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# EYES ON THE FUTURE

WHY SWEDEN IS AT THE VANGUARD OF THE DIGITAL REVOLUTION

## INTRODUCTION

From listening to music on the internet to renewing a prescription, digital technology is becoming part of our daily lives. In this report, we ask why Sweden is so advanced when it comes to digital innovation and explore the impact of new technology on banking, healthcare, government and transport. Plus, with technology continuing to evolve at a rapid pace, we ask digital experts and entrepreneurs to predict some of the changes that lie ahead.
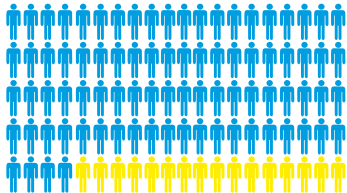
# LOOK WHAT I CAN DO WITH MY MOBILE

**Sweden has been a world leader from the outset when it comes to mobile phones – and the innovations just keep on coming**

▶ **You heard it here first**

Sweden is a world leader in mobile innovation. It's been that way ever since Ericsson manufactured the first GSM radio base station in 1991.

Innovation is still in vogue in Scandinavia, as Stockholm and Oslo recently became the two first cities in the world with publicly available 4G networks

## BUYING TICKETS AND GOODS USING MOBILE PHONES HAS BECOME MAINSTREAM

(also known as LTE, which stands for long term evolution). LTE raises connection speeds to 100 megabits per second (Mbps) or more. To give you an idea of how fast this is, a home broadband connection of about 15Mbps is currently considered

"Life became much easier when I started using my mobile to pay for parking. I don't have to look for a meter and — even better — I don't have to worry about getting fines!"
Åsa Douhan, 28, project manager, Stockholm

pretty speedy. Getting LTE is a bit like swapping a scooter for a Ferrari.

What this means for you is the possibility of real-time video conferencing and television on your mobile, high-speed internet access, eBanking and real-time location and navigation services using applications such as Google Earth.

It's sometimes hard to imagine what we did before we had mobile phones. New applications are arriving every day. Take the free music application Moodagent (www.moodagent.com), which creates instant playlists straight from your music library to match your mood. Within just a few months of its launch, it had become one of the most frequently downloaded applications for both the iPhone and Nokia handsets.

### The power of text

Buying tickets and goods using mobile phones (known as mTicketing and mPayment) has also become mainstream. A simple text message enables you to buy bus and train tickets, or book a class at your local gym. Buying

an SJ ticket on the internet means that you don't need a paper ticket at all – you just show the inspector the eTicket on your mobile when you're on the train.

Meanwhile, Selecta, which owns snack machines all over the Stockholm Metro, recently introduced mPayment, so you can now get a cold Coke or a sandwich in the middle of the night, even if you have no cash on you.

### Sign up for mobile banking

Sweden was one of the first countries to introduce mobile signatures, with programs piloted by both Telenor and Telia Sonera. Telenor customers can log in securely to online services using their phone for authentication and digital signing, while a consortium of banks and mobile operators is working on a mobile signature service infrastructure for banks to authenticate online banking users.

## INNOVATION AT A GLANCE

**Five cool things you can do on your mobile:**

▶ mPayment – just wave your phone in front of a special reader

▶ Facial recognition - point your phone at someone to get their contact details

▶ Augmented Reality – AR adds layers of data over the live video on your phone

▶ Social gaming – compete against your friends while you're on the move

▶ Video conferencing – you can see your friends while you talk to them

▶ Mobile signature – for security when using online banking services

# THE **DIGITAL** DOCTOR WILL SEE YOU **NOW**

**When it comes to eHealthcare services, Sweden leads the world**

▶ **Do you need practical advice on a medical condition?** Or maybe you want to compare health centers in your area and find out what other users think of them. Either way, 1177.se is there to help. It's a public service website supplying healthcare information to Swedish citizens – and it's the first such network in the world.

The website is jointly owned by all Sweden's counties and healthcare regions, and is a resource that anyone can turn to when they need trustworthy, professional advice on care and illness, wherever they are in the country. It's closely connected with the 1177 telephone information service, as both are based on the same medical database.

1177.se is a product of the Swedish National IT Strategy, first formulated in 2006, whose main purpose was to pave the way towards better healthcare. This led to the Patient Data Act, which streamlined all hospitals' patient record systems, as well as the infrastructure needed to securely log in to these systems.

## Healthcare across borders

In early 2010, the National IT Strategy increased its municipal focus. Several new services were introduced, and Inera AB (formerly SVR), a software company jointly owned by the Swedish counties, was commissioned to implement them.

A further result of this initiative is the National Patient Overview (NPÖ – www.npö.nu), a new portal enabling doctors and medical staff to read patient records across municipal and county borders. The doctors log in with the electronic SITHS Card to guarantee absolute secrecy when handling patient data. This will greatly enhance patient safety and make the staff's job easier and less time-consuming. However, SITHS Card or not, the patient's consent is still necessary before any doctor is able to access a patient's history, says Lars Petter, a spokesperson for Inera AB.

## Stockholm's digital lifesavers

Another innovation is the SMSLivräddare (Text Message Lifesaver) project. Every year, some 900 Stockholmers suffer heart failure when out of reach of a hospital. Most do not survive. In April 2010, the Södersjukhuset hospital and Karolinska Institutet introduced SMSLivräddare, where people in Stockholm with cardiopulmonary resuscitation (CPR) knowledge can use their skills to help.

SMSLivräddare is a unique project that uses GPS tracking to increase the chances of survival in the case of heart failure outside hospitals. When the emergency services receive an alarm about a possible heart failure, a member of the project will be directed to the distressed person via their mobile phone. So far, about 1,000 potential lifesavers have signed up, vividly demonstrating how technology can be used in ways that could never before have been imagined.

NUMBER OF PEOPLE WHO HAVE SIGNED UP TO THE TEXT MESSAGE LIFESAVER PROJECT

1,000

"It's a relief that I don't have to talk to my doctor every time I need to renew a prescription. I just use my personal code and send her a message online. The pharmacy has it ready for me to collect the next day."
**Monica Nilsson, 52, freelance journalist, Åmål**

9:00am

# GOOD MORNING, STOCKHOLM...

**Digital technology is now everywhere in our daily lives. Susan Rose's personal diary gives us a glimpse of a typical morning for her family**

▶ **7:30am.** My teenage daughter, Cecilia, is barely awake – but she's still sending her homework to her teacher via the school's ePortal. Over breakfast, she looks at the new assignment she's been set. As usual, it's been posted online.

▶ **7:45am.** I shout up to my 16-year-old son, Silas, to get ready for school. No reply! Because, of course, he's got his headphones on. He's listening to the Spotify playlist he downloaded to his iPod touch yesterday evening, while on Facebook and watching TV. Kids seem pretty good at multitasking these days!

▶ **8:00am.** My husband, Bertil, is checking the traffic on his iPhone. It's his morning ritual – today he's trying to avoid the jams on the way to the airport. Last night he checked in on the airline's website: it'll save him a good few minutes when he gets there.

▶ **8:30am.** Cecilia texts me before school starts. When she got to the subway station, she realised she'd left her SL-card at home, so she used her mobile phone to buy herself an eTicket instead.

At least she remembered her lunch card! Like all her schoolmates, she's got an ePurse card that she uses in nearby restaurants. It means she can buy a meal up to a certain time – and up to a credit limit, too.

▶ **9:00am.** I call my mother – it's part of the routine. She's 81 and lives in Skåne. Since her hip surgery, she finds it hard walking to the shops. Now she uses the laptop we gave her for Christmas to order her groceries online, and gets them delivered right to her door. At least it eases my conscience about being so far away from her.

▶ **9:15am.** I log on and read my emails. I'm a writer, so I can work just as well at home or in the office. With superfast broadband speeds available in most cities, and with internet-based editing systems, it doesn't normally matter where I or my colleagues actually are. I love the fact that I can spend my entire working day at home and yet still meet my publishing deadlines.

Tomorrow, though, I will go into the office for once to have a videoconference with my colleagues throughout Sweden. It will be nice to have a coffee and a chat with my workmates, too – email and text messages are great, but sometimes there's no substitute for having a real face-to-face conversation!
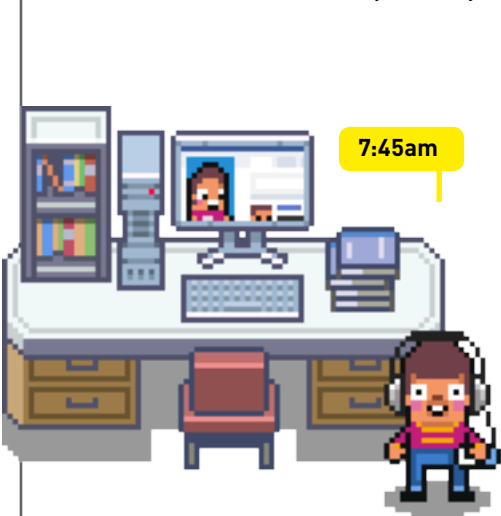
7:45am

8:00am

9:15am

Lunchtime!

# TOMORROW'S BANK **TODAY**

**Nordea's in-house futurologist, Martin Ogarp, shares his vision of the future of online banking**

▶ **Martin Ogarp specializes in strategic support and analysis at Nordea**, but he prefers to see himself as the bank's 'crystal ball': it is his task to look into the future and predict what customers will want.

"Customers have come to expect online access to their bank, and it has to be a high-quality service," he says. "Our philosophy, and the starting point of Nordea's eBanking initiative, is that all interactions with the bank should be able to be carried out however the customer chooses."

To this end, Nordea has deployed a whole suite of security solutions, all based on a security token supplied by Todos, a member of the Gemalto group. The token is combined with a smart card and

customers can use it not just to log in to Nordea's online banking service but also to make online tax declarations, report illness to the Försäkringskassan (social insurance agency) and make internet purchases via the 3D Secure solution.

## Keeping your money safe

Online banking has reduced the hassle of going into a branch, making it easy for consumers to carry out transactions such as bank transfers. Consumers do need to be sure that their money is safe, however.

"We have other, simpler solutions as well, but our aim is to channel everything into the high-security solution," says Ogarp. "Most of our competitors are using the BankID certificate for eBanking over mobile phones, but we would prefer to avoid storing secrets in the mobile. The overall security of today's mobile phones is very low. There is no protection or control of the software environment in a mobile, and even if we haven't seen any significant virus attacks yet, it's bound to occur."

(This is very different when the application resides on the SIM card, which is a secure and trustable environment in which to run such services.)

"Mobiles simply aren't mature enough, although the technology is rapidly evolving, and I'm sure we'll have fully fledged security solutions in place soon. As proof of this, we've just launched our new iPhone app, enabling users to get an overview of their account, make payments and so on."

Looking into his crystal ball, Ogarp predicts: "I'm sure that the mobile phone will be an acceptable payment instrument very shortly, although I believe the security solutions will be in place before

## THE MOBILE PHONE WILL BE AN ACCEPTABLE PAYMENT INSTRUMENT VERY SHORTLY

the payment solutions. This is because the mobile phone can be used as a tool for two-factor authentication [a security system that combines something you have, such as a smart card, and something

you know, such as a password], yielding a markedly increased security level."

"The problem with the mobile has traditionally been that you can use it for a lot of things," concludes Ogarp. "We have to cut through the hype to give customers exactly what they want."

# KEEPING IT SIMPLE

**It might not always feel as if the government is trying to making your life easier, but when it comes to eGovernment services, it certainly is**

▶ **'eGovernment' sounds rather like something out of George Orwell's 1984.** But in fact, there's nothing to be scared of: when it works well, eGovernment is all about making life simpler for you.

The Action Plan for eGovernment in Sweden aims to create 'the world's simplest administration', reducing paper work and giving you instant access to services without having to go to your municipal offices. It wants to make it as easy as possible for as many citizens as possible to exercise their civic rights and fulfil their obligations. The idea is to create a public administration based on the needs of the people in order to achieve significant changes in their daily lives. How? By making the most of digital technology.

A great example of this is the Migration Board's online service for people interested in applying for Swedish citizenship. The first electronic citizenship application was approved in April 2010.

## Not so taxing after all

Another example is the tax return service. All taxpayers have to do is to report a number via a phone call or a text message, or tick a box on the Tax Authority's website.

The groundwork for this service was laid several years ago, when the Tax Authority started to simplify tax declarations by collecting information about everyone's income, tax payments, assets possessed, bank statements and other public information, and then compiling our tax return form for us.

Since then, the burden for most people has been reduced to signing the pre-filled-in form – more than four million Swedes did so this year.

But it doesn't stop there. The Tax Authority has a host of other eServices for companies and the public alike, all designed to simplify tax, income and VAT reporting. This is typical of the way in which eGovernment is helping to make people's lives easier.

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**JUST FOR YOU**

**Five useful things that Swedish citizens can do online...**
▶ Apply for social security benefits
▶ Enrol in higher education
▶ Request a copy of a birth certificate
▶ Report a theft to the police
▶ Search for jobs through local labour offices

**... and five eServices for businesses**
▶ Register a new company
▶ Make customs declarations
▶ Manage social contributions for employees
▶ Make VAT declarations
▶ Submit data to statistical offices

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"The internet is a real boon for businesses. For instance, I take care of tax returns, VAT and payroll taxes by exporting the files from my computer direct to the Tax Authorities."
**Max Svernlöv, 41, company accountant, Malmö**

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## THE STORY SO FAR

**Milestones in the history of eGovernment:**

▶ **1997** – the launch of Government e-Link, an initiative to drastically reduce the cost of exchanging information among public authorities by standardizing processes and using the internet.

▶ **2000** – Sweden sets out to become the first country to be an 'Information Society for All', with public information and services available electronically 24 hours a day, seven days a week.

▶ **2006** – the National Strategy for eHealth is announced. Citizens, patients and relatives will get access to comprehensive information on healthcare, while care professionals will get efficient, interoperable eHealth solutions.

▶ **2009** – Sweden is one of 34 European countries to sign the Malmö Declaration, setting out ambitious goals for eGovernment, to be achieved by 2015.

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# BLAZING A
# DIGITAL TRAIL

**Digital entrepreneur Rick Falkvinge gives his view on why Sweden is a technology hotbed**

▶ **Over the past 10 years, Sweden has been the source of some major technological developments that are now used by millions of people worldwide.** Many of the most successful innovations have been social tools, such as internet telephone service Skype and Stockholm-based music streaming service Spotify.

The Spotify model has harnessed a voracious appetite for sharing free culture online to create a legitimate alternative to online piracy. The entertainment industry might never have embraced this possibility, however, without the likes of The Pirate Bay (the controversial file-sharing site) forcing labels and studios to confront the future. Both sites are part of an ever-fertile technology community in Sweden's melting pot of expertise, experience and innovation; Stockholm is, in attitude and actuality, the capital of a new virtual world.

## Disruptive technology

So what is it about Sweden that makes it such fertile ground for technological innovation? Digital entrepreneur Rick Falkvinge believes that it comes down to a combination of social and technological trends.

"Although there are many theories about why Sweden is somewhere between 18 months and five years ahead of most other countries, I'd like to present my own personal theory," begins Falkvinge. "When you look at history, disruptive technology has always preceded a shift in entrepreneurial and social values. In Sweden, broadband was rolled out by private entrepreneurs who fibered apartments, whereas in most of the rest of Europe, it was rolled out by cable and telecom companies. I had 10-megabit full-duplex internet in my apartment as early as 1998. Across Europe, many people still don't have that. When this kind of disruptive technology becomes widely available – not just to techies but to everybody – the public perception of how it could and should be used starts to change."

## Citizen power

Falkvinge observes that the advent of home broadband has altered the balance of power in a country that has a long history of structural collectivism. "These collective structures lose their influence when, thanks to the development of broadband internet, everybody can suddenly and easily raise their individual voices in different forums," points out Falkvinge. "This more individual approach is a key driver for new high-tech developments."

## IN SWEDEN, WE DO NOT SEE DEVELOPMENT AS A THREAT; INSTEAD, WE BENEFIT FROM IT

Sweden's strong democratic principles have also helped it to reap the benefits of new technology. Although broadband infrastructure is more widespread in Japan, for example, the country's conservative tendencies tend to put a brake on technological innovation led by individuals, whereas European countries generally encourage experimentation. "This is especially the case in Sweden, where we support curiosity, openness and a willingness to experiment," concludes Falkvinge. "We do not see development as a threat; instead, we benefit from it."

# EUROPE **WITHOUT** BORDERS

**The European Union wants to make it easier for citizens to live and work in any of its member states – and the internet is at the centre of those plans**

▶ **Would you like to study in Spain, work in Hungary or maybe retire in Italy?**
Thanks to Sweden's membership of the European Union (EU), you have a right to settle and work in any member state, though it's still not that easy. Apart from the potential language barrier, it can be difficult getting access to your healthcare information in a new country, for example, or using public services across borders.

The EU is keen to develop secure cross-border services and is relying on 'eGovernment' – the use of information and communication technology to improve government services – to achieve this. If the member states were able to exchange information electronically, via the internet, it would make collaboration much easier.

### Hit and miss
When it comes to eGovernment, Sweden is fairly advanced by comparison with most other countries around the world. But even so, it's still been rather hit and miss.

"We are good at developing things, but not at seeing things from a citizen's perspective,"

says Anna Kelly, the e-strategist for the city of Solna. "Right now, I'm missing the political vision."

Something radical was clearly needed – not just in Sweden, but also across Europe – and the result was a joint declaration by 34 European countries, made in Malmö on 18 November 2009, with set objectives to be achieved by 2015.

The reasons for this Malmö Declaration are simple: member states need to deliver improved public services with fewer resources, and eGovernment works better if there is a culture of collaboration and if administrations can easily exchange data. Imagine that you are a French citizen living in Sweden but working in Denmark – you need to know that you will not encounter administrative barriers in your daily life.

### Universal access
The Declaration states that all EU citizens should be able to apply for eServices in the EU from any country, electronically; this will compel all

## WE AREN'T ALWAYS GOOD AT SEEING THINGS FROM A CITIZEN'S PERSPECTIVE

member states to work together to create common portals and electronic document formats. "This is one of the forces behind the accelerating tempo of change," says Magnus Enzell,
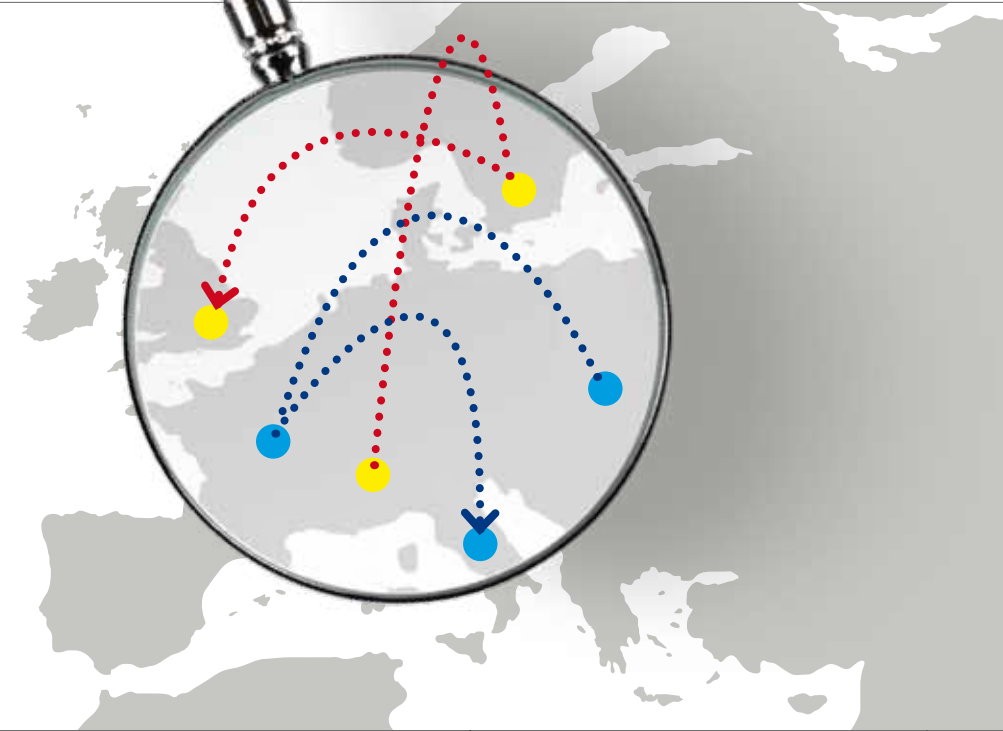
Chairman of the government's Cabinet Office group for e-subjects.

Swedish e-delegation chairman Mats Odell regards the current eIdentity system, which uses downloaded security certificates, as inefficient, inflexible and expensive, since it prohibits the use of public computers for sensitive tasks. Instead, he proposes a central ID store where the person requesting identification can confirm their identity, securing their personal data. This will prevent personal details from being stored everywhere.

"The switchover to einvoicing showed how quickly we can get things done," says Enzell. "Many thought it was impossible, but we beat our deadline."

One obstacle is that the EU doesn't have jurisdiction over any individual country's administration. However, it should be in all member states' interest to increase efficiency, lower operating costs and improve mobility.

All this means that when that job opportunity crops up in Barcelona, Budapest or Bologna, you won't need to think twice about taking it.
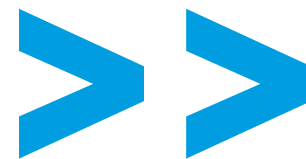
▶ POPULATION: 9,347,899 (EU: 501,259,840)

▶ AREA: 449,964km² (EU: 4,324,782km²)

POPULATION DENSITY: 20.6/km² (EU: 115.9/km²) ◀

ANNUAL POPULATION GROWTH RATE: 0.82% ◀

▶ GDP PER CAPITA: $43,986 (EU: $33,052)

▶ LIFE EXPECTANCY AT BIRTH: male 78.59 years; female 83.26 years (EU: male 75.54; female 81.97)

# SWEDEN IN NUMBERS

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# GO **FIGURE!**

**>>**

**25%: the approximate percentage of companies with 10 employees or more that have a policy stipulating that long-distance meetings should always be held by telephone, web or video if possible[1]**

# 2 MILLION

**The number of members of the auction site Tradera. It has more than three million visitors each month and, on a typical day, almost one million people are active in auctions on the site[3]. Tradera has recently launched an iPhone application to increase usage of the auction site even further**

**3.55 million: the number of mobile phones sold in 2009 – a new record for a single year. The estimated total for 2010 is exactly the same[4]**
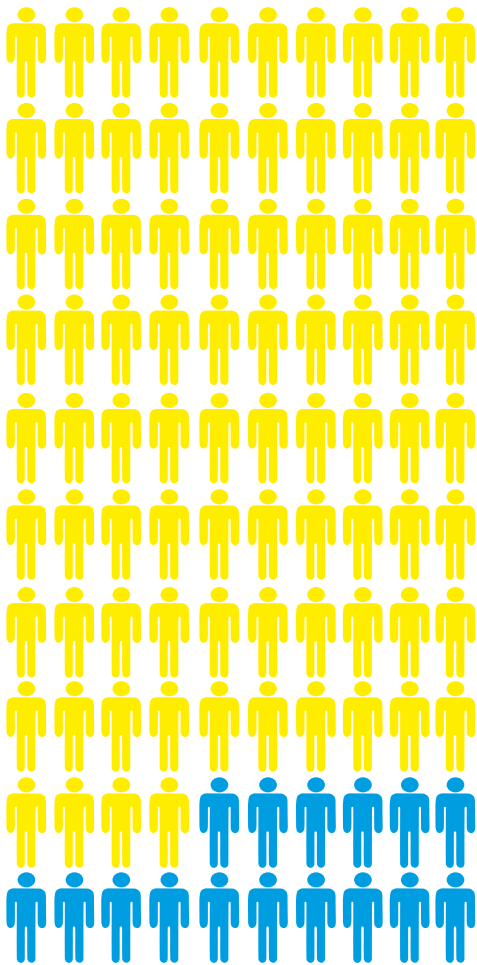
## THE PERCENTAGE OF FIVE-YEAR-OLDS WHO HAVE ALREADY USED THE INTERNET[2]

# 50%
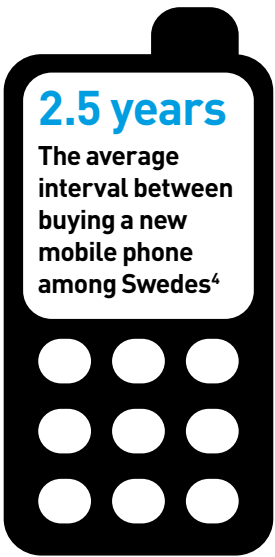
### 2.5 years

**The average interval between buying a new mobile phone among Swedes[4]**

**84%: the percentage of households with broadband internet access, as of 2008, compared with an EU average of 60%[5]**

**90%: the percentage of high school students who say that teachers have told them to be sceptical about information they find on the internet[6]**

# 4,284,665

## THE NUMBER OF PEOPLE WHO MADE THEIR TAX DECLARATION ELECTRONICALLY THIS YEAR[7]

# 3.8%

**The percentage of Sweden's gross domestic product accounted for by expenditure on information and communications technology, compared with an EU average of 2.7%[5]**

# 45.1%

**The percentage of individuals who, as of 2008, had used the internet to obtain information from the public authorities; 29.1% had downloaded forms and 25.8% had returned completed forms[8]**

**Sources:** [1] Statistics Sweden, 'Use of Computers and the Internet by private persons in 2009', published 2010, [2] World Internet Institute, [3] Tradera, [4] Mobiltelefonbranschen, [5] European Commission eGovernment Benchmark Measurement, November 2009, [6] Skolverket, [7] Skatteverket, [8] Eurostat

# WHAT'S NEXT?

**Swedish companies are constantly innovating in a wide range of areas – so what's on the horizon for digital technology?**

## 400,000
### NUMBER OF CARDS SWIPED IN THE STOCKHOLM AREA EVERY DAY

### ▶ Flexible tickets

Every day, some 400,000 cards are swiped on card readers in the Stockholm area. Storstockholms Lokaltrafik (SL), the Greater Stockholm commuting transport company, has been issuing contactless tickets for some time. They're manufactured and, in the case of cards purchased on the internet, pre-activated by Gemalto. Almost all 30-day passes sold nowadays are electronic 'Access' cards. One card covers the whole of greater Stockholm, however you choose to travel. The tickets can be topped up at any major subway station from credit card-operated ticket machines. No stamping, printing or verifying is needed, so you just wave your pass at the barrier and the only worry you have is whether the train will be on time.

### Any time, any place

"SL tickets used to have fixed, inflexible validity periods, but this will soon be gone, replaced by arbitrary start and end dates," says Sara Broberg, SL's Sales Manager. "There won't be any more annual passes, season tickets, or monthly passes as such. It will be great for students who want to cycle during the summer, for example. They'll be free to activate their tickets as the weather demands.

"Another upcoming possibility will be to upgrade your ticket or add more single fares on the same card. And it doesn't matter if you have several fares loaded: the system will use up the oldest tickets first."

### ▶ The direct way to save energy

Netpower Labs AB has found a new and energy-efficient way of powering data centers using direct instead of alternating current.

"The IT sector spews out some 3% of all the carbon dioxide in the world," says Netpower CEO John Åkerlund. "Back in 2000, no one was talking about energy efficiency and energy cost wasn't an issue in any installation. Today, the carbon dioxide problem and increasing energy costs have put energy efficiency at the top of the agenda. Using our direct current [DC] units gives you more stable power, cuts carbon emissions and saves you money." Indeed, one academic paper estimates that the total cost of operating a data center on direct current is between 10% and 30% less than the cost of running it on alternating current.

### Healthy spiral

"A few percentage points may not sound like much, but if a company is using, say, a megawatt per day, then the daily savings of tens of kilowatts will all add up," Åkerlund continues. "Server technology is going in the direction of DC power, but much more can still be done. Air conditioning and cooling units can also be DC-powered, and the savings could be even greater. And with reduced power consumption comes reduced heat generation, and reduced power for cooling, which lowers the power consumption even more. It's a healthy spiral."
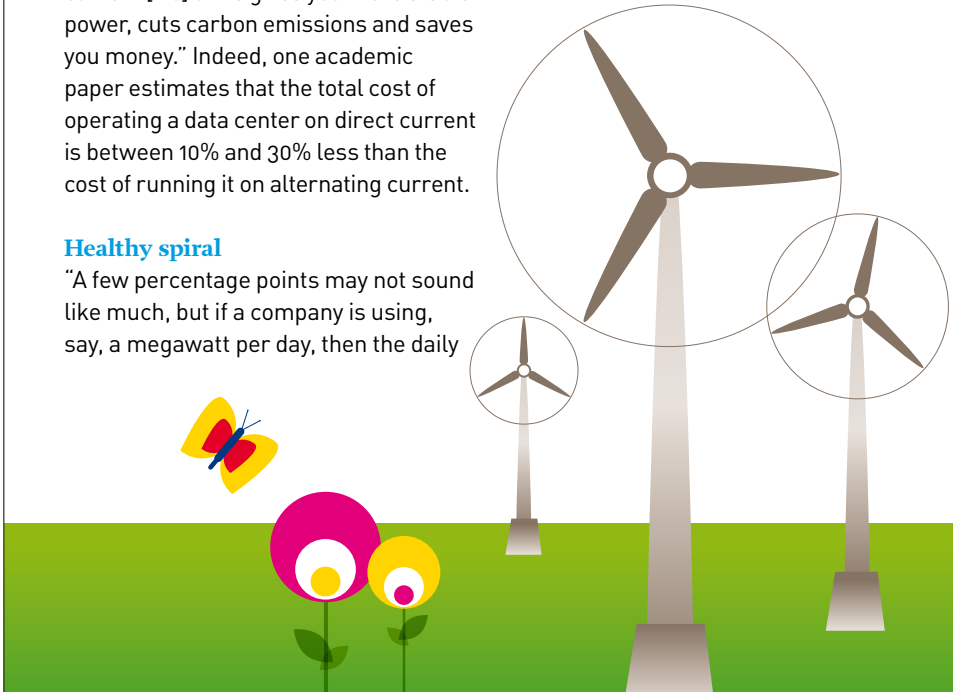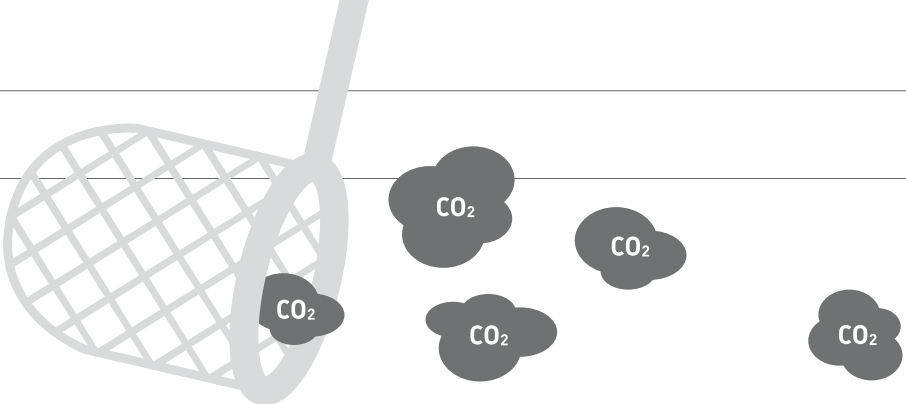
### ▶ Stop sneezing now!

Pollenkollen is a new iPhone app that delivers information about pollen levels to hayfever sufferers. It can even be personalized to sound an alarm if the user's special type of pollen is predicted to rise above a dangerous level.

"We want to make it easier for our customers to lead a good life," says Eva Fernvall, Brand Manager at Apoteket AB, the firm behind Pollenkollen. "And it's easy to provide them with good service and consultation through a mobile app, when they need it most. Pollenkollen is our first, but we're looking at several other apps and services for all mobile platforms."

"Using the internet, I can order clothes and pay for them through my internet bank. It means I don't have to stand in queues — and it stops me making impulsive last-minute buys."
**Maria Sahlin, 32, postgraduate student, Trollhättan**

## PHONEKEY WORKS WITH ALL SORTS OF PHONES AND IS LIKE HAVING A PADLOCK ON YOUR CREDIT CARD

### ▶ A padlock on your credit card

Phonekey is a new service that enables you to lock – or rather, not unlock – your credit card, debit card, cash card or internet account. This services as a defence against digital muggers.

"People don't want to download special security applications to their mobile phones because they're too complicated," says Phonekey founder Tonie Söderström. "Our technology secures all sorts of cards very simply. Users install the Phonekey software on their computer, then choose a phone number. Once they call it, a time window opens during which they log in, finish the transaction or use their card. When the window closes, the card is unusable, whether or not they have the PIN.

"Not having to download any applications has some significant advantages. It works with all sorts of phones, even old junk mobiles as well as landline phones. It really doesn't matter if someone finds, sniffs or phishes your bank account details. Phonekey is like having a padlock on your credit card."

**SEB BANK**

LOG IN
PASSWORD

### ▶ A bank on your phone

Stockholm-based financial group SEB Internet Bank has developed a new app that allows customers to get statements and keep an eye on the stock market without having to find the bank's website or use special codes.

"About two thirds of the people accessing our mobile bank are using an iPhone, but of course we're designing an Android app as well," says Anders Carlström, manager of SEB. "For the future, we've identified the three functions that our customers want most, and we'll try to realise them this autumn: simple login to the mobile bank, securities trading, and various kinds of payment."

## 2 out of 3

**PEOPLE WHO ACCESS SEB MOBILE BANKING ARE USING AN IPHONE**

1234  5678  1234  5678

A N OTHER