

Digital Content SWOT Analysis

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1 Introduction

Digital content is the essence of digital economy and so called knowledge based society, since it presents the vehicle for knowledge representation, sharing, access and use over traditional physical, social, demographic, geographic, economic, etc. boundaries. Digital content is important for strengthening research efforts, studies, education and lifelong learning, as well as enhancing local and regional economies through tourist attraction, which produces businesses, jobs and revenues in a sustainable manner. Digital content and content availability is the key to unlocking new ideas and applications for the first time in history, including the involvement of everyone (and not only businesses). Because of the technological, business and social transformations that it brings, EU faces important challenges in order to embrace the benefits that digital content brings to the society. It is crucial that digital content is created, preserved and available for use in all aspects to the EU citizens and companies regardless of the technology changes that transform the content creation, and usage patterns.

Digital content in a broad way refers to the content that is stored on digital medium and used in digital form. From a production perspective it can be divided into the content that is produced by traditional media and entertainment industry (e.g. publishing, film, broadcasting, music, etc.), content produced by non-entertainment actors (e.g. industrial design, software, advertising, fashion, etc.), content produced by government related institutions (e.g. cultural, scientific, educational, health, public sector information) and internet content (web pages, blogs, digital photos/video, Web2.0, etc.,) [8]. Not all aspects of digital content are relevant for our analysis, rather we put more focus on the digital content provided, accessed and used on-line on the global digital platforms such as internet, inline with more narrow definition of e-content [7].

The scope of digital content in terms of distribution media tends to become more and more web-centric. This comes naturally from the tendency of more and more Internet usage (and users) and the (even slowly) increasing broadband coverage. As the demand for digital content and services increases, content providers, either from the public or the private sector, should meet the requirements and move towards the digital direction. Traditional media stakeholders have already recognized and embraced this trend and turned (and keep turning) to digital solutions such as digital newspapers, Internet radio, Web TV and digital bookstores. Governments turn (slowly as expected) to web-based solutions for civil services as this approach ensures economies of scale and better integration possibilities for data and services. The private sector also enters naturally to the digital era as the Web existence of a private company or organization is considered important even for profile reasons. Users on the other hand tend to share and distribute content mainly for social reasons, including personal data and experiences. In all cases, the common medium is the on-line content or e-content. E-content provides significant advantages and opportunities when compared to other media distribution approaches, as it can be easily distributed and made globally

available in interoperable forms. Many application opportunities arise from adopting the e-content approach, as both provides, users and service developers become important players and in the digital landscape, which they all form together.

Digital content theme that is the object of this analysis in a broad sense incorporates several topics dealt with in the ICT policy framework at the EU and national levels:

- Digital libraries, preservation and e-archiving
- Distributed aggregation of content
- Digitisation of cultural, educational and scientific works
- Open access and open data
- Multilingual web content management
- Intelligent Information Management
- Technology enhanced learning

Policy framework for digital content at the EU level started with adoption of eEurope2002 and eEurope2005 action plans within Lisbon agenda that aimed at supporting further and quicker development and use of internet and digital content together with other measures for building a successful information society. Initial assessment of EU status has recognised that comparing to the USA, EU has not benefited the internet development as much as it could, taking into account that it had the greatest publishing sector, large amount of cultural and educational assets together with linguistic diversity that all could be exploited in building the internet content and services. Based on policy recommendations, several programmes have been established to support creation of digital content such as eContent, eContentPlus, or eTEN. The prime focus of that policy and programmes with respect to the general content was on public sector information, targeting cultural, educational, scientific content and geographic content together with linguistic infrastructure needed for building the cross border content for common digital market. Initial assessments of the status in this area didn't focus on content per se but have been oriented into more generic internet penetration and general e-economy measurements such as number of internet hosts and ISPs, etc.. First attempt to show more direct content related picture has been done in 2003 within eEurope2002 benchmarking report [1] where the first attempt of measuring the volume and importance of local indigenous content at the EU level has been done. It showed that on average local content presented around 50% of the 50 most popular sites in specific EU country, around 37% originated from USA and around 11% from other EU country. On the other side, no EU content has been rated in the 50 most popular sites in USA. Since this report covered only Austria and Greece from SEE region, that at that time were members of EU, not much evidence for the whole SEE region can be drawn from it apart from general constellation that USA content has been important source of content also in SEE region. Local content has also been very important, but there was almost no intra SEE market.

After this initial period with internet bubble burst at the beginning of the millennium, rapid globalisation of ICT industrial and market activities and ICT convergence connected to rapidly

evolving internet technology has brought the platform not only for the future technological, but even more important business and societal transformation that has become one of the most important driver for further development and growth. EU policy has tried to reflect this new situation and set its priorities in renewed Lisbon strategy for growth and jobs in emphasising the innovation and competitiveness as important focus. One of the most important milestone on this path represented so called Aho report [3] that proposed to step out of the narrow definition of R&D policy and set the broader innovation framework taking into account the globalisation challenges of EU. It proposed structural changes for building innovation friendly markets for business as a driver for investment in research and innovation by joining supply side actions with creation of demand for innovative products and services, in particular digital. Report has proposed some of the high potential areas that should be exploited including Digital Content.

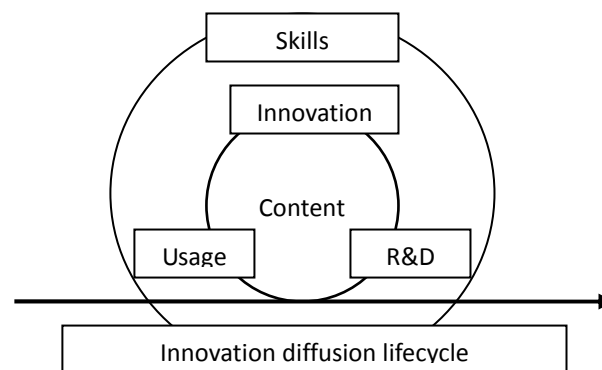
Innovation strategy has been set up [4] and ICT policy has been revised accordingly in the i2010 strategy [5], which included actions for building digital market, enhancing both research and innovation investment and building demand side ICT services areas. For streamlining technological areas, instruments such as technology platforms have been promoted that would enhance partnership of research and industrial stakeholders in technological areas where EU has capacity to lead the market. Digital content has been covered in at least two ETPs, namely ETP for network software and services (NESSI) and network and electronic media (NEM).

This setup for larger innovation framework has been supported by several support policy instruments where 2 most important at the EU level are Framework programme 7 (FP7) for support of research and development activities and Competitiveness and Innovation Framework programme (CIP) for support of innovation related activities. New ICT R&D strategy [6] has raised the explicit need for tackling both provision and demand side in its push-pull strategy in order to cover all innovation diffusion lifecycle. The clear message was that ICT as an pervasive technology needs a clear demand side strategies and support actions in order for EU to benefit the relatively high and successful R&D results for economic growth. This is even more important in case of digital content area where in addition users can play crucial part not only as traditional consumers but as active participants in innovation efforts, specially taking into account non-technological innovations. Participative web, which has brought some of the most important and successful internet services today, is based on user participation and critically relied on availability of their user created content. In order to assess the present situation and future of digital content technological area, it is clear that user aspect and their active role cannot be regarded separately from traditional knowledge triangle framework.

Policy framework for dealing with digital content needs to work on different issues in order to assure consistent and effective framework. Several areas need to be taken into account as proposed by OECD framework [8]: technological area supporting R&D and innovation,

infrastructure area for digital content delivery and regulatory environment for content creation and use (e.g. IPR), business models that ensured non-discriminatory framework environment, government role as producer and user of content (e.g. use and re-use of public sector information) and policy monitoring. Taking this into account, our assessment of strengths and weaknesses will thus be based on the assessment framework as shown on Figure 1.

Figure 1: Digital content assessment framework



SEE countries have been involved in the EU policy framework in different timeframes that was mainly dependent on the accession status of individual country. No much data is available outside the EU policy framework that could be used for SEE region analysis and comparison. This report will be based mainly on available data from EU information society policy benchmarking in order to evaluate the regional view of the digital content area.

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Questions for experts:

1. Is theme digital content important for further development of the national/regional research/business environment?
2. Are topics identified important for further development of the national/regional research/business environment?
3. What is the role of local content stakeholders in further development of the national/regional research/business environment (research, business, education, use, content creation, government)
4. Scope of digital content that is relevant for the SEE region:
 - On-line (e-content)/of-line (CD, DVD, etc.)
 - Traditional entertainment media (TV, radio, newspapers, books, films, music,)
 - PSI
 - User generated content
5. What are the main ICT technological trends in the area of digital content and corresponding identified topics?
6. What are the main market trends in the area of digital content (mobile apps, gaming, cloud computing)?
7. Is holistic view on whole innovation cycle needed in order to build excellent local research/innovation/use of digital content?
8. Can we have excellent research/business without having proper supportive local environment and rely instead on global environment?
9. Is regional – SEE view possible and relevant in order to build excellent research/innovation/use of digital content?
10. Is there a demand for new e-content/innovative e-services/apps in the region?

11. Internet and digital content change traditional models of consumption/creation of information/content, interaction/communication, learning, researching, doing business. What opportunities are there for national/regional stakeholders? How to connect?
12. What are current main research issues in the digital content area and corresponding topics? How the digitalization itself will happen? Means who will do it, how, with what tools and processes, where the money and the skilled workforce will come? Do we expect organically all the cultural heritage to move to digital?
13. What are current main issues in development of EU market for digital content (IPR, privacy, consumer regulation, confidence, etc.)?
14. What is the role of government in facilitating further development of excellent research in digital content?
15. What is the role of government in facilitating further development of excellent business opportunities in digital content?
16. What is the role of search engines regarding digital content distribution?
17. How the internet of things will or affects digital content?
18. What are regional obstacles to move local content to global perspective?

2 PESTLE analysis

2.1 *Political factors*

The purpose of the Europe 2020 Strategy is to improve conditions and access to finance for research and innovation and to ensure that innovative ideas can be turned into products and services that create growth and jobs. Consequently Europe should develop its own distinctive approach to innovation. Europe 2020 focuses on innovations that address the major societal challenges identified in Europe 2020 [1].

The five main targets of the Europe 2020 strategy are:

- 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 / energy: greenhouse gas emissions 20% lower than 1990, 20% of energy from renewables, 20% increase in energy efficiency
- Education: Reducing school drop-out rates below 10% at least 40% of 30-34-year-olds completing third level education
- Poverty / social exclusion: at least 20 million fewer people in or at risk of poverty and social exclusion

The European Commission has proposed to spend almost 9,2 billion EUR from 2014 to 2020 on pan-European projects to give EU citizens and businesses access to high-speed broadband networks and the services that run on them. The funding would take the form of both equity and debt instruments and grants. It would complement private investment and public money at local, regional and national level and EU structural or cohesion funds. At least 7 billion EUR would be available for investment in high-speed broadband infrastructure [2].

Regarding the digital libraries the EU is requesting for further efforts for all member states for ratification of a common digital library. Libraries in EU countries contain more than 2.5 billion books, however merely about 1% of archival material is available in digital form. Despite member states have made significant progress in making cultural content accessible on the Internet, more public and private investments are needed to speed up digitisation. The European commission should have provided 120 million euros in the last two years for the EU digital library, Europeana. However, EU member states were asked to provide additional funding for digitisation as the money allocated by the commission is not sufficient. The total cost of digitizing 5 million books has namely been estimated at approximately 225 million euros [10].

The concern that most EU countries still lack methods, technologies and experience for the preservation of digital material has also been expressed. Further, there is also a need to implement common standards in order that different information sources and databases can be used by the digital library. Lastly, the European commission emphasised that there is

currently a gap between the objects which have been digitised and their online accessibility [10].

Europeana gives direct access to more than 19 million digitised objects and merely 2% of these objects are sound or audio-visual material. Increasing the content that is accessible through Europeana, including types of material that are currently underrepresented, will make the site more interesting for the users, and should therefore be encouraged. The overall target of 30 million objects by 2015 is still in line with Europeana's strategic plan, and also in line with getting Europe's entire cultural heritage digitised by 2025 [3].

The indicative targets for minimum content contribution to Europeana for selected SEE countries and their level of fulfilment are presented in Table 1.

Table 1: Indicative targets for minimum content contribution to Europeana per member state

	Number of objects in Europeana	Indicative Target 2015**	Achieved (in %)
Austria	282.039	600.000	47%
Bulgaria	38.263	267.000	14%
Greece	211.532	618.000	34%
Hungary	115.621	417.000	28%
Romania	35.852	789.000	5%
Slovenia	244.652	318.000	77%

Source: Eurostat

In

Table 2 the R&D expenditures including all expenditures for R&D performed within the business enterprise sector on the national territory during a given period, regardless of the source of funds are presented. Despite the economic and financial crisis the percentage of GDP for research and development remains stable and is slowly increasing almost in all selected SEE countries. However, due to the decreased GDP in the last years in SEE economies, the absolute expenditures for R&D are decreasing.

Table 2: Research and development expenditure as a percentage of GDP

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
EU (27 countries)	1,9	1,9	1,9	1,9	1,8	1,8	1,9	1,9	1,9	2,0	2,0
Bulgaria	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0,6
Greece		0,6		0,6	0,6	0,6	0,6	0,6			
Hungary	0,8	0,9	1,0	0,9	0,9	0,9	1,0	1,0	1,0	1,2	1,2
Austria	1,9	2,1	2,1	2,2	2,2	2,5	2,4	2,5	2,7	2,7	2,8
Romania	0,4	0,4	0,4	0,4	0,4	0,4	0,5	0,5	0,6	0,5	0,5
Slovenia	1,4	1,5	1,5	1,3	1,4	1,4	1,6	1,5	1,7	1,9	2,1

Source: Eurostat

In 2010, R&D intensity (R&D expenditure as a percentage of GDP) in the EU-27 remains at 2%, which is below the 3% target set for 2010 by the Lisbon strategy. The 3 % target will be maintained for the next ten years as one of the five key targets of the Europe 2020 strategy. R&D intensity in the EU was below that in Japan (2008: 3,45%), South Korea (2008: 3,36%) and the United States (2008: 2,79%), but higher comparing to China (1,47%) in 2008. Between EU member states, only Finland (3.87 %), Sweden (3.42 %) and Denmark (3.06 %) exceeded the goal of devoting 3 % of GDP to R&D [7].

Selected SEE countries profiles

The data for the countries below are gathered from the Digital Agenda Scoreboard [5]. Overall, from the profiles below it is evident that in SEE countries with the exception for Austria, the penetration growth rates are below the EU average.

Austria

In January 2012, the penetration rate of fixed broadband was 26,4% of the population, up 2,5 percentage points year-on-year, but still 1,3 p.p. below the EU average of 27,7%. Austria presents the fastest penetration growth rate in the EU. In 2009, business expenditure on R&D in the ICT sectors amounted to 633 mio €, down from 714 mio € the year before, resulting in an R&D intensity of 7,4% of sectorial value added, equally down from 8% in 2008. The share of ICT in total business expenditure on R&D is fairly low, at just above 10%, and public support for ICT R&D was around 11% of total public funding for R&D, which amounted to 0.84% of GDP, above the EU average.

Bulgaria

In January 2012, the penetration rate of fixed broadband was 16% of the population, up 1,1 percentage points year-on-year but still 11,7 percentage points below the EU average. Bulgaria is the second country with the lowest penetration level and its year-on-year growth rate was close but below the EU growth rate of 1,2 percentage points. The low penetration could be a result of the Bulgarian specifics in that area. The widely used public LAN access in

Bulgaria is not taken into account by the current EU methodologies and as a result is not included in the official numbers. If LAN access is included in the methodology one could assume that the Bulgarian position on this indicator would be significantly better (CSD, 2010) In 2009, business expenditure on R&D in the ICT sectors amounted to 7 mio €, down from 10 mio € the year before, resulting in an R&D intensity of 0,5% of sectorial value added, equally down from 0,8% in 2008. All of these figures are extremely low compared to the EU average. The share of ICT in total business expenditure on R&D is fairly low, at just above 13%, and public support for ICT R&D was a negligible share of total public funding for R&D, which amounted to 0,32% of GDP, among the lowest in the EU¹

¹ It could be assumed that **many ICT enterprises in Bulgaria do not register their RTDI activities through** registering patents with Bulgarian authors (CSD, 2010) or through properly reporting the RTDI expense into the National Statistical Institute (Yalamov & Bougiouklis, February 2011). As a result the statistics on RTDI could be assumed as underestimated.

Greece

In January 2012, the penetration rate of fixed broadband is 21.8% of the population, up 1.8 percentage points (p.p.) year-on-year but still 5.9 p.p. below the EU average of 27.7%. Greece, with a 1.8pp year-on-year growth rate, is the fourth top country above the EU average growth of 1.2 p.p. In 2009, business expenditure on R&D (BERD) in the ICT sectors amounted to 57 mio €, down from 74 mio € the year before, resulting in an R&D intensity of 0.7% of sectorial value added, down from 1% in 2008. The share of ICT in total BERD is low average, at just under 15%.

Hungary

In January 2012, the penetration rate of fixed broadband was 22,1% of the population, up 1,6 percentage points year-on-year but still 5,6 percentage points below the EU average. In 2009, business expenditure on R&D in the ICT sectors amounted to 110 mio €, sharply up from 76 mio € the year before, resulting in an R&D intensity of 2,3% of sectorial value added, equally much higher than the 1.4% in 2008. The share of ICT in total business expenditure on R&D is close to the EU average, at slightly below 20%, but public support for ICT R&D was only around 7% of total public funding for R&D, which amounted to 0,48% of GDP, below EU average.

Romania

In January 2012, the penetration rate of fixed broadband was 15,2% of the population, up by 1,2 percentage points year-on-year but still 12,5 percentage points below the EU average. Romania is the country with the lowest penetration level in the EU and its penetration growth rate is the same as the EU average rate. In 2009, business expenditure on R&D in the ICT sectors amounted to 36 mio €, three times as much as the 12 mio € the year before, resulting in a R&D intensity of 0,7% of sectorial value added, after 0,2% in 2008. The share of ICT in total business expenditure on R&D is average, at above 15%, and public support for ICT R&D was roughly 4% of total public funding for R&D, which itself amounted to 0,28% of GDP, far below the EU average.

Slovenia

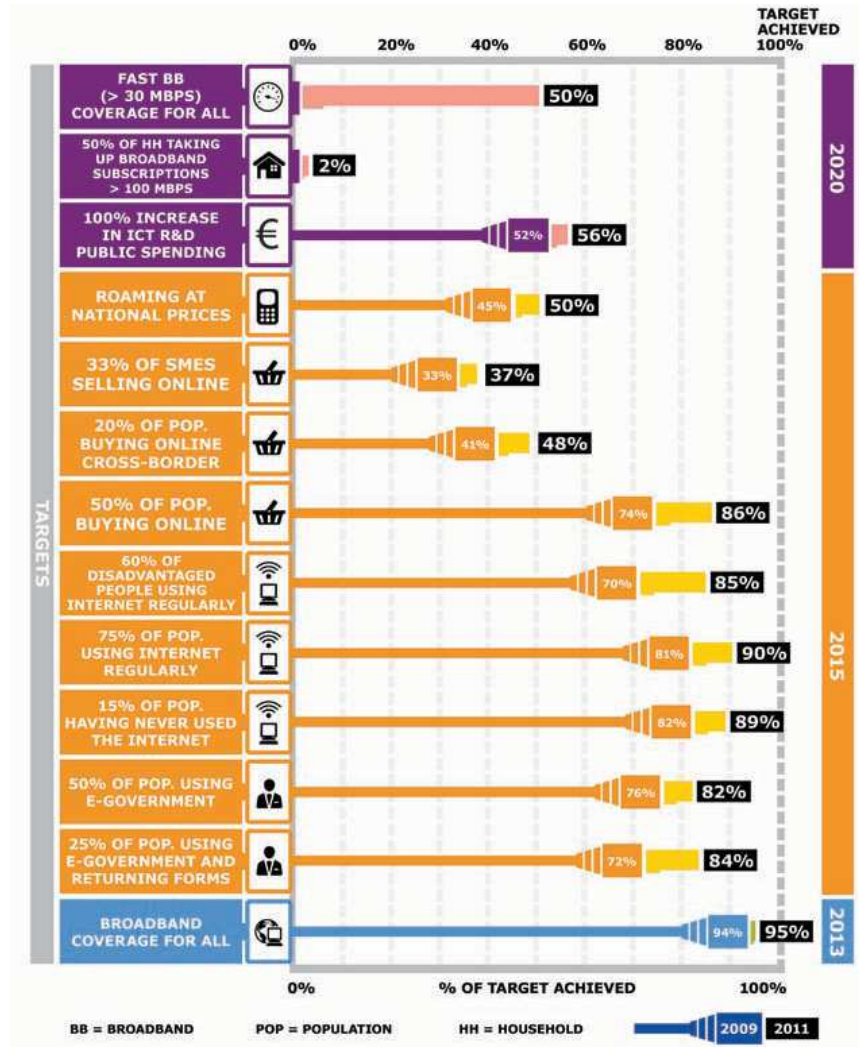
In January 2012, the penetration rate of fixed broadband was 24.6% of the population, up 0.4 percentage points year-on-year but still 3.1 percentage points below the EU average. Slovenia is both below the EU penetration average level and is the second country with the slowest penetration growth rate. In 2009, business expenditure on R&D in the ICT sectors amounted to 49 mio €, nearly unchanged from 48 mio € the year before, resulting in an increased R&D intensity of 4,4% of sectorial value added, after 3,9% in 2008. The share of ICT in total business expenditure on R&D is low, at just above 10%, and public support for ICT R&D was roughly 10% of total public funding for R&D, which itself amounted to 0,75% of GDP, very close to the EU average.

Figure 2 presents how the overall EU scores on the Digital Agenda targets. The specific objectives demonstrated to determine progress towards the goals are:

- Broadband coverage for all
- 50% of citizens buying online
- 20% of citizens buying online cross-border
- 33% of SME's buying online
- 33% of SME's selling online
- 75% internet regular use
- 60% internet use by disadvantaged groups
- 85% internet use
- 50% of citizens using eGovernment
- 25% of citizens using eGovernment and returning forms
- 11bn R&D in ICT public spending in 2020
- 50% of households have subscriptions larger than 100 Mbps (2020)
- 100% coverage of larger than 30 Mbps (2020)

In some areas the progress is evident, however the progress is not large enough to meet the Digital Agenda targets. For example, despite the economic slowdown, there has been growth in public investment in R&D, but not strong enough to hit the target in 2020 [4].

Figure 2: EU scores on the Digital Agenda targets



Source: Digital Agenda Scoreboard

Digital competences and literacy have been included as priorities in the new proposal for the European Social Fund. While 67% of the EU citizens uses internet every week and 56% every day, in 2011 a quarter of the population had still never used internet. Therefore, the largest remaining challenge is to stimulate the rest EU citizens to use internet since countries with higher rate of internet users tend to have a higher rate of people with high digital skills. Non-users mainly involve older and the less educated individuals in all member states, as well as large proportions of the general population in less connected countries (like Bulgaria, Greece, Italy, Portugal and Romania). The Digital Agenda thus aims to challenge this digital divide, also by prioritising digital literacy and competence under the European Social Fund. Funding from the European Social Fund can be a powerful tool to improve digital skills and literacy across the EU [6].

2.2 Economic factors

The global financial crisis has affected most of the SEE economies, as the real GDP growth was negative in 2009 to regain only a part of the growth momentum in 2010, as it is shown in Table 3. Recent years are still not promising regarding the GDP growth; however from the forecast for 2013 it seems that GDP will have positive growth in all SEE economies.

Table 3: Gross domestic product at market prices - percentage change on previous period

	2006	2007	2008	2009	2010	2011	2012**	2013**
EU (27 countries)	3,3	3,2	0,3	-4,3	2,1	1,5	0,0	1,3
EU (15 countries)	3,1	3,0	0,0	-4,4	2,1	1,4	-0,2	1,2
Bulgaria	6,5	6,4	6,2	-5,5	0,4	1,7	0,5	1,9
Greece*	5,5	3,0	-0,2	-3,3	-3,5	-6,9	-4,7	0,0
Hungary	3,9	0,1	0,9	-6,8	1,3	1,6	-0,3	1,0
Austria	3,7	3,7	1,4	-3,8	2,1	2,7	0,8	1,7
Romania	7,9	6,3	7,3	-6,6	-1,6	2,5	1,4	2,9
Slovenia	5,8	7,0	3,4	-7,8	1,2	0,6	-1,4	0,7
Montenegro	8,6	10,6	6,9	-5,7	2,5	2,8	0,4	2,0

(*provisional; **forecast)

Source: Eurostat

The same is evident from the Table 4 showing gross domestic product in million EUR per capita in Purchasing Power Standards.

Table 4: Gross domestic product per capita in Purchasing Power Standards

	2006	2007	2008	2009	2010	2011
EU (27 countries)	23.700	25.000	25.000	23.500	24.500	25.200
Bulgaria	3.400	4.000	4.600	4.600	4.800	
Greece	18.700	19.900	20.700	20.500	20.100	19.000
Hungary	8.900	9.900	10.500	9.100	9.700	10.100
Austria	31.300	33.000	33.900	33.000	34.100	35.700
Romania	4.500	5.800	6.500	5.500	5.800	
Slovenia	15.500	17.100	18.400	17.400	17.400	17.600

Source: Eurostat

Another aspect of the economic profile that can potentially interrupt future developments concerning innovation and the RTDI system is the degree of extroversion or introversion of the economy demonstrated by trade indicators. Table 5 presents the external balance of goods and services which refers to the difference between exports of goods and services and imports of goods and services. If positive, the economy exports more goods and services than it imports, and vice versa.

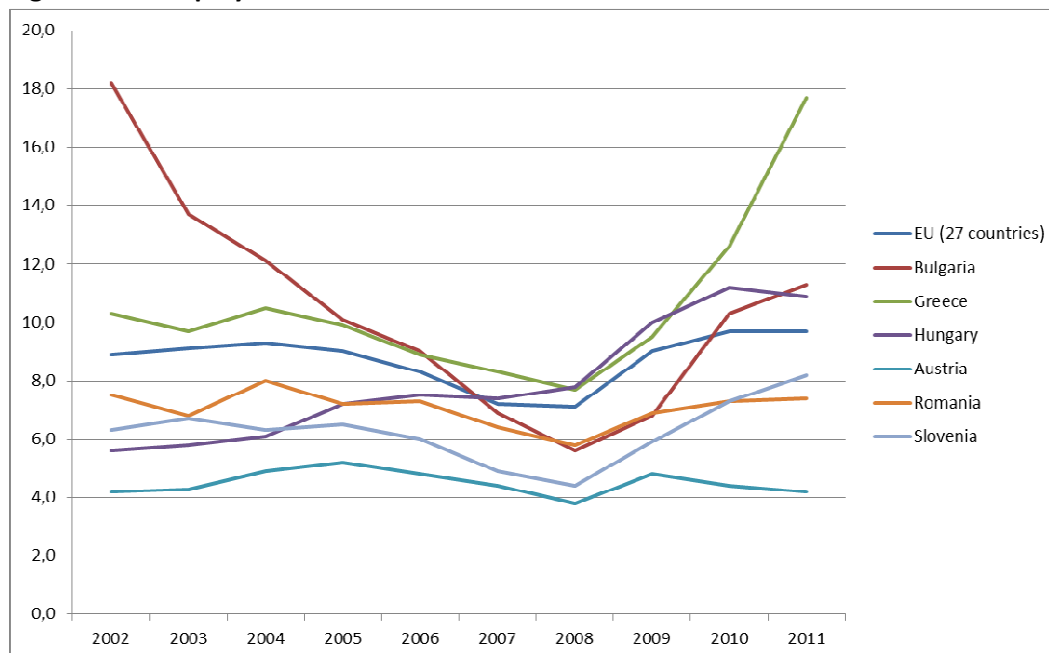
Table 5: External balance of goods and services, current prices (in million EUR)

	2009 Q4	2010 Q1	2010 Q2	2010 Q3	2010 Q4	2011 Q1	2011 Q2	2011 Q3	2011 Q4	2012 Q1	2012 Q2
EU (27 countries)	40.085	27.634	26.050	31.926	31.593	30.975	28.228	39.916	48.172	49.144	54.593
Bulgaria	-377	-656	-484	27	-122	-21	-263	-148	85	-511	
Greece	-6.548	-6.068	-4.854	-4.550	-4.001	-4.185					
Hungary	1.444	1.632	1.495	1.477	1.715	1.844	1.994	1.872	1.722	1.791	2.013
Austria	2.889	2.666	2.943	2.843	2.440	2.320	2.267	2.264	2.389	2.444	2.389
Romania	-1.594	-2.163	-1.890	-1.491	-1.061	-1.757	-2.145	-2.040	-1.240	-1.923	-1.754
Slovenia	140	144	-27	58	-64	7	4	96	267	174	414

Source: Eurostat

In Figure 3 unemployment rates representing unemployed persons as a percentage of the labour force are depicted. Except for Austria, which is having quite stable and low unemployment rate, all selected SEE countries are facing with growing unemployment rates.

Figure 3: Unemployment rates in selected countries



Source: Eurostat

Considering the unemployment rates by level of education it is evident that the rates are increasing also for the population completed the first or second stage of tertiary education where generally the lowest unemployment rates exist. The unemployment growth rate is lower comparing to overall unemployment rate, however the rates are except in Austria quite high as it is evident from Table 6.

Table 6: Unemployment rates at first and second stage of tertiary education

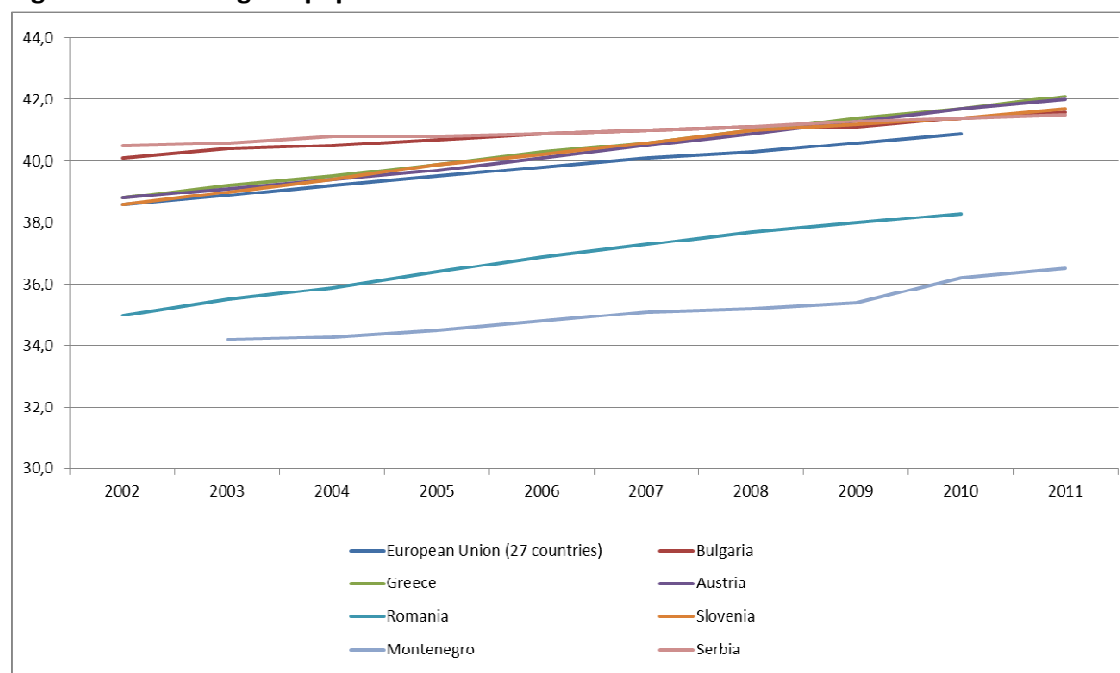
	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
EU (27 countries)	4,7	4,9	5,1	5,0	4,6	4,0	3,8	5,0	5,4	5,5
Bulgaria	8,2	6,8	5,8	4,3	4,0	2,4	2,3	2,9	4,5	5,0
Greece	7,1	6,8	7,8	7,8	7,2	7,0	6,3	7,4	9,8	14,0
Hungary	1,7	1,4	2,2	2,7	2,8	2,9	2,8	4,0	4,7	4,4
Austria	1,8	2,4	3,0	2,7	2,6	2,5	1,7	2,3	2,4	2,4
Romania	4,0	3,3	3,1	3,9	3,8	2,9	2,7	4,3	5,4	5,1
Slovenia	2,5	3,7	2,8	3,2	3,2	3,3	3,4	3,2	4,3	4,9

Source: Eurostat

2.3 Social factors

As it is evident from the Figure 4 the median age of population was above 40 in 2010 in all SEE countries except in Montenegro and Romania. Further, it is common for all SEE countries that the median age is growing with approximately the same growth rate, indicating that populations in these countries are slowly ageing.

Figure 4: Median age of population



Source: Eurostat

The same is evident from the Table 7 showing the proportion of population aged 65 and over as a % of the total population. In the last 10 years in all analysed countries the proportion of people over 65 years increased.

Table 7: Proportion of population aged 65 and over

	2000	2001	2002	2003	...	2007	2008	2009	2010	2011
EU (27 countries)	15,6	15,8	16,0	16,2	...	16,9	17,1	17,2	17,4	
Bulgaria	16,2	16,3	16,9	17,0	...	17,3	17,3	17,4	17,5	17,7
Greece	16,5	16,8	17,2	17,5	...	18,6	18,6	18,7	18,9	19,3
Hungary	15,0	15,1	15,3	15,4	...	15,9	16,2	16,4	16,6	16,7
Austria	15,4	15,4	15,5	15,4	...	16,9	17,1	17,4	17,6	17,6
Romania	13,2	13,5	13,9	14,2	...	14,9	14,9	14,9	14,9	
Slovenia	13,9	14,1	14,5	14,8	...	15,9	16,3	16,4	16,5	16,5
Montenegro				11,7	...	12,9	12,9	13,0	12,7	12,6

Source: Eurostat

The population in Europe is clearly becoming older. The EU Commission stressed in the Europe 2020 strategy the importance of healthy and active ageing. The year 2012 is "The European Year of Active Ageing and the Solidarity between Generations. The European year should help raising awareness, generating innovative approaches and disseminating good practices. Thus all generations are asked to act together and also to learn, to produce and share knowledge. In the digital knowledge society, technology and social media should not divide, but rather promote interrelation amongst generations [8].

Further, promoting access of older persons to education and to ICT and thus updating skills by providing access to lifelong learning should help them to remain active and involved in the society. ICT enhanced learning should have an important place in lifelong learning. Nevertheless, the electronic media use is more frequent and intensive since media and the internet makes it easier to maintain contact with relatives and friends. However, it is important to avoid exclusion and marginalisation of older persons by lowering the access barriers to ICT enhanced learning and other educational obstacles [8].

With regards to multilingual web content it is generally considered that English is and will continuously be the main language of the Internet and perhaps also of the world. Thus, it is often incorrectly assumed that English language will always be the lingua franca of the Internet [12].

English is the third largest language with slightly more than 300 million native speakers today [9], however it has been estimated [14] that English will become one of four languages with around 520 million native speakers in 2050 and the other three languages being Hindi, Spanish and Arabic. Furthermore, as English-speakers on a global basis have a relatively low birth rates, the global proportion of native English-speakers is expected to shrink from over 8% in 1950 to less than 5% in 2050 [14].

It is knowledgeable from satellite television which is an area more mature than the Internet that viewers want television programming in their local language [13]. Therefore, as internet

access continues to diffuse, the situation should not be different regarding the language that internet users would prefer for web pages and e-mail conversations [11]. Furthermore, it has been shown that more than 50% of the internet users speak a native language that is not English and that web users are up to four times more likely to purchase from a site that communicates in their native language [12]. Since EU is allowing the free flow of goods and people the multi-lingual content management is considerably important. It is especially the case with regards to the immigration.

Considering migration in SEE region, there are no significant changes in the last years and the numbers are quite stable as it is evident from Table 8. The table is showing the total number of long-term immigrants into and long-term emigrants from the selected countries during the reference year.

Table 8: Immigration and emigration in selected SEE countries

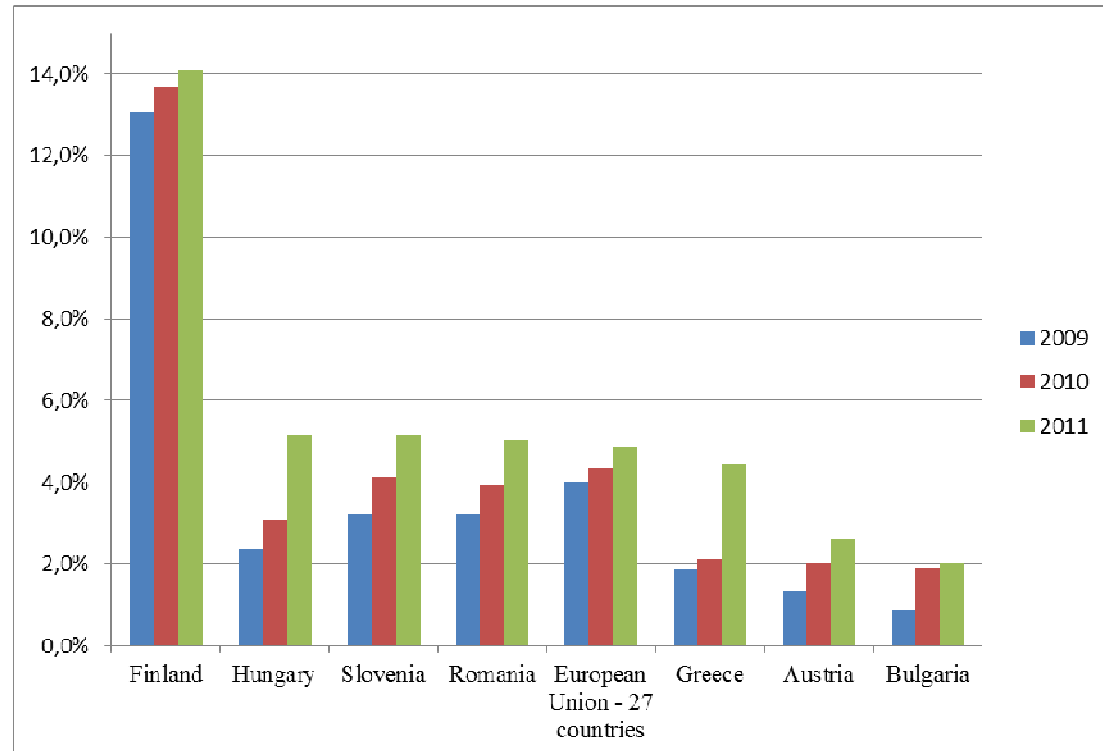
<i>Immigration</i>	<i>2000</i>	<i>...</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>
EU (27 countries)		...	3.300.000	3.500.000	4.000.000	3.800.000		
Bulgaria		...			1.561	1.236		
Greece		...						119.070
Hungary	21.726	...	27.820	25.732	24.361	37.652	27.894	
Austria	81.676	...	114.465	98.535	106.659	110.074	73.278	73.863
Slovenia	6.185	...	15.041	20.016	29.193	30.693	30.296	15.416
<i>Emmigration</i>	<i>2000</i>	<i>...</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>	<i>2010</i>
EU (27 countries)		...				2.314.700		
Bulgaria		...			2.958	2.112		
Greece		...						119.985
Hungary	2.540	...	3.658	4.314	4.500	9.591	10.483	11.103
Austria	64.472	...	70.133	74.432	71.928	75.638	56.397	51.968
Slovenia	3.570	...	8.605	13.749	14.943	12.109	18.788	15.937

Source: Eurostat

2.4 Technological factors

With regards to e-Learning, the percentage of population doing an online course is increasing in the last three years as it is evident from the Figure 5, however the percentage in selected SEE countries is considerably lower comparing to Finland, a country with the highest percentage. Yet, the percentage in SEE countries is at the Europe average level.

Figure 5: Percentage of population doing an online course (in any subject)

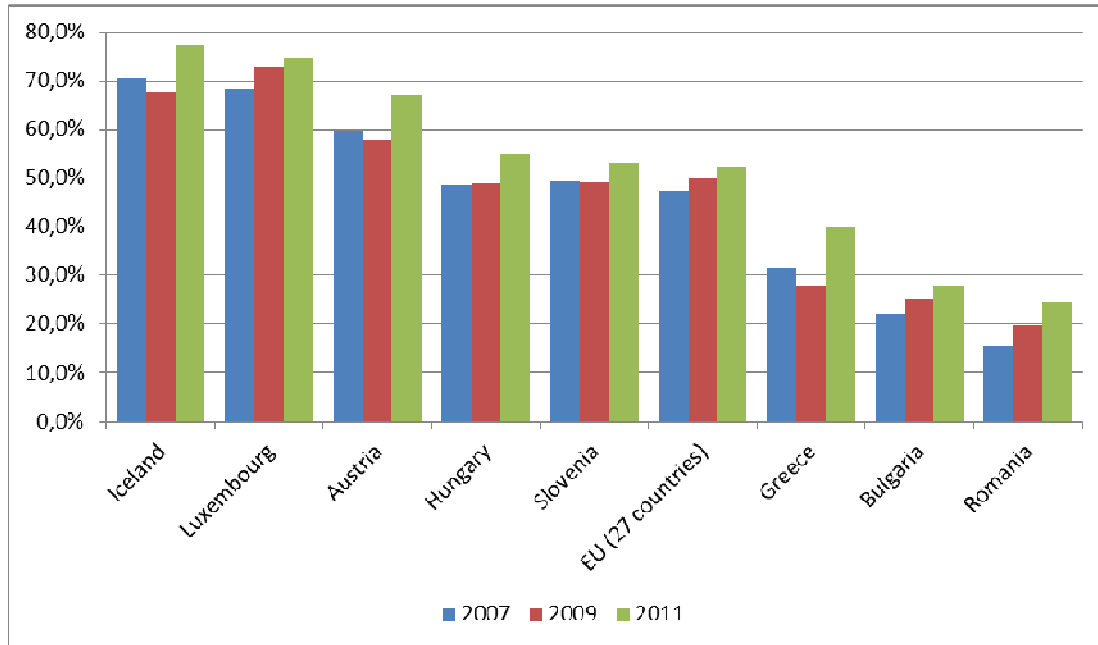


Source: Eurostat - Community survey on ICT usage in Households and by Individuals

It seems that SEE countries, except for Bulgaria and Romania have individuals with adequate computer skills, since there are not important differences comparing to countries with the highest percentage of individuals with medium or high computer skills (Iceland and Luxembourg). This percentage has also been increasing in the last years as it is evident from the Figure 6 signifying that the skills are improving. With respect to SEE, we can see that level of ICT skills are highest in Austria with quite large differences other SEE countries. Overall it seems that region has critical mass of ICT skills comparing to EU27 average, but the main question is if the trend will be improved or worsened.

However this measure may be quite subjective. Thus, in the Figure 7 a percentage of individuals who have written a computer program using a specialised programming language or created a Web page is presented as another indicator of possessing ICT knowledge and skills.

Figure 6: Percentage of individuals with medium or high computer skills

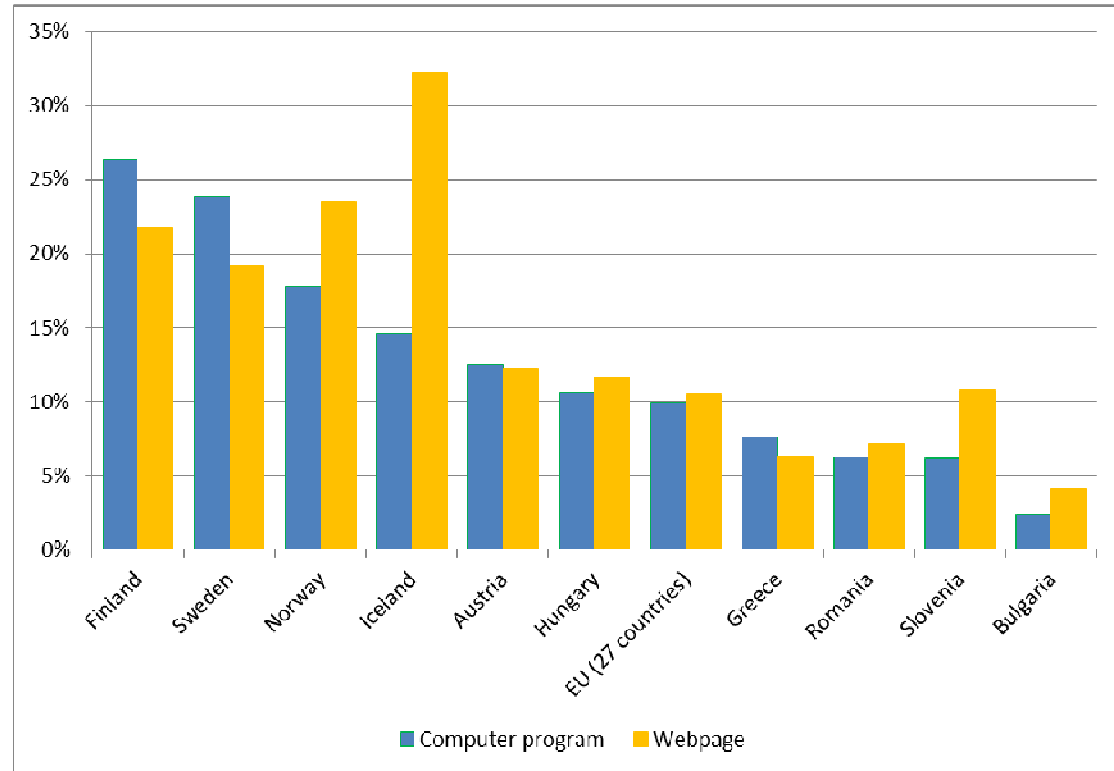


Source: Eurostat - Community survey on ICT usage in Households and by Individuals

Figure 7 is showing that selected SEE countries are positioned much lower with regards to the percentage of individuals who have written a computer program or created a Webpage when comparing to the countries with the highest percentage (Finland, Sweden, Norway and Iceland).

Interesting to see is that distribution of more specific development skills does not translate equally from overall ICT skills. Average difference between SEE and EU27 are larger here, but Slovenia and Bulgaria seem to have relatively lower share of software development skills, Bulgaria also in the area of web development.

Figure 7: Percentage of individuals who have written a computer program using a specialised programming language or created a Web page



Source: Eurostat - Community survey on ICT usage in Households and by Individuals

2.5 Legal factors

Despite recent efforts at the EU level to improve regulations regarding privacy and data protection, the current legal frameworks are fragmented and remain uncertain throughout the area. Privacy and IPR laws are enforced at the national level. There is also a fragmented network of regulations regarding the telecommunication market.

Relevant EU directives currently consist of: protection of individuals with regard to the processing of personal data by competent authorities, electronic communication networks and services and cooperation between national authorities, the retention of data generated or processed in connection with the provision of publicly available electronic communications etc.

Another important aspect of the digital content is the copyright legislation. The Directive on copyright in the information society (2001/29/EC) harmonises the rights of reproduction, distribution, communication to the public, the legal protection of anti-copying devices and rights management systems. Particular novel features of the Directive include a mandatory exception for technical copies on the net for network operators in certain circumstances, an exhaustive, optional list of exceptions to copyright which includes private copying, the introduction of the concept of fair compensation for rightholders and finally a mechanism to secure the benefit for users for certain exceptions where anti-copying devices are in place.

The creation of mega digital libraries and bookstores such as the one being spearheaded by Google has only reinforced the urgency for Europe to ensure that its rich cultural heritage and intellectual creation is made available to researchers, scholars, consumers and the public at large. (15)

The Communication addresses these issues. It outlines actions that the Commission intends to take to facilitate the mass-scale digitisation and dissemination of European library collections. This will provide researchers and consumers with new and exciting ways to gain access to knowledge. The Commission also intends to find a solution to the issue of so-called "orphan works", works whose authors are unknown or unlocatable or both. Their uncertain copyright status means that they cannot be utilised, depriving citizens of an important source of intellectual material. Improving the distribution and availability of works for persons with disabilities, particularly the visually impaired, is another cornerstone of the Communication.

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Questions

2.2. Economic factors.

International – non EU are non presented at all. Can experts provide feedback – data how international economic factors influence regional perspective

2.3 Social factors

The current economic crisis appears that will have quite an immediate social impact in SE. Can this be taken into consideration? Although it is acknowledged that secondary data will be limited at this time.

2.4 Tech factors

Only e-learning is examined

2.5 Legal factors

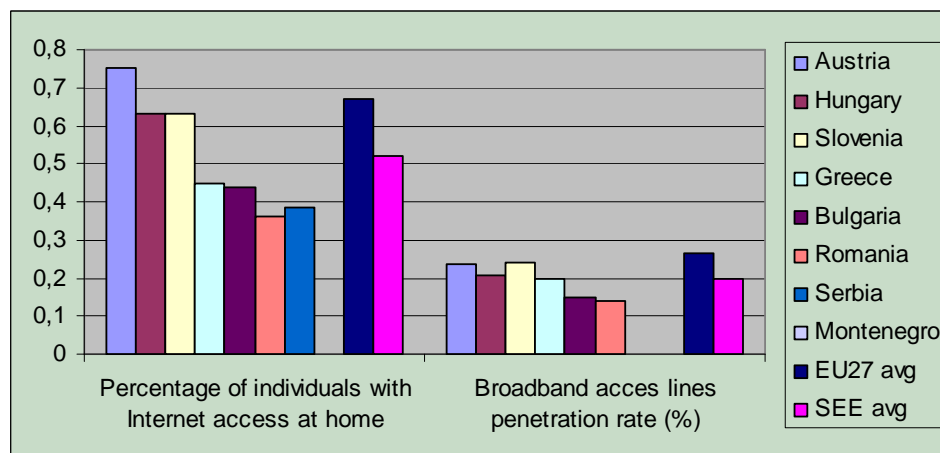
The globalization of digital content flow makes more immense the requirement for EU governing laws.

3 Digital content SWOT

3.1 Content infrastructure and availability

Telecommunication infrastructure is the prerequisite for advanced use of the internet. Its availability defines both the type of content and patterns of its creation, sharing and use over the network. SEE region is not at the forefront of the infrastructure development as shown on Figure 8. Comparing to the EU average, SEE rates lower in internet penetration among individuals although some of the northern countries have comparable internet access rate as EU average. The differences among SEE countries are quite high – Austria has almost doubled internet penetration than Romania and Serbia. At the same time there is also lower broadband access line penetration with less differences between SEE countries, which can present possible obstacle in advanced use of different types of digital content.

Figure 8: Fixed broadband and internet penetration



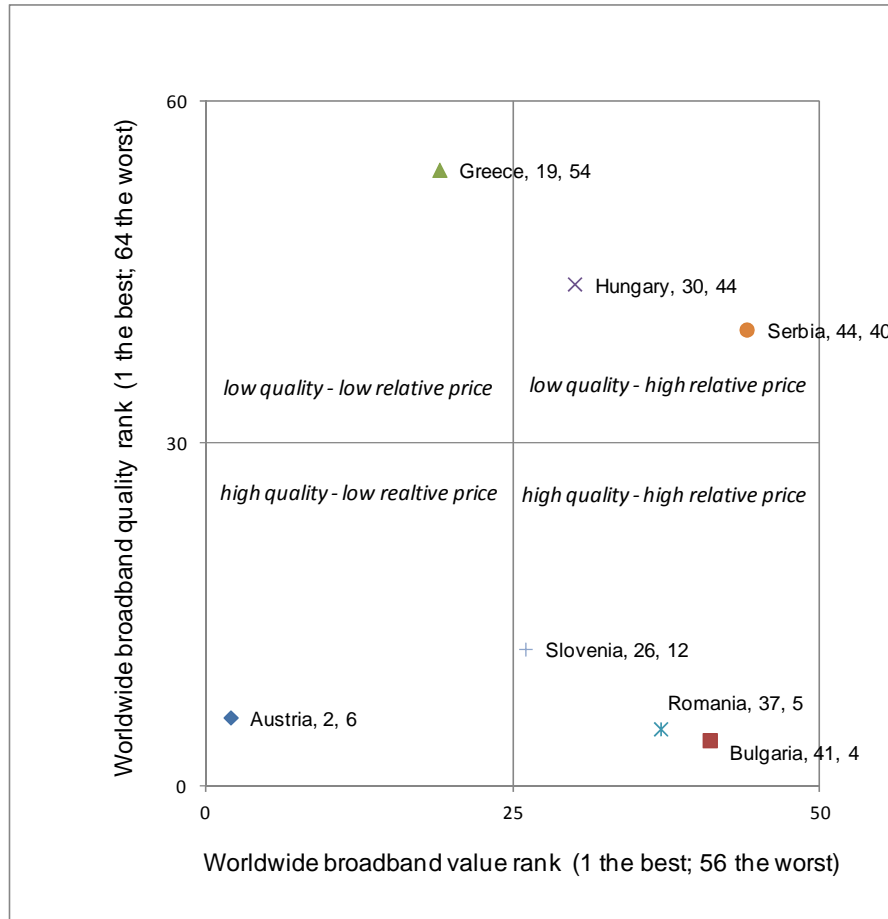
Broad Two factors determine the use of broadband internet – quality and price.

The quality of the broadband Internet in most of the countries in SEE (namely Austria, Bulgaria, Romania and Slovenia) is generally high ranking between 4th place (Bulgaria) and 12th place (Slovenia) compared to 56 countries worldwide.

The common problem for all the countries, with the only exception of Austria, is the relatively high price measured through broadband subscription cost divided by the Gross Domestic Product per capita. This high price could be considered as barrier to the demand and supply of digital content especially for the multimedia content that requires high quality broadband at reasonable price.

Hungary, Serbia and partially Greece are the countries where the quality of the broadband is relevantly low and the price is relevantly high.

Figure 9: Relative price (value)¹ and quality² of Broadband Internet (data source <http://www.netindex.com>)



Mobile penetration on the other hand is much more equally distributed among SEE countries and is relatively high – almost equal to EU average penetration. Similar to fixed lines, mobile broadband penetration is much lower (except for the Austria, where fixed and mobile broadband penetration is similar), but differences among SEE countries are much larger having Austria as the most advanced country almost 20 times higher penetration than Romania.

¹ The mean broadband subscription cost divided by the Gross Domestic Product per Capita.

² Broadband quality compares and ranks consumer broadband around the globe

Figure 9: Mobile penetration

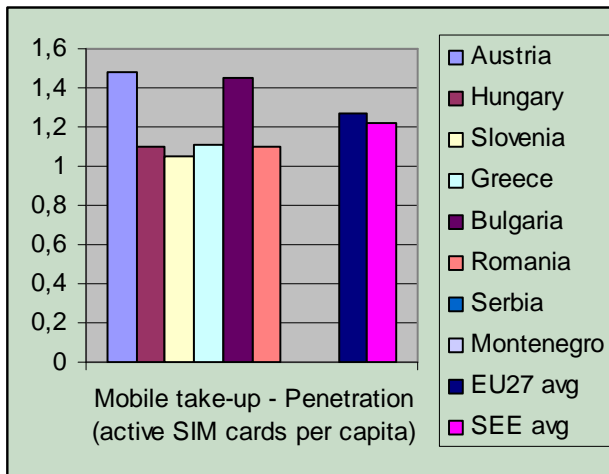
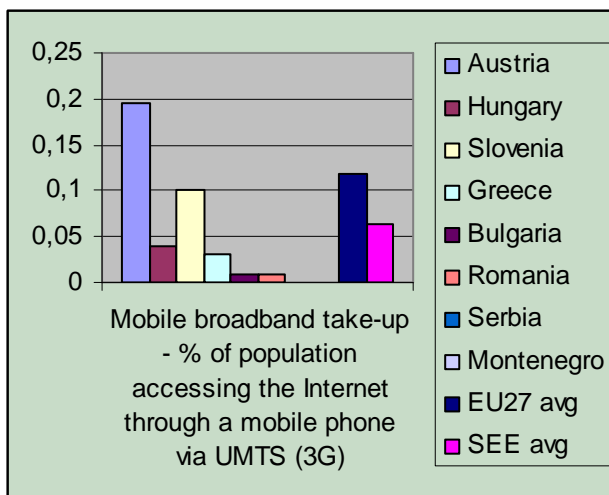


Figure 10: Mobile broadband penetration



There is a strong correlation between development of network infrastructure and the growth of local content. Web based economy requires variety of available content. Traditional internet content that presented static information has been used in the first phase of internet evolution for variety of information and knowledge sharing. Early attempts to measure and evaluate the status have been focused mostly on internet penetration measurements such as number of internet hosts and ISPs that indirectly could be used to asses digital content available. This was logical since other measures have not been available but also initial content was presented mostly by static web pages, so availability of content could be approximated through these indirect indicators.

Further development of WEB 2.0 technologies that brought the opportunities and capabilities for interaction has changed not only the information landscape but also the patterns of behaviour of traditional actors within the economy and society. Emerging

prosumer (producer-consumer) behaviour has changed traditional ways of consumption and provision of traditional content that has together with emergence of audio-visual (AV) content led to establishment of some of the largest social networks ever based on user generated content. Mobile electronic communication technologies have enabled new patterns of connecting to the digital environments that further opened up the capability and opportunities for new innovative business models for provisioning and consumption of mobile content/applications. Semantic technologies have enabled ways of gathering, managing, understanding and analysing digital content properties on one hand and patterns of its use based on human behaviour, interaction, interests, habits and communication patterns. This all together enabled creation of new innovative digital services and products that spurred further development of digital economy.

With recent trend in moving from traditional text oriented web to audio-visual (AV) environments accessed over the mobile platforms and devices, with future addition of sensors networks (Internet of things), internet brings about unprecedented platform for use and reuse of the digital content never before available to average individual. Content remains the fuel for further development, so several initiatives has been started in order to understand its new status and impact. New measures have to be developed in order to understand the volume and the scope of created digital content, which is obviously not straightforward. Local content have got prominent role in further development of internet so special attention has been put its advances. The term “local content” is not uniquely defined, so UNESCO understanding has been taken into account: Local content is an expression and communication of a community’s locally generated, owned and adapted knowledge and experience that is relevant to the community’s situation. OECD report [2] has attempted to measure local content in this context and proposed two types of measurement: measures of local content by economy (geographically bound space) that tries to measure local content in local economies and measures of local content by language (culturally bound space) that tries to measure local content from local language viewpoint.

They proposed the following measures by economy:

- Number of “country code top-level domains” per 1000 residents per economy,
- Num. of web pages/1000 inhabitant
- Number of Facebook subscribers per 1 000 residents per economy,
- Number of online newspapers per 1 million residents per economy,
- Number of streaming online radio stations per 1 million residents per economy,
- Number of Flickr photos geotagged per 1000 residents per economy,
- Number of YouTube uploads per 1000 residents per economy,

and following measures per language:

- Number of web pages per language;
- Number of Wikipedia articles per language,
- Number of blogs per language,
- Number of Tweets per language.

OECD report evaluated only some of the measures using available data and tools (e.g. Google search, Wikipedia statistics, etc.), but clearly not all the data is available and in addition specific indicators only indirectly present the right picture for the purpose of comparison between different results. Actual values for measures in the report have been evaluated into 8 classes for easier comparison (each measure have its own scale).

Figure 11 shows all the measures and

Figure 12 shows recreation of measure of ccTLD domains including Slovenia, Montenegro and Serbia.

Figure 11: Local content by economy

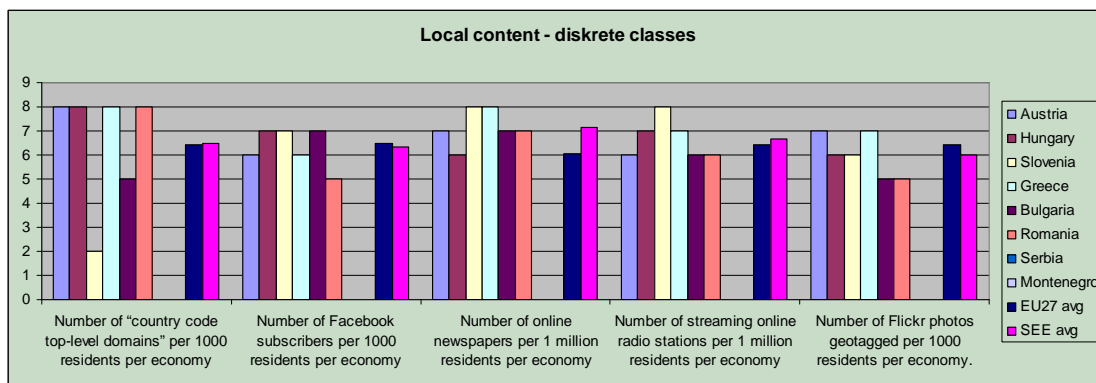
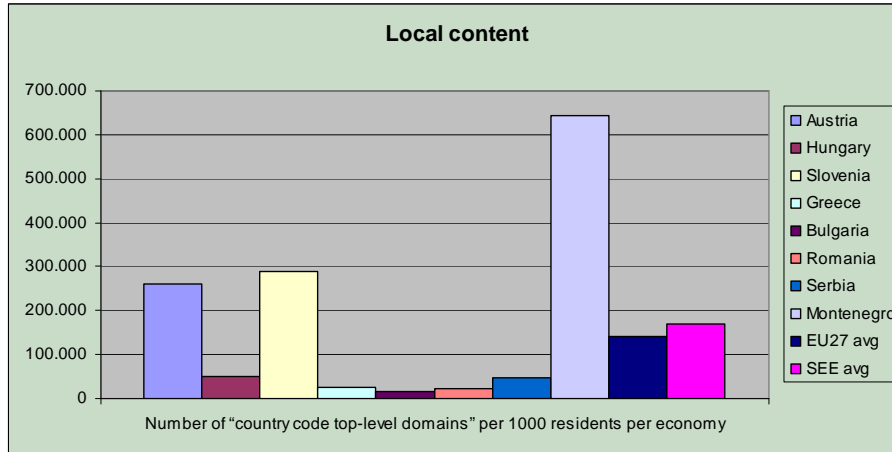


Figure 11 shows that SEE region countries on average score similar to EU average, besides num. of online newspapers where all the countries score quite high which leads to relatively higher score of the SEE average. Obviously, we need to be careful with interpretation of specific measure, since, for example, high score in ccTLD domains tends to be higher for small countries than for the large ones. As an example, we can see this with specific types of e-services (e.g. E-bay, Amazon, etc.) that present unique service in the specific language, are used regardless of the actual number of users. So with additional number of user, additional service is not needed. It could be regarded that in each ccTLD domain there could be a fixed count of web sites that is not related to the number of users (e.g. specific set of e-services, forums, etc.) and variable count of web sites that depends on user count (e.g. personal web sites, company web sites, etc.).

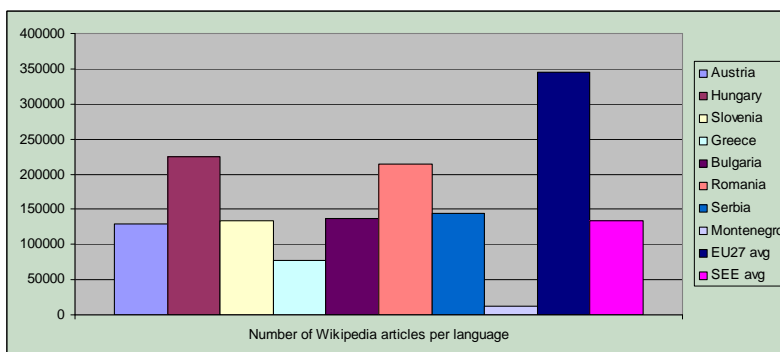
Figure 12: Local content by economy - recreated



This may be the reason for relatively high score of Slovenia and Montenegro on number of web sites in domain as shown on Figure 5. Also this figure shows that interpretation of the values in these cases is not straightforward when it comes to regional view.

Indicators based on languages have not been reported. For most of them, Google has been proposed as a tool for evaluation, but since recalculation was not possible we cannot show the results, still, this measures can be a base for further work. Num. of Wikipedia articles have been recalculated and per language results are shown in **Figure 13** (number for the Austria has been recalculated from all number of German language articles based on number of inhabitants).

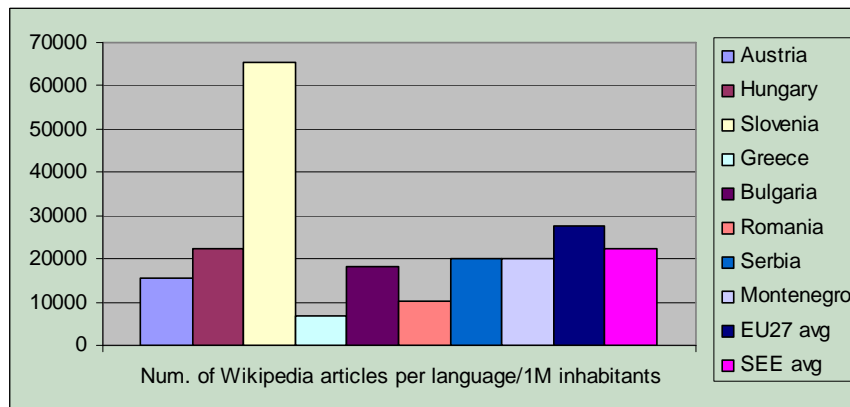
Figure 13: Wikipedia articles per language



SEE language base scores much below EU average and not even one country scoring above EU average. Nevertheless, data shows that region is not completely out of the trend and posses critical mass of local content. This is even clearer if we control the values per capita, which is shown in

Figure 14, where we can see that local SEE content volume on Wikipedia approaches EU average.

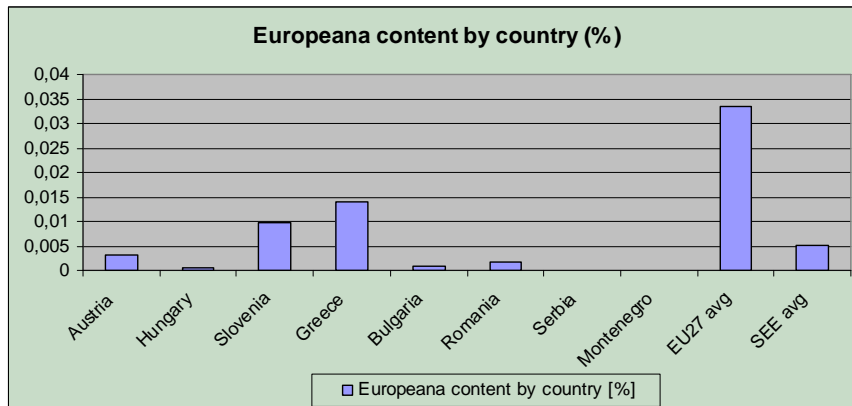
Figure 14: Wikipedia articles per language/1M inhabitants



Another type of digital content that is also vital for successful future development of digital society and thus within focus of digital content EU policy is traditional “analog” content created by “government related” institutions [1.8] that can be put on-line providing it is digitised. Different types of content are relevant, but policy and activities at the EU level has focused on scientific, cultural, educational and public sector information content (including geographical information). The main initiative has been development of digital repositories and the main Europeana digital library for EU. Europeana presents the central point for distributed aggregation of different digital content from different sources in order to establish the central access point to European cultural content.

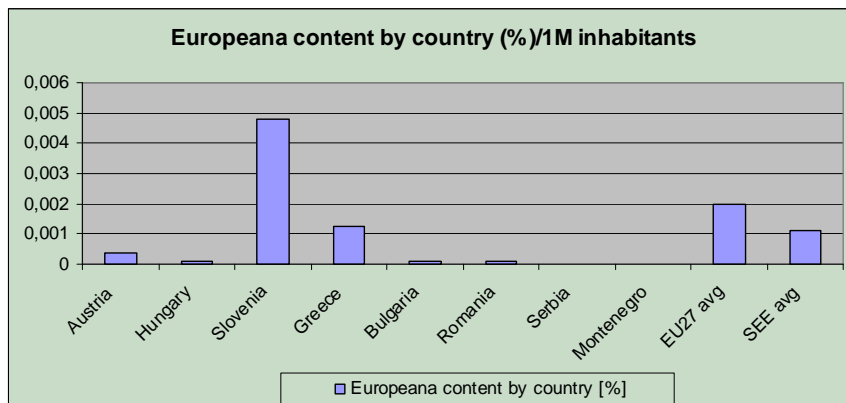
The wealth of the traditional content has been recognised both in public and private spaces. Digitisation projects have been emerging at national and EU level in order to put traditional »analog« content of books, films, music, pictures, etc. to the web, which drove some of the largest players (e.g. Google, Microsoft) in establishing their business ecosystems for provision and consumption of such content. EU has initiated one of the largest project in digitisation for building the cultural, scientific and artistic repository of EU countries and nations in order to spur further development of European digital economy. Digitisation efforts were not of the same scope and volume over different countries. In addition, content availability varies over different regions and countries. Recent report on digitisation status has reported the share of Europeana content by country which is showed on Figure 15 for SEE region [4].

Figure 15: Share of Europeana content (number of digital objects) by country



SEE region has been lagging behind the EU average efforts to connect to the Europeana. Slovenia and Greece have been the most active with the largest content volume actively participating in the Europeana efforts, but joint SEE share of 3,02% is far from 17% of France or Germany alone. Recalculating these shares per capita in Figure 16 shows similar picture, besides Slovenia, which almost doubles the EU average share.

Figure 16: Share of Europeana content by country per 1M inhabitants



Since digitised objects typically represent important national heritage objects (which is why they were selected for digitisation), lack of this content does not favourably impact innovation efforts based on digital material. In addition there are also other barriers that need to be dealt with in order to enhance the use and reuse of digitised material. Report on digitisation [4] reports 4 main issues and corresponding countries that have been able to deal with them:

- Orphan works regime is established: DK, HU, CZ, RO;
- Out-of-print works regime is established: DK, HU, NL, PT, SI, CH, SK, NO;
- List of orphan works is established and available: DE, HU, LT;
- Barriers of accessibility of public domain works identified: AT, SI, NL, PL.
-

Report [4] clearly shows that identified barriers and issues are not well solved in the EU,

where only couple of countries have been able to establish solutions. SEE countries have been included in all cases, which gives them relevant advantage in continuing efforts in this area. On the other hand, other SEE countries have not made progress in this area at all which puts them at the end of EU efforts in this area.

Public sector information presents large amount of information that can be put on-line and used for development of different sorts of web applications thus presenting key driver for innovation in digital ecosystem. EU has set the policy in this area with Public Sector Information directive (PSI) that initially aimed at putting this information together and have it available to the public. With advances of the internet and web based economy, studies have shown that this information has great potential for the society (economic and societal) if information can be reused for non-commercial and commercial purposes. Current policy and proposed revision of the directive has embraced the possibility for marginal cost business model in order to enable wide re-use, proposed open data policy for enabling access to raw data in machine readable form for re-use and extended the scope of the involved institutions to libraries, museums and archives. Recent study on the value of European PSI market reports that EU PSI direct use/re-use under open and marginal cost regime would be of the order of 40 billion EUR annually, while including indirect activities, this would be of the order of 200 billion annually [5]. In addition sector level policies such as open access to R&D results could result in recurring gains of around EUR 6 billion per year. Study on mobile market [6] has shown that the value of PSI market for mobile applications for example is estimated to be cca 35 billion USD in 2015. Study [6] has shown the country share in apps market based on developer's country of origin. From EU countries, largest share was found for UK 13% and Germany 9%. From SEE countries only Austria has been reported to have 2% of the share of mobile apps, other countries were not reported within 1% listing, so do not have or have much lower share of the market. No other data is available to measure the differences between countries, so no other conclusion can be made at this point on SEE status.

S	W
relatively good mobile penetration	low mobile broadband penetration
solid level of local content production and availability	Low quality broadband access in Hungary, Serbia and Macedonia.
positive cases and experiences in tackling the barriers of orphan/out-of-print works and public domain works that could be used as best practices for other countries	Limited incorporation of ICT in the business functions, especially in SMEs
Increasing demand for broadband connections among citizens and enterprises	low level of digitisation activities and integration of local content into Europeana
Strong demand for e-content services and innovation in the region	low intensity of mobile apps development
	low intensity on open data re-use of PSI

	With the only exception of Austria relevantly expensive broadband Internet access in all the SEE countries.
	Low awareness and use of PCs from citizens away from urban centres
	Delays in the development of broadband infrastructures
	The proper exploitation of the potential of Digital Content can provide a comparative advantage for the SEE region regarding excellence due to the rich historical presence and the economic and social particularities of the region.
	High burden of bureaucracy in SEE countries
	Government regulations and bureaucracy are not 'modern' and do not facilitate developments in the digital area. More specifically, regulations regarding IPR, content and user privacy and consuming do not reflect the demands of the society.
O	T
better integration of SEE efforts in digitisation sharing best practices in tackling financial, technology, organisational and process issues	stopped digitisation efforts because of the current financial crisis
open up innovation opportunities with implementation of open data re-use model	missing participation in mobile content economy, because of low mobile broadband penetration
Increase of demand for ICT applications and digital content due to investments from previous Programming Periods on infrastructures in the public domain	
Creation of European commercial digital content technology companies that successfully compete with US corporations	Low commercial demand for digital content

References:

[2] Chris, Bruegge, Masuring Digital Local Content, OECD Digital Economy Papers num. 188, 2011

[1] Digital Agenda for Europe Scorecard, 2012, European Commission

[3] Relationships between local content, internet development and access prices, IPTS, 2012

[4] Second progress report on the digitisation and online accessibility of cultural material and on digital preservation in the European Union, European Commission, 2010

[5] REVIEW OF RECENT STUDIES ON PSI RE-USE AND RELATED MARKET

DEVELOPMENTS, Graham Vickery, Information Economics, Paris, 2011

[6] Pricing Of Public Sector Information Study - Apps market snapshot (D), Final Report, Marc de Vries et al., October 2011, European Commission

Question to experts:

1. Is basic broadband infrastructure important for local research/innovation in digital content? Can we establish well-functioning and world excellent research without basic telecommunication infrastructure.
2. Is local content availability important for further development of research (technologies, concepts, theories) in area of digital content?
3. Is local content availability important for further development of innovations (technological, process, product, business models) in area of digital content?
4. How would well-functioning models of open data/open access change the answers to 2 previous questions?
5. Does digitised content bring added value to digital economy or it will mostly present cost for digitisation and preservation?
6. Do mobile ecosystems present the opportunity for region?

3.2 Research

EU R&D policy has recognised the importance of R&D activities in ICT for economic and social development. SEE countries have in general very different research environments and capacities. General view on ICT sector R&D capacity is shown in **Figure 17** (EUROSTAT). Bulgaria and Romania have the highest rate of ICT R&D expenditure within total R&D, but very low level of total expenditures in R&D as shown in **Figure 18**, which gives very low overall expenditure in R&D in ICT sector per capita as shown in **Figure 19**. For comparison, the highest value of ICT expenditure per capita has Denmark – 190,21 EUR.

Figure 17: R&D expenditures (BERD) in ICT sector

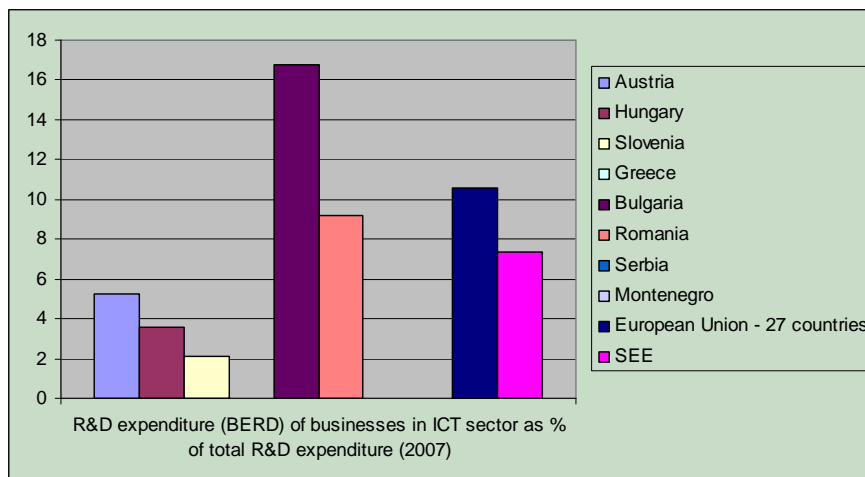


Figure 18: Total R&D expenditure

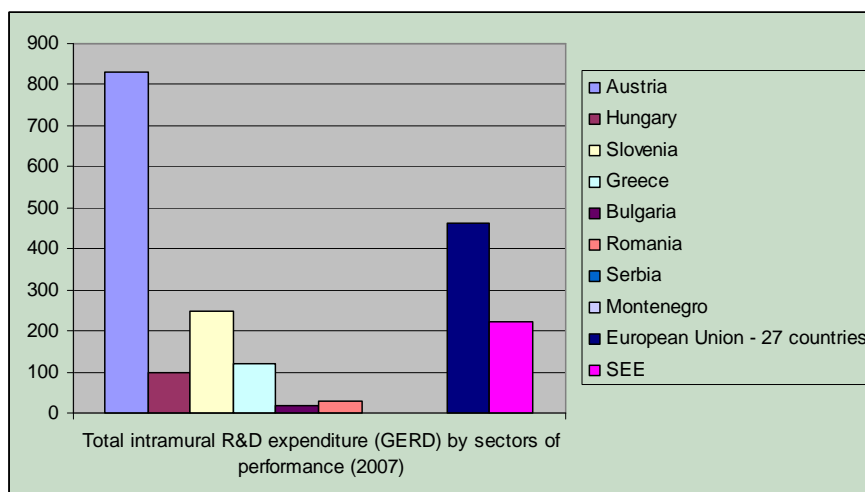
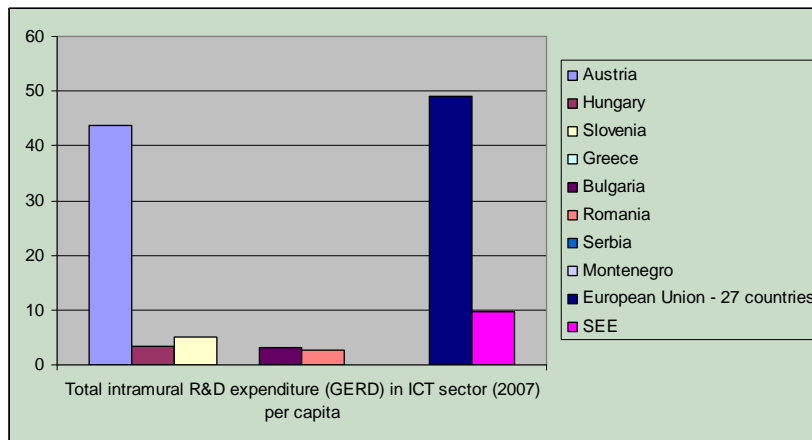


Figure 19: R&D expenditures (BERD) in ICT sector/ per capita



In general, expenditure on ICT R&D in business in SEE is the lowest in EU. Similar situation is shown with government expenditures on ICT (GBAORD) where besides Austria that spends per capita more than twice as EU27 average, only Slovenia catches the EU27 average, but is still far from Luxembourg (46,89 mio EUR) or Sweden (45,14 mio EUR).

Figure 20: Government expenditure in ICT

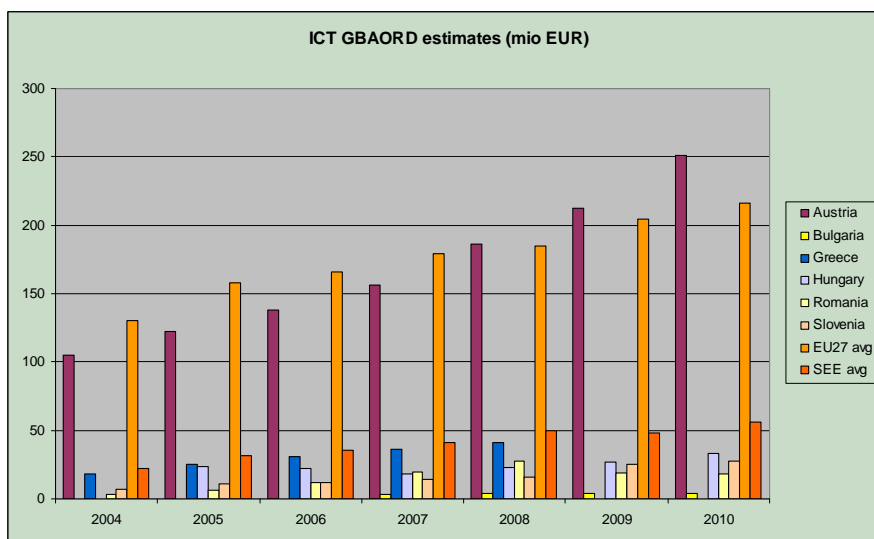
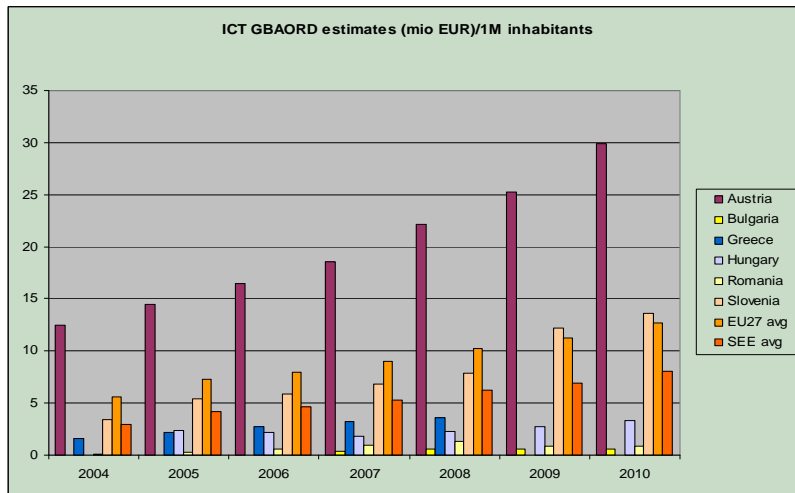


Figure 21: Government expenditure in ICT/per capita



Another view on the R&D capacity is shown by statistics of participation in EU R&D programme FP7 ICT [2].

Figure 22 shows participation in digital content related themes where SEE on average is much lower than EU27 average. Nevertheless, some countries rate very high in specific fields such as Greece in Networked media, Austria and Greece in Information management, Austria in ICT for learning and Greece in Digital libraries. Relative success per capita is shown in Figure 23 where in addition to Austria and Greece also Slovenia scores better than EU27 average in Language technologies, Information management and ICT for learning. This shows that region as a whole has ICT R&D capacity and excellence in digital content area comparing to EU average, which could be further developed and enhanced.

Figure 22: Participation in FP7 digital content related ICT projects

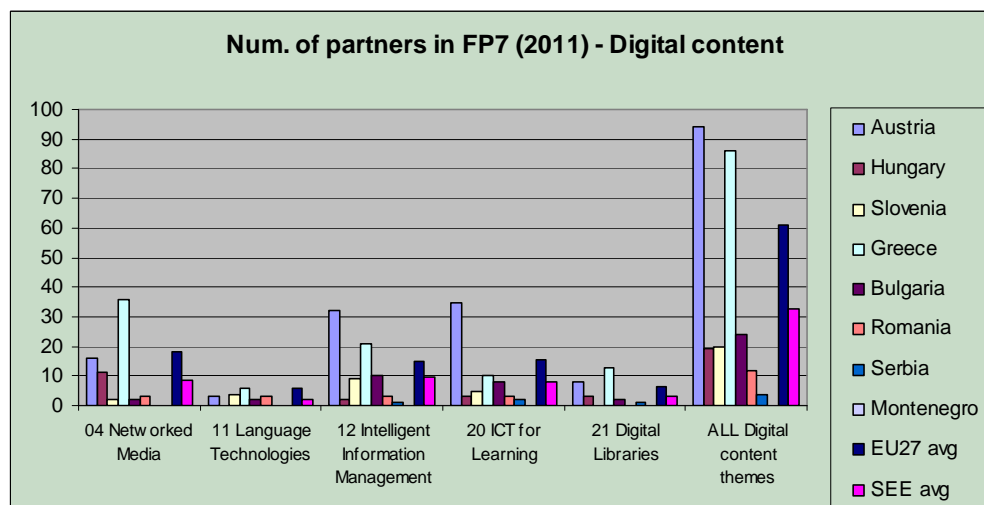


Figure 23: Participation in FP7 digital content related ICT projects/per capita

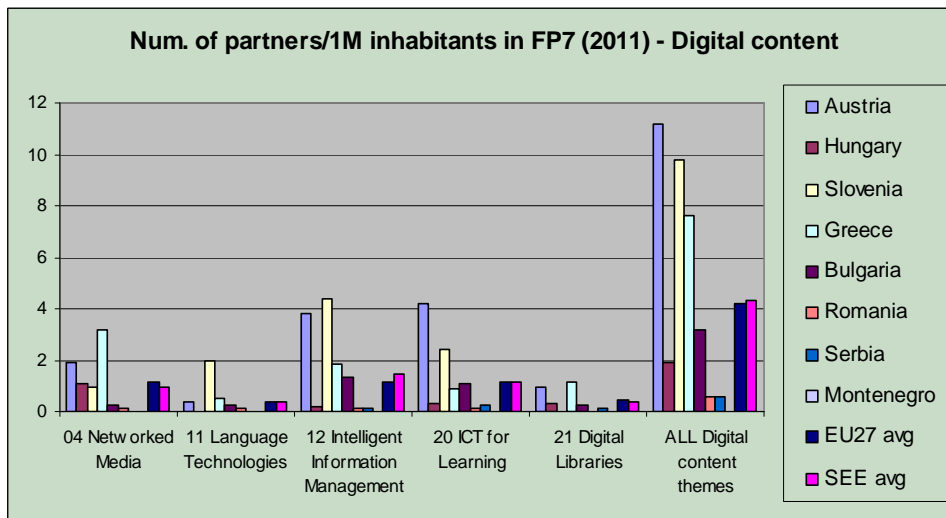


Figure 24: Relative success of participation in digital content

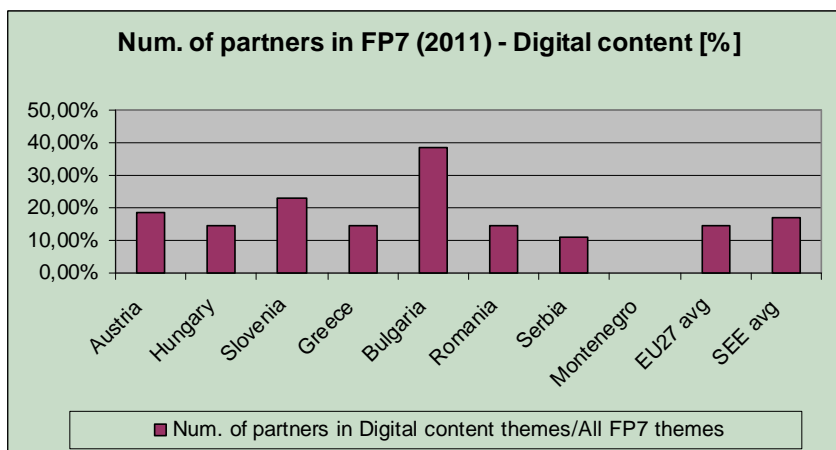


Figure 24 shows that Digital content theme is on average more important for SEE than for EU27. Relative success in this theme vs. participation in all FP7 ICT shows relative capacity of R&D environment in the region and specific country. Bulgaria scores the highest relative success from all EU27 countries.

S	W
relative research excellence in digital content themes and specific topics	low level of R&D ICT support both from business and government
high relative importance of digital content theme relative to all FP7 ICT themes	lack of technological innovation capacity because of low level of ICT R&D founding
Third level education is adapting the masters	Limited exploitation of ICT in education

programmes to ICT needs	
Trained human resources, high quality scientific potential	
High ICT R&D expenditures in Bulgaria and Romania	
O	T
enhance research potential by mutual cooperation of SEE countries in EU programmes on topics that show good R&D participation	lowering capacity of participation in EU programmes because of the current economic crises
start regional support action on themes that show good R&D participation	
Exploitation of various funding incentives and tools at a national and European level for the creation of new ICT products and services	

References:

- [1] A Methodology for Estimating Public ICT R&D Expenditures in the EU European Commission, Juraj Stančik, IPTS, JRC , 2012
- [2] FP7 ICT participation statistics
- [3] Eurostat statistics

Questions to experts:

1. Is digital content relevant for the research activities executed in the region?
2. Are specified topics relevant for the theme and region research activities?
3. What are the main research issues/trends in digital content theme that are/will become relevant for EU level research?
4. What are the main factors for transferring the research results into local/regional innovation activities?
5. How to enhance regional R&D cooperation in digital content theme? Is this required/wanted?
6. What is the role of regional ICT policy?
7. How to enhance EU research cooperation and integration?

3.3 Innovation

Innovation Union Scorecard 2011 rates Slovenia and Austria as Innovation followers, Hungary and Greece as Moderate innovators and Romania and Bulgaria as Modest Innovators. The rating reflects general purpose indicators that measure countries' overall innovation performance regardless of the technological area. ICT plays crucial role in today's economy and presents the enabling technology for further innovation.

ICT sector is responsible for ICT technological innovation so it is important to understand how this sector is performing. We are interested in more narrow area of ICT sector, namely part that is relevant to the digital content theme. Unfortunately, we have not been able to identify any comparable data at this level of granulation, so we can only check what is available to get the impression on innovation capabilities. Recent report [2] shows that ICT sector Value Added (VA) in EU amounted to 470 billion EUR in 2009 where largest share of 91,9% was represented by ICT services. This in turn represented 3,7% of EU GDP. Out of 6,1 mio jobs in the ICT sector in 2009, 5,1 mio was in ICT services (excluding telecom). Similar distribution of VA between ICT manufacturing and ICT services has been shown for SEE countries, where only Bulgaria and Greece had higher level of ICT services share comparing to EU average. SEE region countries are not very ICT R&D intensive. Apart from Austria that represented 3% of EU BERD in 2009, all other countries together represented less than 0,7% of EU BERD. Same goes for R&D intensity (ration of BERD/VA) where only Austria (7,4%) had higher intensity than EU average (5,3%) in 2009 while Bulgaria had one of the lowest levels (0,4%). Comparing EU and USA, reports show that in the size of ICT sector (VA) in 2009 USA has been around 22% larger then EU, mainly because of the increase in Software publishing (NACE 61) and Computer programming, consultancy and related activities (NACE 62) from 2008.

ICT overall climate can be indirectly seen from ICT expenditure in the countries and region showed on Figure 25 and

Figure 26. SEE region ICT expenditures are low, below average EU27 and much below the most successful EU countries such as UK (3,8%) and Finland (3,3%). Even worst result ca be seen if we compare it per capita where besides Austria all other SEE countries score lower than EU27 average and the most successful countries such as Denmark (1209 mio EUR), Luxembourg (1117 mio EUR) and Finland (1097 mio EUR).

Figure 25: Level of ICT expenditure

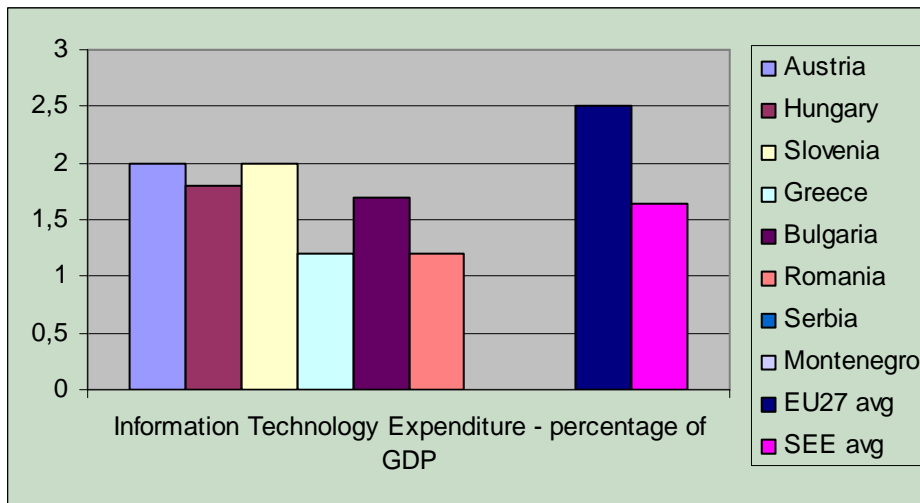
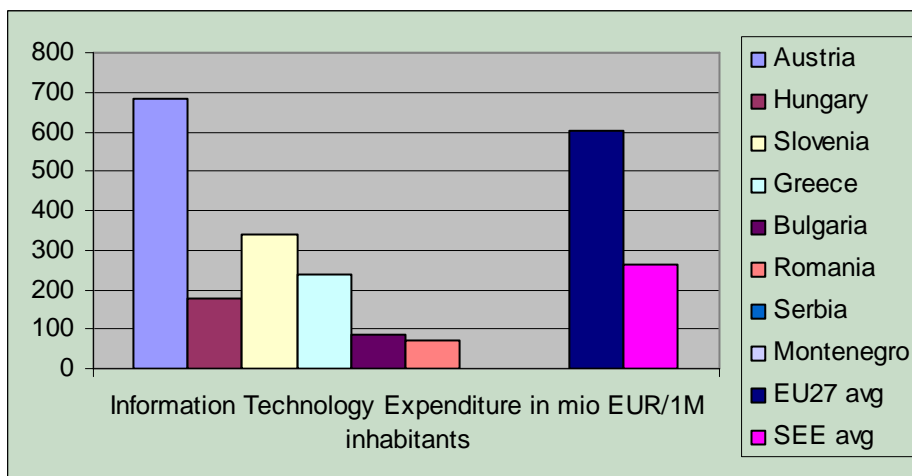
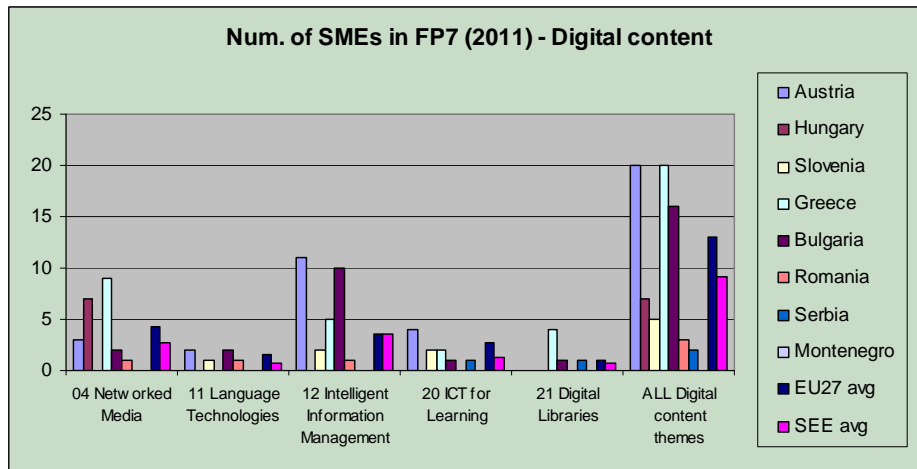


Figure 26: Level of ICT expenditure per 1M inhabitants



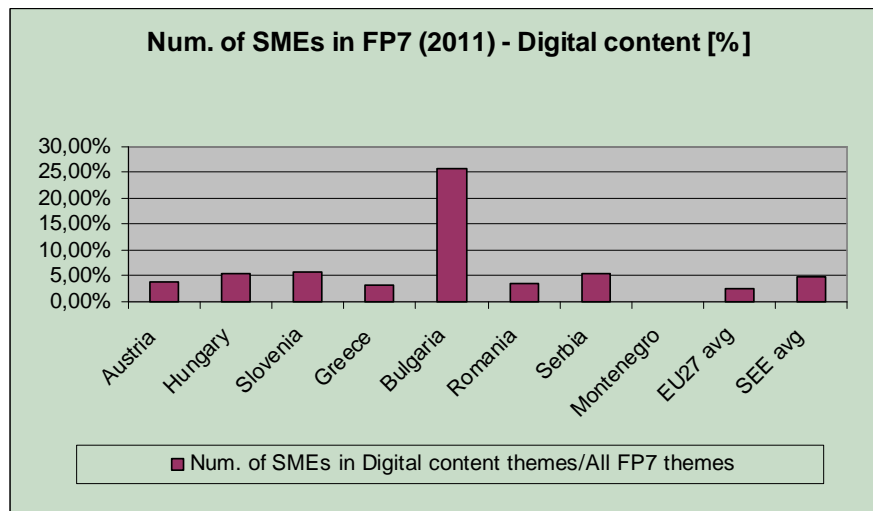
Another look on innovation capacity gives the analysis of SME participation in digital content theme in FP7 ICT programme. SMEs are typical organisation that take ICT technology and try to make improved product or service. Figure 27 shows FP7 statistics of participation of SMEs in digital content related themes.

Figure 27: SME participation in FP7 ICT digital content themes



Results show that the most important topics with SME participation are Network media, and Information management, later scored on average even better for SEE than EU27.

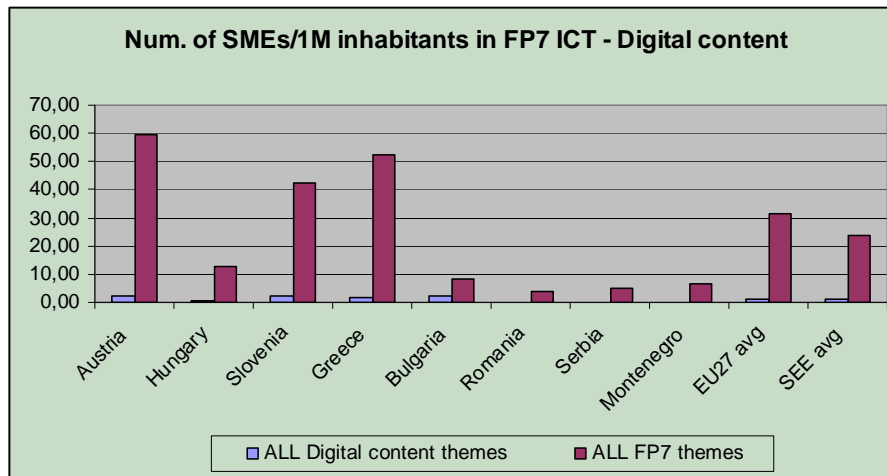
Figure 28: Relative SME participation in digital content theme for specific country



This has been confirmed in

Figure 28 that shows relative SME participation against participation in the whole FP7 ICT programme which is on average better in SEE than EU27. Digital content plays important role in most of SEE countries, most prominently in Bulgaria where almost quarter of SME participation relates to digital content. This is partly results of relative low level of overall participation of Bulgarian partners in FP7. This is shown in **Figure 29** that shows the number of SMEs participating in digital content theme relative to participation in all FP7 ICT (per 1M inhabitants).

Figure 29: Participation of SMEs in FP7 ICT digital content themes per 1M inhabitants.

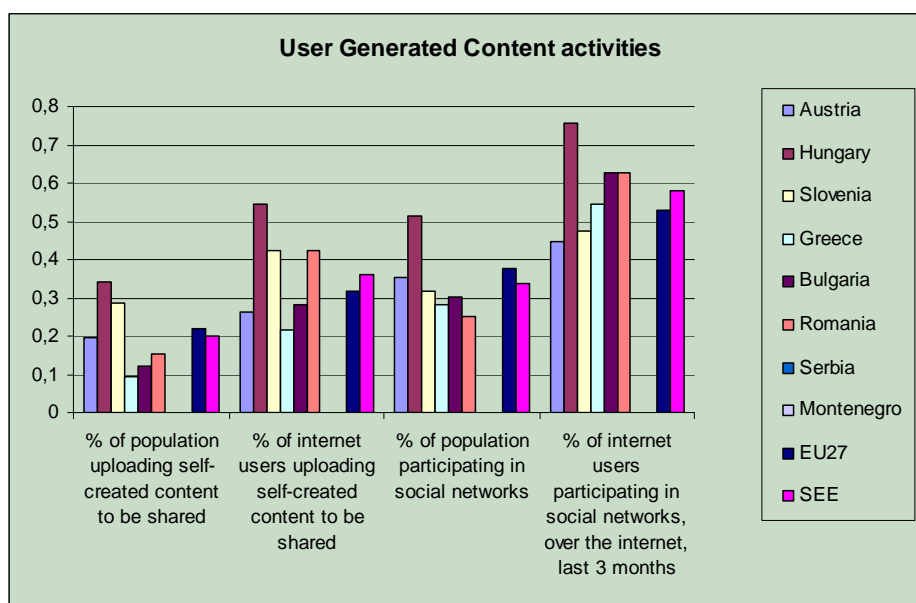


Innovation opportunities in digital content are not limited to technological innovation happening mostly in ICT sector, but rather to all other innovations that relate to process, organisation and business models, which are typically done outside ICT sector by users of ICT (e.g. Facebook, Twitter, YouTube, etc.). When it comes to individual user, we acknowledge the importance of area of User Generated Content where EU and SEE countries in particular have had different ability to participate. Not many quantitative or qualitative indicators have been established to measure the extent of activities in this area, but some official indicators in

Figure 30 and

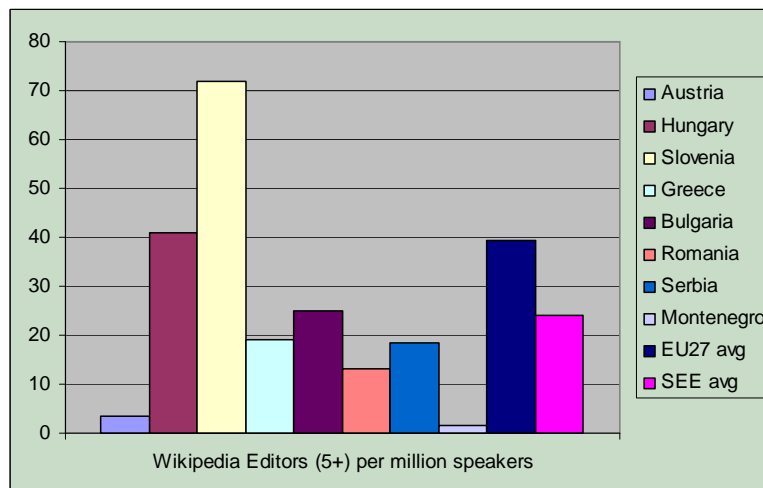
Figure 31 can give us some insights of the situation and differences of involved countries [1].

Figure 30: Potential for user generated content, DAE Scorecard



Indicator *% of population uploading self-created content to be shared* and *% of population participating in social networks* show somehow more directly that active participation in the internet has not been very large in scope both in EU and even smaller in SEE countries. Hungary seem to be more successful, having scored above the EU average (together with Slovenia in % of uploading content), but still, the overall score shows that capacity for active participation in building web2.0 ecosystems in SEE countries is relatively low. Interesting situation is showed with respect to the ratio against internet users that shows that in general users in SEE are on average more active than EU average. This can be interpreted positively that internet users in SEE, relatively to EU average, engage, have skills and wish to join the building of participative web and user generated content services (H, SI), but also negatively that the ratio is dependent on overall ratio of internet users that in some countries is small consisting only of skilled and active population (e.g. young) which is known to use more advanced internet services but different other segments such as average population, older population, illiterate, etc. do not use internet at all (GR, BG, RO).

Figure 31: Creators of Wikipedia content



In general, upper figures indirectly show the level of early adoption of new and advanced services of participative web by population in some cases exists in specific SEE country, but on average this level is low (cca 9%) and is lower than EU27.

More direct measure of innovation capacity can be seen in statistics of participation in EU support activities provided by corresponding EU programmes such as eContent, eContentPlus, eTEN and CIP ICTPSP. The important difference between these programmes and FP7 programme is in the fact that they support innovation in ICT where research is not allowed within the projects. Since also non-technological innovation is supported, different types of participants (not traditional R&D organisations) get the opportunity to get support for their innovation activities. Figure 32 and

Figure 33 show successful participation in different programmes, except for the eContentPlus where application statistics is showed. In all cases SEE region does not reach

the EU27 average although some countries such as Greece and Austria score very high and thus show higher ICT innovation capacity.

Figure 32: Number of participants in EU innovation projects

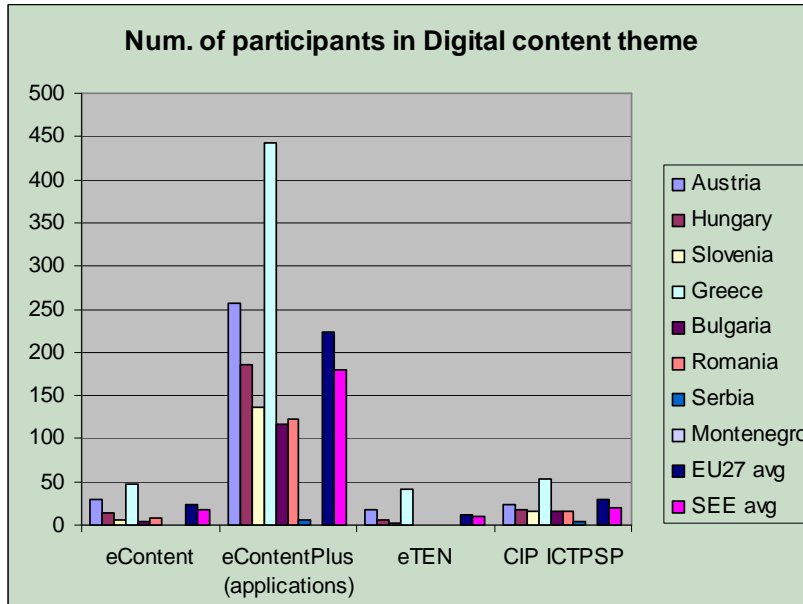
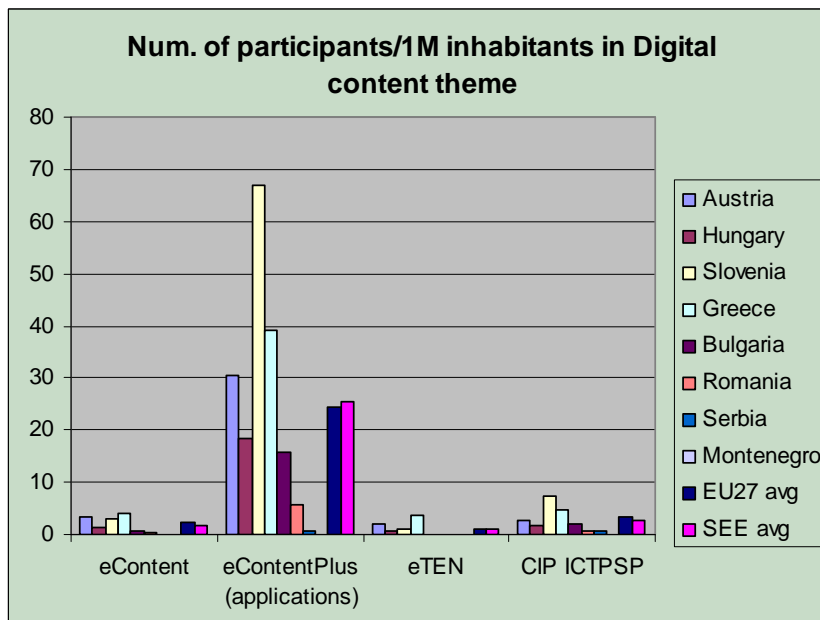


Figure 33: Number of participants in EU innovation projects



In order to enhance excellence in local digital content use, it is important to adopt holistic views on the whole innovation cycle, including multidisciplinary and interdisciplinary approaches. Global infrastructures and international standards and best practices have already become mature and offer successful and reliable services to build upon businesses of

success. But the need for local and regional supportive environment is still present and should not be underestimated due, mainly, to two factors: local stakeholders' and public trust, confidence and involvement and local product and service developers' opportunities for innovation and excellence, which would lead to local economic prosperity with new jobs, sustainable development and increased global recognition.

S	W
Good scientific cooperation/co-publications which enables knowledge transfer and sharing	SEE countries present mostly followers part of innovation lifecycle
Bulgaria and Greece have higher level of ICT services share comparing to EU average	low ICT expenditure that present low option for economy of scale in adoption of ICT
better than average EU27 participation of internet users in WEB20 activities	Lower scope of active participation of population in WEB20 activities
SME participation in Network media, and Information management, scored on average even better for SEE than EU27	low level of overall SME participation in FP7 ICT activities comparing to average EU27
	Low public R&D expenditure
	Low business R&D expenditure
relative good participation of internet users in building participative web of SEE relative to EU average	low level of early adoption capacity for participative web services among general population
Good SME participation in FP7 ICT R&D activities in the topic of Network media, and Information management	low level of participation in EU innovation support programmes, except for Greece and Austria
Digital content as a source of revenue for stakeholders who can create innovative products, services and applications involving their digital content (main sectors that can benefit: education, life long learning services, visitor and tourist services, e-government services)	
O	T
opportunities for follow-up innovation coming from participating SMEs in FP7 ICT projects	changes in EU support programmes for 2013-2020 can threaten the relative successful participation of Austria and Greece in innovation activities, inhibiting SEE region innovation activities
better SEE cooperation and integration in innovation activities would help advance the	Increase of competitiveness in the ICT sector due to Asian countries (India, China); intense

participation in EU innovation measures	international competition, high level of knowledge in combination with low labour costs of other countries
Well- functioning models of Open data and access can lift barriers active at present	
Mobile ecosystems can generate opportunities for new jobs and revenues	

References:

- [1] Digital agenda scoreboard 2012, European Commission
- [2] Predict 2012 report - An analysis of ICT R&D – EU and beyond, Stančik and Desruelle, IPTS, 2012
- [3] Eurostat statistics, 2012
- [4] eContent participation statistics
- [5] eContentPlus participation statistics
- [6] eTEN participation statistics
- [7] CIP ICTPSP participation statistics

Question to experts:

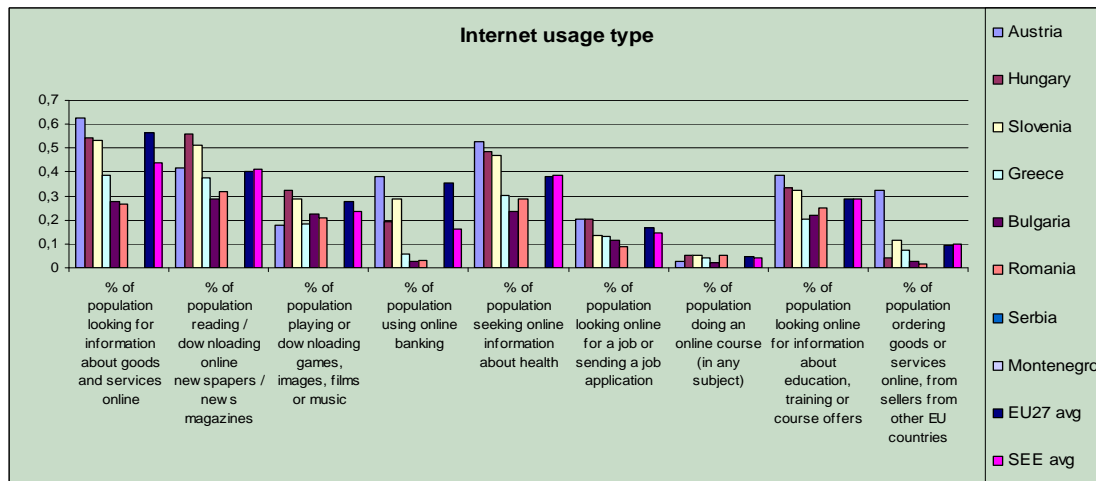
1. Is the theme relevant for the innovation activities executed in the region in the future?
2. Are specified topic relevant for the theme and region innovation activities in the future?
3. What are major regional/global trends in ICT innovation that most influence the region?
4. Are shown trends for innovation in SEE correct?
5. What is the role of ICT policy in ICT innovation area?

3.4 Use and skills

In case of digital content, use cannot be evaluated separately from other phases of lifecycle, since it presents one of the most important factor for analysing and assuring quick uptake of ICT innovation. Use patterns are very closely related to overall framework conditions in specific area such as general technological and innovation culture, access to electronic infrastructure, proper skill level, general economic and social environment, etc.

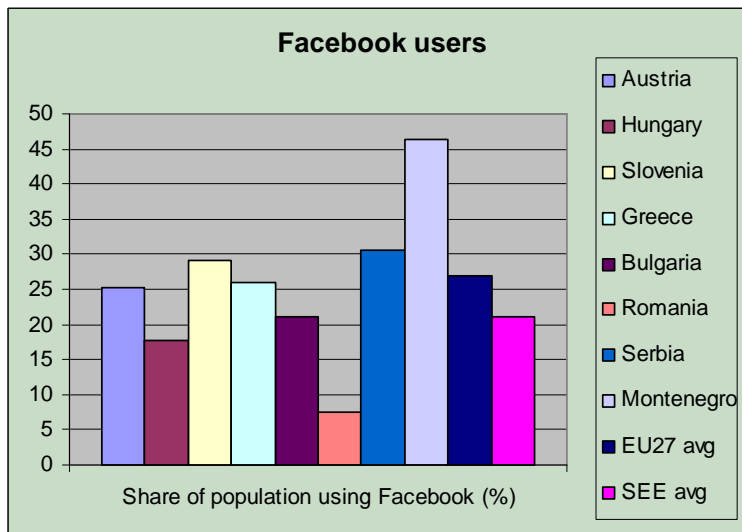
This is particularly important in the digital content economy where gaming, mobile content and re-use of PSI content get mainstream both in research and use and so will become crucial for the overall economic and digital market developments. Lack of development skills can mean that countries will not be able to participate in this area anymore and thus not been able to gain the benefits of the next wave of internet evolution. Digital divide can in this way also become relevant in overall innovation cycle and not only with respect to specific social user segments

Figure 34: Types of internet usage



This situation can also be observed o Figure 34 where it can be seen that level of population engaged in more advanced activities is getting lower toward more advanced activities. Mainstream search for the information rates quite high comparing to playing games, e-banking, e-learning and e-commerce, which is true both for SEE region but also for EU27 in general. These indicators are important since they show the possible demand side of the digital market where absence of demand can have negative impacts on further economic development of digital economy, however the region is fertile for innovation but still lacks the productivity for various reasons, including political, societal, economic factors. There is definitely a strong demand for e-content services and innovation as a vehicle for development of the region.

Figure 35: Share of Facebook users



It can also be observed that besides online banking, gaming and general goods and services searching, SEE region in general does not rate behind the EU average level of internet use.

S	W
average use is comparable to EU27	e-learning, e-commerce and e-banking are not used at the high rate
in general usage level can present the proper level of demand for new innovative services	Low contribution of ICT in the everyday life of citizens
	Copyright clearance issues and ownership of content and digital content are still issues that need drastic improvement
O	T
rising usage rate for more advanced services could have positive impact for local economy and society	not catching up in use of more advanced services can cause skill gaps that would prevent to follow the advances in future internet evolution
Enabling people to become content providers and stakeholders through cooperative actions such as crowdsourcing and social media	

References

- [1] Compendium of Cultural Policies and Trends in Europe, 2012
- [2] Eurostat, 2012
- [3] DAE Scorecard, 2012

Question for experts:

1. Is local usage important for technological cycles of digital economy?
2. What trends in usage patterns can be observed in the local economies?
3. Are there cultural differences that would impact the usage patterns, so that they would not develop to required level?

4 SWOT Summary

Digital content is the essence of digital economy and so called knowledge based society, since it presents the vehicle for knowledge representation, sharing, access and use over traditional physical, social, demographic, geographic, economic, etc. boundaries. Because of the technological, business and social transformations that it brings, EU faces important challenges in order to embrace the benefits that digital content brings to the society. It is crucial that digital content is created, preserved and available for use in all aspects to the EU citizens and companies regardless of the technology changes that transform the content creation, and usage patterns.

Internet economy ecosystem is driven by content, services and infrastructure. Current technology convergence breaks traditional technological areas and business models of communication provides, technology provides, services providers and users. Mobile platforms that have become one of the main area of innovation transform the ICT ecosystems merging traditional content with applications and WEB 2.0 social networking paradigm, where value is more and more created in the network itself. This has brought to strong competition between whole ICT ecosystems including network, technology, service and content providers. Future internet initiatives including converged networks based on IPv6, sensors networks and distributed digital content and services infrastructure will bring even more dynamic space with unpredicted consequences on business as much as society. R&D activities in the content and services sector are becoming more and more globalised and driven outside the EU which results in more and more pressure for action in this area.

EU policy has tried to follow the advances in digital ecosystems with addressing the challenges that impacted the society at large such as privacy, security, IPR, openness of platforms, application stacks and services and interoperability. In the EU, special attention has been given to availability of sources of digital content such as digitisation of traditional cultural artifacts, scientific information, educational content, user generated content and public sector information with the aim of enhancing and enabling internal digital market in EU. SEE region countries do not show any special separate initiatives with respect to this policy and regulation.

Research activities in the EU has in many cases followed the market advances or been executed without adequate follow up in innovative business within EU. FP7 ICT program has supported research activities in this area targeting technologies for content creation, aggregation and management and use. Current data on participation in FP7 programme show that SEE region does not on average participate in these activities at the EU level. Besides Austria and Greece, all other countries participate bellow the EU average level, although comparing data per inhabitant, Slovenia also rates high and beyond EU average. Intelligent information management and ICT for learning seem most promising and important for the region. In addition, level of expenditures in ICT R&D is also much lower than EU average, which shows that there is not much capacity for enhancing the R&D

activities in digital content themes although relative importance of these themes from FP7 participation in SEE rates above the EU average.

Current business trends show that in addition to technological innovations, non-technological play even more important role in digital content ecosystem. Not much data is available for this area from the point of view of business performance, so general ICT data can be used to see the current status. ICT expenditure on average in SEE is much lower than EU average, which shows the lack of potential for digital economy. SME participation in FP7 and CIP can be used to see the potential for technological innovation coming from research results and these results show that Austria, Greece and Bulgaria rate considerably higher from EU average. Overall participation of SMEs in digital content themes relative to all participation in all FP7 shows that digital content is rated higher than EU average, which means that the SEE shows relative need and capability for activities in this area. This is somehow confirmed with participation in innovation projects (eContent, eTEN, CIP ICTPSP) that rates SEE not so far from EU average, but application statistics in eContentPlus shows above average interest in this area.

With a massive shift towards smart and mobile devices on one hand and the Internet and cloud computing on the other, new opportunities for market developments appear by the day. Today anyone can be a part of a thematic network and be both a content provider and a content user at the same time. It is apparent that main market trends shift towards smart mobile devices and applications because they target everyone rather than a limited group of experts. Cloud computing gains momentum as more and more businesses and individuals rely on specialized providers for transparent digital services. Web applications and mainly in the form of mash-ups that include functionalities provided by specialized third-party providers have successfully been introduced over the past decade and will most probably continue to appear in innovative forms. Social media integration has also become almost universal in web sites with high traffic. Crowdsourcing applications have successfully introduced the notion of making everyone a source of digital content but still lack the expected diffusion and volume. In addition, gaming technologies provide significant expertise to the educational community and are able to provide extremely appealing ideas and approaches to lifelong learning, which is, and will remain a hot topic in Europe.

Contemporary ICT technologies and trends in the area of digital content include both general topics and domain specific topics. These topics include:

- Big data
- Open linked data
- Interoperability of data and systems
- Content-based descriptions and representations of content
- Smart (content-based) platforms for content management
- WEB 3.0 and the Internet of Things
- Ubiquitous digital data interfacing and signage

- Digital libraries and archives
- Multilingualism, language and speech technologies and translation systems
- Technology-enhanced learning
- ICT for people with disabilities

Digital content transforms the society, but indicators of use and participation show that EU has not embraced these opportunities to the largest extent. SEE region countries rate in all major indicators of use (with exception of reading on-line newspapers), participation and accessibility below EU average, which shows that there is much potential for further development. Unfortunately, financial crisis and lack of sources for financing research, innovation and access capabilities in ICT in general require special attention in creating virtuous cycle of provision and demand that could provide the capability for growth and development.

SEE region in general scores lower in than average EU27 in almost all indicators measuring whole innovation lifecycle. Nevertheless, specific countries rate much better than average EU27 in specific indicators, which gives the opportunity for joint development. Local content and larger integration within the SEE region can have the potential needed for action, but policy needs to embrace the digital content as a priority theme and act accordingly. Special focus could be put on better integration and cooperation at the regional (but also EU) level in order to leverage the relative capacities and capabilities of specific countries and facilitate knowledge sharing and mutual cooperation in this field.

4.1 SWOT table

Colour legend: content infrastructure, research, innovation, use and skills

S	W
Relatively good mobile penetration.	Low mobile broadband penetration.
Solid level of local content production and availability.	Low level of digitisation activities and integration of local content into Europeana.
Positive cases and experiences in tackling the barriers of orphan/out-of-print works and public domain works that could be used as best practices for other countries.	Low intensity of mobile apps development.
	Low intensity on open data re-use of PSI.
Relative research excellence in digital content themes and specific topics.	Low level of R&D ICT support both from business and government.
High relative importance of digital content theme relative to all FP7 ICT themes.	Lack of technological innovation capacity because of low level of ICT R&D founding.
Good scientific cooperation/co-publications, which enables knowledge transfer and sharing.	SEE countries present mostly followers part of innovation lifecycle.
	Low ICT expenditure that present low option for economy of scale in adoption of ICT.
Better than average EU27 participation of internet users in WEB20 activities.	Lower scope of active participation of population in WEB20 activities.



Relative good participation of internet users in building participative web of SEE relative to EU average	Low level of early adoption capacity for participative web services among general population.
Good SME participation in FP7 ICT R&D activities in the topic of Network media, and Information management.	Low level of participation in EU innovation support programmes, except for Greece and Austria.
	low level of overall SME participation in FP7 ICT Activities comparing to average EU27.
	Low public R&D expenditure.
	Low business R&D expenditure.
Average use is comparable to EU27.	E-learning, e-commerce and e-banking are not used at the high rate.
In general usage level can present the proper level of demand for new innovative services.	
O	T
Better integration of SEE efforts in digitisation sharing best practices in tackling financial, technology, organisational and process issues.	Stopped digitisation efforts because of the current financial crisis.
Open up innovation opportunities with implementation of open data re-use model.	Missing participation in mobile content economy, because of low mobile broadband penetration.
Constant research and development expenditure as a percentage of GDP.	Still relatively low research and development expenditure as a percentage of GDP.
Enhance research potential by mutual cooperation of SEE countries in EU programmes on topics that show good R&D participation.	Lowering capacity of participation in EU programmes because of the current economic crises.



Positive GDP growth forecast in SEE economies.	Underdeveloped copyright legislation that is not harmonized with the new realities in the digital content technologies could become a barrier to digitalization of content and its .
Start regional support action on themes that show good R&D participation.	
Opportunities for follow-up innovation coming from participating SMEs in FP7 ICT projects.	Changes in EU support programmes for 2013-2020 can threaten the relative successful participation of Austria and Greece in innovation activities, inhibiting SEE region innovation activities.
Better SEE cooperation and integration in innovation activities would help advance the participation in EU innovation measures.	
Rising usage rate for more advanced services could have positive impact for local economy and society.	Not catching up in use of more advanced services can cause skill gaps that would prevent to follow the advances in future internet evolution.
Increasing percentage of population doing an online course.	Ageing population not being able to tackle with the contemporary technology and usage.
Increasing percentage of individuals with a specialised internet and computer knowledge and skills.	