having the Internet with them.

A total of 9% of the occurrences took place while participants were *Consuming media* such as watching TV or movies, reading books or listening to music, both live and on television. Many of these occurrences took place in the home, except for the live events (a live concert and a soccer game).

*“Watching a movie on the TV.”* (P4)

Walking was reported as a concurrent activity with mobile Internet access in 9% of cases. These occurrences took place mostly outdoors and were described by participants as, for example “walking back to work from lunch” or “just walking and enjoying the sun”. In those cases we cannot be entirely sure if participants were actually walking when they accessed the Internet or if they were walking but stopped to interact with the phone. In the interviews, several participants reported that they found it difficult to interact with the phone while walking, and comments about that were also made in the diaries.

*“[I] had to stop to use it [the phone]”.* (P17)

Traveling by bus, train, tram or car was a common concurrent activity (8%), not surprisingly since *In transit* was one of the most common locations for cell phone Internet access. We only had two instances where participants admitted that they accessed the Internet while driving but we suspect that in some cases participants reported being in a car doing nothing else even though they were driving. The participants that reported driving while accessing the Internet did seem to feel bad about it. There is an ongoing debate in Sweden about the connection between talking on a cell phone while driving and accidents, and maybe participants did not want to admit that they did that.

*“Driving the truck :-( “* (P2)

Our participants also accessed the Internet from their cell phones while *Socializing*. They reported talking to other people or being in social situations with friends of family in 4% of the occurrences. We even had three cases of talking on the phone and surfing at the same time.

*“Celebrated a friend’s birthday. Drinking beer.”* (P8)

As described above, participants reported little use of phone Internet access at work. They also rarely reported work as a concurrent activity to the Internet access

which means that they did not use the phone for Internet while they were working outside their workplace either. We only have one occurrence of accessing the Internet from the phone while working at home. This might be explained by the fact that most of our participants spent their working day in front of a networked computer and did not need the phone for Internet access. Another factor could be that the mobile Internet mostly concerned leisure activities and thus took place out of working hours or in breaks in work.

## 5 Discussion

Our data suggest that Internet access from cell phones certainly fits the traditional interpretation of "anytime, anywhere" usage, i.e. the cell phone is used to access the Internet in situations where users have no computer access such as outdoors and otherwise on the move and need quick information about their location. We found that 46% of the occurrences in our diary material took place *Outdoors* (23%) or *In transit* (23%). However, only 16% of the total number of occurrences was *Situated information search* reported as the purpose of the Internet access. This means that Internet access from cell phones certainly covers situated information search in traditional mobile situations, but it also covers much more. The most common place for Internet access from cell phone in our material was the *Home* (31%), which suggests that the mobile world does not only embrace users in transit and otherwise on the move, but also extends into the home. In other words, it is almost as likely to be used on the couch in front of the TV as it is on the move. In 84% of occurrences, participants also reported purposes for their Internet access other than situated information search. We believe that this opens up the design space for mobile services to include much more than the location-based service paradigm that has dominated the discussion on mobile services for the past few years.

One of the main explanations for why our participants used their phones to such a high degree for Internet access even though they had access to computers is clearly described in the diaries. Repeatedly, participants report that they chose the phone even though they had a computer because it was more convenient with the phone. Usually, participants had the phone in a pocket or otherwise close by so they could pick it up and access the Internet without having to drop what they were doing or leave the place they were to go to a computer. They also reported that the phone was always on and quick to connect compared to a computer that needed to start up or that was stored in a bag. Quick access and convenience made our participants choose a cell phone over a computer in 51% of our diary occurrences, and thus seem to have compensated for the hardware limitations of the phones such as screen size, key pad restrictions and network speed. As one of the participants put it

*"Nothing [to do with Internet access] is better with the phone, but more convenient."* (P15)

The cell phones also allowed participants local mobility, i.e. moving around for example in the home, making it possible for them to integrate Internet access with other activities. This was particularly obvious for the occasions that took place in the home, where users often combined Internet access with chores such as doing laundry

or cooking, social activities such as watching TV with other family members, or brushing their teeth. All these activities either require certain mobility within the home, or occur in places where it is uncommon to have a computer. From this perspective, it would be interesting to know how many of our participants had laptop computers and wireless Internet connectivity in their homes. That would allow us to determine if the cell phone was the only device at home that allowed them local mobility. Unfortunately, we do not have that information about our participants. However, the cell phone does allow more local mobility than, for example, the laptop computer, since it does not need a flat surface to place it on to interact with it.

As described in the findings, the average Internet access session from a cell phone during this study was 12.6 minutes, and many of the sessions were as short as 30 seconds. However, we found it interesting that even though many sessions were very short, participants only reported being in a hurry in 20% of the occurrences. We believe that this is connected to what has previously been described as the main advantages of the cell phone when it comes to Internet access: *speed and convenience*. Our participants did not use Internet on their phones for short time spans because they were in a hurry, but because the phone works very well to quickly check email or read a few news headlines. If there is a minute or two to spend surfing instead of waiting or simply being bored, the phone does is ideal.

Participants described differences between their Internet access behavior on the cell phone and on the computer. They reported that they were not “sucked into” the phone in the same manner as with the computer. They reported that when they sat down in front of the computer to do something quick on the Internet the session could easily extend to an hour without them noticing it. This hardly ever happened when they accessed the Internet from the cell phone. They described it sometimes as “it is much easier just clicking around on the computer than on the phone”. We believe that the main reasons for these differences are that the computer has much more visual power to capture users’ attention and also that the computer is used in environments that in general are calmer and less invasive than the environments where the phone is used. We believe that this is true also for the use in the home, where it is common that a desktop computer is placed in a study or in a bedroom while our data shows that the phone is used in front of the TV with the rest of the family, in the kitchen and in other more distracting situations.

In this study, it seems that what the most popular and most frequently used services from a cell phone have in common is that they are updated continuously, such as email and news sites. The capacity of these services to trigger users’ curiosity and (perceived) need for constant awareness seem to combine very well with the capabilities of the cell phone.

## 6 Conclusion

We have reported on a diary study of Internet access from cell phones with a primary finding that 51% of the reported occurrences took place in locations where participants had access to a computer but still chose a cell phone. Additionally, the most



frequent location for mobile Internet access was the home. Even though these results need to be validated in further studies, this suggests that, for frequent users such as our participants, the mobile world extends well into the home and that the cell phone has its own role as a device for accessing the Internet. For them, the phone is not a mere backup solution for when there is no computer available, but a tool that often provides quicker and more convenient service than a computer. Moreover, the local mobility provided by the phone allows users to integrate their Internet access with other activities such as home chores or social activities.

Our participants also stated the typical mobile example “finding out something about the location you are in” as a reason for accessing the Internet from a cell phone, but those situations only constitute 15% of our material. The remaining 85% suggests that there is room for a wide range of on-line services for cell phones that are not specifically designed for mobile situations or connected to users’ immediate activities.

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