THE INFORMATION SOCIETY IN EUROPE: POLICIES TO STEM THE DIGITAL DIVIDE[1]

Francisco José Armas Quintá

Department of Geography, University of Minho, Portugal

José Carlos Macía Arce

Department of Teaching, Language, Literature and Social Sciences, University of Santiago de Compostela, Spain

Abstract. A Digital Agenda for Europe is one of the seven flagship initiatives of the Europe 2020 Strategy. The main objective of this initiative consists of promoting ICT, especially the Internet, as a strategic tool to improve business, healthcare services, transport and social activity in a better global standard-of-living context. The Europe 2020 Strategy recommends broadband access for all European citizens by 2013 and higher Internet speeds (30 Mbps or above) by 2020. Nevertheless, what is the real position in the European regional and urban context? This article attempts to describe and explain the current situation and trends in relation to the Europe 2020 Strategy initiative.

Francisco José Armas Quintá, Department of Geography, University of Minho, Campus of Azurém, 4800-058 Guimarães, Portugal; e-mail: franciscojose.armas@gmail.com

José Carlos Macía Arce, Department of Teaching, Language, Literature and Social Sciences, University of Santiago de Compostela, Avenue of Ramón Ferreiro, s/n, 27002 Lugo, Spain; e-mail: carlos.macia@usc.es

1. Introduction

Europe 2020 (EU2020S) is the growth strategy of the European Union to overcome the current crisis. This strategy is driven towards a smart, sustainable and inclusive economy in Europe. These three priorities should help the European Union to reach high levels of employment, productivity and social cohesion by 2020. Con-cretely, the EU2020S has defined eight targets on employment, R&D, climate change and energy, education and poverty, and social inclusion.

[1] ESPON 2013 Programme (European Observation Network for Territorial Development and Cohesion) and SIESTA (Spatial Indicators for a Europe 2020 Strategy Territorial Analysis), European Union. Part-financed by the European Regional Development Fund.

– Employment
- 75% of the 20–64-year-olds to be employed
– R&D
- 3% of the EU's GDP to be invested in R&D
– Climate change and energy
- Greenhouse gas emissions 20% (or even 30%, if the conditions are right) lower than in 1990
- 20% of energy from renewable sources
- 20% increase in energy efficiency
– Education
- Reducing school drop-out rates to below 10%
- At least 40% of 30–34-year-olds completing third-level education
– Poverty and social exclusion
- At least 20 million fewer people in, or at risk of, poverty and social exclusion.

Those are all targets included in the EU2020S through seven flagship initiatives which are presented below. One of these flagships refers to the Digital Agenda for Europe, which proposes the creation of a single digital market based on fast Internet access and advanced services. This paper attempts to explain the current situation in Europe at a regional scale (NUTS2 and NUTS3) regarding the information society and ends with a set of conclusions and policy recommendations.

2. The information society

The last decades of the twentieth century gave way to the Third Technological Revolution and this has brought about a new model of society known as the Information Society, or the Network Society (Castells 2000). Among the new technologies that emerge in the Third Technological Revolution are computing, telecommunications, microelectronics, optoelectronics and genetic engineering, but the advances made in computing and telecommunications were the reason for the Network of networks, the current and ever-popular Internet.

The classic concept of physical territory, displacement and distance was replaced by the instantaneous transmission of information and the provision of advanced online services (Cairncross 2001, Veltz 1999, Ges 1997). These recent technological advances in the means of communication

are associated with contemporary globalisation (Davies 2004) and have brought about the formation of a large global network influenced by the flow of communication and economic, political, social and cultural interaction (Short & Kim 1999).

The transition from the industrial society to the information society has meant, in an economic aspect, a change from factory work to service work, and from physical work to mental work (Fukuyama 1999). For the first time in history, the human brain has direct productive strength and is not only a decisive element in the production system (Castells 2000). In the information society, production is worldwide and information technology is cheap, thus enabling the movement of information and financial transactions across national borders (Veltz 1999, Castells 2000). In the industrial society, information, technology and knowledge were exclusively for advanced nations, mainly concentrated in big metropolises and important capitals. In the information society, this situation has changed in some aspects for smaller-sized entities or rural outskirts because these have access to huge amounts of information that can generate knowledge and, at the same time, promote development processes.

Nowadays, we are witnessing a global opening dominated by communication as part of a worldwide network that reaches its highest density in urban areas. In this global context, the employment situation is closely related to new technologies and the Internet. In economic terms, the information and communications technology eliminates trade barriers and promotes the development of international business, leading to the reformulation of corporate strategies (Méndez 1997). In spatial terms, new technologies cause global cities to concentrate a high percentage of wealth and power, becoming the real economic and political references of modern states (Sassen 2003, Veltz 1999). In this process big cities and spaces nearby maintain a hegemonic position in the information society in respect to small urban centres and rural areas (García Ballesteros 1998). But nevertheless, the use of advanced services among citizens and businesses is not equally distributed in the urban spaces. There are contrasts in the presence, use and diffusion of ICT between central cities and their immediate peripheries,

focusing on the quality of its citizens' lifestyles (Lois et al. 2010).

The information society offers new opportunities for citizens to communicate and interact using the Internet as a strategic tool. Citizens can access a variety of services and opportunities, communicating with other citizens, interacting with governments, associations, companies and banks, empowering work and distance learning, and so on (Armas Quintá & Macía Arce 2011, Muhammad et al. 2007, Rhee 2007). From the business point of view, the benefits of ICT are also evident. Computer advances have transformed the *modus operandi* of companies, information is managed in a more intelligent and dynamic way, and communication is instantaneous, even when performed on a remote basis. In addition, companies have found the Internet to be a new medium through which to promote their products on the market and start buying and selling processes with suppliers and customers. Without doubt, very favourable circumstances that have changed the whole way of understanding the reality of business nowadays (Méndez 1997).

Internet access requires a minimum of infrastructure, and this is usually provided by private telecommunication companies which only act in spaces associated with active markets and economic profitability. Thereby, the telecommunication market decides which territories are connected to the Internet and which are not. This has led to a large territorial and social breakdown known as "the Digital Divide", an exclusion of some communities from the information society. In addition, there is a social group that, in spite of having Internet access, does not use it correctly due to either an insufficient knowledge of how to do it or because it does not find it useful, and, in some cases, for both reasons (Macía Arce 2007, Armas Quintá 2009). Education of the population is therefore necessary if there is to be absolute immersion in the information society as well as information on the opportunities available.

3. The Digital Agenda for Europe

The Digital Agenda for Europe is one of the seven flagship initiatives of the EU2020S. As has been said at the beginning of this paper, the EU2020S was launched by the European Commission in March 2010 in order to break out of the current ongoing crisis and prepare the European economy for future challenges. The EU2020S foresees three priorities, or pillars, which integrate seven flagship initiatives:
– Smart Growth
  • Digital Agenda for Europe
  • Innovation Union
  • Youth on the Move
– Sustainable Growth
  • Resource-efficient Europe
  • An industrial policy for the globalisation era
– Inclusive Growth
  • An agenda for new skills and jobs
  • European platform against poverty

Specifically, the objective of the Digital Agenda for Europe is to maximise the social and economic potential of ICT, especially the Internet, as a strategic tool to improve the economic and societal activity: for doing business, working, communicating, and expressing ourselves freely.

The document recognises the Europeans' frustration when ICT did not fulfil the promise of better public services and economic prosperity, identifying seven most relevant obstacles:
1. fragmented digital markets,
2. lack of interoperability,
3. rising cybercrime and risk of low trust in networks,
4. lack of investment in networks,
5. insufficient research and innovation efforts,
6. lack of digital literacy and skills, and
7. missed opportunities in addressing societal challenges.

The Commission accepts these obstacles and proposes actions to overcome them. These actions constitute the seven pillars of the Digital Agenda for Europe:
1. *A vibrant digital single market* because, in the Commission's words, "it is time for a new single market to deliver the benefits of the digital era" (European Commission 2010a: 7). Some actions proposed by the Commission would be: to simplify copyright procedure, create a legal framework to facilitate the dissemination of cultural work in Europe, promote cross-border and European licenses, ensure

the completion of the Single Euro Payment Area, protect online shops, etc.

2. *Interoperability and standards* because "we need effective interoperability between IT products and services in order to build a truly digital society" (European Commission 2010a: 14). Some proposals include: to promote appropriate rules for essential intellectual property rights and use standards to provide guidance on the link between ICT standardisation and public procurement to help public authorities.

3. *Trust and security* because "Europeans will not embrace technology they do not trust" (European Commission 2010a: 16). First of all, it is clear that users must feel safe and secure when they use the Internet and, on the other hand, reducing threats and strengthening security in the digital society is a private and public responsibility.

4. *Fast and ultra-fast Internet access* because "we need very fast Internet for the economy to grow firmly and to create jobs and prosperity, and to ensure citizens access to the content and services they want" (European Commission 2010a: 18). It is very important to "ensure that by 2020 all Europeans have access to much higher Internet speeds of above 30 Mbps and 50% more of European households subscribe to Internet connections above 100 Mbps" (European Commission 2010a: 19). At the same time it is strategic to fight against the Digital Divide, especially to ensure coverage of remote and rural areas.

5. *Research and Innovation* because "Europe must invest more in R&D and ensure our best ideas reach the market" (European Commission 2010a: 21). At present we can see low European investment in ICT-related R&D. It is possible to identify three main problems:
   a. weak and dispersed public R&D effort,
   b. market fragmentation and dispersion of financing, and
   c. Europe does not progress adequately in ICT innovations.

6. *Enhancing digital literacy, skills and inclusion* because "the digital era should be about empowerment and emancipation; background or skills should not be a barrier to accessing this potential" (European Commission 2010a: 24). In the words of specialists, it is absolutely necessary to educate European citizens to use ICT and digital media as a smart tool to improve education and skills among students and workers.

7. *ICT-enabled benefits for the EU society* because "smart use of technology and exploitation will help us to address the challenges facing society, like climate change and ageing population" (European Commission 2010a: 27). It is clear that ICT offers new opportunities to less resource-intensive products and services to support sustainable healthcare, promote cultural diversity, reduce costs and save time for public administration, citizens and businesses, and give an international dimension to the seven pillars in the Digital Agenda.

Some relevant indicators and objectives considered in this relation in the Digital Agenda for Europe are:

1. Broadband access ("ensure that by 2013 all Europeans have access to the Internet"; European Commission 2010a: 19).

2. Internet speed ("ensure that by 2020 all Europeans have access to much higher Internet speeds of above 30 Mbps"; European Commission 2010a: 19).

3. Households with Internet connections above 100 Mbps ("ensure that by 2020 50% more of European households subscribe to Internet connections above 100 Mbps"; European Commission 2010a: 19).

4. Citizens using the Internet for accessing eGovernment services ("in 2009, only 38% of individuals aged 16-74 used eGovernment services in those 12 months"; European Commission 2010a: 41). By 2015, 50% of citizens must use eGovernment (European Commission 2010a: 31)].

5. Population buying online ("50% of the population should be buying online by 2015"; European Commission 2010a: 40).

6. Enterprises purchasing and selling electronically ("33% of SMEs should conduct online purchases/sales by 2015"; European Commission 2010a: 40).

7. Roaming average ("the difference between roaming and national tariffs should approach zero by 2015"; European Commission 2010a: 40).

8. Internet use ("increase regular Internet use from 60% to 75% by 2015 and from 41% to 60%

for disadvantaged people"; European Commission 2010a: 41).

9. A population that has never used the Internet (in 2009, 30% of individuals aged 16-74 had never used the Internet. It is necessary to "halve the proportion of the population that has never used the Internet by 2015"; European Commission 2010a: 41).

10. Public investment in ICT-related R&D ("double public investment from 5.7 billion nominal Euros in 2007 to 11 billion"; European Commission 2010: 41).

All these indicators and objectives are of interest for the EU2020S, but at present Eurostat and the Member States of the European Union have not compiled data to map this information at the regional scale (NUTS2 and NUTS3). So, the next chapter only presents data available at the regional scale and tries to explain the information society in Europe by taking into account data and maps concerning people who have never used a computer or broadband, or people who have ordered goods and services over the Internet for private use. Most data used in this paper are from Eurostat sources and cover the years 2006–2011.

4. Regional analysis of the digital society in Europe

The analysis of the data demonstrates that regions of Europe fall short of the information society with regard to the objectives proposed by the EU2020S. Europe is not only far away from broadband for all by the year 2013, but it also still finds itself with a very high percentage of the digitally illiterate amongst the population. This situation complicates the expansion of advanced Internet services, such as e-commerce, e-government, telework, etc., and has a negative impact on the European citizens' standards of living.

Moreover, the regional mapping of Europe at the NUTS2 level reveals a deep Digital Divide between Northern and Southern Europe as well as between Central and Eastern Europe. In general, Northern Europe, namely Norway and the Baltic Sea region with the exception of Poland, Lithuania and Latvia, meets the objectives of the EU2020S and achieves the best rates in Europe in terms of the information society. Central Europe

also occupies a prominent position in the dissemination and use of ICT, although its figures are not as good as those achieved by Scandinavia. On the other hand, there are regions of the Mediterranean Basin with high values in France, medium values in Spain and some regions of Italy, Lazio and Emilia-Romagna, and low or very low in the rest of the Mediterranean. Finally, the sharpest Digital Divide is located in Eastern Europe, especially Romania and Bulgaria with percentage values far away from the objectives set by the EU2020S.

The population data on those that have never used a computer are very useful to identify regions positioned at the extremes of the Digital Divide. Undoubtedly, the group that does not use the computer can be called a digitally illiterate population. In Europe, the Scandinavian region, Netherlands, southern United Kingdom, France and the regions of Paris and Hessen have the best percentages of the population who uses or used the computer, with values above 90% (see Table 1 and Fig. 1). At the other extreme are regions of Turkey, Romania, Bulgaria, Greece, southern Italy, including Campania and Sicily, the Portuguese Alentejo and north-western Croatia, with percentages of the population that has never used the computer above 40%. This is a very alarming percentage and confirms that Europe is moving at various speeds in the information society. The overall objectives of the EU2020S seem, in this sense, unrealistic if we analyse these and other similar data.

The analysis of the diffusion of broadband in European households confirms the Digital Divide that separates North and Central Europe from the

Table 1. European regions with the lowest share of individuals who have never used a computer, 2011.

Member State	Region	%
Norway	Vestlandet	1
Norway	Oslo	2
Netherlands	Flevoland	3
United Kingdom	Cumbria	3
United Kingdom	Hampshire	3
Iceland	Ísland	3
Norway	Rogaland	4
Netherlands	Noord Holland	4
Sweden	Östra Sverige	4
Sweden	Stockholm	4

Source: Eurostat 2011.

rest of the continent. The percentage of households connected to a high-speed Internet stands out especially in the Scandinavian regions, including the most peripheral northern and rural economies. It exceeds 75%, giving the lie to the paradigm that tends to identify the phenomenon of the Digital Divide with rural areas (see Table 2 and Fig. 2).

Advanced online services are the final element that consolidates a community in the information society. In this sense, the European Union has a historic opportunity to try to balance the European digital market and involve all citizens. The analysis of users who shop online affirms once again the hegemony of Central and Northern Eu-
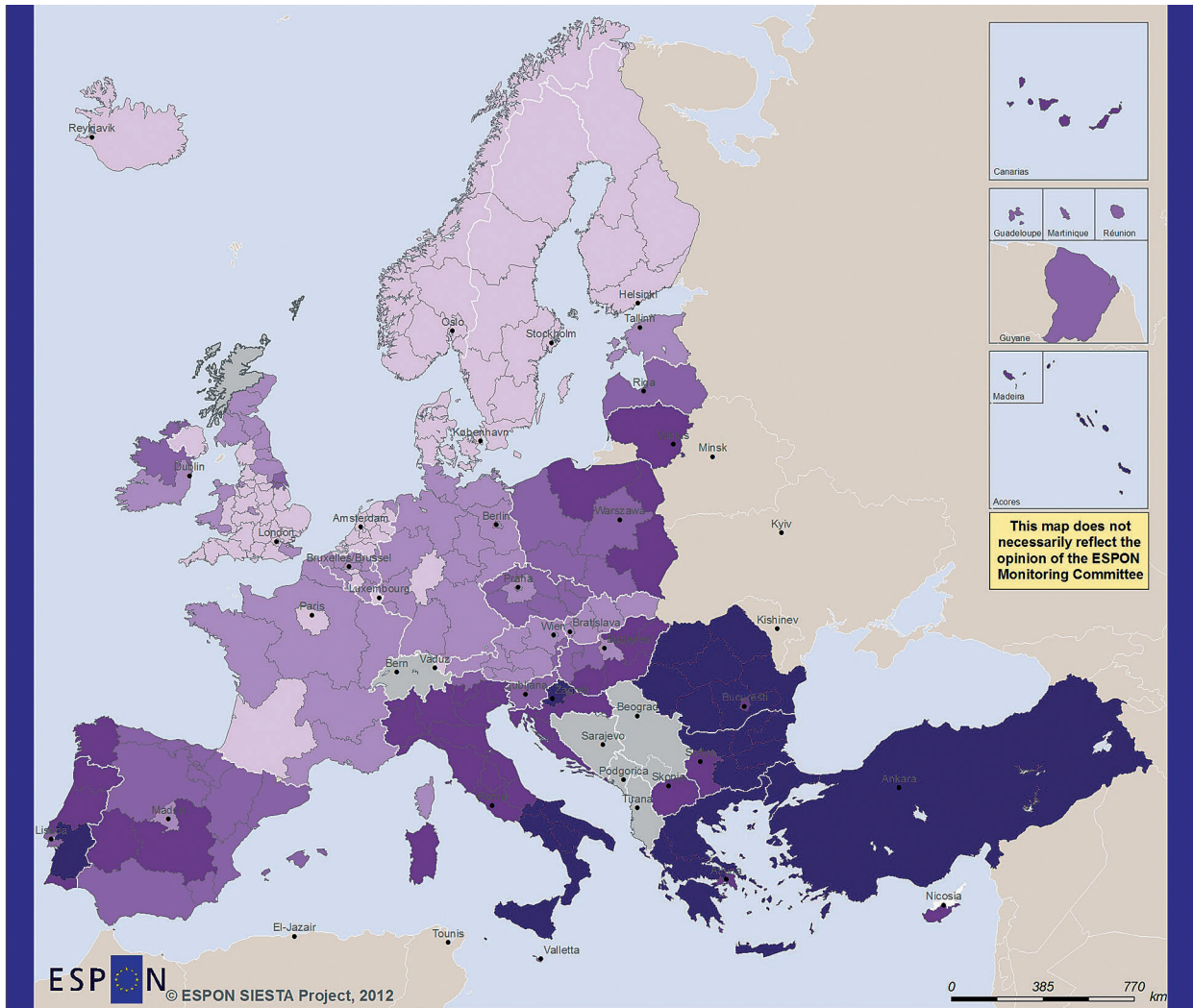
% individuals who have never used a computer, 2011.

- < 10%
- 10% - 20%
- 20% - 30%
- 30% - 40%
- > 40%
- No data
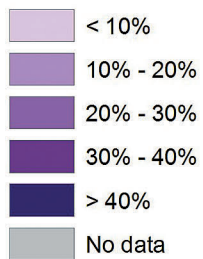
Notes:
IE, UK, SE, FI, NO, EE, LV, LT, BE, NL,
PT, ES, CZ, AT, HU, HR, PL, RO are shown at NUTS2 level.
FR, DE and EL are shown at NUTS1 level.
IS, MK, SI and TR are shown at country level.
BO, HR, TR, MK, DK, NL, SE, UK, ES63 are shown for 2010.
BG is shown for 2007.

Fig. 1. Computer use, 2011.

rope in the information society. On this occasion we can positively highlight four geographic realities:

1. In Germany, a triangle that extends from Bavaria, North Rhine-Westphalia and Holstein and covers more than half of the country's territory, with the percentage of users who shop online at more than 75%.
2. In France, there are two poles, one in the Paris Basin and another in the Rhone valley, opening up into the interior.
3. The United Kingdom presents a very interesting model which highlights its peripheral regions (the Highlands, the West Country, the east coast north and south of Greater London). In short, it includes the coastal regions and even outstanding rural components (such as the Highlands and Plymouth).
4. All Scandinavian regions have outstanding rates again, especially the northern part of Norway – another sign of the new role they

and the rural peripheral regions can play in the information society.

At the opposite extreme, Eastern Europe, in its southern half, has very poor percentages: fewer than 15% of users shop online. These regions are accompanied by Lithuania, Greece, the southern part of Italy with the exception of Lazio, and Portugal with the exception of Lisbon and Algarve (see Table 3, Figs 1 and 3).

To complete the analysis, it is interesting to establish a correlation between the indicators of the development of information society and some of the main indicators of economic issues, employment and education. For example, in terms of per capita GDP, the best scenario is represented by the provinces, or administrative entities of Central and Northern Europe. Thus, the European central space is dominated by the Blue Banana that extends from London to the north of Italy, with possible poles or branches in neighbouring regions such as Dublin, Aberdeen and the

Table 2. European regions with the highest share of broadband penetration rate, 2006–2009.

Member State	Region	%
Sweden	Stockholm	84
Sweden	Sydsverige	80
Iceland	Ísland	80
Denmark	Hovedstaden	79
Netherlands	Utrecht	79
Sweden	Östra Mellansverige	79
Sweden	Västsverige	79
Sweden	Norra Mellansverige	78
Netherlands	Noord-Holland	76
Denmark	Midtjylland	76

Source: Eurostat, several years.

Table 3. European regions with the lowest share of individuals who ordered goods or services over the Internet in 2010.

Member State	Region	%
Bulgaria	Yuzhen	2
Bulgaria	North West	2
Bulgaria	North Central	2
Bulgaria	South Central	2
Romania	Nord-Vest	2
Romania	Sud-Muntenia	2
Bulgaria	Severozapaden	3
Bulgaria	Severen	3
Romania	Nord-Est	3
Romania	Sud-Est	3

Source: Eurostat 2010.

Table 4. European regions with the highest share of employment (the 20-64 age group), 2011.

Member State	Region	%
Finland	Åland	83.6
Switzerland	Eastern	83.3
Switzerland	Central	83.2
Switzerland	Zurich	82.9
Switzerland	Espace Mittelland	81.8
Sweden	Stockholm	81.7
Norway	Oslo og Akershus	81.1
Switzerland	Northwestern	81.1
Norway	Vestlandet	80.9
Iceland	Ísland	80.4

Source: Eurostat 2011.

Table 5. European regions with the lowest share of employment (the 20–64 age group), 2011.
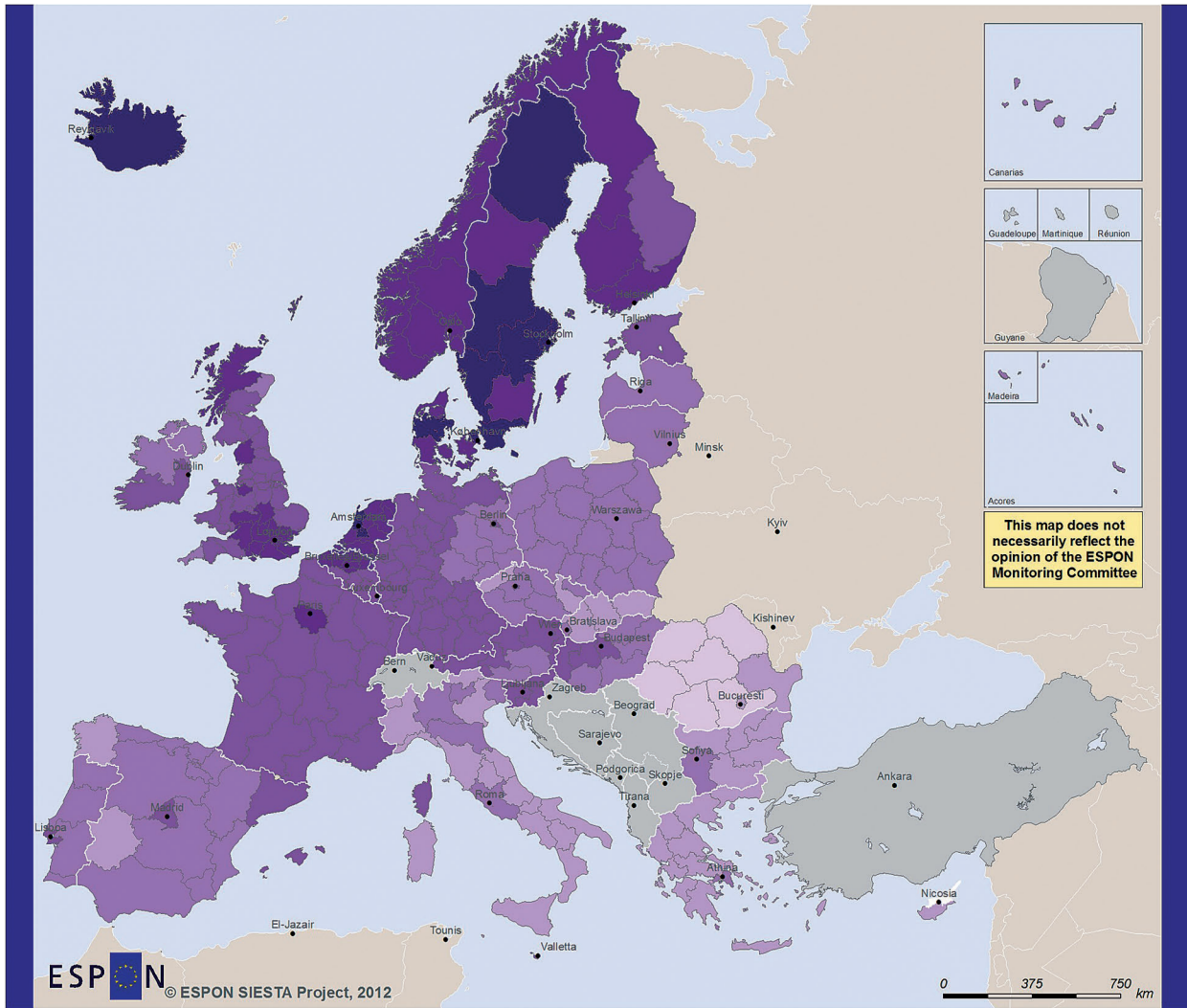
Member State	Region	%
Turkey	Sanliurfa	34.4
Turkey	Mardin	38.8
Turkey	Van	43.2
Italy	Campania	43.7
Turkey	Kayseri	45.7
Turkey	Gaziantep	45.7
Italy	Calabria	46.1
Italy	Sicilia	46.6
Turkey	Istanbul	46.9
Serbia	Serbia	47.2

Source: Eurostat 2011.

north-east quadrant of the Iberian Peninsula. The corridor that begins in the Blue Banana centre and extends to Denmark, Norway, Sweden and southern Finland is also very striking.

Conversely, Turkey and Eastern Europe, including the Baltic republics of Estonia, Latvia and Lithuania, occupy positions very distant from the leading regions in Europe. This same situation, though to a lesser extent, is repeated at the base of the southern Mediterranean Basin, a factor that would establish a slight correlation between economic growth and the prominent positioning

% of households, 2006 - 2009.

- < 15%
- 15% - 30%
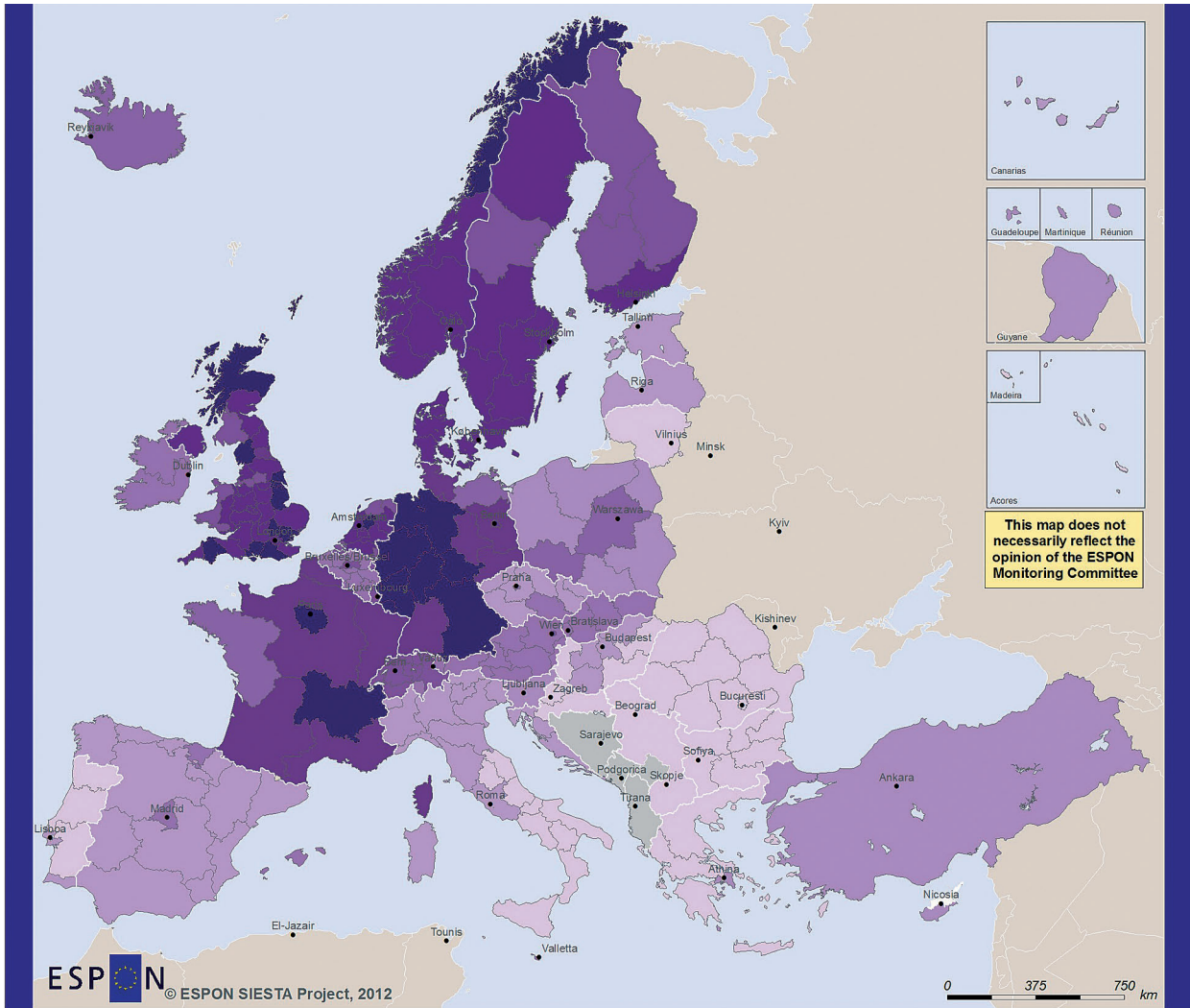- 30% - 45%
- 45% - 60%
- 65% - 75%
- > 75%
- No data

Fig. 2. Broadband penetration rate, 2006–2009.

of the regions of Europe in the information society (see Table 3, Figs 1 and 3).

Moreover, unemployment rates are higher in Turkey, Eastern Europe and the Mediterranean Basin, with the exception of Catalonia, the Balearic Islands, Costa Azul (the French Riviera), Corsica, northern Italy, Slovenia, Athens, Crete and Cyprus. Meanwhile, Central and Northern Europe maintain the largest job boards, except in three specific regions that are located in the north-west of Ireland, especially in the historical province of Connacht, the French region

% of individuals aged 16 to 74, 2010.

- < 15%
- 15% - 30%
- 30% - 45%
- 45% - 60%
- 60% - 75%
- > 75%
- No data

Regional level: NUTS2, NUTS1 and NUTS0
Source: Eurostat
Origin of data: EUROSTAT, 2012
© EuroGeographics Association for administrative boundaries
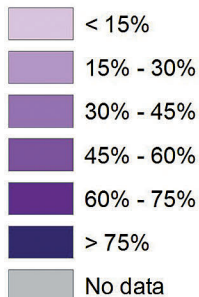
Notes:
DE, FR, EL, RS and PL are shown at NUTS1 level.
TR is shown at country level and data for this country were provided by Turkstat.
Data for CH was provided by Swiss Statistics web site:
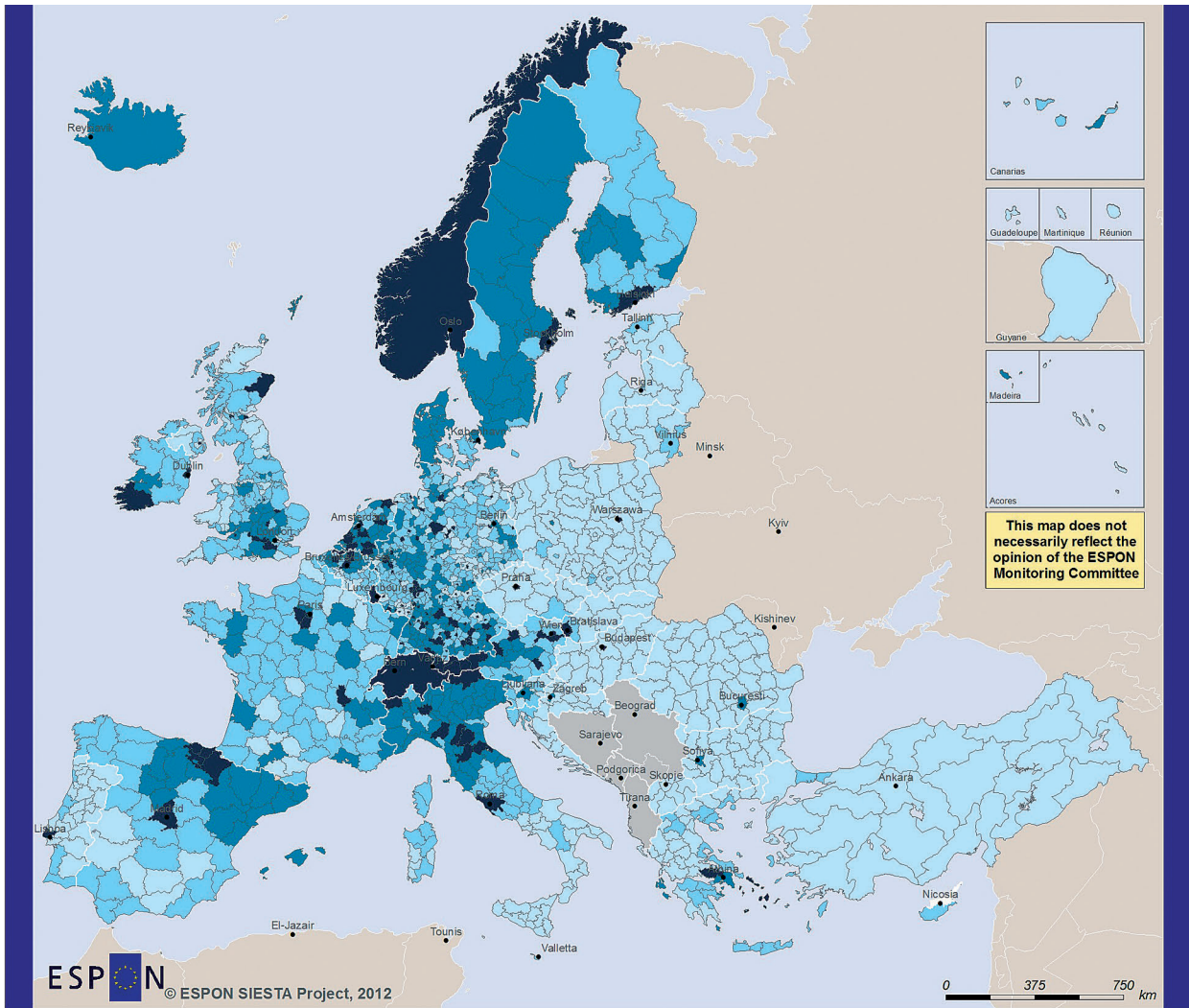http://www.bfs.admin.ch/bfs/portal/en/index. html

Data for BH11, BG12, BG13, BG21, BG22, BG23 and FI2 are not available for 2010.
This regions are shown for 2007.
TR data corresponds to 2011.
UKE1 data are not available for 2010 and are shown for 2009.

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Fig. 3. E-commerce: Individuals who ordered goods or services over the Internet for private use, 2010.

of Languedoc and the Lille-Charleroi corridor across the Franco-Belgian border (see Tables 4 and 5, Fig. 5).

When looking at these indicators, it is important to note that the data on per capita GDP and employment in Europe are only for 2009 and 2010. Therefore they do not reflect the strong impact of the crisis in the last years, particularly se-vere in Greece, Ireland, Portugal, Spain and Italy. Despite this statistical disadvantage, some corre-lation can be observed between per capita GDP, employment, and the development for the infor-mation society. As can be expected, in modern societies that generate wealth and employment there are also companies that opt for the use of ICT (see Figs 2 to 6).

PPS per inhabitant in % of EU average (EU=100) at current market prices, 2009.

- < 75%
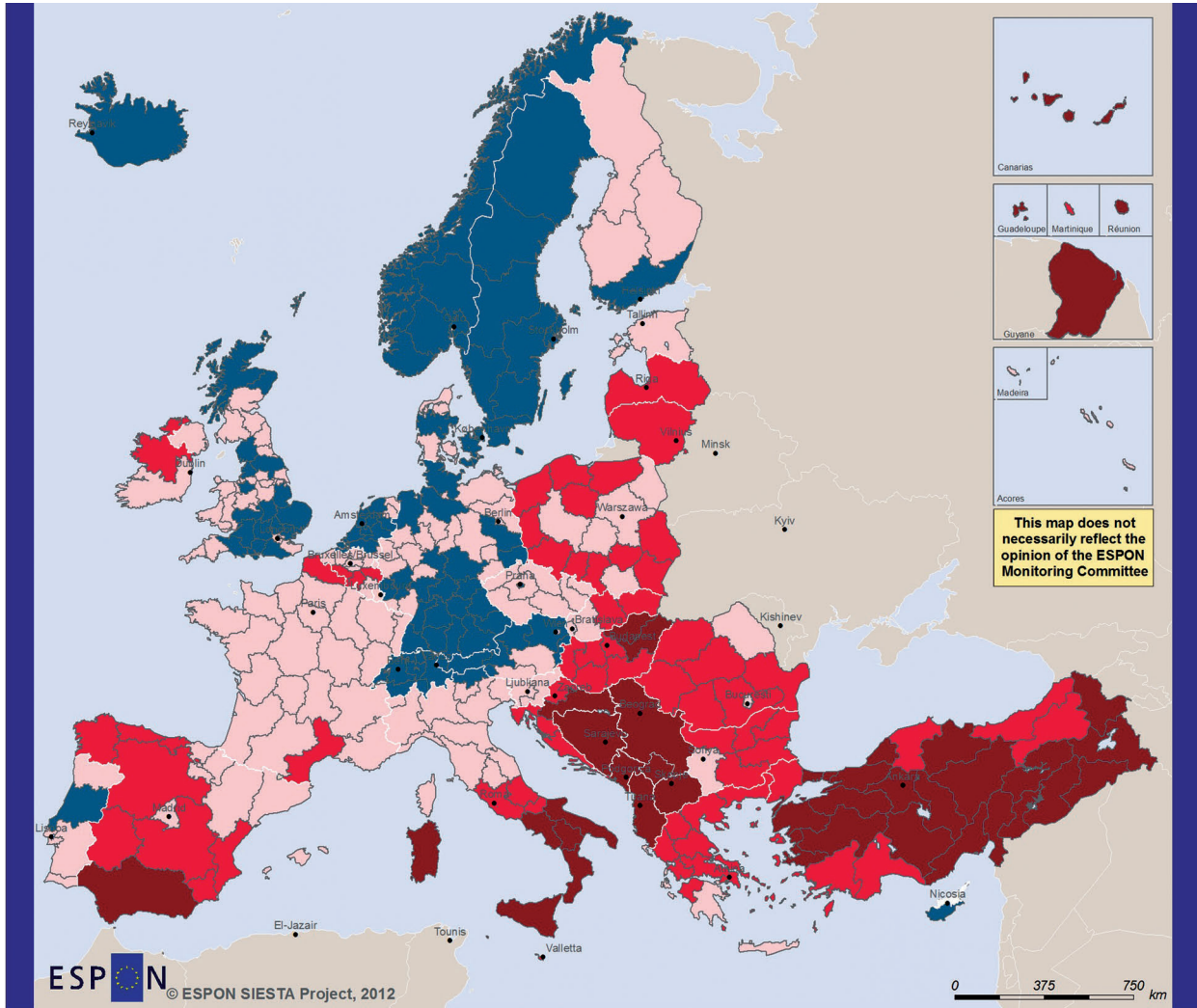- 75% - 100%
- 100% - 125%
- > 125%
- No data

Notes:
Data for ES and TR are shown for 2008.
TR is shown at NUTS2 level.
IS, NO and CH are shown at country level.

Fig. 4. Per capita GDP measured as purchasing standard per inhabitant, 2009.

An analysis of the indicator population, aged 30–34 and with university studies, repeats a similar geographical pattern (see Fig. 6). However, it introduces three 'special situations' that require a reference:

1. With the exception of Bavaria, all regions of Germany and Austria are well away from the objectives of the EU2020S, especially the Aus-

trian regions (23.5%) and all of northern Germany. In these regions, vocational training is a valid alternative to university studies, and this could explain the rates of the relatively low student population aged 30–34.

2. All Italian regions, including the North, have very low figures on the population aged 30–34 with university education (19.8%). Italy

Percentage of active population (%), 2010.
EU 2020 Target = 75%

Below EU Target

■ < 55%

■ 55% - 65%

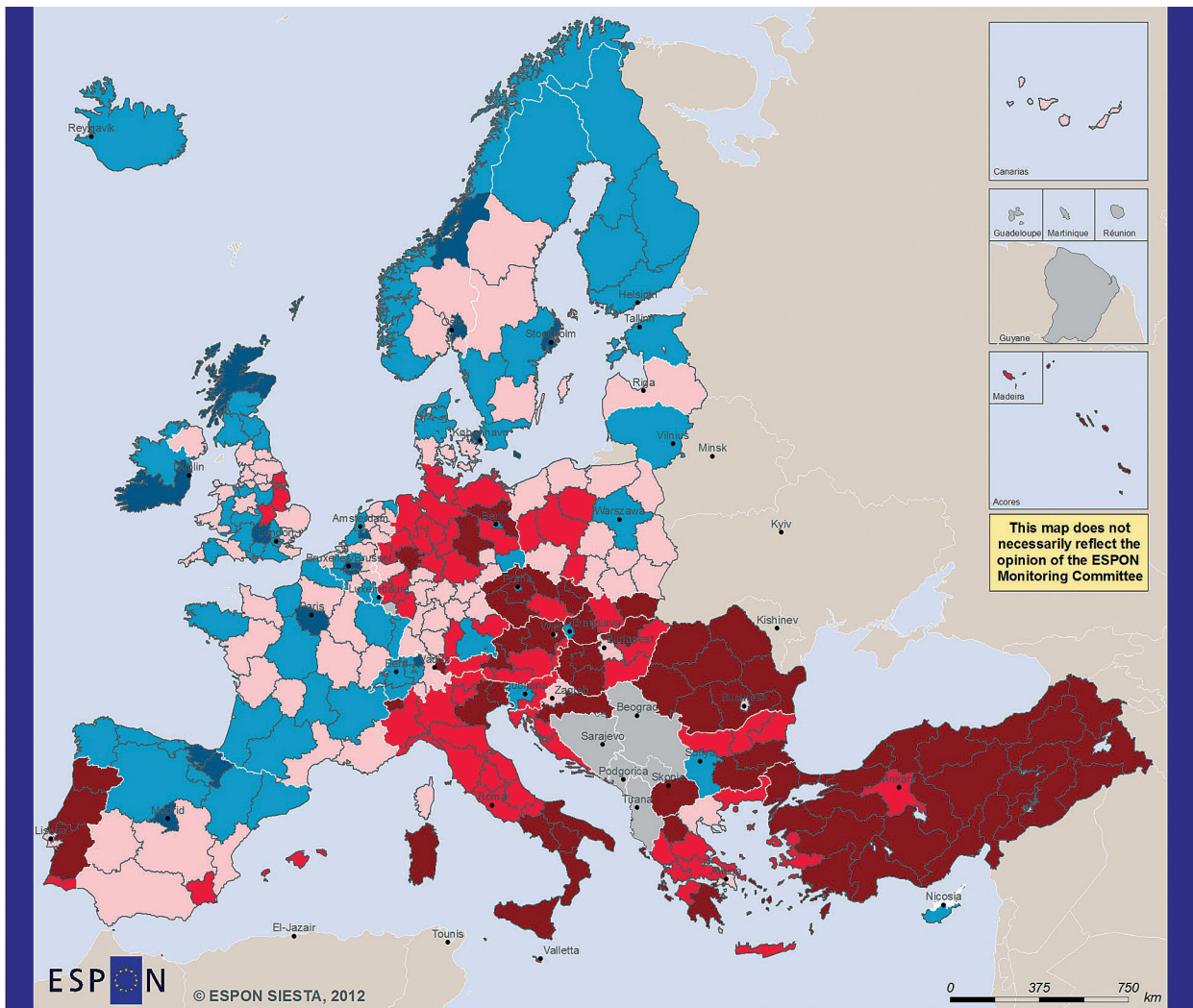□ 65% - 75%

Above EU Target

■ > 75%

Notes:
The employment rate is defined as the number of persons aged 20 to 64 in employment by the total population of the same age group.
The EU27 target is to reach a 75%.
EU27= 68.5%
Data for XK and AL are shown for 2009.

Fig. 5. Employment rate, 2010.

occupies the last position of the EU-27, just over four percentage points ahead of Turkey (15.5%). This deficit in higher education could have a negative impact on the country's economic development in the medium term.

3. The northern regions of Spain exceed the EU2020S objectives for the population aged 30–34 with a university degree, especially the commune of Madrid, the Basque Country and Navarre. However, these same regions have high youth unemployment, especially coinciding with the onset of the economic crisis, which could reflect a deep disconnection between universities and the job market demands.

**Percentage of total population aged 30-34 (%) 2010.
EU 2020 Target = 40%**

Below EU 2020 Target

- < 20%
- 20% - 30%
- 30% - 40%
- No data

Above EU 2020 Target

- 40% - 50%
- > 50%
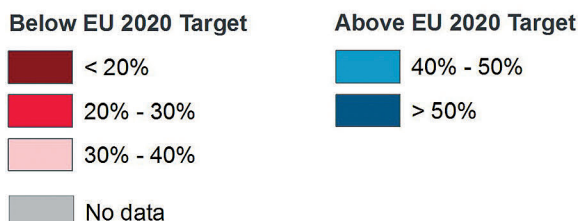
Notes:
The share of the population aged 30 - 34 years who have successfully completed university or university-like (tertiary level) education with an education level ISCED 1997 (International Standard Classification of Education) of 5-6. This indicator measures the Europe 2020 strategy's headline target to increase the share of the 30 - 34 years old having completed tertiary or equivalent education to at least 40% in 2020.

Fig. 6. Population aged 30–34 with tertiary education, 2010.

5. Conclusions and policy recommendations

The analysed data and maps concerning the Digital Agenda for Europe allow us to identify a set of main ideas, potentials and challenges in order to point out several policy recommendations.

5.1. Main ideas

Europe is progressing at different rates in turning into an information society. It is possible to note a Digital Divide between Central Europe and the Scandinavian region on the one hand and the rest of the European regions on the other. The situation is the worst in the East European regions (see Table 1: Individuals who have never used a computer, 2011).

The Digital Agenda for Europe proposes the creation of a single digital market based on fast Internet access and advanced services. The main aim is broadband access for all by 2013, but in 2010 only 61% of households accessed the Internet via broadband (see Fig. 2: Broadband penetration rate, 2006–2009).

According to the Digital Agenda for Europe, the percentage of the population buying online should surpass 50%, but in 2010 only 37% of individuals aged 16–74 bought online. E-commerce, such as advanced Internet services to purchase goods and services, is only widespread in advanced regions of Europe (see Fig. 3: E-Commerce: Individuals who ordered goods or services over the Internet for private use, 2010).

The most advanced regions in the information society are also those that have better rates of per capita GDP and employment (see Figs 2 to 6).

Rural areas in Scandinavia are a model to follow in the information society, breaking the paradigm of the Digital Divide in rural areas.

The competitiveness of European regions would definitely require their integration into the information society.

5.2. Potentials

Most European populations using the computer are also those that benefit most from the penetration of broadband and the use of advanced services over the Internet. Particularly notable are the regions of France, Benelux, Germany, the United Kingdom, Denmark, Norway, Sweden, and Finland.

The Scandinavian peripheral regions use ICT as strategic tools to overcome their geographical distance to Central Europe.

The Scandinavian regions show that developing the information society in rural areas is possible.

5.3. Challenges

Rural, mountainous, sparsely populated and/or peripheral regions usually occupy low positions in the information society as part of the phenomenon known as the Digital Divide. This geographical and technological isolation limits their competitiveness.

There are technical limitations to overcome the technological processes of the past, hindering the diffusion of ICT in certain regions, especially in Turkey.

The regions of Eastern Europe remain in positions far away from the information society. The Mediterranean regions also occupy positions lagging behind Central and Northern Europe.

Breaking the Digital Divide is a challenge for Europe.

5.4. Opportunities and policy recommendations

In the information society there is a group of people who do not use ICT despite the availability of appropriate technical means to do so (this is the difference between real and potential users). This situation exacerbates the Digital Divide.

Promotion of the use of ICT among the population requires advance planning to achieve the objectives in a reasonable time.

In many regions, the probability of a person having never used a computer decreases with the level of educational attainment. Planning the use of ICT in education can be an opportunity for the information society in Europe.

Appropriate policies for the information society should influence training (digital literacy and skills) and public awareness in the use of ICT. The projection is that as the older generations pass away, 'digital illiteracy' will become scarcer in Europe but, having said that, the education of digitally illiterate people is recommended.

E-learning represents a new way of understanding education in rural, mountainous, sparsely populated and outermost regions of Europe.

New technologies have the potential of increasing labour productivity and are strategic in R&D policy. More investment in ICT-related R&D is required by the sector.

New technologies reduce costs and save time for the public administration, citizens (e-government, online healthcare services and telework) and businesses (e-commerce).

There is an opportunity to overcome the uneven digital market of the European Union. Enterprises have the possibility of purchasing and selling electronically, but it is important to overcome the risk of low trust in networks in order to achieve a truly digital market.

New technologies promote environmental sustainability through telework diffusion (reduced commuter movement) and the construction of intelligent buildings that save energy and reduce greenhouse gas emissions.

European integration and territorial cohesion will be of benefit if ICT spread is facilitated. This phenomenon requires public and private infrastructures, training and skills in ICT, low Internet access prices, and policies promoting online interactive services. The rural regions of Scandinavia could be the reference for Europe.

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