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Measuring and Benchmarking Digital Literacy Strategies and Efforts: the BENTLI Project

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Abstract: There are numerous interesting strategies in place in Europe, a large majority of them initiated and executed by regional or local government institutions, more or less successful in addressing groups with a high risk of exclusion. At the moment these institutions can assess the impact of their strategies, but cannot compare the result of the analysis with other strategies, due to the lack of common definitions of the indicators used. The BENTLI project has addressed this problem by providing a methodology for impact assessment and a permanent place for benchmarking and collaboration for regional digital literacy strategies. This paper will present the main indicators and the results of the impact assessment realised in seven different European regions, providing access to a tool for analysis and impact assessment for digital literacy strategies in Europe.

1. Introduction

"Global digital literacy is of vital importance for the progression of mutual human understanding, for the interaction between people and their respective governments. It allows for economic growth and is the core to efficient and rewarding communication in both the workplace and at home providing equal opportunities to many people [1]"

The Information and Communication Technologies (ICT) fundamentally change the way we live, learn, and work. As a consequence of these changes, technological tools, and the creative application of technology, have the capacity to increase the quality of people's lives by improving the effectiveness of teaching and learning. The challenges they present for education and training are many and affect highly sectors of society. New skills – technical, intellectual and social – have become essential for living, working and participating actively in a knowledge society. While their scope extends well beyond technological or "digital literacy", they are the basis on which they depend.

The digital divide is a phenomenon that can be geographical, as between nations or regions, but can also take other forms within a specific geographic region. As literacy and digital literacy merge, those with low skills levels, of different national backgrounds (immigrants, refugees, elderly, low income) are at a particular risk of being excluded from the Information Society. Also, given that more and more countries digitalise a broader set of services and the dialogue with citizens under the umbrella of e-government, the digital divide is not just a matter of economic development, but also an issue of wider social participation and development of our democracy. Thinking in dilemmas, on one hand global digital access and digital literacy can contribute to a more globally sustainable economic and broader democratic development. On the other hand they can also have the

opposite effect of widening the divide and leading to new forms of economic exploitation and democratic exclusion.

While numerous attempts have been made in the recent past to define a framework for measuring Digital Literacy [2], no attempts have been made to measure the impact and effectiveness of regional strategies put into place to increase Digital Literacy, and thus reduce the digital divide.

A study realised by the European project SIBIS [3] shows that there are huge differences in the general level of digital literacy between the EU states, in the digital skill indicators the number of persons who are very confident in their digital skills is 3-5 times higher in the country that has the highest level than in the country with the lowest level. Although the level of digital literacy is increasing remarkably, especially among the youth, the differences between national average level of digital literacy is diminishing and as well as the gender gap, Europe is on the way to preparing for the Information Society, though they still have a long way to go.

There are numerous interesting strategies in place in Europe, a large majority of them initiated and executed by regional or local government institutions, more or less successful in addressing groups with a high risk of exclusion. At the moment these institutions can assess the impact of their strategies, but cannot compare the result of the analysis with other strategies, due to the lack of common definitions of the indicators used. The BENTLI project has addressed this problem by providing a methodology for impact assessment and a permanent place for benchmarking and collaboration. The aim of the project is to provide a hands-on approach for national, regional and local public authorities to measure the impact of their digital literacy strategies, and to benchmark these results against other European regions.

The project selected seven European regions, each with a Digital Literacy strategy developed and executed by the regional public authorities, and with a need to benchmark their strategies and access new practices, so as to improve their strategies.

This paper will present the main indicators and the results of the impact assessment realised in seven different European regions, providing access to a tool for analysis and impact assessment for digital literacy strategies in Europe.

2. Methodology

The project has used a combination of desk research, field research and focus groups to identify a common methodology for impact assessment, based on common indicators, provides not only a tool to assess the impact of a specific regional strategy on the groups with high risk for digital exclusion, but also provides the basis for benchmarking, being able to identify regions that have faced or are facing similar problems. This methodology is complemented by guide for good practice, which has identified, based on the impact assessment using the designed methodology, the different strategies, activities and practices which have a proven success record. This process can be identified by three steps: conceptual framework, common indicators and impact assessment.

The first step has been the definition of a conceptual framework of Digital Literacy. Prior to the 21st century, literate defined a person's ability to read and write, separating the

Exhibit 1: 3 ways in which digital literacy is different than traditional literacy

First, information is not limited to text. Computers allow for multimedia resources such as video, audio, and photos.

Second, we find information differently on a computer with an Internet connection than with a printed book or article. With a computer, we must construct information from multiple sources rather than rely on a single information source.

Third, digital literacy is a multidimensional and interactive skill. It means being able to read as well as integrate and use resources from multiple sources and communicate these newly constructed pieces of knowledge to others.

Source: P.Gilster [5]

educated from the uneducated [4], with the advent of the information society the concept has assumed new meanings, creating a need to define this concept in the digital era.

From the analysis of the different descriptions and points of views of different authors; the final conclusions is that there is not a common definition of Digital Literacy, worldwide accepted, on the contrary, there is a range of them.

The consortium believes that Digital Literacy cannot be defined primarily as the mastery of technical skills, the concept should be broadened to include both critical cognitive skills as well as the application of technical skills and knowledge. These cognitive skills include general literacy, such as reading and numeracy, as well as critical thinking and problem solving. Without such skills, true Digital Literacy cannot be attained. This belief is reflected in the definition chosen: "Digital Literacy is the ability to access network computer resources and to use them and to understand information as presented by computers". In this definition, Digital literacy is made up of:

- *Computer literacy* (software/operating systems): refers to the level of expertise and familiarity someone has with computers". Computer literacy generally refers to the ability to use applications rather than to program
- *Network literacy* (using the networked nature of the network): refers to the ability to communicate with others; obtaining (or downloading) and installing software on a computer; questioning the source of information search on the Internet and Searching for the required information, as well as the ability to use new media such as the Internet to access information effectively.
- *Digital eloquence literacy* (expressing opinions and ideas through digital means): refers to the ability to gather, organise and evaluate information, and to form valid opinions based on the results; and the ability to use new media such as the Internet to communicate information effectively

In total 83 indicators have been identified and described, distributed in four categories.

The second step, consisted of using field research and focus groups with the main stakeholders in the Digital Literacy strategies to identify and reach consensus on the common indicators. The first part of the process consisted in an analysis per region on the indicators currently used for measuring Digital Literacy strategies, reflected in a report containing information on the an analysis of the activities and strategies related to Digital Literacy and the indicators for measurement. These reports provided the input for a workshop per participating region, in which the main stakeholders discussed the indicators currently used, their adequacy and applicability, and identified indicators which in their opinion should be used as well to measure the impact of the digital literacy strategies.

The results from the regional workshops, in turn, provided the basis for the trans-regional workshop, which put in common the results from the regional workshops. The seven participating regions joint forces during this workshop, reaching consensus on the indicators ideally to be used for measuring the impact, efficiency, and success of Digital Literacy strategies. Both the regional workshops and the trans-regional workshop have used the focus group methodology.

Exhibit 2:Focus Groups in BENTLI

Focus group research involves organised discussion with a selected group of individuals to gain information about their views and experiences of a topic. It is particularly suited for obtaining several perspectives about the same topic. Focus groups however rely on interaction within the group based on topics that are supplied by the researcher. Hence the key characteristic which distinguishes focus groups is the insight and data produced by the interaction between participants.

The objective of the Focus Groups in the project is development of the common indicators through a bottom approach by first organising a focus group in each region with the most relevant stakeholders in the field, and afterwards validating the indicators in a trans-regional seminar. The trans-regional seminar involved the most relevant stakeholders in each of the participating regions.

The result has been the achievement of a set of common indicators based upon the consensus of seven European regions.

These common indicators are supported by a set of the guidelines, which describes how to measure and use the indicators for assessing the impact of a regional digital literacy strategy. The "Guidelines to measure the impact of digital literacy" explain how to fill in the standard forms for the common indicators and explain in detail how each indicator needs to be calculated, vital for the success of a benchmarking exercise.

As a result from the workshops four main groups of indicators were created:

- *Users and use*: Indicators that measure the use of the digital literacy services and activities offered, they look at the users according to the different characteristics, as well as at the purpose of use of the services and activities.
- *Infrastructures*: Indicators that measure the available access to the Internet in the region and the equipment available for access.
- *e-Administration*: Indicators that measure the ICT investment of public authorities, ICT education and the services offered on-line by public administration
- *Impact and results*: Indicators that measure the impact and results the digital literacy activities and strategies have had, such as an increase in usage and in digital literacy activities offered

Figure 1: The BENTLI Methodology
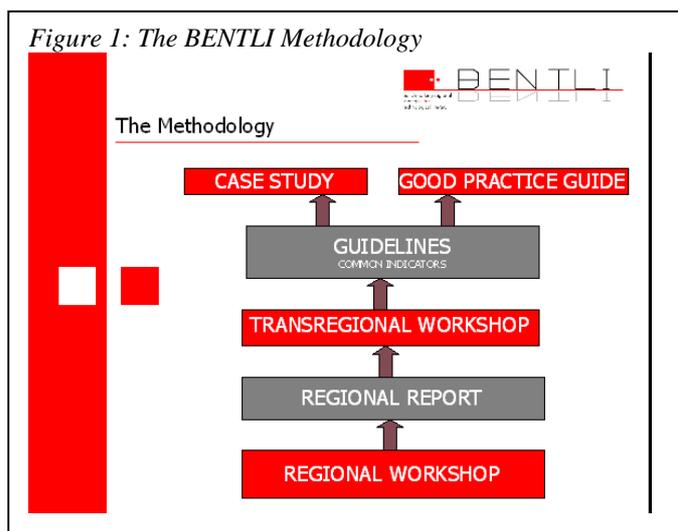
The third step is the application of the common methodology and common indicators for the realisation of an impact assessment in the seven participating European regions, this impact assessment has allowed to identify which of the activities and strategies used in the regions have had a positive and negative impact. Those strategies and activities that have had a positive impact are described in a good practice guide, thus enabling the transfer of relevant practices to other European regions.

As a last step, the European Observatory for Digital Literacy has been set up, integrating all the results and methodologies mentioned, the observatory contains the results of the impact assessment by allowing to access the indicators of the different regions in such a way that benchmarking is immediate, it also includes all good practices that have been identified.

The European Observatory is directed towards national, regional and local authorities that either have a digital literacy strategy in place and wish to benchmark with other European regions, and exchange good practices, or towards those that are initiating such a strategy, for them the Observatory is the perfect learning platform.

3. Regional Digital Literacy Strategies

Through the development of this methodology (common indicators and accompanying guidelines), it became clear that the need for Digital Literacy is a reality in almost all European regions, each region has to address this need in a different way. This has resulted in a set of different strategies, with a different focus, but addressing the need for Digital Literacy of its population to reduce the risk of digital divide.

The BENTLI project, has analysed the different strategies that are put into place in seven different European regions, regions that all have their specific characteristics that

have determined the focus and methodology of their Digital Literacy strategies, the differences in these characteristics has been one of the mayor criteria for the selection of the regions, thus increasing the richness of the practices and activities developed within the strategy.

Table 1:Regional Characteristics

REGION	*DESCRIPTION*
BLEKINGE (Sweden)	Population density: 51 inh/km²; Economy: based on a coastal industry; Demographics: number of inhabitants above 65 years of age is higher than the national average
BRANDENBURG (Germany)	Is a federate state, in which the agriculture plays an important role in the GPD.
EXTREMADURA (Spain)	Population density: 25 inh/Km², a population over one million people but just one city over 100.000 inhabitants, and consists largely of (remote) rural areas. Almost all employment is located in SMEs, of which a high proportion in micro-SMEs.
FRIESLAND (the Netherlands)	Friesland in North Netherland with a high population density 192 inh/km2. On average, about 15% of the people are 65 and older. The main industries nowadays in Friesland are traditional metalelectro industry, tourism, service industry, agro-food and retail, 78% of employment is within SMEs.
PIEMONTE (Italy)	Is one of the most developed regions of Italy. It economy is based on a very well settled industry. It has a strong administrative fragmentation as it is divided into eight Provinces and it counts over 1200 municipalities.
TAMPERE (Finland)	Tampere's population density is 385 per square kilometre. Tampere is one of the three most rapidly developing regions in Finland. Growth sectors of importance for employment include information technology, health and biotechnologies and High technology accounts for a remarkable share in the economy.
YORKSHIRE & THE HUMBER (UK)	Around five million people live in the Yorkshire and Humber region. As well as thriving towns and cities, it has more National Park land, historic houses and castles than any other region, and boasts spectacular scenery and a Heritage coastline.

As shown on Table 1 these regions are different from the point of view either the socio-economic and/or demographic, these facts, have been decisive for the regional governments in the design of their Digital Literacy strategies and actions.

Each region, with its own peculiarities, faces different obstacles and problems, when running their programs and activities to promote Digital Literacy and for the implementation of the Information Society in general. The most common problems are: low percentage of Broadband in some regions (Extremadura, Tampere), ageing population, lack of software adapted to disabled people, lack of investments, big extension of rural areas, predominance of the SMEs, high rate of unemployment.

For this reason, the followed strategies in these regions are very different, meanwhile some regions apply and adapt strategies at designed at national level (North Netherlands, Blekinge, Tampere or Yorkshire and the Humber), other regions have elaborated their own Regional Strategies: Piemonte, Brandenburg and Extremadura.

Table 2:Focus of the Digital Literacy Strategy

REGION	DIGITAL LITERACY STRATEGY FOCUS
BLEKINGE	The target groups in Blekinge are citizens, including the disabled, elderly and immigrants, SMEs and schools, teachers as well as pupils. There are priorities in supporting groups of people in the risk zone of being digital excluded simply because of their digital literate weakness and therefore of greatest needs. Within the framework of the national plans, each organisation and municipality draws their own policies and strategies.
BRANDEN-BURG	Is digital literacy strategy is structured on 4 programs under the title VIA Brandenburg. Those are VIABrandenburg-eLearning as a interpersonal communication process, VIABrandenburg-Personal Training Advisor (PTA) for eLearning, VIABrandenburg – the way for sustained success, VIABrandenburg – the partners and partners networks.
EXTREMA-DURA	Provide connectivity and digital literacy to every citizen, regardless the place they live in is the focus of the strategy, this creates specific difficulties due to the dispersed population and remote rural areas. The main pillar which supports this aim are the New Knowledge Centres (NKC) public spaces, connected to internet and provided with computer equipment and technicians that help users and social, economic and cultural institutions to know, experiment and promote the opportunities that the ICT is creating. The Centres are mainly based in remote rural areas and marginalized neighbourhood in the cities. The other pillars on which the strategy is based are the technological education network and LINEX, the free software application for education and training.
FRIES-LAND	In the province of Friesland this is partly the case; there is a framework. ICT is however touched upon within specific policy programmes and projects, mostly funded through temporary funds (as within LEADER, INTERREG etc.). The current policy is based upon two underlying programmes: ICT Notitie and Fryslan Fernijt. The ICT Notitie, a policy framework, contains ICT applications and services (e-working, e-learning, e-health), ICT Know how and skills (e-inclusion), ICT facilities and conditions. And secondly, Fryslân Fernijt moves advanced skills and tools for tourism, new opportunities and clustering in water treatment and water management.
PIEMONTE	The Piedmont Region has never issued an independent digital literacy plan, but os an integral part of the regional Information strategy. The aim is to giving equal opportunities to all citizens (despite their location, formal education, age) and enterprises (despite their location, size, production sector) to access online services and ICT benefits. Main instruments for this are the "Centro di Formazione per l'egovernment" (Regional e-government Training Center); the agreement signed between the Piedmont Region and AICA (the Italian authority for ECDL release); e-DOTTO (the regional e-learning platform design) and DSCHOLA, the regional initiative for ITC innovation in schools an on the territory.
TAMPERE	The change in technological paradigm and workforce age-structure will become very challenging in the next few years. Increasing the productivity is a very demanding task in the municipalities delivering public services but also in working life in general as well. There is a need for re-engineering the public service processes (e-health, e-government, e-democracy, e-learning, e-procurement, etc.). The focus of the DL strategy are e-learning activities, ICT in education and teacher training as well as the implementation of Internet in Libraries.
YORK-SHIRE & THE HUMBER	The region has an strategy called "ICT Skills Action Plan for Yorkshire and Humber", introducing the background conditions and strategic principles that guide the Action Plan including the core strategies and frameworks of the Regional Economic Strategy, the FRESA, the Regional Skills Action Plans and Northern Way developments. As a minimum everyone needs the ICT skills to participate fully as a citizen

4. Good Practice

One of the project's main objectives is to realise a benchmarking exercise with regional Digital Literacy strategies. An impact assessment has been realised. This paper will analyse the results of 3 BENTLI indicators [6], i.e. number of users according to age, the number of municipalities with Internet coverage and the number of students per computer. Table 3 represents the definition of the indicators, and the results for the participating regions.

Based on the results of table 3, it becomes clear that in the field of infrastructures, and more specifically the number of municipalities with internet coverage varies little, but when analysing this figure in more depth we need to take into account that the region of Extremadura, with a largely dispersed population and many remote rural areas, has 383 municipalities it becomes clear that the efforts in this field realised by the region have been very effective, and have reduced the digital divide of the remote rural areas. The case for Friesland is important due to the fact that although there is a high level of connectivity efforts are made to increase the speed and capacity of the connections.

> *Exhibit 3: Internet Coverage by Municipalities – Good practice*
> *Friesland - St@dsRing Leeuw@rden*: fibre optic network for the transport of data and telecommunications services throughout the city, connections are offered against cost price. Extension of the network throughout the whole province is planned [7]
> *Extremadura - Broadband for all*: initiated by the regional government, in collaboration with Telefonica, it guarantees broadband access to the Internet is to 100% of the municipalities (for remote or small they are) [8]

Table 3. BENTLI Indicators

	Number of users according to age (%)			Number of municipalities with internet coverage (%)	Number of students per computer	
	Up to 15 years old	*15- 64 years old*	*Over 65 years old*		*Primary education*	*Secondary Education*
Indicator Group	Users and use			Infrastructure	e-Administration	
Definition of the indicator	Number of users per age group (in numbers) divided by the total number of population per age group)			Percentage of municipalities/cities/villages that have internet access over the total number of municipalities/cities/villages	Number of students in absolute numbers per computer per different type of education	
Blekinge	-	65	-	100	5	2
Extremadura	91	40	10	100	5	2
Friesland	27	50	23	98	8.5	12.6
Piemonte	-	96	4	50	23	10
Tampere	100	0	0	99	5.4	5.7
Yorkshire & the Humber	No official data available			100	8	5

The indicator "Number of users according to age" offer data on three population age ranges. It is clear that amongst the youngest sector the number of persons that can be considered digitally literate is high. When analysing this in combination with the indicator on the number of computers per students a correlation can be observed. For example in Extremadura, the fact that in formal education the number of students per computer is drastically reduced, has provided an increase digital literacy levels of young people.

> *Exhibit 4: Users and Use – Good practice*
> *Piemonte – Digital Literacy trial within the city libraries*: extending the education services offered by the public library system. Aimed mainly at persons in peripherical districts, the project offers training courses about basic PC use and office applications [9]

5.   What's Next

In general terms the main results of the project are the common methodology for impact assessment, based on common indicators, which provides not only a tool to assess the impact of a specific regional strategy on the groups with high risk for digital exclusion, but

also provides the basis for benchmarking, being able to identify regions that have faced or are facing similar problems.

The foreseen impact of the BENTLI, though goes beyond this, the BENTLI methodology allows for better adapted Regional Digital Literacy strategies, as regional and local authorities and stakeholders allows the to evaluate the results of their strategies and identifying the areas where more focus is needed. The opportunities for cross-regional learning, the guide for good practice and the benchmarking will allow for the adoption of the lessons learned from other regions. The setting up of the European Observatory for Digital Literacy and its underlying network create a solid basis further cooperation and collaboration between all stakeholders in the field of digital literacy.

The European Observatory will focus on measurement and benchmarking of regional digital literacy strategies, expanding into Central and Eastern European countries, providing national, regional and local authorities of these areas with the opportunity of setting up, and or improving, their digital literacy strategies, based upon track record experiences.

6. Conclusions

Digital Literacy is an aspect that is recognised as vital for the success of the knowledge economy in Europe, it is also vital to make Digital Literacy efforts available for all, thus reducing the risk of a digital divide. This importance is recognised in the majority of the publications realised by the European Commission and national governments. There have been some intents to analyse the issue of digital literacy, e.g. SIBIS project, but these analysis are only realised on national level, while the majority of the efforts for Digital Literacy for groups with a high risk of digital exclusion are being realised by regional and local public authorities and government institutions. Moreover, there are huge differences in Digital Literacy between different regions in the same country.

The methodology developed and the complementary documentation of BENTLI allow to reduce digital divide, as the opportunities for cross-regional learning, the guide for good practice and the benchmarking allows for improved Regional Digital Literacy Strategies, and to adopt the lessons learned from other regions. The methodology and results of the project are a starting point to improve the effectiveness and success of regional digital literacy strategies, and will continue through the European Observatory for Digital Literacy.

The digital era is not going to disappear, and the need to respond to the growing digital tide is rapidly increasing, everyone should have the necessary skills to benefit fully from the Information Society. Therefore capacity building and ICT literacy are essential. European public authorities need to provide an answer and develop national, regional and local policies and strategies to ensure that ICTs are fully integrated in education and training at all levels, including in curriculum development, teacher training, institutional administration and management, and in support of the concept of lifelong learning.

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