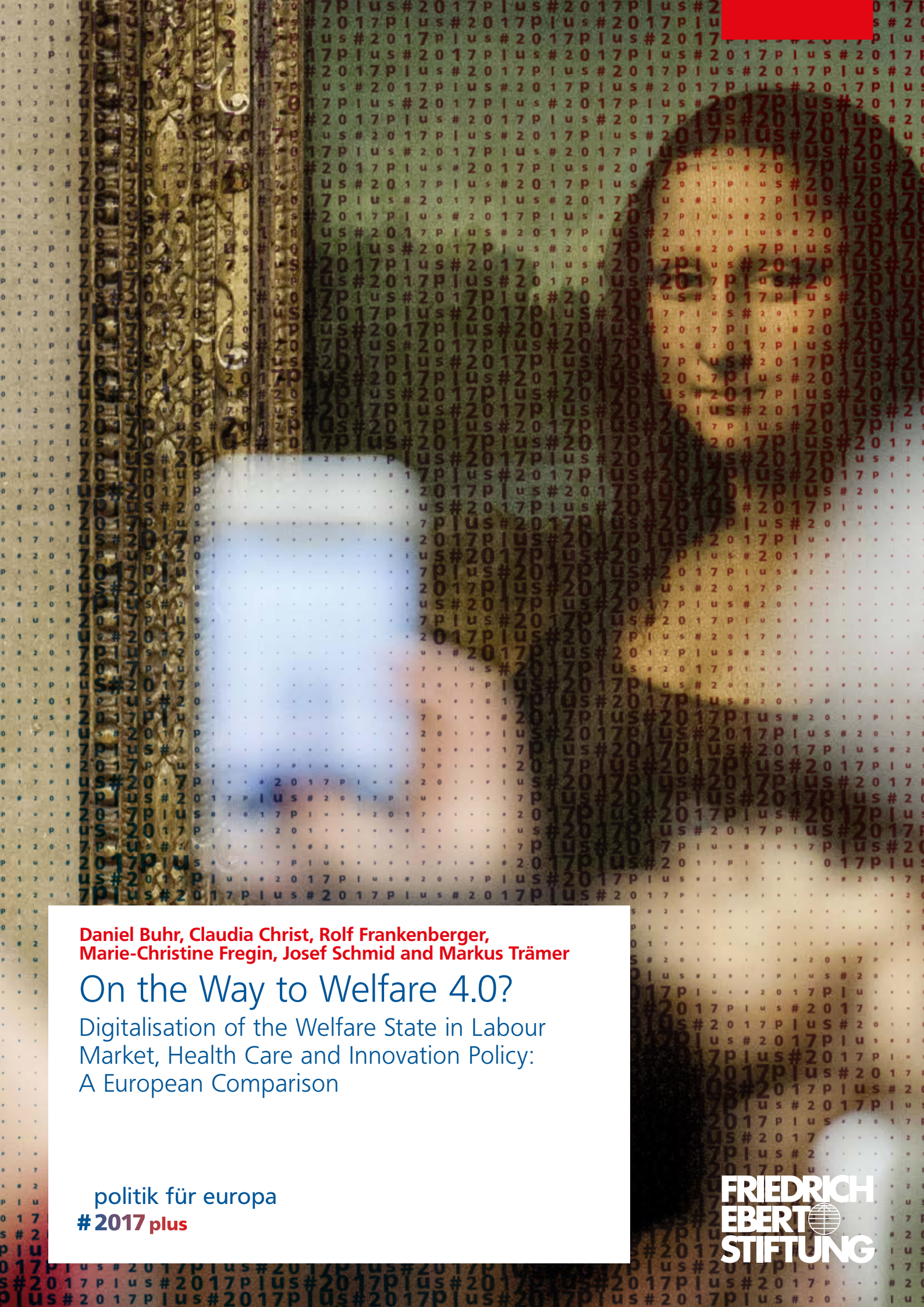


Daniel Buhr, Claudia Christ, Rolf Frankenberger, Marie-Christine Fregin, Josef Schmid and Markus Trämer

On the Way to Welfare 4.0?

Digitalisation of the Welfare State in Labour Market, Health Care and Innovation Policy: A European Comparison

politik für europa
#2017 plus

FRIEDRICH EBERT STIFTUNG

politik für europa
#2017 plus

Europe needs social democracy!

Why do we really want Europe? Can we demonstrate to European citizens the opportunities offered by social politics and a strong social democracy in Europe? This is the aim of the new Friedrich-Ebert-Stiftung project "Politics for Europe". It shows that European integration can be done in a democratic, economic and socially balanced way and with a reliable foreign policy.

The following issues will be particularly important:
- Democratic Europe,
- Economic and social policy in Europe,
- Foreign and security policy in Europe.

The FES will devote itself to these issues in publications and events throughout 2015–2017: we start from citizens' concerns, identify new positions with decision-makers and lay out alternative policy approaches. We want a debate with you about "Politics for Europe"!

Further information on the project can be found here:
http://www.fes.de/de/politik-fuer-europa-2017plus/

Friedrich-Ebert-Stiftung

The Friedrich-Ebert-Stiftung (FES) is the oldest political foundation in Germany with a rich tradition dating back to its foundation in 1925. Today, it remains loyal to the legacy of its namesake and campaigns for the core ideas and values of social democracy: freedom, justice and solidarity. It has a close connection to social democracy and free trade unions.

FES promotes the advancement of social democracy, in particular by:
- Political educational work to strengthen civil society,
- Think Tanks,
- International cooperation with our international network of offices in more than 100 countries – Support for talented young people,
- Maintaining the collective memory of social democracy with archives, libraries and more.

About the authors of the country studies

Prof. Dr. Daniel Buhr teaches Policy Analysis and Political Economy at the Institute for Political Science of the Eberhard Karls University, Tübingen. **Claudia Christ, MA,** is a scholarship holder in the doctoral programme "International comparative research on education and education policy in the welfare state" of the Hans-Böckler-Stiftung and the Eberhard Karls University, Tübingen. **Dr. Rolf Frankenberger** is Senior Lecturer at the Institute for Political Science of the Eberhard Karls University, Tübingen, teaching and researching in the area of comparative political science. **Marie-Christine Fregin, MA,** is a research assistant in political economy and policy analysis at Institute for Political Science of the Eberhard Karls University, Tübingen. **Prof. Dr. Josef Schmid** is Professor of Political Economy and Policy Analysis and at present is full-time Dean of the Faculty of Economic and Social Sciences at the Eberhard Karls University, Tübingen. **Markus Trämer, BA,** is a research assistant in Policy Analysis and Political Economy at the Institute for Political Science of the Eberhard Karls University, Tübingen.

Responsible for this publication at the FES

Michèle Auga is head of the Western Europe/North America department.
Beate Martin is an adviser at the Western Europe/North America department.

**Daniel Buhr, Claudia Christ, Rolf Frankenberger,
Marie-Christine Fregin, Josef Schmid and Markus Trämer**

On the Way to Welfare 4.0?

Digitalisation of the Welfare State in Labour Market, Health Care and Innovation Policy: A European Comparison

INTRODUCTION

Increasing digitalisation is penetrating all areas of the economy, society and politics. This is triggering changes in many areas, which will naturally also affect welfare states. Digitalisation is changing not only industrial production, but also how participation in politics and society is organised; how states and governments provide social services; how participation in the labour market works; how health care services are delivered; and so on. Whereas some studies focus on the risks of digitalisation for the labour market and predict an "end of work" (cf. Frey/Osborne 2013; BMAS 2015), other authors highlight the opportunities that digitalisation offers for social innovation (Buhr 2015; 2016). Such opportunities can be harnessed by means of targeted coordination and change-management if Industry 4.0 also becomes Welfare 4.0. There is currently no in-depth research available into the **consequences of digitalisation** in and for contemporary welfare states and their adjustment towards Welfare 4.0. However, a number of fundamental questions need to be answered. What effects might digitalisation have on health-care systems? How is labour market policy changing? What role does innovation policy play? How far have developments in individual welfare states progressed? What further developments can we expect? And how will the key players in the relevant policy areas react to these?

The questions raised are examined in this study conducted by a group of political scientists from the Eberhard Karls University Tübingen on behalf of the Friedrich-Ebert-Stiftung. Under the title On the Way to Welfare 4.0?, both the status of digitalisation and its effects on the fields of labour market, health-care and innovation policy are examined. The analysis focuses on a comparison of seven welfare states: Estonia, France, Germany, Italy, Spain, Sweden and the United Kingdom. In addition to this comparative study, individual country reports are available that look more closely at the status of welfare state digitalisation (see Buhr/Frankenberger 2016; Buhr/Frankenberger/Fregin/Trämer 2016; Buhr/Frankenberger/Ludewig 2016; Christ/Frankenberger 2016; Fregin/Frankenberger 2016; Schmid/Frankenberger 2016; Trämer/Frankenberger 2016). Together, the studies provide answers to the overarching question of how digitalisation can also result in modernisation of the welfare state, and what needs to be done to ensure that technical innovation can also lead to social progress.

1

WELFARE STATES IN TIMES OF DIGITALISATION

With the increasing digitalisation and interconnectedness of business and society in the twenty-first century, the capitalist production regimes of contemporary industrial societies are changing fundamentally. In particular, the technical and social innovations of Welfare 4.0 are a key challenge for contemporary societies. On the one hand, these innovations create new opportunities for cooperation and production, while, on the other hand, they force these societies to adapt. This requires people to have special knowledge, skills and abilities so that they can function in the "new digital world". More and more tasks are being performed by machines and new tasks for people are emerging that demand new skills.

The technological revolution not only influences production regimes and individuals, but also has a far-reaching impact on society as a whole and on social protection systems. If the production regime changes, this generates specific problems, difficulties and needs that need to be compensated for by the state and society. This usually takes place via welfare systems because capitalism and welfare state are two sides of one and the same coin (Offe 1972). Both systems – the industrial production system and the welfare state redistribution system of social protection – are subject to digital change. However, whereas production systems change and adapt rapidly, the redistribution systems of welfare states are path-dependent and persistent. As a result, existing welfare state structures are coming under pressure and having to adjust. Here, digitalisation essentially has two different impacts on the welfare state. First, digital transformation is creating a new age of industrial production, "Industry 4.0". This can be termed an **external modernisation effect** on welfare states. By altering production and disseminating information and communication technologies and automation, new demands arise for labour in general and for employees in particular (cf. Autor/Price 2013). The processing of these changes and challenges needs to be supported by the welfare state.

Second, the digitalisation of the welfare state is causing **internal modernisation effects**. They are related, on one hand, to the digitalised administration of welfare and the technical environment, such as the proliferation of internet connections and broadband expansion. On the other hand, internal modernisation involves developing the individual skills and abilities that digitalisation requires with regard to information processing, in order, for example, to take part in the community and the labour market. The question of how the welfare state handles (new) social inequalities – known as the "digital divide" – and what solutions might be found to counter the effects of digitalisation goes hand in hand with this. If external and internal modernisation are in equilibrium, social innovation could also arise from technical innovation. This not only drives Industry 4.0, but also transforms the welfare state in the direction of Welfare 4.0. One objective of this study is to compare the development of external and internal modernisation in different welfare states. It will provide an insight into comparative welfare state research, which forms the basis for selecting the seven countries under examination. This is then substantiated and the methodology is explained.

THE WORLDS OF WELFARE CAPITALISM

In comparative welfare state research, a distinction is made between different types of welfare state. They reflect the relevant experiences of each state's national political and social history, as well as the political balance of power (Schmid 2010: 99). Here, the emphasis is on the schema proposed by Danish sociologist Gøsta Esping-Andersen (1990), which resonated widely and is still of great significance today. His "three worlds of welfare capitalism" categorise states as either "liberal", "conservative" or "social democratic". Each of these types follows a historically evolved development path and has its own logic with regard to the organisation of social policies, pattern of social stratification and inequality (in particular in the employment system), and forms of social integration or exclusion (Schmid 2010: 100).

Esping-Andersen (cf. 1990) defines three dimensions that have different effects on the different welfare types: decommodification, stratification and residualism.

Decommodification refers to the relative independence of the social security of the individual from the pressures and risks of commercially oriented ("market") policy- and decision-making. In other words, the higher the level of decommodification, the lower the individual's dependence on selling work

as a commodity in order to secure their own survival. This is achieved via the type and amount of social security benefits.

Stratification refers to the vertical and horizontal economic and social segmentation of society. This involves describing social inequality in terms of income and social status. By providing social security systems and benefits, the welfare state is an instrument of redistribution "to influence and, where applicable, correct the social inequality structure" (Esping-Andersen 1998: 39). At the same time, different types of welfare state themselves generate a specific form of stratification.

Residualism is understood as the specific interplay between market, state and family with regard to individuals' social security and therefore the extent to which the state intervenes in this mixed relationship between private and public provision.

Esping-Andersen (1990) used the above dimensions to develop three ideal-types, which will be discussed below.

The emphasis in a "liberal" (or "Anglo-Saxon") welfare state model is on a hands-off state social policy that focuses on those deemed most in need, supports the welfare production functions of the commercial sector and leaves other welfare production to private providers and the family (Schmidt 2004: 807). The overall decommodification effect is weak, with social entitlements set at a low level and means-tested on a case-by-case basis. There is a stigma attached to applying for such entitlements (Schmid 2010: 101). One example of this type is the United Kingdom. Others include Canada, the USA and Australia.

The "conservative" (or continental European) welfare states are based on strong state social policy in which the emphasis is on insured individuals maintaining their status. Such states are characterised by a Bismarck-style social insurance model in which the socio-political role of commercial interests is usually low, while that of the family is prioritised in accordance with the principle of subsidiarity (Schmidt 2004: 807). Associated with the principle of subsidiarity is the influential role of the churches, which also play a key role in ensuring that traditional family forms are preserved (Esping-Andersen 1998: 44). In contrast to the "liberal" model, the decommodification effect is more strongly developed and the state intervenes more strongly. Social rights are linked to class and status, which leads to the maintenance of status and group differences (Schmid 2010: 101). Examples of this welfare type include Germany, France and Austria.

"Social democratic" (or Scandinavian) welfare states are based on a social policy characterised by universalism, strong decommodification and ambitious ideas of equality and full employment. The aim here is to minimise dependence on commercial interests and family (Schmidt 2004: 807). Decommodification effects are most strongly felt in such states. Examples of this type are the Scandinavian countries of Sweden, Norway, Denmark and Finland.

Figure 1 (from Schmid 2010: 100; Schmid/Buhr 2015) summarises the key features of the three types of welfare state systematically compared in triangular form. This clearly shows Esping-Andersen's ideal categorisation and indicates the mixed forms that actually exist.

Figure 1
Types and dimensions of welfare states according to Esping-Andersen

Type of welfare state liberal

Variables/indicators	
Decommodification	weak
Residualism	strong
Privatisation	high
Corporatism/statism	weak
Redistribution capacity	weak
Full employment guarantee	weak

Type of welfare state social democratic

Variables/indicators	
Decommodification	strong
Residualism	weak
Privatisation	low
Corporatism/statism	weak
Redistribution capacity	strong
Full employment guarantee	strong

Type of welfare state conservative

Variables/indicators	
Decommodification	medium (?)
Residualism	strong
Privatisation	low
Corporatism/statism	strong
Redistribution capacity	weak
Full employment guarantee	weak (?)

Source: Schmid 2010: 100.

In the meantime, Esping-Andersen's approach has been extended to include two additional welfare state types: first, the rudimentary or "Mediterranean" welfare state type, which expressly includes the countries of southern Europe (Spain, Portugal, Greece, and to some extent Italy), and second, the post-socialist welfare state type found in the transitional political systems of central and eastern Europe.

The Mediterranean welfare state is characterised by the stronger role of the family and the lower level of social benefits (Leibfried 1990; Lessenich 1995). Social security systems in this group of countries are typically only partly developed and welfare entitlement has no legal basis (Schmid 2010: 107). In this context, it should also be noted that this group consists of less industrialised, structurally weak and poorer countries in which only relatively low incomes are generated commercially (ibid.). One specific feature of this type is the high degree of employment protection (Karamessini 2007).

The collapse of the Soviet Union and the transformation of its former member states have resulted in a further welfare model being added. Götting and Lessenich (1998) describe the post-socialist welfare state as an authoritarian remodelling of the social democratic welfare type (ibid.: 272). The transformation towards a welfare system in accordance with the western European model is described as gradual and features both old and new characteristics. According to Götting (1998), the post-socialist states are a mixed form: "the post-communist welfare states are currently institutional hybrids" (ibid. 274).

METHODOLOGY

To answer the core research questions of this study, a comparative design was selected. This process examines in particular the development paths and responses of various welfare states to the challenges and opportunities of digitalisation. The focus is is to determine how Industry 4.0 becomes Welfare 4.0. Based on the three (now five) worlds of welfare capitalism, seven countries were chosen and individual case studies were initially conducted on each of them. This study also provides a comparative analysis and consequent recommendations for further action.

Countries were selected on the basis of the various welfare state types distinguished by Esping-Andersen and Lessenich, with examples of each of the five types included in the examination. Germany and France represent the "conservative" welfare state type, Sweden the "social democratic" welfare model and the United Kingdom the "liberal" welfare state. Estonia is primarily considered to be a post-socialist welfare state given its collectivist welfare structures in many areas, even if the country today exhibits a number of "liberal" characteristics following the comprehensive economic and social state reforms that took place after independence: a very low proportion of social spending (14.8 per cent of GDP), above-average income inequality, a very low level of organisation of workers and only a very weak institutionalisation of labour market relationships. Spain and Italy are included here as examples of the "Mediterranean" welfare state. While Spain is a classic representative of this type, Italy may also be considered a "conservative" welfare state, given the dominant role of social insurance and, at the same time, the fairly passive role of the state. There is disagreement among researchers over this classification, however. According to Ferrera (1996; see also Lynch 2014), Italy belongs to the group of "Mediterranean" welfare states, but the latest social state reforms point towards a gradual departure from this in the direction of the "conservative" model. Table 1 summarises the selection of case studies, with Estonia and Italy in italics to emphasise their hybrid status.

Table 1
Countries examined and their welfare models

States	Welfare model
"Liberal" welfare state	UK
"Conservative" welfare state	Germany, France
"Social democratic" welfare state	Sweden
"Mediterranean" welfare state	Spain, *Italy*
"Post-socialist" welfare state	*Estonia*

Source: own compilation.

An overview of the core indicators of each country's political system, economic performance, status of digitalisation and level of spending in individual policy areas compared with the EU28 can be found in Table 2 (see page 8). Here, considerable differences become apparent, not only with regard to the status of digitalisation, but also in terms of state organisation, economic output, spending on labour, innovation and social matters, and other parameters that provide the framework for the digitalisation of the welfare state.

The analysis covers three policy areas that are strongly influenced by digitalisation and for which digitalisation offers strong innovation potential: labour, health care and innovation. In preparing the study a two-stage methodology was adopted. First, primary sources and secondary literature were analysed in the individual policy fields in order to identify relevant reforms and developments. In the second stage, structured interviews were conducted with experts between August and October 2016 and analysed to extrapolate the role and views of the relevant players in each policy area. In Section 3, the results of the study are presented in comparative form for each of the individual policy areas.

Table 2
Status of digitalisation and level of spending in individual policy areas

	Germany	Estonia	France
State form	Federal democratic republic	Democratic republic	Semi-presidential democratic republic
State organisation	Federal	Unitary	Unitary
Party system	Multiple-party system	Multiple-party system	Multiple-party system
Election system	Personalised proportional representation	Proportional representation	Majority voting system
EU member since	1 January 1958	1 May 2004	1 January 1958
Inhabitants per km^2	226.6	30.3	104.5
Urbanisation (% of the population)	75	68	80
Welfare regime	Conservative	Liberal/post-socialist	Conservative
Interpersonal trust (index: 0=no trust; 10=complete trust)	5.5	5.8	5
Income inequality (distribution quintile)	5.1	6.2	4.3
Spending on social security in % of GDP	29	14.8	33.7
GDP per capita (in purchasing power standards, index: EU=100)	125	74	106
Growth rate (real GDP compared to prior year)	1.7	1.4	1.3
Budget deficit/surplus (in % of GDP)	0.7	0.4	–3.5
Productivity nominal per worker (index: EU=100)	106.6	69.7	114.4
Harmonised unemployment rate	4.2	6.8	10.5
Trade union organisational degree (0–100)	18.13	5.65	7.72
R&D overall expenditure (in % of GDP)	2.87	1.44	2.26
Share of 20-24-year-olds with secondary level II as a minimum	77.1	83.4	87.2
Tertiary degrees in MINT subjects (per 1,000 graduates)	16.2	13.2	22.9
DESI index (0–1; 1= digital society)	0.57	0.59	0.51
Share of regular internet users (16–74 years, %)	84	86	81
Internet access density (% of households)	90	88	83
Share of households with broadband connection (%)	88	87	76
Share of companies with broadband connection (%)	96	97	96

Source: Unless specified otherwise: Eurostat; http://www. ec.europa.eu/eurostat; 3 October 2016; data of 2016 or next year available; data on the welfare status type: http://www.learneurope.eu/ index.php?cID=300; 3 October 2016; data on the degree of urbanisation: data.worldbank.org; 3 October 2016; data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN; 3 October 2016. Data digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard; 28 September 2016. Own presentation.

Italy	Sweden	Spain	United Kingdom	EU28
Parliamentary republic	Constitutional monarchy	Constitutional monarchy	Constitutional monarchy	x
Unitary	Unitary	Federal	Unitary	x
Multiple-party system	Multiple-party system	Multiple-party system	Multiple-party system	x
Majority voting system and proportional representation	Proportional representation	Proportional representation	Majority voting system	x
1 January 1958	1 January 1995	1 January 1986	1 January 1973	x
201.2	23.8	92.5	266.4	116.7
69	86	80	83	74
Mediterranean	Social democratic	Mediterranean	Liberal	x
5.7	6.9	6.3	6.1	5.9
5.8	3.8	6.9	5.2	5.2
29.8	30	25.7	28.1	28.6
95	123	92	110	100
0.7	4.1	3.2	2.2	2.2
–2.6	0	–5.1	–4.4	–2.4
106.5	113.2	102.6	102.6	100
11.4	7.2	19.5	4.8	8,6
37.29	67.26	16.88	25.14	x
1.29	3.16	1.23	1.7	2,03
80.1	87.3	68.5	85.7	82.7
13.2	15.9	15.6	19.8	17,1
0.4	0.67	0.52	0.61	0.52
63	89	75	90	76
75	91	79	91	83
74	83	78	90	80
94	97	98	96	95

2

THE STATUS OF DIGITALISATION ACROSS EUROPE

The European Commission is prioritising digitalisation in the ongoing development of the European Union at social and economic level. As early as June 2014, Commission President Jean-Claude Juncker defined the direction of his term in office as follows: "I am convinced that we must use the outstanding opportunities presented by digital and limitless technology in a much better way." The creation of the digital single market has been one of the priorities of the European Commission since 2015. A number of core objectives were set out in the Digital Single Market Strategy for Europe. As well as creating trustworthy and powerful technical infrastructure and reducing digital barriers and the digital divide, key targets include improving digital skills among citizens and administrations, investing in research and development and enhancing digital public services. To accompany the process of digitalisation, a monitoring instrument was implemented in the Digital Economy and Society Index (DESI), which enables individual countries' progress to be benchmarked (cf. European Commission 2015; DESI 2016).[1] Examination of the comparative data on the status of digitalisation across EU states reveals sometimes huge differences between the aspirations and reality of digitalisation. Even average data speeds in broadband and mobile networks (see Figure 2) and the shares of fast broadband connections (see Figure 3) vary widely between countries. The average data speed in the EU28 was 14.01 Mbps (megabits per second) in the first quarter of 2016, and 12.4 Mbps in the mobile network (cf. Akamai 2016). While the Nordic countries of Sweden, Finland and Norway, as well as Belgium and the United Kingdom – and to a lesser degree Germany – have above-average speeds in both broadband and mobile networks, it is mainly the southern European states such as Greece, Croatia and Italy, as well as France that clearly need to catch up to some extent in both areas.

Even if the EU member states fare relatively well by international comparison in terms of technical infrastructure and are generally ranked in the third of the world, there is also considerable need to catch up, particularly in the area of connectivity. However, technical infrastructure is only one of many factors that are important for the development of a digital society. If the dimensions used in the DESI (2016) are included – human capital, actual internet use, integration of digital technologies into the economy and development of digital public services (e-government) – then additional, often very specific differences become apparent between the member states. Overall, the data reveals the extent to which and the areas in which Europe as a whole is still far from being advanced in terms of digitalisation (cf. Figure 5).

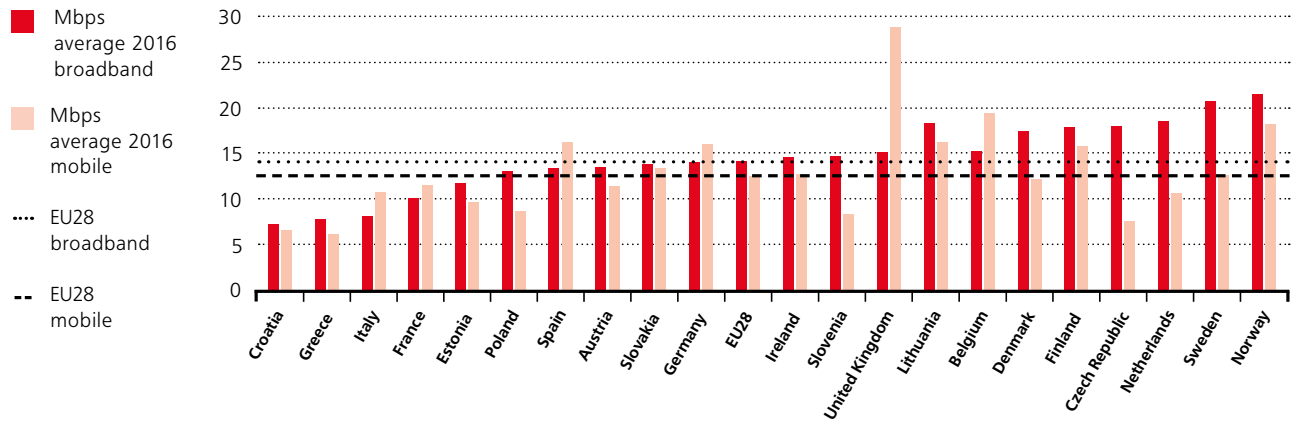
The fact that the digitalisation of the economy – as well as the fostering of citizens' digital skills and the general development of human capital – is key to increasing welfare and driving the EU's economic development becomes clear, for instance, when examining the connection between the level of integration of digital technologies and economic output as measured by GDP per capita (see Figure 4). States with better integration of digital technologies also tend to have higher economic output and vice versa.

Closer examination of the development of the states under survey in terms of DESI dimensions shows the specific strengths of individual countries, which can serve as best practice examples for other states if they are adjusted to the conditions of the welfare state in each case. While Sweden, for instance, is a leader in all dimensions and deemed to be a digitalisation pioneer, Estonia and Spain have clear strengths in the area of e-government and e-administration, and the United Kingdom and, again, Estonia are strong when it comes to human capital and internet use. In general, it can be observed that the least advanced areas are – with the exception of Sweden and to a lesser degree Germany – the integration of digital technologies into the economy (the core of Industry 4.0) and the development of e-government across the EU (see Figure 5). But what do the digitalisation profiles of the seven states examined here look like in detail, and what are the countries' strengths and weaknesses?

---

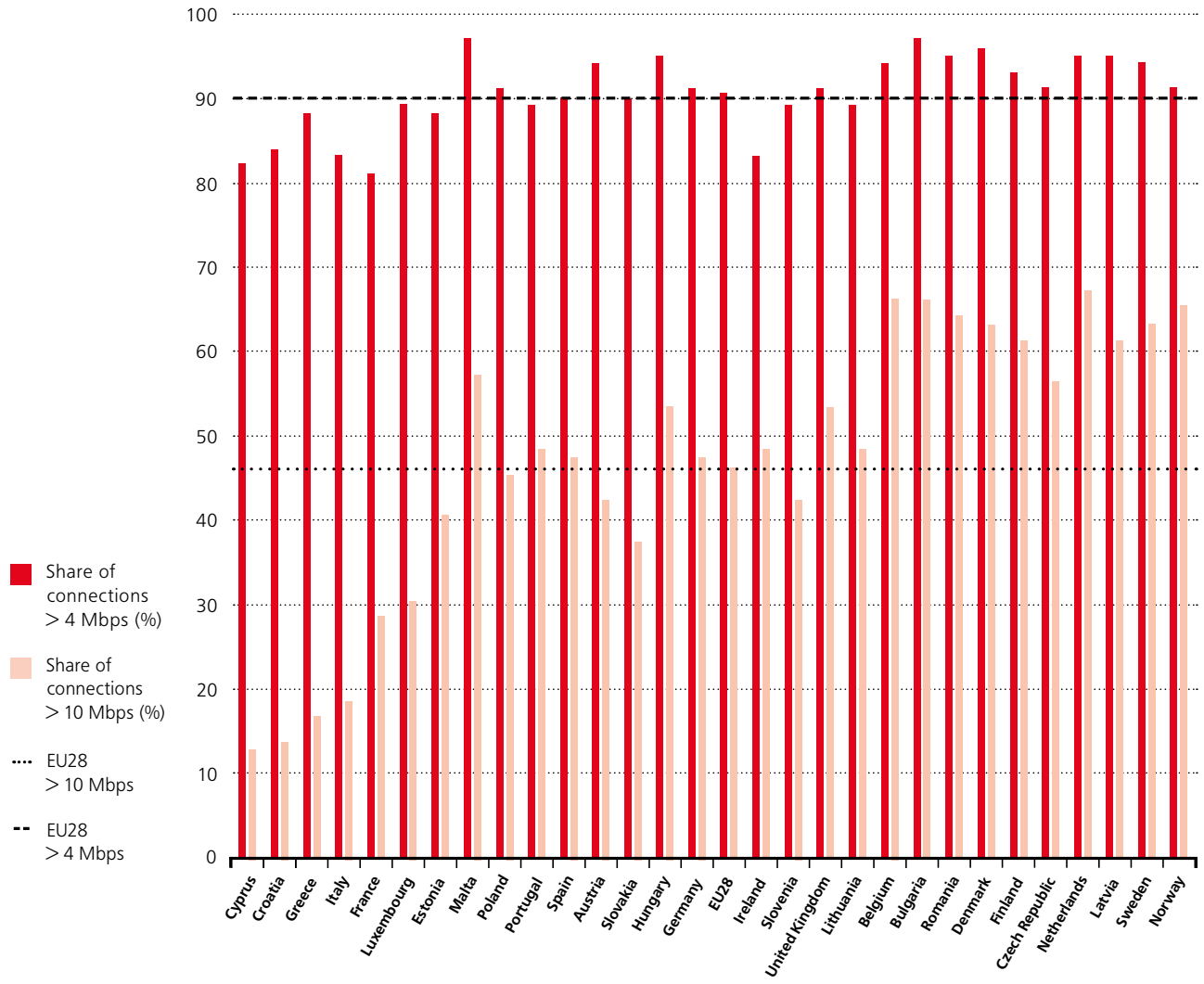
1 The DESI is an index consisting of five dimensions. It examines how EU states are developing to become a digital society. The index developed by the EU Commission (DG CNECT) comprises connectivity, human capital, internet usage, integration of digital technologies and digital public services (e-government). The index varies between 1 and 0, with 1 as the highest score. Source: http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard; 28 September 2016.

Figure 2
Data speeds compared across the EU28: average Mbps



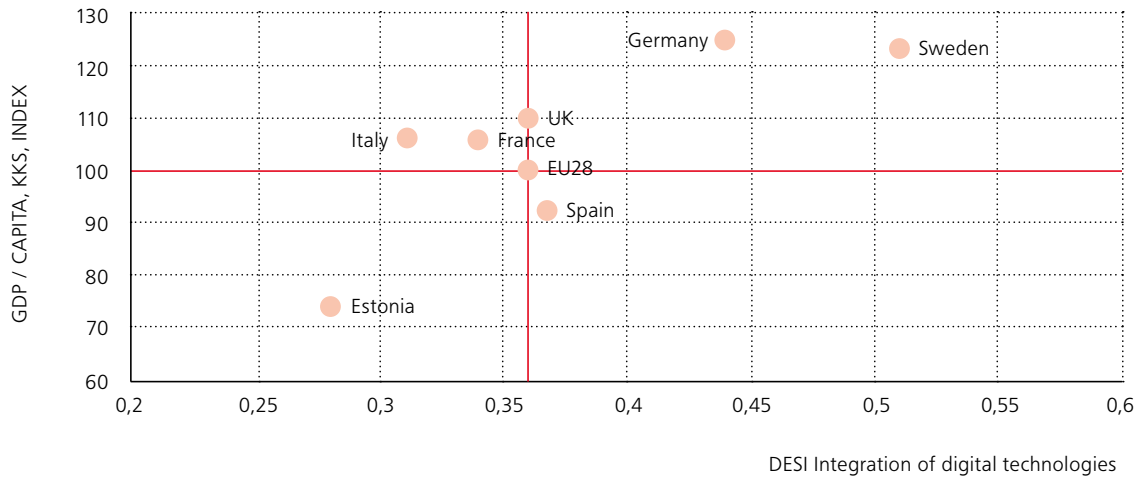
Source: own compilation based on Akamai 2016.

Figure 3
Data speeds by EU28 comparison – shares of fast connections



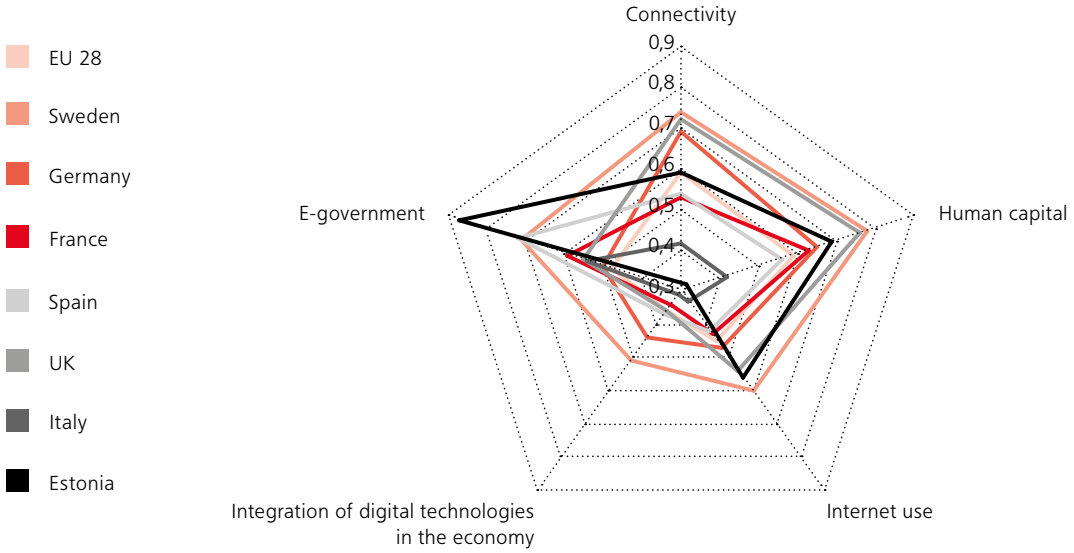
Source: own compilation based on Akamai 2016.

Figure 4
Comparison of the digital economy and economic productivity



Source: own presentation based on the 2016 DESI and Eurostat.

Figure 5
Comparison of the digital economy and society



Source: own presentation based on the 2016 DESI.

Estonia is deemed to be a digitalisation pioneer. It is above the EU average in all sub-indices and shows a high growth rate. While Estonia is the leader when it comes to the development of digital public services and private use of the internet, however, it does need to catch up in terms of integrating digital technologies into the economy, on which it ranks only twenty-second in the EU (2016 DESI).

Digital inclusion of citizens is particularly positive. In 2000 the Estonian parliament introduced a basic right to internet access for all citizens. The parliament also decided that the IT infrastructure must be upgraded every seven years to guarantee progress. This commitment can be seen, for example, in the country's pioneering and extensive broadband infrastructure, even if this has been stagnating a little for a few years and still covers only urban areas. More than 11 per cent of the Estonian population, however, are still waiting for high-speed internet, well above the EU average of 3 per cent (2016 DESI). By contrast, the country comes fourth among EU countries in terms of mobile broadband connections, which is due to the low cost of mobile telephone and internet use and the wide availability of WLAN networks. If additional indicators are included in addition to the purely technical parameters, Estonia ranks seventh in the 2016 DESI, and along with Germany, Austria and the Netherlands is among the states that have made particularly good progress in developing the digital economy.

Estonia has long played a leading role in Europe in the area of digital administration. The first, early step towards digitalisation of broad parts of the administration was the decentralised online platform "X-Road" that was rolled out in 2001. It now covers some 1,000 institutions and offers a wide variety of digital services. In the meantime, many e-services have been set up: for instance, nearly every Estonian has an e-ID card, which has also been available on mobile phones since 2007 (e-Estonia 2016). Furthermore, Estonians have been able to make payments by mobile phone since 2002, process their entire tax returns online for many years and even vote online since 2005 (initially in municipal elections). In the 2015 European elections one in nine votes was cast electronically, and in the parliamentary elections on 1 March 2015 one in five voters used the internet to cast their vote.

France has some catching up to do in terms of digitalisation by European and international standards, in terms of both technology (for example, connection speeds) and the social aspect of digitalisation (for example, the level of internet use and digitalisation of the economy). This is seen particularly in the usage profile and speeds of broadband connections. Although 100 per cent of households are connected to broadband lines, they are used by only 71 per cent. At an average IPv4 connection speed of 9.9 Mbps, France comes third last in Europe. However, the country is making some efforts to improve connectivity (Akamai 2016).

Over and above the technical shortfalls, there is a considerable need for France to gain ground in developing a digitalised society. France comes only sixteenth in the 2016 DESI and is among the countries falling behind in their development, along with Poland, the Czech Republic, Hungary and Slovakia. Even if performance in terms of human capital (twelfth) and e-government (thirteenth) is slightly above average, France fares badly on the 2016 DESI, not only with regard to connectivity (where it is ranked twentieth) but also in integrating digital technologies into the economy (eighteenth) and usage of the internet (seventeenth). Some 81 per cent use the internet, but only 57 per cent have basic digital knowledge. The share of ICT specialists in the workforce is relatively low, at 3.5 per cent.

Even though France has launched some very high-tech initiatives, such as the Tour de France digitale, France digital,2 the Plan Très Haut Débit and the Mission France Très Haut Débit (Ministre de l'Économie 2013), it still lacks a digital development strategy that encompasses all dimensions (2016 DESI). With its Digital Strategy of May 2016, the French government has implemented the Digital Agenda for Europe and has thereby addressed social, as well as economic and technical digital development.

Germany still has potential for broadband expansion and for the development of mobile networks. This is despite its being well developed in the area of digitalisation. Some 98 per cent of German households have broadband connections and 84 per cent use them. With an average IPv4 connection speed of 1.9 Mbps, however, Germany is well behind leading countries such as South Korea (29), Norway (21.3) and Sweden (20.6). In terms of mobile speeds, Germany is also a middle-ranking player in Europe with an average of 15.7 Mbps (Akamai 2016).

Nevertheless, Germany is among the EU leaders in the areas of human capital, internet use and digitalisation of the economy thanks to its rapid and positive development in recent years. If social and economic factors are taken into consideration, Germany's digital development is among the best in Europe. Although Germany is only ranked mid-way in the 2016 DESI (ninth position), it is classified as progressive ("running ahead").[3] As far as integrating digital technologies into the economy is concerned, Germany ranks seventh and shows positive development in all areas. For instance, 56 per cent of companies use digital exchange of information. Further German strengths are the broad proliferation of digital skills among the population, the high number of internet users and their broad range of activities. Only in the area of e-government does Germany still have considerable room for improvement.

With its 2014–2017 High-Tech Strategy and Digital Agenda, the Federal Government is trying to take advantage of the opportunities of digitalisation in Germany. Here, the German strategy is broadly defined and ranges from promoting the population's digital capabilities (digital knowledge society) to extending digital infrastructure (for example, the draft law for facilitating the expansion of digital high-speed networks), supporting digital working (Industry 4.0, IT summit) and digital integration (citizen dialogue) and driving digital administration (Digital Administration 2020, National e-Government Strategy 2014).

Italy is one of the latecomers to digitalisation, which is reflected in its ranking of twenty-fifth in the 2016 DESI, with an index value of 0.4. Here, the development of human capital (twenty-fourth), usage of the internet (twenty-eighth) and the integration of digital technologies into the economy (twentieth) are the main dimensions on which Italy fares comparatively badly. Last year the country made little progress on most indicators.

One exception is the stronger role of e-commerce in the sales volumes of small and medium-sized enterprises (SMEs). The country also fares slightly better for digital public services (seventeenth). Considerable progress has been made in the area of electronic information and communication technologies (ICT). Broadband usage is low for TV connections (only 53 per cent of households), but the situation is far better when it comes to mobile broadband connections. Accordingly, the use of internet services of low.

At the end of 2008, the government rolled out the Digital Italy plan with the aim of digitalising the entire communication infrastructure. In 2010 the EU's ambitious Digital Agenda was integrated into the plan. In addition, investments are planned in infrastructure, electronics and software services. Some 20 major national telecommunications providers have also signed a memorandum of understanding for the development of new-generation networks, with speeds in excess of 100 Mbps.

2 See http://francedigitale.org

3 The Networked Readiness Index also puts Germany in a more (by European comparison) medium-level ranking of 16/139 in 2016 (see Baller et al. 2016: 16). In the DIGITAL 2015 location index, Germany also lies in the middle with a ranking of 6 out of 10 (see BMWi 2015: 8).

One of the highlights of the development is the SPID (Sistema Pubblico Identità Digitale), the Italian digital identity, which was rolled out in March 2016 and should allow password-protected access to all public online services, such as tax returns. Private service providers (for example, banks) should also be able to use the SPID (cf. 2016 DESI). As well as digitalising in the narrower sense, the subject of smart cities is attracting attention in Italy. To date, some 1,300 projects in the areas of energy efficiency, mobility, renewable energies, lighting and waste disposal have been supported, and trailblazers such as Milan and Turin have made good progress towards becoming smart cities.[4]

Spain is catching up in terms of digitalisation and usually ranks around the middle on relevant indicators. According to the 2016 European Innovation Scoreboard, Spain is a "moderate innovator" (EC 2016: 1). In the DESI index, the country ranks fifteenth and is classified as "catching up". After the economic slump following the financial and economic crisis, the first positive signs of development are becoming apparent. Spain is even above the EU average for the integration of digital technologies into public administration (e-governance and e-administration). Some 77 per cent of households currently have access to fast broadband connections of at least 30 Mbps, although there are huge differences between regions and between urban and rural areas. However, only 54 per cent of Spain's population between 16 and 74 years of age has at least basic digital skills. The country is also below the EU average for internet usage (2016 DESI; 2016 EC EDPR).

In accordance with the objectives of the Digital Agenda for Europe, Spain developed an Agenda Digital para España, which was adopted in February 2013. This national strategy is aimed at driving the provision of digital services, promoting digital skills, inclusion and employability, expanding the digital economy and administration and, not least, extending fibre optic networks. The agenda serves as an umbrella for all government activities and sets targets up to 2020. The Ministry of Industry, Energy and Tourism (Ministerio de Industria, Energía y Turismo) is jointly coordinating implementation of the measures with the Ministry of Finance and Public Administration (Ministerio de Hacienda y Administraciones Públicas). In addition, an e-governance plan for 2015–2020 has been adopted (Plan de Transformación digital de la Administración General del Estado y sus Organismos Públicos). As part of the "digital by default" strategy, key public services are to be used digitally in the future. Spain's SMEs fare particularly well with regard to electronic accounting systems.

Sweden has been at or near the top of international digitalisation rankings for years, including the World Economic Forum's Networked Readiness Index and the International Telecommunication Union's 2016 IDI IT ranking. Sweden's very good performance at a technical level – by European and global standards – is matched in terms of social and economic performance. Sweden thus comes third behind Denmark and the Netherlands in the current DESI (2016) with an index value of 0.672 (out of 1), placing it far above the EU28 average.

Sweden leads the way in particular in the areas of human capital, internet usage and e-government, although there is still clear potential for development in high-level industrial usage. Development in Sweden has also slowed compared with other countries, such that it is now one of the countries classified as "lagging ahead". Given its high level of development, however, this is hardly surprising and also applies to other strong performers, such as Finland (2016 EDPR).

As encouraged by the European Commission, Sweden is pursuing a Digital Agenda. Following on from previous strategy papers (on national broadband strategy, e-government strategy, ICT for a "greener" administration, e-health strategy and so on), the government published a Digital Agenda with the title "ICT for Everyone – A Digital Agenda for Sweden" as early as 2011. It calls for every area of social and economic life to be able to benefit from the opportunities offered by the latest ICT. This Digital Agenda is supplemented by a strategy for regional growth and a national innovation strategy. The main objective of the digital agenda is to provide 90 per cent of all private households with broadband transfer speeds of at least 100 Mbps by 2020. By 2013, more than 98 per cent of all workplaces and private households already had access to 4G mobile communication networks (2016 GTAI).

The United Kingdom is one of the countries seeing positive development in both mobile and broadband. It is catching up rapidly with the leading nations in terms of digitalisation, particularly due to its performance in mobile internet: 85 per cent of households use broadband networks and 87 per cent of mobile communications users have mobile broadband (Akamai 2016). While the United Kingdom is only in the wider group of leading countries for broadband connection speeds, the country is the global leader in mobile connectivity with an average rate of 27.9 Mbps.

If economic, social and political aspects are taken into consideration alongside technical issues, the United Kingdom is among the European leaders, ranking sixth in the 2016 DESI index. However, despite huge progress in recent years, it recorded below-average growth rates by EU standards in 2016. As a result, it is one of the countries classified as "lagging ahead", along with Finland, Denmark and Sweden (2016 DESI). Internet usage in particular showed an improvement: minor improvements can also be found in the areas of human capital (third) and internet usage (eighth), while the integration of digital technologies into the economy (fifteenth) and politics (sixteenth) is treading water and no noteworthy progress was made in connectivity in 2016. Particular problems include comparatively high costs, low speed, the lack of ICT experts and the below-average use of new technologies by businesses.

To drive the development of the digital society, a national digital strategy is currently being developed within the framework of the Digital Agenda for Europe, which will pool and enhance existing initiatives. This includes the digitalisation of public administration in accordance with the Government Digital Strategy presented in November 2012. Core elements are a comprehensive domain (www.gov.uk) and the UK Verify single sign-on system, which covers 20 public services. Furthermore, the Information Economy Strategy set out by the government, business and academia is to address key challenges such as the lack of skilled workers, infrastructure, internet security and market failure. The Information Economy Council – consisting of representatives from politics, industry and academia – monitors implementation. The Digital

4 See www.italiansmartcity.it

Skills Strategy agreed in July 2014 is designed to address identified skills shortages and the Digital Economy Strategy rolled out in 2015 will strengthen the digital sector and accelerate innovation.

3

LABOUR MARKET POLICY

Labour market policy includes all state measures to secure jobs, increase employment opportunities for job seekers and improve working conditions (see Schmid/Buhr 2015: 151). In all the countries examined, management and design responsibilities lie with the labour ministries at national level. While "conservative" welfare states, such as Germany, and to a lesser degree the "Mediterranean" welfare states regulate their labour markets relatively strictly, "liberal" regimes such as the United Kingdom give commercial interests a lot more leeway. Together with education policy, labour market policy provides key infrastructure and makes important contributions to education and training (see Schmid 2010). As a result of this policy approach, labour and production processes are structured and regulated social processes (cf. Naschold 1985: 28; cited from Schmid/Buhr 2015: 151). However, they are permanently being changed by digitalisation, automation and everything associated with them. Both the demand for skills and the labour supply are undergoing changes. Although Industry 4.0 has so far had only a moderate impact on the demand for labour in all the countries examined, it is having consequences for work and employment. Technological change is not having the same effect on everyone and is in fact polarising. While demand for skills in high-skilled occupations is rising, it is falling for non-manual routine jobs in particular. What is easy to learn is also easy to automate (cf. Acemoglu/Autor 2011; Autor/Price 2013). Associated with this is a shift or change in income inequality that can partly be explained by the hypothesis of "skill-biased technological change" (SBTC). According to this theory, new production chains require new knowledge in information-processing computer technologies. These complement higher-skilled areas of work, largely replace non-manual routine work and thereby contribute to a polarisation of labour in demand (see Groß 2015: 217). As a consequence, society's digital divide can itself bring about the dangers of work casualisation, particularly for employees in low-skilled and low-pay work. This means that the change in production regime also creates challenges for education and labour market policy. Internationally, it is apparent that labour market policy environments have changed fundamentally in recent years (compare the "reconfiguration of rights and responsibilities and the 'expect and encourage'" work culture, as evidenced, for example, in Germany with Hartz IV). Based on an active labour market policy model, workers are supposed to obtain labour market security primarily through employability and lifelong learning. In theory, this makes education and skills the target dimension of (labour market) policy measures. With the digitalisation and proliferation of electronic ICT, we are on the cusp of a fourth industrial revolution, which will result in huge upheaval in the manufacturing sector. Not only are people globally networked and connected to one another at all times, but increasingly machines are too (Buhr 2015). It is still unclear what the employment balance of the digital economy will look like. However, it is certain that Industry 4.0 will also involve Work 4.0. New work models are being created (telework, cloudwork, crowdwork and so on) and working hours are becoming increasingly flexible and undefined. Work 4.0 does not (yet) describe the reality in all businesses, though. The concept points more to the need to design new policies and highlights the new challenges that the welfare state must address. In the digital agendas of all seven countries examined, work and training staff to deliver the skills now required assume a key role. The following sections provide an overview of labour market policy developments in relation to digitalisation in the seven countries examined. In one aspect, the German agenda stands out in particular: it looks at the consequences of digitalisation and Industry 4.0, seeks social dialogue and expressly focuses on people.

The labour market in Estonia has a high level of dualisation: highly-skilled and well-paid employees live mainly in urban areas, while in rural areas, those with lower skills are often affected by long-term unemployment. Labour market policy has always taken a neoliberal approach; for example, the influence of the social partners is rather weak. Only one in 10 employees is a member of a trade union. From the start of the European economic and financial crisis, Estonian labour market policy has been strongly shaped by the Danish and Dutch "flexicurity" model. Unemployment benefits are financed via state spending and are rather low at only about 4 euros a day. By contrast, considerable resources have been invested in the expansion of digital skills. The 2014–2020 Lifelong Learning Strategy, which the Estonian parliament adopted in

2014, and the 2015 Adult Education Act and Professionals Act are designed to ensure that the needs of the labour market are better met in future with regard to digitalisation.

In **France** the 2015 "Industrie du Futur" initiative provides a good example of the country's comprehensive social dialogue. Government and trade unions have developed a joint concept that will promote research into the role of people in digitalised working environments. In addition, measures are simultaneously being developed that provide for the creation of training places in the digital economy (AHK France 2016). The labour market reform launched in 2016 is aimed at reducing the high unemployment rate and, in particular, the constantly high youth unemployment rate, thereby tackling one of the country's biggest current problems. In particular, the training and ongoing professional development of skilled experts is seen as a prerequisite for the digital transformation of the economy and society. With regard to the proportion of highly skilled workers qualified in mathematics, IT, science and technology (the so-called MINT subjects), France is already in a good position as it has the second highest proportion of young workers of this kind in the EU (EC EDPR 2016).

In **Germany** the Federal Ministry of Labour and Social Affairs (BMAS) has launched a comprehensive – partly public, partly technical – dialogue that particularly involves designing new "decent work" models and setting the rules for future working environments in a forward-looking manner. The debate began with the Work 4.0 green paper. At the end of 2016, the dialogue is to conclude with the Work 4.0 white paper, which should make government action and intentions transparent. In addition, trade unions and employers' associations are involved in various activities, among other things to demonstrate ways in which employees can benefit from the new developments (cf. Degryse 2016). Currently, 12 per cent of jobs in Germany have activity profiles which have a high likelihood of automation. These include in particular jobs done by low-skilled and low-paid workers (BMAS 2015). IT experts, by contrast, are a young professional group that has very good prospects in all industries, although there is a low proportion of women.

Italy, hard hit by the financial and economic crisis, is also grappling with a persistently high level of youth unemployment. Although the indications are now pointing towards an upturn in the economy, the country is proving to be most competitive in labour-intensive low-pay industries involving only low or medium levels of technology. After the crisis, structural reforms in the labour market were implemented, including the loosening of fixed-term contracts. The Jobs Act achieved positive results in terms of the number of employment contracts. However, at the same time labour market dualisation is getting worse. What is more, there is an inflow of (often illegal) migrants and widespread domestic migration from the south of the country. Liberalisation is accompanied by weak productivity growth and falling investment in R&D. There are also weaknesses in the education and training system: pupils leave school early and participation in college education and lifelong learning is well below the EU average.

Statistical authorities currently point to positive developments in **Spain**, but the labour market continues to be highly dualised. Above all many young adults, including those who are highly skilled, have to remain in precarious, often also informal employment. Unemployment benefits are low, and the primary source of support is the family. Especially young, highly skilled adults are therefore forced to seek work outside Spain. However, this is problematic as they are key to Spain`s innovation potential. In 2012 comprehensive labour market reforms were introduced, which are aimed at making the labour market more flexible and strengthening active labour market policy measures. Protection against dismissal have been loosened and, in turn, companies are expected to hire more employees in permanent jobs. This move has been successful to some extent, but there are shortcomings in particular in the population's digital skills. The proportion of ICT specialists in the overall workforce is relatively low (EC EDPR 2016). The country is now faced with a double challenge: it needs to make up for shortcomings and prepare for the future. This process must also involve coordinating the supply of and demand for skills between educational institutions and companies.

The labour market in **Sweden** is characterised by high participation in employment (particularly among women), a high level of education and a relatively high willingness to invest in education and research. As in most Nordic countries, the trade unions organise unemployment insurance and in turn receive state subsidies (Förster et al. 2014). The payment of unemployment benefits comes virtually entirely from state spending. However, inequality and poverty are also increasing in Sweden. In recent years, the number of short-term and temporary employees and of low-skilled and badly paid jobs has risen. For that reason, the government appointed an independent commission in spring 2015 to analyse the future of work and the effects of digitalisation in the country. In Sweden it is also expected that digitalisation will make many non-manual activities superfluous. At the same time, the size of the ICT sector is now nearly twice the EU average. To maintain the inclusive nature of the Swedish welfare state, trade unions in particular are considering a more flexible education policy and a stronger universal social insurance system. The Swedish government also supports international cooperation.

The labour market in the **United Kingdom** has been very dynamic in recent years. In September 2016 the unemployment rate was only 4.9 per cent. At the same time, however, fragmentation of the labour market is increasing. More and more people are working in what are euphemistically referred to as "non-typical" employment relationships, which are often more of a dead-end than a stepping stone. In public service there are ever fewer jobs due to privatisation. Digitalisation is playing a crucial role in these rapid changes. It is estimated that up to 35 per cent of jobs in the United Kingdom will be subject to further automation in the next few decades (Deloitte 2014: 8). Highly skilled, social and creative jobs are becoming increasingly important. A current interministerial report on Digital Skills for the UK Economy offers a number of recommendations, including introducing girls and young women to technical jobs, reforming curriculums and coordinating training more effectively with the needs of the digital economy.

Continued digitalisation is creating major challenges for society. The most important of these relate to labour market policy and to labour and social rights. The capacity of the

various welfare regimes to protect against social risks – for example, those arising from unemployment – varies between countries. For that reason, the divide in material inequality is widening more in "liberal", "Mediterranean" and "conservative" welfare states than in "social democratic" ones. In the coming years, it will be one of the core tasks of governments to drive digitalisation as consistently as possible and simultaneously to strengthen inclusivity in labour markets and welfare states. The aim must be to capitalise on the opportunities of digitalisation. The routes to achieving this are not obvious, and thus they need to be actively sought out.

4

HEALTH CARE POLICY

Digitalisation is affecting health care policy in different ways. Tele-healthcare – in the form of transmitters, sensor mats and smart meters – makes it easier to care for people at home for longer. Apps and wearables allow people to monitor their own bodily functions, including when exercising, and patient records are gradually being digitalised, making them available for big data analysis. These data can, in turn, be used to offer customised treatment or improve disease management for entire population groups and thereby allow patients to live longer and self-sufficient lives. However, these hopes and wishes are also accompanied by fears over data protection, the confidentiality of employees' health status or even the dehumanisation of care. However, these fears need not materialise if the digitalisation process is oriented towards people and their needs and preferences. Here, the countries examined in the study have already reached various stages of this process.

For all the countries examined, it can be concluded that digitalisation will drastically change how welfare states will deliver services and which services they will deliver in the future, as well as how these services are funded and organised. Here, digitalisation interacts with the decision-making processes and institutions of welfare states. Comparing the selected states in terms of the structure of responsibilities in the health care sector, it is clear that health care systems vary according to the degree to which decision-making and the funding and organisation of services are centralised. In Italy, Spain and Sweden, the regions (and municipalities) play a key role in financing, planning and implementing health care policy. In Estonia and France, responsibilities are more centralised, while in Estonia the provision of services has been largely privatised, although supposedly monitored by local authorities. Germany is a special case in that health care is subject to competing legislation. Many actors (service providers, funding bodies and politicians) are involved in the decision-making process and service provision takes place at decentralised levels, with regional authorities responsible for planning and implementation. In the United Kingdom, health care is devolved to the four individual countries, but centralised within them and managed operationally at country level. In nearly all countries (except Estonia), there is a mix of service provision by public and private agencies.

By contrast, **Estonia** is commonly referred to as a digitalisation pioneer. There is also evidence of this in health care policy. In 2005, a forum was set up – the Estonian e-Health Foundation – whose task is to coordinate health care digitalisation. This has already met with tangible success. In 2008, Estonia was the first country to implement a nationwide standardised system of electronic patient files to store the medical records of all citizens (Electronic Health Record, EHR). Both doctors and patients have access to the electronic medical records, although patients can restrict access. More than 70 per cent of Estonians use the EHR (e-Estonia 2016), although the elderly, especially in rural areas, are more likely to have problems using it in terms of both technical access and skills. For that reason, the Estonian government launched an initiative in 2002 that is aimed at familiarising all groups of society with the internet as much as possible. The EHR also offers citizens the possibility of arranging doctors' appointments, receive reminders of appointments and have teleconsultations with attending doctors. Another key function is the electronic prescription of medication: 98 per cent of all prescriptions are now processed online via the X-Road system.

France has fallen behind in recent years in health care digitalisation. The country does not yet have a comprehensive digital-by-default strategy, but in recent years there have been a series of reforms that have yet to be evaluated. For instance, the action plan for the digital economy is designed to drive the promotion of digital instruments in the health care sector (cf. EC EDPR 2016). For that reason, the Agence national des systèmes d`information partagés de santé (ASIP Santé) was set up in 2009, a legally mandated organisation for developing and monitoring the use of IT systems, instruments and infrastructure in health care (ASIP 2009, 2013). In addition, in 2009 an act on telemedicine was adopted that rolled out teleexpertise, telemonitoring and teleconsulting. Pilot projects have been launched in some regions in recent years. The Programme hôpital numérique launched in 2012 paved the way for the digitalisation of hospitals. In 2013 the Ministry of Health published an initial e-health strategy, one of the consequences of which was the launch of the personal health record. In July 2016 this strategy was extended with the roll-out of the Stratégie nationale e-santé 2020 that is aimed at

driving modernisation of the French health care system (Ministère des Affaires sociales et de la Santé 2016). According to the Digital Agenda Scoreboard (2013 and 2015), France is a middle-ranking performer with regard to exchange of patient data and the use of electronic prescriptions, and below the EU average, for example, for online doctors' appointments. The key challenges for France are the use of big data for the development of individualised treatments and medication.

Germany has already had its first experience of the digitalisation of health care with the launch of the electronic health card, which was introduced following the health care reform in 2003. It is the "supporting pillar of the e-health concept in Germany" (Wemmel 2015: 6). The planned implementation in 2006, however, was not possible due to technical delays, incompatible schedules, blockades and coordination issues among the consortium partners of the operating company tasked with implementing the health card, Gematik. Only in 2011, following changes to the provisions of the testing procedure and a reduction in the scope of the card's functions (master data storage) were the first health cards issued. Electronic communication in health care will in future be driven by the storage of emergency data, patient records and medication plans. However, the infrastructure for this is very demanding, particularly with regard to IT security. Furthermore, all players need to be included in the infrastructure via "connectors" and thereby make the various IT systems mutually compatible. By setting deadlines and introducing penalties, the new e-Health Act, which came into force on 1 January 2016, is aimed at putting in place a roadmap for health care digitalisation. Germany has made only slow progress for the past decade and risks falling behind in this area, particularly because the actors in the scheme's self-regulation are blocking one another. For that reason, digitalisation in the health care sector in Germany is still relatively in its infancy. While individual players indeed use digital technologies, there has been hardly any progress in networking these actors with one another, which is a vital criterion for Healthcare 4.0.

In **Italy** there are major differences between northern and southern regions in terms of digitalisation of the health care system, with northern Italy being particularly well developed. Here, the digital environment has been gradually improving since 2008. By introducing national regulations on e-health, the Ministry of Health is trying to implement new ways of organising and providing medical services, rationalising investments in health care and achieving synergies via a standardised strategy. This is to be achieved against a background of high public spending on health care, on one hand, and increasing demand for services from an ageing population, on the other. There is also a focus on greater social justice, which involves, in particular, making it easier to access services and treatment (especially in southern Italy) and taking account of the increasing mobility of patients and specialists (cf. Di Carlo/ Santarelli 2012; Donatini 2015). Italians can already view their data online and change their GP by smartphone. Progress is also being made in the digitalisation of medical files. The public health system (ASL) is managed by the regions. Five regions (Trentino, Lombardy, Tuscany, Emilia-Romagna and Aosta Valley) are pioneers in digitalisation. Some regions have developed IT networks to facilitate communication between doctors, paediatricians, hospitals and territorial services. These networks enable the automatic transfer of patient records and the services provided. Furthermore, there is a gradual switch from hardcopy to electronic prescriptions. Although many practices have rolled out solutions such as systems for booking online appointments, the government's current austerity policy – which has hit public health care funding hard – means that it is now mainly private doctors' practices that are investing in digital solutions (Scheid 2016).

In terms of digitalisation, **Spain**'s health care is seen as very advanced by European standards. Two areas in particular have experienced major progress in digitalisation: (1) electronic prescriptions and orders and (2) electronic medical records (cf. EC EDPR 2016). In 2010 minimum standards for the (electronic) documentation of medical records were defined as part of the national Historia Clínica Digital del Sistema Nacional de Salud (HCDSNS) strategy. The Ministry of Health (MSSSI) is collaborating with the public law body "red.es" on the standardisation of electronic documentation and is aiming for nationwide standardised use of the medical terminology database SNOMED CT. This records the content of medical statements in a standardised and comprehensive form and thereby enables information to be exchanged even across (national) borders. In addition, there is a national strategy (Plan Avanza 2) for expanding the use of ICT in the health care sector. The Ministry of Industry, Energy and Tourism, the MSSSI and the regional health services are working together on an online health care programme (cf. MSSSI 2010). So far, however, the national e-health strategy has not been adopted (cf. EC EDPR 2016) and the exchange of medical data between regions is also still managed in very different ways. The systems in Galicia and the Basque Country are particularly advanced, whereas Catalonia has a closed system that permits virtually no exchange of data with other regions.

By international standards, health care in **Sweden** is well structured, albeit very hospital focused. Sweden can also be considered a pioneer in the digitalisation of health care. To drive this development, the regions and provinces, the municipalities' umbrella organisation, the private health care employers' association and the Swedish Pharmacy Association set up a national cooperation structure known as "Carelink" back in 2000. The country was also a pioneer in its early adoption of national electronic patient records, which was implemented between 2008 and 2012. The first step on the road to networked health care at national level was taken by investing in the digital infrastructure and standardising organisation in the regions. Regions across the country were then networked with one another based on unified standards. Today all health care facilities in Sweden are networked, with data from the source systems virtually merged using a comprehensive patient management system. Online and password-protected, the Nationell Patientöversikt (NPÖ) gives all authorised individuals access to the desired data at the click of a mouse. Many processes have now been almost entirely digitalised. Already 98 per cent of all prescriptions are forwarded online to pharmacies or are accessible via a central database (eHälsomyndigheten 2016). Patients will only be able to interact directly with the NPÖ in the near future, but nearly all citizens have given their consent to participating in the programme (Klein 2016). The NPÖ forms the basis for the further expansion of digitalisation, which is also

supported and coordinated by its own authority, the Swedish eHealth Agency (eHälsomyndigheten 2016).

The **United Kingdom** is one of the countries that have already made relatively good progress towards digitalisation. A number of reforms to the welfare state have been launched in recent years that will drive the digitalisation of services, including in health care. In addition to the Government Digital Strategy, the Department of Health and the core player in British health care, the National Health Service (NHS), have drawn up digitalisation strategies and plans. In the case of the NHS, which was fundamentally reorganised in 2012, these strategies and plans were integrated in the 2014 "Five-Year Forward View" planning document. Here, measures towards digitalisation include electronic assessment of specialists' services, promotion of health apps, electronic storage of medical records (by NHS Spine and the N3 network), online booking of appointments and doctors' prescriptions, support for public e-learning and better support for staff dealing with digital technologies (NHS 2014: 31 et seq.). The processing and merging of patient data for analysis purposes is to be carried out by the care.data program. Due to concerns over the usage rights, however, the program has been suspended until further notice. The National Information Board has been tasked with finding alternatives. The Department of Health launched the "3millionlives" initiative in 2011 to promote the use of tele-healthcare. The programme initially was aimed at benefiting up to three million people. In 2014 the campaign was redesigned and renamed "Technology Enabled Care Services" (cf. Hampson et al. 2015: 11).

5

INNOVATION POLICY

If we see innovation policy as the consistent merging of industrial, structural, research and technology policies, the roots of this policy area can be traced back to the 1950s. In particular, the technology race that began in the 1960s encouraged most modern industrial nations to set up research and technology policy programmes (for example, nuclear power policy in Germany). These were initially seen as industrial policy, and as a state reaction to the failure of the market. Furthermore, most state efforts since then have mainly targeted the supply side of technological development. Social innovations, the demand side and public procurement, however, play a subordinate role in most European states, contrary to US policy approaches.

In **Estonia** responsibilities for innovation policy are spread across various ministries, but lie largely with the Ministry of Education and Research (Haridus- ja Teadusministeeriumi) and the Ministry for Economy and Communications (Majandus- ja Kommunikatsiooniministeerium). The country's expenditure on innovation policy is below average by international standards. This is also seen in the amount spent on research and development in the national economy overall. It is striking that this has been falling in Estonia for several years, with R&D expenditure dropping from 2.31 per cent of GDP in 2011 to 1.44 per cent in 2014, at a time when it rose to over 2 per cent in the EU28.

Estonian innovation policy is also oriented towards digitalisation – and in particular towards the promotion of entrepreneurship. As such, the Estonian economy is based on a large number of SMEs and has an above-average number of entrepreneurs. In addition Estonia offers so-called "e-residency", which is open to foreign citizens and seeks to create a more positive environment for foreigners to start up businesses and facilitate bringing workplaces to Estonia.

In its 2020 Digital Agenda, the government is pooling its measures for improving the ICT infrastructure in order to drive Estonia's competitiveness. Specifically, it plans to expand the broadband network, increase transfer speeds and strengthen the role of digital signatures. Since 2014 Estonia's innovation policy measures have followed two medium-term (2014–2020) policy strategies, the Estonian Research and Development and Innovation Strategy and the Estonian Entrepreneurship Growth Strategy. These set the target of increasing research and development spending by 2020 to 3 per cent of GDP (Lisbon target), two-thirds of which is to be funded by business. Given how this percentage has been falling significantly over the past five years, this target seems quite ambitious. Estonia does, however, consistently rely on support from European structural funds to expand its research and development. Here, the current operating programme for Estonia specifies that 4.4 billion euros will be available in the current funding cycle, of which 3.53 billion euros alone will come from the European Cohesion Fund and are specifically earmarked to improve the Estonian economy's innovativeness.

In **France** the traditionally strong role of the state in innovation policy has diminished significantly in recent years, with new players, programmes and regulations becoming involved. The coordination of French innovation policy is overseen by the Ministère de l'Enseignement supérieur et de la Recherche. Due to the numerous overlaps with other policy areas, other ministries play a major role, such as the Ministère de l'Economie et des Finances, under whose management, for example, the Nouvelle France Industrielle programme was adopted in September 2013. Since April 2015, this programme has been called "Industrie du Futur" and seeks to harness the opportunities of the fourth industrial revolution, as Germany did in 2010 with "Industrie 4.0", the United Kingdom in 2011 with the "High Value Manufacturing Catapult" programme and Italy in 2012 with the "Fabbrica del futuro" programme.

Here, the government is focusing on "grands programmes", which have initially benefited mainly large companies. More recently, however, the French government has been counteracting this more strongly, for instance with considerable tax cuts for companies investing in research and development. In terms of tax incentives for research investment, France now leads the OECD countries. SMEs, in particular, have benefited most from research and development credits, accounting for 80 per cent of them in 2013 (AHK 2016).

The tasks of innovation policy in **Germany** are spread across several levels (vertically) and various ministries (horizontally). Unlike other countries, however, there is no central institution in Germany (for example, an innovation council or innovation

agency) that coordinates innovation policy. In order to better coordinate the innovation policy of the responsible federal ministries (for example, BMBF, BMWi), the Federal Government launched its High Tech Strategy' (HTS) in 2006, subsequently revised in 2010 and 2014. The HTS pursues a more mission and demand-driven approach than the former policy and will be expanded to become a comprehensive cross-sector innovation strategy dealing with both technical and social investments (Buhr 2016).

With its "2014–2017 Digital Agenda", the Federal Government, as indicated above, now attaches greater importance to the opportunities and challenges that go hand in hand with digital change (EFI 2016). At national level, the precursor to the Digital Agenda was essentially the Internet and Digital Society Commission of Enquiry, which existed from 2010 to 2013 and gave recommendations on further policy development in its final report. The Digital Agenda sets out digital policy principles, from which development opportunities for individual policy areas are derived (digital infrastructure, digital world, public administration, digital participation, education, European and international development). The agenda is managed jointly by the Ministry of the Interior, the Ministry of Transport and Digital Infrastructure and the Ministry for Economic Affairs and Energy. This group of three managing ministries makes coordination difficult. In spring 2016 the BMWi presented the 2025 Digital Strategy, which ties in with the Digital Agenda. The Digitalisation Action Programme sets out the 2025 Digital Strategy in more concrete terms by specifying and prioritising tasks. Consistent use of digitalisation to modernise the welfare state is, however, not yet reflected in the Digital Agenda or in the structure of its management.

In **Italy** the central player in innovation policy is the Ministry for Education, Research and Universities (MIUR). It is responsible for national and international scientific activities, funding universities and research facilities and supporting public and private research and technical development. The Ministry of Economic Development (MISE) manages industrial innovation (Modena 2001). Although the "PNR 2014–2020" national research programme was announced some years ago, it has still not been officially approved. At 1.29 per cent, Italy's state R&D expenditure is still well below the 2020 target of 1.53 per cent. In addition, the share of gross domestic expenditure on R&D by businesses is also low for an industrialised country. According to information provided by the Italian Association for Industrial Research, AIRI, companies invested about 8 billion euros in R&D, of which 1.1 billion euros went into ICT.

There are also critical weaknesses in managing and organising the R&D system, as well as massive regional inequalities in favour of the north. Another problem is the lack of networking in industry and the low level of risk capital. The education system is a strength, however, with around two million students enrolled at 95 universities (66 public and 29 private). In addition, there are major state research agencies such as the National Research Council (CNR), the Italian Space Agency (ASI) and the National Institute of Health (ISS).

In terms of Industry 4.0, there are some interesting developments and projects. In particular, major companies in the vehicle, aviation and space industries – many of which supply German industry – are technological frontrunners. There is an especially large number of Industry 4.0 cluster initiatives, although these activities are restricted mainly to the north of the country.

The innovation system in **Spain** has well-developed structures, especially in education and research, but these have been badly hit by the austerity measures implemented in response to the financial and economic crisis. There is only limited evidence of a coordinated policy. Instead, Spain's innovation policy is highly fragmented and locally organised. For instance, the autonomous regions are in charge of funding universities and have key responsibilities for the industrial sector. The Ministry of Economy and Competitiveness (MINECO) is the key player at national level. In addition, the Ministry of Industry, Energy and Tourism (MINETUR) gives targeted support to the industrial sector. The 2011 Science, Technology and Innovation Act (Ley de la Ciencia, la Tecnología y la Innovación, 14/2011) now governs the promotion of R&D and makes provision for two public-private agencies to promote innovation and development. Assigned to MINECO is the CDTI (Centro para el Desarrollo Tecnológico Industrial), which is responsible for promoting R&D. In addition, the research agency AEI (Agencia de Investigación) will in future play a major role and promote outstanding research projects.

To strengthen digitalisation and industry, MINETUR recently set up a line of funding. The Agenda para el Fortalecimiento del Sector Industrial en España (Secretaría General de Industria y PYME; MINETUR 2014a) is aimed at reindustrialising the country and increasing the competitiveness of Spanish companies in the global market. The second line of funding approved in October 2015 is expressly dedicated to digitalisation. The Initiativa Industria Conectada 4.0 is aimed at driving the digital transformation of Spanish industry by means of a joint action plan with the public and private sectors (cf. EOI 2015). In addition, the relevant stakeholders (businesses, trade unions, universities and research institutes) are involved in developing future strategy. The main aim of the initiative is to strengthen competitiveness through investment and the use of new technologies, with a particular focus on SMEs and micro enterprises.

Sweden's innovation system is considered, on one hand, to be one of the most successful in the world. For instance, state expenditure on research, industry and regional growth has risen constantly since the late 1990s, and from 2.5 to 4.3 per cent of the budget between 1997 and 2014 alone (from 0.8 to 0.9 per cent of GDP). On the other hand, Sweden has a relatively low return on innovation, as seen in its rather moderate productivity figures. A large proportion of Sweden's R&D expenditure is on ICT, where there is now a special focus on Industry 4.0. Initiatives are, however, strongly geared towards technological development.

The weaknesses of the Swedish innovation system include the fairly modest transfer of basic research into innovations that are then successful in the market. One explanation of this is often found in the rather heterogeneous management of the innovation system, which is also reflected in innovation policy (OECD 2016). Here, responsibilities have traditionally been widely distributed. The Swedish Ministry of Education and Research is responsible for education, research and development. Responsibility for innovation and industrial R&D continues to lie primarily with the Ministry of Enterprise, Energy and Communications. In addition, there are a number of

advisory committees and agencies that mainly pursue research policy tasks. These include the Science Council (VR), the Research Council for Working Life and Social Research (FAS), the Research Council for Environment, Agricultural Sciences and Spatial Planning (Formas) and the Government Agency for Innovation Systems (VINNOVA). This makes it difficult to coordinate innovation policy. The Swedish government responded to this situation in October 2014 by launching the National Innovation Council (Nationella Innovationsrådet). Chaired by the Prime Minister, the Council consists of representatives from government, employer associations, trade unions and the research community and has its own resources. The Council has set itself the ambitious target of developing a new innovation strategy and reviving innovation policy. This can also be seen in the appointment for the first time of a minister responsible for innovation (Ministry of Enterprise and Innovation). Here, the Swedish government is also aiming to generate targeted state demand via an innovative public procurement system, overseen by a dedicated minister and with its own administrative body (Andersson 2016; Edquist 2016). The Swedish government hopes that the considerable state and municipal budget funds for public procurement (between 65 and 85 billion euros) can be used to drive innovation.

State innovation policy in the **United Kingdom** focuses in particular on two key players: the Department for Business, Innovation and Skills, established in 2009 and replaced by the Department for Business, Energy and Industrial Strategy in 2016, and the state innovation agency Innovate UK, which is attached to this department. Their work is supported by committees that offer additional expertise (Council for Science and Technology, Parliament Office for Science and Technology). To coordinate innovation policy, the Department for Business, Innovation and Skills published a plan in 2014 entitled "Our Plan for Growth: Science and Innovation". In addition, Innovate UK published a "Digital Economy Strategy" in 2015, which is aimed at supporting the British economy through innovations using digital technologies. This served to some extent to lay out in concrete terms the declarations of intent contained in the department's innovation plan. The core points of the strategy are maintaining a strict user focus, promoting sustainability, driving growth in infrastructure and ecosystems and creating a positive environment for and supporting innovators. This includes focusing on digital health care services.

In the United Kingdom, over 100 technology parks (for example, UKSPA) and more than 50 university technology transfer facilities (for example, NCUB, AURIL) play a key role in helping relevant actors, especially universities and businesses, to network with one another. In addition, 11 "catapult" centres have been set up to support early-stage innovation and support businesses in the commercialisation of research (see NESTA 2015).

6

DIGITALISATION AND WELFARE STATES – EQUAL OR UNEQUAL?

The increasing digitalisation of value-added networks and the greater use of new technologies, flexible production processes and new work forms is leading to changes in welfare state architectures (cf. Schmid 2010: 112). The effects of this development can be seen in all three policy areas examined in this study.

As the central location for distributing life opportunities and social security in contemporary capitalist market societies, the **labour market** is particularly affected by digitalisation. The welfare state is supposed to counteract inequalities by redistribution and protecting against certain risks. At the same time, the welfare state itself is based on social stratification, which more or less privileges gainful employment. Digitalisation results in new challenges. Particularly stratified welfare states are more likely to produce a digital divide between those who have the necessary skills to find their way around the digital environment and those who do not have those skills and are therefore more exposed to the dangers of work casualisation (cf. SBTC). Digitalisation in this situation does not alter the demand for work equally across all skills levels, but rather has a polarising effect. While demand rises in highly skilled areas, it falls for non-manual routine work (cf. also OECD Skills Outlook 2013, 2015). This is because "new production technologies, in particular information-processing technologies" caused by digitalisation "make, on one hand, many unskilled tasks unnecessary but require, on the other hand, corresponding knowledge and skills to apply those technologies" (Groß 2015: 217).

One central requirement in all the countries examined is for young people – above all – to acquire the skills necessary for Work 4.0 in a digital economy. This means that the interfaces between the labour market and education, in particular, become relevant. Against the background of digitalisation and Industry 4.0, education policy becomes one of the crucial fields of future welfare state action. The reform of training programmes is high up on the political agenda in all the countries examined. The aim is to better align labour market demands with the supply of skills. Here, an active labour market policy is required that relies more strongly on "encouraging" rather than "expecting". For the active social state, education is a vital component (cf. Schmid 2010: 441). Especially in knowledge societies and high-tech industries, education is not only crucial for the innovation potential of a society but also important for social inclusion. This applies increasingly to countries such as Spain, Italy and France that are affected by constantly high youth unemployment. Governments are addressing the situation with reform programmes aimed mainly at attaining more flexibility and less regulation, but also activation and skills measures. In all the countries examined there is evidence of an increase in "atypical" employment relationships. These often go hand in hand with precarious employment careers and restrictions on integrating into social security systems. Here, ways must be found to include new work models (for instance, crowd-workers working as self-employed individuals) in existing security systems. Because new social risks require new ideas for ensuring a social security net, the long-term question we have to ask is whether and how we might design a social security net that is decoupled from work and how we might arrive at EU-wide regulations.

In short, innovation, digitalisation and Work 4.0 bring new opportunities, but also risks. Societies that want people to take professional risks therefore require social security systems that are able to cushion such risks. For that reason, social rights should belong to people, not to jobs. Traditional categories such as employee and employer are breaking down due to new work models. Working is becoming more mobile, more flexible and less contained. This can be positive, for instance in achieving a better work–life balance, but also negative if the boundaries between work and leisure become blurred. Clear rules are required here. Particularly for employees who are not present in the work place, we need to find new ways of organising trade unions, representing interests and – in the German case – enabling worker participation. At the same time, the interests of the core workforce must be protected. In designing the labour markets of the future, it is also important to avoid a further wage polarisation.

Digitalisation increases productivity and therefore also has the potential to boost demand and create new professions and activities. If appropriate investment is made, this can result in employment growth. Rising demand for workers, however, is to be expected mainly in areas that require greater

skills. Decent jobs need inclusive growth. Because professions and activities can be automated in different ways, all the welfare states examined here require solutions for all those who lose out in the digitalisation process. This requires greater investment in professional development and lifelong learning for low-skilled workers, as well as, for instance, for older workers.

Digitalisation also changes the policy area of **health care**. Digital services (for example, smart watches) are entering the market and starting to monitor our behaviour: apps count our steps, wearables measure our blood pressure. What will happen if the data collected are forwarded to health insurance providers and systematically analysed, and if an individual's behaviour then becomes subject to active health policy measures in accordance with the "expect and encourage" model? Customised medicine offers the opportunity to provide optimal support, but is a concern if this data are made available to employers, for instance. For that reason, the data must be owned by the patient, but this is only the case in very few welfare states in reality, although the same applies in the analogue world. For the most part, patient data involve ownership without possession (that is, the data, including analogue data, lie with doctors) or possession without ownership (lots of data lie with lots of doctors, care organisations and hospitals). However, only those who can be sure that their personal data are actually theirs and secure will accept the use of digital health applications and welcome, wherever possible, the patient-related merging of all the available health data. This is one side of digitalisation. The other is better quality of life due to better and more convenient medical and care services, including in sparsely populated areas if they are equipped with the appropriate digital infrastructure. This is because the digitalisation of health care offers huge opportunities. For instance, it avoids multiple examinations, cumbersome documentation and bureaucracy; it improves diagnosis, prevention, treatment and medication; and it leads to more efficient processes, shorter waiting times and approaches, and thereby more time for people.

Using digital technologies requires digital literacy, in other words, basic skills that enable people to draw the greatest benefit from these new technologies. For citizens to be interested in these technologies, however, they need to recognise what the benefit is for them or how these innovations could specifically improve day-to-day life. If citizens are less prepared for digitalisation and do not have the basic skills required, digitalisation will not be able to achieve its full potential, whether from use of internet connections in general through to health services in particular. Here, it is irrelevant how well e-government services are developed. Here, Italy and Estonia represent two contrasting case studies.

It is striking that the countries that have strong administration units and that have tried to manage digitalisation top down in large-scale projects are those in which the debate about small-scale innovations is more prominent. Here, the problems experienced in Germany and the United Kingdom with health cards, the disappearance of patient data and records and general data protection problems in the NHS with care.data provide particularly noteworthy examples. On the other hand, decentralised states struggle with translation problems and fragmentation when implementing digitalisation, as the examples of Spain and Italy show. Here, a mix of centrally determined requirements and operational autonomy at regional and local level is indeed conducive to achieving objectives.

When managing this process, some states rely on specific coordination committees or agencies. Examples here are the Estonian e-Health Foundation or the Swedish organisation Carelink. Both are national collaborations. The Estonian organisation is under the management of the Estonian Ministry of Social Affairs, with clinics and universities also involved. The Swedish organisation is a collaboration between regions, provinces, municipalities, the private health care employers' association and the Swedish Pharmacy Association. By contrast, when it introduced the health card, Germany relied entirely on the usual corporate health care players, with more or less no involvement of state offices (for example, district health authorities in the area of public health care, the federal states in the area of inpatient care and prevention or health care legislation at federal level). Assuming that national collaborations focus on the common good (given that the players around the table do not all have diverging interests), it is particularly striking how Germany experienced long periods during which the various players sought to block one another in the course of the introduction of the health card. This means that states initially try to fall back on tried-and-tested governance models when managing such change (Germany: corporatism; Estonia: centralisation; Sweden: state-focused corporatism), some of which were appropriate for the task and situation (Sweden, Estonia) and some of which were not (Germany).

Digitalisation is giving rise to challenges of varying intensities in the different welfare state models. First, the countries examined occasionally differ widely in the degree of digitalisation in the economy and society that they have already achieved, from setting up and expanding digital infrastructure to building digital human capital, integrating digital technologies into the economy and driving e-government. Irrespective of the type of welfare state, then, the key aim must initially be to establish high-speed networks across all states and to promote human capital. Second, depending on the type of welfare state, there are also different challenges in terms of content. Measures that are comparatively easy to integrate for one welfare state may have a centripetal effect in other welfare states. For instance, the issue of employment protection in a period of decentralised, flexible and digital work in "liberal", "conservative", "Mediterranean" and "social democratic" states will require different solutions. Applying dimensions of internal versus external modernisation, on one hand, and social inequality, on the other, we can construct a model that systematically shows the interactions between digitalisation and the welfare state and in which we can position the states that have been examined (see Figure 6). Here, the countries are categorised largely in line with the clusters in Figure 5 that show the connection between economic output and digitalisation of the economy. This model will subsequently be broken down according to the policy fields examined in this volume.

Comparison reveals that Sweden has the lowest level of social inequality due to the high redistributive capacity of its social democratic welfare state. It is also proactively and con-

Figure 6
Modernisation and social inequality: comparison of interactions

		Modernisation	
		external	internal
Social inequality	low		Sweden
	medium	Germany France	United Kingdom
	high	*Italy* Spain	*Estonia*

Source: Authors' presentation.

sistently modernising its welfare state internally. Sweden can therefore be considered a pioneer of Welfare 4.0.

Similarly, Estonia and the United Kingdom, with their relatively good levels of network coverage and progress in digital public services, are taking the route of internal modernisation and benefiting very much from this in the areas of connectivity and e-government. However, it is also becoming apparent that the much stronger stratifying effect of post-socialist (Estonia) or "liberal" (United Kingdom) social security systems does not cancel itself out. In fact, it is actually accentuated if it is not accompanied by targeted welfare state measures. Estonia, in particular, is struggling with the effects of a strongly dualised labour market and the social inequality that this brings with it.

By contrast, the "conservative" welfare states of Germany and France are more strongly driven by external modernisation effects. The welfare state subsequently adjusts to the external challenges of Industry 4.0. Here, the question of recalibrating society's internal redistribution of labour and welfare benefits becomes one of the key issues.

The "Mediterranean" welfare states of Italy and Spain face the biggest challenges. Here, on one hand, social inequality is high and exacerbated by the effects of the economic and financial crisis, particularly in Spain. On the other hand, external modernisation effects, especially on the labour market, lead to further stratification of these societies. At the same time, systematic digitalisation of the welfare state offers great development potential, especially with regard to integrating digital technologies into industry, building human capital and driving digital public services. Spain, for instance, is taking the route of digitalising public services as a possible strategy for coping with the consequences of the economic crisis and with latent modernisation problems. It is now slowly catching up.

Innovations will help us to actually utilise the opportunities of digitalisation, even – and perhaps in particular – against a background of increasing inequality. However, the above benefits will not come from technical innovations alone. Rather, they are the product of technical and social innovations: newly established practices, services and organisational forms. Such innovations are occurring increasingly in networks comprising many different players and are being co-produced by users and practitioners. The "classic" innovation process of closed innovation (according to Schumpeter) is directed mainly inwards: attention is given to customers' wishes (problem information) during the process, but the solution is developed internally within the company. Social and technical innovation in the digital world, however, calls for different models. As such, the concept of open innovation (Chesbrough 2003; Chesbrough/Vanhaverbeke/West 2014; cf. also Hippel 1988, 2005) aims at getting customers or patients to provide not only the problem information but also the solution information. Even in large multinational companies there is no longer enough information available internally to solve problems. The knowledge of other, external players needs to be incorporated: of universities and research laboratories, of customers and patients, and also of other companies and possible competitors. Organisations therefore need to develop interaction skills in order to benefit from the advantages of this open innovation process – and to be able to innovate in the first place.

The capacity to innovate is fostered by being knowledgeable and able to combine different types of knowledge. For that reason, a society's ability to innovate is also made up of different types of capital. One might take the Institute for Innovation and Technology's innovativeness indicator as an example (iit 2014):

- human capital – the value of workers' skills and knowledge (from training and professional development as well as lifelong learning);
- complexity capital – the variety of useful knowledge that allows workers to create complex products;
- structural capital – the ability to pool knowledge within organisations;
- relationship capital – the value of the network of relationships; the ability therefore to pool knowledge across organisational borders (very relevant for open innovation in particular).

Here, for example, we can see that Germany derives its strength particularly from its high level of complexity capital. The other types of capital – human capital, structural capital and relationship capital – are, however, much less prevalent there than in Sweden (Buhr 2014). The high levels of human, structural and relationship capital found in the Nordic countries are due to the relatively high quality of communal life (cf. for instance

Bertelsmann Radar 2016), which appears to play a role in enhancing both the functioning of democracy and the development of the capacity to innovate. This social cohesion can also be measured via social relationships (social networks, trust in fellow citizens, acceptance of diversity), connectedness (identification, trust in institutions, sense of justice) and focus on the common good (solidarity and helpfulness, acceptance of social rules, social participation). On this basis, social cohesion is strongest in Scandinavia (Denmark, Norway, Finland and Sweden). These values are therefore interesting because they correlate very positively with other values, such as the size of GDP, the European Commission's DESI – which we have referred to repeatedly here – and the World Bank's Knowledge Index (World Bank 2012). This latter index records how far countries have progressed towards becoming knowledge societies. The index pools information on education levels, the level of economic innovation and the infrastructure for information and communication technology. Here, a very distinct positive correlation can be seen, with the most innovative societies also being those that have strong social cohesion (Buhr 2014).

7

OPTIONS AND RECOMMENDATIONS FOR STRUCTURING WELFARE 4.0

In conclusion, we propose a number of options, as follows.

1 PROMOTING SOCIETY'S CAPACITY TO INNOVATE

In the age of digitalisation, a society's ability to innovate starts with the digital infrastructure. This means fast internet, with blanket coverage. Learning and thinking in networked connections must also be activated. For innovation and labour market policy, this means both investing in innovations and promoting the ability to make use of them actively in the society (human capital). However, it also includes analysing and structuring the consequences of innovations in advance and with the involvement of potential users (structural capital). In this way, employees become innovation drivers and not the driven. The idea here is to enable innovation through participation and thereby rely on open and social innovations (relationship capital), in particular in the care and health area.

2 DEVISING A POLICY FOR A SOCIAL EUROPE

Innovation processes can result in social progress. For that reason, the debate must also be intensified at European level. Societies in the individual member states are already strongly interconnected through the single market alone, and are thereby also affected by social standards, opportunities and limitations in other member states. Modernisation of societies then means promoting not only economic growth but also social progress (Andersson et al. 2016). Social standards are not downsides for economic growth, but rather form the foundation of innovative societies in which both producers and users benefit from faster, more successful and more customised innovations. This also means that more investments are needed, especially in the digital infrastructure, to modernise the economy and the social state. However, this requires shifting away from the strict financial and austerity policies so that states can become more active again and invest, for example, in innovation, research and education. If the EU is to be a project of international solidarity and of common economic and social progress, innovative processes for social progress must not remain limited to a handful of regions or nation states, but have to be promoted systematically and across the EU (Andersson et al. 2016).

3 CREATING SPACES FOR EXPERIMENTATION AND STRENGTHENING REGIONS

Something that works particularly well in the Scandinavian welfare state is management (for example, the National Innovation Council) and the interconnectedness of national and regional politics. On the ground, in the municipalities and districts, players have considerable scope for design and experimentation. This extends to directly demanding innovations at local level. The idea is to involve local users in trying out, testing and refining technical and social innovations. Positive experiences with innovative spaces for experimentation at a regional level need to be fed into dialogue at a European level (Andersson et al. 2016). They should be accompanied by collaborative research, applied and demonstration research, evaluation and acceptance studies, as well as the exchange of information with international partners. Bringing processes at a local level closer to one another and combining them to form a joint European policy framework would improve the opportunities for implementing and expanding innovations beyond those regions that already are strong in innovation and would make a further contribution to greater cohesion and social solidarity.

4 PROMOTING (FURTHER) EDUCATION, SKILLS AND SCIENCE

In the digital world, in particular, the half-life of knowledge, skills and abilities is becoming shorter and shorter. This means that the (further) education and knowledge system has a key role to play: from early childhood education to the training of the most highly skilled (graduates); from formal learning to lifelong and informal learning; and from R&D cooperation struc-

tures between business and academia through to learning and innovation-promoting structures in companies. As such, nearly all the welfare states examined require better facilities in schools and universities, as well as reforms to training and professional development activities. They need to be encouraged and can then certainly be expected.

5 ANALYSING HOLISTICALLY – AND ACTING SYSTEMATICALLY

The interconnectedness of the three policy areas presented here (labour, health care and innovation) show that the issue of digitalisation requires perspective and a stakeholder network, on one hand, and more (or a different type of) coordination on the other – both horizontally and vertically, across levels and traditional ministerial boundaries. Thinking out of the box to create new things also requires new coordination platforms, such as the Swedish Innovation Council, in order to strengthen vertical coordination.

All of this requires an active state that not only provides a (digital) infrastructure, digital administration and comprehensive investments in research and education, but also ensures social and technical standards, general data protection and data security, as well as protection of intellectual property rights – and also knows how to use public procurement actively. This would not only open up leading markets for certain sectors, but potentially also permit a greater willingness to take risks in public administration. This could, in turn, help to support innovative processes in the public sector that are linked to certain social needs. For that reason, an authority should be established at national level that encourages municipalities to progress in terms of innovative public procurement (Andersson et al. 2016). For all these tasks, a welfare state is required that is able to proactively manage its responsibilities: one that makes use of the opportunities of digitalisation for its modernisation, and tries to better align and orchestrate its innovation policy with health care and labour market policies.

Can digitalisation bring about social equality? This is a vision we should continue to develop: by enhancing our welfare state in such a way that, on one hand, it absorbs the risks of growing flexibilisation and, on the other hand, it offers us new ways of harnessing the opportunities of working without space and time constraints – ways that ultimately bring about social progress. This could perhaps be the vision of Welfare 4.0.

Figures

Tables

Bibliography

Acemoglu, Daron/Autor, David (2011): Skills, tasks and technologies: Implications for employment and earnings, in: O. Ashenfelter and D. Card (eds), Handbook of Labour Economics, Vol. 4b, pp. 1043–1171. Amsterdam: Elsevier B.V.

AHK Frankreich (2016): Industrie 4.0. Zielmarktanalyse Frankreich, doi: https://www.ixpos.de/IXPOS/Content/DE/Ihr-geschaeft-im-ausland/_SharedDocs/Downloads/bmwi-markterschliessungsprogramm-2016/bmwi-mep-marktstudie-frankreich-industrie-4.0.pdf?v=2 (last accessed on 22 September 2016).

Akamai (2016): Akamai's State of the Internet Report. Volume 9, Number 1.

Andersson, Lars Fredrik (2016): Länderkapitel Schweden: Die Suche nach der Digitalen Dividende, in Andersson, Lars Fredrik/Alaja, Antti/Buhr, Daniel/Fink, Philipp/Stöber, Niels: Innovationsstrategien in Zeiten der Digitalisierung: ein Vergleich der Innovationspolitik in Finnland, Schweden und Deutschland. Expertise im Auftrag der Friedrich-Ebert-Stiftung, Bonn.

Andersson, Lars Fredrik/Alaja, Antti/Buhr, Daniel/Fink, Philipp/Stöber, Niels (2016): Innovationsstrategien in Zeiten der Digitalisierung: ein Vergleich der Innovationspolitik in Finnland, Schweden und Deutschland. Expertise commissioned by the Friedrich-Ebert-Stiftung, Bonn.

ASIP (2009): Convention Constitutive, doi: http://esante.gouv.fr/sites/default/files/Convention_constitutive_ASIP_19novembre2009.pdf (last accessed on 29.08.2016).

ASIP (2013): Convention Constitutive, doi : http://www.esante.gouv.fr/sites/default/files/ASIP_conv-constit%20modifiee_25mars2013_signee.pdf (last accessed on 29 August 2016).

Autor, David H./Mark G. Duggan (2003): The rise in the disability rolls and the decline in unemployment, The Quarterly Journal of Economics: 157–205.

Autor, David H./Duggan, Mark G. (2003): The Changing Task Composition of the US Labor Market: An Update of Autor, Levy, and Murnane (2003), doi: http://economics.mit.edu/files/9758 (last accessed on 10 June 2016).

Baller, Silja/Dutta, Soumitra/Lanvin, Bruno (eds) (2016): The Global Information Technology Report 2016: Innovation in the Digital Economy. Geneva: World Economic Forum/INSEAD/Cornell University.

Bentolila, Samuel/Dolado, Juan J./Jimeno, Juan F. (2012): Reforming an insider-outsider labor market: the Spanish experience, in: IZA Journal of European Labor Studies, 1: 4.

Bertelsmann Stiftung (2016): Radar gesellschaftlicher Zusammenhalt. Gütersloh: Bertelsmann Stiftung. Available at: http://www.gesellschaftlicher-zusammenhalt.de/ (last accessed on 4 November 2016).

Borchers, Detlef (2011): Elektronische Gesundheitskarte: Es begann vor zehn Jahren, 04.08.2011, heise online. Available at: http://www.heise.de/newsticker/meldung/Elektronische-Gesundheitskarte-Es-begann-vor-zehn-Jahren-1318512.html (last accessed on 30 September 2016).

Brynjolfsson, Erik/McAfee, Andrew (2014): The Second Machine Age: Work Progress, and Prosperity in a Time of Brilliant Technologies. New York: W. W. Norton & Company.

Buhr, Daniel (2014): Alles Gute kommt von Norden?! Die nordischen Innovationsmodelle und die Lehren für Deutschland. Wiso direkt. Dezember 2014. Berlin: Friedrich-Ebert-Stiftung. Available at: http://library.fes.de/pdf-files/wiso/11082.pdf (last accessed on 4 November 2016).

Buhr, Daniel (2015): Soziale Innovationspolitik für die Industrie 4.0. WISO Diskurs. Friedrich-Ebert-Stiftung.

Buhr, Daniel (2016): Länderkapitel Deutschland, in Andersson, Lars Fredrik/Alaja, Antti/Buhr, Daniel/Fink, Philipp/Stöber, Niels: Innovationsstrategien in Zeiten der Digitalisierung: ein Vergleich der Innovationspolitik in Finnland, Schweden und Deutschland. Expertise commissioned by the Friedrich-Ebert-Stiftung, Bonn.

Buhr, Daniel/Frankenberger, Rolf (2016): Auf dem Weg zu Wohlfahrt 4.0 – Digitalisierung in Schweden. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12853.pdf (last accessed on 2 November 2016).

Buhr, Daniel/Frankenberger, Rolf/Fregin, Marie-Christine/Trämer, Markus (2016): Auf dem Weg zu Wohlfahrt 4.0 – Digitalisierung in Deutschland. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12849.pdf (last accessed on 2 November 2016).

Buhr, Daniel/ Frankenberger, Rolf/ Ludewig, Annalisa (2016): Auf dem Weg zu Wohlfahrt 4.0 –Digitalisierung in Estland. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12850.pdf (last accessed on 2 November 2016).

Bundesagentur für Arbeit (BA) (2015): Weißbuch „Arbeiten 4.0" – Antworten der BA auf die Herausforderungen der Digitalisierung, Zulieferung BA zum Weißbuch Arbeiten 4.0.

Bundesministerium für Arbeit und Soziales BMAS (2016): Sozialkompass EU. Available at: http://www.sozialkompass.eu (last accessed on 30 September 2016).

Bundesministerium für Arbeit und Soziales BMAS (ed.) (2015): Übertragung der Studie von Frey/Osborne (2013) auf Deutschland. Endbericht Kurzexpertise No. 57.

Bundesministerium für Gesundheit (BMG) (2016): E-Health-Initiative zur Förderung von Anwendungen in der Telemedizin, 25.04.2016. Available at: http://www.bmg.bund.de/themen/krankenversicherung/e-health-initiative-und-telemedizin/e-health-initiative.html (last accessed on 30 September 2016).

Bundesministerium für Wirtschaft und Energie BMWi (2015): Monitoring-Report Wirtschaft DIGITAL 2015. Berlin: BMWi.

Cabinet Office (2012): Government Digital Strategy, 06.11.2012. Available at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296336/Government_Digital_Stratetegy_-_November_2012.pdf> (last accessed on 14 September 2016).

Carretero, Stephanie/Kucsera, Csaba (2015): Report on Case Studies of Technology-based Services for Independent Living for Older People; JRC Science and Policy Reports, European Commission, Report EUR 27139 EN.

CCOO Industria (2016): La Digitalización de la Industria, Versión actualizada. Available at: http://www.industria.ccoo.es/cms/g/public/o/3/o163555.pdf (last accessed on 5 September 2016).

Chesbrough, Henry (2003): The logic of open innovation: managing intellectual property. California Management Review, 45 (3), 33–58.

Chesbrough, Henry/Vanhaverbeke, Wim/West, Joel (eds) (2014): New frontiers in open innovation. OUP.

Christ, Claudia/Frankenberger, Rolf (2016): Auf dem Weg zu Wohlfahrt 4.0 – Digitalisierung in Frankreich. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12851.pdf (last accessed on 2 November 2016).

Dauderstädt, Michael (2016): Wachstumsstrategien für Südeuropa. Italien, Spanien, Portugal, Griechenland. FES, Berlin.

Degryse, Christophe (2016): Digitalisation of the economy and its impact on labour markets. European Trade Union Institute (ETUI), Working Paper 2016/02.

Deloitte (2014): London Futures. Agiletown: The Relentless March of Technology and London's Response. London: Deloitte Centre for Health Solutions, pp. 1–32.

Department for Business, Innovation & Skills (2013): Information Economy Strategy, 14.06.2013. Available at: <https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/206944/13-901-information-economy-strategy.pdf> (last accessed on 14 September 2016).

Deutscher Gewerkschaftsbund DGB (2016): Grundlegende Anforderungen an ein Weißbuch "Arbeiten 4.0", DGB-Arbeitspapier, January 2016.

Di Carlo, Claudio/Santarelli, Elisabetta (2012): E-health in Italy. Available at: http://www.sviluppoeconomico.gov.it (last accessed on 30 September 2016).

Dolowitz, David P/Marsh, David (2000): Learning from Abroad: The Role of Policy Transfer in Contemporary Policy-Making, in: Governance 13 (1), pp. 5–24.

Donatini, Andrea (2015): 2014 International Profiles of Healthcare Systems. The Italian Healthcare System. The Commonwealth Fund.

Edquist, Charles (2016): The Swedish National Innovation Council: Innovation policy governance to replace linearity with holism, CIRCLE Papers in Innovation Studies, No. 24/2016, Lund.

E-Estonia (2016): http://www.e-estonia.com (last accessed on 30 September 2016).

EFI – Expertenkommission Forschung und Innovation (2016): Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands 2016, Berlin.

EIS (2016): European Innovation Scoreboard. Available at: http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en (last accessed on 22 August 2016).

EOI (2015): Las tecnologías IoT dentro e la industria conectada 4.0. Available at: https://www.eoi.es/savia/documento/eoi-80491/las-tecnologias-iot-dentro-de-la-industria-conectada-40 (last accessed on 25 September 2016).

Esping-Andersen, Gøsta (1990): The Three Worlds of Welfare Capitalism. Princeton: Princeton University Press.

Esping-Andersen, Gøsta (1998): Die drei Welten des Wohlfahrtskapitalismus. In: Lessenich, Stephan/Ostner, Ilona (ed.): Welten des Wohlfahrtskapitalismus: Der Sozialstaat in vergleichender Perspektive. Frankfurt a. M.: Campus Verlag, pp. 19–58.

European Commission EC (2014): France, in: European Commission (ed.): Research and Innovation Performance in the EU: Innovation Union Progress at Country Level, Brussels (last accessed on 22 August 2016).

European Commission EC (2015): Monitoring the Digital Economy and Society 2016-2021. Available at: http://ec.europa.eu/eurostat/documents/341889/725524/Monitoring+the+Digital+Economy+%26+Society+2016-2021/7df02d85-698a-4a87-a6b1-7994df7fbeb7 (last accessed on 30 October 2016).

European Commission EC (2016): Digital Economy and Society Index DESI 2016. Available at: https://ec.europa.eu/digital-single-market/en/desi (last accessed on 30 September 2016).

European Commission EC (2016): European Digital Progress Report 2016. Available at: https://ec.europa.eu/digital-single-market/en/european-digital-progress-report (last accessed on 30 September 2016).

European Commission EC (2016): European Innovation Scoreboard. Available at: http://ec.europa.eu/DocsRoom/documents/ (last accessed on 25 August 2016).

European Commission EC (2016): European Innovation Scoreboard. Available at: https://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_de (last accessed on 25 August 2016).

European Commission EC EDPR (2016): Europe's Digital Progress Report (EC EDPR) 2016. Available at: https://ec.europa.eu/digital-single-market/en/news/ (last accessed on 22 August 2016).

European Economic and Social Committee (EESC) (2013): Economic and social development in the Baltic states : Estonia, Brussels.

Ferrera, Maurizio (1996): The Southern Model of Welfare State in Social Europe. In: Journal of European Social Policy, 6(1): 17–37.

Förster, Christian/Schmid, Josef/Trick, Nicolas (2014): Die Nordischen Länder – Politik in Dänemark, Finnland, Norwegen und Schweden, Wiesbaden.

Fregin, Marie-Christine/Frankenberger, Rolf (2016): Auf dem Weg zu Wohlfahrt 4.0 – Digitalisierung in Spanien. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12854.pdf (last accessed on 2 November 2016).

Frey, Carl Benedikt/Osborne, Michael A. (2013): The future of employment: how susceptible are jobs to computerisation, Oxford University Programme on the Impacts of Future Technology.

Gentner, Andreas/Elbel, Gregor/Pistor, David/Bovians, Malte (2014): Perspektive E-Health – Consumer-Lösungen als Schlüssel zum Erfolg? London: Deloitte & Touch GmbH Wirtschaftsprüfungsgesellschaft, pp. 1–22.

Gerlinger, Thomas/Reiter, Renate (2014): Die Versorgungsstrukturen des Gesundheitswesens in Schweden, in: Bundeszentrale für Politische Bildung: Dossier Gesundheitspolitik, Bonn.

Germany Trade & Invest GTAI (2016): Schweden. Available at: http://www.gtai.de/schweden (last accessed on 30 September 2016).

Global Entrepreneurship Monitor GEM (2016): 2015/2016 Global Report. Available at: http://www.gemconsortium.org/report/49480 (last accessed on 30 September 2016).

Götting, Ulrike (1998): Transformation der Wohlfahrtsstaaten in Mittel- und Osteuropa. Eine Zwischenbilanz. Wiesbaden: Springer Fachmedien.

Götting, Ulrike/Lessenich, Stephan (1998): Sphären sozialer Sicherheit. Wohlfahrtsstaatliche Regimeforschung und gesellschaftliche Transformation. In: Lessenich, Stephan/Ostner, Ilona (eds): Welten des Wohlfahrtskapitalismus: Der Sozialstaat in vergleichender Perspektive. Frankfurt a. M.: Campus Verlag, pp. 271–319.

Groß, Martin (2015): Klassen, Schichten, Mobilität. Eine Einführung. 2nd ed., Wiesbaden: Springer VS.

Hall, Peter A./Soskice, David (2001): Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford: Oxford University Press.

Hampson, Elizabeth/ Malouf, Nicole/ Crallan, Rebecca (2015): Digital Health in the UK: An Industry Study for the Office of Life Sciences. London: Deloitte Centre for Health Solutions.

IG Metall (April 2015): IG Metall gründet Beirat „Zukunft der Arbeit" mit Fachleuten aus Wissenschaft, Unternehmen und Politik, Pressemitteilung No. 28/2015. Available at: https://www.igmetall.de/pressemitteilungen-2015-16019.htm (last accessed on 28 September 2016).

Information Economy Council (2014): Digital Skills Strategy, July 2014. Available at: https://www.thetechpartnership.com/globalassets/pdfs/research-2014/informationeconomydigitalskillsstrategy_oct14.pdf (last accessed on 14 September 2016).

Innovate UK (2015): Digital Economy Strategy 2015–2018. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/404743/Digital_Economy_Strategy_2015-18_Web_Final2.pdf (last accessed on 30 September 2016).

Institut für Innovation und Technik (2014): Der iit-Innovationsfähigkeitsindikator: Ein neuer Blick auf die Voraussetzungen von Innovationen. Available at: http://www.iit-berlin.de/de/publikationen/der-iit-innovationsfaehigkeitsindikator/at_download/download (last accessed on 4 November 2016).

International Labour Organization ILO (2016): ILOSTAT Database. Available at: http://www.ilo.org/ilostat (last accessed on 22 September 2016).

Karamessini, Maria (2007): The Southern European social model: changes and continuities in the last decades", Discussion Paper Series No. 174, Geneva: International Institute for Labour Studies. Available at: http://www.ilo.org/inst/publication/discussion-papers/WCMS_193518/lang--en/index.htm (last accessed on 29 October 2016).

Klein, Manfred (2016): Fünf Jahre nationale Patientenakte in Schweden, in: eGovernment Computing, 18.1.2016.

Köppl, Stefan 2007: Das politische System Italiens. Wiesbaden.

Larédo, P./Mustar, P. (2001): French Research and Innovation Policy: Two Decades of Transformation. In: Larédo, P.; Mustar, P. (eds.): Research and Innovation Policies in the New Global Economy. An International Comparative Analysis. Cheltenham, UK, Northampton MA, USA: Edward Elgar, 447–496.

Leceta, Jose Manuel (Juni 2016): No más I+D+i, Artikel in online Wirtschaftszeitung Cinco Días. Available at: http://cincodias.com/cincodias/2016/06/21/economia/1466526473_535569.html (last accessed on 25 September 2016).

Leibfried, Stefan (1990): Sozialstaat Europa. Integrationsperspektiven Europäischer Armutsregime. Frankfurt a. M.: Suhrkamp.

Lessenich, Stephan (1994): "Three Worlds of Welfare Capitalism" – oder vier? Strukturwandel arbeits- und sozialpolitischer Regulierungsmuster in Spanien. In: Politische Vierteljahresschrift, 35(2): 224–244.

Lessenich, Stephan (1995): Wohlfahrtsstaatliche Regulierung und Strukturierung von Lebensläufen. In: Soziale Welt 46(1): 51–69.

Lynch, Julia (2014): The Italian welfare state after the financial crisis. In: Journal of Modern Italian Studies. Available at: www.tandfonline.com/loi/rmis20 (last accessed on 29 October 2016).

Mazzucato, Mariana (2013): The Entrepreneurial State, Anthem Press.

MINETUR (2013): Agenda Digital para España. Available at: http://www.agendadigital.gob.es/agenda-digital/recursos/Recursos/1.%20Versi%C3%B3n%20definitiva/Agenda_Digital_para_Espana.pdf (last accessed on 22 August 2016).

MINETUR (2014): Planes específicos de la Agenda Digital para España. Actualizado a junio 2014. Available at: http://www.agendadigital.gob.es/planes-actuaciones/Bibliotecaplanesconsolidados/Planes-Especificos-ADpE.pdf (last accessed on 25 September 2016).

MINETUR (2014a): Agenda para el fortalecimiento del sector industrial en España. Available at: http://www.minetur.gob.es/industria/es-ES/Servicios/Paginas/agenda-sector-industrial.aspx (last accessed on 25 September 2016).

Ministère des Affaires Sociales et de la Santé (2016): Stratégie nationale e-santé 2020. Available at: http://social-sante.gouv.fr/IMG/pdf/strategie_e-sante_2020.pdf (last accessed on 25 September 2016).

Ministre de l'Économie et des Finances Ministre de l'Aménagement du territoire, de la Ruralité et des Collectivités territoriales (2013): Le Plan France Très Haut Débit. http://www.gouvernement.fr/action/le-plan-france-tres-haut-debit (last accessed on 25 September 2016).

Modena, Vittorio (2001): The Italian Innovation System. Paper Prepared for Project IFISE, Pavia.

MSSSI 2010: ICT in the National Health System: The Healthcare Online Programme, Progress update January 2010. Available at: http://www.msssi.gob.es/ (last accessed on 22 August 2016).

Mulet Melia, Juan/Leceta, Jose Manuel (September 2016): Cultura de innovación: I+D y mucho más, Article in online journal for economics Cinco Días. Available at: http://cincodias.com/cincodias/2016/09/02/empresas/1472835683_927034.html (last accessed on 25 September 2016).

Naschold, Frieder (1985): Zum Zusammenhang von Arbeit, sozialer Sicherung und Politik; in: ibid. (ed.): Arbeit und Politik. Gesellschaftliche Regulierung der Arbeit und der sozialen Sicherung. Frankfurt/New York, pp. 9–48.

National Health Service (NHS) 2014: 5 Year Forward View. Available at: https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf (last accessed on 18 September 2016).

NESTA (2015): Innovation Policy Toolkit: Introduction to the UK Innovation System, 13.08.2015. Available at: <http://www.nesta.org.uk/publications/innovation-policy-toolkit-introduction-uk-innovation-system> (last accessed 30 September 2016).

OECD (2013): OECD Skills Outlook 2013. Adult Skills. Paris.

OECD (2014): Statistiques de l'OCDE sur la santé 2014: Comment la France se positionne? Available at: http://www.oecd.org/fr/els/systemes-sante/Note-Information-FRANCE-2014.pdf (last accessed on 22 August 2016).

OECD (2015): OECD Skills Outlook 2015. Youth, Skills and Employment. Paris.

OECD (2016): Real GDP forecast (indicator). Available at: https://data.oecd.org/gdp/real-gdp-forecast.htm (last accessed on 25 September 2016).

OECD (2016): OECD Reviews of Innovation Policy: Sweden 2016, Paris.

Offe, Claus (1972): Advanced capitalism and the welfare state. In: Politics & Society 2(4): 479–488.

Renzi, Matteo (2016): Available at: www.bundesregierung.de/Content/DE/Mitschrift/Pressekonferenzen/2016/09/2016-09-01-pk-bkin-renzi.html); (last accessed on 30 September 2016).

RIO Country Report 2015: Italy (2016): Executive summary. Von Leopoldo Nascia Mario Pianta Giovanni La Placa, Brussels.

Scheid, Robert (2016a): Italien hat beim Thema Digitalisierung Nachholbedarf. Available at: https://www.gtai.de/GTAI/Navigation/DE/Trade/Maerkte/suche,t=italien-hatbeim- thema-digitalisierung-nachholbedarf,did=1427254.html (last accessed on 13 October 2016).

Scheid, Robert (2016b): Industrie 4.0 kommt in Italien voran. Available at: http://www.gtai.de/GTAI/Navigation/DE/Trade/Maerkte/suche,t=industrie-40-kommt-in-italienvoran,did=1427256.html (last accessed on 13 October 2016).

Schmid, Josef (2010): Wohlfahrtstaaten im Vergleich. Soziale Sicherung in Europa: Organisation, Finanzierung, Leistungen und Probleme, Wiesbaden: VS Verlag für Sozialwissenschaften.

Schmid, Josef/Buhr, Daniel (2015): Wirtschaftspolitik, 2nd, fully revised edition. Paderborn: Schöningh.

Schmid, Josef/Frankenberger, Rolf (2016): Auf dem Weg zu Wohlfahrt 4.0 – Digitalisierung in Italien. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12852.pdf (last accessed on 2 November 2016).

Schmidt, Manfred G. (2004): Wörterbuch zur Politik. Stuttgart: Körner Verlag.

Taylor, Karen (2015): Connected Health: How Digital Technology Is Transforming Health and Social Care. London: Deloitte Centre for Health Solutions, pp. 1–38.

Telecom Italia 2015 (2016): Sustainability Report. Available at: www.telecomitalia.com/tit/en/sustainability/sustainability-report/sustainability-reports.html; (last accessed on 30 September 2016).

Trämer, Markus/Frankenberger, Rolf (2016): Auf dem Weg zu Wohlfahrt 4.0 – Digitalisierung in Großbritannien. Berlin: Friedrich-Ebert-Stiftung, Referat Westeuropa/Nordamerika (Politik für Europa #2017plus). Available at: http://library.fes.de/pdf-files/id/12855.pdf (last accessed on 2 November 2016).

Vitaud, Laetia (2016): Gig Economy: Italy has a few cards to play. Available at: https://medium.com/switch-collective/gig-economy-italy-has-a-few-cards-to-play-7984582b7580#.6hga301gw (last accessed on 30 September 2016).

Von Hippel, Eric (1988): The Sources of Innovation, New York; Oxford: Oxford University Press.

Von Hippel, Eric (2005): Democratizing Innovation, Cambridge, MA: MIT Press.

WEF (2015): The Global Competitiveness Report 2014–2015. Available at: http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf (last accessed on 29 September 2016).

Wemmel, Jan (2015): Whitepaper Digitalisierung im deutschen Gesundheitswesen. Über Chancen, Nutzen und Herausforderungen. Gütersloh: Arvato Bertelsmann, pp. 1–11.

Wollmann, Hellmut (2014): Schwedische Verwaltung im skandinavischen Kontext. Zwischen Beharrung und Wandel, in: König, Klaus et al. (ed.): Grundmuster der Verwaltungskultur. Interdisziplinäre Diskurse über kulturelle Grundformen der öffentlichen Verwaltung, Baden-Baden, pp. 537–558.

World Economic Forum (2016): Networked Readiness Index. Available at: http://reports.weforum.org/global-information-technology-report-2015/network-readiness-index/

World Health Organization WHO (2000): The World Health Report. Health Systems: Improving Performance. Available at: http://www.who.int/whr/2000/en/whr00_en.pdf (last accessed on 22 September 2016).

Claudia Christ and Rolf Frankenberger

On the Way to Welfare 4.0 – Digitalisation in France

FRANCE

1. ABSTRACT

- France lags some way behind with regard to digitalisation both by European comparison and internationally. This applies both to the technological side (for example, connection speeds) and to the social dimension of digitalisation (for example, internet use and digitalisation of the economy).
- France is one of the most innovation-friendly countries, ranking sixth in terms of expenditure on research and development.
- Experts are convinced that France has a very good basis for global competitiveness due to favourable reforms and strong innovativeness. A key challenge, however, is the digital transformation of SMEs, which in some cases are characterised by obsolete hierarchical structures.
- Digitalisation is viewed mainly as an opportunity to prepare the French economy for global competition and to develop into a leading nation with regard to work, health and innovation.

2. BRIEF OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

The Fifth French Republic is a semi-presidential democracy with the executive branch strongly dominating the legislature. The prominent position of the president derives from the "domaine reservé" in foreign and security policy anchored in Articles 14 and 15 of the Constitution. Despite a strengthening of the regions by reforms in 1982 and 2003, in which the local level obtained far-reaching administrative and fiscal rights and decentralisation was enshrined in an amendment to Article 1 of the Constitution, France can still be described as a decentralised unitary state. The frequent accumulation of offices at different political levels in one person underlines this, as does the considerable economic significance of the centre, the Île-de-France. The French multiparty system is characterised by frequent changes. Re-establishments and mergers of parties occur often. Currently, six parties are represented in parliament, although the government is based on the absolute majority of the Parti Socialiste. The parties are rather weakly organised in comparison with those in Germany.

France's economy is the sixth largest in the world and, with Germany, it is the most important industrialised country in Europe. Besides services and tourism, aviation, energy, agriculture, chemicals and electronics are the most important sectors. Although the state maintains a central guiding role in the economy in the wake of numerous reforms, the economy has shifted in a more deregulated direction with the aim of boosting economic growth. One recent instance of this is the Law for growth and economic activity (Loi pour crioissance et l'activité) passed in August 2015. Comprehensive reforms in the direction of more "flexible" labour markets are being discussed, although they have met with opposition, not least from the trade unions (see Table 3).

The French welfare state is highly regulated and numerous social insurance systems offer broad social and medical coverage. Similar to Germany the French welfare state has been exposed to constant pressure for change since the 1980s, the basis for which to some extent lies in the system itself: "The funding of social insurance as cornerstone of the welfare state is based … in large part on employee contributions and thus depends substantially on economic developments and the number of people in employment" (Grillmayer 2012: 222). While insurances and families constitute the backbone of the French conservative welfare state, there are also broad universal benefits and measures, such as the minimum wage (SMIC) and so-called reinsertion benefit (RSA – revenue de solidarité active). However, France is mainly categorised as a conservative welfare state in Esping-Andersen's sense.

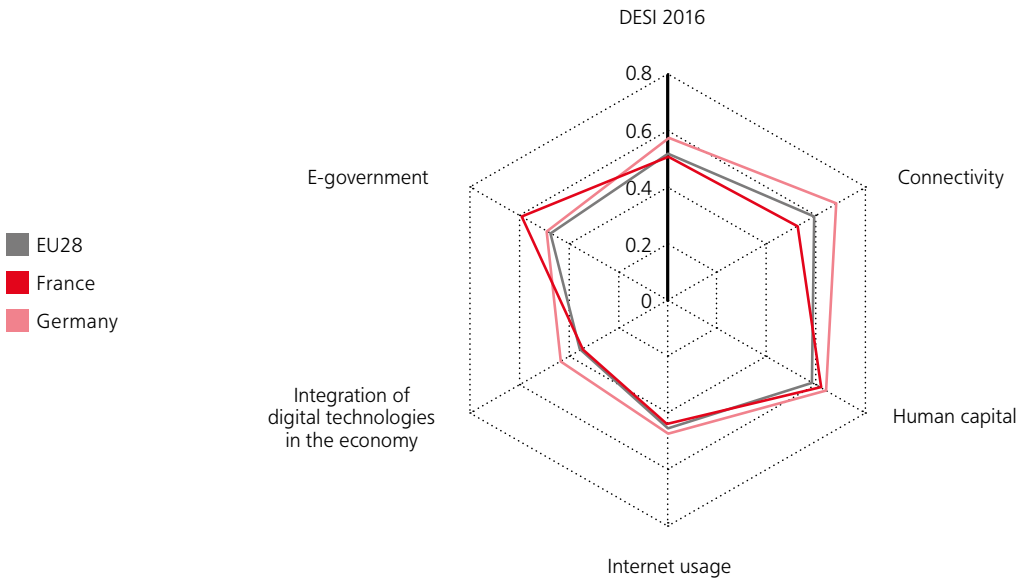
The French welfare state is similar to that of Germany not only in its core institutions such as a social insurance system, but is also affected by similar problems: falling economic growth, the financial crisis and demographic change (Reiter 2014). Experts regard digitalisation as an opportunity for social and economic development, which could also underpin the welfare model.

Table 1
Overview of France[1]

Indicator	France	EU28
Form of state	Semi-presidential democratic republic	
State organisation	Unitary	
Party system	Multi-party system	
Electoral system	Majority voting system	
EU member since	1 January 1958	
Inhabitants/km²	104.5	116.7
Urbanisation (% of population)	80	74
Welfare state regime	Conservative	
Income inequality (distribution quintile)	4.3	5.2
Social expenditure (% of GDP)	33.7	28.6
GDP per capita (PPS, Index: EU=100)	106	100
Growth rate (real GDP in comparison with previous year)	1.3	2.2
Budget deficit/surplus (% of GDP)	–3.5	–2.4
Labour market productivity nominal per employee (Index: EU=100)	114.4	100
Harmonised unemployment rate	10.5	8.6
Trade union density (0–100)	7.72	
R&D total spending (% of GDP)	2.26	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	87.2	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	22.9	17.1
DESI (0–1; 1=digitalised society)	0.51	0.52
Proportion of regular internet users (16–74 years of age) in %	81	76
Internet penetration (% of households)	83	83
Proportion of households with broadband connection (%)	76	80
Proportion of companies with broadband connection (%)	96	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

Figure 1
Development of a digital society in France by comparison with Germany and the EU28



Source: Digital Economy and Society Index 2016.

3. STATE OF DIGITALISATION

Compared with the EU 28 and internationally, France lags somewhat behind with regard to digitalisation, both by European comparison and internationally. This is particularly true for internet usage and broadband connection speeds. Although 100 per cent of households are connected to broadband networks, only 71 per cent actually use them. With an average IPv4 connection speed of 9.9 Mbps France ranks number 45 in the world and in Europe third from last. However, annual growth rates indicates that France is making an effort to improve connectivity. With regard to peak speeds, France ranks only number 62, with 41 Mbps (Akamai 2016).

France does somewhat better in relation to mobile connection speeds, although the average data throughput here is 11.5 Mbps, which is only 41 per cent of that of leader the United Kingdom, at 27.9 Mbps (Germany 15.7). Overall, France has considerable ground to make up by European comparison, both with the expansion of broadband and rapid mobile internet access (Akamai 2016).

Quite apart from the purely technological dimension, France lags substantially behind with regard to the development of a digitalised society. In 2016, France stands in only sixteenth place[2] in the Digital Economy and Society Index (DESI 2016), alongside Poland, the Czech Republic, Hungary and Slovakia. Even though performance in the dimensions of human capital (12) and e-government (13) are slightly above-average, France does badly with regard to connectivity (20), the integration of digital technologies in the economy (18) and internet usage (17) (DESI 2016). Although 81 per cent of the population use the internet only 57 per cent have basic digital skills. The proportion of ICT specialists in the workforce is relatively low at 3.5 per cent.

Even though France has launched a number of strongly technology-driven initiatives – such as the "Tour de France digitale", "France digital",[3] the "Plan Très Haut Débit" and the "Mission France Très Haut Débit" (Ministre de l'Économie et des Finances, Ministre de l'Aménagement du territoire, de la Ruralité et des Collectivités territoriales 2013) there is still no over-arching digital development strategy (DESI 2016) that takes in the social dimensions, too. With the digitalisation strategy presented in May 2016 – La Stratégie Numérique du Gouvernement – the French government implemented the Digital Agenda for Europe, addressing not only economic and technological, but also social digital development. Experts consider the digital participation of citizens on the website contribuez.cnnumerique.fr as an important step towards digital democracy.

4. HEALTH CARE POLICY

The French health care system is based primarily on statutory health insurance, which covers 99 per cent of the population on an obligatory basis (Schmid 2010). Because of the high deductible, over 90 per cent of people have now taken out additional private insurance (Schmid 2010). In 2000 the World

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

3 Vgl. http://francedigitale.org.

Health Organisation called the French health care system the "best health care system in the world" (WHO 2000). Today the judgement would be more sober: although France is well above the OECD average when it comes to most health indicators – such as life expectancy at birth and child mortality – the system is nevertheless chronically inadequate. In France, too, the population is ageing, despite a higher birth-rate than in, for example, Germany. Furthermore, because of inefficiencies at all levels, costs are rising. According to OECD data in 2012 France spent 11.6 per cent of GDP on its health care system (OECD 2014). This puts France in third place for health spending, after the United States (16.9 per cent) and the Netherlands (11.8 per cent), but ahead of Germany, on 11.3 per cent (OECD 2014). The OECD average is 9.3 per cent.

Health care policy in France is mainly centrally governed and regulated. This applies to treatment, funding and organisation by the state – the government and the Ministère des Affaires sociales et de la Santé – and statutory health insurance (L'Assurance Maladie). Health care reforms need first and foremost to get on top of the institutional complexity of statutory health insurance and the negotiating power of the doctors (Reiter 2014). Health care reform in 2004, for example, brought the various health insurance funds under one roof, the Union nationale des Caisses d'Assurance Maladie (UNCAM). This has assumed key functions with regard to the involvement of L'Assurance Maladie in the policy governance of the health care system, for example, in the areas of contract policy, the definition of services and the establishment of reimbursement rates (cf. Reiter 2014; Schmid 2010).

With regard to digitalisation in health care policy the Action Plan for the Digital Economy is aimed explicitly at the promotion of digital instruments in the health care sector (cf. EC EDPR 2016). In pursuit of this aim the Agence national des systèmes d'information partagés de santé (ASIP Santé for short) was set up as early as 2009, a statutory organisation for the development and monitoring of the deployment of IT systems, instruments and infrastructure in health care (ASIP 2009; 2013). Furthermore, a law on tele-medicine was passed in 2009 that, among other things, introduced tele-expertise, tele-monitoring and tele-consultation. In recent years pilot projects have been launched in some regions. The digitalisation of hospitals was enabled by the Programme Hôpital Numérique in 2012. The Health Ministry published a first e-health strategy in 2013, which among other things introduced personal medical records. In July 2016 the strategy was expanded by La stratégie nationale e-santé 2020 in order to drive forward the modernisation and efficiency of the French health care system (Ministère des Affaires sociales et de la Santé 2016). According to the Digital Agenda Scoreboard (2013 and 2015) France lies in the middle with regard to the exchange of patient data or the use of electronic prescriptions and below the EU average with regard to online doctors' appointments.

Experts argue that France still has ground to make up with regard to the utilisation of big data for the development of individually tailored therapies and medicines, especially in relation to chronic and seriously ill patients. Furthermore, many reforms are relatively recent, so that it is hard to assess them at present. Experts consider the implementation and consolidation of new infrastructures and enhanced use of open data and big data in health care to be the main challenges. They regard digitalisation as an opportunity to make the health care system more efficient.

5. LABOUR MARKET POLICY

France's economic structure is characterised, on one hand, by a large number of successful large companies and on the other hand, by rather weak development of SMEs. According to experts digitalisation provides many opportunities to revive France's economic competitiveness. The economic situation has recovered since the financial and economic crisis. The economy is currently growing at 1.41 per cent and positive growth is also forecast for 2017 (OECD 2016). According to the International Labour Organization the unemployment rate has stood at 10 per cent in recent years (ILO 2016). By and large, positive labour market development is expected for the French economy in 2016. The biggest problem remains youth unemployment, which has been well over 20 per cent in recent years (ILO 2016).

The Ministère du Travail, de l'Emploi, de la Formation professionnelle et du Dialogue social is responsible for employment policy and the Ministère de l'Economie et des Finances for digitalisation. The experts advocate broad social dialogue between the general public and all relevant stakeholders. A good example of this, according to them, is the initiative "La Nouvelle France Industrielle" (2013) and its successor programme "Industrie du Future" (2015), which are based on a broad alliance comprising the government, employers, trade unions and research. The labour market reform introduced early in the year aimed at boosting flexibility and employment was overshadowed by vehement protests, however. The plan is aimed at bringing two things together: more security for employees and flexibility for employers, also with regard to digital change. The reform is supposed to reduce the unemployment rate. This is a tall order, which led to protests, especially on the trade union side.

What about the digital skills of the workforce? According to DESI 2016 almost 60 per cent of the population have at least basic digital skills. However, there is ground to be made up with regard to the proportion of workers with "specialist ICT competences" because only 3.5 per cent of workers come under this heading (EC EDPR 2016). In contrast, France rates highly with regard to the proportion of persons highly qualified in MINT subjects: 23 out of every 1,000 people between 20 and 29 years of age have a MINT degree, putting France second in the EU (EC EDPR 2016). The programme "Industrie du Future" has five aims: development of the range of technology, monitoring of companies with regard to digital transformation, training of specialist workers, boosting international cooperation in the standardisation of digital norms and the promotion of French industries of the future. The experts surveyed regard training and further training of qualified workers as a precondition of the digital transformation of the economy and society. This is exactly where "Industrie du Future" comes in. In the course of a dialogue the government and the trade unions have developed a concept aimed at promoting, on one hand, multidisciplinary research measures, dealing especially with the role of people

in Industry 4.0, and on the other hand, measures to provide for the creation of training places within the digital economy (AHK France 2016).

The experts take a positive view of the reform programme around Industry 4.0 and regard France as well on the way to a digital economy with regard to technological progress. However, the digital transformation as a whole is a more prolonged process. On the trade union side there is a danger of digital exclusion, which should be countered through further educational provisions. Furthermore, digitalisation puts some jobs in danger and social inequality could increase.

6. INNOVATION POLICY

France's innovation performance improved between 2008 and 2012, deteriorated slightly between 2013 and 2014 and rose again in 2015, with a performance level 10 per cent above the EU average. This puts France in the group of strong innovation countries, in sixth place worldwide in terms of R&D spending (EIS 2016). France's scientific strengths lie in health care, while its technological advantages and specialisations are mainly in automobiles, aerospace and other transport technologies (EIS 2016). The experts, too, consider France's high innovativeness, especially in science, to be an established strength.

Innovation policy in France is shaped by a philosophy of state intervention that developed during the 1980s and 1990s (Larédo/Mustar 2001). At present, innovation policy seems to be undergoing substantial change: new actors, regulations, framework legislation and priorities are coming to the fore. In past decades the focus was on "grands programmes" under the aegis of the public authorities, from which large companies benefitted, aimed at achieving a leading position for France in research and innovation. SMEs remained largely on the sidelines. This is evident especially in the constantly declining share of productive industry, which fell from 17.8 to 12.5 per cent between 2000 and 2012. The French government sought to counteract this with a plethora of reforms and initiatives. According to the experts, there were two important impulses at national level that had a substantial effect on R&D in France. First, the promotion of competitiveness through the establishment of regional competence centres in 2004, so-called "pôles de compétitivité". They were supposed to boost competitiveness and synergies between research institutes, companies and educational and training institutions within a given region. Second, the experts regard measures promoting business by means of substantial tax concessions as a key instrument for innovation in France. France leads the way among OECD countries in its efforts to promote research investment through tax measures (AHK 2016). The effects were rapidly visible: the main target group, SMEs, benefitted most from the R&D credit with a share of 80 per cent in 2013 (AHK 2016). Other drivers of innovation include subsidies, low-interest loans and insurance at favourable premiums.

The French innovation and R&D system is coordinated by the Ministère de l'Enseignement supérieur et de la Recherche. However, because of the numerous overlaps with other policy areas other ministries also play a major role, especially, with regard to economic matters, the Ministère de l'Economie et des Finances, under whose leadership the programme "La Nouvelle France Industrielle" was adopted in September 2013, which is intended to drive French industrial and innovation policy. In April 2015 this programme was renamed "Industrie du Future", complete with new imperatives and emphases. Thus France is trying to get on board the Fourth Industrial Revolution, in the wake of Germany with "Industrie 4.0" (2010), the United Kingdom with the policy initiative "High Value Manufacturing Catapult" (2011) and Italy with the programme "Fabbrica del futuro" (2012).

The experts are convinced that France, through its useful reforms and considerable innovative strength, has established a sound basis for global competitiveness. However, they regard the digital transformation of SMEs – some of which are burdened by obsolete hierarchical structures – as a key challenge.

7. SUMMARY

According to the World Economic Forum's Global Competitiveness Report 2015–2016 France has excellent infrastructure, good education and health care systems and a favourable market size. It thus represents fertile soil for an economic culture able to adapt to new technologies and digitalisation and to improve productivity in a focused way. The experts regard digitalisation mainly as an opportunity to prepare the French economy for global competition and to enable it to become a leading nation in various policy areas. The digital transformation towards a digital République can succeed, however, only if digitalisation's economic, technological and social aspects are taken into consideration. Only in this way can Welfare 4.0 emerge from Industry 4.0. In the present study we have looked at the relevant reforms in relation to digitalisation in the policy areas of health care, work and innovation. France's strengths, according to the experts, lie in innovation, which affects many other policy areas, such as work and health care, and will result in innovative solutions and services there, too.

Bibliography

Akamai 2016: Akamai's State of the Internet Report, Volume 9 (1), https://www.akamai.com/es/es/multimedia/documents/state-of-the-internet/akamai-state-of-the-internet-report-q1-2016.pdf (30.9.2016).

AHK Frankreich 2016: Industrie 4.0: Zielmarktanalyse Frankreich [Industry 4.0: target market analysis France], https:// www.ixpos.de/IXPOS/Content/DE/Ihr-geschaeft-im-ausland/_SharedDocs/ Downloads/bmwi-markterschliessungs-programm-2016/bmwi-mep-marktstudie-frankreich-industrie-4.0.pdf?v=2 (22.9.2016).

ASIP 2009: CONVENTION CONSTITUTIVE, http://esante.gouv.fr/sites/default/files/Convention_constitutive_ASIP_19novembre2009.pdf (29.8.2016).

ASIP 2013: CONVENTION CONSTITUTIVE, http://www.esante.gouv.fr/sites/default/files/ASIP_conv-constit%20modifiee_25mars2013_signee.pdf (25.8.2016).

European Commission 2016: Digital Agenda Key Indicators, https://digital-agenda-data.eu/datasets/digital_agenda_scoreboard_key_indicators/

visualizations (13.10.2016).
Esping-Andersen, Gøsta 1990: The Three Worlds of Welfare Capitalism, Princeton.

European Commission 2014: France, in: European Commission (ed.): Research and Innovation Performance in the EU: Innovation Union Progress at Country Level, Brussels.

European Commission 2016: European Innovation Scoreboard – France, http://ec.europa.eu/DocsRoom/documents/17857 (25.8.2016).

European Commission 2016: Europe's Digital Progress Report (EC EDPR) 2016 – France, https://ec.europa.eu/digital-single-market/en/news/ european-digital-progress-report-edpr-country-profiles (22.8.2016).

EIS 2016: European Innovation Scoreboard, http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en (22.8.2016).

ILO 2016: ILOSTAT Database France, http://www.ilo.org/ilostat/faces/home/statisticaldata/ContryProfileId?_afrLoop=9597211127904#!%40%40% 3F_afrLoop%3D9597211127904%26_adf.ctrl-state%3D81px4a855_154 (22.9.2016).

Larédo, P./Mustar, P. 2001: French Research and Innovation Policy: Two Decades of Transformation, in: Larédo, P.; Mustar, P. (eds): Research and Innovation Policies in the New Global Economy: An International Comparative Analysis, Cheltenham, UK, Northampton MA, USA: Edward Elgar, S. 447–496.

Ministère des Affaires Sociales et de la Santé 2016: Stratégie nationale e-santé 2020, doi : http://social-sante.gouv.fr/IMG/pdf/strategie_e-sante_2020.pdf (25.9.2016).

Ministre de l'Économie et des Finances Ministre de l'Aménagement du territoire, de la Ruralité et des Collectivités territoriales 2013: Le Plan France Très Haut Débit [Enhanced broadband for all], http://www.gouvernement.fr/action/le-plan-france-tres-haut-debit (25.9.2016).

OECD 2014: Statistiques de l'OCDE sur la santé 2014: Comment la France se positionne? [OECD health statistics 2014: where does France stand?], http://www.oecd.org/fr/els/systemes-sante/Note-Information-FRANCE-2014.pdf (22.8.2016).

OECD 2016: Real GDP forecast (indicator). https://data.oecd.org/gdp/real-gdpforecast.htm (25.9.2016).

Schmid, Josef 2010: Wohlfahrtstaaten im Vergleich: Soziale Sicherung in Europa: Organisation, Finanzierung, Leistungen und Probleme [Welfare states in comparison: social security in Europe: organisation, funding, performance and problems], Wiesbaden.

WEF 2015: The Global Competitiveness Report 2014–2015, http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2014-15.pdf (29.9.2016).
WEF 2015: The Global Competitiveness Report 2015–2016, http://www3.weforum.org/docs/gcr/2015-2016/Global_Competitiveness_Report_2015-2016.pdf (29.9.2016).

WHO 2000: The World Health Report: Health Systems: Improving Performance, http://www.who.int/whr/2000/en/whr00_en.pdf (22.9.2016).

Daniel Buhr, Rolf Frankenberger,
Marie-Christine Fregin and Markus Trämer

On the Way to Welfare 4.0 – Digitalisation in Germany

GERMANY

1. ABSTRACT

- The "German model was able to overcome the economic and financial crisis relatively well, not being afraid to resort to state aid or state coordination provided for economic and industrial policy. However, globalisation and digitalisation pose further challenges for the welfare state.
- Despite good development in the area of digitalisation, there is some way to go with regard to both rolling out broadband and expanding mobile networks. However, because of rapid positive progress in the areas of human capital, internet utilisation and digitalisation of the economy in recent years, Germany is at the forefront in the EU.
- With its high-tech strategy and Digital Agenda, the German government is trying to take advantage of the opportunities arising from digitalisation in Germany. In this context, besides technological development, the promotion of the population's digital competences and the development of Industry 4.0 are of key importance.
- Digitalisation of the health care system is still in its infancy in Germany. While individual actors are certainly implementing digital technologies, their networking – a key criterion for a "Health Care 4.0" – has yet to get off the ground.
- Coordination of innovation policy is one of the main challenges for the future. How the Digital Agenda and the digital strategy will be able to contribute to the modernisation of the welfare state and boost social and technological innovation remains to be seen.

2. BRIEF OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

Germany is a federal and parliamentary democracy, in which political parties play a key role as central political actors with constitutional status. As a result of its federal structure, Germany has a bicameral legislature. Currently, five parties are represented in the Bundestag by proportional representation. Coalition governments are thus the rule. The 16 governments of the federal states (Länder) are represented in the Bundesrat, the second chamber, and are involved in legislation in many instances. Institutionally, we can therefore describe it as a system with many veto players (see Table 1).

In the Basic Law (Germany's constitution) the welfare state is firmly anchored in the principles of the social federal state (Art. 1, para 1) and of the social state governed by the rule of law (Art. 28, para 1) and made concrete in terms of the concepts of social justice and social security. Germany's welfare state, which realises these principles, can be categorised, with Esping-Andersen, as a conservative welfare state (Esping-Andersen 1990). It is based on a comprehensive social insurance system in the areas of sickness, accident, old age and pensions, as well as unemployment, which emerged in broad outlines as early as the nineteenth century. Social security was and remains largely linked to gainful employment and the various forms of social insurance continue to form the institutional core of the welfare state. However, this has been modified through a series of reforms: nursing care insurance (1995) bolsters the social security principle and comprehensive labour market reforms (Employment Promotion Act 1997; Job-AQtIV Act 2001; and Hartz I–IV 2002 to 2005) have transformed unemployment insurance and social assistance, such that a movement towards a welfare state based on basic social protection (Sicherungsstaat) can be discerned, although this would best be described as a restructuring of the welfare state rather than as its dismantling (Schmid/Buhr 2015: 246).

The "German model" of a social market economy, with its neocorporatist embedding of economic activity in organisational negotiation systems, with enterprise codetermination and with its welfare state faces a series of challenges due to globalisation and the digital revolution, compounded by adaptation pressures heightened by the economic and financial crisis. But precisely because of its strong welfare state, made more flexible for example by the reforms of Agenda 2010, Germany has been able to get through the crisis relatively well compared with other European countries, such as Spain and France, "without being afraid of resorting to welfare state assistance or economic and industrial policy coordination" (cf. Schmid/Buhr 2015: 333f).

Table 1
Overview of Germany[1]

Indicator	Germany	EU28
Form of state	federal democratic republic	
State organisation	federal	
Party system	multi-party system	
Electoral system	proportional representation	
EU member since	1 January 1958	
Inhabitants/km²	2,226.6	116.7
Urbanisation (% of population)	75	74
Welfare state regime	conservative	
Income inequality (distribution quintile)	5.1	5.2
Social expenditure (% of GDP)	29	28.6
GDP per capita (PPS, Index: EU=100)	125	100
Growth rate (real GDP in comparison with previous year)	1.7	2.2
Budget deficit/surplus (% of GDP)	0.7	–2.4
Labour market productivity nominal per employee (Index: EU=100)	106.6	100
Harmonised unemployment rate	4.2	8.6
Trade union density (0–100)	18.13	
R&D total spending (% of GDP)	2.87	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	77.1	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	16.2	17.1
DESI (0–1; 1=digitalised society)	0.57	0.52
Proportion of regular internet users (16–74 years of age) in %	84	76
Internet penetration (% of households)	90	83
Proportion of households with broadband connection (%)	88	80
Proportion of companies with broadband connection (%)	96	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

The digitalisation of the welfare state thus represents as much of a challenge as an opportunity to further develop the "German model" in the twenty-first century.

3. STATE OF DIGITALISATION

If one considers the most popular indicators and indices of digitalisation, the Federal Republic of Germany occupies a prominent place. Germany, ranked 25 worldwide, belongs to the expanded leading group with regard to connectivity (Akamai 2016). With an average IPv4 connection speed of 13.9 Mpbs, an increase of 37 per cent on the previous year, however, Germany clearly lags behind the leading states South Korea (29), Norway (21.3) and Sweden (20.6). Worldwide the average is 6.3 Mbps. Broadband coverage over 4 Mbps stands at 91 per cent (placed 15 worldwide and 10 in Europe). Here Germany still has room for improvement. Also with regard to the speeds of mobile internet connections, it needs to catch up, finding itself somewhere in the European middle with an average of 15.7 Mpbs. For comparison only: the United Kingdom stands at 27.9. Thus mobile internet connections, interestingly, are on average faster than landline connections and the average loading speed for page displays is better than in the case of landline connections by a factor of 0.8. There is room for development with regard to both broadband roll-out and expansion of mobile networks (Akamai 2016).

If one turns to digitalisation development including social and economic factors, Germany is among the European leaders. In the European Commission's Digital Economy and Society Index (DESI 2016)[2] Germany lies somewhere in the middle in ninth place although due to its rapid positive development in recent years in the areas of connectivity, human capital, internet usage and digitalisation of the economy it is among the EU leaders and is classified as "running ahead".[3]

A total of 98 per cent of German households have broadband connections and 84 per cent of Germans between 16 and 74 years of age regularly use the internet. There has been an increase in all areas of internet usage. In particular online shopping (82 per cent) is enormously popular. Sixty six per cent of Germans have basic internet skills. In the area of integration of digital technologies in the economy, Germany is in seventh place, but exhibits positive development in all areas. For example, 56 per cent of companies use electronic information exchange. Germany's strengths include the wide diffusion of digital competences among the population, the high number of internet users and their broad spectrum of activities (especially in social networking and online shopping). Also in relation to coverage of landline, mobile communications and satellite Germany exhibits high values.

It is only in the areas of e-government and integration of digital technologies in companies – for example, with regard to the use of social media by SMEs – that Germany is still in need of substantial development.

With the High-tech Strategy and the Digital Agenda 2014–2017, described in detail below, the German government plans to take advantage of the opportunities of digitalisation. In this context, the Digital Agenda is particularly broad-based, ranging from promotion of digital competences in the population ("digital knowledge society") through digital infrastructure (bill on facilitating the expansion of high-speed networks) and digital working (Industry 4.0, IT summit), digital integration (citizen dialogue) to digital administration (Digital Administration 2020, National E-government Strategy 2014).

4. HEALTH CARE POLICY

Germany was able to obtain its first experiences with the digitalisation of the health care system with the introduction of the electronic health care card, adopted in 2003 within the framework of health care reform (Law on the modernisation of statutory health insurance). It is the "supporting pillar of the e-health concept" in Germany (Wemmel 2015: 6). Actual implementation, however, planned for 2006, foundered on technical delays, incompatible schedules and difficulties reaching agreement among the consortium partners of the operating company Gematik (Gesellschaft für Telematikanwendungen der Gesundheitskarte mbH), which had been entrusted with implementing the health card. As things developed, in particular the Council of German Doctors blocked the electronic health card based on doubts about its practicability and data protection. Only in 2011, after changes to provisions on test procedures and a reduction in the range of functions were the first health cards issued. To date, the range of functionality has encompassed only the storage of master data and the functionality of the European Health Insurance Card (on the reverse side). In the future, additional emergency data, patient medical records and medication regimes are to be stored and secure communication between service providers can be enabled.

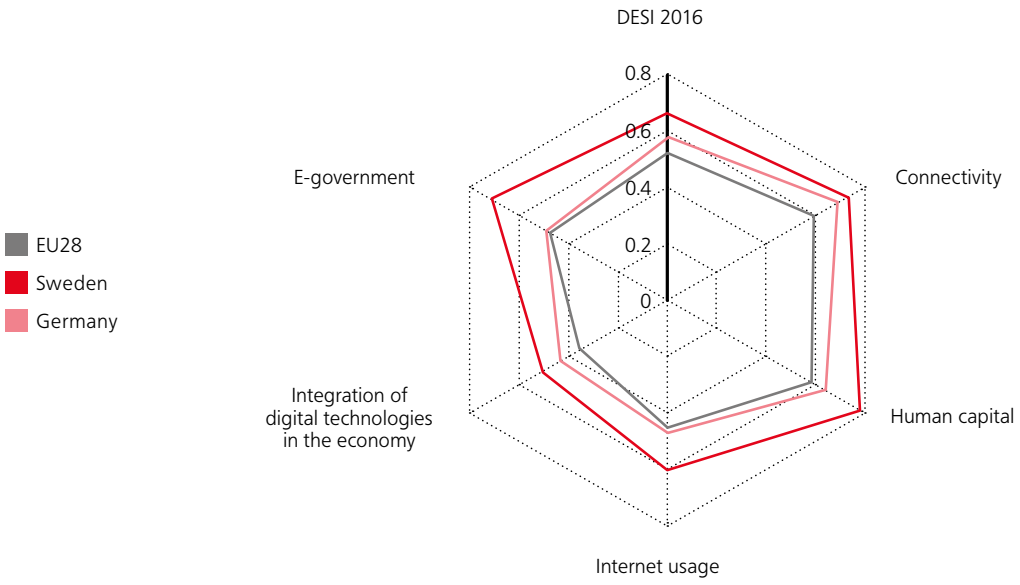
In order to enable these new functions, a number of conditions still have to be created. For example, medical practices, hospitals and pharmacies have to be linked to the telematic infrastructure via so-called connectors and the different IT systems made compatible with one another so that health data can be retrieved across devices. The Law on secure digital communication and applications in the health care system (E-health act), which came into force on 1 January 2016, establishes a schedule for the creation of these conditions and lays down when the new functions are supposed to be enabled, step by step. The law also creates the regulatory

---

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

3 According to the Network Readiness Index, Germany ranks 16 out of 139, which is a middle place compared tot he other European Countries (Cf. Baller et al. 2016:16). In the „Standortindex" DIGITAL 2015, Germany also ranks in the midfield, being sixth out of ten (cf. BMWi 2015: 8).

Figure 1
Development of a digital society in Germany by comparison with Sweden and the EU28



Source: Digital Economy and Society Index 2016.

framework for making it possible to introduce online video consultations and other new applications into ambulatory health care.

The E-health law is, for its part, embedded in a larger Health Ministry initiative proclaimed in 2010 in connection with the Ministry's IT summit process. The aim of the initiative is to identify barriers to the diffusion of telemedicine applications and measures to eliminate them. "The main results so far are the National Telemedicine Portal, a list of criteria for future projects and the planning study on interoperability, whose main elements have been included in the E-health law" (BMG 2016). In parallel with this the Ministry for Education and Research, within the framework of the Digital Agenda on promoting innovation, is supporting health care projects, such as big-data centres and a programme to promote medical IT.

In Germany, the digitalisation of the health care system is still in its infancy. While individual actors are certainly implementing digital technologies, their networking, which is a key criterion of a "Health Care 4.0", has made little headway to date. Furthermore, perceptions and expectations concerning how digitalisation is to be approached are still relatively at odds. The Health Ministry regards digitalisation in the health care system first and foremost as an instrument of efficiency gains and cost savings, as well as for preventing overtreatment and ensuring more patient safety. By contrast, a new perspective is gaining ground: for example, a study by consultancy firm Deloitte goes one step further and describes the German health care system as a "billion euro market on hold" (Gentner et al. 2014: 4).

5. LABOUR MARKET POLICY

The number of workers in Germany categorised as ICT specialists, at 3.7 per cent of the workforce, is in line with the EU average (EC EDPR 2016). However, in recent years in Germany the number of jobs for computer specialists has increased substantially. Employment subject to social security contributions ("proper jobs") has enjoyed particular growth (BA 2015). Demand is enormous and the Federal Employment Agency has announced a labour shortage among graduate ICT specialists and software developers. Statistically speaking, IT specialists in Germany are a young occupational group with a low proportion of women and excellent prospects in all branches of the economy.

According to a study by the Federal Ministry for Labour and Social Affairs (BMAS) 12 per cent of jobs in Germany have a high probability of falling prey to automisation (BMAS 2015). However, the authors of the study do not believe that total employment is necessarily under threat because change will bring new activities and occupations in its wake, although, generally speaking, they will call for higher qualifications than those they will replace. Jobs for the low qualified and low earners are thus more likely to be hit (BMAS 2015). Hitherto, workforce shifts between sectors and occupations have been greater than changes in total employment: Industry 4.0 has so far had only moderate effects on labour demand in Germany (BA 2015).

The already-mentioned Digital Agenda 2015–2017 takes a broader view of Industry 4.0 and its consequences. It also explicitly addresses digitalisation and its possibilities as an engine of employment. The German debate on Industry 4.0 thus encompasses much more than technological possibilities: the Federal Ministry of Labour and Social Affairs (BMAS) has turned its attention to employment and employees and

is focussing on people. To this end a broader – part public, part specialised – dialogue has been launched, centred primarily on coming up with new guidelines on "decent jobs" and proactively shaping the rules of the game for the future world of work. The basis for this is the green paper "Work 4.0", presented in April 2015 by federal minister Andrea Nahles (SPD). In it concrete guidelines are formulated that are being discussed with the involvement of experts from business, associations, trade unions, companies, the social partners and, last but not least, civil society. The dialogue is slated to reach a conclusion at the end of 2016 with a white paper "Work 4.0", formulating answers to the key questions of the green paper and making clear government actions and intentions. Alongside the government initiative there are a number of trade union initiatives. For example, IG Metall has established an advisory board "The Future of Work" with 27 experts from the metal and electrical sector, politics and academia. As a practical accompaniment to political initiatives, the advisory board is to identify ways in which employers and employees can benefit from Industry 4.0 and digitalisation (cf. IG Metall 2015). IG Metall has also set up a website "FairCrowdWork Watch" (http://www.faircrowdwork.org), on which so-called "crowdworkers" can assess their working conditions, exchange views and make use of the trade union's legal advice. This represents a trade union attempt to organise otherwise atomised "freelance" workers (cf. Degryse 2016). The United Services Union ver.di has also taken up the issue and has organised an advice platform for cloudworkers (http://www.ich-bin-mehr-wert.de/support/cloudworking), besides a number of conferences. The German Trade Union Confederation, the DGB, has made a number of demands with regard to the white paper, pointing among other things to the need to expand occupational further training. It also calls for measures to reform enterprise codetermination and on the integration of older workers and immigrants, as well as commitments in relation to labour market research, monitoring of "rationalisation" processes and technology impact assessment (DGB 2016). At the same time, the employers' organisations the BDA and the BDI emphasise what they see as the benefits of "flexibilisation" and subcontracting for employers and employees alike and warn of the alleged constricting influence of the trade unions (cf. Degryse 2016).

6. INNOVATION POLICY

The tasks of innovation policy are distributed over a number of levels (vertically) and various ministries (horizontally). At the national level, competences lie above all with the Ministries of Education and Research (BMBF) and of Economic Affairs and Energy (BMWi). Other ministries with their respective research institutes and agencies (for example, the Ministry of Food, Agriculture and Consumer Protection, the Ministry of the Environment, Nature Conservation and Nuclear Safety, the Ministry of Health and the Defence Ministry) are also involved. In 2015, a total of 14.9 billion euros in government spending were set aide for innovation measures, rising to 17.6 billion in 2017. The focus of activities here is the digital transformation. The skills needed to cope with and shape digital technologies are in future to be passed on at all stages of education and training, which is also intended to boost occupational training.

In contrast to other countries, Germany has no central institution – for example, an innovation agency – for the coordination of innovation policy. In order at least to better coordinate the abovementioned ministries, in 2006 the federal government introduced the High-tech Strategy (HTS), which was revised in 2010 and 2014. In contrast to previous innovation policies, the HTS is not intended to promote only individual technologies, but also to address social needs for cleaner energy, good and efficient health care provision, sustainable mobility, secure communications and Germany's future competitiveness (for example, Industry 4.0). The HTS will thus pursue a more mission- and demand-oriented approach than the previous policy and expand into a comprehensive, inter-ministerial innovation strategy dealing with both technological and social innovations (Buhr 2016).

With its Digital Agenda 2014–2017 the federal government, as already mentioned, now attaches greater importance to the opportunities and challenges accompanying the digital transformation (EFI 2016). The background to the Digital Agenda at national level was above all the commission of inquiry on the internet and the digital society (2010–2013), which made recommendations on further policy development in its closing report. The Digital Agenda formulates "principles" of "digital policy" from which development opportunities in individual policy areas are derived (digital infrastructure, digital world, the economy, public administration, digital participation, education, European and international development). The Agenda is being steered under the joint auspices of the Ministry of the Interior, the Ministry of Transport and Digital Infrastructure and the Ministry of Economic Affairs and Energy. The very involvement of three lead ministries hampers coordination and so the federal government has established a Digital Agenda steering committee to identify new developments at an early stage on a cross-departmental basis and to bring them into discussions. It comprises the relevant state secretaries of the three ministries concerned. The steering committee is to integrate the other federal authorities responsible for implementation in the management and further development of the Digital Agenda. In spring 2016, the Ministry of Economic Affairs presented the "Digital Strategy 2025", which is linked to the Digital Agenda. The "Digital Strategy 2025" is further specified in the Digitalisation Action

Programme, which lays out and prioritises tasks. Consistent use of digitalisation as an opportunity to modernise the welfare state is as yet not evident in the Digital Agenda and in the composition of the steering committee.

7. SUMMARY

Germany is developing into a digital society. Both at the technological and the social and economic levels further efforts in this direction are necessary, however. With the High-tech Strategy and the Digital Agenda Germany has established two programmes aimed at taking advantage of the opportunities of digitalisation and minimising the risks. In particular the Digital Agenda has set its sights on a broad promotion of human capital in the digital knowledge society, the expansion of digital infrastructure, the promotion of digital work and the enhanced deployment of e-government and digital administration. Above all the non-supply-side-oriented measures to promote broad-based social innovation are highly promising.

Bibliography

Akamai 2016: Akamai's State of the Internet Report, Volume 9 (1), https://www.akamai.com/es/es/multimedia/documents/state-of-the-internet/akamai-state-of-the-internet-report-q1-2016.pdf (30.9.2016).

Baller, Silja; Dutta, Soumitra; Lanvin, Bruno (eds) 2016: The Global Information Technology Report 2016: Innovation in the Digital Economy, https://www.pwc.com/kr/ko/publications/industry/wef_gitr_full_report.pdf (30.9.2016).

Borchers, Detlef 2011: Elektronische Gesundheitskarte: Es begann vor zehn Jahren [Electronic health card: it started ten years ago], in: Heise Online, 4.8.2011, http://www.heise.de/newsticker/meldung/Elektronische-Gesundheitskarte-Es-begann-vor-zehn-Jahren-1318512.html (30.9.2016).

Buhr, Daniel 2016: Länderkapitel Deutschland [Country chapter on Germany], in: Andersson, Lars Fredrik; Alaja, Antti; Buhr, Daniel; Fink, Philipp; Stöber, Niels: Innovationsstrategien in Zeiten der Digitalisierung: Ein Vergleich der Innovationspolitik in Finnland, Schweden und Deutschland [Innovation strategies in the age of digitalisation: comparison of innovation policies in Finland, Sweden and Germany], Expert opinion commissioned by the Friedrich-Ebert-Stiftung, Bonn.

Bundesagentur für Arbeit (BA) [Federal Employment Agency] 2015: Weißbuch „Arbeiten 4.0" – Antworten der BA auf die Herausforderungen der Digitalisierung [White paper "Work 4.0" – the Federal Employment Agency's answers to the challenges of digitalisation], Zulieferung BA zum Weißbuch Arbeiten 4.0, Nürnberg.

Bundesministerium für Arbeit und Soziales [Federal Ministry of Employment and Social Affairs] (eds) 2015: Übertragung der Studie von Frey/Osborne 2013 auf Deutschland [Application of the study by Frey/Psborne to Germany]: Endbericht Kurzexpertise No. 57, Berlin.

Bundesministerium für Gesundheit (BMG) [Federal Ministry of Health] 2016: E-Health-Initiative zur Förderung von Anwendungen in der Telemedizin [E-health initiative to promote applications in telemedicine], http://www.bmg.bund. de/themen/krankenversicherung/e-health-initiative-und-telemedizin/e-health-initiative.html (30.9.2016).

Bundesministerium für Wirtschaft und Energie (BMWi) [Federal Ministry of Economic Affairs and Energy] 2015: Monitoring-Report Wirtschaft DIGITAL 2015, Berlin.

Degryse, Christophe 2016: Digitalisation of the Economy and its Impact on Labour Markets, European Trade Union Institute (ETUI), Working Paper 2016/02.

Deutscher Gewerkschaftsbund (DGB) [German Trade Union Confederation] 2016: Grundlegende Anforderungen an ein Weißbuch „Arbeiten 4.0" [Basic requirements of a white paper on "Work 4.0"], DGB-Arbeitspapier, January 2016.

EC EDPR 2016: Europe's Digital Progress Report (EC EDPR) 2016 – Germany. Expertenkommission Forschung und Innovation (EFI) [Expert committee on research and innovation] 2016: Gutachten zu Forschung, Innovation und technologischer Leistungsfähigkeit Deutschlands 2016 [Report on Germany's research, innovation and technological capabilities], Berlin.

Esping-Andersen, Gøsta 1990: The Three Worlds of Welfare Capitalism, Princeton: Princeton University Press.

European Commission 2016: Germany, 30.6.2016, https://ec.europa.eu/digital-single-market/en/scoreboard/germany, (30.9.2016).

Gentner, Andreas; Elbel, Gregor; Pistor, David; Bovians, Malte 2014: Perspektive E-Health: Consumer-Lösungen als Schlüssel zum Erfolg? [E-health prospects: are consumer solutions the key to success?], Deloitte & Touch GmbH Wirtschaftsprüfungsgesellschaft (ed.), London.

IG Metall 2015: IG Metall gründet Beirat „Zukunft der Arbeit" mit Fachleuten aus Wissenschaft [IG Metall sets up advisory board "Future of work"], Unternehmen und Politik, Press release No. 28/2015, https://www.igmetall.de/pressemitteilungen-2015-16019.htm (28.9.2016).

Schmid, Josef; Buhr, Daniel 2015: Wirtschaftspolitik [Economic policy], 2nd revised edition, Paderborn.

Wemmel, Jan 2015: Whitepaper Digitalisierung im deutschen Gesundheitswesen, Über Chancen, Nutzen und Herausforderungen [White paper on digitalisation in the German health care system: opportunities, utilisation and challenges], Gütersloh.

Marie-Christine Fregin and Rolf Frankenberger

On the Way to Welfare 4.0 – Digitalisation in Spain

SPAIN

1. ABSTRACT

- The economic crisis hit Spain harder than most other EU member states. At the time of writing (September 2016) the fourth largest economy in Europe is also caught up in a political crisis: for months now Spain has been without an elected government. In 2016 no law has yet been passed and urgent reforms have been fallen by the wayside.
- Digitalisation began in Spain comparatively late and the country lags behind in particular in the development of digital competences.
- While at the start of the 2000s Spain's economic development seemed exemplary, it is also characterised by relatively weak innovativeness and a lack of investment
- especially by the public sector – in research and development. There is no systematic innovation policy in Spain. The R&D branch is decentralised; for example, the autonomous regions also have some role in determining innovation policy.
- In the areas of science and innovation Spain has well developed structures, whose stability and effectiveness have suffered due to government spending cuts and "austerity" measures. However, competitiveness in the high-tech sector is growing at above the EU average. Spain is developing positively again, albeit slowly.

2. A SHORT OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

Since adopting its Constitution in 1978, Spain has been a parliamentary-democratic constitutional monarchy (Article 1), which acknowledges the principles of both the welfare state and the rule of law. In Article 2, the Constitution also guarantees the unity of the Spanish nation and the autonomy of nationalities and regions. Accordingly, the legislature is divided into two chambers. The first chamber is directly elected by the people by proportional representation. At present there are ten political parties in the parliament, five of which have a pronounced regional character, such as the two Catalan parties ERC and CDC. In the second chamber Spain's territorial units are represented. The so-called autonomous communities have far-reaching legislative and executive competences and are comparable in status to Germany's federal states. Spain is thus one of the most decentralised countries in Europe. Currently (as of October 2016) the country is mired in political crisis; attempts to form a government have failed repeatedly and, for example, in 2016 not a single law has yet been passed.

The interest representation rights of trade unions and employers' associations are anchored in the Spanish Constitution, which also guarantees freedom of organisation and the right to strike. The two major trade union confederations, UGT and CCOO, are politically close to the social democratic party PSOE and the communist party PCE, although at present the latter has no political role.

After being hard hit by the financial and economic crisis between 2009 and 2013 and having to cope with negative real GDP growth rates of between –3.6 per cent and –1.7 per cent, as well as rising unemployment and a massive increase in government debt (99 per cent of GDP in 2015) Spain's economy has been growing steadily since 2014. Unemployment is also falling slowly (see Table 1).

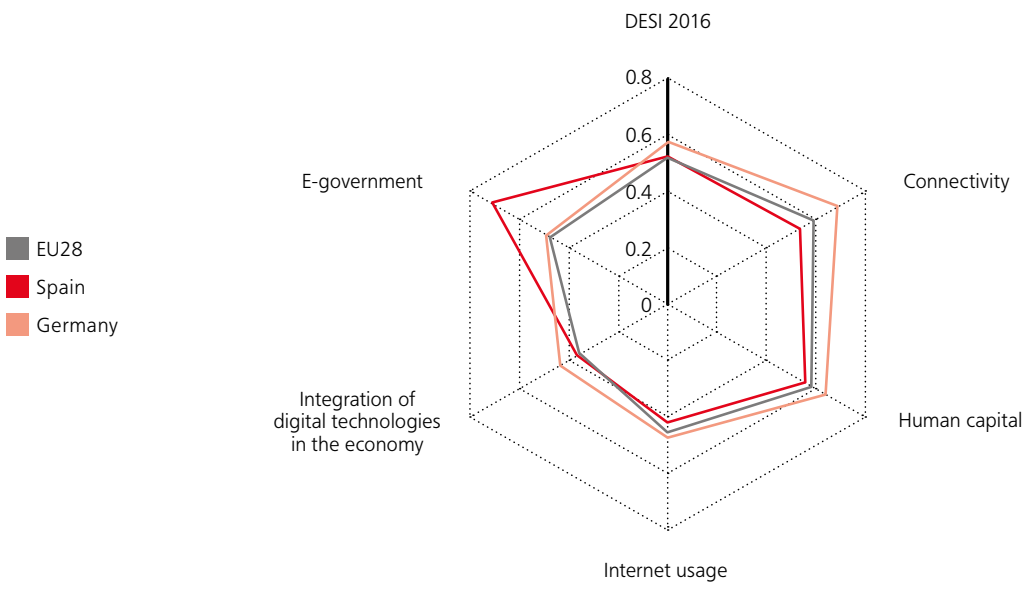
The Spanish welfare state is not categorised in Esping-Andersen's typology (1990), but is often classified as rudimentary or Mediterranean because of its lack of institutionalisation. Sometimes it is also classified as conservative because of the strong role of the family. The importance of interest representation associations and the weak basic provision beyond the contribution based social insurance system run by the Tesorería General de la Seguridad Social (TGSS) would tend to imply that Spain should be categorised under the conservative model. The economic and financial crisis has put the social security systems under particular pressure, so that new paths have to be sought.

Table 1
Overview of Spain[1]

Indicator	Spain	EU28
Form of state	Constitutional monarchy	
State organisation	Federal	
Party system	Multi-party system	
Electoral system	Proportional representation	
EU member since	1 January 1986	
Inhabitants/km2	92.5	116.7
Urbanisation (% of population)	80	74
Welfare state regime	Conservative / mediterranian	
Income inequality (distribution quintile)	6.9	5.2
Social expenditure (% of GDP)	25.7	28.6
GDP per capita (PPS, Index: EU=100)	92	100
Growth rate (real GDP in comparison with previous year)	3.2	2.2
Budget deficit/surplus (% of GDP)	–5.1	–2.4
Labour market productivity nominal per employee (Index: EU=100)	102.6	100
Harmonised unemployment rate	19.5	8.6
Trade union density (0–100)	16.88	
R&D total spending (% of GDP)	1.23	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	68.5	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	15.6	17.1
DESI (0–1; 1=digitalised society)	0.52	0.52
Proportion of regular internet users (16–74 years of age) in %	75	76
Internet penetration (% of households)	79	83
Proportion of households with broadband connection (%)	78	80
Proportion of companies with broadband connection (%)	98	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

Figure 1
Development of a digital society in Spain by comparison with Germany and the EU28



Source: Digital Economy and Society Index 2016.

3. STATE OF DIGITALISATION

Spain ranks somewhere in the middle, according to the experts interviewed on the state of digitalisation by European comparison, and the relevant indicators confirm it: according to the European Innovation Scoreboard 2016 Spain is a "moderate innovator" (EC 2016: 1). With regard to development in the direction of a digital economy and society, measured in the so-called DESI,[2] the country is ranked 15 out of the 28 EU member states (cf. European Commission Digital Economy and Society Index [DESI] 2016; EC EDPR 2016). This puts Spain among the catch-up countries. After the slump that resulted from the financial and economic crisis recovery can be discerned in a number of places. With regard to the integration of digital technologies in public administration (e-governance and e-administration) Spain is above the EU average. Today, 77 per cent of households have access to fast broadband connections of at least 30 Mbps, although there are considerable differences between regions, as well as between urban and rural areas. According to the DESI index, however, a mere 54 per cent of the population between 16 and 74 years of age have at least basic digital skills. With regard to internet use Spain is below the EU average (EC EDPR 2016).

Consonant with the aims of the Digital Agenda for Europe Spain has developed an Agenda Digital para España, which was adopted in February 2013. This national strategy is aimed at encouraging the provision of digital services, promoting digital skills, inclusion and employability and expanding the digital economy and administration and, last but not least, glass fibre networks. The Agenda serves as an umbrella for all government activities and lays down targets up to 2020. The Ministry for Industry, Energy and Tourism (Ministerio de Industria, Energía y Turismo – MINETUR) coordinates the implementation of measures together with the Ministry for Finance and Public Administration (Ministerio de Hacienda y Administraciones Públicas – MINHAP). An e-governance plan for 2015–2020 was also adopted (Plan de Transformación digital de la Administración General del Estado y sus Organismos Públicos). Within the framework of the Digital-by-default strategy, in future, central public services are to be used digitally. In relation to electronic billing systems in particular Spanish SMEs are performing well.

4. HEALTH CARE POLICY

The Spanish Constitution explicitly guarantees everyone health care provision. The Ley General de Sanidad (General law on health care) of 1986 lays down access to the public health care system as a civil right. The system is very decentralised: in 2002 key competences for the provision and organisation of health care services were transferred to the autonomous regions (the 17 Comunidades Autónomas and two autonomous cities Ceuta and Melilla). Since then each region has developed its own health care services. At the beginning of the twenty-first century Spain had one of the most modern health care systems in Europe. Since the financial and economic crisis, however, the system has been put under high pressure due to the government's approach to high public debt. While the quality of health care services in general remains relatively high, experts have identified

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

maintaining the cohesion of the regional systems as the major challenge. Among other things the engineers' association AMETIC has called for the creation of an authority with inter-territorial competences for the development of e-health.

With regard to digitalisation Spain's health care system is well advanced by European comparison, although it is no longer in the prominent position it occupied in the mid-2000s. Digitalisation is particularly well developed in two areas: (I) electronic prescriptions and dispensing of therapeutic measures (e-prescription and e-dispensation) and (II) electronic records of patients' medical histories (cf. EC EDPR 2016). Electronic prescriptions, according to experts' estimates, are currently available to about 70 per cent of the population with statutory medical insurance; the electronic medical card is also used for this purpose. In 2010 a law was passed laying down minimum standards for the (electronic) documentation of patient histories (Conjunto Mínimo de Datos de Informes Clínicos – CMDIC). The national strategy titled Historia Clínica Digital del Sistema Nacional de Salud (HCDSNS) is important for the electronic recording of patients' medical histories. The Ministry of Health (Ministerio de Sanidad, Servicios Sociales e Igualdad – MSSSI) is working with the public body red.es on the standardisation of electronic documentation and is striving to achieve the nationwide use of the so-called Systematized Nomenclature of Medicine – Clinical Terms (SNOMED CT). This gives a complete account of the substantive elements of medical statements and thus standardises and enables the exchangeability of information also across (national) borders. There is also a national strategy (Plan Avanza 2) aimed at expanding use of ICT in the health care sector. MINETUR, MSSSI and the regional health care services are cooperating on an online health care programme (cf. MSSSI 2010). To date, however, the national strategy on e-health has not (yet) been adopted (cf. EC EDPR 2016). According to the law every patient can be treated in every region, but in reality there are problems with system interoperability. Furthermore, the exchange of medical data between regions is handled very differently: the systems in Galicia and the Basque Country are particularly well developed, but Catalonia has a closed system that permits almost no exchange of information with other regions.

Spain is one of the countries in the European Union hardest hit by demographic change. At 82.5 it has one of the highest life expectancies. According to expert estimates, at present around 80 per cent of health care spending goes on the care of chronically sick people. There is thus particular emphasis on telemedicine. Another major issue is the use of big data for the development of individually tailored therapies and medicines. To date only pilot projects have been implemented; Galicia and the Basque Country lead the way. In the area of Bilbao (Basque Country) a telemonitoring service for chronically sick patients, TELBIL, was successfully established between 2009 and 2014 that monitored the state of people's health via smart phone (cf. Carretero/Kucsera 2015). Spanish experts consider the key challenge to be not so much the development of new systems and technologies but the implementation and consolidation of existing ones.

5. LABOUR MARKET POLICY

Currently Spain's statistical authorities attest to positive development: not only is the national economy growing, but in 2016 the proportion of those in employment also grew by 3.2 per cent. However, that is not much to write home about, given that Spain still has the second highest unemployment rate in Europe among those between 15 and 24 years of age. There is a large informal sector, which naturally enough can contribute little to innovation and boosting competitiveness. The Spanish labour market remains extremely fragmented and dualised: some people are virtually dismissal-proof, whereas others are stuck in very precarious employment, in particular many young people, even the highly qualified (cf. Bentolila et al. 2012). Many young people thus feel compelled to seek work outside Spain.

The state employment service (SEPEE) is responsible for the implementation of employment policy and services related to unemployment, although they are largely provided for by basic insurance. The prime locus of solidarity is the family (Schmid 2010). In response to the massive deterioration of labour market performance in the wake of the crisis comprehensive reforms were set in motion: in February 2012 the reform programme II Acuerdo para el Empleo y la Negociación Colectiva 2012–2014 (II AENC) was enacted. The aim is to make the labour market more "flexible". To that end employment protection was diluted, what some regard as excessive severance pay in the event of dismissal was cut and short-time working was boosted. On the other hand, companies are supposed to create more permanent jobs, which according to the OECD has indeed taken place, at least to some extent. Implementation of this triggered demonstrations and general strikes and even experts take a critical view of the labour market measures. In 2014 an Acuerdo sobre el Programa Extraordinario de Activación para el Empleo (PAEA) (Agreement on a special activation programme) was adopted, with particular emphasis on labour market activation policies.

Digitalisation commenced in Spain relatively late and it still lags behind in important areas. The experts interviewed drew particular attention to the education and training deficit in the area of digital skills (cf. EC EDPR 2016). The proportion of ICT specialists in the Spanish workforce, at 3.1 per cent, is below the EU average of 3.7 per cent (EC EDPR 2016). The country thus faces a dual challenge: close the gap and, at the same time, prepare for the future. According to some estimates, around 55 per cent of jobs in Spain are under threat from digitalisation and automation (Degryse 2016: 24; data: EU-LFS). According to some, efforts should thus be made to familiarise young people while still at school with the options open to them in terms of company start-ups and in particular to encourage young women and girls to take up natural sciences and engineering. Furthermore, efforts must be made to improve the labour market situation for highly qualified workers and researchers. At the same time, supply and demand for skills should be better coordinated between educational institutions and companies: according to the engineers' association AMETIC there is, for example, a shortage of specialist programmers and developers. The experts we interviewed all complained that every change of government in Spain brought with it more changes in education policy.

6. INNOVATION POLICY

Overall, Spain is characterised by relatively low innovativeness and a lack of investment – especially in the public sector – in research and development (cf. EC EDPR 2016). Investment in the private sector is also relatively low and scarcely benefits from spillover effects of innovative ideas between forms and regions; the poor links between companies and educational institutions, as well as between autonomous regions is a barrier to innovation (cf. among others CCOO Industria 2016). At the same time, however, it appears that sectors with a high knowledge intensity grew more strongly in Spain than the European average between 2007 and 2012. The competitiveness of the high tech sector also appears to be increasing at a higher rate than the European average (CCOO Industria 2016). Spain is developing positively again, albeit slowly. The opening up of new funding sources, as well as the effective and efficient use of the money are among the main challenges. The experts interviewed also mentioned the atomised corporate structure as a key hindrance to innovation: 94.5 per cent of Spanish firms are micro-companies with fewer than 10 employees, primarily in services. The relative importance of SMEs (in Spanish, PYMEs) for the Spanish economy is thus far higher than the EU average: SMEs are responsible for around 90 per cent of Spanish GDP. While R&D at some major companies is in line with international norms the large number of SMEs is surely responsible for the low innovation rates in the economy as a whole.

There is no systematic innovation policy in Spain. The R&D system is decentralised; even the autonomous regions have a role in innovation policy. For example, they are responsible for university funding and have key competences with regard to the industrial sector. At national level the Ministry of the Economy MINECO (Ministerio de Economía y Competitividad) is the main actor. Besides that the Ministry for Industry, Energy and Tourism MINETUR systematically promotes the industrial sector. The Law on science, technology and innovation 2011 (Ley de la Ciencia, la Tecnología y la Innovación, 14/2011) regulates the promotion of R&D and provides for two new agencies to promote innovation and development as public-private entities. The Centro para el Desarrollo Tecnológico Industrial (CDTI), responsible for funding and supporting R&D, has been assigned to MINECO, while in future the research agency the Agencia de Investigación (AEI) will play a more substantial role and support prominent research projects. There is no central authority in Spain that promotes and coordinates innovation across ministries and areas of responsibility (cf. Leceta 2016; Mulet/Leceta 2016).

MINETUR has national strategies to help Spanish industry meet the challenges of the present and the future: the first funding line Agenda para el Fortalecimiento del Sector Industrial en España (Secretaría General de Industria y Pyme; MINETUR 2014a) is aimed at reindustrialisation and boosting the competitiveness of Spanish companies on internationalised markets. The second funding line, adopted in October 2015, is explicitly dedicated to digitalisation: Initiativa Industria Conectada 4.0 (cf. EOI 2015) is aimed at driving the digital transformation of Spanish industry by means of a joint action plan of the public and private sector (cf. EOI 2015). This initiative has been welcomed by administrative and company experts because the relevant stakeholders have been involved in the development of a future-oriented strategy for Spanish Industry 4.0 (companies, trade unions, universities and research institutes). Under this aegis competitiveness is to be boosted by investment and the deployment of new technologies, paying particular attention to SMEs and so-called micro-firms. In the autonomous regions in some instances major progress has been made with regard to Industry 4.0. Examples include the Programme Basque Industry 4.0, with its Fabricación Avanzada and the Agenda de la Competitividad Industrial Gallega in Galicia (cf. EOI 2015).

In the areas of science and innovation Spain has well developed structures, although their stability and effectiveness have suffered from spending cuts and "austerity" measures. On top of that there have been difficulties in the coordination of policy-making. The Global Competitiveness Report 2015 categorises Spain's innovativeness as unsatisfactory as a result of its low spending on R&D and poor links between universities and companies. "Consolidating" state finances while maintaining high quality in relation to public spending is among the key challenges. In this context all the experts we interviewed referred to the central role of the education system: not only are more transdisciplinary projects to be supported in future, but curricula in schools and universities should and must be adapted to the requirements of digitalised markets. Another challenge, last but not least, is to support a culture that stimulates innovation (cf. Mulet/Leceta 2016).

7. SUMMARY

While in the early 2000s Spain appeared to be a model European pupil with regard to positive economic growth, today it seems to be characterised by inadequate innovativeness (cf. WEF 2015). Among the main barriers to development identified by the experts we interviewed – besides the "austerity" measures, the unstable political situation and the federal policy-making structures – there are also cultural aspects, as a result of which Spain tends to react rather than develop innovative strategies proactively. At the same time, effective instruments for the evaluation of policy measures have to be developed. Models, visions and an entrepreneurial spirit are lacking, not to mention development in the direction of Welfare State 4.0. Indeed, as far as the latter is concerned, according to the experts Spain is rather at the stage of Welfare State 1.0. Now Spain has to face the challenges of a fourth industrial revolution before it has even tackled the third. There is little public debate and social dialogue. Among the main challenges facing the country is to improve productivity and competitiveness, while consolidating public finances. One of the ways in which the government chose to respond to the economic crisis was to cut spending on research and development. At the same time, however, Spain has caught up in important areas, has got a Digital Agenda off the ground, has reregulated innovation policy and has implemented comprehensive labour market reforms. In the health care system there are areas in which the system is digitalised to a considerable extent and with regard to digital infrastructure – glass-fibre, 4G coverage, e-administration – Spain is certainly at the European forefront.

Bibliography

Bentolila, Samuel; Dolado, Juan J.; Jimeno, Juan F. 2012: Reforming an Insider-Outsider Labour Market: The Spanish Experience, in: IZA Journal of European Labour Studies 2012, 1:4.

Carretero, Stephanie; Kucsera, Csaba 2015: Report on Case Studies of Technology-based Services for Independent Living for Older People; JRC Science and Policy Reports, European Commission, Report EUR 27139 EN.

CCOO Industria 2016: La Digitalización de la Industria, Versión actualizada, http://www.industria.ccoo.es/cms/g/public/o/3/o163555.pdf (5.9.2016).

Degryse, Christophe 2016: Digitalisation of the economy and its impact on labour markets. European Trade Union Institute (ETUI), Working Paper 2016.02.

EC 2016: European Innovation Scoreboard – Spain, http://ec.europa.eu/DocsRoom/documents/17857 (25.8.2016).

EC EDPR 2016: Europe's Digital Progress Report (EC EDPR) 2016 – Spain, https://ec.europa.eu/digital-single-market/en/news/european-digitalprogress-report-edpr-country-profiles (22.8.2016).

EOI 2015: Las tecnologías IoT dentro e la industria conectada 4.0, https://www.eoi.es/savia/documento/eoi-80491/las-tecnologias-iot-dentrode-la-industria-conectada-40 (25.9.2016).

Esping-Andersen, Gøsta 1990: The Three Worlds of Welfare Capitalism, Princeton.

Leceta, Jose Manuel 2016: No más I+D+i, in: Cinco Días, http://cincodias.com/ cincodias/2016/06/21/economia/1466526473_535569.html (25.9.2016).

MINETUR 2013: Agenda Digital para España, http://www.agendadigital.gob.es/agenda-digital/recursos/Recursos/1.%20Versi%C3%B3n%20definitiva/Agenda_Digital_para_Espana.pdf (22.8.2016).

MINETUR 2014: Planes específicos de la Agenda Digital para España. Actualizado a junio 2014, http://www.agendadigital.gob.es/planes-actuaciones/Bibliotecaplanesconsolidados/Planes-Especificos-ADpE.pdf (25.9.2016).

MINETUR 2014a: Agenda para el fortalecimiento del sector industrial en España, http://www.minetur.gob.es/industria/es-ES/Servicios/Paginas/agenda-sector-industrial.aspx (25.9.2016).

MSSSI 2010: ICT in the National Health System: The Healthcare Online Programme, Progress update January 2010, http://www.msssi.gob.es/profesionales/hcdsns/TICS/TICS_SNS_ACTUALIZACION_EN_2010.pdf (22.8.2016).

Mulet Melia, Juan; Leceta, Jose Manuel 2016: Cultura de innovación: I+D y mucho más, in: Cinco Días, http://cincodias.com/cincodias/2016/ 09/02/empresas/1472835683_927034.html (25.9.2016).

Schmid, Josef 2010: Wohlfahrtstaaten im Vergleich: Soziale Sicherung in Europa: Organisation, Finanzierung, Leistungen und Probleme, Wiesbaden.

Josef Schmid and Rolf Frankenberger

On the Way to Welfare 4.0 – Digitalisation in Italy

ITALY

1. ABSTRACT

- Italy is among the stragglers with regard to digitalisation in Europe. The dimensions in which Italy does comparatively badly include the development of human capital, internet usage and the integration of digital technology in the economy. In the past year little progress has been made in relation to most indicators.
- The framework conditions for the digitalisation of the health care system have gradually been improved since 2008. The national e-health directives implement the forms of organisation and provision of medical services and are aimed at developing synergies in the health care system. However, the digitalisation of the health care system is limited mainly to the north of Italy.
- With regard to innovation Italy needs to make up ground with regard to both investment and policy governance and tackling regional inequalities. The national research programme "PNR 2014–2020" was announced two years ago, but as yet it has not been officially approved. Italy's government R&D intensity, at 1.29 per cent, is still substantially below the 2020 target of 1.53 per cent.
- The labour market has been deregulated by a number of "structural reforms", such as the Renzi government's Jobs Act. The first signs are positive and the number of labour contracts has increased significantly. At the same time, the policy changes have heightened labour market dualisation and disparity. Deregulation has been accompanied by weak productivity growth and falling R&D investment.

2. BRIEF OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

Italy, like Germany, is among the "belated" nations; Italy was reunified only in the course of the "Risorgimento". Vittorio Emmanuele II was proclaimed King of Italy on 17 March 1861. The country subsequently became a parliamentary democracy with two chambers that have almost identical legislative responsibilities. Until 2005, electoral law combined a system of majority voting and proportional representation, which resulted in a profusion of political parties and unstable political majorities.

"What distinguishes Italy from most other comparable democracies is the pronounced heterogeneity of its political culture" (Köppl 2007). This is linked to the three major divisions that characterise Italy's political system:

The dualism of Catholic and communist subculture; the strong regional fragmentation, manifested in broad terms by the opposition between north and south; and finally the far-reaching alienation of ordinary citizens from the political elites, often expressed in terms of piazza (where ordinary people go about their business) and palazzo (where the rulers go about theirs). (Köppl 2007: 31) (see Table 1)

According to Esping-Andersen's typology of the welfare state (Esping-Andersen 1990) Italy is to be categorised as "conservative" because of the dominant role of social insurance and the rather passive role of the state. This categorisation has been refined by Ferrara (1996; see also Lynch 2014), who prefers to categorise Italy as a Mediterranean welfare state. Such welfare states have four main characteristics:

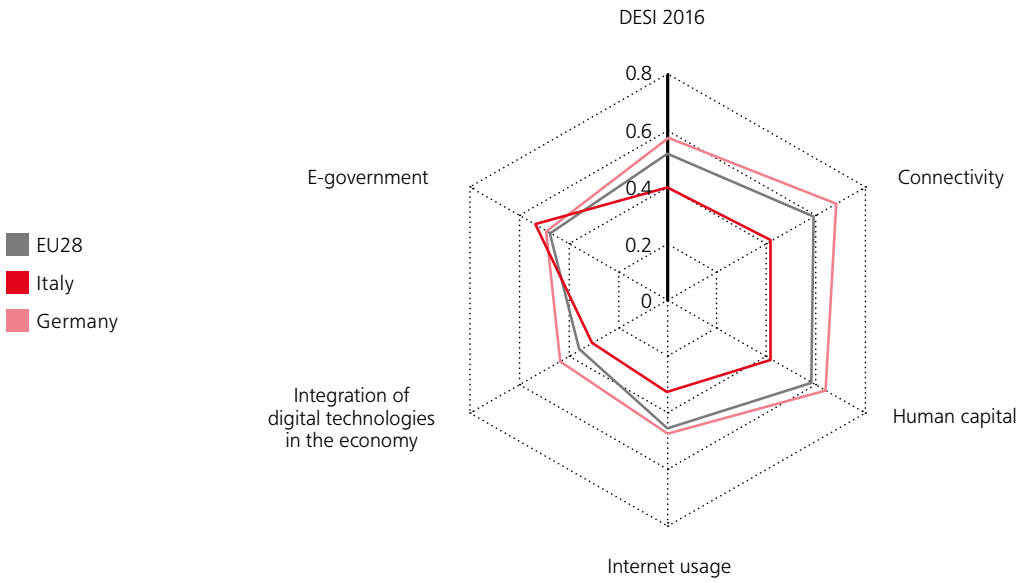
1. The considerable fragmentation of the social security systems, which are markedly selective and particularistic. Access to social insurance in Italy is almost exclusively limited to those in gainful employment. However, even within this group there are major inequalities. The proliferation of insurance funds and programmes that exist in parallel – for example, pensions and unemployment insurance – serve some employees (especially in the major industrial concerns) better than others. Another example is employment protection, which applies to standard employees, but gives much less protection to those in atypical employment and the large number of (sometimes bogus) self-employed (around 30 per cent of workers). This applies particularly to younger people. Furthermore, general basic insurance is lacking for people not covered by social insurance.
2. The existence of universal health care provision, in which private providers also play a major role. Italy's health care system, as solely a protection system, is not insurance-based; since 2000, it has been funded almost entirely from tax revenues and open to all citizens.

Table 1
Overview of Italy[1]

Indicator	Italy	EU28
Form of state	Parliamentary republic	
State organisation	Unitary	
Party system	Multi-party system	
Electoral system	Majority voting and proportional representation	
EU member since	1 January 1958	
Inhabitants/km²	201.2	116.7
Urbanisation (% of population)	69	74
Welfare state regime	Conservative	
Income inequality (distribution quintile)	5.8	5.2
Social expenditure (% of GDP)	29.8	28.6
GDP per capita (PPS, Index: EU=100)	95	100
Growth rate (real GDP in comparison with previous year)	0.7	2.2
Budget deficit/surplus (% of GDP)	–2.6	–2.4
Labour market productivity nominal per employee (Index: EU=100)	106.5	100
Harmonised unemployment rate	11.4	8.6
Trade union density (0–100)	37.29	
R&D total spending (% of GDP)	1.29	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	80.1	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	13.2	17.1
DESI (0–1; 1=digitalised society)	0.4	0.52
Proportion of regular internet users (16–74 years of age) in %	63	76
Internet penetration (% of households)	75	83
Proportion of households with broadband connection (%)	74	80
Proportion of companies with broadband connection (%)	94	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

Figure 1
Development of a digital society in Italy by comparison with Germany and the EU28



Source: Digital Economy and Society Index 2016.

3. Bureaucratisation, clientelism and patronage in the distribution of benefits. This has led not only to generally strong growth in social spending in Italy, but also to disproportionate increases in some programmes, primarily provision for old age, at the expense of others (health care, the family).

Table 2
Cost of social security systems by comparison (% of GDP)

	EU15		Italy	
	1993	2012	1993	2012
Old-age provision	36 %	40 %	50 %	53 %
Health care	28 %	30 %	25 %	24 %
Family	8 %	8 %	4 %	5 %
Unemployment	10 %	6 %	3 %	3 %

Source: Authors' calculations.

4. Few active services on the part of the state. The Italian state plays a very passive role when it comes to the provision of social services. The dominant view is that families and thus primarily women are responsible for bringing up children and caring for old people. At the same time, there are major regional differences between north and south with regard to the provision of social services.

More recent reforms have been aimed at gradually retreating from the Mediterranean model, expressly unifying services and benefits, making the labour market more "flexible" and making administration more efficient.

3. STATE OF DIGITALISATION

Italy is among the stragglers of digitalisation, ranking twenty-fifth in the Digital Economy and Society Index rankings for 2016 (DESI 2016),[2] with a score of 0.4. Italy does comparatively badly[3] in particular with regard to the development of human capital (twenty-fourth place), internet usage (twenty-eighth) and the integration of digital technologies in the economy (twentieth). In the past year little progress has been achieved in relation to most indicators. One exception is a stronger role for e-commerce among SMEs. With regard to digital public services, Italy does a little better (seventeenth place). In relation to the human capital dimension, too (ICT competences), considerable progress has been made. Broadband use is low in fixed-line networks (only around 53 per cent of households), although the situation is much better with regard to mobile broadband connections. Similarly, the usage of internet services is low.

At the end of 2008, the government launched the "Digital Italy Plan", with the aim of completely digitalising the communications infrastructure. In 2010, the EU's ambitious Digital Agenda was integrated in the Plan. Investments in the amount of around 8 billion euros over 10 years for infrastructure and around 2 billion euros for electronics and software services

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

3 DESI Country Report Italy 2016: http://ec.europa.eu/newsroom/dae/document.cfm?doc_id=14128.

are envisaged. Twenty large national telecom operators – including Telecom Italia, Vodafone, Fastweb, Wind, BT, H3G, Tiscali and FOS – have also signed a memorandum of understanding for the development of next generation networks with speeds of more than 100 Mbps.

Among the highlights of development is the SPID (Sistema Pubblico Identità Digitale), the Italian digital identity, introduced in March 2016 and intended to make it possible to access all online public services – such as tax declarations – with a password. Private service providers – for example, banks – are also supposed to be able to use SPID (cf. DESI 2016). Also of interest is the project under the aegis of which, from this year, all 18 year-olds are to have 500 euros put at their disposal for culturally enriching activities, such as attending the theatre, concerts and museums or archaeological sites, as well as buying books. To get it they have to register online and use the money by means of a special app, 18app.it, which can be downloaded to a smartphone, tablet or PC.

Besides digitalisation in the narrow sense, the concept of the Smart City is also garnering attention in Italy. To date, around 3.7 billion euros have been invested in around 1,300 projects in areas such as energy efficiency, mobility, renewable energies, lighting and waste management. Northern Italian cities, such as Milan and Turin, are already well on the way to becoming Smart Cities (for more details on projects see www.italiansmartcity.it).

The policy areas cover a broad spectrum:

- sustainable mobility (820 million euros);
- energy and energy efficiency (640 million euros);
- the environment (waste management, monitoring of pollution levels – 290 million euros);
- improvement of living standards in urban areas, for ICT infrastructure and urban development (660 million euros);
- communications with the population, as well as modernisation and digitalisation of public administration (285 million euros).

The municipalities that have invested most in the development of the Smart City are Bari (755 million euros), Bergamo (532 million euros), Cagliari (345 million euros) and Turin (249 million euros). The main city of Lombardy, Milan, has made considerable progress, in particular within the framework of preparations for the world exhibition. Public and private actors, universities and citizens have been involved in the decision-making process (cf. Scheid 2016; for a more sceptical view, see Vitaud 2016).

4. HEALTH CARE POLICY

Digitalisation of the health care system is taking place primarily in the north of Italy. The country has gradually improved the framework conditions since 2008. The Ministry of Health is trying to implement new forms of organisation and provision of medical services by means of national directives on e-health, to rationalise investments in the health care system and to achieve synergies by means of a consistent strategy. The background here comprises, on one hand, the high public spending on health care and, on the other hand, increasing demand for health care services from an ageing population. Another key concern is to achieve more social justice, in other words, to facilitate access to services and therapy options (especially in the south of the country), as well as to tackle the increasing mobility of patients and specialist staff (cf. Di Carlo/Santarelli 2012; Donatini 2015).

Already Italians are able to see test results on the internet and, for example, can discuss matters with their GP via smartphone. The digitalisation of medical records is also making progress. The public health care system ASL is administered by the regions. Five regions – Trento, Lombardy, Tuscany, Emilia-Romagna and Aosta Valley – are leading the way with digitalisation. Data protection is a key issue in this context.

Some regions have developed IT networks to facilitate communications between doctors, paediatricians, hospitals and territorial services. These networks enable the automatic transfer of patient registries and services that have been provided (prescriptions, outcomes of special diagnostic tests, such as lab and radiology results). Furthermore, a slow transition is going on from paper to electronic prescriptions. By the end of 2014, 80 per cent of all prescriptions were supposed to be electronic, although this target was not achieved.

Because funding of the public system has been considerably curtailed by the government's "austerity" policy, it is mostly private medical practices that have invested in digital solutions. Many practices have introduced online appointment systems (Scheid 2016).

5. LABOUR MARKET POLICY

The Italian economy is currently exhibiting the first signs of recovery after years of recession in the wake of the 2008 financial and economic crisis. GDP is on the rise again: by 0.8 per cent in 2015 and by 1.4 per cent in 2016. Nevertheless, Italy is still far below the pre-2008 level and industrial production in 2014 was 25 per cent below the level of 2007. The government debt ratio is one of the highest in the euro area (132.3 per cent in 2014). The unemployment rate is also high, at 12.7 per cent, with a shocking 42.7 per cent unemployment rate among young people (below 25 years of age). Workforce utilisation and labour productivity are low (European Commission 2016).

In structural terms the Italian economy has two peculiarities:

- the country is competitive primarily in labour-intensive, low-wage industries with low or medium level technology;
- 99.9 per cent of companies are SMEs, accounting for 81 per cent of employment; 47.4 per cent of workers work in companies with fewer than 10 employees (EU average: 29.8 per cent; cf. Dauderstädt 2016).

So-called structural reforms have been implemented primarily in the labour market. In labour legislation – the Renzi government's Jobs Act – the concluding of fixed-term contracts has been made easier and employment protection has been weakened. The first signs since the passing of the Jobs Act appear positive. In the second quarter of 2016 by annual com-

parison there were 439,000 more employment contracts; according to Labour Minister Giuliano Poletti, their quality had also improved (cf. derstandard.at/2000044317498/Italiens-Arbeitsmarktreform-zeigt-erste-Erfolge).

At the same time, labour market dualisation and disparity has also intensified. Furthermore, there is a flow of (often illegal) immigrants, as well as strong internal migration from the south of Italy. It is estimated that they will number over 4 million in the coming four to five decades (Vitaud 2016). Deregulation ("liberalisation") will be accompanied by weak productivity growth and falling investment in R&D. Nevertheless, nominal wages are growing more strongly than productivity (cf, Dauderstädt 2016).

Vitaud (2016) notes a conservative mentality and attitude towards the labour market in response to its increasing dynamism. Workforce foreign language skills are also inadequate.

For Dauderstädt (2016: 21), Italy's structural competitiveness could be improved in a number of ways:

- Labour market reforms could help to reconcile wage and productivity growth. Collective agreements usually last too long and cover branches and regions with widely varying performance.
- The training system must be improved. The transition from school to employment is too rapid because school leaving takes place too early and participation in higher education is low (22.5 per cent in contrast to 37.1 per cent in the EU as a whole in 2013). Participation in lifelong learning, at 8 per cent, is also below the EU average of 10 per cent (2014).
- Italy must not only invest more in R&D, but train and employ more researchers. The number of full-time researchers in industry rose by only 14 per cent between 1990 and 2008 (40 per cent in Germany).

6. INNOVATION POLICY

The Ministry for Education, Research and Universities (MIUR) is the main player in research and innovation (R&D). It is responsible for national and international scientific activities, the funding of universities and research institutions and the support of public and private research and technological development. The Ministry for Economic Development (MISE) is responsible for industrial innovation (Modena 2001). The National Research Programme (PNR 2014–2020) was announced two years ago, but has still not been officially approved. Italy's government R&D intensity, at 1.29 per cent, is still substantially below the target for 2020 of 1.53 per cent. Furthermore, R&D spending as a proportion of GDP is also low for an industrialised country. According to data from the Italian Association for Industrial Research, AIRI, in 2015, companies invested around 8 billion euros in R&D, 1.1 billion in ICT. A third of this sum was spent on software development, another third on telecommunications projects.

The governance and organisational shortcomings of the R&D system, as well as the massive territorial inequalities, are also regarded critically. Around two-thirds of projects are concentrated in northern Italy (Modena 2001). Another problem is the inadequate networking of industry and the low level of risk capital. This also explains why Italy ranks a lowly twenty-fifth (out of 35 countries) on the innovation indicator.

One particularly positive feature is the science and research system. Just under 2 million students are enrolled at the 95 universities (66 state and 29 private). On top of that, there are the major state research agencies, such as the CNR (National Research Council), ENEA, INFN, INFM, ASI (Italian Space Agency) and the National Health Institute, the INS.

The telecommunications sector is a special case. It has been changing rapidly and has adapted to switch from the traditional voice telephony to landline and mobile broadband and the plethora of new services. Telecom Italia has come to regard itself – according to a company report – as an important provider of services and platforms, not only of connectivity. Technological and business innovation are increasingly a key element of Telecom Italia's strategy. Digital innovation is based on a paradigm of "open innovation". In this sense, the company has intensified its relations with universities and has funded around 25 so-called triennial PhDs and Open Labs. In addition, the company is committed to digital start-ups. From 2009 to 2015 around 260 projects were supported (Telecom Italia 2015).

A total of 75,400 companies are active in the IT sector, although most of them have fewer than 10 employees. On the other hand, there are around 150 large IT companies that employ more than 250 people, around 70 per cent of them in the service sector and 25 per cent software houses. At 57 per cent more than half of the sector's companies are based in the north of the country. A further 23 per cent are located in the centre, especially around Rome, while only 19 per cent are in the south.

The shortage of skilled labour in the IT sector is as much of an issue in Italy as in the rest of the Europe. Particularly in demand are flexible specialists who have not only technological skills, but also business or managerial knowledge (cf. Scheid 2016a and Vitaud 2016).

With regard to Industry 4.0, however, there are a number of interesting developments and projects. In particular large companies in the automotive and aerospace industries – including many suppliers of German industry – are at the cutting edge of technology. The strong links with Germany are thus driving development. Piedmont was the first region to make money available – 40 million euros – for smart factory projects, within the framework of a tender. Furthermore, there are numerous individual initiatives: Intellimech is an innovation cluster that implements self-financed research projects on the integration of new technologies in industrial processes. In addition, in 2014, the cluster network Fabbrica Intelligente was established, which is currently involved in four applied research projects, with the participation of Siemens Italia. Other examples include a 3D printing project at the University of Pavia and a partnership of the Marche Polytechnic University with the company Arburg, within the framework of which innovative injection printing solutions are being developed (Scheid 2016b).

7. SUMMARY

On the occasion of a German–Italian summit on 31 August 2016, Italian Prime Minister Renzi emphasised at the closing press conference that "the whole north-east and also the Veneto have excellent relations with Germany. A lot has been invested there and there is a lot of innovative production. There are many good relations with the Germans, in particular regarding the implementation of Industry 4.0 and related efforts in our education system" (Renzi 2016). Thus the notion of Industry 4.0 is coming to prominence and increasingly has strong resonance in Italy.

The current state and prospects of Industry 4.0 in Italy and the effects of digitalisation of the economy and society are difficult to predict and becoming more difficult. On one hand, the structural conditions are merely adequate (Vitaud 2016: "few cards to play"), ranging from low R&D spending through the difficult economic situation to the special nature of a family-oriented welfare state in an SME-dominated economy. Furthermore, although there are some interesting individual projects, their overall effects are uncertain and regional disparities, with the south of Italy hung out to dry, remain serious.

Bibliography

Acatech – Deutsche Akademie der Technikwissenschaften e. V., Bundesverband der Deutschen Industrie e. V. (BDI) 2015: Innovationsindikator 2015, http://www.innovationsindikator.de/fileadmin/2015/PDF/Innovationsindikator_2015_Web.pdf (13.10.2015).

Dauderstädt, Michael 2016: Wachstumsstrategien für Südeuropa: Italien, Spanien, Portugal, Griechenland [Growth strategies for southern Europe: Italy, Spain, Portugal and Greece], commissioned by the Friedrich-Ebert-Stiftung, Berlin.

Di Carlo, Claudio; Santarelli, Elisabetta 2012: E-health in Italy, http://www.sviluppoeconomico.gov.it (30.9.2016).

Donatini Andrea 2015. 2014 International Profiles of Healthcare Systems: The Italian Healthcare System, The Commonwealth Fund.

Esping-Andersen, Gøsta 1990: The Three Worlds of Welfare Capitalism, Princeton: Princeton University Press.

European Commission 2016: Rio Country Report 2015 – Italy Executive Summary, Brussels.

European Commission 2016a: Digital Economy and Society Index DESI 2016 – https://ec.europa.eu/digital-single-market/en/desi (30.9.2016).

European Commission 2016: European Digital Progress Report 2016, https://ec.europa.eu/digital-single-market/en/scoreboard/italy (30.09.2016).

Ferrera, Maurizio 1996: The Southern Model of Welfare State in Social Europe, in: Journal of European Social Policy 6 (1), pp. 17–37.

Köppl, Stefan 2007: Das politische System Italiens [Italy's political system], Wiesbaden.

Lynch, Julia, 2014: The Italian Welfare State After the Financial Crisis, in: Journal of Modern Italian Studies, www.tandfonline.com/loi/rmis20 (30.9.2016).

Modena, Vittorio; Gattoni, Patrizia; Balconi, Margherita; Vita-Finzi, Paola 2001: The Italian Innovation System, Paper Prepared for Project IFISE, Pavia, http://ifise.unipv.it/Download/TheItalianInnSystem.pdf (30.9.2016).

Renzi, Matheo 2016: Press conference by German Chancellor Merkel and Italian Prime Minister Matteo Renzi, www.bundesregierung.de/ Content/DE/Mitschrift/Pressekonferenzen/2016/09/2016-09-01-pk-bkinrenzi.html (30.9.2016).

Scheid, Robert 2016a: Italien hat beim Thema Digitalisierung Nachholbedarf [Italy has some catching up to do with regard to digitalisation], https://www.gtai.de/GTAI/Navigation/DE/Trade/Maerkte/suche,t=italien-hat-beim-thema-digitalisierung-nachholbedarf,did=1427254.html (13.10.2016).

Scheid, Robert 2016b: Industrie 4.0 kommt in Italien voran [Industry 4.0 making progress in Italy], http://www.gtai.de/ GTAI/Navigation/DE/Trade/Maerkte/suche,t=industrie-40-kommt-in-italien-voran,did=1427256.html (13.10.2016).

Telecom Italia 2015: Sustainability Report, www.telecomitalia.com/tit/en/sustainability/sustainability-report/sustainability-reports.html (30.9.2016).

Vitaud, Laetia 2016: Gig Economy: Italy Has a Few Cards to Play, https://medium.com/switch-collective/gig-economy-italy-has-a-few-cardsto-play-7984582b7580#.6hga301gw, (30.9.2016).

Markus Trämer and Rolf Frankenberger

On the Way to Welfare 4.0 – Digitalisation in the United Kingdom

UNITED KINGDOM

1. ABSTRACT

- In particular due to the performance in the mobile sector, the United Kingdom is among the global leaders with regard to digitalisation. However, development is slowing down, not least because of such fundamental uncertainties as whether Brexit takes place and how, and the instability of the political system which it reflects.
- Government innovation policy in the United Kingdom is centralised. The main actors are the Ministry for Business, Innovation and Skills (established in 2009) and the government's innovation agency "Innovate UK". Although the latter has coordination functions, the state is increasingly relying on "the market", for example, when it comes to funding innovation.
- The health care sector has developed a strong position in the domestic as well as the international market, but remains decisively dependent on state financial incentives, procurement and political regulation.
- In the medium and long term, modernisation and digitalisation will first and foremost transform the labour market in the United Kingdom: forms of work, labour relations and models of work. In this context the already well developed digitalisation process has an important demonstrative function for other (neo)liberal economies and welfare states. However, education policy can only provide solutions to these developments in the medium term.

2. BRIEF OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

The constitutional monarchy has its origins in the 1689 Bill of Rights, which binds the monarch to Parliament ("the king/queen in parliament"). Because of the strong position of the bicameral parliament, the UK system of government is often characterised as a parliamentary democracy.

While the lower house (the House of Commons) is directly elected and exercises the legislative function, the members of the upper house (the House of Lords) are appointed and exercise only a suspensive veto. As a result of the first-past-the-post electoral system, a two-party system, including the Labour and the Conservative Party, became established, which has only begun to be disturbed in recent years. In contrast to most European systems the United Kingdom does not have a written constitution. Instead, among other things, laws and the common law serve as legal sources. Even though Wales, Scotland and Northern Ireland, as a result of successful devolution referenda, have had their own regional parliaments since 1997, the political system can still be described as unitary, with a comparatively high level of centralisation (see Table 1).

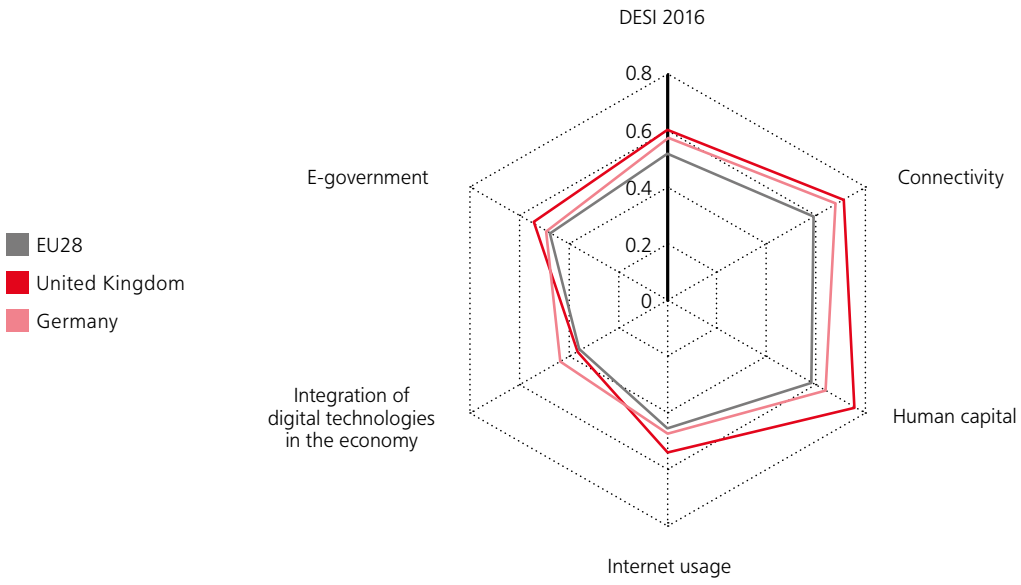
Hall and Soskice (2001) categorised the economic system of the United Kingdom as a "liberal market economy", with deregulated financial markets, a centralised system of corporate governance (board of directors), a fragmented interest representation system, a training system oriented towards general rather than occupational and sector-specific skills ("flexible" labour markets) and relations between enterprises based on competition. The UK welfare state also has markedly "liberal" features (see Esping-Andersen 1990). The word "liberal" here refers to a model of social security that emerged in the mid-1970s, characterised by relatively limited and tax-funded social benefits, strict eligibility criteria and means testing and a relatively large proportion of private provision. There is particular emphasis on the family as a social safety net. An important exception to this "minimal safety net" in the United Kingdom is the health care system, which for the time being still offers relatively comprehensive services and, untypically for liberal welfare states, accounts for 28.1 per cent of social spending.

Table 1
Overview of the United Kingdom[1]

Indicator	United Kingdom	EU28
Form of state	Parliamentary constitutional monarchy	
State organisation	Unitary	
Party system	Multi-party system	
Electoral system	Majority voting	
EU member since	1 January 1973	
Inhabitants/km²	266.4	116.7
Urbanisation (% of population)	83	74
Welfare state regime	Liberal	
Income inequality (distribution quintile)	5.2	5.2
Social expenditure (% of GDP)	28.1	28.6
GDP per capita (PPS, Index: EU=100)	110	100
Growth rate (real GDP in comparison with previous year)	2.2	2.2
Budget deficit/surplus (% of GDP)	–4.4	–2.4
Labour market productivity nominal per employee (Index: EU=100)	102.6	100
Harmonised unemployment rate	4.8	8.6
Trade union density (0–100)	25.14	
R&D total spending (% of GDP)	1.7	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	85.7	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	19.8	17.1
DESI (0–1; 1=digitalised society)	0.61	0.52
Proportion of regular internet users (16–74 years of age) in %	90	76
Internet penetration (% of households)	91	83
Proportion of households with broadband connection (%)	90	80
Proportion of companies with broadband connection (%)	96	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

Figure 1
Development of a digital society in the United Kingdom by comparison with Germany and the EU28



Source: Digital Economy and Society Index 2016.

3. STATE OF DIGITALISATION

The United Kingdom has been developing positively in both the mobile and the broadband sectors – especially the former – and has rapidly become one of the leading nations with regard to digitalisation. As many as 85 per cent of households use broadband networks and 87 per cent of mobile phone users use mobile broadband (Akamai 2016). While the United Kingdom is some way behind the leaders in terms of broadband connection speeds, it is a leader when it comes to the connectivity of mobile connections with an average rate of 27.9 Mbps (by comparison, Germany stands at only 15.7 Mbps).

If - next to the technological dimension - economic, social and political aspects are additionally/also taken into account, then the United Kingdom, placed sixth in the 2016 DESI rankings,[2] belongs to the leading group of Europe. However, despite massive progress in recent years, it exhibited growth rates below average, so that the United Kingdom was characterised into the "lagging ahead" cluster, together with Finland, Denmark and Sweden.[3] A particular improvement can be observed in internet usage (ranked eighth), with more modest gains in terms of human capital (ranked third), by contrast to which integration of digital technologies in the economy (ranked 15) and in politics (ranked 16) are treading water; no significant progress can be discerned in relation to connectivity in 2016, either. Problems include, in particular, comparatively high costs and low speed, as well as the shortage of ICT specialists and below-average use of new technologies by companies.

In order to promote the development of a digital society, a national digital strategy is currently being developed within the framework of the "Digital Agenda for Europe", pooling and further developing existing initiatives. This includes, first, the "Government Digital Strategy" unveiled in November 2012, under the aegis of which administrative records and communications with citizens are to be digitalised. Among the key elements are an overarching domain (www.gov.uk) and the Single Sign-on System "UKVerify", through which it will be possible to use 20 public services, ranging from income tax to social benefits and the new universal credit. Second, there is the "Information Economy Strategy" formulated by the government, industry and academia. Its aims are to prepare the country to meet the challenges – such as the lack of qualified workers, infrastructure, internet security and market failure – related to transformation processes and to bring together and involve the different social sectors. The Information Economy Council, composed of representatives of politics, industry and academia, is overseeing implementation. Last but not least, the "Digital Skills Strategy" adopted in July 2014 is supposed to tackle the shortage of qualified workers and the "Digital Economy Strategy" introduced in 2015 is intended to boost the digital sector and accelerate innovation. All these different areas are to be integrated – also in response to the European "Digital Agenda for Europe" introduced within the framework of the "Europe 2020" programme – in a national digital strategy, which is, however, still in the planning stage.

---

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

3 According to the Network Readiness Index, Germany ranks 16 out of 139, which is a middle place compared tot he other European Countries (Cf. Baller et al. 2016:16). In the "Standortindex" DIGITAL 2015, Germany also ranks in the midfield, being sixth out of ten (cf. BMWi 2015: 8).

4. HEALTH CARE POLICY

Digitalisation is being implemented in health care policy particularly under the aegis of "digital health" and "technology-enabled health (TEC)". This includes digital health care solutions that integrate technology, digital media and mobile telecommunications (cf. Taylor 2015: 4). Advocates of TEC promise cost-efficient, individual and rapidly deployable solutions and thus the prospect of a future market with enormous growth potential is being held out.

The UK's digital health care sector is thriving (cf. Hampson et al. 2015: 2f, 45f). In particular the sectors telehealth and telecare have already been able to gain substantial shares – 25 and 12 per cent, respectively – in the global market. Mobile health care services, such as wearables and apps, are still in their infancy, although their growth rates are high, at 25 and 35 per cent. Similarly, the market for health care data analysis (global market share around 7 per cent) is relatively modest at present, but with estimated growth rates of 24 per cent it has considerable potential. Digital health care systems are by far the largest sector – with a market worth 1.3 billion GBP – but it is growing relatively slowly.

Despite these relatively promising figures, problems can also be discerned in this sector of the British economy, including – as elsewhere – shortages of specialist workers, a lack of digital skills in administration, regulatory uncertainty in relation to, for example, big data or mobile health care apps (data ownership), problems with the commercialisation and scalability of business models, data protection and, last but not least, inequality regarding the access to digital solutions (cf. Taylor 2015: 12f; Hampson et al. 2015: 5).

The plan is to address these problems through policy measures at various levels. Besides the government's digital strategies, mentioned above, the Ministry of Health and the key actor in the British health care system, the National Health Service (NHS), have also come up with digitalisation strategies and plans. In the case of the NHS this was integrated in the planning document "Five Year Forward View" from 2014. This document emerged from the need to develop a new vision for the NHS for the next five years in the wake of its "reorganisation" in the Health and Social Care Act 2012. Concrete measures concerning digitalisation include the electronic evaluation of specialist staff performance, the promotion of health care apps, electronic storage of patient records (through NHS Spine and the N3 network), online appointments and medical prescriptions, support for digital learning in the population and better assistance for people trying to cope with digital technologies (NHS 2014: 31f). The processing and integration of patient data in the area of data analysis is to be carried out through the data.care programme. Due to worries about utilisation rights, however, the programme has been suspended for the time being. The National Information Board has been tasked with seeking alternatives.

At the ministerial level the Ministry of Health launched the "Three Million Lives" campaign in 2011 in order to promote the deployment of tele-health care. The assumption was that up to three million people could benefit from tele-health care in the form of reduced hospital admissions and visits, shorter hospital stays and lower mortality rates. The campaign was conceived with the help of the interim results of the "Whole Systems Demonstrator" programme of 2008, to date the biggest randomised study on tele-health care in the United Kingdom. In 2014, the campaign was re-oriented, renamed Technology-Enabled Care Services and thus expanded (cf. Hampson et al. 2015: 11).

5. LABOUR MARKET POLICY

By some measures the United Kingdom seems to have been very dynamic in recent years. In September 2016, the unemployment rate, according to Office for National Statistics (ONS) figures, was 4.9 per cent; almost 32 million people were in work, 23 million of those full time. But although, at first glance, these figures seem stable and to be welcomed,when taking a closer look one is struck by the labour market's rapidly changing composition The reason for this is the enormous rise in atypical employment, which for many people has ceased to be a temporary phenomenon. The UK labour market can thus be described as fragmented. It is, for example, striking that in the past eight years the number of (bogus) "self-employed" has risen substantially (to around 15 per cent of all workers), as have the number of temporary agency workers and people on fixed-term contracts, while public sector employment has been falling due to the transfer of public assets into private hands and outsourcing of jobs ("privatisation").

Digitalisation is playing a key role in these rapid changes. A 2014 study by Deloitte estimated that up to 35 per cent of workers in the United Kingdom are at risk from far-reaching automation in the coming two decades (Deloitte 2014: 8). In this context, digitalisation is making inroads into administration, sales and distribution, services, transport, construction and production. Creative occupations remain (at present) at relatively low risk of automation, as do occupations requiring substantial social skills, such as teaching, the law, science, arts and media, health care, engineering and IT. The significance of highly qualified, social and creative occupations is thus growing.

It is thus not surprising that innovation policy at the interface with the labour market is perceived primarily as education policy, aimed at making available an adequate supply of suitable workers. To this end, the Information Economy Council published a "Digital Skills Strategy" in July 2014. Its recommendations include encouraging young people, particularly young women, to take up engineering and technology, reform of school curricula, creation of qualifications coordinated with industry and jobs in the technology sector, opening up the sector for people from other disciplines, boosting investment in education and establishing collaboration platforms for companies. In January 2016, an interministerial report on "Digital skills for the UK economy" was published, with similar aims.

This focus on skills resulted from the "Information Economy Strategy", published in 2013, which was the deciding factor in stepping up efforts to tackle digital skills in the workforce. However, this first report was much more wide-ranging and also took in such areas as standard-setting, coordination of government and economy to identify barriers and problems for companies, integration of digital technologies in

companies (especially SMEs), digital inclusion and coordination between schools, universities and companies in training (for example, Massive Online Open Courses, creation of new IT curricula and so on).

6. INNOVATION POLICY

R&D spending, according to Eurostat, have remained constant over a long period at around 1.7 per cent of GDP. Thus, R&D intensity has long been below the EU28 average. Nevertheless, in the most commonly used rankings the United Kingdom is always to be found at the forefront of the countries investigated in terms of innovativeness. This discrepancy is due primarily to the fact that R&D spending represents only part of overall spending on innovation (organisational innovation, software, training, design and so on).

On the government side, innovation policy in the United Kingdom is rather centralised. The main actors are the Ministry for Business, Innovation and Skills (created in 2009) and the state innovation agency "Innovate UK", which is attached to the Ministry. The latter funds companies and supports them with know-how and is supposed to bring firms together in networks. In addition, there are bodies that support the work of the relevant government authorities with expertise (Council for Science and Technology, Parliament Office for Science and Technology).

In recent years, the topic of governance and coordination has returned to the agenda. The Ministry for Business, Innovation and Skills issued a report in 2014 entitled "Our Plan for Growth: Science and Innovation", which among other things calls for a clearer identification of priority industries. Other foci of the report include the shortage of specialist workers, investment in infrastructure, higher funding of research, support for innovation at an early stage and exchange with global partners in science.

Furthermore, in 2015 the state innovation agency, Innovate UK, published a "Digital Economy Strategy" aimed at giving the British economy a helping hand in innovation by means of digital technologies. To some extent it gave substance to the declarations of intent in the ministerial plan. The core points of the Strategy include a strict user centrism, sustainability, growth of infrastructure and ecosystems, framework conditions and support for innovators. There was also a particular emphasis on digital health care services.

In order to implement these plans there must be close cooperation with institutions responsible for establishing good framework conditions, such as institutions that protect intellectual property (Intellectual Property Office), standard-setting institutions (British Standards Institution) and organisations at the cutting edge of research (the Royal Society or the Royal Academy of Engineering).

With regard to the networking of actors, in particular the universities and business, in the United Kingdom over 100 technology parks (for example, UKSPA) and over 50 university technology transfer institutions also play a role. Finally, eleven so-called "catapult centres" have been set up to support innovation at an early stage, helping companies to commercialise research (cf. NESTA 2015).

7. SUMMARY

The United Kingdom is caught up in a rapidly unfolding transformation affecting every area of people's lives.

In the short term over the next few years, however, digitalisation offers the UK economy an opportunity for modernisation and diversification, which ought to be welcomed, given the rampant deindustrialisation and the current stranglehold of the banks and the financial sector and a few other sectors. In particular the health care sector appears to have considerable potential because this policy area and demand for its services can be governed better than others by state authorities (for example, the NHS). In particular telehealth and telecare are dependent on state funding and incentives. Furthermore, this sector has already achieved a relatively good market position.

On the side of the government, there have already been efforts to bring together the various programmes, strategies and action plans across policy areas and to embed them in a coherent digital strategy. After consultations in January 2016, it was expected that the digital strategy would be published within the year. However, the outcome of the advisory referendum on leaving the EU has cast its shadow here, too, and there is now little prospect of publication in the near future because a whole raft of questions have to be answered first. For example, what about access of UK firms to the digital single market and, if Brexit ever did take place, what would be the consequences of a withdrawal of ICT firms or of EU citizens working in the United Kingdom or in the ICT sector? These uncertainties inevitably affect investor confidence in the sector.

In the medium and long terms this modernisation will affect in particular the UK labour market and lead to further transformation of forms of working, labour relations and models of work. In this context, the already advanced process of digitalisation will set an important example for other (neo)liberal economies and welfare states. Education policy represents at best only a medium term solution to the problems arising from transformation. Over the long term other, much broader structural changes will have to be discussed, which will also seek to detach work from social security coverage. Whether, for example, the often mentioned unconditional basic income – above the subsistence level – could be a sustainable solution here must be subject to more detailed empirical research.

Bibliography

Akamai 2016: Akamai's State of the Internet Report, Volume 9 (1), https://www.akamai.com/es/es/multimedia/documents/state-of-the-internet/akamai-state-of-the-internet-report-q1-2016.pdf (30.9.2016).

Baller, Silja; Dutta, Soumitra; Lanvin, Bruno (eds) 2016: The Global Information Technology Report 2016: Innovation in the Digital Economy, https://www.pwc.com/kr/ko/publications/industry/wef_gitr_full_report.pdf (30.9.2016).

Bundesministerium für Wirtschaft und Energie (BMWi) 2015: Monitoring-Report Wirtschaft DIGITAL 2015, Berlin.

Cabinet Office 2012: Government Digital Strategy, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/296336/Government_Digital_Stratetegy_-_November_2012.pdf (14.9.2016).

Deloitte 2014: London Futures. Agiletown: The Relentless March of Technology and London's Response, Deloitte Centre for Health Solutions (ed.), London.

Department for Business, Innovation & Skills 2013: Information Economy Strategy, https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/206944/13-901-information-economy-strategy.pdf (14.9.2016).

Esping-Andersen, Gøsta 1990: The Three Worlds of Welfare Capitalism, Princeton.

European Commission 2016: Digital Economy and Society Index DESI 2016, https://ec.europa.eu/digital-single-market/en/desi (30.9.2016).

Hall, Peter A.; Soskice, David 2001: Varieties of Capitalism: The Institutional Foundations of Comparative Advantage, Oxford.

Hampson, Elizabeth; Malouf, Nicole; Crallan, Rebecca et al. 2015: Digital Health in the UK: An Industry Study for the Office of Life Sciences, Deloitte Centre for Health Solutions (ed.), London.

Information Economy Council 2014: Digital Skills Strategy, July 2014, https://www.thetechpartnership.com/globalassets/pdfs/research-2014/informationeconomydigitalskillsstrategy_oct14.pdf (14.9.2016).

Innovate UK 2015: Digital Economy Strategy 2015–2018. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/404743/Digital_Economy_Strategy_2015-18_Web_Final2.pdf (30.9.2016).

National Health Service (NHS) 2014: 5 Year Forward View, https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf (18.9.2016).

NESTA 2015: Innovation Policy Toolkit: Introduction to the UK Innovation System, 13.08.2015, http://www.nesta.org.uk/publications/innovation-policytoolkit-introduction-uk-innovation-system (30.9.2016).

Taylor, Karen 2015: Connected Health: How Digital Technology Is Transforming Health and Social Care, Deloitte Centre for Health Solutions (ed.), London.

Daniel Buhr and Rolf Frankenberger

On the Way to Welfare 4.0 – Digitalisation in Sweden

SWEDEN

1. ABSTRACT

- The Swedish welfare state is characterised by low social inequality and high social security. It also has a high degree of corporatist penetration and a strong non-governmental sector. The close links between the state, society and business may be one reason for Sweden's positive economic development.
- After the economy slumped in the wake of the financial and economic crisis in 2008–2009 and stagnation in 2012, the Swedish economy has grown steadily and substantially more strongly than the European average. The reasons for this include the strong investment in research and development and the systematic digitalisation of society and the economy.
- Sweden has for years been among the leading countries in the international rankings on digitalisation. Sweden's – by global comparison – very good performance with regard to technology is mirrored in social and economic outcomes.
- With regard to both the expansion and the level of digitalisation Sweden's strongly hospital-centred health care system is a global leader. This has been achieved through a national health care reform that includes investment in digital infrastructure and rationalisation of organisation in the regions.
- The Swedish innovation system is one of the most successful in the world and the proportion of spending on research and development in GDP has risen constantly since 1997. One weakness of the innovation system, however, is the expandable transfer of basic research to marketable innovations.

2. BRIEF OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

Sweden can be characterised as a decentralised unitary state because while, on the one hand, it has a parliamentary system of government with a unitary state structure, on the other hand, it has a high degree of autonomy and self-determination at subnational level enshrined in the constitution. Besides the strong national state there is a strong municipal level with considerable freedom with regard to local self-administration. Its strong role can be attributed rather to informal institutions and a correspondingly long tradition of political action, however; in the constitution itself there are no sections explicitly concerned with the tasks of municipalities (Förster et al. 2014). In terms of the practical division of labour the national ministries in individual policy areas come up with action programmes, which then find their way into laws or recommendations, which must be implemented by all subordinate levels in the three-level planning structure. Especially in the 1990s the municipalities were given more and more responsibilities – for example, schools – and their significance rose accordingly. In total around 83 per cent of all public sector employees are at municipal level, compared with only 35 per cent in Germany, for example (Wollman 2014). Sweden can be considered the prototype of the Scandinavian five-party system, with a Social Democratic Party (SAP) that has been dominant for many decades and laid the foundations for the Swedish welfare state ("Volksheim"). Only in the 1980s was this system interrupted – for example, by parties such as the Greens and later the Pirates – and the dominance of the SAP has continued to decline.

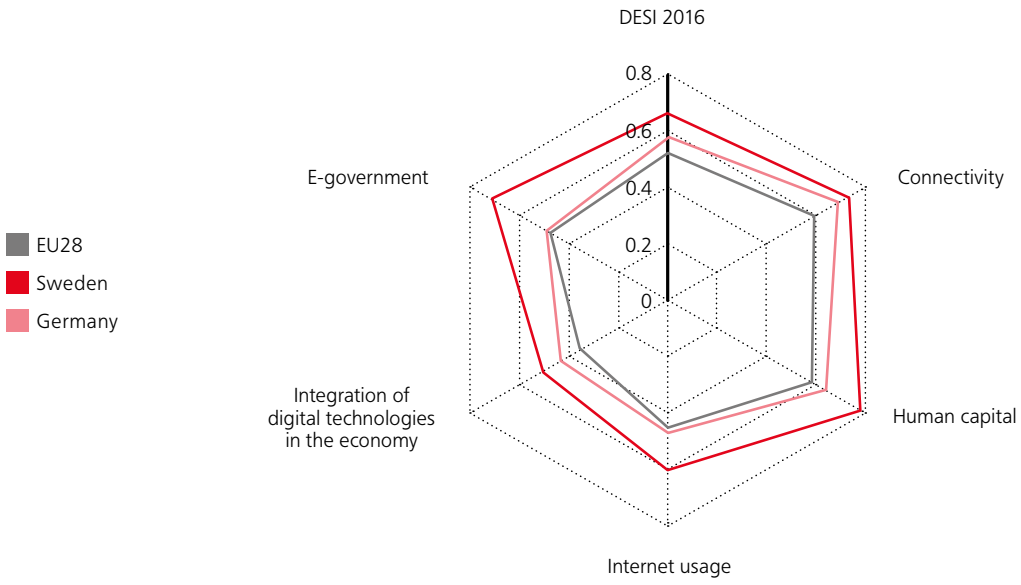
Following Esping-Andersen (1990) the Swedish welfare state is frequently characterised in the literature as the "ideal type of the social democratic welfare state" (Förster et al. 2014). Its features include a comparatively low social inequality (income quintile ratio: 3.8) in the context of strong redistribution and a high rate of social spending (30 per cent of GDP). This also finds expression in Sweden's high corporatist penetration. Civil associations and interest representation are also well developed, for which Götz (2001: 382) has coined the term " Organisationssverige" (Associational Sweden).

Table 1
Overview of Sweden

Indicator	Sweden	EU28
Form of state	Constitutional monarchy	
State organisation	Unitary	
Party system	Multi-party system	
Electoral system	Proportional representation	
EU member since	1 January 1995	
Inhabitants/km²	23.8	116.7
Urbanisation (% of population)	86	74
Welfare state regime	Social democratic	
Income inequality (distribution quintile)	3.8	5.2
Social expenditure (% of GDP)	30	28.6
GDP per capita (PPS, Index: EU=100)	123	100
Growth rate (real GDP in comparison with previous year)	4.1	2.2
Budget deficit/surplus (% of GDP)	0	–2.4
Labour market productivity nominal per employee (Index: EU=100)	113.2	100
Harmonised unemployment rate	7.2	8.6
Trade union density (0–100)	67.26	
R&D total spending (% of GDP)	3.16	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	87.3	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	15.9	17.1
DESI (0–1; 1=digitalised society)	0.67	0.52
Proportion of regular internet users (16–74 years of age) in %	89	76
Internet penetration (% of households)	91	83
Proportion of households with broadband connection (%)	83	80
Proportion of companies with broadband connection (%)	97	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

Figure 1
Development of a digital society in Sweden by comparison with Germany and the EU28



Source: Digital Economy and Society Index 2016.

Interest-representing organisations are involved in both committee work and parliamentary bodies, to which they are either delegated or invited. The relations between the Social Democratic Party (SAP) and the trade union federation are also very close. Although trade union membership is not compulsory, it is strongly recommended (Bengtsson 2008: 4–5). This is all the more significant because trade union density in Sweden is very high by European comparison.

The close links between the state, society and the economy are one reason for Sweden's positive economic development. After the economic slump in the wake of the financial and economic crisis 2008/2009 and stagnation in 2012, the Swedish economy has grown continuously and significantly higher than the European average. Two other reasons are the strong investment in research and development, in respect of which Sweden is a world leader, at 3.16 per cent of GDP, as well as the systematic digitalisation of society and the economy.

3. STATE OF DIGITALISATION

Sweden has occupied a leading position in the international digitalisation rankings for years, whether it be in the Networked Readiness Index of the World Economic Forum or the IT Ranking IDI 2015 of the International Telecommunications Union (ITU). Sweden's very good performance in the technical domain – by both European and global comparison – is reflected in social and economic terms. For example, In the EU's digitalisation index, the Digital Economy and Society Index (DESI[2]), Sweden occupies third place with 0.672 (out of 1), behind Denmark and the Netherlands (EU28 average 0.51). In particular in the realms of human capital, internet usage and e-government Sweden leads the field, while in relation to high-level industrial usage there is still room for improvement. However, in Sweden in contrast to some other countries development has slowed, putting it among the countries that are "lagging ahead". Given the high level of development, however, this is not surprising and affects other high performers, such as Finland (EDPR 2016).

As suggested by the European Commission, Sweden is pursuing a "Digital Agenda". Building on earlier strategic papers – for example, national broadband strategy, e-government strategy, ICT for a "greener" administration, e-health strategy – the government published a Digital Agenda as early as 2011, entitled "ICT for Everyone – A Digital Agenda for Sweden". It postulates that every area of both social and economic life should be able to benefit from the possibilities opened up by modern ICT. This Digital Agenda is complemented by a strategy for regional growth and a national innovation strategy. The principal aim of the Digital Agenda is to provide 90 per cent of private households with broadband transfer speeds of at least 100 Mbps by 2020. Even in 2013 more than 98 per cent of all workplaces and private households had access to 4G mobile networks (GTAI 2016).

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

4. HEALTH CARE POLICY

The Swedish welfare state operates on the basis of universal care, providing far-reaching social services and benefits largely financed by the state and thus borne by society as a whole. This pertains to, among other things, care for children, old people, people in need of care, families and the unemployed, but also to sickness and care insurance, although there have been major reforms over the years. In the course of these reforms responsibilities have increasingly been passed to the municipal level. Districts or regions are now responsible only for medical provision, mainly at the 800 or so primary care centres run by the regional authorities (Gerlinger/Reiter 2014), which employ GPs, nurses, midwives and obstetricians, physiotherapists, paediatricians and gynaecologists. There are also a large number of so-called district nurses. These nurses make house calls, particularly to older people, can prescribe medicines in certain cases and if necessary refer patients to GPs or hospitals. There is scarcely another OECD country in which patients have so little direct contact with doctors as in Sweden. Primary health care provision is supplemented by around 300 private practices that receive public funding within the framework of contracts with the regional authorities, as well as a small number of small private hospitals, found mainly in the urban centres (Gerlinger/Reiter 2014).

Smaller district hospitals, run by the regional authorities, provide basic in-patient care. In addition, the regional authorities run large central hospitals with additional specialist departments and various specialists. Very complex cases or rare illnesses are treated in regional hospitals. In comparison with Germany doctor density in Sweden is lower, although the number of nursing staff in relation to size of population is a bit higher.

By international comparison, the Swedish health care system is relatively well developed, if very hospital-centred. That also applies to health care digitalisation, with regard to which Sweden is a leading country. In order to promote the digitalisation of the health care system, the regions and provinces, the municipalities' association, the employers' organisation in the private health care sector and the association of Swedish pharmacists set up Carelink, a national cooperation project, in 2000. But Sweden's leading role can also be seen, for example, in its early introduction of national electronic patient records, implemented between 2008 and 2012. The statutory basis for this was the New Swedish Health Care Act of 2005. Progress towards a nationwide health care network – within the framework of a national health care reform – first involved corresponding investment in digital infrastructure and organisational unification in the regions. These were then interlinked on the basis of a uniform nationwide standard. Today in Sweden all health care institutions are linked together: specialists and clinics, care organisations and pharmacies. This virtually merges data from source systems by means of an overarching patient management system. Thus the Nationell Patientöversikt (NPÖ) makes the desired data available at a click to all authorised persons, online and password-protected (for example, treatment history). To that end data related to treatment are stored temporarily in the electronic patient records. The owner of the data remains the health care institution that originally gathered it.

Many processes are now almost entirely digitalised. For example, 98 per cent of all prescriptions are already passed on to pharmacies online or are accessible to them via a central databank (eHälsomyndigheten 2016). It is also possible to find out this way whether medicines have been reordered too early or prescribed twice. Only in the next stage can patients interact directly with the NPÖ. However, almost all Swedish citizens gave their consent to participation in the programme (Klein 2016). The NPÖ forms the basis for the further expansion of digitalisation, which is also being supported and coordinated by a designated authority, the Swedish eHealth Agency (eHälsomyndigheten). Especially in sparsely populated central and northern Sweden great hope has been invested in telemedicine; remote diagnostics by specialists and self-monitoring in the case of chronic illnesses are now widespread.

5. LABOUR MARKET POLICY

The Swedish labour market is characterised by high employment participation – in particular among women, a high level of training and a relatively high propensity to invest in training and research. The National Labour Market Board (Arbetsmarknadsstyrelsen), together with its substructure – the County Labour Offices (Länsarbetsnämnd) and local labour offices – are responsible for traditional labour market policy (unemployment benefit, further training and job placement). As in most Nordic countries, unemployment insurance in Sweden is subject to the so-called Ghent system: voluntary and trade union-based unemployment insurance, in which the trade unions take care of organising insurance funds and receive state subsidies for the purpose (Förster et al. 2014). Membership contributions cover primarily administrative costs, whereas actual disbursement of unemployment benefit comes almost exclusively from state funding. Although by international comparison inequality and poverty levels are relatively low, they are becoming increasingly negative (Olsson et al. 2012: 19), which among other things is due to the growing dualisation of employment. Well qualified workers continue to be well treated in the Swedish labour market, while in recent years the number of short-time and part-time employees, as well as low qualified people, has been increasing and with it the number of badly paid jobs. This development is increasingly eroding the model of the Swedish Volksheim.

It is still uncertain what precise role digitalisation will play in future. Thus in spring 2015, the Swedish government established an independent commission to analyse the future of work and its consequences for the Swedish economy. In the current debate on the future of work the dominant notion is that the high ICT investments of recent years will usher in radical labour-saving technologies (Andersson 2016). It is expected that the digitalisation of the workplace, accompanied by a high substitution elasticity between ICT capital and labour utilisation, will make many non-manual workplaces superfluous, which would exacerbate the dualisation or polarisation of the Swedish labour market. The fact is, however,

that Sweden's ICT sector, with around 140,000 mainly well paid employees, makes up just under 12 per cent of all jobs in industry. By international comparison this proportion is almost twice the EU average.

In the coming years, it will be one of the key tasks of the Swedish government to drive digitalisation forward as systematically as it has to date, but also to maintain the inclusive character of the Swedish welfare state. In that context, the trade unions in particular are keen on developing a more flexible education and training policy and boosting a universal social insurance system (Andersson 2016). The Swedish government is also banking on international cooperation. For example, in September 2016, together with the OECD and the ILO, Social Democratic Prime Minister Stefan Löfven – as one of its initiators and drivers – presented a "Global Deal" for decent work and inclusive growth.

6. INNOVATION POLICY

The Swedish innovation system is one of the most successful in the world. The amount set aside in the government budget for innovation – the total sum of money to promote research, industry and regional growth – has grown continuously since the late 1990s. Innovation expenditure was increased between 1997 and 2014 from 2.5 to 4.3 per cent of the budget (from 0.8 to 0.9 per cent of GDP). However, Sweden's returns on innovation are relatively low, which can be discerned in the fairly moderate productivity figures. A high proportion of Swedish spending on R&D is in ICT. This is one of the reasons the Nordic country is a European leader in the development and early marketing of new ICT products and services. However, it recognised the potential of so-called Industry 4.0 relatively late in the day. In the meantime, however, a plethora of initiatives have been launched, including the innovation programme Production 2030. Within the framework of this programme, coordinated by the employer association Teknikföretagen and funded by the state research authority Vinnova, a range of research and innovation projects are supported, for example, with a focus on automation in quality control and cloud-based service solutions for preventive maintenance of networked production systems. However, the initiatives exhibit a strong focus on technological development. One of the weaknesses of the Swedish innovation system is the rather moderate transfer of basic research into marketed innovations. One frequent explanation of this is the fairly heterogeneous management of the innovation system, which is reflected in innovation policy (OECD 2016). Responsibilities are traditionally widely dispersed: the Swedish Ministry for Education and Research is responsible for education, research and development. Responsibility for innovation and industry-oriented research and development remains primarily with the Ministry for Enterprise, Energy and Communication. In addition, the Ministry of Defence and the Ministry of the Environment also have competences and financial resources in the area of research and development, with the high autonomy characteristic of Swedish policy-making. Furthermore, there are a series of consultancy bodies and agencies performing primarily research-policy tasks, such as the Science Council (VR) and the Research Council for the World of Work and Social Sciences (FAS), the Research Council for the Environment, Agriculture and Social Development (FORMAS) and the Swedish Agency for Innovation Systems, VINNOVA.

This hinders effective coordination of innovation policy. The Swedish government reacted to this state of affairs with the introduction of the National Innovation Council (Nationella Innovationsrådet) in October 2014. Under the leadership of the Prime Minister the Council comprises representatives from government, employer associations, trade unions and the research community and has been furnished with its own resources. The Innovation Council can be seen as an attempt to better coordinate innovation policy in the future. The Council has set itself the ambitious goal of developing a new innovation strategy and breathing new life into innovation policy. That is also reflected in the appointment of a designated minister responsible for innovation (Ministry for Enterprise and Innovation). The primary aim is job creation and the lowest unemployment rate in the EU by 2020. Two more short-term goals are to improve risk capital financing and to introduce innovative public procurement, with its own minister and authority (Andersson 2016; Edquist 2016). The Swedish government hopes that in this way the considerable government and municipal budgetary resources for public procurement – between 65 and 85 billion euros – can be used to drive innovation.

7. SUMMARY

Digitalisation remains an important issue on the Swedish government's policy agenda, especially the question of how productivity growth can be fostered in both the public and the private sectors. Education, training and labour market measures are to be used to help familiarise employees with new ways of working to ensure that the costs and utilisation of digitalisation are borne and taken advantage of by all parts of society and not only by some branches or social groups (Andersson 2016). The inclusion of the health care system appears extremely promising, in particular Swedish policy has considerable direct management potential as welfare provider. These options are, on the one hand, enhanced by the extensive autonomy at the municipal level – also as an innovation laboratory for the deployment of new digital solutions – but, on the other hand, hindered with regard to policy coordination. With the establishment of the National Innovation Council headed by the prime minister, Sweden has introduced a very promising instrument for managing development. Now it will turn out whether it is possible to modernise the welfare state while maintaining or reviving its traditional strengths (Volksheim).

Bibliography

Andersson, Lars Fredrik 2016: Länderkapitel Schweden: Die Suche nach der Digitalen Dividende [Country chapter Sweden: Seeking the digital dividend], in: Andersson, Lars Fredrik; Alaja, Antti; Buhr, Daniel; Fink, Philipp; Stöber, Niels: Innovationsstrategien in Zeiten der Digitalisierung: Ein Vergleich der Innovationspolitik in Finnland, Schweden und Deutschland [Innovation strategies in the era of digitalisation: comparison of innovation policy in Finland, Sweden and Germany], Expertise im Auftrag der Friedrich-Ebert-Stiftung, Bonn.

Edquist, Charles 2016: The Swedish National Innovation Council: Innovation Policy Governance to Replace Linearity With Holism, CIRCLE Papers in Innovation Studies N. 24 (2016), Lund.

Esping-Andersen, Gøsta 1990: The Three Worlds of Welfare Capitalism, Princeton.

European Commission 2016a: European Digital Progress Report 2016, Country profile Sweden, https://ec.europa.eu/digital-single-market/score-board/sweden (30.9.2016).

European Commission 2016b: Digital Economy and Society Index DESI 2016 – https://ec.europa.eu/digital-single-market/en/desi (30.9.2016).

Förster, Christian; Schmid, Josef; Trick, Nicolas 2014: Die Nordischen Länder – Politik in Dänemark, Finnland, Norwegen und Schweden [The Nordic countries – politics and policy-making in Denmark, Finland, Norway and Sweden], Wiesbaden.

Gerlinger, Thomas; Reiter, Renate 2014: Die Versorgungsstrukturen des Gesundheitswesens in Schweden [Structures of provision in the health care system in Sweden], in: Bundeszentrale für Politische Bildung: Dossier Gesundheitspolitik, Bonn.

Germany Trade & Invest GTAI 2016: Schweden, http://www.gtai.de/schweden (30.9.2016).

Klein, Manfred 2016: Fünf Jahre nationale Patientenakte in Schweden [Five years of national patient records in Sweden], in: eGovernment Computing, 18.1.2016.

OECD 2016: OECD Reviews of Innovation Policy: Sweden 2016, Paris.

Wollmann, Hellmut 2014: Schwedische Verwaltung im skandinavischen Kontext: Zwischen Beharrung und Wandel [Swedish administration in the Scandinavian context], in: König, Klaus et al. (eds): Grundmuster der Verwaltungskultur: Interdisziplinäre Diskurse über kulturelle Grundformen der öffentlichen Verwaltung [Basic patterns of administrative culture: interdisciplinary debates on basic cultural forms of public administration], Baden-Baden, pp. 537–558.

World Economic Forum 2016: Networked Readiness Index, http://reports.weforum.org/global-information-technology-report-2015/ (30.9.2016).

Daniel Buhr, Rolf Frankenberger and Annalisa Ludewig

On the Way to Welfare 4.0 – Digitalisation in Estonia

ESTONIA

1. ABSTRACT

- Estonia is a pioneer in digitalisation. Since 2000, internet access has been a fundamental right of all citizens. Furthermore, Estonia has committed itself to consistent and regular renewal of its IT infrastructure, which has resulted in an extensive broadband infrastructure. However, while Estonia is a leader with regard to digital public services, e-government and private use of the internet. There is room for improvement with regard to the integration of digital technologies in the economy.
- Estonia is a forerunner of digitalisation in health care policy. The E-Estonian E-Health Foundation successfully coordinates digitalisation of the health care system. In 2008 Estonia was the first country in the world to implement a uniform nationwide system of electronic patient records, storing the medical history of every resident (Electronic Health Record or EHR).
- Estonian labour market policy has taken the path of deregulation. Since the outbreak of the financial and economic crisis in Europe Estonian labour market policy has been closely oriented towards the "flexicurity" model, along Danish and Dutch lines. The influence of the social partners is correspondingly low.
- Considerable resources have been put into improving the population's digital skills. Furthermore, various programmes are targeted towards better serving the needs of business in future, taking account of digitalisation.
- Estonian innovation policy is based on digitalisation and especially the promotion of entrepreneurship. For example, the Estonian economy is based on a large number of SMEs and has an above-average founder ratio.
- In its Digital Agenda 2020 the Estonian government has bundled a range of measures aimed at improving the ICT infrastructure as a driver of Estonian competitiveness.

2. A BRIEF OVERVIEW OF THE POLITICAL AND ECONOMIC SYSTEM

The Republic of Estonia became independent from the Soviet Union on 20 August 1991; the current constitution came into force in July 1992, after a referendum. The constitution contains the basic principles of democracy and asserts that "the supreme power of state is vested in the people". While the protection of living space and the environment are anchored in §53 of the constitution, it contains no fundamental social rights, so that the welfare state has little formal basis. The most northerly Baltic state acceded to the EU in May 2004 and adopted the euro as its currency in 2011. Estonia is also a full member of the OECD. After independence Estonia implemented comprehensive political and economic reforms. In this context the transition from a planned to a market economy was conducted consistently and successfully. Estonia's economic development was interrupted in the crisis year 2009 and output fell by 14 per cent. Since 2011, however, Estonia has once more been on a growth path. Key economic branches include manufacturing industry, transport, telecommunications, tourism and trade. High growth rates have been achieved in the service sector. In 2015 real GDP grew by 1.4 per cent. Although in 2016 economic output and nominal labour productivity are below the EU average, the unemployment rate is also below average, at 6.8 per cent. Investment in research and development, at 1.44 per cent of GDP, as well as the number of people with a tertiary education (13.2 out of 1,000) in the so-called MINT subjects are also below the EU average (see Table 1).

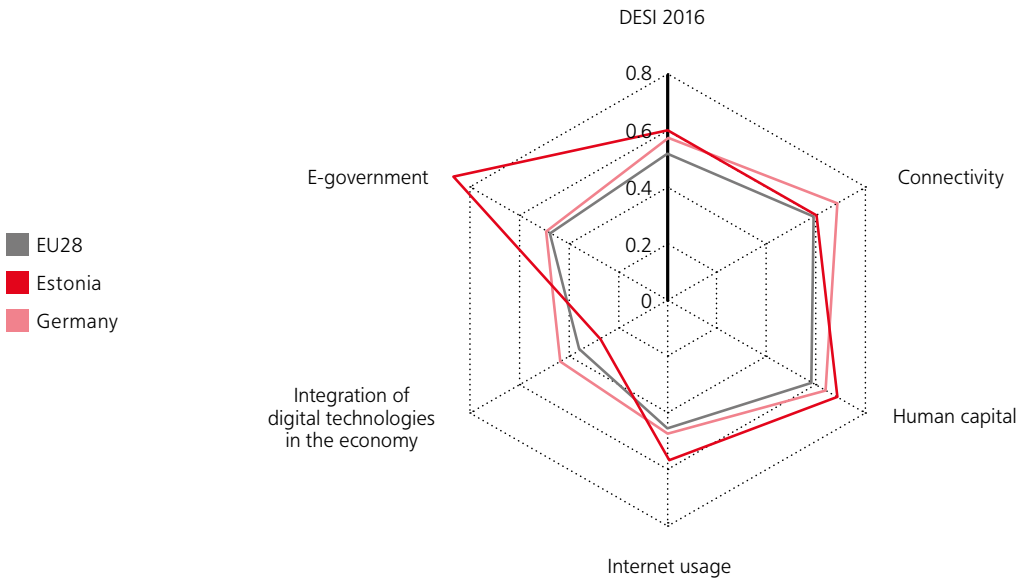
The economic reforms were accompanied by reforms of the welfare state. With a very low proportion of social spending in GDP of 14.8 per cent, above-average income inequality, a very low trade union density and weak institutionalisation of industrial relations the Estonian welfare state has markedly "liberal" (Esping-Andersen) characteristics. A particular social challenge is the integration of the Russian minority and the continuing shrinkage of the population due to emigration. Among other things, digitalisation represents a great development opportunity. Despite the country's comparatively low urbanisation – only 68 per cent of the population live in

Table 1
Overview of Estonia[1]

Indicator	Estonia	EU28
Form of state	Democratic republic	
State organisation	Unitary	
Party system	Multi-party system	
Electoral system	Proportional representation	
EU member since	1 May 2004	
Inhabitants/km²	30.3	116.7
Urbanisation (% of population)	68	74
Welfare state regime	Liberal / post-soviet	
Income inequality (distribution quintile)	6.2	5.2
Social expenditure (% of GDP)	14.8	28.6
GDP per capita (PPS, Index: EU=100)	74	100
Growth rate (real GDP in comparison with previous year)	1.4	2.2
Budget deficit/surplus (% of GDP)	0.4	–2.4
Labour market productivity nominal per employee (Index: EU=100)	69.7	100
Harmonised unemployment rate	6.8	8.6
Trade union density (0–100)	5.65	
R&D total spending (% of GDP)	1.44	2.03
Proportion of people 20–24 years of age with at least upper secondary education (%)	83.4	82.7
Tertiary education in MINT subjects (per 1,000 graduates)	13.2	17.1
DESI (0–1; 1=digitalised society)	0.59	0.52
Proportion of regular internet users (16–74 years of age) in %	86	76
Internet penetration (% of households)	88	83
Proportion of households with broadband connection (%)	87	80
Proportion of companies with broadband connection (%)	97	95

1 Data sources, if not otherwise specified: Eurostat, http://www.ec.europa.eu/eurostat (3.10.2016), data from 2016 or next available year; data on type of welfare state: http://www.learneurope.eu/index.php?-cID=300 (3.10.2016); data on level of urbanisation: data.worldbank.org (3.10.2016); data on trade union density: OECD, https://stats.oecd.org/Index.aspx?DataSetCode=UN_DEN (3.10.2016); data on digitalisation: Digital Economy and Society Index (DESI) 2016, http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

Figure 1
Development of a digital society in Estonia by comparison with Germany and the EU28



Source: Digital Economy and Society Index 2016.

towns – Estonia has many features of a digitalised society. The proportion of regular internet users and the proportion of private households and companies with broadband connections are well over the EU average.

3. STATE OF DIGITALISATION

Estonia is thus rightly described as a digitalisation pioneer. For example, as early as 2000 the Estonian parliament introduced a fundamental right to internet access for all citizens. Parliament also decided that the IT infrastructure should be renewed every seven years in order to ensure technological progress. This commitment is reflected, for example, in the early and extensive implementation of broadband infrastructure, even though this has stalled somewhat for a few years and applies mainly to urban areas. More than 12 per cent of the Estonian population are still waiting for fast internet connections, well above the EU average (3 per cent) (Digital Economy and Society Index 2016). With regard to mobile broadband connections, however, Estonia is third in the EU, also due to the substantial drops in prizes for mobile telephone and internet use and the wide availability of WLAN networks.

If one looks at, besides purely technical parameters, other indicators, Estonia ranks sevents in the DESI 2016[2] with regard to the development of the digital economy, right alongside Germany, Austria and the Netherlands.

Estonia is above the EU average in all sub-indices and is characterised in particular by high growth rates. While the country is a leader in digital public services and the private use of the internet, it lacks behind with regard to the integration of digital technologies in the economy, lying a lowly twenty-second in the EU (DESI 2016).

Estonia took an early lead in Europe in the area of digital administration. The basis of the early digitalisation of broad swathes of the administration was the decentralised online platform "X-Road" introduced in 2001, which now links around 1,000 institutions offering numerous digital services. A plethora of e-services have been established: for example, almost every Estonian has an e-ID card, which has been available on a mobile basis since 2007 (e-Estonia 2016). In addition, for many years Estonians have been able to complete their tax declarations online, since 2002 to pay by mobile telephone and since 2005 to vote online (initially in municipal elections). In the European elections in 2014 one out of every nine votes were cast electronically and in the parliamentary elections on 1 March 2015 one voter in five voted through the internet.

4. HEALTH CARE POLICY

Estonia has the lowest social spending in the European Union, at 16.4 per cent of GDP (OECD 2016). Accordingly, state expenditure on the welfare state and on redistribution within the system are rather low. Social inequality is thus high (World Bank 2016). Although Estonia bears many similarities to the so-called "liberal" variety in various areas of the welfare state, in the health care system there are also features of a conservative or even social democratic system. On the one hand, decommodification – for example, with regard to daily sickness benefits with a replacement rate of around 70 per

2 DESI is an index composed of five dimensions, which surveys the development of EU member states towards a digital society. Developed by the European Commission (DG CNECT) the index encompasses connectivity, human capital, internet usage, integration of digital technologies in the economy and digital public services (e-government). The Index varies between 1 and 0, with 1 representing the highest value, cf. http://ec.europa.eu/digital-agenda/en/digital-agenda-scoreboard (28.9.2016).

cent of wages – is relatively high; on the other hand, medical care is based rather on equal treatment of people covered by health insurance, even though at a fairly low level.

After independence from the Soviet Union the Estonian health care system was first decentralised and partly privatised (especially the hospitals; cf. Ross 2015). With the National Health Plan of 2008, however, we can observe tendencies towards recentralization. These tendences are even stronger since competences were concentrated within the Ministry of Social Affairs, which is responsible for this policy area, encompassing not just health care, but also employment, social security, children and the family, and even gender equality. In Estonia all citizens and residents who pay the "social tax" (Sotsiaalmaks) are subject to compulsory health insurance. Health insurance is funded by employers, who pay 13 per cent of monthly gross wages into the Estonian Health Insurance Fund (EHIF – Eeti Haigekassa). (In total, 33 per cent of income are deducted in the form of social contributions: 13 per cent for the EHIF and 20 per cent for pension insurance.)

Although state spending on health care rose continuously from 2000 to 2015, it remained comparatively low at around 4.2 per cent. It is also striking that relatively few people are employed in the health care system (OECD 2016) and, indeed, many nurses and doctors emigrate. Thus medical provision is strained, especially in rural areas, because the number of both hospitals and medical specialists has been falling for years. On the other hand, the number of care places has risen enormously in recent years.

But the health care system also provides considerable evidence of Estonia's status as digitalisation pioneer. Since 2005 the Estonian E-Health Foundation has successfully provided a forum for coordinating the digitalisation of the health care system. For example, in 2008 Estonia was the first country in the world to implement a nationwide uniform system of electronic patient records to store the medical history of all residents (Electronic Health Record – EHR). Doctors and patients have equal access to these records, although the latter can also restrict access. More than 70 per cent of Estonians make use of the EHR (e-Estonia 2016), although particularly older people – especially in rural areas – have difficulties with it, both in terms of technical access and the necessary digital skills. Thus as early as 2002 the Estonian government launched an initiative intended to facilitate internet use for all social groups. The EHR, after all, also offers citizens the opportunity to make doctor's appointments and to receive reminders about them, as well as to conduct teleconsultations with the doctors treating them. Another important function is the issuing of prescriptions: 98 per cent of all prescriptions are now done online via the X-Road system.

5. LABOUR MARKET POLICY

The Estonial labour market is split: On the one hand, there is a large number of highly skilled people especially in the urban areas; on the other hand there are large numbers of underqualified people. Long term unemployment figures show that these are especially elder cohorts, people from rural areas and non-Estonians.

Estonian labour market policy has long pursued a (neo) liberal course. The influence of the social partners is correspondingly low. The employers are represented by four central organisations. The most influential of these, besides the Estonian Chamber of Industry and Trade (EKTK) is the Central Union of Estonian Employers and Industrialists (ETTK), representing around 1,500 companies, employing more than one-third of all private sector employees. Another important interest representative is the SME Association of Estonia (EVEA) (EWS 2013). But only around one in ten employees are trade union members. Among the trade unions, the Estonian Trade Union Confederation (EAKL) and the Estonian Employees' Unions' Confederation [sic] (TALO) exercise the most influence. However, institutionalisation of industrial relations in Estonia is realtively weak. For example, at local level and among broad swathes of SMEs there is almost no trade union representation.

Since the outbreak of the European financial and economic crisis Estonian labour market policy has been strongly oriented towards the so-called "flexicurity" model, as it was introduced for example in Danmark or the Netherlands. A key actor in this regard, besides the Ministry of Social Affairs, is the Estonian Unemployment Fund (Eesti Töötukassa), which is responsible for both passive and active unemployment assistance. In 2009 it took on the tasks of the Employment Office and has local representation in each district (European Economic and Social Committee 2013).

Unemployment insurance is funded by employer and employee contributions (0.8 per cent of the gross wage for employers and 1.65 per cent for employees – BMAS 2016). Unemployment benefit is state-funded and, at a mere 4 euros a day, very low. Resources for both active and passive labour market measures are extremely tight, both relatively and in absolute terms, with almost half of the Budget coming from the European Social Fund. Among these measures the Estonian government has in recent years increasingly focused on activation, education and acquisition of qualifications, also with regard to digitalisation.

For example, considerable resources have been put into boosting digital skills. Within the framework of the nationwide gaming project "Bit by Bit", for example, pupils between the ages of seven and eleven years of age study programming. Besides school education, the same approach is being tried in further training, for example, with qualification schemes such as "Tech Entrepreneurship" and "IT Innovation". Such schemes as the Lifelong Learning Strategy 2014–2020, adopted by the Estonian parliament in 2014, the Adult Education Act and the Professionals Act of 2015 are aimed at better meeting labour market needs with regard to digitalisation. In this context the Ministry of Social Affairs will cooperate more intensively in future with the Ministry of Education and "Foundation Innove".

6. INNOVATION POLICY

Responsibilities with regard to Estonian innovation policy are distributed across various ministries, although they lie principally with the Ministry for Education and Research (Haridus- ja Teadusministeeriumi) and the Ministry for the Economy and Telecommunications (Majandus- ja Kommunikatsiooniministeerium). However, spending on innovation policy is below average by international comparison. This is also evident in relation to general expenditure on research and development for the economy as a whole. It is striking that in Estonia this has been falling for years – from 2.31 per cent of GDP in 2011 to 1.44 per cent in 2014 – while in the EU28 as a whole it has risen above 2 per cent during the same period.

Estonian innovation policy prioritises, both, digitalisation and the promotion of entrepreneurship. For example, the Estonian economy is based on a multitude of SMEs and has an above-average founder ratio. The Global Entrepreneurship Monitor (GEM 2016) acknowledges Estonia's dynamic development, high innovativeness and continuously rising propensity to establish start-ups. Estonia also offers the opportunity of a so-called "e-residency", which is available to foreign citizens, both to improve start-up conditions for foreigners wishing to establish companies, and to attract workers. Estonia is also catching up in relation to the provision of funding. In 2010 the Estonian development fund set up an affiliate company, "SmartCap", to provide comprehensive growth funding, aimed at bringing together start-ups with capital and "business angels". In addition, the Estonian state has set up the development fund Arengufond to promote information technology and digitalisation in application sectors. For example, around a quarter of the total industrial research budget flows into the IT sector.

This is bundled into various clusters – the Estonian ICT cluster, the Industry 4.0 cluster and the Connected Health cluster – with good links to the Estonian research system. In proportion to the size of the country, Estonia has an internationally renowned research sector, especially in the area of information technology. Besides the three state-run universities in Tartu and Tallinn there are two competence centres (ELIKO, STACC), a private research institute (Cybernetica) and a state research centre (KFBI).

The government has bundled its measures for improving the ICT infrastructure in its Digital Agenda 2020 as a driver of Estonian competitiveness. In detail, it plans, among other things, to expand the broadband network and to boost transfer speeds, as well as to put digital signatures on a sounder footing. Activities in the area of Estonian innovation policy since 2014 have pursued two medium-term policy strategies (2014–2020): the Estonian Research and Development and Innovation Strategy and the Estonian Entrepreneurship Growth Strategy. One aim is to increase research and development spending by 2020 to 3 per cent of GDP (Lisbon target), with two-thirds being funded by business. Given the constant decline of this indicator over the past five years, however, this target seems ambitious to say the least. However, in boosting its research and development Estonia is relying on the European Structural Funds. For example, the current Operational Programme for Estonia makes available 4.4 billion Euros during the funding period, 3.53 billion of which come from the European Cohesion Fund, with a particular focus on the innovativeness of the Estonian economy.

7. SUMMARY

Estonia, given its pioneering role (for example, in e-government), its size and its economic structure, is well prepared to to benefit from the increasing digitalisation both economically and socially. In recent years, for example, it has been shown that the digitalisation of the health care system (for example, electronic patient records) can do a good job of making up for some of the weaknesses in medical provision (for example, poor hospital network, few doctors). However, this only goes part of the way to tackling the structural polarisation in Estonian society. There are still cleavages separating rich and poor, young and old, rural and urban, but also Estonian and non-Estonian. This has also manifested itself in certain aspects on the road towards the information society: winners here (for example, young, well qualified employees in Tallinn's high tech clusters), losers there (for example, public sector employees or agricultural workers, pensioners and non-Estonians in the north-east of the country). Estonia will still have to invest substantially in the expansion of the welfare system in order to reduce social inequality and to avoid serious social tensions.

Bibliography

Bundesministerium für Arbeit und Soziales [German Ministry for Labour and Social Affairs] (BMAS) 2016: Sozialkompass EU, http://www.sozialkompass.eu (30.9.2016).

E-Estonia 2016: http://www.e-estonia.com (30.9.2016).

European Commission 2016: Digital Economy and Society Index DESI 2016, https://ec.europa.eu/digital-single-market/en/desi (30.9.2016).

European Economic and Social Committee (EESC) 2013: Economic and social development in the Baltic states: Estonia, Brussels.

Global Entrepreneurship Monitor GEM 2016: 2015/2016 Global Report – http://www.gemconsortium.org/report/49480 (30.9.2016).

OECD (2016)

World Bank (2016)