Denmark's Digital Growth 2013

Policy Statement to the Danish Parliament

May 2013

The Danish Government

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1. The Digital Growth Potential: Danish Strengths and Challenges

Companies that develop and market digital products and services make valuable contributions to the Danish economy through job creation and growth. At the same time the use of ICT and digital solutions strengthen Denmark's competitive edge through stronger innovation and productivity. Finally, ICT provides opportunities for new business models and areas of growth.

The use of ICT by businesses and the opportunities offered by the Internet in terms of products, services and processes accounts for as much as 10 percent of GDP growth in selected countries over the past 15 years and for more than 20 percent of the growth of the past 5 years[1].

This trend is also visible in Denmark, where the digital economy has grown in importance year over year. From 2000 to 2007 the average annual contribution from investments in ICT accounted for 37 percent of the average growth in labour productivity in the Danish market economy[2].

New technology does not only substitute labour or make the individual worker more productive. For each job lost in the digital economy to the Internet and the effects of digitisation 2.6 jobs are created by the opportunities that arise[3].

International studies

Denmark is ranked among the top-performing countries in a number of international studies. In 2013, we were ranked eighth in the World Economic Forum's Networked Readiness Index, which measures and benchmarks trends across 140 economies. This is a fall from 2012 where Denmark was ranked fourth with Holland, Norway, Switzerland and the UK surpassing Denmark in the rankings[4]. Furthermore, our digital infrastructure is strong. 3G mobile coverage is among the best in Europe [5]. And Denmark is ranked in the top-3 in the OECD in terms of the number of broadband connections per 100 inhabitants [6].

Challenges

The ICT industry's share of total Danish exports has declined, however. And productivity in the ICT industry has been flat in recent years. There is also a substantial untapped potential for digitisation and automation across Danish businesses, in particular among SMEs. We also find differences in the digital infrastructure at regional and local levels. Mobile coverage and broadband speeds are below standard in some areas causing problems for both companies and citizens.

The Government has launched 22 initiatives through an action plan for "Better Broadband and Mobile Coverage throughout Denmark". These initiatives will contribute to a more effective digital infrastructure, which will allow companies and citizens to fully reap the benefits of digitisation.

Growth Team for ICT and Digital Growth

Furthermore, the Government has established a "Growth Team" for ICT and Digital Growth. The Growth Team has been commissioned to submit a number of recommendations for strengthening digital growth in Denmark.

GROWTH TEAM FOR ICT AND DIGITAL GROWTH

The Government's Growth Team for ICT and Digital Growth is comprised of 12 experienced business leaders, entrepreneurs and knowledgeable individuals from the Danish ICT community.

The Growth Team has been commissioned to come up with ideas to support ICT strongholds in Denmark and to strengthen the competitive power of Danish companies through the increased use of digitisation. Among other things, the Team will look at the opportunities and challenges of internationalisation, at research and innovation, at skills and education, at the public sector's role in digitisation and open data, as well as at digital entrepreneurship and the use of ICT in SMEs.

The Growth Team is expected to present its recommendations to the Government in the fall of 2013. Following this the Government will introduce a growth plan with a number of concrete initiatives to address the recommendations.

2. The ICT Industry: A Sector with Digital Growth Potential

Compared to its size the Danish ICT industry makes tangible contributions to employment, value creation and investments in the Danish private sector. Furthermore, the ICT industry plays an important role as a driving force in other industries. It delivers solutions that support digitisation in the private and public sectors. More than 60 percent of its production value is used as input in other companies[7]. And, companies in the ICT industry are relatively more innovative compared to other industries.

However, the ICT industry is challenged by stagnating added value and lagging exports. Denmark is also challenged in terms of creating, attracting and retaining digital entrepreneurs as well as growth contributions from international ICT companies.

The ICT industry makes important contributions to the Danish economy

The ICT industry in numbers

The Danish ICT industry numbered close to 12,000 companies in 2010 within manufacturing and marketing of ICT products, ICT services and telecommunications. Total employment was 83,000 work years, a decline of 4 percent from 2007. From 2007 to 2010 the share of the Danish ICT industry in terms of the total number of companies, total work years and total net investments has grown.

Table 1

THE ICT INDUSTRY AND THE DANISH ECONOMY					
	ICT Industry		ICT Industry's share in percent of total businesses*		
	2007	2010	2007	2010	Trend 2007-10
Number of companies	10,121	11,650	4.4	5.2	0.8
Work Years	86,245	82,890	6.3	7.1	0.8
Turnover (Million DKK, fixed prices 2007)	207,327	173,358	6.6	6.3	-0.3
Exports (Million DKK, fixed prices 2007)	38,108	34,674	5.1	4.5	-0.6
Investments, net (Million DKK, fixed prices 2007)	8,213	11,315	5.9	9.9	4.0
Added value (Million DKK, fixed prices 2007)	70,112	67,243	8.5	9.1	0.6
Labour Productivity	2007	2010			
ICT Industry (thousand DKK)	813	811			
Other industries (thousand DKK)	591	615			

*) "total businesses" = non-agricultural industries; i.e. private businesses minus primary industries.

- *ICT-services* is by far the biggest sub-sector covering 85 percent of all companies. The sector covers a broad spectrum; from software development and data management to consulting services and repairs. The sector has close to 10,000 companies with employment totalling 48,000 work years.

- *Wholesale of ICT-equipment* (computers, software, electronic equipment etc.) account for 9.5 percent of the total ICT industry. The sector numbers 1,100 companies and employs 13,000 work years.

- *Telecommunications* (fixed, wireless, satellite etc.) account for 3 percent of the total ICT industry. Telecommunications cover 350 companies and employ 16,000 work years.

- *ICT manufacturing* (computers, electronic components etc.) account for 2.5 percent of the total ICT industry, numbers 300 companies and employ 5,500 work years.

Source: Danish Business Authority based on custom data delivery by Statistics Denmark

Productivity in the Danish ICT industry

In 2010 the growth in added value was 10 percent. This is a decline from 2007 to 2010. However, in relative terms the decline is lower than the added value for the entire Danish business sector. The share of the total added value has grown by 0, 6 percent from 2007 to 2010, driven primarily by growth in ICT services, which is the only sub-sector registering growth in added value (in fixed prices).

Labour productivity

In terms of labour productivity (value add per full-time employed) the average contribution from employees in the ICT industry was 860,000 DKK. This is significantly higher than the average for other industries (659,000 DKK per full-time employee). The telecommunications industry accounted for the majority of the growth in value add.[8]

From 2007 to 2010 the ICT industry has seen a marginal decline in labour productivity (0.1 percent) with other industries yielding growth of 1.3 percent. The decline may be accredited to the fact that value add had been much higher in the ICT industry. It is also conceivable that the ICT industry has not made adjustments to their work force from 2007 to 2010 to the extent found in other business sectors.

Productivity data suggests that the Danish ICT industry fall below the EU average. In ICT related sectors Denmark has limited productivity advantages in a few sub-sector (telecommunication equipment; manufacturing of radio, television etc.) when applying internationally comparable data from the EU.[9]

The ICT Industry – A Dynamic and Innovative Sector

The ICT industry is characterized by rapidly changing conditions with a constant flow of technological change. Products and services are developed, marketed and sold – with relative ease - through a variety of digital channels.

Growth enterprises

In 2009 9.4 percent of the companies in the ICT industries were characterized as growth enterprises[10] compared to only 3.4 percent in other private business sectors.

Level of innovation

Companies in the ICT industry are fairly innovative. In 2010, 59 percent of ICT companies were characterized as innovative compared to 43 percent among other urban industries [11]. At the same time, the share of innovative ICT companies has grown from 55 to 59 percent since 2009. The share of innovative companies in other business sectors has declined marginally from 44 percent to 43 percent during the same period.[12]

In relative terms the telecommunication and ICT manufacturing sectors have many innovation activities. The level of innovation is lower in ICT services where Denmark trails the other Nordic countries. In Norway, Finland and Sweden the "IT and information services" sector is among the 10 most innovative sectors. This is not the case in Denmark. In other ICT-related sectors such as "Telecommunications" and "Electronics" the innovation activity levels in Danish companies match those of the other Nordic countries.[13]

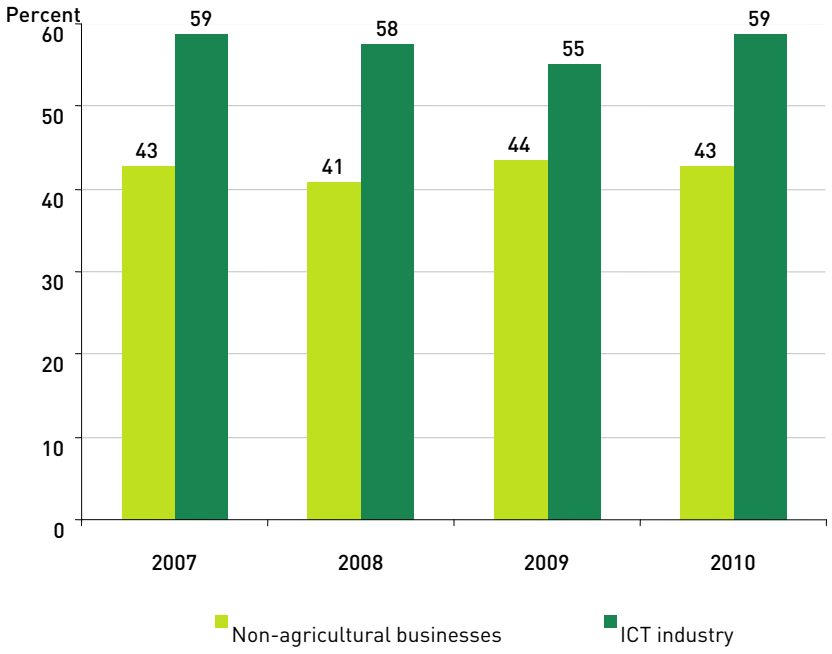

Figure 1
Share of companies that have carried out at least one innovation activity (product, process, marketing or organizational innovation), 2007-2010

THE GOVERNMENT AIMS TO STRENGTHEN THE FRAMEWORK FOR INNOVATION AND ENTREPRENEURSHIP – INCLUDING THE ICT INDUSTRY

Through various initiatives the Government is focusing on innovation and entrepreneurship as key drivers for growth and job creation. These initiatives will also prove valuable to the ICT industry.

The Innovation Strategy
The National Innovation Strategy from December 2012, "Denmark – a Nation of Solutions", will contribute to transforming more of Danish business strongholds into new growth and job creation. The Strategy focuses on creating more targeted innovative solutions to global societal challenges, to strengthen knowledge sharing among knowledge institutions and companies, and to support more innovation in the educational system. Among the 27 initiatives is the creation of an innovation centre for ICT and life sciences in India in 2013. The effort will strengthen innovation in the ICT industry and the innovative use of ICT in other business sectors, including new and smarter products using embedded ICT.

The Market Development Fund
To promote growth, job creation and exports particularly in SMEs that show significant potential the Government has set up the Market Development Fund (formerly the Business Innovation Fund). From 2013 and up to and including 2015 405 million DKK has been allocated to the fund to support the market development of innovative products and services including, products with embedded ICT. Almost all of the projects supported by the Market Development Fund are digital, partly or in full.

LaunchPad
Recently, the Ministry of Business and Growth created the LaunchPad initiative to attract promising foreign entrepreneurs to Denmark including ICT entrepreneurs. The presence of foreign entrepreneurs will contribute to creating growth and employment in Denmark and will bring international expertise to the Danish entrepreneurial network. By participating in a business plan competition foreign entrepreneurs will have access to advisory services and financing to realise their business plans. In August of 2013 30 foreign entrepreneurs will come to Denmark and join a accelerator program.

The Export Potential of the Danish ICT Industry

Traditionally, the Danish ICT industries have not been export-intensive. Their share of total exports (4.5 percent in 2010) is declining and accounts for a lower share of total exports compared to the majority of OECD countries. At the same time, the deficit of the ICT trade account is growing[14].

We do, however, see positive export trends in selected sub-sectors. Growth is evident in certain areas of ICT services, an area that traditionally has low export intensity. For example, the export of data and information services grew more than 70 percent from 2005 to 2011, yielding growth of 4.6 billion DKK.[15]

This growth may indicate that Danish businesses have been successful in harvesting a research stronghold in the area. A recent study shows that Danish ICT-related research has been successfully applied in Big Data, where large volumes of data (from sensors, measuring gauges and video cameras) are transformed into critical information and business ideas, and thus creating economic value[16].

Global value chains

Furthermore, ICT are heavily impacted by global value chains and large international companies. A traditional export approach may not yield the full international market potential of the Danish ICT industry, as the aim is to attract the most productive elements of the value chain that contribute to Danish job creation, strong ICT hot-spots and new business opportunities.

International ICT companies

Historically, Denmark has been successful in attracting several R&D departments from global ICT companies, and today we hosts a number of R&D departments within the ICT area. At the same time, globally-oriented Danish ICT companies have their R&D departments in Denmark. On the other hand, several R&D departments have been closed down or have been relocated abroad.

3. Increased Digitisation Strengthens the Competitive Power of Danish Businesses

The use of digital opportunities by Danish businesses' yields higher productivity and increased competitive strength. This is accomplished through digitisation of the companies' internal and external processes, the embedding of ICT in products and services, and the use of digital platforms in creating entirely new business models.

A growing number of companies use digital solutions – for business processes and for making more intelligent products using, among other things, embedded ICT. At the same time there is still an untapped potential for strengthening more companies – in particular SMEs – by using and integrating digital solutions and ICT, for example in administrative processes, production, sales and business development.

The Level of Digitisation in Danish companies

To varying degrees Danish companies have embraced the opportunities offered by digitisation. A 2012 study shows that a significant share of Danish businesses use digital solutions for relatively simple business processes, such as bookkeeping and accounting, or for individual areas in the company's core business.[17] The numbers suggest that there is an untapped potential for further digitisation.

17 percent of the companies use ICT in all critical areas of the business and are digitally connected to customers and suppliers. Only 7 percent have developed unique digital business concepts, where the business is anchored to the innovative use of ICT. The digital frontrunners are found across business sectors and have often developed digital business concepts as well as introduced systems for automatic interdepartmental data exchange.

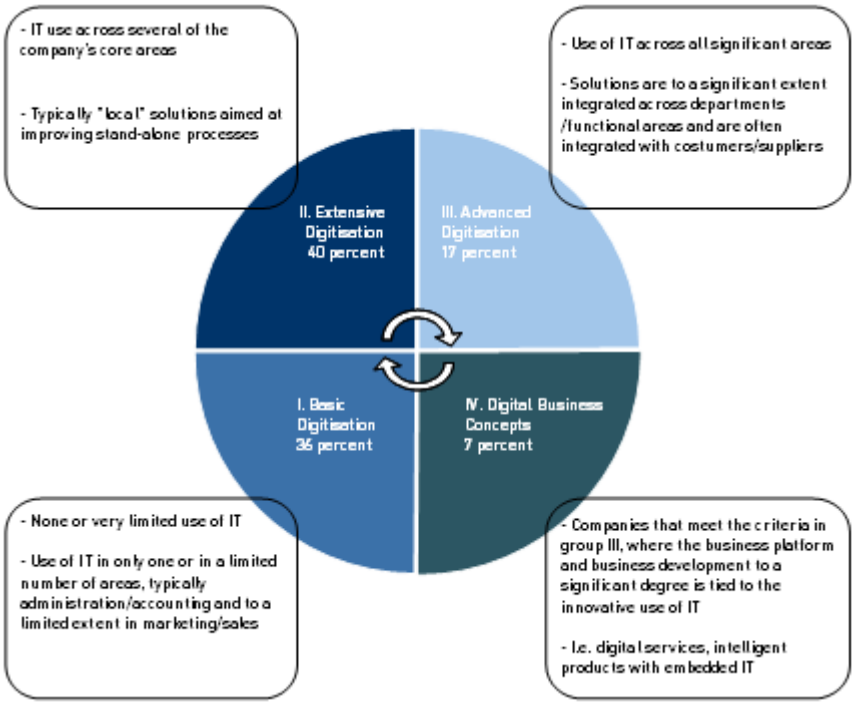

Figure 2
Companies' level of digitisation

Source: IRIS Group: Digitisation of Danish Businesses. 2013.

ICT skills

Access to ICT skills plays an important role for companies in terms of the digitisation of their business. The driving forces behind use of ICT in companies grow with the level of digitisation – from a demand for increased effectiveness to a stronger focus on using digitisation for business development purposes. Along the line, the requirements for labour skills and specialized ICT skills are growing.

Approximately 80 percent of all ICT educated individuals are employed outside the ICT industry.[18] ICT graduates may contribute to the company's implementation of digital solutions, to introduce new innovative ways of using ICT in products, and, not the least, to facilitate digital business development.

In 2011 one in ten companies recruited or attempted to recruit ICT specialists. Among those companies one in three have experienced difficulties in the hiring process[19]. On a positive note 2012 saw an 8 percent increase in enrolment in higher ICT education. The growth is significant in ICT business academy programs (10 percent growth compared to 2011). At Danish universities growth has been most imminent in multi-disciplinary ICT programs. For example, enrolment in information science ICT programs has grown by 13 percent.

SKILLS DEVELOPMENT

The Government is strongly focused on supporting further skills development in the Danish labour force. Most recently "Growth Plan DK" allocated 1 billion DKK to more and improved adult and life-long training. And in 2013 the Government will present a plan for a vocational education reform. This stronger focus on labour force skills will also prove beneficial to the ICT industry.

Digitisation of business processes strengthens productivity and competitiveness

Internal processes

There are significant gains to be made from companies digitising their internal processes. A recent study suggest that if the share of companies that have digitised at least one of their internal processes increase by one percentage point, the gross added value will grow between 2.6 and 6.5 billon DKK on an annual basis[20].

Many companies use ICT in their core business processes, including ERP software for managing resources across the organizations and CRM software for managing customer information [21]. The share is growing and accounted for one-third of the companies in 2012. The share of companies using cloud computing[22] has however dropped from 30 percent in 2010 to 24 percent in 2012.

ICT and innovation

A recent study from Centre for Economic and Business Research (CEBR) points to a positive correlation between ICT investments, the propensity of innovation and the effect of innovation activities on organisational productivity [23]. The analysis shows that companies that invested heavily in ICT in 2007 were more innovative in areas related to product, marketing, process and/or organizational innovation.

When comparing productivity trends for the same group of companies from 2007 to 2010, ICT intensive companies on average experienced annual productivity growth which was 2.4 percentage points higher compared to companies that had not invested heavily in ICT.

ICT intensive companies have yielded higher productivity growth from innovation compared to non ICT intensive companies. When comparing ICT intensive and ICT passive companies, a combination of product and marketing innovations account for 32.5 percent of the gap in annual productivity growth. The residual gap in productivity can be attributed to other factors including export and educational levels.

STRONGER FRAMEWORK FOR DEVELOPMENT AND USE OF DIGITAL SOLUTIONS

The European Regional Development Fund and The European Social Fund support among others the development and use of digital solutions. From 2007 to 2013 the funds have funded a range of projects in Denmark designed to improve the framework for growth and job creation by building new digital solutions, tools and products or increasing the use of existing solutions. In 2012 grants amounting to 19 million DKK from the European Social Fund and up to 9.95 million DKK from the Danish Business Authority were committed to the project "KOMP-AD – The Competence Track for increased automation and digitisation of SMVs".

Digitisation offers new opportunities for companies to engage with their customers, suppliers and partners, which may lead to improved logistics, more custom-made products and services as well as new collaborations on innovation.

In 2012 roughly 60 percent of the companies engaged in the automated exchange of data with their stakeholders; a growth of 10 percentage points from 2009[24].

E-commerce

There is a huge potential for exploiting the opportunities offered by the Internet in reaching new markets through e-commerce, especially in the area of cross-border e-commerce. A Digital Single Market, where legislation addressing cross-country trade across the European Union, opens up new growth opportunities for Danish businesses. The European Commission estimates that the number of European individuals shopping on-line will grow from 141 million to 190 million in 2014.

In 2011, 29 percent of the companies were selling online (unchanged from 2010)[25]. When looking exclusively at SMEs 22 percent of those sold products and services online and 8 percent were engaged in cross-border e-commerce. The EU average is 13 percent and 6 percent, respectively.[26]

Danish consumers spend more on e-commerce in other countries than do foreigners in Danish online stores. According to the Danish E-Commerce Association (FDIH) Danish consumers spent 11 billion DKK in foreign online stores, while international consumers spent 3 billion DKK in Danish online stores. In other words there is currently an e-commerce trade deficit of 8 billion DKK.

Innovative product development through embedded ICT and digital business models

Digitisation offers a range of opportunities for business development and product development. The embedding of software and sensors in existing or new products provide new opportunities for control, energy saving and development of entirely new functionalities.

Digital business development

The Internet and the technological development provide possibilities for a dynamic approach to business thinking. Cloud computing, mobile platforms, Big Data, the use of apps and the continued proliferation of social media pave the way for new innovative ways of doing business for all types of companies including digital entrepreneurs.

Approximately 7 percent of the Danish SMEs have developed digital business concepts, where the core business is tied to digital opportunities [27].

Embedded ICT

An estimated 20 percent of the companies have ICT embedded in their products[28]. Examples include intelligent heating control in thermostats, robotic vacuum cleaners, which use infrared sensors and photocell technology, and hearing aids that use groundbreaking technology to feed sound directly from the TV to the hearing aid

The increased use of embedded ICT is among other things reflected in the number of so-called telemetric subscriptions[29]. They include automatic measuring of data for power consumption or power service. The number of telemetric subscriptions

reached 700,000 in 2012 compared to 200,000 in 2007. The past year alone subscriptions grew 10.6 pct.[30]

ICT CREATES VALUE IN THE INTERSECTION OF OTHER BUSINESSES

The Government's growth teams have a focus on the role of ICT in helping create new products and markets.

For example, the Growth Team for Energy and Climate has focused on intelligent electricity networks and the linkage between electricity, gas and district heating with the purpose of testing the interaction across various technologies and various suppliers.

The Growth Team for Creative Industries and Design has focused on the impact of digital development in the creative industries. ICT has been instrumental in creating a rapidly growing creative industry in the areas of computer games, learning games, applications and other content distributed via digital channels to various media platforms such as smart phones, tablets and PCs.

4. Digital Growth in Collaboration with the Public Sector

Denmark is at the leading edge of the digitisation of the public sector and is ranked at the top of all international benchmarks in the area.[31] This is not the least the result of a strong, strategic collaboration involving the national, regional and municipal level in public digitisation. In recent years a number of initiatives have been launched to strengthen public digitisation while also serving to create stronger frameworks for Danish businesses through, for example, fewer administrative burdens and new business and exporting opportunities.

Public digitisation

One element in the eGOVERNMENT Strategy 2011-2015 is that all communication between companies and public authorities shall be in a digital format. Beginning in 2013 companies will have access to a digital mailbox to which all mail communication from public authorities can be sent. As digital systems are made available companies will be mandated to use these.

EASIER PATH TO GROWTH -
– THE EGOVERNMENT STRATEGY

- The eGOVERNMENT Strategy 2011-2015 is the fourth national digitisation strategy, which is the result of close collaboration involving authorities at the national, regional and municipal level.
- Among other things, the Strategy focuses on speedier processing of case and fewer administrative burdens.
- Working systems in public authorities are automated and digitised to avoid, for instance, that companies are forced to submit identical information to more than one public authority.
- Communication between companies and various public authorities should be conducted in a digital format
- Data collected by the public sector should be made available far more widely so it can be re-used by the private sector.

Digital annual reports

Beginning June 30 2012, Danish companies are mandated to submit their annual accounts in a digital format. The transition to digital reporting is gradual. Small companies were transferred to digital reporting through the course of 2012, while larger companies including all publicly listed companies will follow in 2013 and 2014. For small companies the transition to digital reporting is proceeding very well with 95 percent of the reporting being done digitally.

Virk.dk

The Virk.dk portal is the joint public service platform for Danish companies. Virk.dk may be used for registering a new company and for submitting notifications to public authorities. In 2012 a personalised page for individual companies was added to the portal.

VIRK.DK

- In 2012 3.5 million filings were made via VIRK.dk, which is 12 percent higher than in 2011.
- On average, 800 new companies are registered using Virk.dk every week.
- Mit Virk ("My VIRK") is the company's personalised access point to Virk.dk. Here, companies may receive notifications with information and deadlines from relevant authorities, access filing records, create shortcuts and access and edit company information
- "Born Digital" guides the user to sign up for a digital signature (NemID), employee signature, a NemKonto ("EasyAccount") for receiving payments from public authorities and a secure digital mailbox for receiving mail from public authorities immediately following the registration of a company.
- A joint public design manual was devised in 2012 to assist public authorities in developing better self-service solutions for companies.

Security and comfort

One key prerequisite for digital growth is that the digital systems are secure. The digital signature, NemID, which was developed in collaboration between the public and financial sector provides secure identification across all digital platforms. With the launch of the Centre for Cyber Security in December 2012 the Government has strengthened the national effort in responding to internet-based attacks against Danish society.

NEMID AND THE CENTRE FOR CYBER SECURITY

NemID

- With the digital signature, NemID, private companies, public enterprises and Danish citizens now have a joint digital identification and authentication solution with a very high security threshold.
- 3.7 million individuals use NemID and the system has been used more than 1 billion times since its launch in the Summer of 2010.
- NemID for smartphones and tablets is expected to be launched in late 2103 or early 2013. NemID for companies (employee signature) will be introduced following this.
- In addition to banks and the public sector, approximately 400 private companies have made a deal to offer log-in with NemID at their web sites.

Centre for Cyber Security

- The key task of the Centre for Cyber Security under the Danish Defence Intelligence Service is to solidify Denmark's ability to counter threats targeting critical ICT systems in the public sector and in other sensitive sectors including utilities, telecommunications and finance.
- Threats may include internet-based espionage, theft of intellectual property as well as business secrets such as business plans, technical knowhow, budgets, agreements etc. During 2012 the Centre has assisted affected institutions in tackling targeted attacks.
- The Centre's warning service, GovCERT, is responsible for warning and countering cyber attacks. In 2011 private companies working with critical ICT infrastructure were invited to be part of the GovCERT.

Strategy for digital welfare

The Government, Local Government Denmark and Danish Regions collaborate on a developing a strategy for digital welfare, which will be launched in 2013. The initiatives are expected to boost public demand for new, effective digital welfare

services. This will contribute to growth and job creation in the ICT industry and in other relevant business sectors.

DIGITISATION IN HEALTH

Standards for health IT
- The Ministry of Health has issued a notice on standards for ICT in the Danish public health service. The standardization will contribute to improved conditions for the development, production and sales potential for Danish ICT companies.
- Standard requirements are established by the National eHealth Authority through, among other things, the continuous update of a standard catalogue containing some 400 ICT standards.

Telemedicine
- Building on the National Action Plan for the Dissemination of Telemedicine, which is an element of the The eGOVERNMENT Strategy 2011-2015, regions and municipalities have agreed to allocate 80 million DKK to demonstrating and diffusion of a range of telemedicine solutions.
- Furthermore, a stronger effort has been initiated to establish standards in the area so that telemedicine solutions can be tied to existing ICT systems in hospitals, in municipalities, and among general practitioners.

Digitisation of health research
- The Government aims to maintain Denmark's position as front runner in clinical health scientific research and to attract international research projects.
- By pooling all clinical testing in one portal a more coherent and significantly more affordable solutions can be attained which may facilitate that researchers can quickly bring together a certain number of test subjects.
- In the spring of 2012 all national health registers will be pooled under the auspices of the National Serum Institute, which also hosts the recently opened national bio-bank.
- In 2012 the SPIR-platform "Patient@home - Innovative Welfare Technology for the 21st Century" was launched to carry out public/private collaboration on research, development and innovation in telemonitoring, rehabilitation and care. The Danish Council for Technology and Innovation and The Danish Council for Strategic Research have allocated 70 million DKK to this platform from 2012 to 2018.

Innovative public collaboration with the private sector

Public procurement

The public sector procured IT and telecommunications related services valued at 18 billion DKK in 2012 compared to approximately 15 billion DKK in 2010 and 17 billion DKK in 2011. Procurers include authorities at the state and regional level, municipalities and autonomous institutions and enterprises (primarily in the areas of education, utilities and transportation)[32].

Intelligent procurement is vital for the public sector in getting the most value while at the same time supporting value add in the private business sector. Therefore, in 2013 the Government will launch a strategy for intelligent public procurement.

The widespread digitisation of the public sector will give Danish ICT companies the opportunity of demonstrating strengths in the home market and will also boost their export potential. At the same time, innovative companies may reuse some of their public solutions in solutions targeting the private business sector.

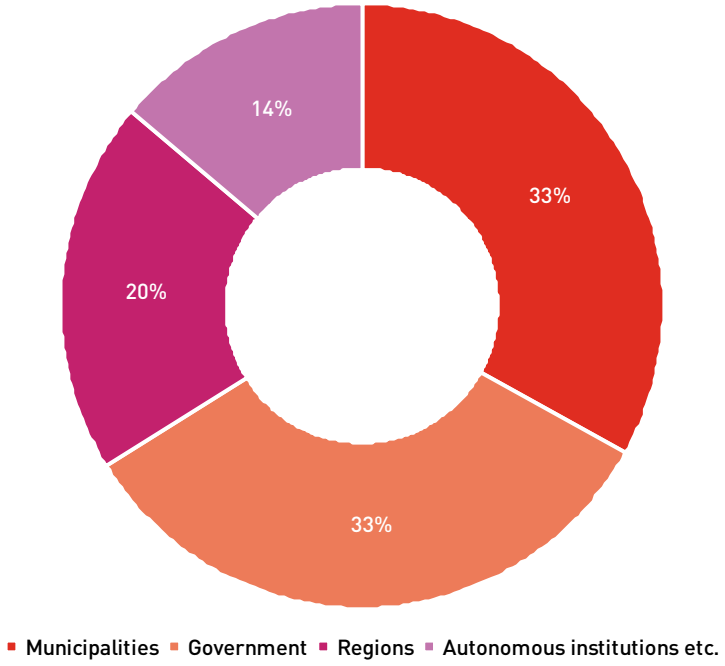

Figure 3
Distribution of public investments in IT and telecommunication-related services, 2012

Companies that develop solutions based on cloud computing will benefit from these solutions complying with the relative strict requirements that the public sector is committed to in protecting personal information.

IMPROVED FRAMEWORK FOR PUBLIC USE OF CLOUD COMPUTING

The public sector may benefit from using ICT related services delivered via the Internet from external providers. Cloud computing may cover server capacity, software and services.

The advantages of cloud computing including flexible access, simpler administration and a simpler and more affordable pricing structure. Furthermore, it is possible to scale the cloud server and change the set-up if required, which will eliminate the need for investment in expensive hardware.

The rules pertaining to the protection of personal information have been a challenge for the proliferation of cloud-based solutions in the public sector. A working group with representation from the Danish Agency for Digitisation, the Ministry of Justice and the Danish Data Protection Agency has therefore endeavoured to come up with suggestions for a revision of rules, which hinders the unnecessary use of cloud computing in the public sector. The working group submitted its recommendations in the fall of 2012. Based on these recommendations work to adjust regulation in the area has been initiated and is expected to be finalized in mid-2013.

Standardisation

Standards that support interoperability across multiple ICT systems are a prerequisite for creating the necessary coherence in the public sector, and will also benefit the Danish business community.

One fine example of public standardisation is NemHandel ("EasyTrade"), the public procurement systems which today is also used by a large number of companies for business-to-business trade. The share of companies using NemHandel has grown from 19 percent in 2011 to 28 percent in 2012. The majority of companies use NemHandel for invoicing public authorities, but we are also seeing an increased intra-company use[33].

NEMHANDEL – OPENPEPPOL

NemHandel is a publicly developed technology designed to make it easier and more secure for companies to submit invoices and other business documents via the Internet. The technology supports the entire c-commerce process, from the exchange of orders, order confirmations, goods catalogue and credit notes. When invoicing public authorities NemHandel has been mandatory since May 1 2011.

The technology is based on open-source in order to allow anyone to embed NemHandel in their software. Several large software companies have done so and many private companies therefore use NemHandel for business-to-business invoicing.

At the European level NemHandel is integrated with OpenPEPPOL, which allows all public authorities to receive electronic invoices from other EU Member States. Companies may also use OpenPEPPOL's standardised components and infrastructure which makes it possible to digitalise the entire business process when trading across country boundaries.

The European standardisation directive which was negotiated during the Danish EU Presidency in 2012 provides a window for applying relevant ICT specifications in public tenders to reduce public administrative costs, strengthen competition among suppliers and supporting interoperability in the public systems.

Public data

The public sector holds large volumes of data that may be highly valuable to the private business sector, in particular to the extent that data is in a digital format and of high quality. Public data can be used for streamlining internal processes and for exchanging entirely new types if digital products and services.

In October 2012 the Government and Local Government Denmark launched a programme focusing on the re-use of so-called basic data in the public sector and to provide companies with the opportunity of re-using data at no cost.

THE BASIC DATA PROGRAMME

Basic data is used across all segments of the public sector and is a prerequisite for authorities in attending to their tasks in a correct manner and in that respect contributing to the overall efficiency of society.

With the Basic Data Programme the Government will clean up and improve several public registries that contain key public data. This will lower administrative costs and citizens will not have to submit the same information more than once.

Basic data is highly valuable to the private business sector as well. Companies use this data for internal processes and the information embedded in public data may be used for developing entirely new digital products and services. A range of basic data is therefore made available for everyone at no costs including companies and citizens.

Starting in May 2013 it will be possible in a digital format to purchase annual business accounts from CVR.dk thereby creating more visibility to users as well as improved financial accounting and business development. Furthermore, digital annual business accounts will create innovation and growth as other companies can easily gain access to data that may help in developing new business concepts.

5. A Well-Developed Infrastructure: The Foundation for Digital Growth

A well-functioning broadband infrastructure and good mobile coverage are prerequisites for businesses and citizens in their ability to profit from the digital opportunities regardless of locations, thereby realizing the full benefits of the digital economy.

Denmark has a highly developed digital infrastructure. However, in some locations, companies and consumers are not able to get adequate mobile connections or broadband speeds. Furthermore, the demand for high-speed broadband does not match the opportunities currently offered by the infrastructure.

Broadband access and mobile coverage should be well-functioning throughout Denmark

Broadband coverage

Denmark is ranked in the top-3 among all OECD countries in the number of broadband connections per 100 inhabitants[34]. In recent years a growing share of households and companies has gained access to high-speed broadband. The number of households and businesses with access to broadband connections that support 100 Mbps download increased from 38 percent in mid-2011 to 65 percent in mid-2012. In the same period, the number of households and businesses with access to 30 Mbps upload grew from 35 percent to 39 percent.[35] In other words, Denmark has made great strides towards meeting the Government's goal that every household and company should have access to broadband download speeds of at least 100 Mbps by 2020.

Upload speed

In March 2013, the Government set a target that every household and company should have access to upload speeds of at least 30 Mbps by 2020. The objective reflects the need for companies and citizens to be offered the possibility to create and share content on the Internet. By the middle of 2011 35 percent had access to 30 Mbps upload. By the middle of 2012 the share had grown to 39 percent.

The number of broadband subscriptions, however, does not match broadband access. In 2012, one percent of Danish broadband subscribers had a marketable download-speed of 100 Mbps or higher, significantly lower than for example Sweden, where more than 16 percent of the broadband subscriptions at the end of 2011 were 100 Mbps or higher[36].

However, Danish business companies are increasingly subscribing to high speed connections. In 2012, 16 percent of the companies had 100 Mbps or higher, marking growth of 10 percent year-over-year.

Table 2

BROADBAND SPEED 2012

	Download		Upload	
Minimum Speed	Percent with opportunity [37], Middle of 2012	Share (percent.) of broadband subscriptions, End of 2012	Percent with opportunity 2012	Share (percent.) of broadband subscriptions, End of 2012
100 Mbps	65	1.1	32	0.6
50 Mbps	77	4.3	38	2.3
30 Mbps	83	14.4	39	8.9
10 Mbps	97	73.5	79	16.3
2 Mbps	99,9	95.8	97	45.7

Source: Danish Business Authority: Broadband Mapping 2012 and Telestatistics – Second Half 2012.

Mobile coverage

Mobile coverage through via 3G matches the top-performing European countries[38]. In an international context mobile coverage in Denmark is good. The most recent mobile mapping shows that 477 out of 586 postal codes have geographical outdoor coverage of 99 percent from at least one mobile carrier[39].

IMPROVED ACCESS TO MOBILE BROADBAND IN DENMARK

Spectrum for wireless and mobile broadband
The Government has put focus on the public sector's ability to establish coverage requirements in areas with limited coverage when carrying out spectrum auctions as well as when municipalities are procuring broadband and mobile connections.

To improve the roll out of broadband the Government has established coverage requirements in the 800 MHz-auction, which took place in 2012. The requirements will ensure that by 2015 99.8 percent of all households, businesses and holiday homes in 207 postal districts will have access to mobile broadband with an experienced speed of 10 Mbps or higher. Broadband speeds are expected to increase significantly in the coming years due to technological progress. In future spectrum auctions the Government will continue to address the possibility of establishing coverage requirements.

In 2016 and 2018 auctions will be held in the 1800 MHz-frequency band and 900 MHz-frequency band, which are suitable for mobile broadband and mobile speech. Furthermore, it is expected that in 2015 international efforts will open up for using mobile broadband in the 700 MHz-frequency band, which today is used for television, but which would be highly suitable for supporting coverage in remote areas.

Improved roll-out of broadband in Danish municipalities
The Government's initiative to support improved broadband and mobile coverage will give municipalities better opportunities to improve broadband coverage in areas with limited coverage. Among other things the initiative will give municipalities the ability to make greater demand for mobile and broadband coverage when procuring broadband to institutions and employees.

Furthermore, it is currently contemplated how municipalities are given better opportunities for promoting broadband, for example by making passive infrastructure available.

Broadband on Bornholm
"Growth Plan DK" allocates 30 million DKK annually in 2014 and 2015 to promote high speed broadband on the island of Bornholm. Access to high speed connections on Bornholm is significantly below the national average and approximately 13,000 households and companies currently do not have access to 30 Mbps download.

In March 2013, the Government launched the Action Plan for "Better Broadband and Mobile Coverage throughout Denmark". With this initiative the Government will contribute to developing a world-class digital infrastructure as a platform for digitisation and growth in Denmark.

ICT infrastructure investments

The framework for digital infrastructure investment is the tele-policy agreement from 1999, which stipulates that, as a starting point, the market itself assumes the responsibility for developing the infrastructure in line with technology-neutral framework conditions.

IMPROVED FRAMEWORK FOR INVESTING IN ICT-INFRASTRUCTURE

The "Improved Broadband and Mobile Coverage throughout Denmark" Action Plan strengthens the framework for the continued investments in broadband and mobile coverage. The Government has, among other things, revised the Planning Act so that rural zone permits are not required for adding antennas on the top of existing masts used for public mobile communication, as well on silos and tall smokestacks.

Furthermore, the Ministry of Business and Growth has drafted a guide for municipalities and government institutions which addresses lease conditions and legal framework for mobile phone masts with the intent of promoting a more uniform and transparent practice in the area thus avoiding significant unwarranted rent increases.

Transparency and Competition

Transparency and effective competition in the telecommunications market will provide citizens and enterprise with a real choice between price and quality when selecting telecommunications products. Efficient competition will drive the development of new digital services.

COMPETITIVE ENVIRONMENT

In 2012 the Danish Business Authority imposed a number of obligations on TDC in order to strengthen competition in the broadband area. Among other things, a new commitment on price-squeezes has been imposed on TDC, which implies that the difference between TDC's wholesale price and end-user price will allow other carriers to achieve positive earnings when competing against TDC.

Furthermore, TDC shall offer its competitors a so-called virtual access to the infrastructure used for broadband tenders. This will allow competitors to offer high speed broadband without having to make significant investments - and at a lower price than today.

The Danish Business Authority stipulates the fees that TDC's competitors pay for gaining access to the company's infrastructure. Recently, the Danish Business Authority has lowered prices for a number of wholesales products in the broadband market, which will make prices on broadband connections and broadband TV cheaper.

Review of the Danish broadband market

During the course of 2013 the Ministry of Business and Growth with the involvement of market stakeholders will carry out an extensive analysis of

competition in the broadband markets, which go beyond than what the Danish Business Authority – as the regulatory body on the telecommunications market – already addresses in various market analyses. The review will, among other things, review the impact of television content on broadband competition. The initiative will strengthen competition in the broadband market. The initiative will strengthen competition in the broadband area and thus provide the consumer with more choices and lower prices.

Transparency in the mobile area

In collaboration with, among others, the Danish Competition and Consumer Authority and the Telecommunication Industry, the Danish Ministry of Business and Growth will launch several initiatives to improve transparency in the mobile area, including improved information on the quality of mobile phone antennas. The Danish Business Authority will develop an app showing coverage as consumers move around to allow for comparison of experienced coverage.

The Danish Business Authority has mapped the "experienced mobile coverage" across Denmark. The mapping is based on measurements of open-air mobile coverage which was carried out by the Danish Technological Institute at 417 selected locations across Denmark.

The mapping shows that mobile coverage for outdoor speech in general is good, but that mobile phone characteristics will impact the ability to place calls. The mapping also shows that there are some variations in the coverage of the four mobile carriers. So in some instances it is possible by switching to another carrier to get coverage in the area where the mobile phone is used the most.

TRANSPARENCY FOR CONSUMERS

European labelling scheme for quality of mobile phone antennas
The Danish Ministry of Business and Growth have initiated a study on the receiving capabilities of mobile phones, which will be finalised in 2013. The Government will work towards establishing a European labelling scheme for mobile phone antenna quality. The labelling scheme will provide consumers with information on the mobile phone's reception capabilities so that consumers may compare individual phone models.

Improved broadband mapping
The Danish Ministry of Business and Growth is initiating a pilot project aimed at developing a more detailed mapping of the broadband infrastructure to provide better knowledge of local broadband coverage. Furthermore, the existing broadband-meter is provided with a map-feature, which provides users with an overview of actual broadband speeds.

Guidance on cookie rules
The protection of the user's private sphere when using the Internet is essential in preserving trust in the Internet and in that respect in further developing the digital market. In Denmark and at the European level there is much focus on the protection of the private sphere on the Internet including through the cookie rules and the ongoing negotiations for a new regulation on data protection. In April 2013 the Danish Business Authority published an updated guide on the cookie rules, which specifies the requirements for information and consent when using cookies in connection with electronic services. The purpose of the rules is to protect the digital service user privacy and as such to preserve Internet trust.

European roaming-agreement
Denmark continues to be involved in the efforts to implement the roaming agreement, which was negotiated by the Danish presidency in early 2012. The agreement lowers prices for mobile calls across Europe and lowers prices for data roaming services.

During 2012 as a result of the agreement data traffic prices dropped from 20 DKK per MB

to 6.5 DKK per MB. In July of 2013 prices will drop to 4 DKK per MB, and the price for placing calls to your home country will decline by more than 30 percent from 2012 to 2013.

The agreement also addresses several structural initiatives, which will lead to higher transparency and improved competition. Telecom operators offer special roaming schemes that offer additional discounts than the ones stipulated in the policy agreement.

Notes

[1] McKinsey Global Institute: ”Internet matters: The Net’s sweeping impact on growth, jobs, and prosperity”. 2011.
[2] Authors' calculations (Danish Business Authority). 2013.
[3] McKinsey Global Institute: ”Internet matters: The Net’s sweeping impact on growth, jobs, and prosperity”. 2011.
[4] World Economic Forum and INSEAD: Global Information Technology Report 2013. The decline is imminent across a broad set of indicators in the index, including business assessment of the framework for innovation, availability of new technology, access to venture capital, and an assessment of the integration an effect of ICT in the public sector including the areas of education and welfare.
[5] European Commission: Digital Agenda Scoreboard 2010.
[6] Denmark has 38.3 broadband connections per 100 inhabitants, OECD. June 2012.
[7] Authors' calculations (Danish Business Authority). 2013.
[8] Authors' calculations (Danish Business Authority) based on custom data delivery by Statistics Denmark. 2013.
[9] Authors' calculations (Danish Business Authority) based on custom data delivery by Statistics Denmark. 2013.
[10] Companies with at least 5 employees that have seen annual average growth in number of employees of 20 percent or higher over a three-year period are regarded as growth enterprises.
[11] For various reasons the following sectors are not included in the non-agricultural industry category: Agriculture, fishery, energy and water supply, ports etc., railway and bus services, banking institutions, insurance, non-profit housing agencies and public administration etc.
[12] Authors' calculations (Danish Business Authority) based on custom data delivery by Statistics Denmark. 2013.
[13] Danish Agency for Science, Technology and Innovation: Productivity Impacts of Business Investment in R&D in the Nordic Countries – A microeconomic analysis. Publication expected in the third quarter of 2013. CEBR: Business sector ICT spending and innovation activities. 2013.
[14] OECD: Information Economy Report. 2012.
[15] DE-perspective 2010. Based on custom data delivered by Statistics Denmark.
[16] Damvad: Danish and International Strongholds in ICT, 2013.
[17] IRIS Group: Digitisation of Danish Businesses 2013.
[18] Authors' calculations (Danish Business Authority) based on custom data delivery by Statistics Denmark. 2013.
[19] Ibid.
[20] Centre for Economic and Business Research (CEBR): Digitisation and productivity. 2011.
[21] ERP = Enterprise Resource Planning and CRM = Customer Relationship Management.
[22] ICT-services delivered and accessed through the internet.
[23] Centre for Economic and Business Research (CEBR): ICT innovation and Productivity, 2013.
[24] Ibid.
[25] Statistics Denmark: Use of IT in Companies. 2012.
[26] European Commission: Digital Agenda Scoreboard. 2012.
[27] Known examples of digital companies include Spotify, Netflix and Endomondo, which deliver digital products via a digital platform.
[28] IRIS Group: Digitisation of Danish Businesses. 2013.
[29] Subscriptions used solely for machine-to-machine communication (M2M).
[30] The Danish Business Authority: Tele Statistics– Second half, 2012.
[31] OECD: Denmark: Efficient e-Government for Smarter Public Service Delivery. 2010
[32] Information from Centre for Digital Administration (CEDI).
[33] Statistics Denmark: Use of IT in Companies. 2012.
[34] Denmark has 38,3 broadband connections per 100 inhabitants, OECD. June 2012.
[35] Danish Business Authority: Mobile Mapping 2012.
[36] European Commission: Digital Agenda Scoreboard 2011. Danish Business Authority: Telestatistics – Second Half 2012.
[37] ’Percent with opportunity" shows the number of households and companies with access to a broadband infrastructure that support the shown speeds.
[38] European Commission: Digital Agenda Scoreboard 2010.
[39] Danish Business Authority: Mobile Mapping 2012.

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Denmark's Digital Growth 2013
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Companies that develop and market digital products and services make valuable contributions to the Danish economy through job creation and growth. At the same time the use of ICTs and digital solutions strengthen Denmark's competitive edge through stronger innovation and productivity.

Finally, ICTs provide opportunities for new business models and areas of growth.

The Policy Statement on Denmark's Digital Growth 2013 highlights the current state of Denmark's digital economy. The statement is divided into five chapters.

1.
The Digital Growth Potential: Danish Strengths and Challenges

2.
The ICT Industry: A Sector with Digital Growth Potential

3.
Increased Digitisation Strengthens the Competitive Power of Danish Businesses

4.
Digital Growth in collaboration with the Public Sector

5.
A Well-Developed Infrastructure: The Foundation for Digital Growth