DANISH
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Supporting Digital Literacy
Public Policies and Stakeholder Initiatives

# Final Report
# Topic report 4
# Conclusions and recommendations based on reviews and findings

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## Reader's Guide

In 2005, the Commission proposed a new strategic framework, i2010 – European Information Society 2010. i2010[1] is intended to stimulate an integrated approach to information society in Europe, also in recognition that an open and competitive digital economy is a driver of inclusion and quality of life. Since its launch, the i2010 strategy has been reviewed through the Annual Reports and updated in 2008 through the Mid-Term Review.[2]

Within the context of the Mid-Term Review, a study entitled Supporting *Digital Literacy: Public Policies and Stakeholders' Initiatives* was commissioned to Danish Technological Institute. The main purpose of the study has been to provide a comparative analysis of different Digital Literacy measures within the EU25, Norway, and Iceland, and in selected countries such as India, Canada and the USA. The study has focused on initiatives and policies targeted to disadvantaged groups not being able to take full advantage of the information society for different reasons such as geographical location, or the socio-economic situation of an individual. Furthermore, the study has analysed Eurostat Community Household Survey on the Use of ICT in Households and among Individuals from 2006-2007, and other large-scale surveys.

Topic Report 1 provides an overview and comparative analysis of past and present digital literacy (DL) initiatives in each of the 25 Member States as well as in Norway and Iceland, USA, Canada, and India. A total of 464 different initiatives were identified, ranging from large-scale public programmes rolled out nationally and targeting the entire population, to very small-scale third sector actions with very specific target groups. The report describes how these initiatives are distributed across key dimensions of DL (rationales, sustainability, motivational measures, platforms, content, accessibility, and usability). It also discusses the characteristics of initiatives aimed at specific disadvantaged groups (people with low educational attainment, unemployed, disabled, elderly, young people at risk, women, rural populations, inner city residents, ethnic and cultural minorities, and criminals and substance abusers). Moreover, differences in approaches between countries are addressed.

Topic Report 2 investigates indicators and measurement tools employed in the EU25 and beyond with a particular focus on the results of the special module on digital literacy contained in the 2006-2007 edition of the Eurostat Community Survey on ICT usage in Households and by Individuals. This overview and analysis provides information on the current level of digital skills in the European countries. It furthermore provides information on certain barriers to more intensive use (including motivational issues) and on the actual learning processes behind the acquisition of digital skills. The report also compares the Eurostat results with findings from other recent studies and briefly notes the content and structure of the most interesting alternative monitoring and measurement initiatives identified alongside the 464 initiatives described in Topic Report 1.

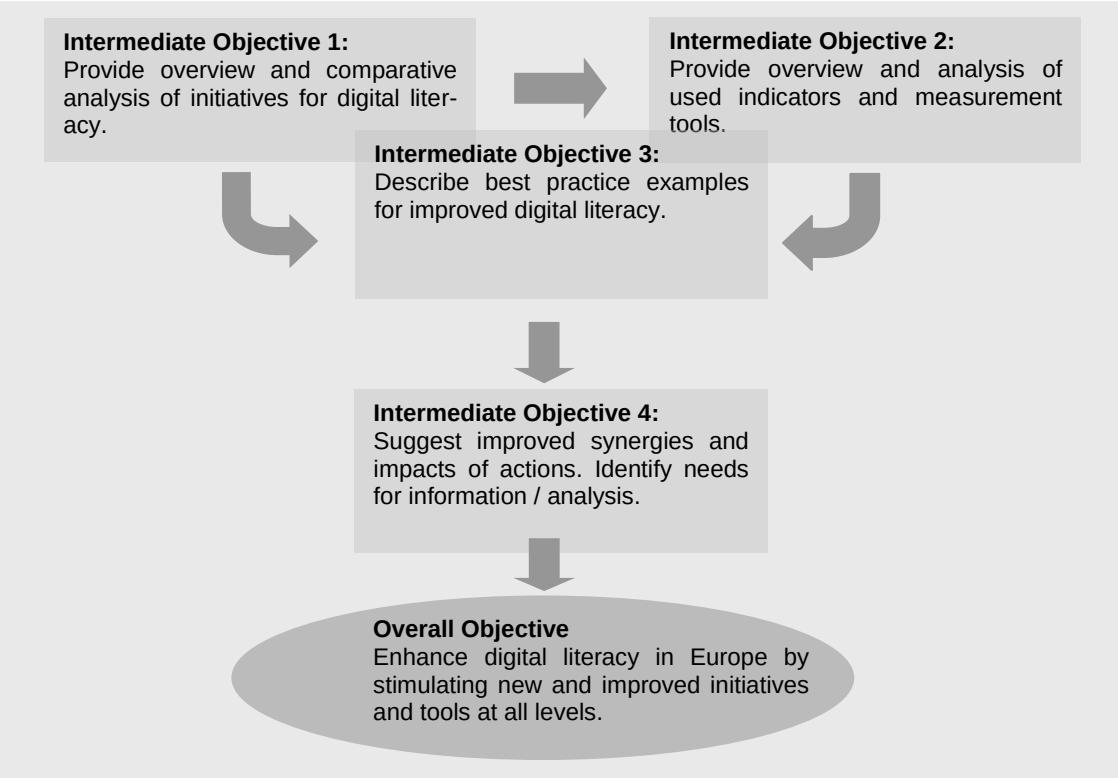
Topic Report 3 is based on the findings of the first two topic reports. It describes and analyses in more detail 30 selected good practice cases. It contains a comprehensive presentation of main enablers of digital literacy analysed in terms of setting relevant objectives, providing effective structure, design, and implementation, maintaining the motivation of target groups,

[1] http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm
[2] European Commission 2008a.

addressing potential barriers, planning and measuring impacts, securing sustainability, and focusing on innovation in approaches, methods, and technologies.

Topic Report 4 builds on the first three reports and external expert contributions. The analysis of country policies, best practice studies and the Eurostat data have provided a comprehensive evidence base on the current status and challenges related to digital literacy. Building on the evidence base from the three previous reports and literature analysed, Topic Report 4 concludes by identifying possible areas in which the EU could take action with the purpose of improving digital literacy among disadvantaged groups and aligned with existing policy measures and the overall policy intentions of the strategy i2010.[3]

**Structure and Objectives in Overview**




For further information about the structure and content of each topic report, please see the respective tables of contents.

[3] http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm.

## Abstract

In 2005, the Commission proposed a new strategic framework, i2010 – European Information Society 2010 - to stimulate an integrated approach to the development of an information society in Europe, recognising that an open and competitive digital economy is a driver of inclusion and quality of life. The i2010 strategy has since then been reviewed through Annual Reports and it was updated in 2008 as a follow-up of the Mid-Term Review.[4]

Within the context of the Mid-Term Review, a study entitled *Supporting Digital Literacy: Public Policies and Stakeholders' Initiatives* was commissioned to Danish Technological Institute. The main purpose of the study has been to provide a comparative analysis of different digital literacy measures within the EU25, Norway, and Iceland, and in other selected countries. The study has analysed initiatives and policies that target disadvantaged groups who are not able to take full advantage of the information society for reasons such as individuals' geographical location or socio-economic situation. Furthermore, the study has analysed the 2006-2007 Eurostat Community Household Survey on the Use of ICT in Households and by Individuals, and other large-scale surveys. The Eurostat data show some distinct socio-economic characteristics of the population of non-computer and -internet users. The greatest numbers of non-computer and non-internet users are found among:

- The elderly (from 55 years of age and older – especially those between 65 and 74 years of age);
- Women compared to men;
- Persons with low qualification levels;
- Persons with few economic resources;
- Persons in low-density population areas and objective 1 regions;
- Persons in manual jobs, the unemployed, and especially the retired or inactive.

Indirectly, the Eurostat data indicate a reduction in the first digital divide (access) as the proportion of non-computer users has diminished over time. However, developments in ICTs could lead to a second digital divide associated with higher intensity and quality in internet use and skills for critical assessment of information sources. The data show relatively smaller improvements in computer and internet skills for persons with low qualification levels and for the unemployed or otherwise economically inactive.

The case studies in Topic Report 3 provide numerous examples of how broad-based partnerships with involvement of private and public stakeholders and NGOs are critical to success of digital literacy (DL) initiatives. Another central element is to ensure that measures are tailored to the circumstances of an individual. However, relatively few initiatives have specifically aimed at the development of advanced digital literacy skills, though there are some examples of initiatives where participants have learned to use ICT in more advanced and interactive manners. This emerging advanced deployment of ICTs is enabled by affordable technologies such as mobile phones, Ipods, and PDAs[5], through collaborative functionalities called WEB

[4] European Commission, 2008a.
[5] A PDA is a handheld computer, also known as a personal digital assistant

2.0[6] , and through a open source software platforms, for example Facebook[7]. These technologies can be used for a range of purposes; from looking for support in an on-line community for persons with respiratory ailments, to a rural farmer in a remote region who gets advice on ecological farming, to a group of elderly who share a common interest about historical events in their community. These emerging changes in the use of ICT must be acknowledged in the ways digital literacy is understood and addressed. If not, there is an imminent risk, that a second digital divide could emerge; and furthermore that potential innovations to be gained from these more open, creative, and participatory ways of exploiting ICT remain unharvested. Hence, policy attention is needed to readdress digital literacy initiatives aligned to a more advanced social usage of ICT.

It is characteristic that the good practice initiatives often are embedded in other policy measures such as employment, lifelong learning, social policies, or micro-enterprising and as such also deal with the potential transformative nature of digital technologies. The publication from Futurelab, *The Future of Digital Literacy - a Charter for Change* (Selwyn & Facer, 2007), frames the reasons that the digital divide remains a complex and entrenched social problem. First, according to the authors, there is a diverse and wide range of technologies that could be considered to be ICTs – not just computers and the internet. Second, there is a diverse and wide range of activities that have gradually become more ICT intensive and which as a result have transformed- or could be transformed in the near future (Hilding-Hamann & Eggert Hansen, 2005) – from learning and employment to leisure and public services. As more information is gathered and created and reconstructed through the internet, individuals should have the competences to debate, contribute, and participate actively in the information society.

Due to these patterns of development, appropriate policy responses are likely to become more complex and demand a higher level of coordination between different policy realms. Furthermore, it becomes urgent that everyone from childhood on possess skills that enable a critical view of digital information sources.

The case studies suggest that public policy interventions concerning digital literacy are likely to be successful if they have a broader purpose than simply teaching the use of ICT. Several cases demonstrate how digital literacy measures can function as new ways to spur participation in community-building activities and stimulate individuals' return to schooling or to employment. As such, ICTs have the potential to drive and lead to major social innovations. In order to prioritise public policy intervention it will, however, be of value to have more robust data and evidence on the social and economic impact of digital literacy over time.

The Eurostat Community Household Survey on the Use of ICT in Households and by Individuals from 2006- 2007 offers a rich data set from which it has been possible to deduce a number of findings highly relevant to policy making. However, the current design of the survey also has its limitations, particularly regarding more advanced usage of ICT, and regarding

[6] Web 2.0 describes the trend towards online collaborative working, including the evolution of social networking sites, wikis and blogs. http://blog.semantic-web.at/2008/09/30/eu-commissions-short-sighted-definition-of-web-30/

[7] Facebook is a social networking website that was originally designed for college students, but is now open to anyone 13 years of age or older. Facebook users can create and customize their own profiles with photos, videos, and information about themselves.

the potential impact of a growing conversion of ICT platforms on the digital literacy level among different groupings. It is yet to be seen if the OECD-PIAAC initiative[8] on measuring adults' skills will lead to revised questions that are more relevant to emerging policy needs regarding for example the use of ICT for problem solving purposes. New indicators will likely be needed. The purpose would be to assess whether more advanced usage of ICT will lead to new forms of exclusion or to the emergence of new ICT platforms which are more intuitive in use and therefore gradually engage wider groups. Without robust and timely monitoring instruments in place, there is a risk that public funding will not be used optimally, for example by responding to an information society of yesterday. However, there is a balance to strike between the development and use of new indicators that are tested and are robust, given time and cost, and the type of knowledge to be gained by a policy cycle that makes use of pilots and formative evaluations to inform policy decisions about next steps. Given the rate and the speed of ICT innovations, there is likely to be a constant time delay in the uptake of new ICT applications in society at large and in the construction of adequate metrics.

[8] Currently (March 2009) under development, with support and expertise provided by the European Commission.

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# 1. Introduction

In its i2010 initiative, the Commission outlined three policy priorities:

1. The completion of a Single European Information Space which promotes an open and competitive internal market for information society and media
2. Strengthening Innovation and Investment in ICT research to promote growth and more and better jobs (also through an 80% increase in Community ICT research support by 2010);
3. Achieving an Inclusive European Information Society that promotes growth and jobs in a manner that is consistent with sustainable development and that prioritises better public services and quality of life[9].

The study on digital literacy is situated in the visions of the strategy i2010. This Topic Report 4 is the final report in the study of Digital Literacy.

Much has been achieved through coordinated efforts between the European Commission, the Member States, regional authorities, NGOs and the private sector. In the next stage, policy measures therefore should build on achievements already made to ensure efficiency and coherence in policy making to the benefit of an inclusive and participatory information society.

## *1.1. Objectives of the study*

Topic Report 4 is structured in three main sections.

The first part of the report presents the analytical framework for the entire study, followed by an outline of the country reports. The section concludes by an analysis which outlines a number of features that seem to be characteristic appear to be central to sustainable and user-centred digital literacy in initiatives.

The second part of the report presents key findings from the Eurostat Community Survey on ICT Usage in Households and by Individuals from 2007 (referred to as Eurostat Community Survey).

The final part of the report first discusses areas where advances could be made by taking into account achievements already made or by promoting greater synergy between existing measures and in the context of emerging, more advanced uses of ICTs. It concludes by drawing up a number of messages relevant to policy making within the overall vision of i2010, identifying areas where there are opportunities to build on achievements made at an EU level, in individual Member States, or at the regional level.

[9] European Commission, 2005.

### *1.2. The analytical framework*

The analytical framework has functioned as a guide for data collection and reporting in the countries covered by the study as regards the overview and review of digital literacy initiatives, as regards the overview and review of indicators and measurement tools for digital literacy, and as regards the analysis of good practice examples.
The analytical framework was developed in an iterative process informed by findings in the first parts of the study.

The main changes to the initial version of the analytical framework have been:

- An increase in the number of initial DL initiatives to be identified in each country, adding small and regional/local initiatives, but nevertheless relevant to the policy focus in the study;
- Additional dimensions to be analysed in relation to the DL initiatives (motivation, access, values, ICT platform and channel used, European perspective and sustainability);
- A change of focus from national monitoring initiatives to Eurostat data analysis due to a limited number of national monitoring initiatives;
- Additional dimensions in the analysis of the good practice cases in order to comprise emerging more advanced usage of ICT and its impact on new dimensions of digital literacy such as critical thinking and interactive content creation.

An initial scan of available information sources was conducted to allow the development of an analytical framework building on a solid knowledge base. Nevertheless, the continuous scan has continued throughout the project period to inform the study. It has been supplemented by experts, the Commission, and national correspondents and representatives. The national correspondents have been selected on the basis of their expertise in digital literacy policies and more broadly in inclusion policies.

## 2. Conclusions from the reviews and good practices

This section summarises the activities and results of the different operational phases of the study. The phases include:

- Review of national reports and digital literacy initiatives in 32 countries
- Review of monitoring and measuring initiatives
- Review of 30 good practices
- Formulation of conclusions and policy recommendations

### *2.1 Reviews of national reports and digital literacy initiatives*

#### *Introduction*

This phase of the project established an overview and comparative analysis of past and ongoing initiatives for improved digital literacy in the EU25 and beyond, in particular those targeting disadvantaged groups.

Data collection in the different countries has included the following elements:

- Review of available documents, reports, studies, and policy papers, using the internet, other publicly available databases, or other publicly available sources of information.

- Correspondence with relevant stakeholders or officials. The purpose has been to obtain additional information, either documentation which is not publicly available or assessments, for instance of implementation, results, and impacts of digital literacy initiatives.
- Where relevant: interviews with selected stakeholders or officials in order to obtain further qualitative information.

***Analytical framework***

The outcome of this phase was presented in an initial summary report (November 2007), followed by Topic Report 1 which contains an analytical synthesis of the data from the country reports. It goes beyond the country status and the individual initiatives to provide an in-depth analysis of core dimensions of digital literacy (DL) – both across countries and within the countries.

Topic Report 1 contains a cross-cutting analysis in which the following key issues (as listed in the initial proposal and complemented by additional input from the DL experts[10]) are wholly or partly addressed:

- To what extent have DL initiatives targeted disadvantaged groups? Which types of disadvantaged groups have been most in focus?
- What are the most important types of DL initiatives since 2000? Which approaches, methods, and tools have been most widely used?
- Which types of initiatives hold the largest promises in terms of achieving good results? In effective initiatives, what have been the key facilitators for development?
- What has been the role of the various actors? What are the experiences with the involvement of different types of stakeholders?
- To which extent are digital literacy initiatives part of an overall strategy for information society development? Is there evidence that a strategic approach in the design and implementation leads to a greater impact?
- Which lessons are emerging from the landscape of DL initiatives? Have synergies or gaps been identified which could be relevant to future policy making and policy coordination?

The data sources that have been included in the analysis are:

1) 32 country reports:
These reports capture evidence, policies, and trends for ICT in each country, as well as specific initiatives and policies for promoting DL among disadvantaged groups, also at grassroots level and industry-level, in addition to what is offered by national public agencies. In most instances, national correspondents with expertise in digital literacy policies and practices in the country in question have written the reports. The correspondents have used the same framework guideline to select and describe relevant initiatives taking into account the criteria set for selecting cases:

*Initiatives were included that:*

- *Have demonstrated visible results in terms of <u>quality of methods</u> developed and applied; have <u>achieved objectives</u> leading to improved digital literacy among the defined target*

[10] A DL Expert Group was created in November 2007 with a mandate to provide input and guidelines to the review of DL (http://ec.europa.eu/information_society/activities/einclusion/docs/diglitgrpmandate.pdf) at four meetings in 2008. The Expert Group prepared a set of Recommendations on digital literacy, which are available on http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_hlg_recommendations.pdf

*groups; have included digital contents and environments relevant to the target population; and which have managed to overcome barriers, obstacles or bottlenecks through innovative and resourceful approaches, not least regarding outreach mechanisms.*
- *Have generated experiences or insights which can be scaled and which can inform future policymaking and practice regarding digital literacy.*
- *Have been implemented between 2000 and 2007.*

*Digital literacy initiatives had to comply wit at least one of the following criteria to be included in the study:*
- *Initiatives should involve more than 500 end users*
- *Initiatives should have a duration of more than 6 months*
- *Initiatives should have a budget of at least €100,000*
- *Initiatives should involve original methods for improving digital literacy*

A second scanning of initiatives was subsequently carried out specifically to complement the selected initiatives with smaller and local initiatives. The above criteria were not strictly adhered to in the second scan. The aim was to achieve a larger number of identified initiatives and a broader scope in initiatives selected. Thus, although the final list of initiatives is not exhaustive, consultations with relevant national representatives confirm that that the coverage is comprehensive and includes most of the important initiatives in each country for the given time period (2000-2007). After consultation with the European Commission, it was agreed to omit further study of initiatives previously documented in other EU policy contexts.

A total of 464 initiatives were analysed from 32 countries. The findings of the cross-cutting analysis are summarised below.

#### *Targeting disadvantaged groups*

A fair share of initiatives in Europe tries to address the perceived needs of disadvantaged groups. Especially target groups like the disabled and the elderly, and to some extent the unemployed, have been prioritised through a number of initiatives in Europe, whereas disadvantaged groups such as early school leavers, women, ethnic groups, and deprived groups in rural areas seem to have received less attention.

The focus on the disabled and the elderly in European initiatives could be explained by the fact that the needs of these groups in relation to DL are very distinct. Particularly the group of disabled risks, for mere physical reasons, to be excluded from a range of net-based private and public services, unless usability measures are taken.

Both the elderly and the disabled are often less mobile. Digital literacy may be the means to expand their employment opportunities and their levels of civic engagement and participation. Some of the challenges reported are that the elderly often have problems with the functionality of the platform/device (PCs, mobile telephones, touch screens).

Cognitive research (Shapiro, 1997) has demonstrated that an elderly population will often need specifically targeted approaches to learning new things. The best practice case studies illustrate nevertheless that tailored methods and content can engage the elderly in digital media.

For disabled groupings, the specificity of requirements will often be associated with the nature of their disability. Since the early 1990's, the EU has implemented research measures to stimulate the uptake of ICT. The purpose has been to improve the quality of life for the elderly and the disabled, most recently within the 7th framework programme "Ambient Assisted Living.[11, 12] Through these measures, the EU has supported and promoted a number of research projects and actions to make ICT and related technologies accessible and usable for the elderly and the disabled.[13]

Research carried out within the European Framework programmes, and more globally, has contributed tremendously to improving genuine access and usage of ICT among different groups of disabled, most often building on innovative forms of user involvement throughout the entire design and development phase[14].

Many of the case studies show how motivational factors are a pre-condition to success and therefore must be considered in the design of an initiative.

There may be gender specific factors or issues relating to broader inclusion measures, which need to be addressed as a precondition to success. For example, a comparative study from the United States from 2001 found distinct differences in the patterns of use of ICT among young individuals in low-income families and middle-income families. Middle-income youth tended to have a much more varied use of ICT applications for different purposes, and they had better problem-solving skills than did children from low-income families (McInerney, 2001). The close linking of subject matter with the learner's surroundings and socio-economic context has proven to be a successful strategy. Several of the cases demonstrate that the learners' motivation to acquire digital skills develops as they recognise possible personal gains from being digitally literate. As ICT skills become increasingly prevalent in many jobs, youth without basic digital literacy skills will in many instances be at risk in the transition to the labour market. The more recent developments in social computing[15] hold some promises of engaging groupings traditionally defined by a low level of digital literacy and often affected by broader exclusion challenges as well. For example, some ethnic youth groups use mobile technologies with more ease than the computer. Similarly, more recent data show that women and individuals + 50 are emerging as new and active users of social computing applications and sites. (Pascu 2008)

Previous analysis of PISA data (Sweet, 2003) has shown a direct correlation between low ICT skills and low numeracy and literacy skills. This could explain why some youth may show a lot of talent in playing on-line games and yet are little motivated and have difficulties in using ICT for other purposes. In educational contexts, the use of ICT is now very common across all education sectors. In some instances, ICT can provide a learning environment suitable to

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http://cordis.europa.eu/fetch?CALLER=COORD_FP7&ACTION=D&DOC=20&CAT=NEWS&QUERY=011dacd735ac:f3fc:7ba484f7&RCN=29054

12 **Ambient Assisted Living** (known as **AAL**) includes methods, concepts, (electronic) systems, devices as well as services that are providing unobtrusive support for daily life based on context and the situation of the assisted person. The technologies applied for AAL are user-centric, i.e. oriented towards the needs and capabilities of the actual user.

13 For an overview of selected initiatives, see for example source list, Meister, Johannes-Jürgen.

14 See for example European Disability Forum, http://www.edf-feph.org/default.asp.

15 Def: Collaborative content, created with web2.0 technologies, is part of the social computing phenomenon. The key feature of collaborative content is that it is created, reviewed, refined, enhanced and shared by interactions and contributions of a number of people. http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1885

individuals with learning difficulties of either a physical nature (for example dyslexia) or a social nature (being a first generation migrant).

In other instances, increased use of ICT across learning contexts can alleviate learning difficulties because a range of educational software supports different learning styles where the individual may learn in his/her own time and pace. A number of examples from this study illustrate how innovative and targeted usage of ICT can enable individuals - in spite of being challenged for quite different reasons and in different ways – to acquire basic digital literacy skills and through that new opportunities. From the USA in particular, there are some interesting cases regarding ethnic groupings and at-risk juveniles. An evaluation of *GO GIRLS!*, a media education program created by the National Eating Disorders Association, found that media literacy skills can help high school girls enhance their sense of self-acceptance and empowerment regarding media images of women's bodies (Piran et. al, 2000). Similarly, an evaluation of *Flashpoint*, implemented by the Massachusetts Juvenile Justice System, showed that learning to deconstruct media messages helped juvenile offenders think critically about the consequences of risky behaviour and develop strategies to resist impulses that may lead them to engage in these behaviours, particularly during stressful moments or "flashpoints" in their lives (Behson, 2002). These cases provide lessons of potential relevance also in a European context. Reasons could be that in the USA several digital literacy measures have evolved within in a broader context of inclusion and social innovation than usually seen in European digital literacy initiatives at this stage.

A study from the USA (Lenhart & Fox, 2006) shows that in the USA some ethnic minorities use blogs more than their share in the overall community of Internet users might suggest. This opens interesting perspectives to engage these youngsters in eGovernment community services - designed bottom-up by the users themselves, and as a first step to reconnecting to society at large.

#### *Approaches and platforms*

DL outreach measures targeting disadvantaged groups often aim to teach participants basic ICT skills, often using curricula similar to the ECDL certification[16]. Adaptation can occur in the type of exercises and problems that are used, or participants may produce material relevant to their personal lives. Proximity in a sociological sense is central to reaching excluded individuals and to success in four ways:

- Program content should be recognisable and relevant to participants' everyday lives;
- Participants should share the same socio-economic background and cultural values;
- Initiatives should be carried out in familiar locations where the target group lives;
- The trainers, teachers, and facilitators must be rooted in or familiar with the participants' socio-economic space - for example living in the same community or being part of an NGO that represents the participants' interests.

A large number of initiatives primarily address stage 1 and stage 2 digital literacy[17]. Measures that from the outset focus on a transformative, interactive, and social use of ICTs identified as

[16] European Computer Driving Licence

[17] Whereas stage 1 was defined by promoting access, stage 2 was concerned with basic users skills, and Stage 3 is emerging with interactive and safe use of ICTs also for transaction purposes. For a broader coverage of Stage 1, Stage 2, and Stage 3 digital literacy, please refer to Digital Literacy Report: a review for the i2010 eInclusion initiative. Commission Staff Working Document, http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_review.pdf

a Stage 3 of digital literacy are still an emerging phenomenon, though some of the cases reported in Topic Report 3 have these characteristics.

There could be several reasons that Stage 3 usages are still in the making:

- Course organisers, who in many instances are volunteers, might not feel sufficiently familiar with emerging WEB 2.0 applications to use them as the IT platform for a given initiative;
- The equipment and connections available might not be sufficiently updated so that they can be used in more interactive ways;
- Affordable or free broadband services to edit for example digital film sequences may not be broadly available in the community where the initiative takes place;
- Many initiatives assume that individuals first have to learn the basic use of a computer and the internet before progressing to use in a social context, despite emerging evidence that situated and context-relevant learning can be relevant for persons with limited ICT skills.

Rapid and disruptive changes have led to affordable or free interactive technologies that can be used for a range of purposes with a strong social potential - as some of the cases show. However, new emerging opportunities to build and expand social capital tend to be of greater benefit to those already endowed and privileged (Zinnbauer, 2007). These groups have made use of these opportunities to network for career advancement – for example through *LinkedIn* - to be better informed about health issues, or to share common interests. From the USA a body of newer literature suggests that social technologies also open up to new users groups traditionally considered as minorities (Lenhart & Cox, 2006; Pascu, 2008). Public policy targeting digital literacy among disadvantaged groups is under pressure to capture emerging usage so as to learn from innovative use of WEB 2.0 technologies among disadvantaged groups, and to ensure that new divides do not emerge in the wider communities of socially excluded individuals. Examples of how WEB 2.0 technologies are applied to address factors that can lead to social exclusion should be studied in depth as they emerge to obtain a deeper understanding of the processes of innovation within the specific initiatives as a basis for evidence-based policy making.

User-driven new ways of collaboratively using, producing and sharing text, sound, and images can not only pave the way for a more advanced level 3 digital literacy on a broader base than currently. The scope and nature of some of the cases covered in this study demonstrate how many of these bottom-up driven initiatives may evolve as social innovations[18] with relevance to other contexts (Chauhan, 2006), and improve life quality for a growing number of chronically ill and disabled who often tend to experience a higher level of exclusion.[19] The vast majority of the European population owns mobile phones rather than computers; never-

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[18] Social Innovation refers to new ideas that resolve existing social, cultural, economic and environmental challenges for the benefit of people and planet. A true social innovation is systems-changing – it permanently alters the perceptions, behaviours and structures that previously gave rise to these challenges.
http://209.85.129.132/search?q=cache:7Gst6YtrWoIJ:socialinnovation.ca/about/social-innovation+definition+social+innovation&cd=5&hl=en&ct=clnk

[19] Digital Literacy, European Commission Working Paper, and recommendations from Digital Literacy High-Level Expert Group, (2008)
http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_review.pdf and
http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_hlg_recommendations.pdf

theless, only a minority uses mobile phones for more than telephone conversations and text messaging, although opportunities for other uses already exist. As interactive TV and household appliances become broadly available and affordable, it is likely that these platforms as well as mobile phones could be used in innovative ways in the next generation of DL initiatives to address a stage three of digital literacy. As mobile devices and digital TV become more widespread consumer electronics with user-friendly interfaces, the need for practical hands-on ICT training as a prerequisite to being digitally literate might be reduced, whereas the need for skills related to transactions on the net and collaborative content creation may grow.

Other ICT platforms such as mobile phones are more easy to use, more affordable and much more widely spread than the Internet, in particular among groups at risk of exclusion. The need for practical hands-on training may as such be reduced. Using mobile phones and text messaging in digital literacy initiatives may not only reach broader target audiences in an affordable manner. Studies suggest that it may lead to new an evolution of more inclusive and user-driven government services in general (mGovernment, mLearning, mHealth), and may offer a great potential to reconnect groups at risk of exclusion from public services, learning and civic engagement (Millard, 2003; Millard and Horlings, 2008). A study conducted for Institute for Prospective Technological Studies in Seville provides a number of concrete examples of such emerging services (Zinnbauer, 2007):

- Political participation: In September 2006, the UK's Citizen Calling Initiative has carried out a trial public consultation on criminal justice issues to which young people between 16 and 25 were invited to register their opinion and contribute via text and multimedia messages. The outcomes are currently being assessed.
- Job-seeking: some recruitment agencies inform registered users via text messages about upcoming job opportunities and even start to accept applications via mobile phones.
- Health issues: several industry-sponsored experiments with text message reminders in the health sector in the UK showed impressive success rates. For example, the number of missed appointments with family doctors was reduced by 26-39% and the number of missed hospital appointments by 33-50%, leading to estimates that a national roll-out of the system could yield annual savings of £256m-364m. Likewise, text messages were found to significantly strengthen compliance with medication regimes for diabetes.

Consequently, it is not surprising that certain types of DL initiatives are emerging and developing coverage:

- Online learning platforms and resources may provide opportunities for groupings unable to visit PIAPs[20], educational institutions, or community centres. Such solutions offer opportunities to achieve economy of scale through for example a common platform for the delivery of learning resources, which may be redesigned to different target groups and used in different learning situations. An example is the Australian Flexible learning framework[21]. It is jointly funded by the Australian Federal Government, and the states and territories. Through this platform, training is delivered to diverse audiences, from aborigi-

[20] Definition: Public Internet Point (PIAP)
[21] http://www.flexiblelearning.net.au/flx/go

nes in the bush being trained in micro banking for the benefit of the isolated community, to elderly workers in the mining industry.

- Initiatives supporting community- and innovation-driven content and the production of new content are emerging along with the evolution of WEB 2.0 (i.e., the increasing proliferation of internet services allowing users to collaborate and share information online). Data show that for example Wikipedia is used by all adult age groups (Pascu, 2008). However, usage increases with income and education. Wikipedia provides a channel for the elderly to share their knowledge with younger people, and that retired people constitute a key editorial segment. The European Spire survey of educational users also show high activity for Wikipedia, as 54.8% of the respondents read Wikipedia and 14% contributed to it (Ala-Mutka, 2008). Originally, the growth in take-up of social computing applications was initiated by young Internet users. A study from IPTS (Pascu, 2008) suggests, however, that more recently new user groups have been emerging that are not composed of traditional early ICT adopters: more and more woman and older people are starting to use social computing applications. In Europe, a significant increase in the usage of video-sharing sites, for instance, can be ascribed to increased use by women and those aged 50-64 - the so-called 'Silver Surfers' (Pascu, 2008).

#### *Key factors of success*

Several factors impinge on the successful provision of DL initiatives for the disadvantaged. Not surprisingly, initiatives developed in alignment with national policy strategies tend to develop more smoothly from conception to implementation and are more likely to be adequately resourced. However, a strong link to a national strategy does not automatically ensure success in properly targeting end-user groups or in achieving real impact. Policy objectives may change as new governments take office or public administrations are reorganised, and there can be competing agendas with other policy spheres of public funding. Finally, as many of the case studies show, public administrations are often not a key actor for reaching special-needs groups.

Therefore, it is crucial that digital literacy initiatives have the ability to raise support and funding independent of government, both in kind such as specific knowledge regarding location- or user-specific circumstances, as well as in the form of capital, equipment, and infrastructure.

The entrepreneurial power of local community leaders provides a third source of successful DL initiatives which should be considered noteworthy despite their often miniscule capital or sometimes unorthodox views contrasting policy mainstream. Imagination, enthusiasm, and relentless pursuit of a vision are invaluable in the small-scale grassroots network types of initiatives that commonly serve the constituencies not easily reached by government.

#### *The role and involvement of different actors and stakeholders*

The cases studied seem to suggest that initiatives that have a multi-stakeholder approach and/or involve private actors are more likely to be sustainable. Broad involvement will typically ensure that the initiatives comprise persons with insights into the needs of the target group as well as persons with insights into the financial and managerial aspects of an initiative. In addition, if industry is involved it will also often donate important resources to the project as well as provide expertise on different matters.

However, there are examples of mainly publicly-driven initiatives, such as the European ECDL-type certificate, which have been strongly rooted in solid policies and strategies with sufficient funding and efficient infrastructures in place to reach large audiences. Similar initiatives have typically targeted specific audiences such as teachers, people working in the public sector, students and pupils, or certain occupations.

In many instances, initiatives aimed at a specific disadvantaged group will involve an active participation of representative associations and organisations with deep insights into the needs and thus appropriate approaches regarding the target group in question. Cases within this study suggest that the involvement of representative organisations with insights into a particular target group is critical to success.

Adequate resources are often a challenge. The involvement of well-connected volunteers is vital to obtaining sufficient means to become operational. This may involve obtaining commitment from an ICT sector organisation to secure contributions of equipment or software from member companies. It may also be a senior citizens' association that creates links to schools with students that are willing to teach elderly persons how to use mobile telephones.

***Digital literacy policies – setting the context***

Practically all European countries now have comprehensive information strategies in place. The country-specific initiatives do not, however, all seem to be a direct outcome of those strategies. One reason is that country policies may not always have a direct focus on digital inclusion; another and more important factor is that other bodies than the public authorities, particularly NGOs, play a lead role in many of the initiatives.

In some countries, digital literacy policies and initiatives are still mainly aimed at improving infrastructures and providing equipment and skills to the population at large, with no or limited focus on special needs groups other than general measures reinforcing recognised web standards on official government home pages. At the other end of the scale, some countries have more or less abandoned the concept of accessibility in terms of large-scale rollout, and have reached a next stage concerned with measures to improve user friendliness and relevance and content of services for specific target groups.

Future strategies and policies - especially initiatives targeting disadvantaged groups - will nevertheless likely have to consider both accessibility and usability in order to align with technology developments related to technology convergence. The good practice case study phase has therefore aimed to cover initiatives, which mirror how policies regarding the information society have evolved from a Stage 1, primarily concerned with issues of coverage and access, to a Stage 3 that is emerging as a consequence of more advanced forms of transactions via the net. In these emerging contexts, users need to be confident, creative, and critical, as they engage in media use for different purposes.

***Digital literacy - an evolving topic***

In a historical perspective, the concept of a digital divide initially was related to the disparity between those who could afford to buy computers and had access to and could afford internet connections, and those who were cut off from these privileges – the gap between “the haves” and “the have-nots” in a technological sense. Later developments demonstrated that formal access and possession of the technology in itself did not automatically imply a genuine access

to ICT including the ability and motivation to use it. Beyond the technology in itself, individuals needed the proper competences to use it and purposes for doing so. DL policies clearly have emulated this shift in focus: from the rollout of infrastructure and subsidisation of computer purchases, to teaching and certifying basic computer skills, and to current efforts to incorporate the many new internet possibilities into learning modules that make DL courses resemble everyday situations.

The latter development might be viewed not simply as a natural update of previous computer courses, but equally as a renewed focus on the motivational aspects of technology use and on appropriate measures to stimulate an engagement in DL. As previous experiences showed, access to ICT infrastructures would not in itself yield a wider uptake. Similarly, findings now show that an ample provision of ICT training does not automatically lead to more ICT-skilled because not everyone is yet motivated to use ICT.

Digital literacy policies have evolved in quite different manners in the past decade in the European Union. In the New Member States and in the Old Member States at the lower end of the aggregate i2010 indicator ratio[22], digital literacy policies have mainly focused on infrastructure development. In countries at the top level of the aggregate i2010 indicator ratio, policies have evolved with a support for initiatives aimed at different excluded or potentially excluded groups.

Within and across countries there are significant similarities in the focus of ECDL (standard) type DL programmes aimed at the unemployed and the elderly.

However, there are very few examples of initiatives that have been transferred from one country to another. Most of the standard course initiatives have led to certifications and diplomas; yet there is limited evidence and formal knowledge about whether these initiatives have improved course participants' actual use of information and communication technologies for employment and civic purposes, compared to those who have not enrolled in certificated courses. One of the key issues is that when evaluations have been conducted, they have primarily focused on outputs (number of participants who have passed a certification, and user satisfaction), whereas the actual impact has largely remained unaddressed.

Synergies have primarily occurred in large-scale national projects providing standard courses to the population as a whole or to large population segments - for example for employment purposes in the public sector, or aimed at the educational community (teachers and pupils/students). The hypotheses that were tested in the good practice case study phase were first, whether there are unexploited opportunities for synergies across initiatives within coun-

[22]The aggregate index is a simple average of the following variables mainly from Eurostat: Total DSL coverage, DSL coverage in rural areas, Broadband penetration, DSL penetration (all as percentage of total population), household internet connection rate (as percentage of all households), household broadband internet connection rate (as percentage of all households with an internet connection), share of basic public services for citizens fully available online, shares of population who i) are regular internet users, ii) send emails, iii) look for information about goods and services, iv) use internet telephoning or videoconferencing, v) play or download games and music, vi) listen to web radio/watch web TV, vii) read online newspapers/magazines, viii) use internet banking, and who ix) use e-government services, as well as shares of population with i) no internet skills, ii) low level of internet skills, iii) medium level of internet skills, and with iv) high level of internet skills (all as percentage of total population). The relative score in relation to the EU average is utilised to adjust for the varying country availability of variables. The measure is developed by the European Commission.

tries and across borders in Europe, and second, whether such synergies can be transferred from addressing one target group to addressing others. However, the analysis showed that it was not possible to make any evidence-based conclusions, because of the way the particular initiatives have been monitored and evaluated. There are significant gaps in knowledge about which types of initiatives have a strong impact on particular target audiences and successfully achieve their objectives, and which ones have less of an impact and why. Very few initiatives have included a formalised external evaluation, and none of the initiatives has taken measures to collect outcome-based data over time as a basis for an impact analysis. Therefore, there is little information as to what works and why, and why some individuals take part and others do not. There are immanent risks that future initiatives will be implemented without sufficient opportunities to draw from a formalised knowledge base from the results of previous initiatives, because the knowledge base is limited and even often quite anecdotal. In order to build a formalised knowledge base for future policies and practices, appropriate evaluation methodologies must be developed and applied, also including longitudinal methods in order to understand impact over time. The good practice case study phase (see section 2.3) has looked at this issue.

***Digital initiatives selected for further analysis***

Case studies were selected according to the following criteria:

- Initiatives that explicitly **target one or several disadvantaged groups** to maximize the number of cases not simply affecting disadvantaged people in general terms (population and disadvantaged groups at large) or only indirectly (education system);
- Initiatives that **use online learning platforms or support digital literacy development for mobile telephone and PDAs**[23] instead of or in addition to the standard use of basic computer equipment;
- Initiatives that include the **use of audio, video, or graphic (multimedia) content** and not just text-based materials;
- Initiatives that **support the development of user-produced and/or community-driven content** and in which the acquisition of ICT skills is embedded in broader policies of e-participation;
- Initiatives that have undergone some form of evaluation or initiatives that have been **running for several years and are still running** so that their impact can be assessed either through documents or through contact with implementers and/or users;
- Initiatives that have **documented impact** and/or have been **recommended by the correspondents** compiling the country reports.

Furthermore, the selection of cases has been guided by the constraint that – with a minimum of exceptions – only 2 or 3 initiatives from each small country and 4 or 5 initiatives from each large country (more than 20 million inhabitants) should be represented in the sample. Initially, 87 cases were selected, but they were supplemented by additional cases, primarily cross-European, to a total of 91 cases.[24]

[23] A PDA is a handheld computer, also known as a personal digital assistant.

[24] The four additional cases were three cross-european - The PIC project, the E-Migra project, and Grandparents and Children, plus the Spanish initiative Cibervoluntarios.

The table below shows the proportion of selected practices by target groups compared with the original sample of 464 digital literacy initiatives.

| Potential disadvantaged groups | In sample | Overall | (N)[25] |
|---|---|---|---|
| *i. Population/Disadvantaged groups at large* | 29% | 31% | (25) |
| *ii. Educational system* | 5% | 19% | (4) |
| *iii. Work related* | 5% | 5% | (4) |
| *iv. Poor education and training* | 17% | 7% | (15) |
| *v. Unemployed* | 20% | 12% | (17) |
| *vi. Disabled* | 25% | 20% | (22) |
| *vii. Health* | 1% | 1% | (1) |
| *viii. Elderly* | 37% | 18% | (32) |
| *ix. Young people at risk* | 17% | 8% | (15) |
| *x. Women* | 20% | 10% | (17) |
| *xi. Rural development* | 18% | 8% | (16) |
| *xii. Urban development* | 9% | 3% | (8) |
| *xiii. Ethnic, cultural and language minorities* | 16% | 10% | (14) |
| *xiv. Criminal and other illegal behaviour* | 5% | 2% | (4) |
| *xv. Other groups* | 5% | 1% | (4) |
| *Total no. of DL initiatives* | 87 | 464 | |

## *2.2. Reviews of digital literacy monitoring and indicators*

The digital literacy study has reviewed the 2006 and 2007 Eurostat Community Survey on Usage of ICT in Households and by Individuals and identified a range of factors influencing the use of digital services and the development of computer and internet skills. New variables have been analysed in the 2007 special module on digital literacy aimed at identifying factors and trends relevant to ICT usage among potentially marginalised and disadvantaged communities. The review has also compared the results shown in Eurostat with those of a number of other recent monitoring and measurement initiatives in Europe and the USA.

#### *Past and present data on computer and internet skills levels in Europe*

With a point of departure in the 2006-2007 Eurostat figures on digital literacy (including new indicators), the study has examined indicators of potentially marginalised and disadvantaged groups: gender, age, education, occupation, population density, economic regions, income, age/education, and age/employment.

#### *Improvements, but the digital divide is still a concern*

The data available from Eurostat on potentially marginalised and disadvantaged communities are presented according to traditional indicators such as age, gender, geographical location, level of education, employment status, and type of job (manual vs. non-manual).

Computer and internet skills levels have improved from 2006 to 2007 throughout Europe.[26] The number of individuals who have never used a computer or the internet has generally

[25] The third column contains the actual number of cases selected in each topic field.

decreased (3 percentage points and 6 percentage points respectively), with only marginal variations in relation to age and education attainment levels.

The Eurostat data show some distinct socio-economic characteristics of the population of non-computer and -internet users. The greatest numbers are found in:

- The elderly (from 55 years of age and older – especially those between 65 and 74 years of age);
- Women compared to men;
- Persons with lower education levels;
- Persons with few economic resources;
- Persons in low-density population areas and objective 1 regions;
- Persons in manual jobs, the unemployed, and especially the retired or inactive.

Improvements in the proportion of non-users have been greatest in thinly populated areas. Data from a regional level (e.g. NUTS2 level[27]) would be useful to analyse if there are specific factors which seem to have impacted the improvement in digital literacy levels. This could form a basis for eventual evidence-based policy actions within regional policies at the EU level and within Member States.

An examination of micro-data related to non–users in comparison with individuals with medium- or high-level computer skills confirms the above observations about computer skills as defined by age groups, general level of education (defined as low, middle, or high), and geographical location (defined by population density and country).

Indirectly, the Eurostat data indicate a reduction in the first digital divide (access) as the proportion of non-computer users has diminished. The proportion of persons with no computer skills has decreased by 3 percent points, from 43% in 2006 to 40% in 2007. However, there is a potential second digital divide associated with higher intensity and quality in internet use, critical assessment of information sources skills, and level of motivation. The data show relatively smaller improvements in computer and internet skills for persons with low education attainment levels (the proportion of persons with no computer skills has decreased from 65% to 61%) and for the unemployed or otherwise economically inactive (from 74% to 72%).

A high proportion of persons with medium and high computer and internet skills levels is found among youth (77%), students (84%), and individuals with a high educational attainment level (77%). For efficiency and equity reasons, an argument could be made to focus on digital literacy policies and measures targeting socially disadvantaged groups to avoid the creation of a secondary digital divide as more advanced use of ICT expands in different parts of our life spheres.

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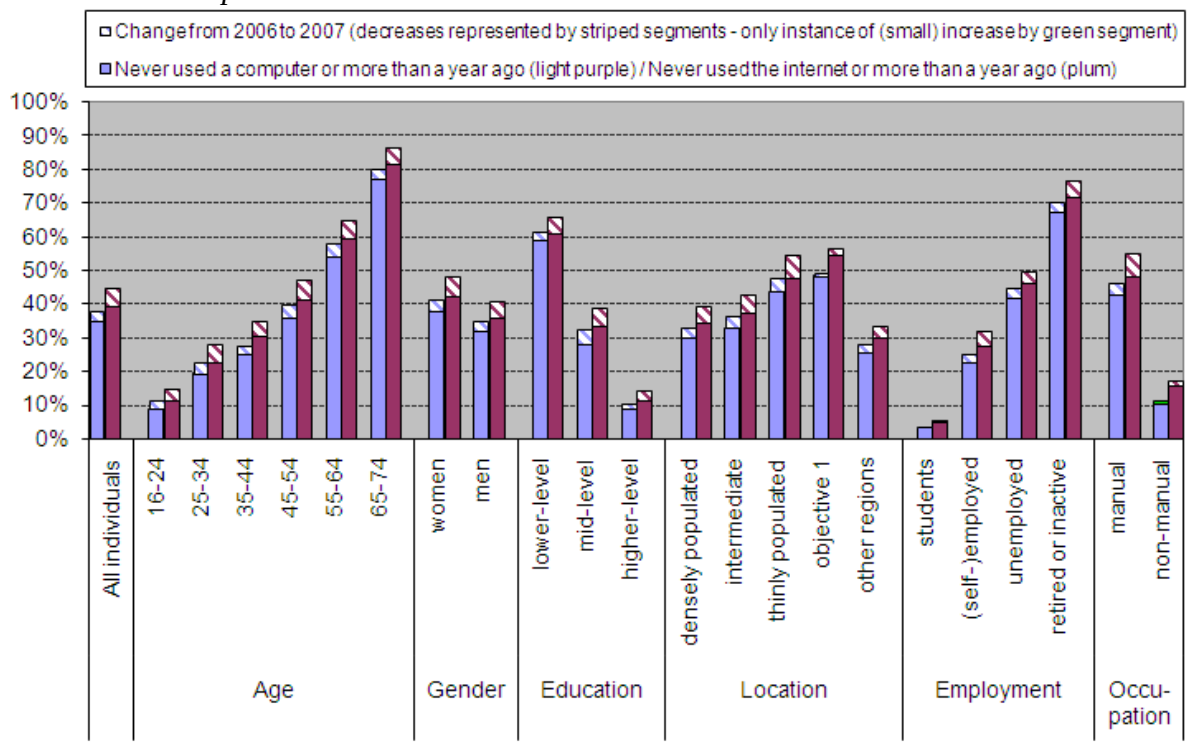
[26] Note that index skill questions regarding computer skills differed in 2005 with the simple item related to the ability to use a mouse to open programs has been substituted with the somewhat more demanding item related to the ability to connect and install new devices such as a printer or a modem.

[27] The NUTS nomenclature is a geographical hierarchical classification created and developed according to the following principles: a) The NUTS favours institutional breakdowns, b) The NUTS favor regional units of a general character, c) The NUTS is a three-level hierarchical classification. NUTS2 defines regions of 0.8-3.0 million inhabitants. For more details see: http://ec.europa.eu/eurostat/ramon/nuts/basicnuts_regions_en.html

*Never used a computer vs. never used the internet*




*Source: Topic Report 2, section 2.2. Percentages of all individuals in population group (unless otherwise noted the age group is 16-74). Related to questions B1 and C1 of the Eurostat Community Survey on ICT usage in Households and by Individuals. See Topic Report 2, annex 3 for exact data and breakdowns.*

As the table above shows, there is a clear pattern in the actual use of computer and internet which is quite similar to patterns of participation in lifelong learning in Europe; the higher the age the less usage, and the lower the level of education, the less usage. Similarly, persons in manual jobs have a lower usage than those in non-manual jobs, and usage by the unemployed and retired or inactive is also less frequent. Regional disparities can also be noticed, although not with as large a variation as for the other categories.

From a policy perspective it is quite alarming to note the percentage of persons in manual jobs who have not used the internet or a computer as compared to those in non-manual jobs, and the differences in Internet and computer use linked to formal educational attainment. Persons with low educational attainment and who at the same time lack digital skills are likely to be less mobile in the labour market and much more likely to be laid off in economic down-turns.

Data show that employment is an important source for acquiring and using ICT skills. Therefore it should be considered if broader measures of ICT training for at-risk groupings could be improved with focus on ICT as an enabler of innovation and productivity. (Piester et al., 2008).

Though the ECDL initiative has provided an important step stone for the advance of ICT skills at the very basic level, it seems quite obvious that concerted efforts to further the skills levels among the low skilled and those at the fringe of the labour market would need to go beyond the level of ICT skills offered through the ECDL and would need to focus on how ICT can be used in an integrative manner in companies' internal and external processes. There are reasons to believe that parts of the differences in use could be ascribed to differences in

ICT uptake across firms and within specific job function. Many studies have found that there is a direct correlation between firms' competitive strategies and their investment in skills (for example Leney et al., 2004). Therefore, any structural effort to further ICT training as a measure in innovation and competitiveness policies would likely need to be able to demonstrate how a given firm could benefit from a broad investment in its ICT skills base.

A survey on ICT uptake in SMEs from Italy from 2002 (Lucchetti & Sterlacchini, 2002). found some quite interesting patterns of use. The analysis showed three levels of use:

- **The general-use ICTs:** this includes e-mail and Internet access. Simple rates of adoption are very high and do not depend on size (i.e. number of employees) and industry.
- **Production-integrating ICTs:** This includes LAN, EDI and Intranet. These ICTs are linked to production processes either carried out within the firm or based on inter-firm relationships; they are more expensive than general-use ICTs and require relevant technological skills (often internal to the firms).
- **Market-oriented ICTs:** These are jointly identified by the presence and the content of a firm's Web site. Analysis of the content shows that Websites are mainly used to improve the firms' visibility and to provide detailed information on their products, with a view to enlarging the potential customer base.

These differences not only impact the quality of skills among individuals working in technology-poor and technology-rich environments; the limited use of ICT may also impede productivity and innovation in processes and services. The divide between employees who have opportunities to improve their ICT skills through daily job functions and those who do not can hamper labour market mobility insofar as those workers who are not ICT literate are likely to have fewer job opportunities than those who are.

In terms of policy implications, the findings from the Italian study suggest that European actions aimed at increasing the use of ICTs among SMEs should be based on a well-aimed policy mix. If the objective is to help firms increase their productivity, then the development of production-integrating ICT skills should be given priority; if, on the contrary, the policy is aimed at enhancing market opportunities, then the focus should be on market-oriented ICT skills. In either case, a key factor is the improvement of the human capital within SMEs. Given that the ICT intensity is rapidly evolving across sectors, active labour market policies and also lifelong learning at the sectoral level and within the European Social dialogue can be a means to raise industry-relevant ICT skills levels to the benefit of individuals and sector competitiveness.

For future policy purposes, data on the usage of ICT at the firm level and within different occupations can provide valuable insights which could feed into sector-specific measures to raise digital skills levels.

#### *Impact of age, education, and employment on computer and internet skills*

The lower the age and the higher the level of educational attainment, the better the level of computer and internet skills. This trend is more pronounced when both factors are combined. The combination of age, educational attainment, and employment status (or type) in relation to computer and internet skills also highlights the existence of a geographical divide across Europe. Relatively small northern and north-western countries in general have higher

proportions of inhabitants with medium to high computer skills levels compared to southern and south-eastern nations. More information about the curriculum of educational programmes which cannot be characterised as IT programmes, but yet have an ICT component could reveal if measures to introduce hybrid curriculum, for example in the combination of humanities and ICT, are more succesful in contributing to higher computer and internet skills levels than traditional programmes.

The analysis in Topic Report 2 on computer and internet skills in relation to employment status (or type), based on the module on ICT skills in the Eurostat Community Survey from 2007, reveals that past and present employment has a direct influence on computer skills levels for the younger population (16-24 year olds) and for the elderly (55-74 year olds). Younger employed and self-employed (economically active) persons have much higher average computer and internet skills levels than older unemployed or inactive persons. For these two age groups, the economically active will generally have a higher level of computer skills than the unemployed. The unemployed will in turn have better skills than the retired or economically inactive, with a lower proportion of individuals with no computer skills or a higher proportion of people with medium/high computer skills.

Employment status has some impact on whether a person has some internet skills or none at all. At the medium to high internet skills levels, employment status only has a limited impact. The Eurostat data provide no plausible explanation for this. One reason could be that those with medium to high-level internet skills regardless employment status have taken a personal interest in learning how to use the internet.

As ICT becomes embedded in an increasing number of jobs and in a range of public services, public policies should ensure that the elderly in the labour market and those at the fringe of the labour market have adequate ICT skills as a prerequisite to improving their labour market participation. Furthermore, active labour market policies which include training in ICT could increase the likelihood that elderly in the labour market are not forced into retirement because of an insufficient ICT skills base.

#### *Why digital literacy is still a policy topic*

There are many reasons why public policies should continue to address digital literacy. First, there are still users in all European population segments that have limited or no ICT skills. Second, individuals without advanced digital skills may be disadvantaged in a number of ways as ICT increasingly penetrates all life spheres and WEB 2.0 technologies gain foothold both in civic and business contexts. From a public policy perspective it should be of concern that those citizens who either cannot access the internet or who are not motivated to learn how to use a computer, a mobile, or WEB 2.0 technologies, may not have the same level of information and choice as those who are digitally literate and motivated to use ICT in different life spheres:

- First, ICT is a source of finding and accessing expertise. An individual without understanding of or access to electronic technologies becomes disadvantaged in terms of access to human capital, for example if they look for expertise in relation to health issues.
- Second, businesses and particularly SMEs will most often expect individuals to come with a broad range of skills. In most companies, digital literacy skills are no longer considered specific to a business. Persons without ICT skills will therefore in a job

search context be at a disadvantage compared to those who possess digital literacy skills.

- A third source of disadvantage stems from a lack of ICT competences in a consumer context. If an individual is not able to use the internet to compare prices of a certain goods, to book tickets on-line, or to forward a complaint, then prices paid are likely to be higher and services more difficult to access.
- Fourth, if an individual needs a public service - be this medical expertise or public school system ratings before making a decision about relocation, then that person is likely to be able to make a more informed choice if he/she has been able to search the internet for information in advance.
- Finally, with developments in social computing and collaborative context creation, those who can use the internet and the new accompanying types of software platforms are in a better position to participate in public discourse, for example in an election debate as seen in the presidential election campaign in the USA in 2008.

***Barriers to a more intensive use***

There are a number of barriers to a more intensive ICT use:

- The rapid change in platforms and services, where most are not self-explanatory and intuitive, can be an entry barrier if an individual does not have a network that will help. Data show that a majority of persons learn to use ICT through informal channels, and the socially excluded tend not to have networks to the same extent as the rest of the population.
- Much digital content is in English. Despite the growth of non-English information on the Web, persons who do not read or write English may nevertheless be at a disadvantage regarding certain aspects of more advanced usage.
- Many of the digital literacy initiatives build on NGOs and volunteers' commitment. If they are not familiar or comfortable with ICTs and the use of WEB 2.0 technologies for more interactive purposes, initiatives will tend to remain focused on basic ICT skills. Although activities on a level with the ECDL certificate are important because individuals with basic ICT skills in place might be motivated to progress, these activities are no longer attuned to the current ways of using ICT in different life spheres.
- Although numerous regional, national, and EU-level initiatives have been implemented, accessibility may still be a barrier for the disabled, for individuals in rural communities, or for persons living on marginal welfare benefits.
- The perceived relevance of digital content may also be a barrier, and can be seen as a "chicken and egg" conundrum. With more advanced skills, an individual obtains vast opportunities to access sites with participants that have similar interests; however, if individuals are not motivated to learn how to search for and retrieve and post digital text, then they might never discover these possibilities.

The lack of motivation tends to some extent to follow patterns quite similar to those regarding participation in lifelong learning - both are heavily impacted by the individual's socio-economic circumstances.

Increased motivation among digitally excluded individuals will likely require measures that are complementary to the initiatives and best practices analysed within the context of this

study - not least regarding active labour market policies, lifelong learning measures, youth and cultural policies, social policies, and regional development.

***Actual use of online services***

The analysis of the use of online services highlights interesting indicators concerning the different types of electronic services and their content and focus. Not surprisingly, the younger and more educated a person is, the more likely he or she is to use available online services. Persons in white-collar jobs tend to have a greater motivation to use internet services relevant to learning. Online searches for health-related information become relatively more important the higher the age and the higher the level of educational attainment.

The actual use of on-line services depends not surprisingly on the quality and volume in e-government services, but also on how difficult and complex it actually is to make use of those services. As e-government services evolve, it is critical to ensure that there remains a means for individuals without basic ICT skills to have easy access to public services. In the transformation of public services to e-services it is still critical to maintain a multi-channel strategy in order not to risk a digital divide. The possibility to use a collaborative approach to content creation in public services puts pressure on the public sector to inform in new models of open innovation with the involvement of users. For example, collaborative content can provide a new information channel with the capacity to reach and interact with young audiences[28], or it can be a means to increase equity in accessing health-related information.

The geographical variations identified for computer and internet skills are similar to those for the use of online services. The data indicate that countries in the north and north-west have a higher proportion of online service users than countries in the south and south-east. Eurostat data show a more varied picture regarding the use of online services for learning purposes. Austria, the Netherlands, Belgium, the United Kingdom, and Sweden (14-34%) rank in the lower third in relation to internet use for learning purposes, whereas use of the internet for learning purposes is much more common in countries such as Portugal, Italy, Denmark and Cyprus (54-71%). There are no clear explanations for the variety in uptake.

Individuals can acquire skills through life experience and self-study, in contrast to participating in formal courses. At the EU27 level, 41% have utilised self-study using books in order to improve their computer skills, making this more common than both learning through formal education and on-the-job training measures. Irrespective of age and education, persons with a high level of computer skills are more likely to have engaged in self-study using books or learning-by-doing, whereas persons with low computer skills are least likely to have done so. As with other forms of self-study and informal skills development, book-based study represents a method which is amplified by general literacy skills. That is, if individuals already possess a solid base of literacy skills they are more likely to use self-study and books to increase their digital literacy. As some of the cases studies demonstrate, some individuals with limited digital skills need assistance to get started with ICT. On-the-job training that comprises ICT may be a way forward. The Eurostat data point for example to elderly men, for whom vocational training on demand is important to acquiring ICT skills.

[28] For example the EU YouTube site (http://www.youtube.com/eutube), personal blogs of politicians, the collection of video questions through YouTube for the 2008 US presidential debate.

The availability of local learning facilitators to help individuals could therefore be a means to ensure that individuals with low computer skills engage in training, as many of the case studies demonstrate. As facilitators often are volunteers, one measure to strengthen broader partnerships with involvement of NGOs in digital literacy initiatives could be to develop European curriculum and a certificate especially aimed at up-skilling volunteer ICT facilitators. Such courses could comprise elements such as facilitation models, pedagogy adapted to different target audiences, technological tools in practice, motivational issues, ICT and community engagement, and ICT and social innovation in practice.

When examining the relative scale of the five internet activities (using the internet for learning purposes, for seeking health-related information, internet banking, accessing public websites, or seeking jobs) and the regularity for making safety and back-up copies of files by individuals, there are no significant findings relevant to the digital literacy levels of the marginalised and disadvantaged groups. Conclusions can only be drawn based on broader population groups and in geographical terms; students are most likely to use the internet for learning purposes, women are more likely to use the internet than men for seeking health-related information, persons with higher educational levels and in white color jobs are more likely to use internet banking and public websites, and the unemployed are more likely to use the internet for seeking jobs. Unfortunately, the Eurostat data do now allow for a finer analysis on for example ethnic minorities.

***Conclusion on Eurostat Findings***

To summarise, and to frame future actions, the following can be concluded:

- On the positive side, massive investments in infrastructures across Member States seem to be paying off. The potential barriers to internet access in homes show some signs of positive developments, although this is based on a limited data set[29].
- Computer and internet skills levels have improved throughout Europe from 2006 to 2007.
- The numbers of individuals who have never used a computer or the internet have generally fallen (3 and 6 percentage points respectively), with only marginal variations in relation to age and educational attainment levels.
- In absolute terms, traditional indicators such as age, gender, education, economic resources, geographical location, and type of job thus are still relevant.

The proportion of non-computer and non-internet users is greatest among:

- The elderly (from 55 years of age and older – especially those between 65 and 74 years of age);
- Women compared to men;
- Persons with lower educational attainment;
- Persons with fewer economic ressources;
- Persons in low density population areas and objective 1 regions;
- Persons in manual jobs, unemployed, and the retired or economically inactive.

[29] Reasons are that the Eurostat ICT Community Survey data do not include indicators such as "having access elsewhere", "do not need or want it", "equipment or access costs", "lack of skills", "physical disability", and "privacy or security concerns", which are only available for ten countries (DK, FI, AT, DE, BE, GR, EE, CZ, CY and BG) and only at a national level.

The evidence of a potential second digital divide – related to a level-three usage, that is a more advanced usage as defined in the European Commission's review from 2008[30] (i.e. not only level of ICT skills, but intensity and quality of internet use including using the net for transactions, critical analysis skills, and levels of motivation) – can to some extent be confirmed by the fact that there are only relatively smaller improvements in computer and internet skills for persons with low educational attainment levels and among the economically inactive.

Data indicate that some groupings already have medium to high computer and internet skills levels, e.g. young people (77%), students (84%), and individuals with high levels of education (77%). For the most effective use of resources, it should be considered if policy efforts requiring public expenditure should focus on disadvantaged groups, with the point of departure in the existing knowledge about which types of measures work best for which groupings. It also should be carefully considered whether digital literacy measures in order to succeed need to be accompanied by complementary policy efforts in related fields of intervention such as return to education and active employment – as some of the best practice cases from this study would seem to indicate.

The use or non-use of computers and the internet is as previously illustrated strongly dependant upon socio-economic factors. A significant number of Europeans (21%) have not taken a course to develop computer skills because they rarely use a computer, particularly among the 65-74 year olds. As population density and economic activity levels fall, the "rare use of computers" is increasingly emphasised as a reason for not taking part in courses. It would be relevant in the future to have data that could differentiate the situation in different regions based on proximity to services, remoteness, level of economic development, and socio-economic characteristics of the population, in order to target policies appropriately, not least regarding European Structural Funds.

Nevertheless, although many who are perceived as digitally excluded also are socially excluded, the two categories are not mutually inclusive. Digital divide should therefore be addressed through a mix of policy instruments that will vary according to the underlying factors for digital exclusion such as early school dropout or long-term unemployment.

Variations are found in attitudes and rationale concerning competence development and reasons for not having participated in a computer course, according to indicators such as age, gender, education level, population density, employment status, and job type. Lack of time is considered more important as a factor for not taking a computer course by people in manual jobs than by those in non-manual employment. This could be explained by the fact that persons in non-manual jobs often have greater flexibility with regard to organising their own work.

[30] See source list, Digital Literacy Report:
A review for the i2010 eInclusion Initiative, European Commission Staff Working Document and Recommendations from Digital Literacy, High-Level Expert Group, European Commission, 2008.
http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_review.pdf and http://ec.europa.eu/information_society/eeurope/i2010/docs/digital_literacy/digital_literacy_hlg_recommendations.pdf

The availability of resources and the local level of economic activity impact the level of motivation. Substantial European Structural Fund investments have already been devoted to developing ICT Broadband infrastructures and to raising the basic ICT skills levels among the population in regions lagging behind. Still, there could be an argument for continued ICT investments in the poorer parts of the regions of Europe, in order to avoid further increase in disparities between regions and within regions as the level and intensity of ICT usage becomes more advanced in some parts of Europe and among certain groupings. For these reasons, the new strategic guidelines for cohesion and rural development for 2007-2013 urge managing authorities to adopt a strategic approach and call for the mainstreaming of the information society into the development plans of both policy contexts.

Similarly, an increased coordination of i2010 and regional policy is foreseen under the initiative Regions for Economic Change (RfEC)[31] which aims to help regional authorities to implement the renewed Lisbon and Gothenburg agendas. RfEC includes two thematic networks on ICT which aim to contribute to improve regional capacity in the ICT field, particularly among less developed regions.[32]

As particularly the USA cases show, collaborative content creation can be a means of engaging excluded individuals who have otherwise shown no interest in traditional ICT training measures. However, at present only a small number of European individuals have contributed with content to online discussion communities.

If new opportunities to be informed, to raise issues for discussion, and to connect deploy specific internet applications, they exclude people who do not have access and skills to participate. Skills may be related to the usage of the tools themselves, to the usage of content, or to the skills for collaborating with others. The Internet is increasingly used to connect to voter l constituencies such as was seen in the American Presidential election. For reasons of democracy, digital measures should be designed so as to encourage greater numbers of citizens to "become digital". If new forms of unequal uptake of on-line content creation emerge, this could lead to new forms of inequality because those who share their content publicly have the ability to set an agenda of public discussions and debates (Hargittai & Walejko, 2008).

#### *Comparing the results from Eurostat with other recent surveys*

The comparison of Eurostat data with other survey data generally shows a consistent picture of the correlation between ICT skills and various demographic and socio-economic variables. Very few discrepancies emerge between the Eurostat Community Survey data and data from other initiatives. For future initiatives such as OECD- PIAAC,[33] it will beneficial to advance efforts already underway to include comprehensive information on socio-economic variables.

#### *Analysis of other monitoring and measurement initiatives*

Following the validation of the country reports and assessment of the 91 individual measurement and monitoring initiatives, an in-depth analysis was carried out of the most prominent survey and monitoring measures and their policy contexts. It is characteristic that most of the

[31] http://ec.europa.eu/regional_policy/cooperation/interregional/ecochange/index_en.cfm
[32] For a wider presentation of regional policies in the context of i2010 , please see http://ec.europa.eu/information_society/eeurope/i2010/digital_divide/index_en.htm#Synergies_with_other_policies
[33] http://www.oecd.org/document/35/0,3343,en_2649_39263238_40277475_1_1_1_1,00.html

initiatives only have collected data once. The following briefly summarises a number of large scale surveys. Topic Report 2 includes a deeper analysis of a series of those measures:

*Large scale monitoring initiatives*:

- SIBIS/ BISER (BG, HU, PL)
  - Covered several European countries;
  - Introduced an interesting DL model that builds on the COQS index (Communication, Obtaining, Questioning and Searching).
- Citizens' ICT skills (DK and NO)
  - Based on a comprehensive seven component digital literacy model;
  - Citizens assess their capabilities/confidence in relation to 34 different ICT-based tasks;
  - Provides breakdown by age, income, education, employment;
  - Analyses motivation and barriers to learning digital literacy skills;
  - Examines need for future ICT skills development for work and leisure/family life;
  - Model in Denmark transferred to Norway with results from both countries.
- Internet Barometer Sweden (SE)
  - This study of media and internet access and use has run since 1979;
  - Breaks down users by where they access the internet, gender, age, education, geographical location, employment status and job type, household types, and family size;
  - Study compares use of internet with use of other relevant media such as TV, radio, newspapers, and mobile telephones.
- Educational Testing Service (USA)
  - Based on a comprehensive seven component digital literacy model;
  - Involves real testing of students' skills levels;
  - Testing has taken place since 2001.

- STEM/MARK (Czech Republic)
  - Uses a simple definition of digital literacy. According to the parameters defined by STEM/MARK a person is literate in information technology, if she/he is: able to find and generally process information, using standard computer hardware and software, and familiar with selected computer programmes and capable of using them efficiently (terminology, text editors, table editors, graphic editors, internet and e-mail);
  - Identified five typologies of users: *Technological "leaders"* (7% of the population); *Implementers* (25% of the population); *Routine users* (7% of the population); *Showing interest* (38% of the population); *Refusing* (23% of the population).

Other measuring initiatives - South East Asia

- The 2006 National Internet Development Agency of Korea (NIDA) survey on household/individual computer and Internet usage asked about the perceived positive and negative impacts of ICT. The approach was to ask Internet users and non-users

whether they agreed or disagreed with a number of positive and negative propositions concerning the impact of informatisation (NIDA, 2007). The 2006 NIDA survey on household/individual computer and Internet usage found that the most frequent positive impacts of informatisation reported were convenience in life (78% of Internet users aged 12 and over), promotion of national right to know (60%), and increase of leisure time (48%). Quite high proportions also agreed with propositions on negative impacts; for instance, 55% of Internet users agreed that invasion of privacy was a negative impact, while 40% agreed about feeling alienation (NIDA, 2007).

- A 2005 survey by the Centre for Communication Research, City University of Hong Kong, China, asked Internet users and non-users about their perceptions of the impact of Internet use. The survey also asked non-users to assess the impact on them of not using the Internet (CNNIC, 2006). In Hong Kong, China, only a small proportion of non-users reported a negative impact. For instance, only 2% reported that they at times or frequently were excluded by their circle of friends, and only 3% reported being sometimes or frequently disadvantaged in job recruitment, promotion, etc. In Hong Kong, China, respondents' perceptions of Internet use included the positive finding that 84% agreed somewhat or highly with the statement that Internet use can help enhance the efficiency of work/study/life. On the other hand, 60% agreed somewhat or highly with the statement that Internet use can make one vulnerable to bad influences.

*Monitoring initiatives aimed at minority groups:*

- (N)onliner Atlas (DE)
  - It is a public/private initiative involving enterprises and institutions, and has been in operation since 2001;
  - Assesses levels of internet use and non-use as well as reasons for non-use;
  - Examines users and non-users by gender, region, size of city/town, income, education, employment or not, size of household;
  - Examines the needs of users and non-users in relation to getting the best results from using the computer;
  - Runs topical examinations in relation to internet security, mobile use, etc.
- Achterstand en Afstand, Digitale Vaardigheden van Lager Opgeleiden, Ouderen, Allochtonen en Inactieven (NL) (Disadvantage and Distance, The Digital Skills of the Lower Educated, the Elderly, Immigrants, and the Economically Inactive)
  - Examines the IT skills of different minority groups in the Netherlands including ethnic groups, the disabled, low educational attainment, economically inactive, women, and the elderly;
  - Difficulties experienced by these groups and reasons for not developing the skills – covering interest, disposable income, ability to process information, social setting, and time constraints;
  - Examines social and economic consequences of non-use and lack of ICT skills for participation in society.
- OFCOM (UK)
  - Analyses internet access and use and media literacy among different ethnic groups, the disabled, youth, and the elderly;

- OFCOM uses a simplified and straightforward definition of media literacy (focusing on electronic media): '*the ability to access, understand and create communications in a variety of contexts*';
- Research linked to a promotional strategy – hence an expectation that research leads to tailored promotional activities in order to address target audiences with specific needs.

- PEW (USA)
  - Annual surveys of internet, mobile telephone, and other media use among the US population;
  - Breaks down access to and use of broadband, internet, and mobile services for different ethnic groups and age groups;
  - Has developed typologies of information and communication technology users;
  - Examines the role of information and communication technologies in people's lives, including people with chronic diseases and disabilities.
- Oxford Internet Surveys (UK)
  - Annual surveys of internet use and skills among the UK population;
  - Breaks down access to and use of broadband internet for different socio-economic groups and age groups;
  - Has recently successfully combined the data from OFCOM with three other sources of data to examine socio-economic trends;
  - Has developed typologies of information and communication technology users and non-users;
  - Examines the role of information and communication technologies in users' daily lives.

More recently, and of interest to the digital literacy study, researchers in the UK have developed an E-Society Classification[34], the argument being that as the 'e-society' becomes more important to everyone there is a need to get a better understanding of the different impacts that technology has upon the ways in which people use it in their everyday lives.

The E-Society Classification is a detailed classification of all of Great Britain's neighbourhoods, based on information about levels of awareness of information and communications technologies, usage patterns, and attitudes to their effects upon the quality of life.

The classification provides a new methodology for studying the 'E-Society' and people's engagement with new information and communications technologies. The online version provides predictions at the level of the unit postcode. The study has been conducted within the Economic and Social Research Council's E-Society Programme in the UK.

The classification deployed is hierarchical, consisting of 8 Level 1 Groups and 23 Level 2 Types. The Groups and Types are listed below.

| | |
|---|---|
| Group A : E-unengaged | Type A01 : Low technologists<br>Type A02 : Cable suffices |

[34] For full details see http://www.spatial-literacy.org/esocietyprofiler/

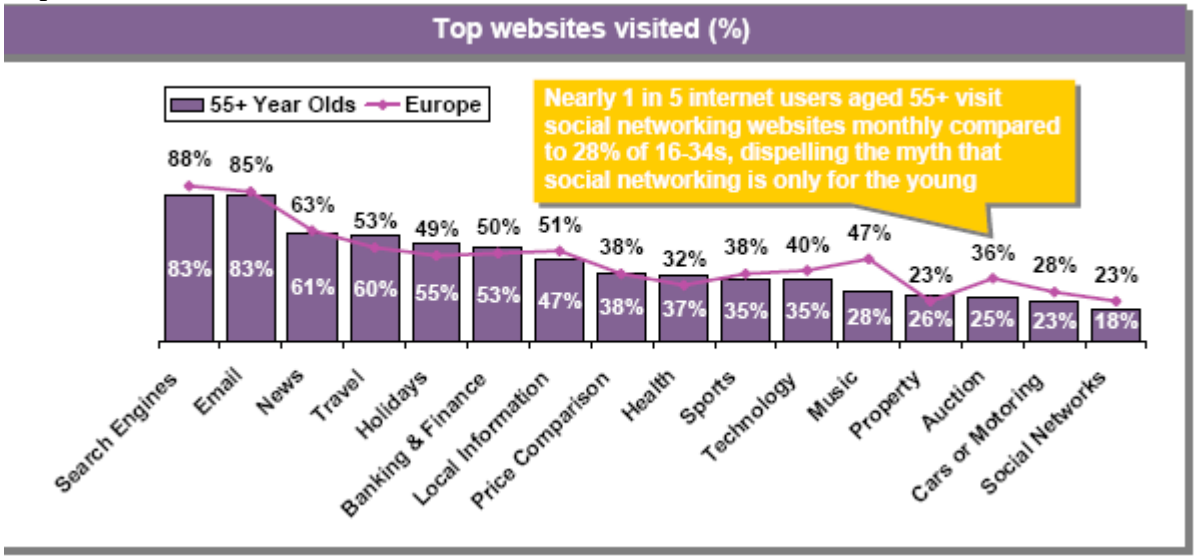
| | |
|---|---|
| | Type A03 : Technology as fantasy<br>Type A04 : Mobile's the limit<br>Type A05 : Too old to be bothered<br>Type A06 : Elderly marginalised |
| Group B : E-marginalised | Type B07 : The Net : What's that?<br>Type B08 : Mobile Explorers<br>Type B09 : Cable TV heartland |
| Group C : Becoming engaged | Type C10 : E-bookers and communi-cators<br>Type C11 : Peer group adopters |
| Group D : E for entertainment and shopping | Type D12 : Small time net shoppers<br>Type D13 : E for entertainment |
| Group E : E-independents | Type E14 : Rational utilitarians<br>Type E15 : Committed learners<br>Type E16 : Light users |
| Group F : Instrumental E-users | Type F17 : Computer magazine rea-ders<br>Type F18 : E for financial management<br>Type F19 : On-line apparel purchasers<br>Type F20 : E-exploring for fun |
| Group G : E-business users | Type G21: Electronic orderers |
| Group H : E- experts | Type H22 : E-committed<br>Type H23 : E - professionals |

Source: http://www.spatial-literacy.org/esocietyprofiler/eclassification.php

The UK research particularly contributes to a richer understanding of the factors which impact uptake and use of ICT. The case studies also show that access and use of the Internet and computers cannot be analysed as a single divide between those who are either "in" or "out". The digital divides result from complex interactions between various layers of specific differentiating factors linked to cultural or behavioural differences. These may be progressively lessening, while other factors may be linked to structural social, economic, geographical, and cultural inequalities that largely pre-existed the Internet. Such existing gaps may be apparent in education levels, life standards, consumption patterns, and position in the labour market, as the Eurostat data show. For this reason, effective digital literacy measures need to be in synergy with other policy realms such as return to education and labour market integration in order to be sustainable, as many of the cases in the next section demonstrate. The phenomenon called *social computing* discussed in previous sections is characterised by rapidly changing technologies and models of use. "Traditional" ways of monitoring user website activity, e.g. tracking metrics like page views and unique site visitors, are according to a study from IPTS on social computing not sufficient (Pascu, 2008). There is, according to the author, a lack of internationally comparable data on social computing from national statistical sources. Traditional measurements can potentially over-represent the number of unique visitors to a site by a factor of 2.5. Social computing is a moving target with rapidly evolving technologies, markets, and user behaviours. In the context of digital literacy for social inclusion, there are as

previously mentioned signs that the growth in social computing that was first taken up by youth now stems from women and those aged 50-64 – the "silver surfers" (Pascu, 2008).

Top Web sites 55+




Source: Pascu, 2008.

## *2.3. Reviews of good practice initiatives*

This section discusses conclusions, in particular gaps and challenges still to be addressed, and outlines key enabling factors and their likely relevance to the overall impact of future DL initiatives.

The conclusions are derived from an analysis of thirty good practice examples. These cases offer insights into the range of methods that can lead to sustainable and effective ways of enhancing DL levels among disadvantaged groups.

Key enablers and policy themes are summarised in the following:

### *Setting relevant objectives for initiatives*

The good practice cases are characterised by a good match between the objectives of relevant stakeholders and the operational objectives of the initiative. This will likely lead to a stronger stakeholder commitment in the actual implementation.

The review shows that most of the initiatives have primarily defined qualitative goals that cannot easily be measured, and it is therefore hard to assess to what extent an initiative has achieved its objectives. There are, however, examples of projects that upfront have defined quantitative targets that can be measured against actual outcomes (for example *Lernbar*, *Look@World Foundation*, *ESF Pathways*, and *Street Level Youth Media*).[35] A plausible reason for the lack of well-defined metrics could be that many of the initiatives are bottom-up network-based "ecosystem" innovations that occur in open structures with committed volunteer non-permanent staff, and thus without the characteristics of a formal project structure.

[35] For a more detailed coverage of the cases, please refer to Topic Report 3.

***Effective structure, design and implementation of initiatives***

A distributed bottom-up organisation seems to facilitate outreach to target groups and the involvement of volunteers as well as relevant expertise and technical support. This pattern is found across countries, from the single *ICOM* centre in Lyon, France, to the Danish *Data Rooms* infrastructure of over 100 distributed centres. Successful structures tend to rely heavily on a network of facilitators and informants. The *ICOM* centre uses the web, external seminars and workshops to transfer its experiences and knowledge base to other centres that wish to improve their services to disabled persons. The Danish *Data Rooms* project and the *Seniorweb.nl* rely on the respectively 500 and 2,300 volunteers to plan and implement local activities. In addition, these two projects have respectively 100 and 300 training rooms available for their activities. This distributed model facilitates a wide outreach within a short time, and increases the likelihood of establishing a psychological as well as a geographical proximity.

Some participants will be concerned with a risk of failing when they first start. The most effective methods to overcome start–up barriers tend to be approaches that take their point of departure in the individual participants and are based on small groups or one-to-one tuition. Other factors to get individuals started include proximity to the target groups and the stability and ease of use of the ICT infrastructure. Access to up-to-date ICT at home, at work, or in educational institutions or libraries, can complement what is taught in the training sessions with opportunities to practice what has been learned. It is beyond the scope of most initiatives to offer additional access to ICT platforms outside training sessions, although public-private partnerships can enable such a set-up. From the point of view of suppliers, there can be reasons to offer cheap leasing options, as some individuals may be motivated to acquire a PC if they can afford it, once they get comfortable and see the value-added.

Most of the initiatives cover an operational level of digital literacy characterised by a situation where individuals learn the basics of using a computer and other devices. A number of initiatives comprise digital literacy training for functionalities at a second and more advanced level including the use of advanced online public services and transaction services. Examples include the initiative *55PLUSS* in Norway, where several modules offered are divided into a basic and an advanced level.

A few of the initiatives have also addressed a third level of digital literacy. In these initiatives, ICT is used in an integrative and creative manner to enhance new forms of interaction that leads to the formation of higher order media literacy skills. An example is the *Web in de Wijk* initiative, where facilitators support the development of neighbourhood networks and joint online collaborations around the design, development, and maintenance of a neighbourhood blog or news portal.

Very few initiatives have specifically addressed the development of critical information literacy skills in relation to the use and production of digital content, although some initiatives have prepared citizens for safe internet use and the use of online ID certificates and public services associated with stage 3 of digital literacy. As demonstrated in the data from the Community Survey on ICT usage in Households and by Individuals, there is a marked difference as to how individuals with higher educational levels use the internet for more advanced services compared to those with lower educational qualifications. If not addressed, this could lead to a second digital divide – hence policy attention is needed to readdress digital literacy

initiatives to these more advanced levels of use for wider populations regardless of formal levels of education.

The digital literacy initiatives provide many benefits. In some instances, initiatives not only provide facilities for developing basic digital literacy skills, they also provide a pathway to formal education. Such initiatives explicitly target groups with low education levels and provide them access to guidance and support as a prerequisite to returning to education. To this end, initiatives can be organised in collaboration with formal education institutions offering e-learning qualifications relevant to further education or bettered employability. An example is the *ESF Pathways* initiative from the UK. It was organised in collaboration with University for Industry (UFI) which operates the *LearnDirect* offer. The initiative aims to improve the employability of the UK workforce by offering learning and skills development via e-learning. A large proportion of participants in the ESF pathways project have not only developed basic ICT skills, but have also returned to formal education and obtained a formal qualifications via the online learning programmes.

#### *Focusing on motivations of target groups*

Several of the good practice cases have developed methods to assess the motivations, needs and wishes of the target groups. These initiatives stress the importance of understanding user-needs as a prerequisite to tailoring services to individuals' circumstances. The approaches used vary from formal interviews and tests to informal talks prior to the start of a programme.

Users state a range of reasons for wanting to improve their computer skills. Some are motivated by the growing role of ICT in both civic and job contexts; others want to be able to communicate with families and friends far away, and for some it can be a matter of forming new friendships and meeting peers in different on-line communities.

Some target groups have very specific reasons for wanting to improve their DL skills. For the unemployed, improved ICT skills can improve employability. For the disabled, ICT skills can offer new options to engage in educational activities on an even playing field with fellow students, or can be a means to improved employment prospects.

The promotional methods used to motivate and attract new participants range from "word of mouth" - often through the many volunteers - to newspaper articles, advertisements, webpage promotion and even radio and TV campaigns.

#### *Addressing barriers to DL development*

The initiatives are focused on removing barriers.
Barriers can be manifold such as:

- Fear of failure;
- Financing;
- Recognition and transfer of competences acquired.

Several initiatives report of fear of failure when individuals are first approached. There are a number of ways that initiatives overcome such challenges. Digital literacy initiatives may be housed in local community premises where individuals are familiar with from other contexts; facilitators may be peers or volunteers from an NGO with comprehensive knowledge about

the specific target group. Other measures take their point of departure in everyday situations or in areas that participants are interested in and where use of digital technologies could be of benefit, and some initiatives also build on consumer technologies such as mobile phones that are typically familiar from daily life situations.

Another challenge is inadequate funding both in a start-up phase, and at later stages, if the initiative proves beneficial and therefore worth transferring and scaling. To overcome limited funding some have introduced membership fees, user payments, or payments for some participants for example (employed vs. unemployed). In some instances, innovative methods are used to insure ICT equipment at an affordable price. These include recycling of ICT hardware from corporate stakeholders and the introduction of open source software

Most digital literacy programmes do not offer certifications at the end of the programme, but can nevertheless reduce future costs of proprietary certifications. Some initiatives provide training that corresponds to the curriculum content of the official ECDL certification, so individuals who need formal recognition of acquired competences can subsequently acquire this relatively easily without enrolling in a full course. ECDL training activities organised by companies for their employees are more likely to lead to certifications, partly because they are funded by the employer, and partly because employers encourage employees to pass the tests as a documentation of competence levels.

#### *Achieving and measuring impacts of DL initiatives*

Most of the initiatives have very varied but not very formalised methods for measuring outcomes by surveying such factors as:

- simple user satisfaction,
- level of interest in the initiative,
- level of participation in the initiative, and
- level of completion of the programmes.

The level of interest in the initiative is typically measured in unique visits to the website of or events run by the initiative. Several initiatives measure outputs such as the number of course participants and courses offered. Some initiatives also measure the number of certificates obtained or courses completed. Whilst some initiatives merely measure user satisfaction, others actually attempt to measure an impact by for example surveying participants a couple of months after completion of an activity to assess the impact a programme may have had regarding employment or return to education. Finally, an initiative such as the *eNC Authority* in the USA has measured the impact of its programme on the development of the knowledge society in the state of North Carolina through a range of indicators such as jobs created, business clients served, and additional funding leveraged.

However, the real impact of some of the new emerging models with great potential as social innovation may remain unknown. Reasons are that they develop as bottom-up open networks with changing involvement over time. Furthermore, they often evolve with no or very limited funding from the public they therefore tend not to be tracked. Some of the measures are highly context bound, therefore the social context has to be taken into account, and cannot automatically be transferred and scaled in other contexts with different value systems. But lessons can be learned from these practices of open social innovation which can feed into new innovations.

This in turn raises questions about how policy makers can best identify and learn from bottom-up innovations that are highly localised, but which might include features and be built on models that could turn into valuable social innovations for a broader community.

***Making DL initiatives sustainable***

European funding opportunities such as the European Structural funds have no doubt played a major role in promoting digital literacy initiatives for disadvantaged groupings across Europe. There are examples of initiatives that combine funding from regional, national, and European sources, as well as sponsorships and donations. Others have saved on staffing by involving more volunteer workers.

An analysis of the approximate costs of an initiative shows a variation from 83-661 EURO per participant; the fees users pay are, however, typically much lower. The figures provide an indication of the costs involved. One initiative that carried out a simple cost–benefit analysis as part of its monitoring efforts found that more than 50% of the participants three months after the course stated that they had achieved significant benefits from having taken part. [36]

Apart from sufficient funding, the quality and commitment of stakeholders and partners is vital for the sustainability of DL initiatives. Although some initiatives are top-down driven, most of the initiatives combine top-down with bottom-up strategies because grassroots involvement is crucial to engage disadvantaged groups.

Equally crucial is the recruitment and development of staff and volunteers to support a distributed organisation of activities. In order to support target groups, staff and volunteers must often combine skills, mastering both technical and "soft" social and organisational skills. This requires training of trainers, facilitators, and mentors.

Some initiatives have managed not just to remain active and attractive to their stakeholders, but also to scale activities to new regions, new areas, and new delivery methods, and even to influence initiatives in other countries.

Projects that lead to sustainability demonstrate alignment with effective demand and supply. Suppliers of digital literacy initiatives for disadvantaged groups have to take into consideration the fact that purchasers are often not the same as beneficiaries/users. The purchasers will for example be a municipality or a regional authority will have to be convinced about the value and the appropriateness of the initiative. Cost-benefit analysis and impact evaluations should comprise calculations of indirect costs such a volunteers contributions or equipment donated in negotiations of long-term funding to demonstrate the real value of an initiative. Cost-benefit analysis can demonstrate public money saved in the medium term as a result of the initiative, for example individuals that are no longer welfare recipients or juveniles that are no longer in conflict with the law, and impact evaluations can demonstrate for example the potential number of participants returning to education. Effective supply is the other side to the coin. There exists an enormous supply of initiatives in the field of digital literacy, but few can be categorised as innovations. In addition, only some initiatives manage to become sustainable in the sense of demonstrably implementing a business model that can operate cost-effectively after the initial funding period has ended. Another aspect of efficient supply is that

[36] Only two out of the 30 good practice cases provided data of this kind.

a model can be copied, scaled or sustained without depending too much on specific individuals.

The study on social innovation (Mulgan et al., 2007) indicates that social innovation initiatives building on a public funding scheme such as the Structural Funds tend to run for too short a period to become totally self sustainable. One of the factors that possibly should be taken into account in decisions regarding an extension of a funding period is the savings made in the public budget. This can be the case if an individual prior to the initiative was dependant on social benefits and returns to schooling, which could likely lead to employment upon graduation. It can also be a situation in which the social services have to intervene less because the digital literacy initiative is perceived as the first step to a more meaningful life and thus with less conflict with the public authorities. Finally, some of the cases also show how digital literacy initiatives can lead to micro social enterprising. Only through a full cost-benefit calculation can the benefits of NGO initiatives be truly appreciated and be used as a basis for support and operational funding decisions. Currently there are too few longitudinal studies, and a greater number will likely be needed to throw more light on the stages an NGO-initiated action goes through to become self sustainable with public funding and without, or perhaps with in-kind funding such as equipment and volunteers.

***Introducing innovation in approaches, methods and technologies***

The good practice cases illustrate how specialised pedagogical or interaction approaches tailored to the individual target audiences - and in its extreme also to the individual learner - are a precondition to successful implementation. This has led to new methods where one-to-one tuition, formation of small groups, and peer-to-peer learning or action-based learning have become significant elements in a situated learning environment.

Furthermore, several initiatives have introduced new forms of content and content development models where the learner is at the centre as a co-creator of content, and the sharing of content is part of the learning process. This is relevant to more advanced uses of digital sources associated with a level 3 of digital literacy, and is particularly seen in initiatives that focus on broader participation issues including community building.

Initiatives have introduced blended learning which partly consists of e-learning platforms and partly of classroom and informal learning.

Some of the good practice initiatives have also introduced new organisational and business models that can be characterised as social entrepreneurship[37] at the local level. These initiatives partner with large companies that donate equipment for social enterprising to reintegrate disadvantaged groups so they can become resourceful users of new services. Many of the initiatives, including those addressing the elderly, are run partly by virtual organisations, organised and communicating via virtual environments. There is however at this stage still limited systematic evidence as to whether these forms of partnerships benefit enterprises in a direct way, such as leading to innovations in platforms or the development of new services or new

[37] A social entrepreneur can be defined as someone who recognises a social problem and uses entrepreneurial principles to organise, create, and manage a venture to make social change. A discussion of the definitions of social entrepreneurship can be found at the Stanford Social Innovation Review, http://www.ssireview.org/articles/entry/social_entrepreneurship_the_case_for_definition/.

client groups, or if the benefits are more indirect in terms of creating an image of social responsibility.

## *2.4 Recommendations*

As ICT increasingly penetrates people's lives, digital literacy is becoming a critical element of social inclusion, civic participation, and economic prosperity and equity in 21st century society. Though digital literacy is not a new topic *per se*, policy makers must meet the challenges associated with limited or lack of digital literacy.

Much has already been accomplished, nationally and at a European level, as shown by the data on digital literacy from the Eurostat Community Survey on ICT usage in Households and by Individuals.

The i2010 initiative, which was presented in the i2010 Communication[38] in June 2005, frames this study on digital literacy.

The following section sums up main conclusions and recommendations for further policy actions, building on those achievements made to ensure maximum synergy and coherence with existing initiatives at all levels. The conclusions and recommendations are organised according to key strategic themes:

- Access and connectivity
- Diversity in needs
- Digital literacy in the context of social inclusion
- Skills and learning for a digital age
- Policy coordination
- Awareness raising
- Evaluation and monitoring

### Access and connectivity

The introduction and adoption of broadband access to the internet has had a positive impact on the use of digital services and the development of skills (Helsper, 2008). Many countries in Europe are introducing or have introduced broadband infrastructures, and several countries are close to achieving full coverage. Broadband has achieved mass-market penetration in Western Europe, with France, Germany, and the UK leading in terms of absolute numbers. Denmark, the Netherlands, and Switzerland have the highest consumer broadband household penetration rates in 2007. The penetration rate was 59% in the Netherlands, 57.8% in Denmark, and 55.6% in the UK, whereas the coverage in France was somewhat lower at 44.6 % (Gartner Newsroom).

However, there are still challenges within countries in Europe where rural and remote communities possess the infrastructure and yet may be unable to access these broadband networks for economic reasons. Therefore, European ICT policies within broader economic development measures will likely also in the short to medium term need to analyse and test viable financial and technical models for providing broadband access to the most remote and economically disadvantaged locations.

[38] http://ec.europa.eu/information_society/eeurope/i2010/key_documents/index_en.htm#i2010_Communication

Regular access at home and at work leads to more advanced digital usage. Although access at libraries, schools, net cafés, and public internet access points is important, extending home and work access through affordable infrastructure costs should be a priority for policy makers. Telecommunications may play an important role if treated as a public utility, much as telephone services were regulated for example in the United States to produce low-cost services and universal access, which has then been transferred to similar support structures for digital services.

Findings from the UK and other countries indicate that the quality of the bandwidth impacts the confidence and ability the user develops in order to access advanced digital services (Broadband Stakeholder Group). Ambitious broadband policy targets throughout Europe are likely to improve digital participation and support the development of skills as more valuable services come on-line.

***Diversity in needs***

The group of elderly is a distinct group that can benefit by possessing rather basic skills to compose texts and get online, both for social purposes and to access public and private services. Increasing numbers of elderly are fee-paying members of associations that offer them targeted DL training and support measures. But for those that are not or cannot afford to be a member of such an association, municipalities play a role in ensuring an adequate offer of DL initiatives that motivate the elderly, through for example libraries and elderly community centres. The social aspects of initiatives that target the elderly tend to provide fertile soil for the creation of virtual user networks and groups/clubs.

The group of disabled is heterogeneous, with a range of very specific demands to usability. Given that some of these groups may be quite small, cross-border initiatives can be beneficial in creating volume to improve usability and the prospects of genuine access for small groups of disabled. However, even if digital technologies hold the potential of overcoming limitations regarding mobility, the rollout and quality of digital services should not be deployed as justification for physical isolation of the disabled.

Basic digital literacy skills are a precondition to employment and employability across an increasing number of occupations. Lack of digital skills is often just another dimension to insufficient literacy skills (Sweet and Meates, 2004; Hilding-Hamann and Eggert Hansen, 2005). Therefore, when planning digital literacy courses for the unemployed or other disadvantaged groups, eventual literacy difficulties should be identified, as most basic digital literacy courses rely on a certain level of literacy skills.

Several of the initiatives targeting young persons at risk focus with success on the correlation between digital literacy and community and civic engagement. A book by Pippa Norris (Norris, 2001) describes three dimensions of divide as:

- the global divide, characterised by differences in access between countries and within countries;
- the social divide, which is the gap between the information rich and poor in each country, and;
- the democratic divide, which highlights differences between those who do and do not use digital resources to engage, mobilise and participate in public life.

It is characteristic that the good practice initiatives touch upon all three dimensions and thus also deal with the potential transformative nature of digital technologies. From the case studies, it can be concluded that public policy interventions concerning digital literacy are likely to be successful if they have a broader purpose than simply learning how to use ICT. Several cases demonstrate how digital literacy measures can function as an alternative way to societal engagement such as social enterprising, and that they can spur participation in community building activities, and stimulate individuals' return to schooling. In order to prioritise public policy intervention it will however be of value to have more robust data and evidence on the social impact of digital literacy. For further discussion, please refer to the section on monitoring and evaluation.

The growing phenomenon of open ICT educational resources and the use of open source platforms can lead to new opportunities.[39] Furthermore, lessons from the literature on user-driven innovation also suggest that ICT companies can benefit tremendously by engaging with new user groups who can provide valuable input to software innovations or the functionality of a particular application.

In recent years, policies have been devoted to widening access to the Internet and to raising and expanding basic digital literacy skills, not least through the ECDL (European Computer Driving Licence) certification and similar initiatives which have specifically focused on school pupils or the elderly. In collaboration with the Member States, the European Commission has taken action to support the development and to address the main challenges of the information society and media sectors up to 2010[40], in order to insure a competitive and open digital economy that is inclusive and can sustain the quality of life in Europe. Numerous measures taken by the European Commission aim to monitor progress and disseminate good practices through for example the eUser Portal, the ePractice Portal and the e-skills initiative, plus more indirectly within the European Social and Employment policies through the annual joint reports. The education and training policies also emphasise the importance of digital competences as one of the key competences for the future.[41]

***Digital literacy and social inclusion***

In making digital literacy initiatives effective it must be noted that all segments of society may potentially be digitally excluded, though data shows that there is often a strong correlation between socio-economic characteristics and the level of digital literacy and motivation to engage in use of ICT.

Functional digital literacy implies the ability to source and interact with content, services, and websites of choice, in a creative, critical, and confident manner. For this to occur, DL initiatives should not only ensure that individuals can use ICT in an operational manner, but also that individuals are able to exercise an empowered and informed choice about their use or non-use of ICT. To make active use of interactive on-line services, cognitive skills are in most instances needed to situate information in its context, to assess its value. Many current e-government services require communicative ICT skills to be able to search for and exchange

[39] See OECD- CERI http://www.oecd.org/document/20/0,3343,en_2649_35845581_35023444_1_1_1_1,00.html
[40] http://ec.europa.eu/information_society/eeurope/i2010/key_documents/index_en.htm#i2010_Communication
[41] http://ec.europa.eu/education/policies/2010/doc/basic2004.pdf
and Recommendation of the European Parliament and of the Council of 18 December 2006 on key competences for lifelong learning, available at http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:EN:PDF

information. Targeted public online services can for some groupings be a first step to getting them connected with eGovernment services in a meaningful way, for example registering a child for day care or renewing a prescription from a doctor. However, not only digital literacy skills but also linguistic skills remain an issue, as public sites are mostly only available in the country's native language. The UK Department for Work and Pensions presents a promising practice that provides essential information resources not only in English, but also in eight major languages of immigrant communities.[42] The Cabinet Office has furthermore issued guidelines for UK Government websites, which specify in detail best practices with regard to designing information resources in different languages (Zinnbauer, 2007).

Ideally, all individuals should have ready access to hardware, software, and digital content and services relevant and useful to their needs and interests; in addition, they should have access to relevant technical and social support and the skills and know-how to support their use of these digital media services (Selwyn and Facer, 2007). The role of NGOs should be acknowledged, as dimensions to access are strongly associated with locations where an individual feels comfortable and thus frequents. Local network-based and grassroots NGOs are a central source in many instances to motivate and engage disadvantaged groups, and through their interventions digital literacy measures may lead to improved social capital.

The allocation of enabling resources for community networks, ICT facilities, and learning centres for peers across generations, can be a very cost–efficient way of raising the digital skills levels in a community and of bringing other benefits as well. Typically, activities revolve around a centre that functions as a connection point for all the stakeholders. These centres, called PIAPs (public internet access points), Public Internet Centres (PICs), telecentres, digital playgrounds, cyber bases, internet cafés, etc., are no longer just points of access to information and communication technologies. These centres play multiple roles in supporting the development of social, cultural, and economic capital in the community. Many centres are highly dependent on a voluntary workforce and short-term funding, which makes it very difficult to expand and further develop their activities. Hence, policies should be focused on creating strategies that enable centres to become - at least partially - self-sustaining. One method, as the case studies show, can be to encourage participants to engage in social micro-enterprising. Other means can be to use existing community and cultural infrastructures as a basis for digital literacy measures at a local level.

The cases illustrate that individuals' engagement in activities that are relevant to their own life circumstances can lead to the return to education for those who have dropped out of school or left school with low skills levels - thus reducing the risks of long-term exclusion.

#### *Skills and learning for a digital age: early school leavers*

While youngsters have an increased access to and use of ICT and as such have been able to increase their basic and advanced ICT skills, an important challenge remain for the 10% of youth in Europe between 16 and 24 years old who are not making use of ICT. From other skills areas it is well known that the last group of non-users are the hardest to tackle and that digital illiteracy is connected to other types of exclusion such as low numeracy and literacy skills, as has been shown by PISA data from the OECD. Though alternative measures have been taken particularly focusing on the youth cohort, for example with on-line learning platforms supporting community-created content and grassroots networking, little is known about

[42] These languages are Arabic, Bengali, Chinese, Gujarati, Punjabi, Somali, Urdu, Vietnamese (http://www.dwp.gov.uk/otherlanguages/)

the actual impact on those potential users who are the least motivated and who may have the poorest basic literacy skills.

As some of the cases could indicate, innovative community-based approaches to digital literacy can be a means to motivate early school leavers to re-enter formal education. Again, even if this study has shown success cases, most of the knowledge concerning return to education through the use of innovative digital measures suffers from anecdotal evidence and limited knowledge about long-term impacts and efficient means to replicate and scale successful measures.

***Digital literacy - a gateway to shop floor innovation, employability, and mobility***

In relation to potentially marginalised and disadvantaged individuals, the analysis also shows an emerging second digital divide relating to a more advanced use of digital information and trust in online transactions. As ICT skills become increasingly prevalent in many jobs, individuals without e-skills - be they early school leavers or the elderly - are at risk in the current and future labour market. More jobs across sectors become technology-intensive to remain competitive, and in many instances also to diversify products and services.

From the Eurostat data there is sufficient evidence that shows a direct correlation between low levels of digital literacy and employment status. Therefore, in synergy with the European e-skills initiative and aligned with national, sectoral and EU policies on lifelong learning, further measures should aim to strengthen ICT skills among the blue collar workforce through innovative measures to apply ICT to business products, processes, services, and within value chains. Practical and application-oriented use of ICT in genuine working contexts can not only stimulate the motivation to learn how to use ICT, but can also lead to improved productivity and innovation in services and products.

An array of measures have already been taken to encourage early school leavers to return to education. Pilots that explore the use of ICT with a broader purpose of encouraging disengaged youth to re-connect should be encouraged[43]. For these pilots to be of value to a broader community, appropriate evaluation measures that address short and medium term impact should be applied.

***Digital literacy - an evolving agenda***

The rapid and also disruptive change in ICTs has paved the way for a range of new social networking tools that have given life to numerous online communities and blogs. These developments reinforce opportunities to create new bonds and give individuals and communities a voice to influence public discourse, as was seen for example in the last election campaign in the USA in 2008. However, even if these developments build on affordable mobile devices and open source software, these new online spaces and tools are not necessarily usable and used by those who could gain the most. ICTs have penetrated all aspects of life - whether looking for a new job or advice on a health issue, finding affordable housing, acquiring a new skill, or having a voice in public matters. Therefore, digital literacy is still a matter for public policy even if Europe in general has seen a rise in digital literacy levels in the population as a whole.

[43] See- for example The Maastricht Study (2004), The European Commission, DG Education, Training, and Culture

The best practice cases suggest that digital literacy public polices are in a transformational phase from their original purpose of ensuring and expanding affordable access and basic ICT skills for underprivileged groupings. Digital literacy inclusion policies have evolved and have begun to be situated in a broader socio-economic context, and the agenda is still evolving.[44] The spread and the lowering of prices for mobile telephones as well as the spread of interactive open source software platforms is enabling a transformation of digital inclusion measures. Early discourse about digital literacy tended to implicitly concern individuals' skills gaps, thereby individualising the broader socio-economic bases of digital literacy. Digital literacy was subsequently mostly addressed in traditional course models, although with adaptations in content and modes of delivery to the needs of the specific target groups.

Newer initiatives tend to exploit the transformative potentials of ICT. They recognise socio-economic inequalities, and the lack of digital skills is perceived as a symptom of exclusion. At the same time, ICTs also become an enabler of social innovation, because technologies become the means to get a voice and to address real and broader problems of common concern for a specific community. Several of the case studies exemplify models where individuals are perceived as persons with resources and a life biography. Within these emerging models which have developed in parallel with open source social software and mobile computing, digital literacy emerges as a means for individuals to come to grasps with their own resources and obtain a voice - a first step to societal recognition and civic engagement.

Though such transformative models of digital literacy often remain localised in time and space, some of the measures remain viable and can be of benefit not only to the individual, but can also at times result in social innovations with benefit commercial enterprises and society at large by stimulating the development of new services or functionalities.. As platforms converge, multi-channel strategies should inform public policies aimed at getting disadvantaged groups on-line; such strategies should exploit mobile telephones, WEB 2.0 solutions, open source platforms, and other consumer commodities as they penetrate the market and become affordable or free of charge. Yet very few initiatives address the third level - how digital media may be used in a transformative way, applying higher order critical analytical and creative skills in specific contexts of use. As digital services and digital content become more widespread in all parts of our society, it becomes urgent that everyone from childhood on possesses skills that enable a creative and critical view of digital tools and information sources. As more information is gathered through the use of the internet, it is necessary that individuals have the competencies to assess the quality and relevance of information downloaded from different sites. Individuals must also be able to assess where it is safe to provide personal information, for example when shopping on-line. Finally, as ICT penetrates different life spheres, the ability to communicate via the internet for civic, educational, entertainment or work purposes becomes a must.

Policies for digital literacy should enable such a progression in initiatives to ensure that relative inequalities in internet use will not be similar to disparities in the penetration rates of previous mass media. It will be important to ensure that appropriate monitoring mechanisms are in place to track the evolution of measures so that they target level 3 of digital literacy, and to ensure that a new and more complex pattern of digital literacy divide does not emerge as digital services become more advanced. To monitor that the advance of digital literacy does not

[44] European Charter for Media Literacy http://www.euromedialiteracy.eu/ .

lead to new inequalities, the benchmark framework already defined within the i2010 initiative should be used[45]. However, this framework could likely call for new indicators measuring the social impact of ICT, including the role of mobile's PDAs etc. as a means to digital participation for example based on the type of metrics suggested by the OECD working group of information society indicators (OECD 2008).

It remains a policy challenge to ensure that NGO facilitators, local community volunteers, and teachers and trainers all have sufficient skills to exploit developments in ICTs in a purposeful manner fit to the context of use. One way could be for the European Commission to take action with involvement of all relevant stakeholders to ensure that previous experiences with the ECDL form the basis for the development of digital hands-on resource materials aligned to developments defined as stage 3 digital literacy, and which can then be adapted to different purposes and teacher and trainer target groups.

Within the framework of i2010, the Commission could take the lead to ensure that innovative practices for digital literacy build on more advanced and interactive usage of ICT. With evaluation mechanisms in place, such practices can be documented in a common format so that they can be published for example through the ePractice portal set up by the European Commission.[46] As some initiatives are likely to be developed and lead by NGOs, moderate seed funding could increase the likelihood that innovative activities are shared on a broader basis.

The publication from Futurelab, *The Future of Digital Literacy - a Charter for Change* (Selwyn, and Facer, 2007), frames the reasons that the digital divide remains a complex and entrenched social problem. First, according to the authors, is a diverse and wide range of technologies which can be considered as ICTs – not just computers and the internet. Second, there is a diverse and wide range of activities that have gradually become more ICT intensive – from learning and employment to leisure and public services. Due to these patterns of development, appropriate policy responses are likely to become more complex and demand a higher level of coordination between different policy realms.

#### *Holistic and coordinated policies*

The Eurostat Community Survey on the Usage of ICT in Households and by Individuals and other similar surveys show that there is a significant statistical correlation between social disadvantages (low income, unemployment, poor education, ill health, and social isolation) and the inability to access and use digital services.

As digital services become more widespread and advanced, measures should be taken to ensure that policies that are inextricably linked - such as social inclusion, employment, health, education, and innovation - are addressed together in a coherent way. Online government initiatives are not likely to reach the most excluded simply because the economically and socially disadvantaged are most often not digitally active. Given that these groups would most likely benefit from such online services if they had the access, incentives, and skills to do so, the use of a multi-channel approach - that is the recognition of different media platforms - to teach and support digital media skills development could be a first step to get more persons

[45] http://ec.europa.eu/information_society/eeurope/i2010/benchmarking/index_en.htm
[46] http://www.epractice.eu/index.php?page=home

motivated to come online. However, the case studies and new literature also show that new ICT, however user-friendly, is unlikely to connect individuals with low networking skills; most often, the first prerequisite for bottom up, grassroots-based initiatives aimed at reducing exclusion through ICT is a motivated enabler and connector. Such mediated access should also comprise mediated access to online services where there are no alternative non-electronic channels, through citizens' service centres or whatever local facilities may be available. In the UK, the Yemeni Community Centre in West Bromwich, UK, has developed a learning module aimed both at the young and adult ethnic community which, for many reasons, does not wish to participate in formal education. This programme supports literacy, employability, and social integration through the local delivery and personalisation of services. More widely, such developments could be encouraged by prioritising the evolution of eGovernment services built on open innovation models with the involvement of those types of users who are likely to be the most marginalised, and by disseminating innovative and inclusive eGovernment services through for example E-government Awards under the European Commission.

#### *Awareness raising*

Member States have launched many initiatives to advance digital literacy, and the European Computer Driving License has played a central role in raising the operational skills levels across Europe. The EU-funded education and training programmes have also contributed to developing and transferring good practice through different partnerships and collaborative measures. As services get more advanced, policy makers should target support to initiatives that can enable more people to become confident, critical, and creative users of advanced services, in what the European Commission characterises as a stage 3 use. In this sense, some of the examples provided illustrate how different new interactive social technologies pave the way for highly innovative and involving user-driven measures which contribute to social capital formation, and more widely also to social innovations which go far beyond the specific initiative. However, some initiatives exist only for short periods, as long as they receive some form of public funding, and sustainable models seem hard to develop. There is therefore a need to roll out some of the leading-edge projects with a potential for social innovation, also more widely, so as to experiment with sustainable business models, scaling, and transferability and from such large scale pilots deduce practices and models which may feed into evidence-based policy making. This should be encouraged both through existing programmes supported by the European Commission, as well as at a national level. The existing European Network of Living Labs could also provide an ideal platform for furthering more advanced levels of digital literacy as well as user-friendly services through the active involvement of users in real life situations.[47]

There are likely to be synergies in coordinated awareness-raising activities, as the effects of activities at one level are amplified by activities at other levels. A coordinated "European Week for Digital Living and Learning" aimed at raising awareness and demonstrating the opportunities emerging from advanced and creative usage of ICT, might be a good way of bringing the subject to the forefront of the agenda in both policy and user communities throughout Europe. The added value of such an initiative, which for example could be coor-

[47] The European Network of Living Labs (ENoLL) (http://www.openlivinglabs.eu/about.html) is a bottom-up developed organisation representing the European Living Labs, the EU., national and regional governments, academia and leading companies and SMEs, providing networking and a global context to its activities. The concept of a Living Lab is that experimentation and co-creation with real users in real life environments will lead to sustainable and user friendly new solutions, new products, new services or new business models.

dinated through Living Labs in Europe, would be that it would likely receive visitors from schools and it would likely get good media coverage and as such reach target audiences of not-yet-avid ICT users. A demonstration of the qualities associated with being digitally literate could motivate persons with low levels of motivation to engage in the digital age. Furthermore, without broad policy awareness about the evolutionary character of digital literacy, there is a risk that advances made in the past years will be lost and new types of divides will evolve, because previous policy measures that addressed basic aspects of digital literacy were not sufficiently followed up by complementary measures at a later stage. There are already substantial amounts of information disseminated throughout the European Union anchored in a wide range of local, regional, national, and European projects, centres, and initiatives. Many of the good practice examples and background reports are accessible through various websites, for example the European e-practice portal[48]. If online information portals are to be of practical value, they must be interactive, interlinked, and dynamic, allowing users to contribute to the further development of content and exchange of experiences.

***Evaluation and monitoring measures***

The study of digital literacy has shown that evaluations of the impact of initiatives are generally underdeveloped. In those cases where there is an explicit mention of evaluation measures, these focus in most instances on simple outputs such as user satisfaction, enrolment, and completion rates. From a policy perspective, such data are of limited use, as they do not bring any overall insights into the benefits of participation in digital literacy initiatives. To improve practice and to learn from leading edge practice, the use of formative evaluations[49] should be encouraged regarding EU interventions, Member State initiatives, regional actions, and if resources are available, initiatives run by NGOs. In a study on the role of ICT in developing social capital and quality of life (Gaved & Andersen, 2006), the authors argue that the lack of empirical knowledge about what works is an effect of insufficient long-term strategies in most publicly funded measures. Long-term strategies are a prerequisite to gather longitudinal data about local ICT initiatives and their effect on social capital and quality of life within communities. For these reasons, promising initiatives should have funding models, which have a longer span than what is current practice in most initiatives, also those funded under the Structural Funds.

Formative evaluation can be used strategically to strengthen or improve a programme or intervention by examining, amongst other things, the drivers of change, the dynamics of the processes of innovation, the delivery of the programme, the quality of its implementation, the organisational context, personnel, structures, and procedures, and measures for scaling and acquiring sustainability.[50] Formative evaluations are typically change-oriented and attuned to assessing in an ongoing way any discrepancies between the expected direction and outputs of the programme and what is happening in reality. Furthermore, formative evaluations can generate understandings about improvement in programme implementation. As such, formative evaluation can contribute to learning about what works under which conditions and for whom, and can function as an evidence base for policy decisions regarding transfer and scaling of initiatives.

[48] http://epractice.eu

[49] Formative evaluation activities include the collection and analysis of data over the lifecycle of the programme, and timely feedback of evaluation findings to programme actors to inform ongoing decision-making and action (i.e. a form of operational intelligence).

[50] See for example OECD/CERI: *Systemic innovation in Vocational education and training.* An initiative to throw light on the processes of systemic innovation as a means to successful reforms, and managing processes of change.

With appropriate evaluation measures in place as an integral part of the design of programmes and activities, the DL initiatives will be able to take full advantage of user-driven innovations. Furthermore, evaluations are also critical to develop sustainable cost-effective initiatives. Apart from the EU level, similar measures should be encouraged at Member State level with an increased priority to evaluations that measure effectiveness, outcomes, and impacts of measures implemented at national and local level. At all levels there is a need for an improved and evidence-based understanding of the correlation between digital literacy, emerging new phenomena regarding social computing, and reduction of social exclusion. As pointed out above, the Internet poses relatively high barriers to effective use in terms of required equipment, affordability, accessibility, and necessary skills. However, other ICTs such as mobile phones are more easy to learn how to use, more affordable, and much more widely spread in particular among groups at risk of exclusion. Mobile phones could offer a great potential to reconnect and engage such at-risk groups in civic activities, in learning, or in micro enterprising, as cases from the USA have shown.

***Measurement methodologies and indicators***

The project has analysed the latest data from the Eurostat Community Survey on ICT usage in Households and by Individuals (2007) and compared these with other international and national monitoring and measurement activities. From Topic Report 2 on Monitoring and Measurement initiatives, a number of issues emerge relevant to future monitoring and measurement initiatives:

**Richer socio-economic background variables** – In order to learn more about specific disadvantaged groups from survey data, more socio-economic background information is necessary.
This may entail background data about:

- ethnic background;
- mother tongue;
- migratory status, and/or;
- number of years in a certain country.

Other measuring initiatives have shown that there is valuable information to be gained from identifying full-time housewives (“assisting spouses”) as a separate category in relation to digital media skills, to address possible gender bias.

Furthermore, if detailed micro data were available regarding occupational categories, it would be possible to target certain sectors of economic activity or particular groupings within the sector where digital media skills were low but where there were expectations of a growing level of ICT penetration. To exemplify, a major regional three-year measure in Northern Jutland in Denmark, funded by the Danish Ministry of Science and Technology, provided funding to the local building and construction sector with the aim of boosting productivity through the use of ICT throughout the whole value chain (Pedersen, 2004). However, there is a difficult balance to strike between the length of a household survey and its implementation costs. One option could be to over-sample groupings for which there is a particular policy interest in obtaining better insights on barriers to increased ICT use. In the current preparation for the implementation of PIAAC, some countries have already made decisions about over-sampling

certain populations - in Denmark, for example, a decision has been made to over-sample the age group + 55.

**More data breakdown options** – In order to gain specific insights into conditions, behaviour, and attitudes of particular disadvantaged groups in relation to digital media skills in Europe, it will be necessary to allow for analysis of micro-data from national sources. Access to micro-data is central if cross tabulation of variables (for example age, ethnic origin, employment status, and educational level) is needed for a deeper understanding of digital literacy barriers within a certain groupings.

**More stringent digital literacy measures** – It is yet to be seen if the *Problem solving in technology rich* environments module in the OECD PIAAC initiative[51] on measuring adults' skills will lead to revised questions that are more relevant to the current and emerging policy needs. New indicators are needed to understand the evolution and socio-economic impact of the growing importance of social computing leading to more advanced forms of ICT usage, for example for collaborative content creation or new e-government services, as well as the emerging use of devices other than PCs such as mobiles, PDAs and digital TV for communication purpose. The working party on Indicators for the Information Society (OECD 2008) suggests that existing surveys such as the Eurostat Household Survey could be adapted and updated to get a more concise understanding of developments in social computing and user created content. Suggested metrics are for example: participation in chat sites, posting messages on sites, having one's own blog, sharing audiovisual content, and use of online digital content.

OFCOM data, for example, show that some ethnic groups are more likely than the UK population at large to use other forms of digital media than the PC, such as digital TV and mobile phones and SMS services. Whereas these ethnic groups may be low- or medium-skilled when it comes to using the computer, they may have high skills in relation to using other media simply because of a more frequent use.

Without robust and timely monitoring instruments in place, the risk is that public funding is not used optimally. Given time and cost restraints, there is a balance to strike between the development and use of new indicators that are tested and are robust, and the knowledge that can be generated from pilots with a solid evaluation framework. Given the rate of ICT innovations, there is likely to be a constant time delay in the uptake of new ICT applications in society at large and the construction of measurement tools. Another factor to take into account before eventually adapting the Eurostat Community Survey module on digital literacy is the time series aspect of such monitoring efforts. Time series data with consistent metrics can be compared over time and are therefore central to policy making - as for example the ways in which PISA has informed policy making in a number of countries to improve outcomes in literacy and numeracy. If the metrics are changed over time, then a direct impact assessment of a given policy intervention becomes more complex.

**Policy coordination.** Whilst respect for subsidiarity must be maintained and bottom-up activity has a central role and legitimacy in many aspects of eInclusion and social inclusion, there is still a need for EU enabling measures (e.g. within OMC processes) in key fields such as digital literacy and equality of access and usability of services of public interest.

[51] Currently (March 2009) under development, with support and expertise provided by the European Commission

The evidence presented in this report suggests that whilst there are quite a few examples of well-targeted efforts at both Member State and local levels, the bulk of eInclusion activity and funding seems so far to have been more generally oriented and distributed. At the EU level, it should be encouraged that eInclusion measures remain on the agenda in the question on how Community instruments can be used to target specific at-risk groups in this area.

Finally, there has not yet been much effort given to monitoring and evaluation with specific focus on the interdependency between digital literacy and social inclusion. This applies both to eInclusion initiatives in themselves as well as to thee complex question of how and to what extent eInclusion measures are contributing to wider social inclusion. AS technologies change and the deployment of technologies become more advanced, monitoring and evaluations instruments must be aligned to these new contexts so as to capture the impact on exclusion and so that Community instruments[52] are used in an optimal manner for those who are most at risk.

Such monitoring and evaluation instruments can build upon the social inclusion indicators agreed at the Laeken Summit at the end of 2001. However, none of the current indicators address the eInclusion theme. In addition, although Member States were encouraged to use a variety of specific extra indicators chosen at the national level to supplement the common EU indicators, only in a few cases do these refer to eInclusion or eExclusion. The development and implementation of new indicators in a comparable manner across Member States is costly. Given the rapid change in ICTs and thus the definition of digital literacy, it seems prudent to assess to what extent existing reporting measures from the Member States as well the i2010 benchmarking framework can be used not only for monitoring purposes, but also as a yardstick for exchange of promising practices between Member States.

[52] For example: i2010,[52] or ICT-related measures in the NAPs/employment context, and national implementations of Community Directives such as the Universal Service Directive[52],

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