



J R C T E C H N I C A L R E P O R T S

Literature Review on Employability, Inclusion and ICT, Report 2:

ICT and Employability

Authors: Maria de Hoyos, Anne E Green, Sally-Anne Barnes, Heike Behle,
Beate Baldauf and David Owen

Editors: Clara Centeno and James Stewart

2013

Report EUR 25792 EN

European Commission
Joint Research Centre
Institute for Prospective Technological Studies

Contact information
Address: Edificio Expo. c/ Inca Garcilaso, 3. E-41092 Seville (Spain)
E-mail: jrc-ipts-secretariat@ec.europa.eu
Tel.: +34 954488318
Fax: +34 954488300

<http://ipts.jrc.ec.europa.eu>
<http://www.jrc.ec.europa.eu>

This publication is a Technical Report by the Joint Research Centre of the European Commission.

Legal Notice
Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use which might be made of this publication.

Europe Direct is a service to help you find answers to your questions about the European Union
Freephone number (*): 00 800 6 7 8 9 10 11
(*) Certain mobile telephone operators do not allow access to 00 800 numbers or these calls may be billed.

A great deal of additional information on the European Union is available on the Internet.
It can be accessed through the Europa server <http://europa.eu/>.

JRC78601

EUR 25792 EN

ISBN 978-92-79-28293-5 (pdf)

ISSN 1831-9424 (online)

doi:10.2791/71448

Luxembourg: Publications Office of the European Union, 2013

© European Union, 2013

Reproduction is authorised provided the source is acknowledged.

This report should be cited as follows: Green A E, de Hoyos M, Barnes S-A, Owen D, Baldauf B and Behle H. *Literature Review on Employability, Inclusion and ICT, Report 2: ICT and Employability*. Centeno C, Stewart J (Eds.). JRC Technical Report Series, JRC EUR 25792 EN. Institute for Prospective Technological Studies, Joint Research Centre, European Commission (2013). Available at: <http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/employability.html>

Printed in Spain

ACKNOWLEDGEMENTS

The Warwick Institute for Employment Research (IER) would like to thank Institute for Prospective Technological Studies for the opportunity to complete this research. Our sincere thanks go to Clara Centeno from EC JRC-IPTS for her constructive project management and to Gabriel Rissola and James Stewart for their useful comments and support.

In particular, IPTS and the Warwick Institute for Employment Research would like to thank those who participated in the *ICT for Employability Expert Validation workshop* on 25th May 2012 in Madrid, and provided invaluable comments and suggestions. Participants were:

- Jean Michel Bonvin, Haute école de travail social et de la santé - éesp – Vaud, Centre d'études des capacités dans les services sociaux et sanitaires (CESCAP), Switzerland
- Hans Dietrich, University of Erlangen-Nuremberg, Germany
- Hans Dubois, European Foundation for the Improvement of Living and Working Conditions
- Colin Lindsay, Scottish Centre for Employment Research, University of Strathclyde, UK
- Barbora Novotna, European Commission, DG Employment and Social Affairs
- Javier Ramos Diaz, Universitat Pompeu Fabra, Spain, and E-Democracy Centre, University of Zürich, Switzerland
- Gérard Valenduc, Fondation Travail-Université, Namur, Belgium
- Gabriel Rissola, EC JRC-IPTS
- Anna Sabadash, EC JRC-IPTS
- Cristina Torrecillas, EC JRC-IPTS

The following individuals from the authorship and editorial teams also participated in the Workshop:

- Clara Centeno, EC JRC-IPTS
- Maria de Hoyos, Institute for Employment Research, University of Warwick, UK
- Anne Green, Institute for Employment Research, University of Warwick, UK
- James Stewart, EC JRC-IPTS

PREFACE

Unemployment in Europe is currently high: it reached in August 2012 10.5% overall,¹ and is even higher in some groups such as young people 22.7% and the low skilled 14.7%.² Previous research on how Information and Communication Technologies (ICT) can support socio-economic inclusion processes for groups at risk of exclusion, namely migrants and youth at risk, provides evidence of the relationships between ICT and employability. For example, access and ability to use technology affect employability and also increase wage levels. Likewise, the rise of the internet has brought about major changes in how individuals look for jobs and the factors that shape their success, such as their (online) social networks.

These findings have prompted JRC-IPTS to launch new research to provide solid theory and evidence to better understand how ICT technologies, skills, applications, and usages can improve people's employability, helping them to gain and sustain employment and thereafter progress and to support policy development in the field of employability. As a first step, JRC-IPTS contracted the Institute for Employment Research, University of Warwick, UK to prepare:

- 1) a review of the literature on employability, its dimensions and the factors which affect it in general and for groups at risk of exclusion, namely migrants, youth and older workers; and
- 2) a report on how ICT contribute to employability, support the reduction of barriers and create pathways to employment for all and also for the three specific groups at risk of exclusion.

This research project was carried out in the context of IPTS policy support activities for the implementation of the Europe 2020 strategy, and the Digital Agenda for Europe to enhance digital literacy, skills and inclusion, and the social inclusion and employment policies. Four reports have been produced:

1. Literature review on Employability, Inclusion and ICT, Report 1: The Concept of Employability, with a specific focus on young people, older workers and migrants
2. Literature review on Employability, Inclusion and ICT, Report 2: ICT and Employability
3. Literature review on Employability, Inclusion and ICT, Report 3: Database of example practices of how ICT can support employability for young people, older people and migrants
4. Literature review on Employability, Inclusion and ICT, Report 4: Review of available data sets on employability and ICT

This report is the second of the project reports. The complete set of reports can be found at the IPTS ICT for employability web page:

<http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/employability.html>.

¹ Eurostat (2012)

² Eurostat, data for 2011

TABLE OF CONTENTS

EXECUTIVE SUMMARY	7
1. INTRODUCTION	11
1.1 Outline of the report.....	11
1.2 ICT and labour demand: the changing profile of employment.....	23
1.3 An employability framework for ICT.....	24
2. METHODOLOGY	29
2.1. The research questions.....	29
2.2. Identifying and selecting relevant studies.....	30
2.3. Summarising and integrating the material.....	31
2.4. Consultation.....	31
2.5. Overview.....	31
3. THE ROLE OF ICT IN AFFECTING EMPLOYABILITY	33
3.1. The digital divide, digital literacies and employability.....	33
3.2. The role of ICT in enhancing skills and confidence for employment.....	36
3.3. ICT enabling exploration of skills, employment, education and careers.....	41
3.4. ICT enabling job search and recruitment and selection processes.....	48
3.5. ICT enabling new ways of working.....	59
3.6. Overview.....	65
4. ICT, EMPLOYABILITY AND YOUNG PEOPLE	67
4.1. Individual factors.....	67
4.2. Individual circumstances.....	68
4.3. Employer/ organisational practices.....	70
4.4. Local contextual factors.....	70
4.5. Macro level factors.....	71
4.6. The role of labour market intermediaries and support agencies.....	71
4.7. Overview.....	73
5. ICT, EMPLOYABILITY AND OLDER WORKERS	74
5.1. Individual factors.....	74
5.2. Individual circumstances.....	75
5.3. Employer/ organisational practices.....	76
5.4. Local contextual factors.....	79
5.5. Macro level factors.....	79
5.6. The role of labour market intermediaries and support agencies.....	79
5.7. Overview.....	83

6. ICT, EMPLOYABILITY AND MIGRANTS	85
6.1. Individual factors	85
6.2. Individual circumstances	88
6.3. Employer/ organisational practices	89
6.4. Local contextual factors.....	90
6.5. Macro level factors	91
6.6. The role of labour market intermediaries and support agencies	91
6.7. Overview	92
7. CONCLUSIONS AND RESEARCH GAPS	93
REFERENCES.....	97
APPENDIX 1: LIST OF ACADEMIC DATABASES SEARCHED AND RESULTS	115
APPENDIX 2: LIST OF JOURNALS SEARCHED MANUALLY AND RESULTS.....	116
APPENDIX 3: LIST OF WEBSITES CONSIDERED.....	117

LIST OF TABLES

Table 1.1	List of practice examples	13
Table 1.2	Revised employability framework: a key role for ICT.....	25
Table 3.1	Comparison of Web 1.0 and Web 2.0 in job search and recruitment.....	50
Table 3.2	Advantages and disadvantages of e-recruitment and e-selection: employers' perspectives.....	57
Table 3.3	Selected labour market intermediaries playing a key role in recruitment and selection.....	58

EXECUTIVE SUMMARY

This report presents a literature review of the relationship between ICT and employability. It follows Report 1 (Green et al., 2012) which reviewed the literature on employability and how this issue has been addressed in relation to three groups of interest: young people, older people and migrants. A focus on these groups is also relevant to this report which investigates the following questions:

- I. According to the literature and available information, what role does ICT play in affecting employability?
- II. According to the literature and available information, how does ICT affect employability for the three groups defined above?

This report considers employability in a context where ICT is playing a role – together with globalisation, rapidly changing markets, demographics – in changing the profile of employment and labour demand. ICT implementation and adoption have enabled and presented opportunities for new ways of working, and for organising and managing work. ICT has also led to an increased demand for high-skills and a ‘professionalisation’ of the workforce, but there has also been growth in low skilled, low paid and unskilled work. The implementation and adoption of ICT in the labour market has also enabled new ways of working and is expected grow in significance in terms of labour demand over the next 20-30 years across Europe.

Within this context, the employability framework developed in Report 1 can be seen as a starting point for this report and to some extent guided the exploration of factors that could potentially play a role in facilitating and enhancing employability. It can be said that ICT impinges on all aspects of the framework, albeit more directly in some than in others.

The digital divide, digital literacies and employability

In developed societies, the number of services that people can or need to access through the internet and other ICTs is increasing and in some cases the internet and ICTs are replacing the way transactions are conducted. Thus, ICTs can enable individuals to participate in society but, at the same time, a lack of access to, or ability to use, these media can lead to digital exclusion. Thus, in addition to having access to technology, individuals need to be *digitally literate*, which encompasses multiple skills, and knowledge and understanding of the digital world. Being digitally literate is relevant to employability as it empowers individuals to participate in society’s economic and cultural activities. e-Inclusion intermediaries play an important role in supporting those at risk of exclusion develop their digital literacy and employability. Thus their role will be discussed in this report.

The role of ICT in enhancing skills and confidence for employment

ICT skills can be seen as ‘gateway skills’ without which a person’s likelihood of finding employment would be significantly reduced. Moreover, ICT skills can also serve to enhance a person’s employability profile, particularly when combined with other skills and attributes, or as a catalyst for further skills development. Regarding what skills should be taught to increase a person’s employability, it is important to consider the fast pace at which new technologies develop, the ‘shortening lifecycles’ of ICT skills, and the need for continuous learning and upskilling. Schools, colleges, universities and the work environment play an important role in enhancing the development of ICT skills and their failure to integrate technologies successfully impacts on pupils and employees’ ICT development. In addition to this, the task of e-Inclusion intermediaries to support the development of ICT skills is crucial, particularly for those with basic skills or unemployed. These organisations should ideally liaise with other actors to ensure that the training provided effectively leads to improved employability.

ICT enabling exploration of skills, employment, education and careers

The methods in which services to support the exploration of education and employment opportunities are accessed and delivered have changed dramatically over the last decade. Within the current economic climate of public spending cuts, the application of ICT is increasingly viewed as a tool for which a range of enhanced services relevant to employability can be delivered. ICT enabled methods for exploring careers, education and employment includes: tools for assessing individual skills for employability; tools for profiling those who may require additional support and help to improve their employability; ICT enhancing access to careers information and guidance to support employability; and, as part of this, the role of ICT in enabling access to labour market information (LMI). In sum, ICT is growing in importance for careers support services and its application is recognised as useful for accessing LMI as well as being an efficient method in which to expand services.

ICT enabling job search and recruitment and selection processes

Over recent years the formal notification of job vacancies by employers has largely moved from print media to the internet and web-based services have become established which facilitate new forms of job search and application, and matching of workers with job opportunities. The internet has created new opportunities for job seekers to access more easily and more cheaply a wider range of vacancies than was possible previously. However, there are concerns that inequalities in use of and access to the internet and use of other ICTs will intensify difficulties experienced by disadvantaged groups in accessing vacancies and associated support and benefit services, especially as the amount of information and transactions conducted online increases, with public employment services also placing greater emphasis on e-services. Therefore, initiatives aimed at supporting the development of the skills necessary to take advantage of these technologies play an important role, particularly in helping citizens at risk of exclusion. From an employers' perspective, it is difficult to make robust assessments of the incidence of use of new technologies in e-recruitment and e-selection given the pace of change in technology a lack of comprehensive evidence of employers' recruitment and selection methods. What is clear is that practice is changing and that it varies. ICT-enabled recruitment and selection may have advantages for employers in terms of cost, convenience, ease of communication, flexibility in terms of content and ease of making changes to processes and practices. But this may enhance the disadvantage of 'at risk' groups.

ICT enabling new ways of working

The implementation of ICT has revolutionised the workplace enabling new and innovative ways of communicating, searching, sharing, storing, creating, processing and presenting information and knowledge. As a consequence, ICT has enabled new ways of working, including flexible working arrangements and 'teleworking', which has enabled those who have difficulties in accessing the labour market (such as health and mobility issues, caring responsibilities, those wishing to study alongside work, etc.) to undertake employment and enhance their employability. In this respect, distance learning/working initiatives are especially valuable for women since they allow work and upskilling to be performed from home and at times suitable to individual. Research in this area highlights the importance of evaluating individual user needs and to balance this with design, implementation and the wider context to ensure that it is effectively used. Another implication of the use of ICTs in relation to employment is that it has affected the differentiation of working from personal time and has led to both to the *extensification* and *intensification of work*, with potential impacts on the individual.

ICT, employability and young people

There is some evidence that many young people are very confident users of the internet, but lack ICT skills in terms of privacy awareness, ethical and legal use, and sometimes fail to adopt a critical attitude in creating and using content. Overall, young people are not a homogeneous group and their access to ICT, behaviours toward this tools and degree of adoption vary widely. Some ways in

which ICT can increase employability of young people is by helping them develop soft skills relevant to the world of work such as team working and problem solving; by enhancing access to a wider range of careers information advice and guidance; and by providing confidential support for disadvantaged members of minority groups, particularly those with concealable stigmatised identities. Schools are highly relevant for the acquisition of young people's ICT competencies and there has been some considerable progress in ICT learning; nevertheless, the digital divide within schools impacts on the acquirement of ICT.

The role of labour market intermediaries and support agencies is very pronounced as a mediator in young people's transitions, especially for early school-leavers, drop-outs from vocational training and for those people experiencing unemployment after a period of employment. In order to help lower skilled young people to gain necessary ICT skills and find sustainable entrance to the labour market, many active labour market programmes (ALMPs) include ICT training both in more general education (basic computer courses) or specific vocational skills (advanced computer courses or courses providing e.g. technical and manufacturing skills). Other possible skills gained in an ALMP include the ability to write a CV or to submit a job application.

ICT, employability and older workers

Studies drawing on large-scale longitudinal datasets have analysed the likelihood of older workers using computers at work remaining in employment in the short to medium term. The evidence shows a relationship between computer skills and delayed retirement. It has been argued that in order to stay in employment, older workers not only need acquire the required ICT skills but also exploit them in their work. Moreover, level of education was identified as a relevant variable for men but not for women. Although results suggest that possession of ICT skills is important in enhancing employability of older people, health has a more crucial role to play in remaining in employment.

The literature highlights three theoretical considerations that can have bearing on the take up of technology in later life: its use in the household during one's upbringing; socialisation at work (with women assumed to be at a disadvantage due to the segmentation of the labour market); and the size and "immediacy" of social networks (assumed to shrink in later life).

ICT, employability and migrants

Migrants differ in terms of their demographic characteristics, their education, their labour market experience and their employability characteristics, and the stage in their migration. Poor language skills may thwart migrants in taking up employment and also in gaining work commensurate with their qualifications. ICT can support migrants by making language training accessible through distance learning and support. ICT also has a particularly important role in providing information about the labour market and how to apply for jobs in the host country, so enhancing labour market and job seeking knowledge of migrants.

Reviews of initiatives making use of ICT to promote education and employment opportunities for migrants suggest that the role played by ICT tends to be complementary to, rather than substituting for, other integration and employability initiatives, acting to accelerate such processes. However, measuring the success of initiatives involving the use of ICT to enhance employability is hampered by a general lack of longitudinal data. ICT could play a role in making employer recruitment and selection practices more transparent to potential applicants. It has also been suggested that specialised e-marketplaces could be created for migrants. Even where migrant integration services are provided under the auspices of the public employment service, many migrants obtain employment through social networks and ICT is of relevance here.

ICT has a particular role to play in providing access to information about the regulatory regime regarding migration and employment, and the welfare and institutional regime. Macroeconomic factors also play a role in availability of funding to support the activities of intermediaries and support agencies.

Conclusions and research gaps

A common message highlighted in the consideration of the three groups that constitute the focus of this report is that young people, older people and migrants are all heterogeneous groups showing marked variations in the ICTs skills and situations of the individuals included.

The evidence base on ICT and employability is uneven. In general, there is more evidence on individual circumstances than on other components of the employability framework.

1. INTRODUCTION

1.1 Outline of the report

This report presents an analysis of the relationship between ICT and employability. It follows a previous study reviewing the literature on employability and how this issue has been addressed in relation to three groups of interest: young people, older people and migrants (Green et al., 2012). A focus on these groups is also relevant to this report.

Seven chapters make up this report, including the present one. The next chapter (Chapter 2) describes the methodology used in this study. Chapter 3 provides an overview of the role of ICT in affecting employability and serves as background to chapters 4, 5 and 6, which address this issue from the point of view of young people, older workers and migrants.

Chapter 3 is divided into six sections. Section 3.1 introduces the terms 'digital divide' and 'digital literacy' which are relevant to discussions throughout the report. It also looks at the role of intermediaries in helping people develop ICT skills and employability. This leads to a discussion of the role of ICT in enhancing people's skills and confidence for employment (section 3.2). Internet skills are discussed as some of the skills supported by different organisations and intermediaries to assist individuals who may be at risk of digital exclusion, and the role of inclusion intermediaries is also considered.

Section 3.3 focuses on ICT's role in enabling exploration of skills, employment, education and careers. First it looks at tools for assessing employability skills and their availability in support of individuals at risk of exclusion. It then discusses the (limited) availability of profiling tools to identify those who need additional support and the difficulties that have been observed in developing such tools. This is followed by a discussion on how ICT can assist the delivery of careers information and guidance services, and by a discussion on how it can be used to enhance the availability of labour market information.

The role of ICT in job search and recruitment and selection processes is the topic of section 3.4. This section starts by setting the context of the changing technological environment in which these processes take place. It then looks at ICT and job search, first from the job seeker perspective and subsequently from the employer perspective. A discussion of the role of labour market intermediaries concludes this section.

Section 3.5 investigates the literature in relation to teleworking and flexible working arrangements which have been enabled by ICTs. The impact of ICT on employment is considered from different and contrasting perspectives, including ways in which it can open employment opportunities and ways in which it can encroach on individuals' personal space.

Section 3.6 provides a brief overview of the chapter.

Chapters 4-6 follow a structure taken from the employability framework provided in Report 1 (Green et al., 2012). These chapters are concerned with the role of ICT in employability of young people, older people and migrants, respectively. Each aims to cover the following topics: individual factors, individual circumstances, employer/organisational practices, local contextual factors, and macro level factors. The role of labour market intermediaries and support agencies are considered in turn.

Chapter 7 provides concluding remarks and discusses research gaps and areas for further research.

Throughout this report a range of ICT developments, initiatives and projects that support employability for young people, older people and migrants are discussed.³ These initiatives have been collated in a good practice database (see Behle et al., 2012) and are listed in Table 1.1.

³ Other initiatives and projects have been identified in this report, but may not have been included in the good practice database if the initiative has ended, is small-scale in terms of the number of beneficiaries or scope, the initiative is similar in scope to another that is included in the database or the research team where unable to access sufficient information to make an assessment.

Table 1.1: List of practice examples

ICT initiatives to support employability		Purpose of initiative summary	Target group(s)	Link to Employability framework
1	Amazing-people Amazing people e-programme	To provide career coaching to help people make career choices	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - migrants - youth - older people 	ES; IF2; IF4; IF5; IF6; IF7; IC3
2	BYCS-UK Bangladeshi Youth and Cultural Shomiti	To provide ICT access and relevant training programmes to assist people in gaining qualifications for employment	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - migrants - youth - older people - Bangladeshi population 	ES; IF1; IF2; IF5; IF7
3	eLSe eLSe - Senioren lernen zuhause (e-learning for seniors at home)	To develop, test and offer an online learning course for senior citizens in five European countries with no or very little computer skills to enable them to learn at their own pace	- older people; no or low level of computer skills who would find it difficult to attend a course in person due to their geographical location, other mobility restrictions, or other commitments	ES; IF1; IF2; IF3; LC1; LC3

4	eScouts-UK	eScouts (Intergenerational learning circle for community service)	To develop an innovative intergenerational learning exchange between senior adults and youth volunteers focusing on the development of digital competences, plus passing on advice and guidance to young people regarding labour market choices, employability and adult life choices	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - migrants - youth - older people - intermediary actors 	ES; IF1; IF2; IF4; IF5; IF7
5	Ethnic Jobsite	Ethnic Jobsite	To provide online recruitment solutions for members of minority groups through access to vacancies and information regarding job search	<ul style="list-style-type: none"> - migrants - ethnic minorities - employers seeking diverse workforces 	ES; IF1; IF4; IF5; EP2; LC3
6	Experience Counts 50+	Experience Counts 50+	To support over 50s into sustained employment by providing 1:1 support, information advice and guidance, SMART action plan and access to ICT courses	<ul style="list-style-type: none"> - unemployed/ economically inactive - older people (aged 50 plus) 	ES; IF1; IF2; IF3; IF4; IF5; IF6; IF7
7	Fit.Fasttrack	Fit. Fast track to IT (MigrantICT-IE is part of this initiative)	To develop market orientated curricula and resources, and to equip marginalised communities with PCs and interactive whiteboard technologies	<ul style="list-style-type: none"> - jobseekers 	ES; IF2; IF5; IC3

8	Fundacion Bip-Bip	Fundacion Bip Bip	To use surplus computer equipment and install them in homes, organisations and shelters that target disadvantaged groups	- those in danger of being digitally excluded, especially migrants, drug addicts in rehabilitation, children in care, larger prison population in the reintegration process, physically and mentally disabled and battered women	ES; IF1; IF3; IC3
9	GetYourselHired-UK	Get Yourself Hired	To provide job seeking advice for young people to develop their employability; and to gain a better understanding of young peoples' job seeking behaviour and what makes a successful jobseeker to inform policy and practice	- young jobseekers in the UK	ES; IF1; IF2; IF4; IF5; IF6; IF7; LC1; LC3
10	Interface3-BE	Interface3	To offer non-mixed (single-sex) ICT training designed to enable women to access positions in all economic sectors using or producing ICT and to address the barriers that women face to enter careers in ICT	- women - unemployed women - migrant women - women retuning to the labour market - school-age women (ICT career awareness programmes)	ES; IF1; IF4;IF5; IF7; IC3
11	Inter-Life	Inter-Life Project	To create an integrated educational environment of web-based and mobile technologies, that supports a virtual working space for young people to make educational and career decision making skills	- youth	ES; IF1; IF2; IF4;IF6; IF7; IC3

12	Internet Saloon	Internet Saloon	To provide basic one day courses that present the internet such that any person, even without prior knowledge of the PC, is able to navigate, network and use e-mail after six hours	- older people	ES; IF1; IF2; IC3
13	IPERIA-FR	IPERIA Institut, France (known previously as FEPEM institute)	To design and develop continuing training programmes adapted to the needs of employees and their employers, and to provide training for carers and unemployed individuals seeking to enter the sector	- individuals employed in household employment, encompassing children and elderly care and family employees. This includes low-skilled individuals and immigrants - unemployed people interested in working in this sector	ES; IF1; IF2; IF4; IF5; IF7; IC1; IC2; IC3; EP1

14	KEMP	Keep employment by developing e-skills (KEMP)	To develop an ICT course for people aged 45 plus with low ICT skills levels who are working in SMEs in the service sector in order to raise awareness of the importance of ICT training for maintaining or strengthening employability	<ul style="list-style-type: none"> - older people in paid work - other adult learning organisations 	ES; IF1; IF2; IF7; IC3; EP1; LC1
15	Keycompetences-EU	Key competences for all	To support the enhancement of the basic key competencies of low qualified adults improving their employability through an alternative ICT-based, user-centered, interest-oriented approach	<ul style="list-style-type: none"> - migrants - youth - older people - intermediary 	ES; IF1; IF2; IF5; IF7; IC3; LC1
16	KCPS	Kuder Career Planning System	To offer comprehensive and user-friendly solutions to help career planners of all ages identify their interests, explore their options, and plan for career success through a range of online assessments and tools	<ul style="list-style-type: none"> - youth - parents/carers - intermediary actors - educators - adult career changers 	ES; IF1; IF2; IF6; IF7; IC3
17	MigrantICT-IE	Migrant ICT Project (part of Fit.Fastrack initiative)	To help migrants integrate into a new culture by supporting the development of IT skills and by finding a secure relevant job or go on to further education	<ul style="list-style-type: none"> - migrants - youth - older people 	ES; IF1; IF2; IF4; IF5; IF7; IC3

18	Naric UK	Naric	To provide an analysis of qualifications to establish lines of comparison with recognised national and international standards or qualification framework levels	<ul style="list-style-type: none"> - individual migrants preparing to study/ studying or in employment in the UK - individuals from the UK preparing to work or study abroad - organisations include Awarding Bodies, Professional Associations, Education Authorities, national and international education providers 	ES; IF1
19	Notschool UK	Notschool	To provide an 'Online Learning Community' offering an alternative to traditional education for young people who are unable to engage with school or other complementary provisions	- young people disengaged from classroom learning, aimed at the 14-16 age range but welcomes both younger and older teenagers	ES; IF1; IF3; IF7; IC3; MF1

20	OWLE50+	Older Women in Learning and Enterprise 50+ (OWLE50+)	To offer a series of workshops and support for older women to enable them to contribute to society and the economy throughout their later lives by responding to each woman's needs through learner-centred up-skilling	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - older women - older disadvantaged women - older women at a crossroads in their life - older women who needed assistance in sustaining or establishing a business 	ES; IF1; IF2; IF4; IF5; IF6; IF7; IC2; IC3
21	SkillsHealth Check-UK	Skills Health Check Tools	To provide tools (a set of online questionnaires with a report) designed to give individuals information about their skills, interests and motivations in the workplace, and to help individuals into, and progress in, employment	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - migrants - youth - older people - all working age adults of any ability 	ES; IF1; IF2; IF4; IF7; IC3; LC1; MF2

22	SmartWork-EE	Smart Work Association of Estonia	To promote smart work and employment opportunities in rural communities in Estonia, so that: individuals can choose working arrangements and workplaces; businesses can increase their productivity through flexible working arrangements; and at risk groups can be helped to enter the labour market	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - any at risk groups 	ES; IF4; IF5; IC3; EP1; EP3; LC1; MF3
23	SpielendLernen-DE	Spielend Lernen - Learning whilst Playing	To provide a web-based learning platform 'scoyo' to help young people with their school work	- disadvantaged young people who struggle to follow the school curriculum	ES; IF1; IF7
24	StiftungDigitalechancen-DE	Stiftung Digitale Chancen (Digital Opportunities Foundation)	To help people to learn more about the Internet, support providers of public Internet Access Points in social institutions that enable people to use the Internet	<ul style="list-style-type: none"> - new users without access to the internet - new users with special needs - providers of publicly accessible access points - parents, social workers and charities for children - politicians, higher education and companies 	ES; IF1; IF3; IC3

25	ValenciaYa-ES	Valencia Ya	To provide free Internet access points, free training in the use ICT tools, donate recycled computer equipment to NGOs and associations and support digital voluntary programme for people with disabilities and limited mobility	<ul style="list-style-type: none"> - unemployed/ economically inactive - returners to the labour market - migrants - youth - older people - intermediary actors 	ES; IF1; IF3; IF5; IC1; IC3
26	YouthforWork-KE	YouthforWork-KE – Computers for Development (CFD) Youth for Youth Project 'Learning by Doing'	To support the ICT skills development of young people; assist the unprivileged, especially women, to access skills that can allow micro entrepreneurship projects to allow self-sufficiency; stimulate local ICT sector growth by developing workforce ICT skills; organize employability training workshops for children and women ; promote cross cultural exchange between youth in Africa and the Netherlands on employment cultures	<ul style="list-style-type: none"> - unemployed/ economically inactive - migrants - youth - international development 	ES; IF1; IF2; IF4; IF5; IF7; IC3; LC1

Link to employability framework key:

ES Enabling support factors

Individual factors

IF1 Demographic characteristics

IF2 Disposition to enhancing employability

IF3 Health and well-being

IF4 Labour market and Job seeking knowledge

IF5 Economic position

IF6 Adaptability and mobility

IF7 Employability skills and attributes/
characteristics

Individual circumstances

IC1 Household circumstances

IC2 Household work culture

IC3 Access to resources

Employer/ organisational practices

EP1 Organisational culture

EP2 Recruitment and selection practices

EP3 Working practices

Local contextual factors

LC1 Features of local employment

LC2 Local work culture

LC3 Local labour market operation and norms

Macro level factors

MF1 Regulatory regime

MF2 Welfare regime and institutional factors

MF3 Employment policy

MF4 Macroeconomic factors

1.2 ICT and labour demand: the changing profile of employment

In an ever-changing and unsettled economic context, risk and uncertainty are prominent characteristics impacting on labour supply and demand. Drivers of change in the labour market, such as technological change, globalisation, rapidly changing markets and services, demographics (i.e. an ageing workforce), environmental and geopolitical factors serve to transform the profile of employment and ways of working. They have challenged the relevance of an established view of a 'job for life'. As noted in Report 1 (Green et al., 2012), career transitions are no longer a one-off event at the early stage of an individual's working life, but rather more complex, prolonged and often spanning lifetimes (see also Super, 1980; Wilson, 2008). Individuals are undertaking multiple transitions between education and work, and between occupations and sectors. In order to undertake these transitions successfully, a range of employability skills need to be developed and enhanced. The changing profile of employment and changes in labour demand need to be examined in order to understand why individuals might experience several transitions during a lifetime. Such analysis might also provide insights into how individuals might be assisted in making such transitions.

ICT implementation and adoption have enabled and presented opportunities for new ways of working, and for organising and managing work. Some researchers have focused on the idea that there is a shift from an industrial to an information society in response to globalisation and ICT implementation. This was believed to be driven by economic and social changes and increased employment in knowledge-intensive jobs in the 1980s and 1990s. The information society may be characterised by a highly skilled, knowledge-driven workforce employed in flatter organisations (Miles, 1996). This shift has been argued to mark the move towards 'fluid careers' (Bimrose, 2006). However, this change has not been fully realised (Moynagh and Worsley, 2005). Instead there has been a move towards more flexible working patterns with ICT enabling workers to be geographically dispersed (see section 3.5).

Other research suggests that there has been a move towards high performance working; a move towards the development of skills, mass customisation and a focus on customer needs (Felstead et al., 2011). The adoption of ICT within organisations has enabled this shift, together with enabling new ways of communicating and organising work; high performance working represents that shift. ICT implementation is seen to support these new working practices. New forms of expertise and skills are emerging in response. A study of 10 companies and a survey of 294 employers in UK, by Sung and Ashton (2006) highlighted various successful cases where ICT adoption have been central to new working practices by, for instance, enabling communication, stimulating innovation and supporting to new product development and services.

Actual and projected changes towards more highly skilled occupations mark a 'professionalisation' of the workforce. There has also been some growth in low skilled, low paid and unskilled work (McCollum, 2012; Wilson, 2008). This suggests increasing 'polarisation' (Devins et al., 2011; Goos and Manning, 2003; Autor et al., 2006), marked by a rise in employment shares in high and low wage occupations. Some commentators (such as Autor et al. (2003) and Levy and Murnane (2004)) have argued that computerisation and international outsourcing have contributed to labour market polarisation, while others emphasise that changes relate more to the routinisation of work rather than specifically being a result of technology implementation (Devins et al., 2011; Hughes and Lowe, 2000). Employment projections suggest a continuation of recent trends over the medium-term, with future jobs growth in knowledge-based industries, such as advanced manufacturing, high-tech and business services (Goos and Manning, 2003; Wilson et al., 2008; Wilson and Homenidou, 2011).

The implementation and adoption of ICT in the labour market has also enabled new ways of working and will grow in significance in terms of labour demand over the next 20-30 years across Europe (see Wilson, 2008). Virtual worlds and virtual markets are growing as there are greater possibilities for online commerce and training. There is a need for some caution, as virtual markets

and worlds have their drawbacks. For instance, they can fall victim to exploitation; maligned intent; a sense of 'big brother'; and illegal activities. Bönke et al. (2000) define e-business environments and the digitalisation of the economy as beneficial in terms of working within the global economy. For instance, employees can develop their skills. The implementation of technology has been useful by enabling access to large audiences and for raising funds. Crowdsourcing defines the use of collective intelligence of internet users to develop and innovate. ICT in this context has opened up boundaries not only between customers and organisations, but between geographically dispersed employees (or helpful volunteers) and their organisations (Fähling et al., 2011). Electronic marketplaces, such as Pico jobs, highlight new forms of working by involving customers in the innovation process. Similarly crowdfunding (raising finance from a large audience) offers entrepreneurs a new method in which to finance activities by pulling together resources from geographically dispersed individuals made possible by technology. For instance film and arts projects are being successfully funded in this way (see Agrawal et al., 2010; Belleflamme et al., 2011).

At the heart of economic growth across the globe is the need for a highly skilled, flexible, autonomous and productive workforce with high-level skills. Those who experience long periods of unemployment will as a result suffer "significant reductions in employability, human capital, skills, and the motivation and ability to upgrade skills, making them far less attractive to employers" (Devins et al., 2011: 11). ICT has a key role in supporting workforce learning and development, and importantly employability skills.

1.3 An employability framework for ICT

An employability framework was developed in companion Report 1 (Green et al., 2012). This framework is presented in Table 1.2, with shading indicating where ICT plays, or has potential to play a key role in facilitating and enhancing employability. It is clear from the distribution of shading across the framework that ICT has a role to play in all enabling support categories identified. In particular it has role in providing access to ICT hardware and software, in building ICT skills, and in terms of technology-enhanced job broking and job matching services. It also has a place in all columns of the framework, but has an especially prominent place in individual factors and in employer/ organisational practices.

- *Individual factors*: ICT impacts directly on employability skills and characteristics (given that ICT skills are included within employability skills and characteristics). ICT also impinges indirectly on labour market and job seeking knowledge, through access to information on labour market opportunities, ability to tailor a CV with ease, etc.; and on adaptability and mobility, since ICT enables access to information to inform such mobility and adaptability.
- *Individual circumstances*: Access to ICT (at household level, as well as at individual level) is of direct relevance here, as it is a key employability resource.
- *Employer/ organisational practices*: ICT can have a direct impact on recruitment and selection practices (which may be set up electronically), and on working practices, through facilitating teleworking, etc.
- *Local work culture*: In some local labour markets, ICT may be pertinent in terms of its place in the prominence of accessing vacancies.
- *Macro level factors*: ICT may play an increasingly prominent role here through e-delivery of public services and through the way the public employment service operates (e.g. in contacting claimants electronically about vacancies, monitoring job search, etc.

Hence, ICT impinges on all aspects of the framework, albeit more directly in some than in others.

Table 1.2: Revised employability framework: a key role for ICT

(Key issues highlighted in pink are where ICT plays / has potential to play a key role)

Enabling support factors					
<i>Role of labour market intermediaries and support agencies in public, private and voluntary sectors, trades unions, national and local employer associations / business organisations, local / regional authorities, and sectoral and professional bodies, education institutions (schools, colleges and universities) in:</i>					
<ul style="list-style-type: none"> • providing support to individuals on the employability pathway – pre-employment preparation – training provision/ signposting to specialist provision – signposting/ referral to non-employment/ training support services (e.g. health, housing, care, etc.) 	<ul style="list-style-type: none"> – CV preparation – interview practice – job search advice and support – access to ICT skills provision – access to ICT hardware and software – job broking (including technology) – job matching (including technology) – post-employment support 	<ul style="list-style-type: none"> • providing support to employers in facilitating aspects of employment: – pre-employment and in work training – recruitment and selection – off-the-job and on-the-job training – helping ensure employee voice and buy-in – legal advice (e.g. on employment regulations) 	<ul style="list-style-type: none"> • influencing local training/ skills policy – to address national and local labour market needs – adapting existing training programmes to meet local needs – through facilitating opportunities for business and employee voice 		
Individual factors		Individual circumstances	Employer/ organisational practices	Local contextual factors	Macro level factors
<p><i>Demographic characteristics</i> (could be the basis for discrimination)</p> <ul style="list-style-type: none"> • age • gender • nationality • country of origin • time in host country • ethnic group • religious affiliation • name 	<p><i>Disposition to enhancing employability</i></p> <ul style="list-style-type: none"> • attitudes to education and training – commitment to lifelong learning – engagement in CPD • engagement in networking to extend human/social/cultural capital • attitudes to paid employment, self-employment and entrepreneurship • attitudes to taking up unpaid/marginally paid work – volunteering – internships 	<p><i>Household circumstances</i></p> <ul style="list-style-type: none"> • direct caring responsibilities • other family and caring responsibilities • other aspects of individual's contribution to household (economic or otherwise) • other household circumstances 	<p><i>Organisational culture</i></p> <ul style="list-style-type: none"> • commitment to training / skills development and skills utilisation (and for whom) – whether have a training budget – whether have a training plan – whether support (and fund) on-the-job/ off-the-job training (including e-learning) – whether offer work experience/ work placements • whether adopt high performance work practices – whether provide opportunities for employee voice • trades union recognition 	<p><i>Features of local employment</i></p> <ul style="list-style-type: none"> • quantity of jobs (vis-à-vis number of people seeking employment) in the local labour market • quality of jobs – occupation/ skill level – full-time/ part-time – permanent/ temporary – pay • location of jobs (vis-à-vis residences and local transport networks) 	<p><i>Regulatory regime</i> (mainly nationally-specific but some factors at EU level)</p> <ul style="list-style-type: none"> • rules determining labour market access – migration policy – equalities policy / anti-discrimination policy • formal education system, curricula and training policy (including funding regimes)

<p><i>Health and well-being</i></p> <ul style="list-style-type: none"> • health – physical – mental • disability 	<p><i>Labour market and Job seeking knowledge</i></p> <ul style="list-style-type: none"> • employment/ work knowledge base (including work experience and general work skills) • awareness of labour market opportunities - knowledge of employers' recruitment practices – knowledge and use of formal and informal information sources • ability to fill in a CV, perform effectively at interview • realistic approach to job targeting 	<p><i>Household work culture</i></p> <ul style="list-style-type: none"> • whether other household members are in employment • existence of a culture in which work and skills development is (not) encouraged 	<p><i>Recruitment and selection practices</i></p> <ul style="list-style-type: none"> • how and where jobs are advertised (i.e. methods used) - formal - informal - internet/ e-based • how successful applicants are selected – manual – e-screening/ e-selection • (non) discriminatory practices 	<p><i>Local work culture</i></p> <ul style="list-style-type: none"> • whether neighbourhood has high levels of employment/ non-employment • local norms/ aspirations regarding education/ training/ employment 	<p><i>Welfare regime and institutional factors</i></p> <ul style="list-style-type: none"> • benefits system • active labour market policy • role of public employment service • role of trades unions • ICT policy – public service delivery
<p><i>Economic position</i></p> <ul style="list-style-type: none"> • (currently) in employment – full-time employee – part-time employee – self-employed (with or without employees) • (currently) unemployed – duration • (currently) economically inactive – reason – duration • overall work history 	<p><i>Adaptability and mobility</i></p> <ul style="list-style-type: none"> • career management and adaptability • functional mobility • occupational mobility • geographical mobility • wage flexibility (and reservation wage) 	<p><i>Access to resources</i></p> <ul style="list-style-type: none"> • access to transport • access to financial capital • access to social capital (including for job search) • access to cultural capital (to ease entry into employment and to maintain employment) • access to ICT 	<p><i>Working practices</i></p> <ul style="list-style-type: none"> • whether adopt flexible working practices (and for whom) – part-time working – term-time hours – compressed hours – annual hours – job sharing – flexi-time – teleworking • working from home on a regular basis 	<p><i>Local labour market operation and norms</i></p> <ul style="list-style-type: none"> • recruitment norms - how/where jobs are advertised locally - role of employment agencies in local labour market (and occupational/ sectoral labour markets locally) • role and strength of different actors in the local labour markets (e.g. key employers, local authorities, trades unions, etc.) 	<p><i>Employment policy</i></p> <ul style="list-style-type: none"> • work incentives (for individuals) • access to education and training when on benefits • incentives for employers to recruit / take on individuals for work experience, and for skills development

<p><i>Employability skills and attributes/ characteristics</i></p> <ul style="list-style-type: none"> • essential attributes - basic social skills - honesty and integrity - personal presentation - reliability - willingness to work - understanding of actions and consequences - positive attitude to work - responsibility - self-discipline • personal competencies - proactivity - diligence - (self-)motivation - judgement - initiative - assertiveness - confidence - self-esteem - self-efficacy - perceived employability • basic transferable skills - literacy - writing - numeracy - verbal presentation - basic ICT skills - new basic skills 	<ul style="list-style-type: none"> • key transferable skills - problem solving - work process management - team working - personal task and time management - e-skills - interpersonal and communication skills - emotional intelligence - aesthetic customer service skills • high level transferable skills - team working - business thinking - commercial awareness - vision - job-specific skills - enterprise skills - creativity • qualifications (and where obtained) - academic - vocational - job-specific 				<p><i>Macroeconomic factors (at national and supra-national scales)</i></p> <ul style="list-style-type: none"> • aggregate demand for labour - unemployment levels - vacancy levels - employment profile • employer/ consumer confidence
--	--	--	--	--	--

2. METHODOLOGY

2.1. The research questions

As noted above, this report presents the second part of a study reviewing the concept of employability with a specific focus on three groups considered to be at risk of social exclusion: young people; older people; and migrants. While the first part of the study (Green et al., 2012) focused on employability, the aim of the present review is to consider the relationship between employability and ICT. More precisely, the report seeks to answer to the following **research questions**:

1. According to the literature and available information, what role ICT plays in affecting employability?
2. According to the literature and available information, how does ICT affect employability for the three groups defined above?

The study can be seen as broad in scope given that its research questions were not narrowed to specific issues of the concept and actors of interest. Instead, the research questions were open in the sense that they aimed to cover a range of topics. These topics were agreed between the sponsor and the research team to scope the area under study, including:

- Indicators for employability
- The changing nature of employability (e.g., as a result of the current economic climate)
- Exclusion
- Young people, youth, younger, NEET (not in employment, education or training) etc.
- Migrants
- Older workers, older people, mature workers, seniors, etc.
- ICT, communication technology, information technology, computer skills, ICT skills, computer literacy, e-skills, e-learning, e-business, telework
- Key competencies (mix of skills, knowledge, attitudes, experience)⁴
- Education
- Employment
- Labour market trends
- Labour market intermediaries
- Supply and demand
- Social inclusion
- Occupational health
- Integration
- Human capital development
- Social capital
- Human resources
- Development
- Workability
- Discrimination
- Gender issues
- The demand side (employers' perspective)
- Transitions (to, from, between employment)
- Entrepreneurship, Self-employment
- The role of ICT in supporting employability, but also cases where it can be a hindrance
- Job search issues (including the role of ICT from both the employer and the job seeker's perspective)
- Teleworking
- Web, social networks, digital skills, applications, online services

Armstrong et al. (2011) propose that scoping reviews can be seen as “a process of mapping the existing literature or evidence base” (p 147). As stated, such reviews may serve a range of

⁴ This is to address the following questions: What is known about current trends in the profiles or set of key competencies (mix of skills, knowledge, attitudes, experience) that are demanded by the labour market and thus would increase employability? What are the competencies that employers seek beyond an educational level or profile?

purposes, such as summarising findings in a specified area of study, identifying research gaps, or informing research questions for literature reviews. In relation to the latter purpose, a scoping review can be of help not only in specifying research questions in detail, but it can also provide useful information about the potential costs of such a review by giving an indication of the number of studies that will need to be considered (Armstrong et al., 2011). Furthermore, it may be added that scoping studies can serve to inform policy and practice.

Although conducted in a systematic and transparent way, scoping reviews place fewer limitations than systematic reviews in relation to the types of study designs considered and the search terms used, and require researchers to proceed in a reflexive way at each stage of the (iterative) process (Arksy and O'Malley, 2005). The stages of this process, which were shared with the process of creating Report 1, are discussed next.

2.2. Identifying and selecting relevant studies

Relevant studies were identified by a process of searching academic databases and websites of relevant organisations with the aim to cover both academic and grey literature. Some academic journals were also searched manually given their relevance. The lists of academic databases, journals and websites searched are reported in Appendices 1-3.

Academic databases were searched using the following specifications:

- The term 'employability' was used as a search string. The choice was made on a preliminary search using different options, which indicated that using this term would ensure sufficient, yet manageable coverage. This choice, however, was not without limitations since it was acknowledged literature relevant to the study is not limited to publications that use the term 'employability'.
- Searches were delimited to include publications dating from February 2002 to February 2012.
- In relation to geographical coverage, European studies were considered as central to the study, but publications from the US and Australia were considered also.

Searches were conducted by three members of the team using the above criteria. Each of the publications that this search yielded was then screened against the topics listed above. Material was included if it served to inform the understanding of employability in general or in relation to one or more of the topics listed. These topics provided a "clearly articulated scope of enquiry" (Levac et al., 2010: 3) and helped to clarify the focus of the study and guided the search strategy. Appendix 1 provides a summary of the results obtained from each database and the number of publications that were considered as relevant after this screening. A list of 3,020 publications was made available through the searches of academic databases.

The list of publications was stored using reference manager software (EndNote) that allows, in most cases, for references to be imported automatically rather than manually. These references were then reviewed in detail by two of the researchers who considered the title and study abstracts in relation to the list of topics to make decisions about inclusion or exclusion of material. This further screening led to trimming the original database and bringing the number of relevant publications to 854.

A further 46 references were added by searching a small number of **academic journals manually**. The journals were searched for relevant publications between February 2009 and February 2012.

Websites of relevant organisations were also searched for reports or grey information with regard to employability and the specified topics. The initial list of websites considered is provided in Appendix 3.

In addition, a considerable number of publications were obtained by the researchers' own databases and through the team's network of contacts. IPTS provided a number of reports and material to be considered. Therefore, identifying and selecting relevant studies was an operational stage throughout the project (see also Levac et al., 2010).

This process allowed the creation of a database, which was sorted according to five main themes:

- Employability general;
- Employability and young people;
- Employability and older people;
- Employability and migrants;
- Employability and ICT.

In summary, this database should be seen as a starting point for the scoping exercise as new questions emerged from further iterations. This was the case during researchers' own work exploring employability and specific topics, and during consultations.

2.3. Summarising and integrating the material

The research team consisted of six researchers; three of whom were experts in young people, older workers and migrants. Thus, in summarising and integrating the material, these experts focused on employability and ICT in relation to their area of expertise. The remaining three members of the team focused on employability in general.

As the literature was being examined, the researchers used the emerging insights to create an outline for the report, which served to organise the results. This outline was shared with the sponsor who provided feedback and suggested areas of research in which they were particularly interested. This led to the need to conduct further searches; therefore, as mentioned, the material gathered in the first phase of searching should be considered as a starting point.

2.4. Consultation

The process of consultation for this review was agreed at the start of the project. First, the researchers and IPTS agreed on both formal and informal consultations to share preliminary findings, discuss courses of action and gather feedback. In addition to this, the research contract stipulated the submission of a draft report prior to a formal report, which allowed for comments and suggestions from the sponsor to be addressed in a revised report. Finally, an Experts Meeting was organised by IPTS to present the report to the members of the policy, research and practitioner communities in order to discuss the study and gather further views on its impact and how it could be improved. The meeting took place at IPTS's offices in Seville and comments provided by the participants contributed to consolidation of this report.

2.5. Overview

This study can be seen as a scoping review which aims to map the literature and evidence base available on employability and ICT. The process consisted of defining a research question; identifying and selecting relevant studies; summarising and integrating the material; and consulting with sponsors and experts. These stages were iterative during the process and some of them continued to be in operation throughout.

3. THE ROLE OF ICT IN AFFECTING EMPLOYABILITY

This chapter presents a broad discussion of the literature that deals with the relationship between ICT and employability. The aim is to provide the background for a discussion of how ICT affects employability for the three groups of interest: young people, older people and migrants. Section 3.1 provides an overview of relevant definitions and concepts such as the digital divide and digital literacies and discusses their relevance to finding and sustaining employment. After this, Section 3.2 considers the different ways in which ICT skills can enhance employability, which range from giving access to a labour market that demands digital literacies, to empowering individuals to achieve their aims and objectives in life. This then leads to a discussion in section 3.3 of ICT enabled methods for exploring education and careers, including tools for assessing and profiling individual skills for employment, and for providing access to careers information and guidance. Section 3.4 looks at the role of ICT in job search and the processes of recruitment and selection. This is done from the perspective of the job seeker and the employer and, as is the case for the entire chapter, the role of intermediaries is also discussed. The last section presents a discussion of how ICT has impacted on how and where work is carried by giving new meaning to the concept of flexible working and teleworking thanks to the advent of new technologies for storing and sharing information.

3.1. The digital divide, digital literacies and employability

3.1.1. Overview of definitions and relevant dimensions

Information communication technologies (ICTs) play an important role in society. The number of services that can be accessed through these media are increasing and in some cases replacing the way transactions are conducted. However, there is a recognised disparity between those who have access to ICTs, and particularly services and information provided online, and those who do not, and this has led to the coining of the term 'digital divide'. According to CEDEFOP (2009) the digital divide can be defined as "within populations, the gap between those who can access and use information and communication technologies (ICT) effectively, and those who cannot". The definition provided earlier by the OECD (2001: 5) also focuses on this gap but also mentions the importance of the difference in opportunities to access ICTs and to use of the internet.

As these definitions suggest, *access* is an important element affecting the digital divide. Issues related to access range from having a computer and access to the internet, to considering the availability of basic telecommunications infrastructure in less developed areas. An OECD study considering European countries, Canada and Korea showed that income, household composition and place of residence are the most important factors in predicting individuals' internet access; and age, employment status, and education were also found to be associated with internet usage (Montagnier and Wirthmann, 2011). Räsänen (2006: 79) also found that factors such as age, income, gender and education "explain Internet use rather similarly across the EU". In developed societies, computer and internet use have become so widespread that non-use can lead to exclusion of individuals from ordinary economic and cultural activities (Cushman and McLean, 2008). Those without access to ICTs will find it increasingly difficult to access the services and help they need if these become primarily provided online, as is a clear tendency (see Adam et al., 2011). Therefore, the digital divide should be seen an issue with social and political implications and not merely as a technological problem. This is especially the case as more services are delivered electronically.

The use of the term 'digital divide' has been criticised as narrowly focusing on a dichotomy between those who have access to ICTs and those who do not. Lindsay (2005) mentions that this has "arguably led to an oversimplification of the debate, where 'improving access' to ICT is seen as a panacea for social and labour market exclusion" (Lindsay, 2005: 328). In his study of unemployed job seekers, he found that job seekers' experiences of the digital divide varied according to their access to economic and cultural capital. Whereas economic capital refers mainly to material

resources, cultural capital encompasses ICT skills; willingness and ability to continue developing these skills; building a self-image as an ICT user; and being part of a community that harnesses the benefits of ICTs. Addressing this perceived inaccuracy in the term, Klecun (2008) suggests instead that the term 'digital exclusion' should be used to indicate that the problem is also about skills, attitudes and beliefs in relation to ICTs. This is supported by evidence suggesting that the barriers to digital inclusion include: (1) access, (2) motivation, and (3) skills and confidence (FreshMinds, 2008).

Klecun (2008) also highlights the fact that the skills necessary to make efficient use of ICTs include technical skills but also context-specific, literacy and numeracy skills. In other words, individuals need to develop other ICT-related skills to make use of new technologies in genuinely beneficial ways. Johnston and Webber (2006) take this view further and propose that an (ICT focused) 'information literacy' should be seen as a soft applied discipline that individuals should master to be able to take part in the information society. The authors suggest that a curriculum for such a discipline would focus on information literacy for citizenship, economic growth and employability. The latter involves "education, training, and continuing development of all the knowledge, skills, and ways of being information literate required for access to and success in the economy" (Johnston and Webber, 2006: 117).

Although Johnston and Webber (2006) put ICT at the centre of their definition of 'information literacy', Koltay (2011) differentiates between 'information' and 'digital' literacy, suggesting that the latter is particularly concerned with digital media. In the present review, the term digital literacy will be adopted as it reflects more accurately its aims. Digital literacy has been defined as the skills, knowledge and understanding that enables critical, creative, discerning and safe practices when engaging with digital technologies in all areas of life. It includes several different elements from e-safety to creativity, from technical skills to cultural understanding. Moreover, the ability to find and evaluate online information has been identified as 'digital fluency' (Bartlett and Miller, 2011).

As indicated by Paul Trimmers, Head of ICT for Inclusion Unit at the European Commission (IPTS, 2010), digital literacy and competences are critical to Europe 2020 strategy for growth toward a sustainable and inclusive economy. Digital literacy is plainly defined by CEDEFOP (2009) as "the competence to use technology (ICT)". However, this use of the term has been criticised as "not always clear" and it has been suggested that terms such as digital competence, e-skills or e-competencies could be harmonised (IPTS, 2010: 37). This lack of clarity has also been related to the fact that digital literacy involves a diverse range of skills (including hardware and software skills), attitudes and behaviours that change at the same pace as ICT development, and it may be appropriate to talk about digital literacies referring to the use of a range of tools beyond the PC (e.g., social media, smart phones, tablets, etc.), at different levels and for different purposes.

Belshaw (2011) suggests that digital literacy is "an ongoing *process* and group of practices" (p 82) and argues for a "pluralistic, multi-faceted, contextualized and contingent definition of digital literacies" (p 220). He concludes by proposing a focus on digital *literacies* that takes into consideration cultural, cognitive, constructive, communicative, confident, creative, critical and civic aspects of this construct. Ala-Mutka (2011) provides support to this view and suggests that a more useful approach would involve recognising this plurality and taking individual needs into account. In the author's own words:

"The digital competence landscape is multi-layered, and an all-encompassing widely applicable and agreed single definition is difficult, if not impossible to achieve. It is more useful to aim for an approach which recognises the main areas and can be adapted according to the needs of different target groups and situations." (Ala-Mutka, 2011: 53)

Some of the main areas to consider are provided by Ferrari (2012) in a report which collected and analysed data on frameworks aimed at developing digital competences. The areas proposed include information management; collaboration; communication and sharing; creation of content; ethics and responsibility; evaluation and problem solving and technical operations. The report

highlights the fact that although technical skills are seen as a central component, “having technical skills at the core of a digital competence model does not give enough importance to other equally relevant aspects”. (Ferrari, 2012: 43).

Several studies on the use of ICT and employability take Amartya Sen’s (1999) capabilities approach which places emphasis on empowering individuals to achieve their goals and aspirations (Garrido et al., 2009a; Mansell, 2002). In relation to ICT, this perspective can be seen as focusing on individuals’ capabilities to function in a society where information exchange through new technologies is an important part of economic and cultural activity. The literacies or capabilities needed for this include access to digital information; ability to make sense of, and critically assess this information; ability to take part in the digital conversations; and the ability to use ICTs to improve one’s situation in life. Mansell (2002: 420) proposes a focus on “what citizens are able to do as a result of their interactions with new media and what capabilities they are able to acquire as a result of those interactions”. Nonetheless, there is evidence that not all individuals see ICT use as part of their goals and aspirations and this may include individuals at risk of exclusion, such as older or disabled people (ONS, 2011; Montagnier and Wirthmann, 2011) or those from minority ethnic groups or dependent on welfare benefits (Crump and McIlroy, 2003). This highlights the link between motivation and ICT use as a factor that needs to be considered alongside access.

Approaches that consider what individuals are able to do with ICT to improve their situation are relevant to the employability discourse since they relate the use of the technologies to the presumed aim of individuals to find employment or improve their employment situation. As highlighted above, access to ICT is not sufficient if motivation, skills and confidence are lacking. Furthermore, the context in which these skills are to be deployed and the particular situations of excluded individuals may present challenges that need to be addressed before the benefit of ICT skills is realised (Gillard et al., 2007). Therefore, studies and interventions aimed at improving the impact of ICT on employability agree on the need to adopt a holistic perspective. For instance, Garrido et al. (2009a) explored the effects of programmes aimed at increasing immigrant women’s digital skills in the process of adaptation to the EU labour market. This process was conceptualised as consisting of three paths: (1) education and lifelong learning, (2) social inclusion, and (3) cultural inclusion. The study focused on the role of non-governmental organisations (NGOs) in this process and employability was a key element given its relevance to facilitating integration. The results suggest that women need not only computer access but also assistance in developing digital skills, making practical use of them, and broader support for social and labour market integration.

3.1.2. e-Inclusion intermediaries

Labour market intermediaries and support agencies play an important role in providing services to support employability of young people, older people and migrants. Agencies involved include government (national and sub-national), NGOs, trades unions, and educational institutions (schools, colleges and universities) etc. The extent to which policies are centralised varies between countries, but generally there has been a trend towards decentralisation of planning and provision in order that services can be responsive to local situations. However, the economic crisis and funding constraints⁵ has led to the closure of some services (Platonova and Urso, 2009). Services provided by NGOs are often supported by public funding, so spending cuts mean that provision of support is dynamic (i.e. services may be provided for a fixed term only).

The diversity and nature of NGO involvement in ICT skills and employability training is such that Garrido et al. (2010) have devised a framework distinguishing between various organisational characteristics, including mission, vision, scope, values and the nature of partnerships with which they are involved. They make a further distinction between NGOs on the basis of programme characteristics, including client selection, client employability expectations, ICT training strategies (i.e. whether ‘vertical training’ for ICT workers or ‘horizontal training’ involving provision of basic ICT training for a range of occupations), and the nature of complementary services provided (including

⁵ Many services are reliant on funds from local/ regional/ national governments or from EU sources.

job preparation services, job placement services, connections to employers and non-employment related services linked to employability, e.g. in legal, health and transport domains). Such diversity in the nature of service provision is also apparent in the USA, where community based organisations providing basic ICT training tend to integrate such training with other services and other providers in order to enhance employability prospects for lower wage, lower skills populations (Sullivan et al., 2007).

Many intermediaries play wide ranging roles and not all are concerned with enhancing digital skills or facilitating use of e-services. The Institute for Prospective Studies (IPTS, 2012) describes those actors playing a key role in digital inclusion as e-Inclusion intermediaries and states that:

“digital inclusion and social inclusion actors such as Public Internet Access Points (PIAPs), public libraries, Third Sector organisations including NGOs as well as social workers, in a word, eInclusion ‘intermediaries’ play a crucial role, both in providing digital literacy to excluded groups as well as using ICT to support social inclusion of groups at risk of exclusion such as to acquire new skills (through eLearning platforms) or for employment.” (IPTS, 2012)

PIAPS are publicly available places that provide access to computers, the internet and other digital technologies. PIAPS allow individuals to access information and online services, and also provide training and support in other areas such as advice on government services, training, careers advice, or job search. According to Kluzer and Rissola (2009: 69) PIAPs have become a “privileged channel for digital literacy and adult education”, with telecentres – the most common representation of PIAPs – playing a crucial role in supporting those at risk of exclusion develop skills for employability. According to Telecentre-Europe (an online network community of telecentre practitioners), “telecentres promote e-Inclusion, serving a broad clientele, including the elderly, disabled and immigrant or other challenged communities.” (Telecentre Europe, 2012). Being located in public libraries and voluntary or community organisations allows telecentres to reach migrants, older people and ‘other challenged communities’.

Formal education institutions, from school to university and including vocational education, can be seen as important intermediaries in the use of ICT for employability. First, through their teaching role they can help make students aware of advances in ICT and support them in engaging with the technology (e.g. Loveless et al., 2006). Secondly, they can make use of ICT to promote employability through online programmes promoting careers skills and providing information and guidance (Venable, 2010). The latter use of internet resources is in part a consequence of limited resources (Westergaard, 2012) but is also fostered by the need to provide careers support to a larger and more diverse group of students (see section 3.3). In any case, there seems to be a need to ensure that teaching staff are also committed to embracing the use of ICT in order for them to encourage students’ engagement (Kukulka-Hulme, 2012; Schneckenberg, 2010; Sobrado Fernández et al., 2012). An examination of the digital divide which starts with a consideration of access to ICTs soon leads to the need to take into account other factors. For individuals to take advantage of new technologies to achieve their aims and goals in life, including that of finding and sustaining employment, they must have access to ICTs, but also be literate in relation to the use of these technologies. e-Inclusion intermediaries such as PIAPS, and telecentres in particular, are important in relation to supporting those at risk of exclusion develop their digital literacy and employability and thus their role will be discussed throughout this report. The next section looks at the skills and competences needed to enable individuals to use ICTs to find and sustain employment.

3.2. The role of ICT in enhancing skills and confidence for employment

3.2.1. Introduction and overview

From an employability perspective, having ICT skills can be seen as a necessary quality that gives people a foothold in the labour market. This suggests that ICT skills can be seen as ‘gateway skills’ without which a person’s likelihood of finding employment would be significantly reduced (Guest editors ITID, 2009). However, ICT skills can also serve to enhance a person’s employability profile,

particularly when combined with other skills and attributes, or as a catalyst for further skills development (ibid). This highlights the importance of ICT skills for individuals who are considered at risk of exclusion and of developing programmes in support of ICT skills for employability. Moreover, it is important to consider that the potential for ICT skills to enhance a person's employability depends on employers' needs for these skills and the extent to which they will be deployed at work. From an employer's perspective, a person can be seen as employable if they have the skills necessary to perform their role, and ideally, to improve their productivity. This relationship is not simple and providing ICT skills that will in effect enhance employability requires the concerted effort of various actors⁶.

Garrido et al. (2009b) propose an analytical framework for researching the links between ICT skills and employability. Their framework is derived from empirical data gathered through interviews with NGOs offering ICT and employment programmes in twenty-three countries; it therefore uses these organisations as proxies for the range of actors who support individuals in developing their ICT skills. The framework "integrates three levels of analysis to identify the elements that can potentially link ICT skills to employability" (p 5). Level 1 focuses on the characteristics of the ICT training and employment programmes, and particularly on who takes part in these programmes (the target group), the content and the training approach used. The second level (Level 2) refers to the relation between the training provider and other organisations such as employers, government agencies and social organisations which have a role to play in the labour market or helping individuals become employable. Strong and diverse networks are expected to have a positive effect on outcomes since they increase the resources that can be tapped into assist clients more efficiently (in a manner similar to the 'weak ties' proposed by Granovetter (1974)). Level 3 consists of factors at the individual level and macro level contextual factors that affect a person's employability. Individual factors "shape the motivation of beneficiaries to come to the organisations, to enrol in the training programme, and to some extent, to follow certain tracks in the employability pathway" (Garrido et al., 2009b: 8). As for contextual factors, these include labour market and enabling factors that also affect a persons' employability.

Regarding what skills should be taught to increase a person's employability, it is important to consider the fast pace at which new technologies develop, the 'shortening lifecycles' of ICT skills, and the need for continuous learning and upskilling (CEPIS, 2006). In addition to this, those at risk of unemployment or exclusion are usually 'basic' users of ICT, as opposed to 'specialist' or 'advanced' users for whom ICTs are the main part of their job, or who make use of sector-specific ICT tools, respectively (OECD, 2005). Basic users make use of ICT such as the internet, word processors and email for general purposes and at work. The skills developed by different users can thus be described as 'practitioner' and 'end-user' ICT skills (CEPIS, 2005; CEDEFOP, 2006). While end-user ICT skills refers to the ability to use ICT effectively for general purposes, practitioner skills "comprise capabilities required for specifying, developing, installing, operating, supporting, maintaining, managing, evaluating ICT systems" (CEPIS, 2005: 49). Although it can be said that individuals at risk of exclusion could benefit from end-user ICT skills, these per se do not provide a competitive advantage in the labour market but provide gateway access. However, there are examples of initiatives such as interface3⁷ in Belgium and the UK Cisco Networking Academy Programme (Gillard et al., 2007) which focus on practitioner ICT skills for those at risk of exclusion.

⁶ This also raises questions regarding how these ICT skills are measured and recognised in the labour market and how they affect individuals' employment opportunities or work performance. Several studies have related ICT training and skills to productivity (e.g., Baralou, 2010 in a Greek context; The Economist Intelligence Unit, 2004), and it would be expected that ICT skills and qualifications would increase a person's chance of finding employment (see also CEPIS, 2006). Less information is available, however, on how ICT are deployed or acquired by operating in digital environments or how these skills are recognised.

⁷ <http://www.interface3.be/>. More information on this initiative can be found in the practice database (Behle et al., 2012).

Although the focus of this review is on basic users and end-user skills, there are other categorisations of ICT skills that are worth considering. For instance, 'e-Business skills' in relation to ICT are defined as the "capabilities needed to exploit the strategic opportunities provided by ICT (in particular the internet)"⁸ (CEPIS, 2006: 31). It is this capability to use ICTs for a strategic purpose that Cobo Romani (2009) referred to when stating that "non-expert ICT users have been oversimplified as evidenced by mentioning only capability to interact with generic ICT tools" (Cobo Romani, 2009: 19). The author raised the need for a categorisation of ICT users that included the ability to use ICTs in conjunction with other skills and knowledge to create value added. The importance of highlighting these categories is that it suggests that ICT skills, be they practitioner or end-user skills, should be seen in relation to the extent to which they enable individuals "to take actions and decisions that allow them to lead better lives" (Qureshi, 2011). To have an effect on a person's employability, ICT skills need to be seen in relation to a specific purpose such as job search, accessing services, or a particular personal, social or economic purpose. As Garrido et al. (2009b: 5) indicate, "stand-alone training on ICT applications without integrating any social purpose into the training... [is] invariably the least effective curricular model in relation to employability".

Schools and the work environment play an important role in enhancing the development of ICT skills and their failure to integrate technologies successfully impacts on pupils and employees' ICT development. As will be discussed in section 4.2, schools offer different ICT opportunities, and disadvantaged children may have fewer chances to experience ICT learning as a higher order activity than their more advantaged counterparts (Bradbrook et al., 2008). In relation to work, businesses that fail to adopt ICT will also lack ICT trained individuals and in turn will offer no ICT training. Beckinsale et al. (2011) provide some evidence of this in their qualitative study of the ICT-adoption gap in UK ethnic minority businesses. As the authors indicate, none of the businesses studied provided ICT training and "not one of the businesses had an IT manager or skilled individuals with IT training". On the other hand, Hempell (2003) shows that there is 'skill bias' in the use of new technologies, meaning that investing in new technologies raises the need for human capital investment and "foster[s] the incentives for firms to pay for training programmes" (Hempell, 2003: 31; emphasis in the original). ICT skills matter as they have been associated to increased employability in a number of ways, including measurable and non-measurable aspects such as increased wages and aspirations, respectively. As Garrido et al.'s (2009c) study on the effect of ICT programs by non-profit and public workforce-development organizations in the USA suggests, ICT skills development can assist those at risk of exclusion not only in finding (or changing) employment, but also in increasing their wages and fostering further skill development.

More recent research has reported that the ICT curriculum in UK schools needs to be transformed and a major part of this process is the reskilling of teachers (Wells, 2012). Research undertaken in London examined the knowledge and capacity of teachers to develop and deliver a more computing-based curriculum. It was concluded that significant reskilling would be required in order for teachers to undertake more complex ICT developments.

Turning to use of ICT skills and skills development in the work environment, the European Working Conditions Survey (EWCS) shows that computer users (particularly those with higher education) were more likely to report better career opportunities. Computer users also had significantly 'more learning opportunities and challenges offered by the job' and significantly higher job satisfaction, although the significance of the latter variable disappeared when age and education, as well as other organisational characteristics, were controlled for (including autonomy) (Joling and Kraan, 2008). Similarly, the latest EWCS also reported that computer users and those who use computers and machines have more creative work (defined as solving unforeseen problems, complex tasks, learning new things or applying one's own ideas) (Eurofound, 2012). This may suggest that computer users are more likely to have jobs that enable them to develop their skills at work and enhance their career prospects, which in turn may impact on their employability.

⁸ See also European e-Skills Forum, E-Skills for Europe: Towards 2010 and Beyond, Synthesis Report, 2004.

3.2.2. Internet skills

Internet skills are among the ICT skills that NGOs and other organisations supporting individuals at risk of exclusion deal with. Whereas earlier definitions of internet skills referred to the “ability to efficiently and effectively find information on the web” (Hargittai, 2002: 2), ICT developments (in particular Web 2.0) have rendered obsolete definitions that do not take into account participation in exchange of information. Moreover, the same can be said about definitions that leave out the role that the internet plays in helping people achieve their goals or the need to develop internet security and privacy awareness. Hence the internet, and in particular social computing applications/ social media, require new competencies related to security, safety and privacy, as well as the ability to use data responsibly, alongside networking, collaboration, sharing and information search skills (Ala-Mutka et al., 2009).

According to van Deursen and van Dijk (2009) research in relation to internet skills has taken different directions by focusing on: the operation of digital media; the understanding of the formal structures of digital media (e.g. navigating hyperlinks); information search behaviours; or personal goals and benefits derived from the use of this media. With this in mind, the authors proposed a framework of internet skills consisting of four types of skills:

- Operational internet skills (ability to operate an internet browser, search engine, and internet-based forms);
- Formal internet skills (ability to use hyperlinks to navigate between pages and maintain a sense of location);
- Information internet skills (ability to make choices and take actions that allow the user to access useful information and to evaluate this information, e.g., choosing a website and defining search strings and evaluating the information retrieved); and
- Strategic internet skills (ability to take advantage of the internet for a particular goal).

Van Deursen et al. (2011) further classified these four types of skills into two groups: ‘medium-related’ skills including operational and formal internet skills; and ‘content-related’ skills including information and strategic internet skills. They conducted a study to assess the relationship between medium- and content-related internet skills and factors like age, education and gender among adult internet users in the Netherlands. The results of the study indicated an association between age and internet skills. An expected outcome was that “the elderly perform more poorly than the younger generations with regard to medium-related skills” (van Deursen et al., 2011: 135). Nonetheless, older people were found to perform better than younger individuals in relation to content-related skills, i.e., with the skills they defined as information and strategic skills. The relationship between educational attainment and internet skills was also a salient finding and results suggested that this factor was positively associated to all the internet skills defined (see also van Deursen and van Dijk, 2009). Given that there was a weak association between hours spent on the internet per week or years of internet use and internet skills, the authors concluded that education is more important than intensity of internet use in terms of being able to take advantage of this tool. No association was found between gender and the medium- or content-related skills.

The results discussed above suggest that to make use of the internet to achieve specific purposes it is necessary to possess more than operational or formal internet skills. For internet skills and ICT skills more widely to have a positive effect on people’s employability it is necessary that they serve a personal, social or labour market purpose. With the increasing tendency for the digitalisation of society and government services it is not difficult to see ways in which being digitally literate contributes to social inclusion. The fact that digital media is now ubiquitous in developed countries means that the number of people without end-user ICT skills is expected to decrease. However, those who do not possess these skills will be at a higher risk of exclusion.

3.2.3.E-inclusion intermediaries' role in developing ICT skills

The second element of Garrido et al.'s (2009b) framework suggests looking at the relationship between ICT training providers "with employers, donors, government agencies and other social organisations and the way that these networks impact employability outcomes" (p 4). Multiple studies' conclusions converge in saying that the task of e-Inclusion intermediaries to support the development of ICT skills of the workforce, particularly the low-skilled, should ideally involve liaising with a range of actors to ensure that the training provided effectively leads to improved employability. However, although ideal, working in this way, is not always the norm (Garrido et al., 2010).

The view that a coordinated approach is needed is also shared by initiatives such as the European Alliance on Skills for Employability (2008) which aim is to assist people from disadvantaged groups in building technical and other employability skills. Among other activities, the Alliance invests resources in encouraging synergies between existing programmes. It is also involved in setting-up and extending partnerships with stakeholders to enhance cooperation between the private and public sectors and non-profit partners working in 'e-skills development'.

Sullivan et al. (2007) conducted a study on the provision of integrated services to support the low-skill and low-wage population in the USA. They concluded that community Based Organisations (CBOs) offering basic ICT training hold 'harmonious' partnerships with other CBOs, specialised training organisations, employers and governments. They found that CBOs saw ICT skills as necessary but not sufficient for employability and thus relied on their partnerships to provide wrap-around services to complement their services. Furthermore, these partnerships also helped to inform their training provision and served as a source of new recruits. More conventional education players, such as adult education colleges, can be said to play a similar role in European countries such as Germany, Italy, Spain and the UK. However, other than anecdotal evidence, no research was identified on the impact of these.

Also in relation to this, the ICT Task Force Working Group (2006), one of several initiatives taken under the European Commission's industrial policy, included among its recommendations the establishment of multi-stakeholder partnerships to provide training to those from disadvantaged groups, including older people, people with disabilities and young people looking for work or underemployed. Furthermore, it was specified that:

"These partnerships will bring together local governments, the ICT industry, the local and regional job centres, Chambers of Commerce and Federations of SMEs to bring together the leading IT skills training knowledge and resources with providers of wider business skills and job placement support services. Such partnerships should also provide access for training participants to internships and work experience in local SMEs and larger businesses" (ICT Task Force Working Group, 2006: 19).

In Ireland the FIT initiative⁹ has provided ICT skills training to support the long-term unemployed return to work and meet the needs of local employers. To date in the global FIT initiative over 8,000 people have participated in courses, and 5,000 have progressed into employment. This initiative is a good example of cooperation between public educational institutions, public employment services and the private sector.

Other evidence of how these partnerships work in practice can also be found. The UK provides an example of training providers working with public employment services to support customers. In the UK, those with no ICT skills will face not only barriers to entering a labour market where these skills are often essential, but also the challenge of accessing the new Universal Credit, the first benefit system that will be offered by default through digital channels (UK Online Centres, 2012).

UK Online Centres are independently run organisations receiving funding from different sources. They were set by the government in 1999 to provide public access to computers but their role has

⁹ See <http://www.fit.ie/>.

evolved and now their mission highlights the aim to help people get online to improve individual lives and communities.¹⁰ UK Online Centres work in partnership with Jobcentre Plus (the national public employment service) to help customers access online services and develop the digital skills needed for finding work. In practice, the partnership works by Jobcentre Plus advisers referring customers to UK Online Centres for assistance in getting online and it is estimated that “70% of the centres within the 3,800-strong network have a referral relationship with their local Jobcentre” (UK Online Centres, 2012: 11). It is suggested that this relationship requires strong networks and close communication to be successful (ibid).

Goodison et al. (2004) undertook an earlier study of clients using UK Online Centres which provides further insight into UK Online Centres’ relationships with other stakeholders. The study provides some evidence of UK Online Centre’s liaisons activities with local employers, Chambers of Commerce and charities to discuss opportunities for local employment. This was seen as a positive coordination which led to a better understanding of how the needs for employers matched (or otherwise) the skills of the local population. Another issue raised by this study was that ICT learning centres sometimes overlap in the services they offer. Consequently, regional coordination of provision was identified as a need to avoid duplication which could affect negatively the centres’ efforts and stability. Funding was identified as another area of concern to various degrees for the centres that took part in the study (see also Adam et al., 2011). Funding was defined as time-limited and insecure for the complex task of helping the socially excluded into long-term employment and learning. The manager of one of the centres expressed the need for funding that takes into account the fact that some customers start from a very basic level making finding sustainable employment a goal that cannot be reached with short-term interventions.

The relationship between Jobcentre Plus and UK Online Centres is an important one but the UK government’s aim is to create a wider network of organisations providing digital support. These organisations, known as ‘external providers’ are defined as

“Organisations which provide IT support and training to digitally excluded claimants aimed at developing their skills and confidence. The courses offered by providers such as Learn Direct, Exchange Group and UK Online are free and provide training on IT skills which are useful beyond accessing Jobcentre Plus online services. Other organisations including colleges, libraries and voluntary bodies can also provide support to claimants. This support is not necessarily in the form of training but can range from providing internet access to advice and guidance in relation to accessing Jobcentre Plus services.” (Adam et al., 2011: 27¹¹).

Establishing relationships between the different actors that support the development of ICT skills presents challenges and funding cuts in many European countries in the face of economic crisis mean that these services are being stretched. However, the potential to improve the services that are provided to customers justifies these efforts. Garrido et al. (2009b) point toward further examples of successful collaborations between employment service organisations and suggest that where this is the case “beneficiaries receive services from a number of organisations and are cooperatively referred between these groups” (p 8). This arguably improves the services provided and makes organisations more able to address the needs of individuals and assist them in developing their ICT skills for employability.

3.3. ICT enabling exploration of skills, employment, education and careers

ICT has already changed the way in which individuals explore education, training and work opportunities; and it will continue to do so. For instance, the methods in which services to support the exploration of education and employment opportunities are accessed and delivered have changed dramatically over the last decade. Within the current economic climate of public spending cuts, the application of ICT is increasingly viewed as a tool for which a range of enhanced services

¹⁰ <http://www.ukonlinecentres.com/about-us/background.html>

¹¹ <http://research.dwp.gov.uk/asd/asd5/rports2011-2012/rrep776.pdf>

relevant to employability can be delivered. ICT enabled methods for exploring careers, education and employment is considered in terms of: first, tools for assessing individual skills for employability; second, tools for profiling those who may require additional support and help to improve their employability; third, ICT enhancing access to careers information and guidance to support employability; and finally, as part of this the role of ICT in enabling access to labour market information.

3.3.1. The role of ICT in assessing individual skills for employability

ICT enabled methods of developing and assessing or appraising individual skills can be used in a variety of ways for a range of audiences at different stages of their career. Examples include supporting learning, increasing self-confidence, measuring individual achievement and evaluating the effectiveness of training programmes. A recent literature review of evidence around the efficacy of skills assessments and appraisals in helping to identify and measure individual skills levels (including those skills needed by employers), examined online, and paper-based versions, and combinations of the two (Bimrose et al., 2007). It concluded that there was limited evidence on assessing adult skills for employability and that no one assessment package could be identified. Overall, the literature review identified seven online tools¹² with a sound evidence base for the assessment of skills to support employability, including:

- the Skills Confidence Inventory (SCI) to be used in conjunction with the Strong Interest Inventory (SII) (Betz, Borgen and Harmon, 1996; Chartrand et al., 2002);
- the Campbell Interest and Skills Survey (CISS) (Campbell, 2002);
- the Expanded Skills Confidence Inventory (ESCI) (Betz, et al., 2003);
- the Kuder Skills Assessment (KSA) to be used alongside the Kuder Career Search (KCS) (Rottinghaus, 2009; Zytowski, 2001; Zytowski and Luzzo, 2002);¹³
- the Task-Specific Occupational Self-Efficacy Scale (TSOSS) (Koumoundourou, 2004);
- the Skills Health Check (Adams et al., 2009); and
- the 'Getting Ready for Your Next Job' inventory (Wanberg et al., 2012).

Three of these assessments (SCI, SII and TSOSS) were found to be suitable for use with disadvantaged groups, and all excepting the Skills Health Check were developed in the US. The first five tools were developed on a commercial basis. Rottinghaus (2009) noted that more work needed to be undertaken on the KSA and KCS to determine their validity with different adult populations, and Bimrose and Barnes (2011) highlighted that more work needs to be undertaken to evaluate the validity of the tools for different groups.

Recently, a web-based program has been produced for individuals with a 'developmental disability' in the US assessing preferences, skill levels and job requirements (Morgan, 2008). Podcasts on particular jobs and the critical tasks involved in that area of work are viewed by the individual who assesses and chooses five preferred occupations. Decisions related to work conditions, tasks and specific jobs are then made, which form the basis of a plan for learning and development activities. Results show that it is positive in helping individuals plan for their career and get motivated, thus maximising aspiration and achievement (Morgan, 2008).

In education settings, the Brigance Diagnostic Life Skills Inventory (LSI) has been used to target provision and monitor students. It was also found to be useful in measuring basic adult education, secondary special education, vocational education and 'English as a Second Language' programmes. It was also noted that self-administered tools (both paper-based and online) were cost-effective, but less reliable than those results obtained with the help of a labour market

¹² For a detailed explanation of each of these tools, see Chapter 2 of Bimrose, et al., 2007 <http://research.dwp.gov.uk/asd/asd5/rports2007-2008/rrep459.pdf>

¹³ The Kuder Career Planning System (KCPS) is based on these assessments. This system is detailed in the good practice database.

intermediary (Bradley-Johnson, 1997). Other research has shown that subjectivity can be an issue with employability skills assessments, such as an individual's assessment of their self-efficacy, confidence and self-esteem (Blades et al., 2012). The purposes of the skills assessments tools and the needs of users are varied, but generally, these assessments can be useful in supporting employability by:

- enabling the identification of individual skills levels;
- identifying gaps in skills, knowledge and understanding;
- improving individual confidence in skills and abilities;
- encouraging the exploration of education and employment opportunities that coincide with skills; and
- encouraging the development of a learning plan.

However, it has been argued that any skills tools used to support employability and career progression have to take account of individual needs, motivations, knowledge, values and interests as well as skills (Bimrose and Barnes, 2011; Bimrose, et al., 2007). New assessment tools under development are aiming to address some of these issues, but, at present, there is little evidence of their efficacy.

In the UK, a new online skills assessment and diagnostic tool has been developed by the Government, named the 'Skills Health Check' (more detail on this project is in the good practice database) (Behle et al., 2012). It is aimed at all working age adults of any ability and can be completed with or without the help of a careers professional or labour market intermediary. Individuals are provided with an action plan after completion. The early version of the assessment tool was designed to identify those requiring help with their employability skills in order to be referred to the careers service. The tool has undergone various stages of testing, evaluations and improvements to both the content and the technology. The first evaluation was positive with individuals noting the potential of the skills report to be motivational (Adams et al., 2009). The tool is designed to help individuals assess their personal skills (i.e. skills, motivation, interests and personality) alongside their activity skills (i.e. working with numbers, checking information, working with shapes, working with written information, solving mechanical problems and solving abstract problems). The results enable individuals to compare their existing skills with those required for a particular job, which then forms part of an action plan for learning. Through this assessment individuals are encouraged to explore employment and education opportunities. The 'Skills Health Check'¹⁴ was launched in 2012 as part of the National Careers Service in England.

In the US, the 'Getting Ready for Your Next Job' inventory,¹⁵ aimed at unemployed individuals, is being developed as both a paper-based and online tool. The inventory has been designed to help unemployed individuals understand skills (such as networking, finding vacancies) associated with the job search process, enabling the exploration of employment and education opportunities (Wanberg et al., 2010). The inventory assesses 13 areas relevant to successful job outcomes. Using the online version, individuals are able to complete the inventory and then decide whether to seek help from a labour market intermediary or continue independently with their job search. Feedback boxes are provided throughout the inventory for either the individual or intermediary to complete identifying particular resources or actions. An early evaluation reported on the positive impact of the inventory, whilst highlighting areas of improvement (Wanberg et al., 2010). These included improving and tailoring the feedback - ensuring that it was good and differentiated in terms of users' educational level, the speed of reemployment and the quality of outcome. Optimising feedback for different search strategies and methods employed by users were all identified as elements requiring improvement.

¹⁴ See <https://nationalcareersservice.direct.gov.uk/tools/skillshealthcheck/Pages/default.aspx>

¹⁵ See <http://www.ynj.csom.umn.edu/>

There is also a range of online employability self-help tools aimed at enabling individuals to assess their skills, write application forms, complete curriculum vitae and prepare for interviews. PORTA22¹⁶ is a good example of a holistic employability tool. Developed in Spain, it offers the user a range of professional development tools to support career development, from helping individuals understand their aptitudes and skills, job hunting strategies, managing change and learning about opportunities in a changing labour market.

The literature review did not uncover any published evaluations on the efficacy of the employability self-help tools.

Overall, skills assessments tools can provide a holistic approach in which individuals can explore future education, employment and career choices. An evaluation of a selection of these profiling tools shows that the process can support individual understanding of the importance and transferability of skills (Bimrose et al., 2007; Bimrose and Barnes, 2011). ICT has enabled more flexible access to these tools. However, for disadvantaged individuals or those without IT access, there are few assessment tools available. There is an important role here for labour market intermediaries to help fill this gap by facilitating access to, and supporting use of, such tools.

3.3.2. The role of ICT in profiling those who may require additional support to improve employability

Within the literature, a range of tools and approaches have been recognised that help labour market intermediaries and public employment service advisers identify those individuals who require additional support to improve their employability. Adviser discretion to support such individuals is a common approach. In some instances advisers have full discretion to act as they see fit in supporting individuals, but increasingly ICT enabled diagnostic tools are being employed to support advisers in determining individual needs, sometimes with reference to eligibility rules. Tools using psychological models have been designed around profiling or screening individuals' attitudes towards entering and staying in employment. By identifying constraints and barriers, advisers are able to design a plan to change individual behaviour and attitudes to support individuals' employability. Several reviews of the use by advisers of skills diagnostic/ profiling tools have been completed (Bimrose et al., 2007; Hasluck, 2004, 2008; O'Connell et al. 2009; Rudolph, 2001). Some international ICT enabled tools identified include:

- Worker Profiling and Reemployment Services (WPRS) in the USA (Black et al., 2007; Wandner et al., 1999);
- Frontline Decision Support System (FDSS) in the USA (Eberts and O'Leary, 2002);
- Service Outcome Measurement System (SOMS) in Canada (Colpitts and Smith, 2002);
- Job Seekers Classification Instrument (JSCI) in Australia (Gray and Agllias, 2009; Lipp, 2005; McDonald et al., 2003);
- Kansmeter in the Netherlands (Rudolph, 2001); and
- Activity Matching Ability System (AMAS) in Great Britain (Birkin et al., 2004).

These ICT tools are based on linear logistic regression analysis of administrative data. JSCI, for instance, uses administrative data for nearly 1 million jobseekers. These statistical programmes identify and analyse statistically significant factors (such as relative disadvantage to others seeking employment) that impact on whether an individual will remain unemployed for a significant period and thus require additional support. The aim of these tools are to ensure that resources are effectively used with the aspiration of saving money. Evidence on the cost effectiveness of these services is limited.

The available evidence on these tools shows mixed results in profiling individuals and identifying those requiring intensive support to improve their employability. Research in the UK has shown that profiling can be useful in periods of unemployment for disadvantaged individuals (such as disabled

¹⁶ See <http://w27.bcn.cat/porta22/en/>

people and lone parents) (Bryson and Kasparova, 2003). Many of the statistical profiling tools are no longer in use, particularly as evaluations found that them to be inaccurate in identifying individual in the early stages of unemployment (Rudolph, 2001). In summary, there are ICT tools for profiling individuals needing support to enhance their employability to be developed, but there remain issues with the measures and statistical profiling behind the systems.

3.3.3. ICT enhancing access to careers information and guidance

To deliver flexible careers information and guidance services, technology is important as it can provide a direct source of information without the need for intermediaries, while offering speed and flexibility for users. The term 'careers guidance' is used here to encompass the delivery of guidance and counselling services to those entering the labour market, seeking employment and wanting to change career. Delivery of these services can be face-to-face or mediated by ICT. Careers information includes a range of data on the labour market, information on vacancies and learning opportunities, all of which can be presented in a written or pictorial format. The current policy context in the UK emphasises the need to exploit the potential of new technologies and integrate their use into all aspects of careers guidance. Technology is seen as a way to expand and enhance careers guidance services for both adults and young people. It may be assumed that its introduction will not only extend access to services by increasing the flexibility of delivery methods, but that it will also help reduce costs by lowering the demand for face-to-face support.

A review of a number of OECD countries identified in what ways ICT was becoming integrated into career information and guidance systems (Watts, 2002). Many countries were found to use technology to support services. However, the level of ICT integration into the services varied; three models were identified. First, there was a supported model, where the user may see a careers guidance professional for a short time before and/or after using the system. This, for example, may include programmes designed to help users identify particular occupations they may be suited to after completing a set of questions. Second, there is the incorporated model where the user and the professional would use the system together as part of the intervention; for instance, labour market information on a careers website may be explored together as part of the intervention. Third, there is a progression model, where a system is used at a particular stage of the intervention process and is part of a sequence of events. For instance, ICT enabled skills assessments and profiling could form part of this process (as discussed in subsections 3.3.1 and 3.3.2). The models imply that a range of ICT tools could be employed to deliver services.

The implementation and application of ICTs can enhance access to career guidance services in a number of ways. There is wide range of research on how services can be enhanced by ICT and on how effectively this can be, and has been, achieved. Some research has shown that for delivery to be effective careers practitioners and professionals need the required skills and competences (many of which are a natural progression of those gained during training and their experience), together with the appropriate training and ICT infrastructures (Barnes and La Gro, 2009; Bimrose, Barnes and Attwell, 2010). Recent research has identified what ICT can be used to support careers information and guidance services, including: email; chat; newsgroups; websites; SMS (text messaging); telephone; software (i.e. CD-ROM and free-standing computer programs); and video-conferencing (see for example Closs and Miller, 1997; Barnes, La Gro and Watts, 2010; Watts and Offer, 2006). There has been no large scale data collection on how individuals are using ICT to access careers information and guidance; much of the work has been small scale, context specific and qualitative in nature.

There are a range of practical guides and checklists for using different methods of internet-based careers guidance (such as Ariadne, 2004; Offer, 2002; Madahar and Offer, 2004; Offer, 2004a, 2004b, 2004c; Sampson et al., 2003; Sampson, 1997). The speed at which ICT is developing, and understanding what is appropriate in terms of delivery and what is required in terms of training, is complex (Bimrose et al., 2010). An evaluation of the skills needs and training supply for careers guidance in the UK concluded that whilst there is acknowledgement that services will be increasingly delivered using ICT methods, the knowledge base of the professional workforce is

lacking (Cobbett et al., 2009). Adequate training, technical infrastructure and managerial/technical support are considered crucial to the effective delivery of services in the future (Bimrose et al., 2010). Some ICT initiatives aimed at developing career guidance professional skills and competences in collecting, sharing and disseminating LMI are presented in subsection 3.3.4. There is some research on the ICT competences of careers guidance professionals (see Barnes, 2008; Bimrose et al., 2010; Cobbett et al., 2009; Cogoi, 2005), but there is limited evidence on ICT developments aimed at improving career guidance professional ICT skills and competences (Silverii and Busi, 2009). Silverii and Busi (2009) undertook a two year project, called ICT Skills 2, developing the e-guidance competences of career guidance professionals. The project developed and piloted a training module across Europe aimed at: developing career guidance professional skills and competences in evaluating existing ICT sources; developing new attitudes and skills in using ICT for career guidance purposes; and enabling users to reflect on their practice and the role of ICT. The project outcomes included: a map of e-guidance competences; surveys on the national context of ICT use in guidance and recommendations for implementation of the new tools and training; an e-practitioner profile designed to be explored through an open source platform; an online tool for competences self-assessment and an e-portfolio (ibid p.64). The project concluded that the range of developed tools had been validated, and so could be adapted and used in different country contexts, and had been beneficial in raising ICT competence levels.

There is also much evidence on the positive role the internet can play in supporting careers guidance services (see Ariandne, 2004; Artess and Papadatou, 2010; Evangelista, 2003; Madahar and Offer, 2004; Offer, 2002; Palomba, 2009; Sampson et al., 2001). This can be by enabling access to information on the labour market (discussed in subsection 3.3.4) and supporting the development of career management skills (such as understanding the labour market, occupations and vacancies, educational opportunities and applying for jobs). The Amazing people e-programme is one example of how ICT is being used to enable access to career coaching resources to help individuals find employment (more detail is available in the good practice database). Web 2.0 applications, such as Twitter and Facebook, are also enabling new ways for delivery of careers guidance services (Barnes and La Gro, 2009; Bimrose et al., 2010; Hooley, et al., 2010; Vuorinen, 2009). The wide range of ICT tools that can be used to support services, together with the skills and competences required to use them, highlights the gap in current understanding of what comprises the effective use of ICT in careers information and guidance practice, together with how it may support employability.

A small-scale, mixed-methods research study was undertaken to explore the skills and competencies required by careers professionals to deliver internet-based careers guidance; and investigate young peoples' views on how they want technology to be used in the future to deliver these services (Bimrose et al., 2010). The fieldwork involved 46 young people and 17 careers professionals from the careers service, across six locations in England. Data were gathered using investigative frameworks developed from, and grounded in, the research literature. Research findings from this study suggested that increased use of internet-based services could be an effective method for delivering online careers services. This included the use of email, SMS and chat rooms. Social networking sites were not considered by the young people in this research as an acceptable way to contact career guidance professionals, but rather as a tool to deliver careers information such as work experience opportunities, further education courses and vacancy data. In terms of understanding careers, young people were found to use ICT to find information on jobs, salaries and to explore educational courses. Some internet resources used included CV writing; KUDOS; Jobs4U; UCAS; Unistats; job and work experience vacancies; and the Area Prospectus (a local site in which young people can explore education and training options for post-compulsory education). The research concluded that the way young people are able, or not, to access and use technology must shape any future extension of online services. Careers guidance professionals were found to believe that there was great potential in using ICT to extend the delivery of services to reach those young people unable to travel to service centres. ICT was not seen as a way to replace face-to-face services, which were considered vital to building relationships with the hard to

help or NEET groups. An assessment of ICT skills and competences found that careers guidance professionals were not confident in their use of ICT, particularly website development and design. However, skills around using ICT to communicate were high. Overall, the study contributed to understanding the ways in which internet-based services are currently integrated into careers practice in England, plus how young people would like to have internet-based services integrated into delivery, such as using ICT to providing easier, or alternative, access to career guidance professionals by email and SMS. Importantly, it also highlighted careers professionals' skill gaps in terms of ICT skills and confidence in the use of these services.

Research suggests that integrating technology in the provision and delivery of career information and guidance services has great potential to support the development of employability skills, but differentiated service provision based on age and context needs to be considered. For instance, younger age groups are more concerned with gathering information about possible careers, and how this might affect their choice of subjects at school. Older age groups are more likely to be concerned with the availability of courses, work experience or jobs. Other adults may be more concerned with local employment opportunities, and with funding for training to up-skill or retrain. The use of ICT in expanding the delivery of services and reaching the hard to help or NEETs was evidenced as having the greatest potential alongside the delivery of careers information. Research has shown the careers guidance professionals are well placed to delivery guidance and counselling services using ICT, but there may be training needs in terms of confidence and the design and development of web content. In all cases, careers professionals would need to be able to access up-to-date information (see subsection 3.3.4, below). There seems to be potential for more personalised internet careers materials to be delivered through the internet. Fundamental to these services is access to technology and the confidence and skills to use it.

3.3.4. The role of ICT in enabling access to labour market information for careers

Information on the labour market, education and training opportunities is a valuable resource for career guidance professionals and ICT is enabling access to it at an increasing rate. LMI has the potential to provide a robust foundation for individuals to make choices and decisions about their learning, work and career pathways. Over the past decade, there has been increasing emphasis on the need for high quality, robust and reliable LMI to be at the centre of impartial career guidance (Bimrose and Barnes, 2010; Enterprising Careers and IER, 2006; Careers Profession Task Force, 2010; UKCES, 2011a). Improving and enabling access to LMI is a strategic objective of the UK Commission for Employment and Skills in the UK as it will improve information, advice and guidance in supporting individuals into sustainable employment and progress in work (UKCES, 2011b). Career guidance professionals need access to information and intelligence on the current and future labour market and employment trends, expertise in understanding and interpreting that information, together with knowledge of their local labour market and employment opportunities. More comprehensive LMI coverage (such as data disaggregated to the local level) is also required to support careers services. This includes LMI on local employment trends, local future requirements plus local opportunities and vacancies.

The potential to use technology to interrogate a wide range of sources, judge the efficacy of different sources, integrate data from a range of sources and disseminate creatively in different forms for different audiences has not been fully realised (Bimrose et al., 2010). Technology is well developed to enable data to be made accessible and interrogated, but to date this has not been fully explored or exploited. ICT application is recognised as useful for accessing information, as well as an efficient method in which to expand services (Bimrose et al., 2011; Careers Profession Alliance, 2011; Careers Profession Task Force, 2010). Technology would also enable the collation and sharing of local data.

The Open and Linked Data initiative has gained momentum in recent years and many datasets, from across the world (including governmental, reference, geographic, media, scientific, and social data) have been published. Open and Linked Data, as well as complementary open data initiatives, are becoming significant contributors to the information landscape of the Web. More Open Data are

enabling the development of initiatives to make data more use-friendly. Some select ICT developments for career guidance services are underway in the UK, including:

- Web-based employer database (developed at part of the MATURE¹⁷ project by Pontydygsu) created information inputted by advisers in one regional service, information is displayed on a map and details local employer which the advisers have visited or contacted;
- the SALAMI project which linked together local LMI from Nomis, job profiles and locally available courses using the XCRI course repository to support learners with their career choices (Clark, 2011; Clark and Coolin, 2011); and
- a prototype careers database (funded by the UKCES, a non-departmental public body) designed to bring together and present data from national sources through a range of interfaces for those providing careers support and those seeking these services (Bimrose et al., 2012).

These are illustrative examples of how technology can be effectively used to support the collection of LMI and illustrates one way in which ICT is growing in importance for careers support services. It is hoped that the development of the careers database will enable private organisations to access data and create applications for the market. ICT application is recognised as useful for accessing LMI as well as an efficient method in which to expand services (Bimrose et al., 2011; Careers Profession Alliance, 2011; Careers Profession Task Force, 2010).

3.4. ICT enabling job search and recruitment and selection processes

This section sets out the role of ICT in enabling job search, recruitment and selection. First, by way of background, it sets out how ICT in general, and specific ICT developments, have changed the context for job search, recruitment and selection. Secondly, it sets out the role of ICT, particularly the internet, in enabling job search from a job seeker (i.e. potential employee) perspective. Thirdly, the focus shifts to the employer perspective and developments in e-recruitment (i.e. using ICT in recruitment to advertise/ search for applicants and/or notify potential applicants of job opportunities) and e-selection. Fourthly, the brokerage and other roles of labour market intermediaries, including public employment services in EU member states, in assisting both job seekers and employers are highlighted. A typology of labour market intermediaries is presented also.

3.4.1. The changing technological environment for job search, e-recruitment and e-selection

Traditionally job seekers and employers have used the local (and sometimes, depending on the nature of the post, the national) press and informal contacts as mechanisms to find/ fill jobs. Classic studies of job search highlight the role of informal networks embedded in everyday social interactions in job search (Granovetter, 1974), which in turn reinforced the predominantly local nature of job search and recruitment processes (Hanson and Pratt, 1991; 1992). Such informal methods and a localised job search process raise concerns about unequal access to job information and so unequal outcomes of the search process, because information circulating through social networks is biased socio-economically and geographically towards network members with similar experiences.

The internet, and ICT more generally, have served as conduits opening up the process of information exchange between job seekers and employers which lies at the heart of job search and recruitment processes (Barber, 2006). Over recent years the formal notification of job vacancies by employers has largely moved from print media to the internet and web-based services have become established which facilitate new forms of job search and application, and matching of workers with job opportunities. E-recruiting has evolved into a suite of services that employers can use for attracting and connecting with job candidates through electronic job posting, online job application forms and CV/resume search, applicant tracking and sorting systems, and contacting

¹⁷ See <http://mature-ip.eu/>

applicants (Nakamura et al., 2009: 21; Pin et al., 2001). Hence, In the light of these trends, there are dangers that existing inequalities in job search and recruitment may be magnified. However, the distinction between ICT-enabled recruitment and selection practices and more conventional approaches is not necessarily clear cut, as both types of practice may coexist alongside each other.

Technological developments are continuing to impact on job search and recruitment processes. For instance, as shown in Table 3.1, whereas Web 1.0 applications are associated with exchange of information between a job seeker and potential employer, Web 2.0 encourages sharing of information and ideas in relationship-based approaches involving employer and (potential) employee (Aurelie and Fallery, 2008). Key tools associated with Web 1.0 are careers websites, job boards and recruitment systems. These enable employers to advertise jobs more cheaply and job seekers to see a wider range of vacancies than formerly, but essentially they can be seen, at least in part, as representing the migration of some traditional offline recruitment channels, such as traditional newspaper adverts to the Web (Ettinger and Kijl, 2009; Pin et al., 2001). They also offer the prospect of better candidate management on the part of the employer. Tools associated with Web 2.0 allow readers to become actors through tools such as blogs, online social networks and virtual worlds. As such they can build up large scale weak tie relationships of the type expounded by Granovetter (1974) as being of key importance in job search (Ettinger and Kijl, 2009). They allow greater communication and more differentiation/ personalisation (see also Karla et al., 2008). It is important to reiterate that Web 1.0 and Web 2.0 tools are complementary; employers and job seekers may make use of both. Indeed, it has been suggested that hybrid Web 1.0 and Web 2.0 tools are emerging (Hansen, 2010). However, given the pace of change in technological change and employers' practices, which are influenced by cost issues and broader economic factors also, and a lack of comprehensive evidence of employers' recruitment and selection methods, it is difficult to make robust assessments of the incidence of use of Web 1.0 and Web 2.0 tools in e-recruitment and e-selection. Some insights are available from bespoke surveys: for example, an online survey administered in 2010 by McAfee (2010) across organisations of different sizes and from different sectors in seventeen countries worldwide, with a response rate of 19%, representing 1,055 respondents, found that 22% made use of Web 2.0 tools in human resources, especially recruitment. While this provides some insight into the scale of use, it is possible that given that this was an online survey, organisations making greatest use of ICT may be over-represented amongst respondents. Finally initiatives aimed at supporting the development of the skills necessary to take advantage of these technologies play an important role, particularly in helping citizens at risk of exclusion¹⁸.

¹⁸ 'Key competencies for all' (<http://www.keycompetences.eu>) and 'Valencia Ya' (<http://www.valencia.es/valenciaya>) can be seen as examples of such initiatives. For further details see also the good practice data base (Behle et al., 2012).

Table 3.1 Comparison of Web 1.0 and Web 2.0 in job search and recruitment

Web 1.0	Web 2.0
Transactional recruitment (one-off, short-term) – directed to the task of filling a specific vacancy	Relationship recruitment (applicant relationship management, long term) – geared towards developing the e-presence of the employer in the minds of (potential) applicants over the longer term
Large job boards – for employers to post vacancies to a larger audience than would be reached by other means	Development of new services – including online social networks such as LinkedIn to find future employees and contact applicants who may be open to a job offer
Email alerts ('push mail' service) – notifying pre-determined recipients of opportunities/ developments on a sporadic basis	RSS feeds, real-time information – allowing employers to automatically place updated information on a search engine of job offers
Classic communication (advertisement) – information is restricted to the specific vacancy that the employer seeks to fill	Development of employer's reputation and branding – employers may use Web 2.0 tools to enhance their organisational image and help to present their organisation as an 'employer of choice' for applicants
Centralisation of recruitment management – generally (but not exclusively) associated with organisational centralisation in a HR department	Offers scope for contradictory trends: (1) decentralisation of recruitment responsibilities to different parts of the organisation (in accordance with specific needs), or (2) externalisation towards specialist recruitment agencies specialising in developing an ongoing relationship for an organisation
Basic job advert (text)	Rich media advertisement (audio, video, animation) – providing more information about what a job is like
Active recruiters (job advertising) – used by recruiters who are actively seeking applicants to respond to a specific vacancy	Proactive recruiters (social networks, blogs) – where employers are proactive in searching for specific recruits, rather than merely waiting for responses
Active applicants (CV posting, reply to adverts) – these are individuals who are actively seeking work (e.g. individuals may need to meet requirements of active job search in order to receive unemployment benefits)	Passive or proactive applicants (open to market opportunities) – these are individuals who may make use of Web 2.0 tools to browse available opportunities on an occasional basis and/or who may apply for a new post if an attractive opportunity is presented or if an employer approaches them, but who are not searching for a job intensively

Source: adapted and extended from Table 4 in Aurelie and Fallery (2008)

Industry research suggests that there has been a growth in applications posted to social media but that while employers might use social media for marketing and branding, most see online job boards as the more effective means of recruiting (i.e. Web 1.0 rather than Web 2.0 applications).¹⁹ Further technological developments may be expected going forward. One trend identified is greater

¹⁹ <http://www.recruitmentgenius.com/buzz/Research-Shows-Surge-In-Social-Media-Job-Advert-Applications-461>

e-streamlining of the recruitment process²⁰ (i.e. using ICT to deal automatically with the more labour-intensive aspects of recruitment and sifting of applicants, to enable employers to spend more time on cultivating applicants/ employees who are likely to be of longer-term importance to their organisation). There is also likely to be greater incorporation of mobile apps into recruitment to accommodate the use of smart phones and tablets in job search.

3.4.2. ICT and job search: the job seeker perspective

The internet has created new opportunities for job seekers to access more easily and more cheaply a wider range of vacancies than was possible previously. Traditionally, in the pre internet era, job search was conducted at the local scale (as outlined above) and for some more specialised roles at regional or national scale. Using the internet it is possible to conduct job search at all geographical scales, including internationally. So, for example, with the aim of facilitating international mobility, the EURES internet portal²¹ has been designed to advertise vacancies across the EU, with the aim of facilitating international mobility. It is supported by the European Commission and links the public employment services (PES) across the European Economic Area (EEA). All vacancies from EU and EEA national public employment services are accessible on the EURES portal in 25 European languages. Via the EURES portal job seekers can search electronically for vacancies in particular occupations or via job titles or skills. They can also post their CVs online.

Potentially, this easier access allows individuals to browse vacancies more readily; indeed, workers can ‘flirt’ with new options by checking their salaries and career opportunities vis-à-vis associated vacancies.²² Similarly, the facility to send applications electronically makes it easier to send off applications, including untailed applications distributed on a scattergun basis. At the same time, ICT makes it easier to conduct research about companies/ organisations to which job seekers are sending their applications (as outlined in previous sections) and to tailor applications more specifically. This is something that job seekers need to be aware of (as outlined in subsection 3.4.4).

Most of the earliest research on use of the internet in job search was conducted in the USA using data from the Current Population Survey (CPS) and its special supplements on ‘Use of the internet’ (Kuhn and Skuterud, 2004; Fountain, 2005; Stevenson, 2009; Kuhn and Mansour, 2011). The CPS is a monthly survey conducted in the USA for the Bureau of Labor Statistics. Every month, the survey asks unemployed people questions regarding job search activities.

As might be expected, analyses show increasing use of the internet for job search over time. In this context, an underlying theme from studies using the CPS data from the US is changing returns to internet job search activity. Some early studies pointed to early adopters of the internet reaping particular benefits. Focusing on a sample of unemployed job seekers in 1997 and 2000, Fountain (2005) found that in the earlier period internet use more than doubled the probability of finding a job in comparison with not using the internet, while in the later period this greater probability was no longer apparent. In the intervening time the number of job searchers using the internet had increased substantially and the subsequent lower returns from internet use were explained in terms of internet users no longer being a small and select segment of the unemployed population. Hence, employers could no longer make unduly positive inferences about an individual’s skills and productivity from the fact that they had applied for a job online. Indeed, Kuhn and Skuterud (2004) suggested that employers might interpret use of the internet by job seekers in negative terms; indicating that those who applied online did so because of their poor informal contacts or social networks, or because there was some information that they wanted to hide from an employer. While internet enabled job search and ICT-enabled applications have increased since the time of

²⁰ <http://www.recruitmentgenius.com/buzz/2012-Will-See-Greater-E-Streamlining-Of-Recruitment-Process-393>

²¹ <http://ec.europa.eu/eures/home.jsp?lang=en>

²² <http://www.recruitmentgenius.com/buzz/Online-Recruitment-Options-Creating-Generation-Of--Job-Flirts--466>

the study, it does highlight an important point that e-applicants may seem 'remote' and that employers may look positively on applicants, at least for some vacancies, who call in with a CV or distinguish themselves/ show initiative in some non-standard way.

Another focus of analyses of CPS data on use of internet for job search is on unemployment duration and re-employment rates. Using data for the period 1998-2000 and focusing on a group of unemployed workers, Kuhn and Skuterud (2004) found that two-thirds of unemployed internet job seekers were re-employed after a year, compared with half of non-internet job seekers. This suggests a positive outcome from internet job search. However, further analyses suggested that those who used the internet to look for jobs had characteristics typically associated with being re-employed faster. When such characteristics were held constant the positive effect of internet job search was no longer apparent. Kuhn and Mansour (2011) replicated the Kuhn and Skuterud (2004) analysis with 2008-2009 data and found that internet job search was effective in reducing unemployment durations.

Other studies have focused on the impact of internet job search on the quality of the match between workers and firms. Adopting match duration as a proxy for match quality, Hadass (2003) found that internet recruits tended to have shorter employment durations than employee-referral recruits. Similarly, Nakamura et al. (2009) reported that internet recruits were significantly less likely to retain their jobs than employee-referral recruits. This suggests a need for more studies monitoring the duration, types and quality of jobs individuals find when searching on the internet.

Further studies have focused on the wider impact of internet use on job search practices more generally. A comparison of all job search methods used by unemployed job seekers who made use of the internet for job search with those who did not, revealed that the former were more likely to use a range of different job search methods than the latter (Kuhn and Skuterud, 2000). The analyses revealed that internet job search was associated with more intensive job search overall, since internet use supplemented other job search methods; (just as a study focusing on organisations' use of e-recruitment media between 2002 and 2006 in the UK showed that such techniques offered a supplement to, rather than a replacement for, traditional methods [Parry and Tyson, 2008]). Following a group of employed people, Stevenson (2009) also underscored the link between internet job search and other job search methods, indicating a positive relation between internet job search and search intensity.

On a related theme, the CPS has been used also to investigate use of the internet for job search and discouragement in the job search process. Based on econometric analysis of data for 2009 and 2003, Ford (2011a) concluded that internet-based job search decreased the probability of discouragement in job search, so helping to maintain active job search. Broadband users, whether using the internet from home or from shared public facilities for job search, were about half as likely to give up searching for work because of discouragement than those who did not use the internet in job search. This is an important finding for policy at a time of high unemployment. The same analysis also highlighted that lower-income households were more likely to be reliant on mobile broadband, while further work showed that mobile use reduces labour market discouragement even more than broadband use at home (Ford, 2011b). This highlights the potential importance of such broadband coverage for efficient functioning of the labour market.

Using Labour Force Survey data from Great Britain on use of the internet in job search over the period from 2006 to 2009 (Green et al. 2011), multivariate analysis has revealed age and highest qualification as key factors affecting individuals' use of the internet for job search. The analysis revealed a significant and consistent decreasing trend in the use of the internet to look for work as people age, with the youngest age groups (i.e. those aged under 25 years) being most likely to use the internet in their search for work and the oldest age groups being least likely to do so. Moreover, these differentials by age were more marked in 2009 than in 2006. There was a very significant positive relationship between education (as measured by highest qualification) and use of the internet in job search, with those individuals with degrees being most likely to use the internet in their job search. It should be borne in mind, however, that 'highest qualification' subsumes

elements of ability and experience of using the internet generally, not just specifically for job search, affordability of using the internet, and how different kinds of jobs are advertised. Some significant urban and regional differences were revealed also, indicating that job seekers from less prosperous regions and those outside major metropolitan areas are least likely to make use of the internet for job search. To some extent this might reflect spatial differences in sectoral and occupational structures and prevalence of advertising vacancies electronically. It might also be the case that the range of job search information sources is much larger in metropolitan areas than in smaller spatial labour markets, so internet searching may be especially effective in such a context. There was no significant difference between men and women in the use of the internet for job search, and no particularly significant variations in the use of the internet for job search by ethnic group were identified once other factors were controlled for. There was a significant and consistent increasing trend among job seekers in the use of the internet over time from 2006 to 2009, emphasising the increasing importance of use of the internet in job search. In 2009 around four in five job seekers in Great Britain were making use of the internet in job search, and since 2009 this proportion is likely to have increased further.

As in the US studies, analysis of data from Great Britain study shows that job seekers who use the internet are more likely to use other job search methods than job seekers who did not use the internet (Green, Li et al., 2012). The strongest positive association is between internet job search and studying situations vacant columns in newspapers or journals. Use of the internet also has complementarities with advertising in newspapers or journals and answering adverts in newspapers and journals. This illustrates how use of the internet in job search complements the print media. Conversely, use of the internet for job search appears to substitute to some extent for visiting the Jobcentre (i.e. the public employment service), applying directly to employers, and asking friends, relatives, colleagues or trade unions about jobs. These are the traditional job search methods that emphasise direct contact with intermediaries, employers or individuals in the job seeker's social network, which have been associated in the literature (outlined above) with an enhanced 'fit' between employee and employer. This suggests that use of the internet may be associated with a more indirect and less personal approach to job search, which possibly may result in inferior matches, especially where the job seeker applies indiscriminately to large numbers of job opportunities. Hence, it is salient to note that job seekers are often encouraged by advisers to use a range of job search methods, and that in a tough economic climate face-to-face networking is more important than ever (Hansen, 2010).

In summary, these US and Great Britain studies point unequivocally to increased use of the internet in job search over time. In the early years of internet adoption there were contrasting views as to whether on internet job search was a positive feature demonstrating the initiative of the applicant, or whether it had the negative connotation of suggesting that an applicant had poor informal contacts and/or had something to hide. The effectiveness of internet job search has changed over time, but what does seem clear is that those using the internet in job search tend to use more other methods too, which might imply a greater intensity of job search. Informal contacts can still play an important role in individuals finding employment (see also the discussion from the employer perspective in the following subsection). Use of complementary methods in searching for the same job means that it is difficult to evaluate the effectiveness of the internet in finding a job vis-à-vis other job search channels. Analyses suggest that individuals referred to employers by existing employees have a better 'fit'. The findings from Great Britain indicate that older job seekers and those with lower education levels most likely to 'lose out' in terms of accessing employment opportunities via the internet. However, the studies also suggest that it is important for job seekers to make use of a variety of job search methods, not solely those that are ICT-enabled, in order to enhance their prospects of finding a job.

According to data from the Eurostat Community Survey on ICT usage in households and by individuals 2011, 46% of unemployed individuals used the internet to look for a job or submit a job application (European Commission, 2012). The same data source revealed that 17% of all individuals in the EU27 had used the internet to look for a job or submit a job application; with the

proportions by country ranging from 7% in the Czech Republic and Cyprus, 9% in Romania and 11% in Portugal and Poland to 26% Sweden and the UK and 27% in Denmark, Latvia and Finland.

As highlighted above, there are concerns that inequalities in use of and access to the internet and use of other ICTs will intensify difficulties experienced by disadvantaged groups in accessing vacancies and associated support and benefit services, especially as the amount of information and transactions conducted online increases, with public employment services also placing greater emphasis on e-services (as outlined in section 3.4.4). Those individuals who make use of the internet for job search, but who do not have easy access to the internet (for example at home) are likely to lose out as ICT enabled recruitment allows employers to make recruitment decisions more speedily (see section 3.4.3). Those not currently using the internet in the job search process are likely to be even more disadvantaged, as they miss out on new vacancies advertised only online. These individuals are themselves diverse and are likely to require different kinds of support, as revealed by a typology developed by Adam et al. (2011) in a study of claimants of out-of-work benefits in Great Britain, but which is likely to be of wider salience for other countries also:

- *Unaware* - mainly recently unemployed claimants, with some experience of using the internet – their key barrier was a lack of awareness;
- *Unready* - longer term unemployed with little or no internet experience. Their key barriers were a lack of awareness, little or no internet access, minimal IT skills, and a lack of confidence. Access to the internet coupled with tailored computer and internet training and face-to-face support would enable this group to use ICT to enable job search use digital services more generally;
- *Uninterested* - long-term unemployed, those nearing state pension age, and those with health problems. They generally had minimal internet experience, and no interest in learning. Persuasion or compulsion, coupled with training and support would be required for this group to make use of the internet for job search and associated support services.
- *Unable* - generally these were long-term out-of-work benefit claimants for whom work was a very distant goal. They had multiple barriers, including poor literacy and English language skills, and health problems limiting mobility. This group would need persuasion about the value of the internet, alongside long-term, personalised support to enable them to use ICT.

This typology suggests that labour market intermediaries need to segment the individuals they are seeking to support and target their assistance accordingly (see section 3.4.4 for further discussion of the role of such intermediaries).

3.4.3. The role of ICT in recruitment and selection: the employer perspective

To gain as full as possible a picture of the role of ICT in enhancing job search, it is important to gain insights into recruiters' perspectives on, and rationale for, using ICT in recruitment and selection. In general, recruitment and selection has been relatively neglected in labour market studies (Keep and James, 2010). Likewise, a recent review of the e-recruiting literature concluded that recruiters' perspectives were "terra incognita" (Wolfswinkel et al., 2010: 10). Moreover, because this is a fast-moving area, it is difficult to gain a clear insight into how many employers are using ICT in recruitment and selection, and for which jobs.²³ It is not clear how many jobs are posted on websites, or how many 'cross postings' of jobs between websites exist. Nor is it absolutely clear what kinds of jobs are advertised electronically and which area not; (for example, some less skilled

²³ Industry surveys undertaken by recruiters and software organisations are likely to provide only a partial picture, and are likely to exaggerate the overall role of ICT in recruitment and selection. For instance, a survey of 73 leading employers in the USA showed that in 2005 half of new hires were from the internet, with employer websites being the single most important internet source (Cober and Brown, 2006).

or skilled manual jobs may be less likely to be posted on the internet than those for ICT professionals). Advertising methods used are likely to vary over time and space, in accordance with macro-economic circumstances and relative ease/difficulty experienced in filling vacancies, as well as local labour market and sectoral profiles and norms.

One of the few studies to investigate employers' online recruitment and screening practices is a US study analysing job vacancies posted on the job board Monster.com between 2004 and 2006 (Brencic and Norris, 2012). The analyses find that employers are most likely to use online search and screening tools when they provide on-the-job training and when vacancies require higher levels of education. Such employers are more likely to use online search tools provided by Monster.com, as are employers who use the job board regularly.

Similarly, it is not clear how many employers make positive use of information posted on social and professional networking sites by applicants (e.g. checking applicants' LinkedIn profiles to see how they use public networking sites, what interests and news feeds they use, and what connections they may already have within the organization). In an article in the New York Times in 2009, Wortham (2009) reported that a survey by Career Builder of 2,667 managers in the USA²⁴ had found that 45% of managers and human resources staff used social networks to screen job applicants – and that this proportion had doubled over the course of a year (and is likely to have increased further since). Facebook, LinkedIn and MySpace were the most common sites examined by employers; (job seekers also use these sites to make contacts within organisations).

An analysis of the importance of e-recruiting for German companies (Karla et al., 2008) found that in 2006 large companies posted 86% of their job postings at their career site and 60% at online job exchanges, while only 27% posted advertisements in the print media. In the same year, approximately two thirds of all jobs filled were generated by job postings at companies' career sites or at online job exchanges. 2006 was also the first year when large companies in Germany received more electronic than paper-based applications.

A recent case study of Tesco, the largest food retailer in the UK, concluded that use of the internet in recruitment and selection resulted in cost savings and was good for the company's image (Gopalia, 2011). The company's own website was used in most instances, but external websites were used in the case of hard-to-fill vacancies for occupations such as bakers and pharmacists). Corroborating this, the Chartered Institute of Personnel and Development's 'CIPD Annual Survey Report 2009 on 'Recruitment, retention and turnover' identified attracting candidates through the employing organisation's own website as the most commonly used method for attracting recruits in the UK (CIPD, 2009).

The internet enables employers to change what they demand from applicants. With e-recruitment employers can be very prescriptive in the way in which they ask candidates to provide information. For example, through an internet-based multiple choice questionnaire (i.e. use of 'closed questions'), often designed to gather personality information to assess the applicant's 'fit' with the position applied for and with the employer more generally, candidates may be scored as they proceed through the questionnaire. Those who do not meet the required threshold may, in some instances, not be routed to proceed to 'open questions' inviting candidates to provide examples of their work experience and skills relevant to the job for which they are applying. In this way, the volume of candidates invited to complete the full application process is reduced, but importantly, non-conventional candidates may be disadvantaged, even if they are capable of doing the job in question. Some employers may even use ICT tools to assess the online influence of applicants, and eliminate applicants whose score is too low.²⁵

²⁴ http://www.careerbuilder.com/share/aboutus/pressreleasesdetail.aspx?id=pr519&sd=8/19/2009&ed=12/31/2009&siteid=cbpr&sc_cmp1=cb_pr519_&cbRecursionCnt=1&cbsid=8412d5b32ef54ce6854a035cf3a59d12-303995843-x3-6.

²⁵ See http://www.wired.com/epicenter/2012/04/ff_klout/ for details of how a Klout score can measure an individual's online influence.

Through electronic screening of questionnaires accessed via the internet, virtual work simulations (which attempt to identify attributes that are difficult to assess from CVs) and automated scoring systems (see Anders, 2011), employers can screen and select applicants much more quickly than by adopting more traditional 'good practice' methods where selection panel members may score applications manually against 'person specification' criteria and then meet to compare scores and draw up a short list of candidates for interview. The rationale for using such automated software for large companies is often one of 'cost saving' – in terms of time spent on the selection process. The use of such e-selection systems is likely to be greater for large employers than for smaller ones, given the set up costs and the volume of vacancies they are dealing with.

Some of the key advantages and also disadvantages of e-recruitment (i.e. using ICT in recruitment to advertise/ search for applicants and/or notify potential applicants of job opportunities) and e-selection (i.e. using ICT to assist in the selection process) are set out in Table 3.2. One of the key issues highlighted is the trade-off between the quantity and quality of applicants yielded by e-recruitment and e-selection. This raises issues of filtering for employers who receive more applications (and more unqualified applicants [see Dineen et al., 2007; Verhoeven and Williams, 2008; Maurer and Cook, 2011]) than they can cope with, highlighted by the rise in 'job flirting' outlined in the previous section. In such cases the expected economic efficiencies of using websites is compromised. As noted in the previous paragraph, some employers may amend their selection criteria in order to overcome this problem. Others may provide online information and feedback that allows job seekers to assess their level of 'fit' for the vacancies in question in order to reduce attractions amongst the poorest fitting potential applicants (Dineen et al., 2007), although there is a potential disadvantage that such strategies may decrease the applicant base by leading individuals to mistakenly believe that they are not suitable for a role when in fact they are. It is important to conduct research among actual job seekers to verify this alongside work on the use of e-recruitment by employers, but currently there is a lack of evidence here (Maurer and Cook, 2011). However, in other cases, and perversely in the light of excess applications and an associated exacerbation of adverse selection in a harsh economic environment, some employers may choose to adjust their recruitment practices and dispense with any ICT-enabled recruitment, relying instead on a 'friends and family' policy of informal referrals involving asking existing employees to bring vacancies to the attention of their acquaintances, as highlighted in pre-internet studies of job search (Autor, 2001).

Table 3.2: Advantages and disadvantages of e-recruitment and e-selection: employers' perspectives

Advantages	Disadvantages
Larger geographical reach (than traditional methods - and so)	Large numbers of (unsuitable) applicants (i.e. quality / quantity trade-off)
Larger audience (than traditional methods)	Time consuming sifting of application forms
24/7 access/ availability	High cost (for small companies)
Quicker turnaround – so reduction in time to hire	Name recognition required (may be difficult for small and/or new companies)
Relatively cheap – cost savings on recruitment and personnel costs	Use of e-selection may discriminate against suitable candidates in a more diverse talent pool (e.g. graduates from non-traditional backgrounds ²⁶)
No space constraints in terms of amount of information provided – can inform in more creative ways (the via traditional methods)	Some concern about authenticity when candidate tests are conducted online
e-application forms with a structured format allow use of screening software – and so enable employers to deal with larger volumes of applicants	Personal touch could be lost
Access passive job seekers	Excludes applicants without internet access / skills
Target candidates/ niche markets	
Positive impact on corporate image and reputation; reinforcing brand	

Source: adapted from Table 1 in Verhoeven and Williams (2008) and Barber (2006)

In summary, rather less is known about how employers use e-recruitment and e-selection than about how ICT is used by job seekers. What is clear is that practice is changing and that it varies between employers. ICT-enabled recruitment and selection may have advantages for employers in terms of cost, convenience, ease of communication, flexibility in terms of content and ease of making changes to processes and practices. This may enhance the disadvantage of 'at risk' groups.

3.4.4. The role of labour market intermediaries

While use of the internet and other ICTs offers some advantages to job seekers and employers, it is necessary for them to develop skills to deal with an increased amount of information and make effective use of it. Labour market intermediaries can play an important role here in helping individuals to navigate their way around different websites, etc., while at the same assisting employers with recruitment and selection (as outlined in Table 3.3). For example, public and private sector welfare-to-work providers and information, careers advice and guidance professionals (see section 3.3) might advise individuals about internet-based job search techniques and help match and direct them to suitable vacancies, while private sector employment agencies and public employment services might help employers by providing e-recruitment and e-screening (i.e. ensuring that candidates meet the necessary legal and qualifications criteria to be employed) services. Although playing labour market intermediary roles, trades unions and voluntary organisations tend not to have a direct role in recruitment and selection, albeit they may have an indirect influence.²⁷ It is clear that the services provided by the different intermediaries overlap.

²⁶ This includes a high proportion of black people in the UK (Connor et al., 2001).

²⁷ They may play an important role in promoting use of ICT in learning, training and staff development more generally.

Table 3.3: Selected labour market intermediaries playing a key role in recruitment and selection

<i>Intermediary type</i>	<i>Services to individuals</i>	<i>Services to employers</i>
Careers advisers and guidance professionals	Main role is to advise on opportunities and direct to information sources (including those on-line) to find out more	May seek information from employers, but unlikely to offer advice
Private sector employment agencies	Provide job matching services to individuals – often through sophisticated use of ICT	May provide a range of services to employers – including vacancy advertising, e-recruitment, e-screening, e-selection and more general legal advice; may advise on use of Web 2.0 tools for branding
Public employment services	Range of services to individuals – including eligibility for benefits, advice on job search, job-matching services, monitoring of job search, etc	Services advertising vacancies on behalf of employers; may provide pre-employability training, screening and selection services for employers
Private sector welfare-to-work providers	Intensive support – including face-to-face with most disadvantaged groups; use ICT for monitoring purposes and to match individuals to vacancies	Will contact employers for access to vacancies; and will sometimes provide follow-up support (as necessary) to new recruits in order to help sustain their employment
Trades unions	May advise workers at risk of losing their jobs to seek out opportunities elsewhere and to engage in learning to enhance their employability	May liaise with employers regarding recruitment channels
Voluntary organisations	May provide advice on different recruitment channels used by employers	May provide advice on recruitment and selection with regard to specific equalities groups/ specialist issues
Educational institutions	May provide advice to individuals on how and where to apply for jobs	May provide access to candidates on particular (relevant) courses

Public employment services are a particularly important category of labour market intermediaries. As outlined in Table 3.3, they provide a range of online services, including registration (for out-of-work benefits), vacancies advertisement, job search assistance and monitoring, automatic profiling of jobseekers' profiles with jobs and communication with job seekers by social media. In the context of budgetary stringency, public employment services are striving to deliver services efficiently, while also providing greater personalisation of services to individuals. In the light of a strategy towards e-service provision (for both routine and complex functions), often this means directing those individuals most able to help themselves to e-services, while reserving face-to-face delivery of services for those who are most disadvantaged in the labour market. Increasingly, monitoring and support functions of public employment services involve automatic vacancy matching (bringing together details of vacancies with individual job seekers' profiles), use of e-workbooks to monitor the actions and progress of individual job seekers, and use of social media for communication purposes.²⁸ Public employment services also provide services to employers, in terms of preparing and pre-selection of candidates for specific vacancies. Most public employment

²⁸ <http://ec.europa.eu/social/main.jsp?langId=en&catId=89&newsId=1042&furtherNews=yes>

services are working towards increasing the proportion of employers they work with, with specialist staff often targeting employers (especially large employers who can offer most vacancies) in particular sectors.

While labour market intermediaries might be involved in teaching basic ICT skills and using the internet, they also have a role to play in strategic digital skills development in handling large quantities of information required for successful job search. They also have a role in advising job seekers how to best present themselves and their skills in an ICT-enabled e-recruitment and e-selection market place. They need to advise individuals on how to manage and update their public profiles on the Web and remove any 'digital dirt' (Lehmann, 2010), given that the information they contain (whether directly work-related or not) may be used in selection decisions. They also need to highlight the importance of speed of responsiveness to job vacancies which operates on faster turnaround times with greater use of e-recruitment and e-selection practices.

Less directly, but nonetheless importantly, ICT professionals and others also play an important role in designing websites. A field study of 1,360 applicants to a multinational financial services organisation showed that perceived efficiency and user-friendliness of websites were the most important determinants of user satisfaction (Sylva and Mol, 2009). In essence, ICTs have a crucial role to play in enhancing the functioning of labour markets (European Commission, 2012).

3.5. ICT enabling new ways of working

This report focuses on how ICT affects employability, but it is also argued that ICT plays an important role in shaping the way jobs are undertaken and the work opportunities open to individuals. The implementation of ICT has revolutionised the workplace enabling new and innovative ways of communicating, searching, sharing, storing, creating, processing and presenting information and knowledge (Barnes, 2012). This has prompted shifts in workplace organisation and transformations in organisational cultures, structures and forms (see for example Lai and Burchell, 2008; Leonardi, 2007; Ritchie and Brindley, 2005; Valcour and Hunter, 2005; Zammuto et al., 2007). As a consequence, ICT has enabled new ways of working, including flexible working arrangements and 'teleworking', which has enabled those who have difficulties in accessing the labour market (such as health and mobility issues, those with caring responsibilities, those wishing to study alongside work, etc.) to undertake employment/ enhance their employability.²⁹

3.5.1. ICT enabling flexible working

Flexible working arrangements can be described as any working pattern adapted to meet the needs of the individual employee (such as meeting the demands of work and family) or employer (such as operating in an increasingly competitive market). These types of working arrangements can be seen to benefit employees, employers and the economy. These can be interpreted and implemented differently, but can include:

- Annualised hours – an employee's hours are worked over a year through set shifts;
- Compressed hours – an employee works agreed hours over fewer days;
- Flexi-time – an employee is able to choose when to work, but probably adhering to standard core hours;
- Homeworking – an employee is able to working from home; and

²⁹ For an example of how 'know how' in the role of ICT can facilitate new ways of 'smart working', which may have advantages for workers and employers, and also help 'at risk' groups and those in some locations with restricted local employment opportunities (e.g. some rural areas) enter the labour market, see the work of the Smart Work Association of Estonia (<http://www.smartwork.ee/en/smart-work>) detailed in the good practice database. A further initiative, Fit Fast track to IT (see Behle et al., 2012), promotes an inclusive Smart Economy by creating a fast track to marketable technical ICT skills for those at risk of unemployment. It is a key industry skills development initiative facilitating collaboration with government, education and training providers and disadvantaged communities to enable greater access to employment for marginalised job seekers.

- Job-sharing – two or more employees share a job designed for one person;
- Part-time working;
- Staggered hours – employees start and finish at different times³⁰.

ICT (such as the internet, email, mobile technologies, file sharing, web-conferencing and company intranets) have been argued to be key to facilitating these working arrangements, which have become common practice in the labour market. For instance, in the UK, the 2003 Employment Act placed a duty on employers to consider requests from parents of young and disabled children for flexible working arrangements. Similar legislation has been put into place across Europe, the US and Australia. Focusing on selected recent research, to take account of new legislation and technological advancements, flexible working patterns have been argued to be beneficial to older people (Loretto et al., 2007) and parents (Burnett et al., 2011; Carlson et al., 2010; Gregory and Milner, 2011), but benefits are mixed for women (Carlson et al., 2010; Crompton and Lyonette, 2011; Skinner and Pocock, 2011).

In a survey of 607 full-time employees in the US, research by Carlson et al. (2010) found that flexible working practices did enrich performance and satisfaction in the work and family domains for both men and women. It was noted, however, that flexibility played a stronger role for women. The benefits for women were also found significant in Australia in research examining flexibility and work-life interference (Skinner and Pocock, 2011). Recent research by Burnett et al. (2011) on the perceptions of flexible working practices of Western, employed, white-collar, middle-class fathers noted tensions between the traditional ideas of working, a culture of long hours, managing pressures of professional work and modern perceptions of fatherhood. Stamm and Buddeberg-Fischer (2011) also found traditional gender roles applied for physicians in Switzerland in those households with children. A survey of 414 physicians (214 of whom were female) investigated how physicians and their partners managed their careers and private lives. It found evidence that women were more likely to adopt flexible working practices (such as reduced hours), but that this had a detrimental impact on their careers (Crompton and Lyonette, 2011; Stamm and Buddeberg-Fischer, 2011). Mixed-methods research undertaken in France and UK by Gregory and Milner (2011) also found similar tensions for working fathers, but suggested that they extensively used informal flexible working practices were available. Some of the concerns of flexible working suggest, however, that the work-life domains can become blurred, particularly with the advancement of work extending technologies, as will be discussed later.

ICT has enabled fast communication and easy access to information and company data and thereby facilitating flexible working practices. Research has shown that through the use of technology and with the support of organisations, employees are able to become more flexible and autonomous in their work and where it is undertaken (Barnes, 2012; Forster, 2000; Orlikowski et al., 1995). This has been found to have both positive (increasing work efficiency, job satisfaction, work-life balance) and negative effects (isolation and resentment, lack of interaction and team-working) (Barnes, 2012; Chesley, 2010; Marks and Huzzard, 2010; Morganson et al., 2010). The online survey conducted by Morganson et al. (2010) of 578 employees in the US reported that although both office-based workers and ‘satellite’ workers had high levels of work-life balance and job satisfaction, office-based workers reported higher levels plus the highest levels of workplace inclusion. In the UK, research evidence on technology enabling flexible working practices have been tempered suggesting that organisation structures, capability and managerial support is required for successful implementation of technology to support these practices (Barnes, 2012; Morgan, 2004; Wynarczyk, 2005).

3.5.2. The role of ‘teleworking’

‘Teleworking’ (or ‘remote’ working) can be defined as working at a distance from colleagues or employer that is facilitated by communication technology (Telework Association, 2012). Article 2 of

³⁰ See http://www.direct.gov.uk/en/employment/employees/flexibleworking/dg_10029491.

the European Framework Agreement on Telework of 2002 defines 'telework' as "Telework is a form of organising and/or performing work, using information technology, in the context of an employment contract/ relationship, where work, which could also be performed at the employer's premises, is carried out away from those premises on a regular basis." (Eurofound, 2010)

Moreover, it was indicated that a "teleworker is a person who performs telework" and that a "characteristic feature of telework is the use of computers and telecommunications to change the accepted location of work" (Eurofound, 2007). This is relevant since technology will continue to be a facilitating factor for performing work outside the employer's premises.

Teleworking can be seen as a flexible working practice among others (e.g., flexitime, job-sharing, part-time working) adopted by employees at various degrees (CIPD, 2011). Eurofund estimated around 4.5 million individuals were 'employed in telework' in the European Union in 2007 and indicated an increasing trend in the number of employees adopting teleworking practices (Eurofound, 2007).

Teleworking represents the 'geographical decentralisation' of work (Burris, 1998) and means that work is now an activity that is not necessarily attached to a particular space. Although concerns for the environmental impact of commuting and employers' efforts to reduce costs are also important drivers in the increase in teleworking, ICT also plays a prominent role. In the UK, the number of people working from home at least one day per week increased from just under 3 million to 4.3 million between 1997 and 2010, representing an increase in proportion from 11.3 to 15.3% (Felstead, 2012). Of these teleworking individuals, 33.1% mentioned that they relied on ICT (telephone and computer) to work from home in 1997 and this proportion rose to 58.7% in 2010. This suggests that ICT plays an important role in teleworking but is not always indispensable for this practice.

Back in 2002, the EU social partners agreed and signed a framework agreement that views telework "as a way for employers (both in the private and public sectors) to modernise work organisation, and a means for workers to improve their work-life balance and achieve greater autonomy in the workplace" (Eurofound, 2007). Eurofund also reports a wide adoption of initiatives and some changes in legislation across European countries in support of telework. It has been argued that teleworking benefits individuals, businesses, the economy, society and the environment (Telework Association, 2012). However, evidence of this, and in particular of who teleworks, for what reasons and related outcomes has been described as elusive (Bailey and Kurland, 2002).

In a literature review of telework, Bailey and Kurland (2002) found that there is a lack of evidence supporting the two main suspected motivations for teleworking: transportation-related factors and balancing family and work, especially for women with small children. From the employer perspective, the authors also suggest that managers' "reluctance plays a role in predicting employers' adoption of telework" (p. 389). Their review also found a lack of clear evidence in increased general job satisfaction for teleworkers in spite of the evidence indicating satisfaction with specific aspects of such arrangements. As the authors put it, the "literature lacks support for claims of higher satisfaction among teleworkers" (p. 389). Bailey and Kurland's main contribution seems to be their attempt to bring the question of *how* do people telework to the fore. For instance, they highlight that the frequency with which individuals telework may be associated with the negative effects of being away from the office (such as lack of visibility). Besides this, the authors suggest a shift of focus to the *practice* of telework rather than on individual teleworkers and call for theory building efforts on this topic.

Illegems and Verbeke (2004) investigated long-term effects of teleworking on organisations' human resources such as an impact on attracting, retaining and motivating employees. To this end, the authors adopted a perspective that focused on how telework can impact on employee's job satisfaction and hence affect the stability of an organisations' human capital resource-base. They conducted two surveys, one involving 83 managers from organisations based in Brussels, and another with 261 employees from 16 of these organisations. From a managerial perspective, and

focusing on adopters and non-adopters teleworking practices, the results indicated similar views in relation to the positive impacts of telework. However, the results indicated that managers' views on negative impacts were qualitatively different and difficult to quantify since they referred to different parameters. The authors concluded that differences between adopters and non-adopters be traced to firm-level characteristics. As they put it, non-adopters had a more traditional profile and were "less likely to be active in a knowledge-based sector, make less use of teamwork, make less use of electronic communication, make more extensive use of direct supervision (...) and have employees with somewhat lower educational levels" (p 328). As for the impact of telework from an employee perspective, those working in 'adopter' firms did not recognise a negative effect on promotion possibilities, problems with equipment, direct supervision or social isolation. In all, adopters had much more positive views on all five parameters tested.³¹ This study's main contribution is to highlight the difficulties in measuring the long term effects of teleworking, and that positive expectations are typically held by adopters. However, whether this is this case because of the fact that they are adopters or because of their different characteristics remains an open question.

In practice, teleworking suits some jobs or sectors more than others and being able to adopt this practice assumes that the person is able to use a range of ICTs to export work to other environments and perform it remotely. Whereas technologists and knowledge workers' (as defined by Drucker, 1999) jobs can be seen as more suitable for teleworking, this practice seems less suited for manual work or work in the retail sector, for example. However, advances in ICTs also make possible collaboration and communication between people based in different locations and therefore the possibility to work together at a distance. Devices such as mobile and smart phones put people within reach, and through teleconference facilities virtual meetings can be organised with attendees in different parts of the world. Moreover, information can also be securely accessed and exchanged remotely. In theory, this means that disadvantages associated with location and mobility can be overcome with new technologies. Nevertheless, a 'virtual world of work', albeit technically a possibility, is not yet a reality given that aspects of the culture of work still depend on face-to-face interaction (Messer, 2010).

Although a discussion of telework is relevant to those in employment, particularly from an industrial relations perspective, working from home or a person's place of preference has a wider range of potential beneficiaries including the self-employed, job seekers and lone parents. Furthermore, distance learning can also be related to improving employability more generally by giving remote access to training and development. Initiatives such as Interface³² in Belgium and IT Fitness³³ in Germany are examples of how ICT skills training can be achieved, at least partly, online. Evaluation of these initiatives would be useful in informing about the extent to which they serve to enhance users' employability.

Goyal (2011) mentioned that distance learning initiatives are "especially valuable for women and could help prevent dynamic inefficiency under interrupted labour supply and separations" (p 128). This conclusion emerged from a study which tested how the internet and other ICTs can contribute to increase women's participation in the labour force in terms of equality and efficiency. Through this study the author showed that ICT makes it easier to match skills to jobs and facilitates the upgrading and maintenance of skills by means of the flexibility it conveys. In other words, by

³¹ i.e., (I) impacts on the strategic development of the human capital resource-base (e.g., recruitment potential); (II) impacts on the operational functioning of the human capital resource-base (e.g., increased work time); (III) impact on the organisation's broader productive efficiency (e.g., improved flexibility); (IV) impact on the organisation's external linkages (e.g., customer service); (V) externalities (e.g., improved opportunities for the disabled).

³² <http://www.interface3.be/>

³³ www.it-fitness.de (in German; for an introduction in English see <http://www.microsoft.eu/skills-and-education/case-studies/boosting-it-fitness-through-skills-and-qualifications-in-germany.aspx>)

allowing women to work from home and at times suitable to them, women can find jobs that make use of, and update, their skills.

3.5.3. ICT enabling employment opportunities

As discussed in the previous section, telework enables work to be undertaken remotely and in collaboration with other workers. The restructuring of work in this way has enabled those with a disability to participate in the labour market. Research undertaken in Belgium by Illegems and Verbeke (2004) examined the benefits of telework for employers and employees. A survey to assess perceptions of teleworking was conducted firstly with human resource managers and secondly with employees in organisations that had implemented, or had the intention to implement, teleworking practices. The adoption of teleworking practices was not found to have impacted negatively on broader human resource practices, as employees were more likely to stay with the company. Companies adopting these practices were more likely to retain knowledge and skills, but for employees there were reduced opportunities for promotion, training, professional interaction and team-working. Overall, teleworking was perceived to have positively impacted on job opportunities for disabled people, enabling flexibility and enhanced productivity.

More recent research on those with spinal cord injuries revealed that telework enhanced employment outcomes for those returning to work (Bricout, 2004). Telework enabled some barriers, such as mobility, transport and fatigue, for those recovering from spinal injuries to be addressed. It, however, concluded that individual readiness needed to be assessed before ICT solutions were introduced to ensure successful return to work outcomes. Conclusions were similar in a study in the Swedish labour market. People with disabilities were interviewed to understand the micro and macro influences on barriers to their entry, or return, to the labour market (Michailakis, 2001). The study showed that ICTs have, as perceived by the interviewees, the potential to support individuals to overcome and remove barriers to their entry to the labour market, but they were only a partial solution. Individual needs and context need to be taken into account to increase possibilities for employment.

A literature review by Baker et al. (2006) explored the relationship between telework and people with disabilities. It evidenced that technology may have opened up opportunities for those with a disability, but that it had also placed constraints on the type of work available. The review revealed that telework was not as beneficial to those with a disability as might be expected. It was concluded that the type of work available limited access to the workplace, interactions with colleagues and the development of social capital. So in terms of employability, telework for those with a disability can be argued not to be a benefit.

Technology has not only enabled new ways of working, which have for the most part been evidenced as beneficial, assistive technologies have also enabled the less employable, those socially disadvantaged because of their age, health, disability, low educational attainment or location, to access employment opportunities. Using Sen's capability approach, Toboso (2011) focused on the functioning of ICT to promote equality and opportunity. He theorised that ICT plays a key role in the well-being of individuals with a disability. Functioning of ICT needs to be considered in terms of accessibility and design, together with user participation in the development and the implementation stages of technology to ensure the promotion of equal rights and opportunity for all. User participation in the design of technology is key to assistive technologies enabling employability.

There is much research on the positive effects of ICT training for those who are less able. It is also evident that ICT skills and confidence can be improved through basic skills training. For instance, one study in the US looking at organisational competitiveness found that employees' ability and use of technology in the workplace improved where employers had provided basic numeracy and literacy training (see Bassi, 1994).

Research also evidenced that a systematic ICT training programme in Hong Kong with 105 people with learning disabilities was effective in increasing computer literacy and competences (Li-Tsang

et al., 2006). A small sample of ICT users with learning disabilities and their keyworkers were surveyed and interviewed on the delivery of assistive technologies (Beyer et al., 2008). The aim of the research was to consider outcomes in terms of changes in independence, skill, choice and control. Assistive technologies were found to promote positive outcomes for those with learning disabilities, but these outcomes were dependent on well-planned resources and implementation strategies. Planning and ICT audits for effective implementation are highlighted and supported by other research (see Aspinall and Hegarty, 2011). A recent review of ICT training and education programmes and initiatives over a 5-year period across the EU was undertaken by Whitney et al. (2011). EU initiatives supporting e-inclusion through education and training programmes and the promotion of assistive technologies were considered in terms of how they addressed the needs of those subject to social disadvantage. The 'design for all' principle was central to the review. It revealed that across the EU, the development of speciality courses and a curriculum for professional development for these groups was slow.

There is increasing interest in e-services in health care, as reflected in the increasing importance of e-psychological services in the UK.³⁴ ICT has been shown to have mixed results in health care treatment programmes, (see García-Lizana and Muñoz-Mayorga, 2010; Stamatia et al., 2010). García-Lizana and Muñoz-Mayorga (2010) in their review of evidence on the effectiveness of ICT in depression management, and building sustainable self-efficacy and self-management, was found to be insufficient. Although more research is needed, they found some evidence that videoconference meeting and face-to-face treatments, and online self-help programmes, could be beneficial improving symptoms. However, it is evident that to be effective ICT solutions need to be based on an understanding of individual users and their needs, and the complex interactions with health professionals and the health system (Stamatia et al., 2010).

Overall, research in this area of ICT enabling employment opportunities and, thus, supporting employability highlights the importance of evaluating individual user needs and balancing this with design, implementation and the wider context to ensure that it is effectively used.

3.5.4. ICT enabling work to encroach on personal space

Another implication of the use of ICTs in relation to employment is that it has affected the differentiation of working time from personal time. Currie and Eveline (2010: 534) define this distinction by suggesting that work is "what people do in an employed capacity, while 'family' remains an idealised realm of non-work or leisure that takes place alongside household work". However, in their study on how ICT has changed the work-life balance of academics caring for young children, the authors find that these technologies lead both to the *extensification* and *intensification* of the work realm. In other words, they suggest that work has extended physically and temporally. This means that work can now be exported to, and be done from home, and that it can potentially expand to time that would otherwise be family time.

It may be said that ICTs are not solely responsible for the intensification of work and that economic factors and globalisation have a role to play in shaping job roles and expectations. However, as Chesley (2010) found in a study conducted in the USA, there is the perception in people's minds that using computers and mobile phones makes them more productive but also that it contributes to accelerating the pace of life and increasing workloads. Another study conducted in the USA also found that ICTs were seen by workers as a 'mixed blessing' since although they made them more effective, they also increased work demands and led to work spilling over into personal time time at evenings and weekends (Madden and Jones, 2008). In a previous study, Southerton (2007) mentioned that the effect of accelerating the pace of life was more commonly observed in women. She argued that ICT contributes to a feeling of 'harriedness' by making "the coordination and personal allocation of practices both more 'pressing' and 'unavoidable'" (p 126).

³⁴ See <http://www.nice.org.uk/nicemedia/live/11568/33185/33185.pdf>

ICTs that facilitate work to be done remotely have been labelled as 'work extending technologies' (WETs) and are seen as having both positive and negative effects on individuals' working life and in particular their work-life balance. Towers et al. (2005) cite both positive and negative effects of WETs. Among the benefits, they mention increased flexibility in terms of where and when the work is done, and in terms of adopting a client centred approach. Among the negative effects, they highlight the fact that employees can be expected to be constantly on call and there is an associated increase in the amount of input that is expected from employees. Stephens et al. (2007) also see the extensification of work into personal space and time as leading to a culture of work where employees are expected to work longer hours. However, different technologies have different implications for work-life balance. For instance, Wajcman et al. (2008) suggested that mobile phones allow individuals better control of the extent to which they allow work to spill over their family life.

Furthermore, the use of WETs has also led to increased concern about issues related to well-being and work. According to the Work Ability and Social Inclusion Project (WASI³⁵; see also section 5.3) occupational risks associated with increased computer use include "musculoskeletal disorders and health risks caused by physical inactivity" and cite Eurostat, 2010 statistics indicating that among the most common health problems are those "related to hands and arms, stress and depression". Teleworking raises challenges in relation to assisting workers in ensuring health and safety practices if work is taken to the private space. This includes both physical issues and issues related to mental and emotional wellbeing which could be exacerbated by difficulties to achieve a satisfactory work-life balance.

The studies on the extensification and intensification of work discussed here do not focus on low skilled individuals or those at risk of inclusion. However, there are risk issues for these groups as well. For example, as Goyal (2011) points out in relation to women in developing countries, technology "can make [women] non-stop workers instead of improving their options" (p 115). Gillard et al. (2007) also bring to the fore some of the complexities associated with tackling social exclusion by providing ICT skills. In their study of the contribution of the UK Cisco Networking Academy Programme (CNAP) to empowering low-skilled and unemployed women, the authors found that training and certification were not sufficient. Indeed, these served instead to exacerbate participants' exclusion since the around-the-clock availability demanded by the profession, together with a lack of integration to a predominantly masculine community of practice, were associated with participants' inability to enter the workforce for which they were trained. In looking at the risks that the use of ICTs may pose for individuals from disadvantaged or at risks it is necessary to conduct further exploratory work. This will potentially lead to an increased understanding of the effects that the adoption of ICT for employability could have on these individuals.

Within organisations ICT has, and continues to, enable new ways of working and employees are adapting to these new practices. With technological advances, there will continue to be more opportunities for flexible and remote working. The potential advantages of ICT facilitating flexible working can be summarised as creating improved relationships at work, increased loyalty and commitment, greater autonomy, improved job satisfaction and work-life balance. Much of the recent work in the area shows that these new working practices are being embraced and have been better implemented as knowledge and understanding have improved. However, despite the wide range of benefits of technology, there are concerns regarding work extending technologies and the blurring between work and personal domains.

3.6. Overview

This chapter provides a discussion on the range of implications that ICT has for employability. It suggests that there is a need to support people in becoming digital literate. To assist individuals in developing capabilities to find and sustain employment it is suggested that a holistic approach needs to be adopted. Labour market and learning intermediaries have an important role

³⁵ <http://info.arcada.fi/sv/wasi/project-overview>

to play in this respect. To enhance the efficacy of their services, intermediaries need to build networks with other actors, particularly with employers and those who can provide complementary services. But the possibilities for ICT to help people develop and progress through their working lives go beyond job search and ICT skills. ICT has also served to change and improve the delivery of careers services ranging from providing advice and support through digital media to making labour market info readily accessible. There is still potential to continue exploiting technology for developing these services, but, as with job search and ICT-assisted flexible working practices, there is a need for users to be digitally literate to be able to benefit from these tools.

4. ICT, EMPLOYABILITY AND YOUNG PEOPLE

Young people are sometimes seen as ‘digital natives’ to suggest that they have grown up in an era of digital devices where ICTs such as the internet and multimedia are inherent parts of their lives (Thomas, 2011; Helsper and Eynon, 2010). However, this term is not without controversy since young people are not a homogeneous group and their access to ICT, behaviours toward these tools and the degree of adoption vary widely (The Economist, 2010). This chapter considers this, as it looks at research on young people and ICT for employability. It starts by examining individual factors and circumstances (Sections 4.1 and 4.2, respectively) and then moves on to employer/organisational practices (Section 4.3). A brief look at local contextual and macro level factors (Sections 4.4 and 4.5) is followed by an analysis of the role of labour market intermediaries and support agencies (Section 4.6). Finally, a brief overview is provided (Section 4.7).

4.1. Individual factors

In the context of ICT skills, young people are often referred to as the ‘generation google’ or digital natives. Young people use technology not just for communication and consuming information, but also for creating and sharing knowledge (see Lenhart and Madden, 2005). Internet-based services are becoming an important part of many aspects of users’ lives cutting across socialising, study and work (Greenhill, 2008). These uses include: sustaining social interactions and a sense of community; supporting the generation and communication of cultural/social capital; being a hub for the discussion and generation of ideas; disseminating knowledge; sharing materials; providing entertainment; and sustaining and expanding a knowledge network (Attwell and Costa, 2009).

There is some evidence that many young people are very confident users of the internet, but some are not particularly competent, especially when it comes to digital fluency (Bartlett and Miller, 2011; see section 3.1.1). Others refer to their lack of ICT skills in terms of privacy awareness, ethical and legal use, and lack of critical attitude in creating and using content (Cullen et al., 2010). It is, therefore, of important to distinguish between different groups of young people and to dismiss uncritical views of all young people as ‘cyberkids’ (Facer and Furlong, 2001), and so to recognise the multiple levels of ICT access and use (Facer and Selwyn, 2007). The multiple levels of use in which certain groups of young people are included or excluded from the various uses of ICT, together with the ways in which ICT can include otherwise excluded young people, are discussed in section 4.2.

Obviously ICT skills can impact on employment opportunities in the software and hardware industry (ILO, 2001; Expert Group on Future Skill Needs, 2008). However, as Bradbrook et al. (2008) indicate, there are many other ways in which ICT can increase employability of young people:

- Development of softer skills such as networking, collaboration and problem-solving (these skills can also be developed by gaming);
- Through use of social and cultural tools for sharing information and experiences through peer-to-peer networking and communities of interest, especially for isolated rural young people;
- Engendering greater social diversity in schools by enabling communication and co-operation through virtual and real linkages with other schools in different geographic and socio-economic environments;
- Supporting disadvantaged members of minority groups, particularly those with concealable stigmatised identities;
- Through provision of confidential support and advice; this is especially important for challenges such as health, bullying and crime; and
- Through supporting political activities.

4.2. Individual circumstances

A literature review commissioned by IPTS as part of the IPTS initiative under the ICTAS Action (ICT for an Inclusive Information Society and Quality of life) found that young Europeans in the 16-24 age group enjoy widespread access to ICTs, and that accessibility has been steadily increasing over the years. Nevertheless, access to ICTs for young people varies considerably across member states, with a particular discrepancy between Northern European countries and Eastern countries, notably Romania (Cullen et al., 2010).

The same report lists two controversial ideas about the progression of access to ICT, and thus, the speed by which the digital divide is expected to change. Concerning to the notion of 'evolutionary progression', differences in access to, and use of, ICTs by young people will eventually work themselves out as technologies become virtually ubiquitous in homes, schools, workplaces and communities. On the other hand, many factors (e.g. gender, socio-economic status) affect the frequency of ICT use amongst young people (see also van Deursen and van Dijk, 2009 and van Deursen et al., 2011). Both perspectives can be underlined by empirical material, and, on closer inspection, are not as contradictory as they seem. General access to, and use of, ICT has improved and will continue to do so, however, the pace in which changes occur can differ according to the mentioned factors.

Nevertheless, there is considerable scope for increasing internet-related skills and literacy of children and their parents. In particular, there is a need for critical evaluation for children and further guidance and support for parents. A study in the UK identified a new kind of divide in which young people are divided into those for whom the internet is a rich source of information and those for whom it remains a narrow, unengaging, if occasionally successful, resource of rather less significance, depending on internet access at home, broadband access, and parental internet use (Livingstone and Bober, 2004).

Previous research has shown that key barriers against the inclusion of young people are:

- cost;
- peer pressure;
- social context;
- attitudes towards computer use;
- difficulties accessing computers;
- a lack of relevance of computer technology to children's daily lives; and
- the potential of formal educational environments to exacerbate inequalities in access and anxieties around ICTs (Facer and Furlong, 2001; Facer and Selwyn, 2007, Cullen et al., 2010).

The connection between poor background and lack of access to ICT is a link that is followed up in almost all publications that were read for this review, and is also one of the focal points for many of the best practice examples (e.g. *Stiftung digitale Chancen* in Germany which hosts a data base of all publicly available ICT access points, and the associated *Spielend Lernen*; more detail on these projects is in the good practice database (Behle et al., 2012)). Nevertheless, as highlighted in section 4.2, the availability of ICT resources is not enough to ensure digital inclusion and overcome the digital divide: young people also need to acquire the skills, knowledge and confidence to use ICT and recognise the relevance of ICT both for everyday life and future employment prospects (Faulkner, 2004). Publicly accessible resources also need some kind of service support in order to help users with little or no ICT skills (Kubicek and Welling, 2001). The TARDIS project also addresses these kinds of issues and aims to develop an open-source platform for online and offline social training for young people at risk of social exclusion.³⁶ The TARDIS project is especially interesting as

³⁶ More information about the two projects mentioned can be found on their respective home pages www.digitale-chancen.de and <http://tardis.lip6.fr/presentation/tardis-platform>

it combines the expertise of human practitioners with the flexibility and safety of repeatable online game simulations with virtual agents. The work of the TARDIS and similar projects mentioned on the TARDIS website is especially useful for young people with mental health conditions such as ADHD (Attention deficit hyperactivity disorder) or autism as games are able to help control 'executive functioning'.

In a study of young people classified as 'not in employment, education or training' (NEET), Passey et al., (2008) found a lack of policies and guidance regarding ICT; specifically they found that providers often have no specific guidance or exemplars available to them. The research also revealed that ICT could have a marked impact in supporting NEET young people more effectively, but that some aspects of the fluidity currently inherent in the system in certain respects do not support those who have a chaotic, unordered or potentially destructive lifestyle. For example, school-based learning environments do not match the needs of young people classified as NEET – who mostly have built up strongly negative views of school-based learning – and fail to recognise their personal circumstances. Notschool, a UK-based initiative, offers an alternative to traditional education for young people who are unable to engage with school or other complementary provisions. Notschool.net offers full time alternative education provision, facilitating the inclusion of the most marginalised young people. A related initiative is the Youth for youth Project, which provides opportunities for disengaged young people to develop ICT skills that can be deployed in different sectors.³⁷

Schools, nevertheless, are highly relevant for the acquisition of young people's ICT competencies (Tijdens and Steijn, 2005) and there has been considerable progress in ICT learning (Connor et al., 2001). Nevertheless, the digital divide within schools impacts on the acquirement of ICT skills. Disadvantaged children are less likely to have teachers who have received professional development on ICT-enabled pedagogy; and minority, poor and urban students get less exposure to computers for higher-order learning (Bradbrook et al., 2008). In a German study the effects of the school selection/ streaming/ tracking practices (as described in the first report [Green et al., 2012], section 7.4.2) on ICT skills can be differentiated. Even though students in a *Hauptschule* (school for the less academically orientated) spend less time on the computer, the proportion that stated they enjoyed working with the computer was higher than the corresponding figures from a *Gymnasium* (school for more academically orientated students leading to university-entrance exams). Also, the way students from a *Hauptschule* used a computer differed from student of a *Gymnasium*: watching DVDs, sound engineering and chatting are tasks more commonly performed by *Hauptschüler* whilst *Gymnasiasten* are more likely to use email programmes and search for information on the internet (Kutscher et al., 2009). Similar differences have been found by Cullen et al. (2010) in which young people from lower social status groups spend more time downloading music, videos and games and less on education and civic activities than their higher status counterparts.

The uses of ICT differ according to personal characteristics. For example, young men are more likely to use games machines and watch television, using technologies to gain information, or in more passive ways. On the other hand, young women tend to use certain technologies in ways more concerned with communicating, and with active engagement. There is also some evidence of differences according ethnic minorities; for example, Muslim young women may not be able to use facilities that are open to young men (Passey et al., 2008). Other research has analysed the way young people access and use technology to extend understanding of how technology may be implemented within schools and careers education to support learning and development (see for example Eynon and Malmberg, 2011; Green and Hannon, 2007). Research by Eynon and Malmberg (2011) of over 1,000 people from a UK representative survey revealed four typologies of internet use that were differentiated individual characteristics and contextual features: the peripherals; normatives; all-rounders; and active participators.

³⁷ For further details of Notschool and the Youth for Work project (YouthforWork-KE) see the good practice database.

There are many ways in which ICT can help young people with special needs. Young people with visual impairment, for example, can utilise speech synthesisers and text magnifier programmes, and young people with hearing impairment can communicate with the use of email and word processing applications (ILO, 2001). On the other hand, online learning activities can raise problems for higher education students with dyslexia and other cognitive disabilities (Woodfine et al., 2008), and blogs, wikis and other social computing applications pose additional threats to accessibility for disabled people (Fisseler and Bühler, 2007).

4.3. Employer/ organisational practices

In many European countries (Milmeister and Willems, 2008; Klein, 2005; Greatbatch et al., 2004), employers complain about the skills base and readiness for training of young people when they enter employment, especially in subjects such as languages, mathematics or computer skills. As a consequence, a plethora of governmental schemes such as training or work experience programmes exist to enhance the employability and trainability skills of entrants to employment or apprenticeships. In some countries, however, it is not clear whether these programmes were introduced as a measure to increase the skills of young people or as an answer to long-term youth unemployment due to a lack of job or apprenticeship vacancies (Braun et al., 2007).

4.4. Local contextual factors

As noted above, schools play an important role at the local level in supporting young people in developing a level of digital fluency that will translate into enhanced employability in the short or medium term. Moreover, local contextual factors such as the level of support provided by schools or the availability of other resources within the community to further develop and utilise ICT skills in a safe environment, will also impact on young people's employability. For instance, although distance learning may mean that ICT skills can be developed at a distance, so overcoming local barriers, such courses are not always available, and so those in rural or in suburban areas may have restricted access to training provision (Passey et al., 2008). Overall, the literature search yielded a lack of information on local factors other than the role of schools, colleges and universities (which have been identified as key intermediaries).

There is optimism about the use of ICT in educational institutions to develop both generic and specific skills which will potentially enhance employability. This is evidenced in the numerous studies on the potential for the internet and related technologies to assist learning, make it more efficient and to increase accessibility to disadvantaged students (e.g. Hedberg, 2011; Kozma and Wagner, 2006; McDonald and Howell, 2011; Sarmiento et al, 2007; Schneckenberg, 2011). Moreover, ICT can also be used as a tool to assist career and skills exploration and to provide guidance (as discussed in section 3.3). This optimism, however, is not without criticism and it has been suggested that less attention has been given to the fact that at the university level not all students make "formal academic use of ICT during their teaching and learning" (Selwyn, 2007: 84) or to questioning the use, content and implications of the ICT training provided (ibid).

Although there is variation in adoption and usage of ICT among young people, educational institutions can provide opportunities to engage with technology in purposeful ways that include communication with students, management of admissions and courses and use of technology as digital media within courses. In addition to this, ICT training and skills development can be offered as a subject in its own right. The latter may include modules focusing on skills development and certification programmes such as the European Computer Driving Licence (ECDL) / International Computer Driving Licence (ICDL) which provide an externally defined structure that can be readily adopted by schools and national education systems (ECDL Foundation, 2011a). The ECDL Foundation argues that there are several benefits to recognising employees' ICT knowledge and skills through these qualifications (ECDL Foundation, 2011b). These benefits include a reduction in the amount of re-training required for staff and the possibility to measure workers' ICT skills against a quantifiable standard, although the evidence for these and other claimed benefits is limited.

Although this review did not identify studies focusing on how ICT could be used to improve employability *directly* (in a school, college or university context), it is important to highlight that educational institutions play a role, as labour market intermediaries, in promoting the use of ICT to assist the integration of students to the world of work. It has been suggested that a government's use of the internet encourages citizens' adoption of this tool (du Rausas, et al., 2011). This argument can be extrapolated to suggest that as educational institutions adopt and make use of ICT in effective ways they will foster the use of new technologies for employability.

4.5. Macro level factors

The Youth Employment Network Initiative, set up by the UN Secretary General, has specifically recommended a focus on information and communication technologies (ICT) as a means of creating more jobs for young people (United Nations, 2001). In addition to issues already mentioned, such as to overcome the digital divide, in more detail, these recommendations include:

- Collaboration of the ICT industry and educational institutions in order to improve technical ICT skills of young people;
- Exploiting opportunities for paid employment and self-employment, and entrepreneurial activities offered by the development of internationally- and domestically-oriented ICT industries;
- Making greater use of both new and traditional information and communication technologies as tools for development and for greater voice and empowerment for all groups of young people;
- Taking action to bridge the ICT gender divide within, as well as among, countries by eradicating factors that restrict equal access to ICT;
- Facilitating community initiatives and partnerships between public, private and multilateral institutions to ensure that actions at local, national and international levels to bridge the digital divide are mutually reinforcing (United Nations, 2001).

The recommendations from this initiative are related to the macro level factors of the employability framework (Green et al., 2012) but since they are not directly associated with national or EU policies their relevance is limited. These macro level factors would include regulations that affect the labour market; welfare regime and institutional factors; and employment policy. The review undertaken for this report found little evidence of macro level factors of this type that focus on the use of ICT for employability for young people (or older workers or migrants). It is possible that regulations covering ICT for employability for these groups is contained within regulations developed for other areas. However, this raises the question whether there is a need for regulations at the national or European level covering the development of ICT for employability, e.g. within education initiatives.

4.6. The role of labour market intermediaries and support agencies

The role of labour market intermediaries and support agencies is very pronounced as a mediator in the various transitions young people experience. Transitions include classical pathways such as:

- School to work;
- School to apprenticeship to work;
- School to higher education institution to work;
- School to further training institution to work.

Labour market intermediaries and support agencies are even more significant for less direct pathways such as early school-leavers, drop-outs of vocational training or those who experienced unemployment after a period of employment.

In recent years, developments in ICT have changed public employment services as self-service instruments for job searchers have become more important. As a result, many job seekers are

looking for vacancies that fit their competencies without the intervention of counsellors (Koning, 2007). There are some concerns that the expansion of job search services delivered through ICT risks leaving behind the most disadvantaged (Lindsay, 2005).

In order to help lower skilled young people to gain necessary ICT skills and find sustainable entry to the labour market, many active labour market programmes (ALMPs) include ICT training both in more general education (basic computer courses) or specific vocational skills (for instance, advanced computer courses or courses providing technical and manufacturing skills) (Kluve, 2006). Other possible skills gained in an ALMP include the ability to write a CV or to submit a job application (Behle, 2010).

ICT support with transition skills development for young people has been piloted in an ESRC/EPSC funded project in the UK, called Inter-Life (more information on this project can be found in the good practice database) (Behle et al., 2012). The project investigated the use of virtual worlds (such as SIMS and Second Life) to support young people in their management of important life transitions and develop skills to help them progress from school to further/higher education or employment. The project concluded that these kinds of technological spaces provided participants and their careers advisers with 'realistic' activities to test out a range of scenarios and simulations.

Many Member States in line with the European Economic and Social Committee (EESC) discuss the demand for high-level ICT skills and, in this context, the number of students studying in so called STEM (science, technology, engineering, mathematics) subjects (Expert Group on Future Skills Needs, 2008; EESC, 2011). It is expected that the skills gaps will widen in future labour markets, especially in the following fields: STEM (science, technology, engineering and mathematics); energy; information and communication technology; green transport; the environment; and health. It is expected also that the difference between newly-created jobs and jobs in which demand is diminishing is widening (EESC, 2011). Therefore, many initiatives exist to increase student numbers in secondary and tertiary education in these subjects.

Although it is recognised that there is much research on the role of parents, friends and social networks in the career decision choices of young people (see Amundson and Penner, 1998; Amundson et al., 2010; Argyropoulou et al., 2007; Bubany et al., 2008; Creed et al., 2010; Greenbank and Hepworth, 2008; Hirschi and Läge, 2008; Janeiro and Marques, 2010; Lease and Dahlbeck, 2009), labour market intermediaries, particularly career guidance professionals can play an important role in supporting career decisions. As highlighted by Green et al. (2012), research is underway by the BBC Lab UK to improve understanding of young people's employability skills, their employment prospects and what makes them successful at finding employment. The Get Yourself Hired Test³⁸ is an online programme designed by careers guidance and employability experts to support young people develop the necessary skills to find sustainable employment. More information on this project can be found in the good practice database (Behle et al., 2012).

In relation to encouraging young people into STEM career pathways, this was recognised in a recent review in the UK which not only highlighted the role of careers guidance professionals, but also teachers and schools in helping students make informed choices and providing adequate information regarding STEM careers (Holman and Finegold, 2010). The *STEM Careers Review* reported that currently careers guidance support needs to be strengthened and that new perspectives need to be adopted in relation to STEM to help encourage young people into these occupational areas. Girls, and their particular needs in relation to STEM, were also highlighted. This included the need to provide role models for girls and to help develop understanding and skills required to deal with situations, such as career breaks and parental responsibilities (Ofsted, 2011).

Several initiatives to support girls and young people in to STEM occupational areas have been developed, including Girls in ICT, WISE, e-skills UK Girls in IT, Women in Technology and

³⁸ See <https://www.bbc.co.uk/labuk/experiments/employability/> for more information.

Futuremorph.³⁹ Some strategies and policy recommendations for encouraging girls into ICT occupations have been outlined in a review of 48 case studies undertaken in Europe, led by Faulkner (2004). The review concluded that although the numbers of women in ICT were increasing, the sector still suffered low number which resulted in image problems that were surprisingly not linked to ideas of masculinity.

In recent years, there has been an increase in women studying STEM subjects. However, findings from a recent study (Smith, 2011) suggest that there is little noticeable impact on the recruitment data and gendered patterns of participation persist in several subject areas. The increase in women studying STEM subjects has failed to increase women in relevant occupations, as broadly recruitment to key areas such as physics and engineering remains stagnant (ibid).

The Computers for Development (CFD) Youth for Youth Project "Learning by Doing" initiative is a good example (reported in Behle et al. (2012)) of how developed countries are working others to support ICT skills development. The CFD project between the Netherlands, Kenya and Ghana has adopted a process of training needs assessment, curriculum development and Train the trainer workshops, encouraging links and knowledge transfer with students from all three countries. Through this initiative useful resources are developed and shared. The aim is to develop digital and social inclusion whilst learning ICT skills.

There is much research on the use of ICT in higher education career interventions. A literature review undertaken in 2005, noted that computer-aided career intervention was standard practice (Bimrose, Barnes and Brown, 2005). The current and potential uses of ICT in higher education careers, limitations and cost-benefits have been widely discussed (Artess and Papadatou, 2010), but there is little research evidence on the effectiveness. Research that has been undertaken has focused on effectiveness of programmes in terms of whether they supplemented face-to-face interventions or whether they were 'stand-alone' (Eveland et al., 1998; Wei-Chang, 1999). Outcomes were measured in terms of increased career decision-making and decidedness, self-defined satisfactory self-directed search and career exploration. Both studies found that students preferred computer interventions, but outcomes were better with practitioner involvement.

4.7. Overview

ICT has potential to enhance the employability of young people in many ways and schools play a crucial role in this process. However, for these practices to succeed in this aim, collaboration between educational intuitions and the ICT industry has been proposed. Intermediaries have a role to play in this respect as well, not least in ensuring that the needs of young people at risk of social exclusion are not overlooked. Young people can be seen as being 'digital natives', but this view should be taken with caution as it can serve to downplay the role of adopting a critical and strategic approach to the use of ICTs, including the need to adopt safety ICT practices. There is a further need for research into the use and potential benefits of ICT for specific groups such as women or young people classified as NEET.

³⁹ See: <http://girlsiniict.org/>; <http://www.theukrc.org/wise>; <http://www.e-skills.com/education/schools/employers-working-with-schools/girls-in-it/>; <http://www.womenintechnology.co.uk/>; and <http://www.futuremorph.org/>.

5. ICT, EMPLOYABILITY AND OLDER WORKERS

In recent years, older people in general have somewhat caught up with regards to their ICT skills but they are still lagging behind compared with the rest of the population according to statistical data (Eurostat, 2011). As is the case for young people, generalisations have to be met with some caution as the group is heterogeneous and older people will have varying degrees of ICT skills depending on interests and necessity to use ICT at work.

There is a considerable body of literature on the challenges groups of older people experience in dealing with ICT and how they can best be supported in learning ICT skills. Sharit et al. (2009), citing Charness et al. (2007) conclude though that “common myths that older people are less able or less willing to learn to perform technological tasks are not supported by the literature” (Sharit et al., 2009: 463).

While ICT skills are increasingly a necessity in today’s labour market and can thus affect the employability of those who do not have the required ICT skills, ICT, when mastered, can also be an enabler and used to support an ageing workforce in employment, telework being an example.

This chapter explores how ICT affects the employability of older workers, taking on board both approaches.

5.1. Individual factors

Drawing on large-scale longitudinal datasets, studies in Germany, Italy and the US have analysed the likelihood of older workers using computers at work remaining in employment in the short to medium term, using odds ratios. The advantage of these datasets is that they are longitudinal and allow testing for the influence of a number of variables, with the disadvantage being that the information on ICT contained in the surveys is limited (e.g. to computer usage in Germany) and that data go back up to nearly a decade ago.

Friedberg’s analysis of the US Population Survey and the US Health and Retirement Study, a representative survey of Americans aged 50 plus, had two main conclusions: as older workers only fell behind in computer usage in their latter employment years she argued that retirement plans rather than age explained their lower use of computers. The second conclusion was that the older computer users retired later than those who did not use computers and that data support the argument that those planning to retire later learned computer skills *and* that computer users delayed retirement as they had invested in their skills (Friedberg, 2003). This suggests that learning computer skills may be a factor in prolonging working lives.

Schleife (2006) used the representative German Socio-Economic Panel (SOEP) for the years 1997, 1999 and 2001 to analyse: (a) the relationship between computer use and age and (b) the likelihood of older computer users remaining in employment within the next 2 and 4 years respectively, focusing on *men* only. The results show: (a) that the probability of using a computer at work declines for the age group 55-64 (by about 10%)⁴⁰ and that using a computer at home, level of education and occupational status have a significant positive impact on the probability of using a computer at work. As regards (b) she found a positive partial correlation between computer use and probability of remaining in employment two and four years later for men aged 50-60. However, controlling for other variables (sector and size of company) that impact became insignificant.

Using the German SOEP data, Peacock (2009) found that computer use in 2001 was lower among unemployed people and the lower skilled (both employed and unemployed) and that within the group aged 50 to 59 similar differences could be observed (this was not tested for significance but relative differences were substantial). Using years of computer access as the only available proxy for computer skills, and months of employment between 2001 and 2005 as a proxy for

⁴⁰ Similarly the 2005 European Working Conditions Survey shows that workers aged 55 and over plus had a 10% lower probability of using computers at work compared to those aged 25-34 (Villosio et al., 2008).

employability as the dependent variable, Peacock found in her multivariate exponential model analysis that computer access duration significantly decreased the odd ratios for exiting employment for the 50-59 year olds by 3%, irrespective of occupational status, gender, health and nationality. Similar results were found for the two younger age groups (40-49 and 30-39). To put this in perspective, good health had the greatest effect on decreasing the odd ratios for exiting employment in her analysis – and while this was true for all age groups, the effect was strongest among the oldest group (48% compared to 37% and 40% respectively). However, this suggests that possession of ICT skills is especially important in enhancing employability of older people.

More recently Biagi et al. (2013) used the longitudinal element of the 2000, 2002 and 2004 waves of the biannual Bank of Italy survey on Household Income and Wealth (SHIW) to explore the impact of ICT knowledge and use among *male* workers aged 47-60 on transitions into retirement. Their multivariate analysis (ordinary least squares and IV estimates for robustness check) came to the conclusion that it is the combined effect of being ICT literate and using a PC that reduces the likelihood of transitioning out of employment by 12% (which given the Italian social security system is seen as equivalent to transitioning into retirement). Consequently the authors argue that, in order to stay in employment, older workers not only need acquire the required skills but also exploit them in their work.

Using the longitudinal data of the 2000, 2002, 2004 and 2006 waves of the same survey (SHIW) Codagnone et al. (2009) controlled employment probability results by gender, age and level of education as well as a few other variables. Their probit regression found that men aged 50-64 who had a higher education degree as well as digital skills and experience in using ICT had a nearly 20% higher employment probability than their counterparts (men aged 50-64 with higher education) who did not have digital skills and experience. A relatively higher employment probability was also found for a younger group at the other end of the skills spectrum: men aged 35-49 with a low level of formal education and digital skills and experience in using ICT have a nearly 5% higher employment probability than their counterparts who did not have digital skills and experience. Results for women in these two age groups were reported to be mixed and non-conclusive, requiring further research.

Lee et al. (2008) conducted a small scale study in Greater Miami, USA, to explore the barriers older unemployed people from lower socio-economic backgrounds with no or limited experience with common work-related software applications faced when returning to work as well as their training needs, particularly around (information) technology, and training preferences. One of the key findings of their mixed methods study (focus groups and questionnaires) of 37 people, aged 50-76, largely from ethnic minority backgrounds and working in blue-collar jobs, was that they identified age and lack of technology skills (e.g. computer, fax and photocopiers) as the biggest barriers to finding paid work they were actively looking for, followed by language barriers, transport problems or commuting distance to work, and lack of education or skills. The study reported that there was “a great deal of interest” in training in computer use in general and in commonly used software programmes (Microsoft Office) and that participants anticipated that this would help them finding paid work, with most of them ideally looking for a job that offers flexibilities (e.g. flexible schedule, work from home or part-time work).

5.2. Individual circumstances

The large-scale EU survey on ICT usage in households with at least one individual aged 16-74 and individuals aged 16-74 shows that internet and broadband internet access in households has increased substantially over the last couple of years, having reached 73% and 68% respectively in 2011, and that this coincided with a falling percentage of people who have never used a computer at home at work or at any other place (24% in 2011), with large differences being observed across EU Member States (Eurostat, 2011).

More detailed data are available for the age groups 55-64 and 65 to 74 on the frequency of internet use, the purpose for which they use it, their level of internet skills and the use of mobile

devices to access the internet. Looking at the age group 55-64, their frequency of use has increased during the period 2005 to 2010 but is still lagging behind the total population. The study also showed that 55-64 year olds used the internet in the last 3 months prior to the interview mainly for emailing (40%) and finding information about goods and services (40%) and rarely for other activities, including searching for information about education, training or courses (10% compared to 23% overall), online courses (2% compared to 4% overall) and job search or sending an application (4% compared to 15% overall), for which there may arguably not have been a need during that particular three-month period. According to the study, the level of internet skills had slightly improved over the last 6 years among internet users, but the majority of 55-64 year old internet users (63%) still have internet skills that were classed as 'low' (i.e. they used the internet for one or two out of six activities ranging from using a search engine to creating a webpage). Compared to the 55-64 year olds, the oldest age group (65-74) shows, as may be expected, lower levels of internet use (25% at least once a week), with similar types of activity topping the list for internet use (albeit at a lower level), and a slightly higher share of low skills among those having gained some internet experience (68%) (Eurostat, 2012).

Drawing on existing literature, Peacock (2009: 151) highlights three theoretical considerations that can have a bearing on the take up of technology in later life: its use in the household during one's upbringing; socialisation at work (with women assumed to be at a disadvantage due to the segmentation of the labour market); and the size and "immediacy" of social networks (assumed to shrink in later life).

5.3. Employer/ organisational practices

5.3.1. Working in the ICT sector⁴¹

In her qualitative research Brooke (2009) examined how the experience of working in smaller IT organisations in Australia influenced whether staff expect to continue to work with the firm or exit at some stage. The research was conducted as part of the cross national Workforce ageing in the new economy project (WANE) and was based on interviews with 71 employees, aged 21 to 60, who worked in 10 innovative small and medium sized enterprises which spanned different types of organisations. The study identified "age-based career structures" with most people in their twenties constantly up-dating their technical skills to stay at the cutting edge of technological developments, and most people above that age moving into project management roles (mostly people in their 30s) or general management roles (mostly people in their 40s). Up-dating technical skills was reported to require long hours of work making it difficult to balance work with family life, and also the pressures of work may be seen by others as poorly aligned with changing capabilities of older workers and the work-life balance they may aspire to. It was also reported that some expressed a desire to move on to a different job having programmed for some time. Careers in these innovative IT firms were found to be unpredictable due to the lifecycle of young innovative firms, the gulf between jobs requiring largely technical skills and management posts and the lack of development opportunities in SMEs more generally. The relative number of people in their 50s in this sample was small (9), concentrating in general management roles (including in a take-over firm), with alternatives being seen in IT-based consultancy jobs. A prolongation of working lives in this line of

⁴¹ It is worth mentioning in this context that a project is currently underway in Finland, Latvia and Estonia which seeks to improve the work ability and wellbeing at work through stress management and leadership. The Work Ability and Social Inclusion (WASI) project mainly focuses on office workers using ICT for administrative tasks, as musculoskeletal disorders, a sedentary lifestyle and the constant need to update ICT skills can impinge on their productivity. Part of the project is the implementation of the Metal Age Programme which was originally developed for aging workers in the steel industry in the EU by occupational health specialists, including Professor Juhani Ilmarinen. The project, due to completed in December 2013, will also evaluate the cost-benefits of the intervention. For further information see <http://info.arcada.fi/sv/wasi/project-overview>

work was seen as difficult “due to the age graded norms of IT roles, which were magnified by the intensity of IT work and the unpredictable and discontinuous availability of work” (ditto, 253).

5.3.2. ICT and teleworking

Sharit and colleagues (2009) highlight the paucity of empirical evidence on teleworking and older workers. While teleworking offers benefits for both employers and employees there are also concerns both groups may have, and these are succinctly presented in Sharit et al. (2009). Against this background, they argue that home-based teleworking offers opportunities for older workers to extend their working lives as it can help to combine care and work, dispense with a potentially tiresome commute, enhance feelings of security, particularly if there are any health issues and could be offered relatively easily as a reduced-hour contract (many) older workers may prefer. On the other hand, Sharit and colleagues argue that telework requires relevant ICT skills or participation in employer supported training programmes in order to improve these skills, and that employers may need to pay particular attention to equipment and workplace design issues for older workers to comply with health and safety regulations.

In their own survey among US managers - drawn from three different sources the authors had access to (n=314) and covering a wide range of branches in the private sector, including ICT, which accounted for 44% of the total sample - Sharit and colleagues looked at the importance of 13 attributes for the managers' decision to allow staff to telework and how older workers (aged 55 plus) compared to younger ones on these attributes. The results show that older workers were rated as significantly better than younger workers with regard to many attributes, including the three most important ones for teleworking (trustworthiness, reliability, and ability to work independently), but the reverse was the case with regard to technology skills and the ability to make adjustments. Moreover, managers with less than five years' experience were less likely to favour older workers than those with the most experience in many respects, including technology skills. In the light of these results the authors argue that more needs to be done at company level (a) to raise awareness among managers that older workers are willing (and capable) to learn; (b) to provide adequate training and support; and (c) to take account of workplace design factors (as indicated above). It is also maintained that employment policy changes at state or national level are needed to address health and safety issues, privacy, and tax-related matters for the purchase of equipment, and to promote teleworking opportunities for older people.

The Eurofound study (2011) has shown that telework is one of the measures companies may offer to support carers. This is discussed further in section 5.3.3.

5.3.3. ICT supporting informal carers

Statistical data for the EU27 show that a substantial group of employees regularly care for a relative aged 15 years or over and that this is peaking at age 50-64 (10.2% compared to 6% overall, according to the LFS 2005 ad hoc module, cited in Eurofound, 2011). The data also show that the majority of carers of working age (59.2%) are in employment (compared to 63.5% of the overall population) (ditto). One example of how ICT can support carers is the IPERIA initiative, a good practice example reported in Behle et al. (2012), located in France. It provides an integrated approach to vocational training for carers where training is implemented remotely to facilitate access.

A systematic mapping exercise on ICT based EU initiatives which support informal carers of older people living in the community (Carretero et al., 2012) found some evidence that ICT based alarm systems monitoring the movement of older people in their home can help facilitate the combination of care and work and that this also improves carers' health and their social life (3 out of 12 good practice examples). The report also develops a fictive future scenario showcasing how a combination of ICT based tools or measures could support carers in employment more fully, with the example including a portable computer enabling a video link to the older person at any time, employer facilitated support (an online company platform with information for carers and opportunities for telework or flexible working) and online carer support.

Eurofound (2011) commissioned a study that identified and described company initiatives for workers with care responsibilities for disabled children or adults in 50 organisations across 11 Member States. Teleworking was among a number of measures companies offered, among them some telecommunications companies who arguably have the infrastructure in place, with other measures including opportunities to reduce hours, working flexibly in other ways or care-related support, such as information, counselling or practical and financial support. According to the report companies may offer opportunities for teleworking temporarily on a formal or informal basis or permanently, and they may, in principle, be open to all employees, role permitting, with carers known to have taken up this option to help them reconcile care and work. Overall, it was argued that the role of the line manager is key to supporting carers and that more needs to be done to raise awareness.

5.3.4. Using ICT to support active ageing at work

Drawing on previous European projects the ongoing *Goldenworkers* project aims: “to build a roadmap for ICT adoption in the field of active ageing at work”⁴² that can be deployed by researchers, public and private organisations and policy makers. Davila et al. (2012) note that previous research (AALIANCE, 2009) established that ICT in the workplace could be used to adapt working conditions to the environment and the person, to support the execution of tasks, to facilitate teleworking and access to work stations and to reduce and prevent work-related diseases. Moreover, Davila et al. (2012) argue that three types of challenges need to be addressed for ICT to effectively support active ageing at work: (1) technological, (2) design, and (3) deployment challenges; in order that solutions can be developed that take account of user ideas and views, and generate high user acceptance. In particular, it is argued that there is scope to make more use of the so-called life-based design approach (Leikas, 2009) to produce user-friendly-solutions, ensuring, for example, that age-related impairments in hearing, seeing and touching do not conspire to make the use of ICT more difficult for older people.

Of the relevant technologies identified by earlier research, the project focuses on areas that hold most promise, including:

- ambient intelligence (automatic configuration of adjustable workplaces to reduce posture- or environment-related strains);
- augmented and virtual reality (improvements in tele-presence to help reduce travelling);
- affective computing (monitoring emotions and stress symptoms to avoid overload and distress);
- robotics (providing assistance with tasks – e.g. in health care, or in replacing human work in cleaning open spaces);
- internet (better internet-based communication and use of cloud computing to increase workplace flexibility) and
- brain-computer interfaces (BCI) (to help disabled people work, with BCI currently in use outside of the workplace to help disabled people communicate).

As part of the *Goldenworker* project, future scenarios have been developed on how new ICT developments, in combination with age-management measures, might support older workers in specific work environments. In nursing, for example, ICT could be used to reduce the physical workload through ICT supported devices such as robots assisting with lifting patients or self-navigating objects such as hospital beds and linen containers. Moreover, other devices could facilitate information processing, benefiting in particular those with reduced eyesight, such as 3D images for diagnosis or big computer screens to display digitalized documents in any size that suits the (older) user. Other devices complementing the scenario include a more user-friendly, electronically adjusted work environment, ICT to support (occasional) teleworking in office-based

⁴² <http://www.goldenworkers.org/index.php/the-project>

jobs, a smart assistant alerting the carer at work if the person he or she is caring for needs any help or monitoring one's own health with the help of a smart assistant (Bendig et al., 2012).

Josue et al. (2009) suggest that reskilling older workers, through specialised technical and vocational education training, is essential in the current labour market and needs to be supported by educational policy. It is reported that there have been major shifts in how training is delivered and the beneficial role technology can play in the process.

5.3.5. Online information

There is an increasing amount of online information on demographic change, on how to perform an age structure analysis within companies, on employability self-checks (by companies and individuals⁴³) and on good practice in age management. However it is not known whether such online information is being accessed by companies (or individuals in the case of employability self-checks), and if so, whether any related action is taken – for example, to improve the employability of (older) individuals (if analyses suggest that this might be useful).

5.4. Local contextual factors

The literature review did not uncover relevant information on local contextual factors.

5.5. Macro level factors

The literature review did not uncover relevant information on macro level factors. In the light of constrained financial resources it may be noted that training budgets and funding for initiatives concerned with using ICT for enhancing employability of older people may come under increased pressure.

5.6. The role of labour market intermediaries and support agencies

There are numerous examples of intermediaries offering training in ICT skills (partly in partnership with other agencies), often on a flexible as and when needed basis, as part of their overall support to help older people back into work. In some instances there may only be brief information published about the type of programme⁴⁴ and in other cases more detailed information, including evaluation results, were accessible. The examples chosen below are all programmes targeted at people aged 50 plus and running over a couple of weeks, aim to give a flavour of the type of programme, the role ICT played in this, and what it had achieved.

The two-year project *Older Women in Learning and Enterprise 50+* (OWLE50+) aimed to enable women to “overcome disadvantages” and to develop their potential to play an active part in the economy or in society in later life (more detail on this project is in the good practice database). Co-funded by Grundtvig as part of the EU Lifelong Learning Programmes, the programme was run as a pilot in three countries (UK, Italy and Sweden⁴⁵), offering a series of workshops for women aged 50

⁴³ For a German language example see <http://tbs-nrw.de/tbs/index.id,22.html>. (DemoBiB is the information portal of the technology advisory group at the trade union DGB North-Rhine Westphalia.)

⁴⁴ Some of the regional active labour market programmes for the older long-term unemployed in Germany mention specific initiatives that include a tailored IT element. One example is a course developed by a recruitment agency as part of the programme which prepares older people for work in call centres by offering training that includes customer services and IT (Bundesministerium für Arbeit und Soziales, 2010, Unternehmen mit Weitblick, 2010). Incidentally similar initiatives, embedded within different structures, are known to exist in England. More broadly, a regional programme in the north of Germany maintains that its high success in placing the older long-term unemployed is the intensive support through a tailored training programme offered by its partners which can include one-to-one coaching, health promotion and/or IT training (Bundesministerium für Arbeit und Soziales, 2009; Unternehmen mit Weitblick, 2009, <http://www.perspektive50plus.de/veroeffentlichungen/broschueren/>)

⁴⁵ The partners were Tecnopolis Science and Technology Park, Bari, Italy; Norrköpings Kommun, Sweden (a large local authority); and the Centre for Micro Enterprise (CME) at the London Metropolitan Business School.

plus over a 10-12 week period covering five strands: (1) older women's enterprise competencies and micro business start-up, (2) employability and life skills, (3) ICT for social and business growth, (4) community involvement and (5) effective senior citizenship in the EU and own country. The ICT skill-related learning objectives varied by national partner: Italy focused on acquiring basic business IT skills in two sessions, Sweden on communication via email among participants and understanding the concept of the social media, and the UK on offering a facilitated session exploring different technologies. At the end of the programme the 97 project participants were at different stages of pursuing or realising their plans, with substantial numbers having enrolled in a wide range of vocational training or adult education courses (including two having registered for a basic computer course), set up or were still developing their idea of a (micro) business, found a new job, were still in the same job but had reflected on their choices or made plans for the future or volunteered. Some were looking for jobs and few considered themselves unemployed. Self-assessments before and after the course for the UK showed improvements in terms of (a) participants' level of confidence; (b) their assertiveness; and (c) their perceived capacity of generating an income (Roberts and Reynard, 2012).

Funded by the London Councils and the European Social Fund, the two-year *Experience Counts 50+* Programme offers tailored one-to one support (minimum of six hours information advice and guidance together with an optional IT course) for economically inactive or unemployed residents in two London Boroughs (Harrow and Brent); (more detail on this programme is available in the good practice database). While the whole programme is run by New Challenge, a small non-profit organisation in London, the two IT courses are delivered in partnership with the College of North West London. One is a basic IT course (a three-week, 21 hours, course at entry level 3, covering internet, email, word processing and spread sheets) and the other one, developed jointly with New Challenge, a more in-depth course (level 1) to equip participants with skills for administrative roles. It was reported that more than a year after the programme began it had supported 100 people aged 50 plus, the majority of them were ethnic minorities (86%) and many had a long-standing health condition (30%); 30 engaged in further learning;⁴⁶ 21 had found paid work and 11 had been in employment for six months. Pivotal to the success of the project was working with people to find work or training that suits their circumstances (taking into account any health issues or caring responsibilities for an older person) and close links with stakeholders (Jobcentre plus and links with employers in particular sectors). The basic IT course was deliberately offered as a non-accredited course so that fears of exams do not come into play, and all progressing to the more in-depth course were reported to have completed it (ESF website;⁴⁷ TAEN, 2012).

The development of (e-) entrepreneurship among unemployed people and retirees aged 50 plus is at the heart of the two year (2009-2011) Grundtvig funded project *Bazaar – Virtual Market for Mature Entrepreneurs*. Overall, the project aims to improve the employability of older workers by helping them to further develop their skills and expertise, aspire to gain a new qualification and to start their own e-business drawing on their professional expertise or any creative hobbies they pursue. Key elements of the project include coaching, a training course and an e-platform facilitating exchange among participants. Basic IT courses are provided on a needs basis, with the guidebook for trainers suggesting 40 sessions (45 minutes each), covering amongst others Word, Excel, browsers, searching on the internet and internet security, using a range of teaching methods. Courses with 10 to 15 participants each have been offered by the educational partners in the participating countries (Germany, Austria, France, Italy, Turkey and the UK) in 2011. For example, Austria's first four-month course was reported to have generated promising business ideas, with future courses being offered in a more compact manner. Italy's course on e-commerce, run in collaboration with a senior organisation and a trade union, attracted 10 participants, including migrants. Little if anything has been reported on outcomes which may take some time to materialise. The project has been identified by the E.N.T.E.R. network (European Network for

⁴⁶ Likely to be refer to the more in-depth IT course but this is not made explicit.

⁴⁷ http://www.esf-works.com/projects/case-studies/case_studies/402602

Transfer and Exploitation of EU-Project Results) as a best practice example in the area of later life learning.⁴⁸

Conducted as part of the *South West Opportunities for Older People (SWOOP)* and part funded by EQUAL, this small pilot programme (17 participants in total, of which 14 were female) sought to evaluate the effectiveness of an electronic portfolio to support people aged 45 plus in their job search and personal development. The e-portfolio used commercial software to support reflection, self-assessment and the creation of a record of achievement (CV or a supporting statement), and was embedded within a mentor-supported programme that ran for three times three-hours sessions over a period of 3 to 4 weeks. The qualitative evaluation, based on the feedback from project participants and the mentor, revealed that four elements were important: the e-portfolio software, the process of reflection and evidence building, facilitated by the features of the programme (quizzes, diagnostic tools, required evidence building), the mentor-facilitated support and the group support, and that the e-portfolio without the support of the mentor to help them guide through the programme and the peer support would not have generated the same results. Overall participants were reported to have gained from the programme in a number of ways that are expected to help them with their job search (e.g. a better understanding of their own skills, more self-confidence and a more positive outlook). While none of the participants had completed a CV ready for a job application at interview during the course, 4 out of the 9 unemployed or inactive participants were known to have found a job after the programme (Stevens, 2008).

Other EU projects aim to improve the ICT skills of people aged 50 plus in paid work either as a stand-alone course or as part of a wider programme. One example of a stand-alone ICT course is the KEMP project (Keep employment by developing e-skills). Its main objective was to develop and pilot an ICT course for older workers (45 plus) in a particular segment of the economy (SMEs in the services sector), focusing on e-skills that can be used in both the professional and the private context.⁴⁹ An example of a wider programme is the ELE55+ project (Employability Learning Environment) targeting the 55 plus group in SMEs. This programme supports age management in SMEs and includes courses on basic business English for adults, basic computer skills for adults and social competence as well as physical activities, a job-search database and consultancy with an employability expert.⁵⁰ Beyond the immediate (positive) assessment of those taking part in the pilot programme the researchers have been unable to find information on participant outcomes.

On the other hand, criticism has been expressed elsewhere that IT training offered to older workers was too generic and basic in nature and failed to take into account the specific IT skills and experience the individuals already had (Maltby, 2007).

In addition to those programmes aimed at supporting older workers into paid work, there are a range of IT courses specifically for older workers which do not have an apparent aim of enhancing their employability. However, it needs to be noted that one strategy to get older people interested in learning ICT skills is to focus on non-work related aspects they would enjoy but require ICT skills (e.g. genealogy or emailing), so they should not be dismissed in terms of enhancing older people's employability in the longer term. Examples include a project called *eLSe* (e-learning for seniors at home in Germany), which provides "non-formal, flexible and accessible" e-learning courses and has been identified as "best practice" in Europe by the European Commission, DG Education and Culture⁵¹ and the ongoing transnational TAO project (Third Age Online) aiming to increase the participation of people aged 50 plus in online communities, offering ICT support and e-learning opportunities in a range of user-determined areas as part of it.⁵² Another example is *Internet Saloon* (see Behle et al., 2012), an Italian initiative, now present in seven cities, which has received

⁴⁸ For further details see <http://www.eu-bazaar.biz/> and in particular the guidebook on the course content.

⁴⁹ For further details of KEMP see the good practice database.

⁵⁰ For further details see <http://www.tsanov.eu/ele-55plus-eu/>.

⁵¹ For further information see <http://www.el-se.org> or <http://www.else-academy.eu>. More detail on this initiative is available in the good practice database.

⁵² See www.thirdageonline.eu.

the Skills for Employability Award in 2011 in the category active ageing. Its offer includes a training programme on online tools for job seekers aged 50 plus, as reported on the Age Platform Europe website.⁵³ Similarly, a discontinued programme offering internet access and computer courses for senior citizens in more than 250 internet cafes or educational institutions in one German State had provided volunteer-delivered support for older job seekers (writing of CVs, job search over the internet) as part of this programme with additional State funding. Based on a course run in November/ December 2004 by older volunteers with a total of 43 participants, additional course material had been developed and uploaded onto the project webpage (Diakonisches Werk der Evangelischen Kirche im Rheinland, not dated).⁵⁴

An alternative approach concerns intergenerational learning, where older people become mentors for younger people – sharing with them their life experience and knowledge of the workplace, while young people can help older people with their ICT skills. One such example is the eScouts community intergenerational learning initiative.⁵⁵ Specifically, this initiative centres on intergenerational contact between younger and older people (aged over 55), with training facilitators acting as intermediaries between these two groups. This transnational initiative involves partners from Bulgaria, Italy, Poland, Spain and the UK, with intergenerational contact taking place through a variety of local stakeholder organisations (e.g. public internet centres, youth and elderly associations, etc.). The aim is to create a common and certifiable curriculum for different target groups (young, elderly and the facilitators promoting e-inclusion), to be exploited by partner organisations and new stakeholders. This particular initiative is in the establishment phase, and details of outputs and outcomes are not available in the public domain at the time of writing; however the initiative is of interest in that it is illustrative of one way of enhancing digital skills of older people for employability and non-work purposes.

There are also instances of intermediaries and support agencies focusing attention mainly on older people as part of a more general initiative. One such case is Microsoft's 'Technology, Innovation and Initiative' (TII) Programme in Portugal (Ruivo and Cruz, 2010), designed to address the needs of the unemployed population from the declining textiles sector over a three-year period from 2006 to 2009. Given the focus on textiles, it transpired that the majority of the target group for the TII programme were older women with low educational levels. As is the case with many initiatives, Microsoft implemented the TII programme in partnership with other organisations. Key partners were the Technological Centre for the Textile and Clothing Industries of Portugal – with responsibility for implementation, and the Ministry of Labour and Social Solidarity – which was responsible for recruitment onto the programme. All trainees were provided with free access to the use of computers and the TII programme provided four levels of ICT training, ranging from basic computer skills to more advanced end-user applications. At the second level the programme included 'employability' sessions covering how to search for a job using the internet, analysing and responding to job adverts, preparation of letters of application and CVs, interview preparation, etc. Although the partners acknowledged at the outset that the ICT competencies developed under the TII programme could not by themselves guarantee a job after training, it was assumed that the training programme would improve beneficiaries' likelihood of getting a job. Yet in their assessment

⁵³ <http://www.age-platform.eu/en/age-policy-work/employment-and-active-ageing/latest-news-on-active-ageing/1420-internet-saloon-wins-2012-skills-for-employability-awards-in-category-on-active-ageing-through-it-learning>

⁵⁴ The SOL project (Senioren OnLine) was initiated by the North-Rhine Westphalian Ministry for Health, Social Affairs, Women and Family and three civil society organisations. Targeting people aged 55 plus, it ran between 1999 and 2005. Having attracted many senior citizens, the programme came to an end when demand subsided as older people had either satisfied their initial curiosity or had gained their own internet access. Support is now provided to facilitate online networking and information exchange among older volunteers located in different places (Diakonisches Werk der Evangelischen Kirche im Rheinland, not dated).

⁵⁵ For more information see <http://escouts.eu/>. More detail on this initiative is available in the good practice database.

of the TII programme Ruivo and Cruz (2010) concluded that the programme's major achievement was to empower beneficiaries⁵⁶ (many of whom were older people who previously had no or limited ICT knowledge and skills) by developing their autonomy to access new channels of information through digital literacy and to upgrade their training trajectories (for example through processes of recognition, validation and certification of acquired competencies), rather than offering job opportunities for their rapid reintegration into the labour market.

The initiatives discussed in this section give an indication of the type of support offered to older people by labour market intermediaries and other agencies. Some initiatives run across countries although the services offered vary depending on needs and resources available. Another variation observed was within the older adult population; for example, while some courses can be aimed at women, in other cases the user population can be predominantly defined as coming ethnic minority groups. Although initiatives aimed at providing a broad spectrum of ICT skills have been criticised for being too generic and basic, some focus on helping clients develop specific skills for employability such as the e-skills necessary to start a new business, and others use alternative approaches such as intergenerational learning. Overall, it may be said that no single approach or initiative has potential to address all the needs of older workers and a range of alternatives can be seen as a positive outcome. Further evaluation of initiatives is needed to assess their cost effectiveness and impact.

5.7. Overview

Studies drawing on large-scale longitudinal datasets in Germany, Italy and the US have analysed the likelihood of older workers using computer at work remaining in employment in the short to medium term. The evidence leads to complex results showing a relationship between computer skills and delayed retirement. It has been argued that in order to stay in employment, older workers not only need acquire the required skills but also exploit them in their work. Moreover, level of education was identified as a relevant variable for men but not for women. Although results suggest that possession of ICT skills is important in enhancing employability of older people, health has a more crucial role to play in remaining in employment.

Contextual factors at household level and in the workplace have also emerged as important from the review. Household circumstances and socialisation and segmentation in the workplace impact on learning ICT skills for employability. In general, employers tend to view older people as having a lower level of ICT skills than younger people. In the workplace line managers play a key role in facilitating access to training and in sanctioning possibilities for ICT-facilitated remote working.

Labour market intermediaries and support agencies are active in facilitating ICT skills acquisition amongst older people. However, rather than being directly concerned with employability, initiatives often focus on non-work related issues, although the skills acquired may be valuable in enhancing employability.

⁵⁶ This empowerment chimes with the capabilities approach to employability, rather than a 'work first' perspective.

6. ICT, EMPLOYABILITY AND MIGRANTS

'Migrants' (used here as shorthand for immigrants and ethnic minorities) comprise a heterogeneous group, such that it can be difficult to make generalisations about the role of ICT in affecting/enhancing their employability. Moreover, this situation is exacerbated by fast changes in the structural conditions and social reality of migrants and developments in ICT, and a lack of empirical data – especially on the purposes for which ICT is used (Ros et al., 2007). The chapter begins with a discussion of individual factors (section 6.1) and this is where most of the literature has been focused. Individual circumstances are considered in section 6.2, and employer/ organisational practices in section 6.3. Section 6.4 deals with local contextual factors and section 6.5 with macro level factors. The role of labour market intermediaries and support agencies is outlined in section 6.6 and some concluding comments are made in section 6.7.

6.1. Individual factors

6.1.1. Introduction

Migrants differ in terms of their demographic characteristics, their education, their labour market experience and their employability characteristics, and the stage in their migration trajectory (i.e. whether newly arrived or more established migrants). Some migrants arrive with a job to go to and with a good knowledge of the how the labour market works, whereas others seek employment on arrival and may lack labour market and job seeking knowledge. At one end of a continuum there are international elites of highly qualified migrants who have been seen as representative of a culture entailing international geographical mobility and digital mobility (Borkert et al., 2009). It is appropriate to refer to these individuals as 'connected migrants' (Diminescu, 2008), given their connections with their origin, destination and other societies. At the other end of the continuum migrants may be internationally mobile, but either lack digital literacy or the strategic skills to use digital media to move into employment commensurate with their skills at their destination.

In discussions on employability and ICT it is salient to note that migrants are disproportionately younger adults, and this has implications both for their employability and for their ICT skills. It also means that initiatives targeted at young people at risk of social exclusion, are likely to include migrants/ those from ethnic minorities, who make up an increasing proportion of the population of young people.

Those individuals who are most disadvantaged socially might be expected to be least likely to have access to digital resources. However, some groups (e.g. Black Caribbean groups in the UK), appear to be more 'digitally engaged' than might be expected given their social circumstances (Helsper, 2008), and in aggregate, Guiral and Le Corvec (2006) show that migrants are often more proficient than the local population at the same level of instruction in using ICT. Likewise, Kluzer et al. (2008) suggest that the fact that migrants show ICT adoption rates similar to the EU population, despite their worse socio-economic status, is a function of their younger than average age, the need/ desire to keep in touch with social networks of families and friends in their home country and elsewhere, the need to access ICT for education and employment purposes, and the desire to explore ICT-mediated content, services and social relationships in the host society. Data from the UK show that within each broad ethnic minority group, those aged less than 45 years and those from higher social groups are more likely to use ICT media devices than the general UK population (Ofcom, 2008a). The same study shows that adults from all ethnic minority groups are more likely to be interested in, and confident about using, interactive functions than the general UK population. However, in relation to employment and employability, it is also salient to note that exposure to ICT at work differs for individuals by occupation and sector (see Brynin, 2006, for details of a study covering Britain, Germany, Italy and Norway, showing how workers in managerial and technical occupations are more than twice as likely to use computers at work as those in craft and unskilled occupations) and that inter-ethnic differences overlay these divisions. Research from Israel, based on a survey with 1,410 interviews with Arab and Jewish populations in Israel, suggested that the

concentration of Arab groups in blue-collar occupations not involving computers may lead to negative attitudes to ICT adoption (Mesch and Talmud, 2011).

Despite concerns about access to and use of ICT, a recurring feature from several studies is that what matters is not a binary division between 'haves' and 'have nots' and between 'users' and 'non users', but rather the appropriation of ICTs (i.e. the process by which individuals strongly and permanently incorporate ICT in their daily practices of working, dealing with government services, communicating with others, etc) (Codagnone, 2009; Codagnone and Kluzer, 2011; Tsatsou et al., 2011). This suggests a need for more nuanced measurement of ICT and its role in employability.

6.1.2. ICT and skills development

There has been a good deal of interest from a policy perspective in the role of ICT in fostering the integration, and also the employability, of migrants; indeed, for migrants of working age (i.e. the majority) employment is often a key component of integration. As for all individuals, possession of digital skills enhances employability in a labour market where computing skills are becoming increasingly ubiquitous across sectors and occupations.⁵⁷ However, of particular relevance to migrants is the role of ICT in enhancing language skills. For instance, the Bangladeshi Youth and Cultural Shomiti (BYCH) initiative is a good example of how ICT training courses have been developed and run alongside numeracy, literacy and language courses to help people in gaining qualifications for employment (see Behle et al., 2012).

Poor language skills may thwart migrants in taking up employment and also in gaining work commensurate with their qualifications; indeed, Codagnone and Kluzer (2011) note that lack of language skills and lack of education (or lack of recognition of educational credentials) are the two conditions interacting most negatively with lack of ICT access and skills to produce a vicious circle of increasing exclusion. Yet when in employment, especially if employed in precarious low wage roles involving shift work or uncertain hours, it may be difficult for migrants to enrol on, and complete, language courses. Use of ICT may offer a degree of flexibility – both in terms of timing of study and personalisation of content to include individuals' stage of learning and needs – in language learning that is particularly helpful to such individuals, either as a complement to (in a blended learning model) or as a substitute for attendance at language classes. In the face of budget cuts, ICT-enabled language learning may become more important in future; and importantly it should be noted that ICT-enabled language learning can be used both pre-emigration (i.e. so that migrants can learn the host country language before they arrive) and post-immigration (since they offer greater spatiotemporal flexibility than traditional classroom learning) (Collin and Karsenti, 2012).

In a review of ICT tools for linguistic integration in western societies, Collin and Karsenti (2012) identified 19 tools. These ranged from: (1) tools providing information about face-to-face language classes; to (2) portals for online resources (i.e. websites that direct users to learning platforms); to (3) applications for learning certain language expressions; and to (4) fully-fledged education platforms offering online courses in linguistic integration. In a review of the use of ICT in helping adults learn their host country's language, Kluzer et al. (2011) also provide insights into these different resources and indicate that countries where greatest use is made of ICT (at the time of writing) are the Netherlands, Denmark and the UK. They highlight how ICT can provide flexibility and personalisation in language learning from a learner (and teacher) perspective, and that this might result in cost savings from a provider perspective. However, they emphasise that in order to avoid enhanced marginalisation of less educated and less skilled members of the migrant

⁵⁷ In some instances ICT courses for migrants have been developed alongside numeracy, literature and languages courses. One example is the Bangladeshi Youth and Cultural Shomiti (BYCS) in Leicester in the UK (see <http://www.bycs.org.uk/> and the good practice database for further details). ICT has also been recognised as a way of providing migrants with skills to help them to find sustainable employment and integrate into a new culture (see the Migrant ICT project based in Ireland in the good practice database).

population it is essential to take into account learners' attitudes towards ICT and the low level of digital competence among some learners.

How ICT is used in language learning differs to some extent between countries. For example, in the Netherlands knowledge of the Dutch language and society is a prerequisite for entering the country and applying for residence, and the fact that there is an obligatory computerised test and a free market for language resources means that there are a large number of digital resources for learning Dutch (Driessen et al., 2011). Conversely, the same study showed that in Sweden, at least to date, the range of ICT tools for learning Swedish was smaller (albeit often freely available on the internet), and the policy emphasis had been on providing work placements in order to get learners connected with the labour market.

A study on the experiences of adults from ethnic minority groups in Britain learning English for Speakers of Other Languages (ESOL) in seven different learning centres in England, found that ICT based learning was valuable in encouraging ethnic minority group learners to speak more with the host community, so suggesting that ICT-based learning offers a space for learning and practising, which is often absent in a traditional ESOL classroom setting (Webb, 2006). As noted by Redecker et al. (2010), ICT may help migrants to gain initial language skills, to gain information and knowledge that will help their integration into the labour market – perhaps through virtual exposure to likely real-life situations, and may also offer access to more personalised training. Examples include IT tools for preparing migrants for integration examinations.⁵⁸ Other initiatives focus more on developing ICT skills, which in turn can help in fostering migrant integration and assist in finding employment. One example here is the DO IT! initiative in Belgium, launched by a consortium of NGOs with funding from Microsoft, which offers IT training to unemployed women, who are disproportionately of non-European origin.⁵⁹ 4,500 people were provided with ICT training under this scheme in 2007 (Diminescu et al., 2009).

More specifically in relation to accessing specific types of employment, there is a role for ICT in enabling individuals to set up e-portfolios which demonstrate their skills, knowledge and expertise of relevance for particular job roles, as a complement to their formal qualifications (which may or may not be recognised in their host country). In Germany, for instance, an e-notebook has been established to allow individuals to record their activities, work and CV.⁶⁰ In Stockholm, Sweden, the Arbete initiative, in collaboration with potential employers, has trained migrants to fill specific jobs, sometimes using ICT to teach language and other work-related skills; Redecker et al. (2010) report that in seven years 1,000 migrants moved into work. In the East of England in the UK a TransQual English Language training programme, funded by the regional development agency, providing preliminary and work-contextualised language courses for migrant workers, was complemented by a TransQual Migrant Worker Qualification Conversion project, which offered guided access to the government approved NARIC system⁶¹ of qualification comparison, to assist migrant workers to make fullest use of their qualifications.⁶²

There is also a growing interest in digital games for skill acquisition. While not specifically targeted at migrants or ethnic minorities, users are typically young people (i.e. a group in which migrants and ethnic minorities are disproportionately represented). Skills acquired through digital games may be sector- or occupation-specific, and may aid employability (All et al., 2012).

⁵⁸ See <http://www.itpreneurs.nl/> in the case of the Netherlands.

⁵⁹ See <http://www.interface3.be/> see more detail on this is in the good practice database.

⁶⁰ See <http://demo.kompetenz-erfassungs-notebook.de/>

⁶¹ Naric is detailed in the good practice database.

⁶² See <http://www.esf-works.com/projects/short-reviews/projects/400407> for a programme which ended in 2010 and <http://www.learningincommunities.co.uk/projects/current-projects/esf-migrant-employment-support-project-2011-13-bedford-transqual/> for an ESF-funded follow up programme in Bedford.

6.1.3. ICT and labour market and job seeking knowledge

ICT also has a particularly important role in providing information about the labour market and how to apply for jobs in the host country, so enhancing labour market and job seeking knowledge of migrants. The availability of information on the internet means that more recent migrants with digital skills and access to ICT potentially have a greater range of information available to them prior to moving than migrant had a decade earlier. Hence, prior to migration, migrants with access to ICT and the necessary digital skills are able to prepare for their move by using the internet to find out more about the destination. Reference has been made above to EURES which provides information on vacancies throughout the EU. Once in the host society, a mix of information provided in migrants' own first language, and in the language of the host country, may be beneficial. For new arrivals, provision of information in their mother tongue can help initial orientation. So, for example, in Denmark the FINFO website, provided by the Danish Library Centre for Integration in ten languages, has a section on 'Work', containing information on general information about the Danish labour market, starting your own business, tax, job seeking and CVs, parental leave, discrimination and racism in the workplace, trade unions and unemployment funds and the work environment.⁶³ Other information portals may be directed at specific groups – for example, Turks living in Germany.⁶⁴ Hence, at this stage in their migration trajectory, migrants often still make use of the internet but also may use Web 2.0 tools for e-based social networking purposes.

It is also salient to note that governments may use ICT to help attract/ provide information for returning migrants. A specific example is provided by Poland (Szczepanski, 2009). Data from the Central Statistical Office in Poland indicate that in 2008 there were around 2.21 million Poles living abroad. The Polish Government is concerned with providing migrants with information to enable them to make a rational choice about returning and to ease re-integration into the Polish labour market should they choose to return. Hence an internet portal has been established⁶⁵ providing information about issues pertaining to reorganisation of life and work in Poland, and there is a facility for answers to specific questions to be provided by experts (from EURES and/or government staff).

6.1.4. Overview

Reviews of initiatives making use of ICT to promote education and employment opportunities for migrants suggests that the role played by ICT tends to be complementary to, rather than substituting for other integration and employability initiatives, acting to accelerate such processes (Redecker et al., 2010). However, measuring the success of initiatives involving use of ICT to enhance employability is hampered by a general lack of longitudinal data (Redecker et al., 2010).

6.2. Individual circumstances

Some migrants lack financial resources and this may in turn lead to them being disadvantaged in seeking employment by lack of access to ICT at home (van Dijk, 2005). When they do have access at home to ICT, cost factors may impinge once again, and be manifest in a lack of access to up-to-date ICT (both hardware and software) in order to take full advantage of ICT in acquiring skills or searching for (Vranken et al., 2007). There may also be differences in access to ICT and the internet within families. However, it should not be assumed that all immigrants and people from ethnic minorities are disadvantaged in their access to ICT. An audit by Ofcom (2008a) of digital literacy of ethnic minority groups in the UK showed that internet take up and mobile phone take up was higher amongst ethnic minority groups than amongst the whole UK population, even amongst those groups (such as Pakistanis) with relatively poor labour market performance.

⁶³ See http://www.finfo.dk/work-en?set_language=en

⁶⁴ See <http://www.tgd.de/> providing a range of information (not just employment and training) for Turks in Germany.

⁶⁵ See www.powroty.gov.pl

Some initiatives with a primary objective of enhancing digital skills may serve another important function by providing access to hardware and software in community settings. An example is Fundacion Bip Bip in Spain,⁶⁶ which over a ten-year period set up 2,000 classrooms with computers and internet connections, and provided ICT access to 500,000 disadvantaged individuals in order to enhance their societal integration and employability.

Even in instances where ICT is available within a household, the engagement of some individuals with ICT may be compromised by their role within the household. Cranmer (2006) showed how women's engagement with ICT may be compromised by their role as partner, housewife, daughter, sister, etc. Such differences may be even more pronounced in some cultural settings where gender divisions are especially pronounced. Hence, there has been particular interest in the role of ICT in enhancing the employability and integration of migrant women. Research in five contrasting European countries (Hungary, Italy, the Netherlands, Romania and Spain) has shown that by progressive learning and adoption of ICT, immigrant women can play a fuller and more autonomous role in society through education, social inclusion and cultural participation (Garrido et al., 2010). This research also found that lack of recognitions of qualifications and work experience achieved in migrants' home countries was an important reason why immigrant women were disproportionately employed in low skilled positions in the labour market.

Yet ICT has the potential to strengthen migrant networks – both in their home country, with diaspora communities and with local people at their destination. Borkert et al. (2009) suggest that migrant networks are powerful agents in a networked society. Such networks can provide both social and cultural capital in accessing and maintaining employment. Use of ICT can also compensate for a lack of social capital; in a study in Israel of group differences in the use of computer-mediated communication based on a sample of 1,264 internet users, Mesch (2012) found that minorities and immigrants showed greater motivation to use ICT to expand business and occupational contacts, whereas members of the majority group were more likely to use ICT to maintain existing family friendships and ties.

6.3. Employer/ organisational practices

Labour market integration measures using ICT have tended to focus on migrants, rather than on employers (Platonova and Urso, 2009). An example of an industry-led training initiative (with EU and partner co funding), partners from the educational sector in Ireland, Poland and Lithuania, is the Irish initiative, Fast Track to IT (FIT),⁶⁷ which provided IT training and job matching services for unemployed people and newly arrived migrants from Poland and Lithuania.⁶⁸

ICT could play a role in making employer recruitment and selection practices more transparent to potential applicants. It has also been suggested that specialised e-marketplaces could be created for migrants (Rissola and Centeno, 2011). One example of such an initiative is the Online Jobcentre for Foreigners in the Czech Republic,⁶⁹ which was active from 2004 until 2010, where jobs for which 'foreigner' applicants (i.e. from third countries and not just from other EU member states) were considered were advertised (most of these were unskilled) and applicants could post CVs.⁷⁰ A somewhat different example is the Ethnic Jobsite in the UK,⁷¹ which was established in 2000 with a

⁶⁶ See <http://www.fundacionbip-bip.org/mision.php>. More detail on this initiative is available in the good practice database.

⁶⁷ As noted previously, this initiative works in close collaboration with government departments and national education and training agencies, local development organisations and a host of community based organisations. More detail on this broad initiative - <http://www.fit.ie/> - and the narrower MIGRANT ICT element (focused on migrants) is available in the good practice database.

⁶⁸ Publicly available information indicates that the first ICT course aimed at migrants involved 100 Polish and Lithuanian students.

⁶⁹ See <http://www.lmi.ub.es/bridge-it/online-job-centre-foreigners-skilled-workers.html>

⁷⁰ Note that this was a standalone website: it was not linked formally with job boards in other countries.

⁷¹ See <http://www.ethnicjobsite.co.uk/aboutus.php>.

clear guiding principle to promote racial equality. It helps and supports ethnic minority job seekers find quality employment and assists organisations in their recruitment of a diverse workforce to comply with the Race Equality Duty for the public sector (Kluzer and Rissola, 2009).

Employers increasingly make use of their own websites as a tool to enhance their image as an employer of choice. Hence it is appropriate to explore the types of messages that company websites portray regarding the extent to which they welcome and value a diverse workforce. A study by Antun et al. (2007) examined the corporate websites of the 100 largest restaurant companies in the USA and through a content analysis identified ambiguities between the companies' stated diversity policies and their depiction of these policies on their websites, with specific reference to Hispanics and companies' attitudes towards Hispanics. For individuals browsing company websites in their search for work, the "feel and personality" of the Web page (Antun et al., 2007) is important in helping a potential applicant to assess whether they would 'fit in' at the workplace. The content analysis showed that although 81% of websites showed photos with multiple races, 85% did not include on the homepage a reference to the firm's commitment to diversity. Only 6% of websites provided details in Spanish (as well as English); (all of those that did so were international franchises). The results suggest an important disconnect between the intended message of being an equal opportunity employer and the actual message portrayed on the website. More generally, the findings of this study show that companies can do more, using their websites, to ensure that their equal opportunities policies are portrayed accurately on their websites, so making migrants/ ethnic minorities feel that they might 'fit in' and be valued at a particular workplace.

In the face of pressure for cost savings on recruitment, there may be concerns that any trend towards 'online only' recruitment may have implications for workforce diversity. A trade-based study, reported in 2008, of job applicants to food service and retail positions by JobApp Network,⁷² a provider of application screening and assessment tools for online and telephone in the USA, found that minorities (and women) were less likely to use the internet to apply for jobs, and more likely to use the phone: whereas nearly 81% of non-minorities applied online and 19% applied by phone, among minorities less than 59% used the internet and 41% used the phone. The results were attributed largely to access to and penetration of broadband by household income. While access to ICT changes over time, and these results are specific to a particular sector in the USA, the findings suggest that while online recruitment should complement, rather than replace, more traditional hiring methods in order to ensure that some sub-groups (including ethnic minorities/ migrants) are not disadvantaged.

Where employers advertise vacancies has an influence on the profile of applicants obtained. In news from the British Broadcasting Corporation (BBC) in 2002, the head of online recruitment reported that around half of applications were made on paper and half were online.⁷³ He indicated that online applications were of slightly quality and were more likely to be shortlisted. He attributed this to the fact that on the Web it was possible to have larger adverts (so making them more prominent) and provide more detail about positions. In order to increase applications for managerial positions from ethnic minorities (so as the BBC workforce more closely reflected the ethnic composition of the population), greater effort was being placed on advertising in publications with a wide ethnic readership.

6.4. Local contextual factors

Migrants are often disproportionately concentrated in deprived neighbourhoods and in low skilled occupations. Qualitative evidence from Newcastle upon Tyne, in the UK, suggests that geographical

⁷² See: *Nation's Restaurant News*, November 17, 2008: <http://nrn.com/article/study-online-recruiting-should-diversify-not-replace-traditional-hiring-0#ixzz1ukGndhiH>

⁷³ See 'Online candidates 'more likely to make shortlist'', *Personnel Today* 6/4/2002 - <http://www.personneltoday.com/articles/2002/06/04/12989/online-candidates-more-likely-to-make-shortlist.html>

and labour market aspirations of ethnic minority communities change over time (Stiell and Tang, 2006). The authors suggested that first and second generation ethnic minority women in Newcastle had more 'localised aspirations', and preferred the 'safety' of their neighbourhood for work and training, whereas third generation ethnic minority women had different – and geographically and occupationally wider – educational and work-related expectations.

Even where migrant integration services are provided under the auspices of the public employment service, many migrants obtain employment through social networks (see the case of Portugal in Rodriguez, 2009). ICT is of relevance here in enhancing the reach of social networks, and here it is pertinent to note also that a UK study suggests that individuals from ethnic minority groups are more likely to have a social networking profile than all adults in the UK who used the internet (Ofcom, 2008b); (albeit such sites may be used mainly for social networking purposes other than accessing employment).

When in employment, migrants may use professional networks to further their careers and provide support to their peers. Using information from 25 semi-structured interviews, Roos (2009) describes how Indian IT professionals in Belgium use the social networking site Orkut both as a means of establishing strong ties and a means of creating weak ties of interaction to help in changing jobs, networking within companies and to provide assistance to fellow Indian professionals in terms of sharing experiences and information. One interviewee noted that 'referral goes faster' via fellow professionals than via a consulting company.

6.5. Macro level factors

The regulatory regime may impact on employment of migrants, both in terms of their legal rights to access the labour market. Partners and family members (often disproportionately women) of migrants may face particular difficulty in entering employment, and ICT can play a role in providing access to education and social support, so fostering integration and employability.

Migrants/ ethnic minorities, along with other population sub-groups, are affected by government ICT policy/ initiatives to foster digital delivery of services. In Hungary, for example, which in 2006 had only 32% of households with an internet connection vis-à-vis a EU27 average of 49%, the government launched an eHungary project with the aims of decreasing the digital divide and promoting the use of e-government services to strengthen the competitiveness of underdeveloped regions and communities. Specifically the project was targeted at the most marginalised groups, including ethnic minorities (Posfai and Fejer, 2008). The first stage of the project – eHungary Programme 1.0 – involved the establishment of internet community access points. At the second stage – eHungary 2.0 – there was an emphasis on intensified local promotion of and raising awareness of e-government services and e-knowledge, guidance and personalised assistance in the use of e-services through e-counsellors, and providing high quality e-services across the country. Details of the impact of the project on ethnic minorities have not been found in the public arena, but the project is illustrative of the way in which ethnic minorities/ migrants may be a specific target of national ICT policy in delivering digital services more broadly.

More generally, ICT has a particular role to play in providing access to information about the regulatory regime regarding migration and employment, and the welfare and institutional regime. Macroeconomic factors also play a role in availability of funding to support the activities of intermediaries and support agencies (as outlined in section 6.6).

6.6. The role of labour market intermediaries and support agencies

Labour market intermediaries and support agencies play an important role in providing services to support migrant integration and employability. Types of services provided by intermediaries of particular relevance here span digital literacy measures, language learning and information about employment opportunities. In general, services aim at fostering employability alongside non-work related aspects of integration, and may work in partnership with other stakeholders. There is a relative dearth of evidence to date on the impact of eInclusion (albeit the Vienna study outlined the

types of data sources needed for measurement [Codagnone, 2009]), although greater attention is being made to measuring the impact of e-inclusion intermediaries in an EC-sponsored project (MIREIA).⁷⁴

For some sub-groups the environment and location in which support is provided, and the characteristics of trainers and other users of ICT facilities is important in facilitating take up. Based on focus groups with individuals from ethnic minority groups in deprived areas in Great Britain, Owen et al. (2003) and CLES Consulting, MCCR and CEMVO (2003) have shown that South Asian women, in particular, valued support from female trainers in female only classes in a 'supportive' context in the immediate neighbourhood. However, in general, labour market intermediaries providing ICT related support (including telecentres) tend not to focus solely on a specific sub-group, but a wider population. Bearing this in mind, rich insights into the range of digital support initiatives for and by immigrants and ethnic minorities in the EU27 are provided by Kluzer et al. (2008) and by the BRIDGE-IT network (Haché et al., 2011). Kluzer et al. (2008) identified 119 such initiatives as being of particular relevance, the majority of which were led by the third sector or the public sector (sometimes in partnership). The majority of the initiatives had multiple objectives, with digital literacy and access being the most frequently mentioned focus of the initiatives (31% of all cases). 15% of cases had a focus of initiatives was on ICT training competences for employability, 16% related to ICT enabled learning/ education, 8% to local community regeneration or development, 5% focused on ICT in support of/ used by ethnic entrepreneurs, and 4% were concerned with ICT for job finding and recruitment. This indicates that employability is not the major aim of digital support initiatives aimed at immigrants and ethnic minorities, but that it may be an element in wider multi-faceted initiatives. Haché et al. (2011) document 60 good practice initiatives promoting integration of migrants and ethnic minorities through ICT. Some of the initiatives documented relate specifically to labour market and economic participation support (including anti-discrimination support, building training competencies for employability, training and searching for a job, competence assessment, and training for jobs in ICT, the media and/or the creative sector), while others focus on education and learning more generally, integration into civil society and ICT for enabling further ICT appropriation.

6.7. Overview

ICT has the potential to transform and enhance the dynamism of the bonds linking migrants with other individuals in origin and destination societies, and elsewhere. Diminescu (2008) suggests that rather than thinking of 'uprooted migrants', the concept of the 'connected migrant' is more appropriate. This paradigm shift highlights the potential of ICT to enhance the way in which migrants engage with other individuals and actors in the labour market and beyond, in a way that fosters connectivity within and between groups. Thus ICT provides a means to bridge with the host country and bond with the home country, that matches what Kloosterman and Rath (2001) term the 'mixed embeddedness' of many migrants (see also Tsatsou et al., 2011), in a way that might enhance their employability in each.

The actual and potential role of ICT in fostering the employability of migrants is most evident in enhancing individuals' digital and language skills. In the latter case, ICT can play an important complementary role alongside other learning methods. Labour market intermediaries and support agencies are active in using ICT as one means to improve the integration and employability of migrants, often alongside individuals from other groups. By contrast, there is a dearth of evidence on employer and organisational practices relating to the use of ICT for employability of migrants.

⁷⁴ See <http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/MIREIA.html>

7. CONCLUSIONS AND RESEARCH GAPS

One of the fundamental questions that this review aimed to address was whether ICT affects employability and if so, how. In relation to this, working practices as well as the work environment have changed and will continue to do so over time. Attributing this change solely to new technologies would not be accurate, but at same time and as discussed in section 1.2, it cannot be denied that developments in this area have a very influential role to play in influencing the profile of employment and ways of working. ICT developments in since the 1990s, with the advent of the internet, have considerably accelerated the rate of ICT adoption for communication and information sharing for the general population and not just for those who work in the IT sector. In this process, the world of work has become one in which using some form of ICT is increasingly fundamental even at levels that were ICT-independent until recently. In this context, it can be said that ICT has affected what individuals need to do, or be, in order to gain employment, sustain it and progress in their careers.

A challenge that emerges as a result of the introduction, adoption and use of ICT in society more generally is that of achieving digital inclusion, or seen from a different perspective, eradicating digital exclusion. In societies where ICTs such as a computer and the internet are not only ubiquitous but also increasingly the preferred means for delivering services (both publicly and privately), the risk of becoming socially excluded is one that needs to be on the social and political agenda. The fact that the number of those without access to ICT continues to decrease suggests that those who remain digitally excluded will be increasingly left out. In terms of employability, these individuals are likely to face problems accessing information about jobs (given the increasing importance of ICT for job search) and obtaining jobs (given the need for at least basic ICT skills). Moreover, they will also fail to benefit from the opportunities that can be accessed through ICT including those associated to skills acquisition and professional development.

The aim to achieve digital inclusion poses further challenges particularly when considering those at risk of exclusion such as young people, older workers and migrants. For young people, although they are typically seen as 'digital natives', there is little evidence that indicates that their ICT skills are skills that can be directly translated into employability skills. Whereas there might be some transferability, there is still a need for further support in the form of careers guidance and digital skills development. Older people, on the other hand, are more likely to lack ICT skills than young people but they may also have other knowledge and experience that means that once these skills are acquired they are used more strategically. For this group, as well as for migrants, eInclusion intermediaries providing access to ICT and support to engage with these tools is crucial. Intermediaries that adopt a holistic approach rather focusing narrowly on ICT skills are more likely to be successful in progressing individuals towards finding and maintaining employment. After all, ICT skills are not a panacea for employability but a complement to other skills, attributes and behaviours.

A common message highlighted in the consideration of the three groups that constitute the focus of this report is that young people, older people and migrants are all heterogeneous groups showing marked variations in the ICTs skills and situations of the individuals included.

From the evidence presented in previous chapters a number of research gaps and areas for further research may be identified:

- With respect to the three groups of particular interest, there is more evidence on individual circumstances than on other components of the employability framework.
- There is a relative dearth of robust evidence on the extent to which, and how, employers use ICT in recruitment and selection. Key issues here are the speed of change as ICT develops the variable penetration of ICT by sector, size of organisation and economic circumstances.

- There is also a lack of research with actual job seekers and the ways in which they use e-recruitment in practice.
- Much of the recent research on ICT facilitating new ways of working has been based on Western countries and has been quantitative in nature. To improve our understanding of these new working practices, there is a need for further qualitative research to explore in-depth issues.
- Research into the potential of ICT to enhance employability needs to be maintained to ensure that understanding keeps up-to-date with technological advances. Researching ICT can be complex as a variety of factors needed to be considered at an individual level and macro level (such as user context, skills, competences, confidence, access, resources, policy, HR strategies).
- More research is needed on the types of skills assessment and profiling tools (such as those identifying individuals requiring additional support and early intervention) to address employability of those who are less able or socially disadvantaged.
- Another area of research which would be important to exploit and that has been addressed in a limited way is in relation to employer-provided ICT training. Understanding the role of this type of training (whether for developing ICT skills per se, or using ICT as a medium for, e.g., lowering costs or increasing efficiency) would shed insight into the role of employers in supporting digital inclusion, job stability and career progression. Questions can be raised in relation to how to engage employees, what systems to use and their effectiveness. After all, as Hempell (2003) suggests, helping employees develop their ICT skills contributes, indirectly, to developing other skills such as the ability to learn “to adapt to changing tasks more easily” (p 31). Although there is evidence of employers providing training, less is known about how it is delivered, the extent of ICT adoption for this purpose or its impact. Hence, there is a research gap regarding how use of ICT for training has implications for costs, quality and effectiveness of such training.
- Conversely, there are also unanswered questions regarding how self-employed individuals access and use ICT and how they keep updated given their relatively more autonomous situation. This also relates to entrepreneurship and the use of ICT as media for accessing funding (e.g., via crowdfunding) or to establish and maintain social networks. Although there is some research in relation to the use of social media for, e.g., public relations, there is less evidence on how these practices affect individuals’ employability or whether a lack of engagement with ICT and social media would disadvantage them.
- The impact of community-based and other organisations (e.g., adult education colleges) has been investigated in other countries such as the USA (Sullivan et al., 2007; Garrido et al, 2009b; 2010). There seems to be a gap in studies looking at the role of such institutions and organisations in a European context. Previous studies have highlighted the importance of the networks created by these organisations with other training organisations, employers and governments and this is an aspect that should be taken into account.
- ‘Gamification’ and ‘serious games’ refer to the use of game-design elements or digital games to improve the experiences of users in non-game contexts (Deterding et al., 2011). Games used in this way have been suggested as a tool with potential to support social inclusion and enhance the delivery of public services and the development of skills. By using 3D content reconstruction, computer vision tools, and artificial intelligence it is possible to create learning experiences in a digital way (e.g., Doulamis et al., 2012). This report has addressed this topic in relation to young people. However, there is further scope to investigate the relationship between gamification and employability: How digital games experiences can be used to support employability? To what extent do employers take advantage of ICT to train young people? How can individuals harness games-related skills and interests to increase their employability?

In relation to young people:

- Young people and ICT for employment is an area that is currently under-researched. As mentioned in section 4.2, there is a need to investigate further how ICT initiatives can support young people more effectively and efficiently, particularly for those at risk of exclusion. This will potentially provide further contextual information to inform practices aimed at specific groups of individuals.
- Also in relation to young people, section 4.1 highlights some ways in which ICT can help to enhance employability; however, how this could be achieved and how effectively requires further research. An alternative approach to this area of study is to explore the ways in which young people's seemingly innate digital skills can be used to support other users and benefit young people as well.
- The review identified a dearth of research in relation to how local contextual factors affect the role of ICT in the employability of young people. These factors include: features of local employment; quantity and quality of jobs; quality of jobs; location of jobs; local work culture, etc. Given the anecdotal evidence suggesting that these factors play an important role in young people's employability, these local contextual factors vis-à-vis employability can be suggested as an area for further research.

In relation to older people:

- There is a lack of research focusing specifically on local contextual factors influencing use of ICT for enhancing employability. While use of ICT in recruitment and selection processes might be expected, a priori, to disadvantage older people on the basis of less developed digital skills than many young people, there is a lack of published evidence on specific impacts by age.
- While there is research on the impact of macroeconomic factors on employability of older people (see Green et al., 2012), there is a research gap concerning how macroeconomic factors impact on the role played by ICT in enhancing the employability of older people.

In relation to migrants:

- There is a lack of evidence on how the use of ICT by employers impacts on the employability of migrants. More specifically there is a research gap on how organisational practices in the workplace relating to the use and development of ICT impact on migrants' skills development vis-à-vis other groups.

REFERENCES

- AALIANCE (2009) *ALLIANCE Ambient Assisted Living Roadmap*, Deliverable 2.4.
- Adam D, Campbell-Hall V, de Hoyos M, Green A and Thomas A (2011) *Increasing digital channel use amongst Jobcentre Plus claimants*. DWP Research Report No. 776. Available at: <http://research.dwp.gov.uk/asd/asd5/rports2011-2012/rrep776.pdf> (Accessed: 18/4/2012).
- Adams L, Oldfield, K, Fellows L and Hall P. (2009) *Evaluation of the Skills Health Check Diagnostic Tool*. Coventry: Learning and Skills Council National Office. Available at: <http://dera.ioe.ac.uk/158/1/nat-shctoolevaluation-aug09.pdf> (Accessed: 30/03/2010).
- Agrawal A, Catalini C and Goldfarb A (2010) Entrepreneurial Finance and the flat-world hypothesis: Evidence from crowd-funding entrepreneurs in the arts (Working paper 10-08). Toronto: NET Institute.
- Ala-Mutka K. (2011) *Mapping Digital Competence: Towards a Conceptual Understanding*. Institute for Prospective Technological Studies. Available at: ftp://ftp.jrc.es/pub/EURdoc/JRC67075_TN.pdf (Accessed 15/01/2013).
- Ala-Mutka K. (2011) *Mapping Digital Competence: Towards a Conceptual Understanding*. Institute for Prospective Technological Studies. Available at: ftp://ftp.jrc.es/pub/EURdoc/JRC67075_TN.pdf (Accessed 15/01/2013).
- Ala-Mutka K, Broster D, Cachia R, Centeno C, Feijóo C, Haché A, Kluzer S, Lindmark S, Lusoli W, Misuraca G, Pascu C, Punie Y and Valverde JA. (2009) *The Impact of Social Computing on the EU Information Society and Economy*. Institute for Prospective Technological Studies. Available at: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=2819> (Accessed: 08/08/2012).
- All A, Bleumers L, De Grove F, Jacobs A, Marien I, Schurmans D and Van Looy J (2012) *D2: Draft Report: The State of Play of Digital Games for Empowerment and Inclusion: Opportunities and Challenges*, IBBT.
- Amundson NE and Penner K (1998) Parent involved career exploration. *The Career Development Quarterly* 47: 135.
- Amundson NE, Borgen WA, Iaquinta M, et al. (2010) Career Decisions from a Decider's Perspective. *The Career Development Quarterly* 58: 336-351.
- Anders G (2011) Work simulations solve the hiring conundrum. *The Guardian*. Available at: <http://www.guardian.co.uk/money/2011/oct/28/work-simulations-solve-hiring-conundrum> (Accessed: 20/4/12).
- Antun JM, Strick S and Thomas L (2007) 'Exploring culture and diversity for Hispanics in restaurant online recruitment efforts', *Journal of Human Resources in Hospitality and Tourism* 6 (1), 85-107.
- Argyropoulou EP, Sidiropoulou-Dimakakou D and Besevegis EG (2007) Generalized Self-Efficacy, Coping, Career Indecision, and Vocational Choices of Senior High School Students in Greece: Implications for Career Guidance Practitioners. *Journal of Career Development* 33: 316-337.
- Ariadne (2004) *Guidelines for web-based guidance*. Bucharest: Afir Publishing.
- Arksey H and O'Malley L (2005) Scoping studies: towards a methodological framework. *International Journal of Social Research Methodology* 8(1): 19-32.
- Armstrong R, Hall BJ, Doyle J and Waters E (2011) 'Scoping the scope' of a Cochrane review. *Journal of Public Health* 33(1): 147-150.
- Artess J and Papadatou A (2010) *Audit of computer-aided guidance: Towards what will be needed for 2015*. Manchester: AGCAS & HECSU.
- Aspinall A and Hegarty JR (2011) ICT for adults with learning disabilities: an organisation-wide audit. *British Journal of Educational Technology* 32, 365-372.
- Attwell G and Costa C (2009) *Integrating personal learning and working environments. Beyond Current Horizons: Technology, Children, Schools and Families*. London: DCSF/Futurelab.
- Aurelie G and Fallery B (2008) 'E-recruitment: new practices, new issues. An exploratory study', University of Montpellier.
- Autor D (2001) 'Wiring the labour market', *The Journal of Economic Perspectives* 15 (1), 25-40.
- Autor D, Katz L and Kearney MS (2006) 'The polarisation of the US labor market', *American Economic Review Papers and Proceedings* 96, 189-194.

- Autor D, Levy F and Murnane RP (2003) 'The skill content of recent technological change: an empirical investigation', *Quarterly Journal of Economics* 118, 1279-1333.
- Bailey DE and Kurland NB (2002) 'A review of telework research: findings, new directions, and lessons for the study of modern work', *Journal of Organizational Behavior* 23(4): 383-400.
- Baker PMA, Moon NW and Ward AC (2006) Virtual exclusion and telework: Barriers and opportunities of technocentric workplace accommodation policy. *Work* 27, 421-430.
- Baralou E (2010) *IT Skills: The Business Gain*. ALBA Graduate Business School. Available at: http://www.alba.edu.gr/RnD/Documents/IT_Skills_The_Business_Gain.pdf (Accessed 10/08/2012).
- Barber L (2006) *e-Recruitment Developments*, Institute of Employment Studies, Brighton.
- Barnes A and La Gro N (2009) Using ICT: a step change in career guidance or a sop to the twittering classes? In H Reid (Ed.) *Constructing the Future V: Career Guidance for Changing Contexts* (pp. 70-78). Stourbridge: ICG Publications.
- Barnes A, La Gro N and Watts AG (2010) *Developing e-guidance competences: the outcomes of a two-year European project to transform the professional development of career guidance practitioner*. Cambridge: Career Research and Development.
- Barnes S-A (2008) *Workforce development and the use of ICT in Delivering Career Guidance in the UK*. Cambridge: NICEC.
- Barnes S-A. (2012) The differential impact of ICT on employees: narratives from a hi-tech organisation. *New Technology, Work and Employment* 27, 120-132.
- Bartlett, J. and C. Miller (2011) *Truth, Lies and the Internet. A report into young peoples' digital fluency*. http://www.demos.co.uk/files/Truth_-_web.pdf?1317312220
- Bassi LJ (1994) Workplace education for hourly workers. *Journal of Policy Analysis and Management* 13: 55-74.
- Beckinsale M, Ram M and Theodorakopoulos N (2011) 'ICT adoption and ebusiness development', *International Small Business Journal* 29(3): 193-219.
- Behle H, Barnes S-A, Baldauf B, Owen D, Green A and de Hoyos M. (2012) *Examples of how ICT can support employability for young people, older people and migrants: Database of best practices*. Report prepared by the Warwick Institute for Employment Research (IER) for the Institute for Prospective Technological Studies (IPTS).
- Behle H. (2010) 'The impact of active labour market programmes on young people's mental health: possibilities and limitations' in *Youth employment and the future of work*, Editors: Evans, J. and Shen, W. Strasbourg: Council of Europe Publishing.
- Belleflamme P, Lambert T and Schwiendacker A (2011) Crowdfunding: Tapping the right crowd. CORE Discussion Paper. Belgium: Center for Operations Research and Econometrics.
- Belshaw DAJ (2011) What is 'digital literacy'? A Pragmatic investigation. *Department of Education* Unpublished thesis: Durham University, 274.
- Bendig T, Davila A and Pujol L (2012) *D2.1. Future Scenarios of Ageing at Work. Goldenworkers project*. Available at: <http://www.goldenworkers.org/index.php/public-materials/deliverables> (Accessed: 01/08/12).
- Betz NE, Borgen FH and Harmon LW (1996) *Skills confidence inventory: Applications and technical guide*, Palo Alto, CA: Consulting Psychologists Press.
- Betz NE, Borgen FH, Rottinghaus P, et al. (2003) The Expanded Skills Confidence Inventory: Measuring basic dimensions of vocational activity. *Journal of Vocational Behavior* 62, 76-100.
- Beyer S, Meek A, Kilsby M and Perry J (2008) The TATE [Through Assistive Technology to Employment] Project: Outcomes of the TATE Project for people with learning disabilities and staff. *Journal of Assistive Technologies* 2, 57-65.
- Biagi F, Cavapozzi D, Miniaci R (2013) Employment transitions and computer use of older workers. *Applied Economics* 45 (6), 687-696.
- Bimrose J (2006) The Changing Context of Career Practice: Guidance, Counselling or Coaching? *Inaugural Professorial Lecture*. Derby: Centre for Career guidance Studies, University of Derby.
- Bimrose J and Barnes S-A (2011) *New Approaches to Holistic Assessment: Discussion Paper for PES to PES Dialogue Conference*. Available at:

<http://ec.europa.eu/social/main.jsp?langId=en&catId=105&newsId=1025&furtherNews=yes>
(Accessed: 01/12/11).

- Bimrose J and Barnes S-A. (2010) *Labour market information (LMI), information communications and technologies (ICT) and information, advice and guidance (IAG): the way forward?*, London: UK Commission for Employment and Skills.
- Bimrose J, Barnes S-A and Attwell G (2010) *An Investigation into the Skills Needed by Connexions Personal Advisers to Develop Internet-based Guidance (Guidance Report)*. Reading: CfBT Education Trust.
- Bimrose J, Barnes S-A and Brown J (2005) *A Systematic Literature Review of Research into Career-related Interventions for Higher Education*. Manchester: HECSU.
- Bimrose J, Barnes S-A, Brown A, Hasluck C and Behle H (2007) *Skills Diagnostics and Screening Tools: A Literature Review (Research report 459)*. Leeds: Department for Work and Pensions/Corporate Document Services. Available:
<http://research.dwp.gov.uk/asd/asd5/rports2007-2008/rrep459.pdf> (Accessed 11/10/2012).
- Bimrose J, Wilson R, Elias P, Barnes S-A, Millar P, Attwell G, Elferink R, Rustemeier P, Beaven R, Hay G and Dickerson A (2012). 'LMI for all' *Career Database Project - Processes Adapted and Lesson Learned*. London: UK Commission for Employment and Skills.
- Birkin R, Haines V, Hitchcock D, Fox D, Edwards N, Duckworth S, Gleeson R, Navarro T, Hondroudakis A, Foy T and Meehan M (2004) Can the activity matching ability system contribute to employment assessment? An initial discussion of job performance and a survey of work psychologists' views. *Journal of Occupational Psychology, Employment & Disability* 6, 51-66.
- Black DA, Galdo J and Smith JA (2007) Evaluating the Worker Profiling and Reemployment Services System Using a Regression Discontinuity Approach. *The American Economic Review* 97, 104-107.
- Blades R, Fauth B and Gibb J (2012) Measuring Employability Skills. A rapid review to inform development of tools for project evaluation. London National Children's Bureau.
- Bönke D, Eckhard A, Jörg Z, and Constanta P (2000) *Information age business and knowledge-driven virtual market places*, in Standford-Smith B and Kidd PT (eds) *Business: Key Issues, applications and technologies*, pp.339-345.
- Borkert M, Cingolani P and Premazzi V (2009) 'The State of the Art of Research in the EU on the Uptake and Use of ICT by Immigrants and Ethnic Minorities (IEM)'. Seville: Joint Research Centre – IPTS, European Commission.
- Bradbrook, G. et al. (2008) Meeting their potential: the role of education and technology in overcoming disadvantage and disaffection in young people. Available:
http://eprints.lse.ac.uk/4063/1/Meeting_their_potential.pdf (Accessed: 14/5/2012).
- Bradley-Johnson S (1997) Brigance Diagnostic Life Skills Inventory. *Psychology in the Schools* 34: 382-384.
- Braun F, Richter U and Marquardt E (2007) Unterstützungsangebote in Deutschland für bildungsbenachteiligte Jugendliche beim Übergang von der Schule in den Beruf. Expertise im Auftrag der Universität Luxemburg. Available:
http://download.intern.dji.de/bibs/9_8596_expertise_lux.pdf
- Brencic V and Norris JB (2012) 'Employers' online recruitment and screening practices', *Economic Inquiry* 50 (1), 94-111.
- Bricout JC (2004) Using telework to enhance return to work outcomes for individuals with spinal cord injuries. *Neurorehabilitation* 19, 147-159.
- Brooke L (2009) Prolonging the careers of older information technology workers: continuity, exit or retirement transitions? *Ageing & Society*, Feb. 2009, 29 (2), 237-256.
- Brynin M (2006) 'Gender, technology and jobs', *British Journal of Sociology* 57 (3), 65-84.
- Bryson A and Kasparova D (2003) Profiling benefit claimants in Britain: A feasibility study (Department for Work and Pensions Research Report 196). Leeds: Corporate Document Services.
- Bubany ST, Krieschok TS, Black MD, et al. (2008) College Students' Perspectives on Their Career Decision Making. *Journal of Career Assessment* 16: 177-197.

- Burnett S, Gatrell C, Cooper C, et al. (2011) Fatherhood and Flexible Working: A Contradiction in Terms? In: Kaiser S, Ringlstetter MJ, Eikhof DR, et al. (eds) *Creating Balance*. Berlin and Heidelberg: Springer 157-171.
- Burris BH (1998) Computerization of the Workplace. *Annual Review of Sociology* 24: 141-157.
- Campbell D (2002) The history and development of the Campbell Interest and Skill Survey. *Journal of Career Assessment* 10: 150-168.
- Careers Profession Alliance (2011) *CPA Final Project report*. Careers Profession Alliance.
- Careers Profession Task Force (2010) *Towards a strong careers profession: An independent report to the Department for Education*. London: Department for Education.
- Carlson DS, Grzywacz JG and Kacmar KM (2010) The relationship of schedule flexibility and outcomes via the work-family interface. *Journal of Managerial Psychology* 25: 330 – 355.
- Carretero S, Stewart J, Centeno C, Barbadella F, Lamura G. and Schmidt A (2012) *Can technology – based services support long-term care challenges in home care? Analysis of evidence from social innovation good practices across the EU CARICT Project Summary Report*.
- CEDEFOP (2006) *ICT Skills Certification in Europe*. Available at: http://www.cedefop.europa.eu/etv/Upload/Information_resources/Bookshop/431/6013_en.pdf (Accessed: 12/05/2012).
- CEDEFOP (2009) *Terminology of European Education and Training Policy: A Selection of 100 Key Terms*. European Centre for the Development of Vocational Training. Available at: http://www.cedefop.europa.eu/EN/Files/4064_en.pdf (Accessed: 29/02/2012).
- CEPIS (2005) *ICT-Skills Certification in Europe*. report prepared for the Council of European Professional Informatics Societies Available at: http://www.ictliteracy.info/rf.pdf/eSkills_Certification_final_report.pdf (Accessed: 4/04/2012).
- CEPIS (2006) *ICT Skills Certification in Europe*. Available at: http://www.cedefop.europa.eu/etv/Upload/Information_resources/Bookshop/431/6013_en.pdf (Accessed 10/08/2012).
- Charness N, Czaja SJ and Sharit J (2007) Age and technology for work. In Shultz KS and Adams GA. (Eds) *Aging and work in the 21st century*, 225–249. Mahwah, NJ: Erlbaum.
- Chartrand JM, Borgen FH, Betz NE and Donnay D (2002) Using the Strong Interest Inventory and the Skills Confidence Inventory to Explain Career Goals. *Journal of Career Assessment* 10: 169-189.
- Chesley N (2010) Technology use and employee assessments of work effectiveness, workload, and pace of life. *Information, Communication & Society* 13, 485-514.
- CIPD (2009) *Recruitment, retention and turnover: Annual Survey Report 2009*. London.
- CIPD (2011), The Chartered Institute of Personnel and Development. Available at: <http://www.cipd.co.uk/hr-resources/factsheets/flexible-working.aspx> (Accessed: 19/4/2012).
- Clark R (2011). *Re-presenting Labour Market Information data sources: What we have learned from the SALAMI project*. Nottingham: The University of Nottingham.
- Clark R and Coolin K (2011). *Labour Market Information to support learners making course choices*. Nottingham: Leap Ahead LLN.
- CLES Consulting, MCCR & CEMVO (2003) ‘Supporting access to ICT for BME groups in deprived areas: approaches to good practice’, *Department for Education and Skills Research Report 388*, DfES Publications, Nottingham.
- Closs SJ and Miller IM (1997) *IT in Guidance: Careers Guidance at a Distance. An evaluation of desktop video conferencing technology*. Sudbury: Department for Education and Employment.
- Cobbett D, Dodd F, Miller S, et al. (2009) *Skills Needs and Training Supply for Career Guidance – A Gap Analysis*. Newcastle-upon-Tyne: LLUK and UKCES.
- Cober RT and Brown D (2006) *2006 Direct Employers Association recruiting trends survey*, Booz Allen Hamilton, Washington DC. Available at <http://www.jobcentral.com/DESurvey.pdf> (Accessed: 14/06/2012).
- Cobo Romani JC (2009) *Strategies to Promote the Development of E-competencies in the Next Generation of Professionals: European and International Trends*. Monograph No.13, Communication and Information Technology Department, Latin- American Faculty of Social

- Sciences, Campus Mexico (FLACSO-Mexico). Available at: <http://www.cardiff.ac.uk/socsi/research/researchcentres/skope/publications/monographs/monograph13.pdf> (Accessed: 25/01/2012).
- Codagnone C (2009) *Vienna Study on Inclusive Innovation for Growth and Cohesion: Modelling and demonstrating the impact of inclusion – Executive Report*, European Commission, Brussels.
- Codagnone C (Ed)(2009). *Inclusive Innovation for Growth and Cohesion: Modelling and demonstrating the impact of inclusion*. Available: http://ec.europa.eu/information_society/activities/einclusion/library/studies/eco_impact/index_en.htm Accessed: (14/06/2012).
- Codagnone C and Kluzer S (2011) *ICT for the Social and Economic Integration of Migrants into Europe*, European Commission, JRC IPTS, Luxembourg.
- Cogoi C (2005) *Using ICT in Guidance: Practitioner Competences and Training. Report of an EC Leonardo project on ICT skills for guidance counsellors*. Bologna: Online Edizione.
- Collin S and Karsenti T (2012) 'Facilitating linguistic integration of immigrants: an overview of ICT tools', *Issues in Informing Science and Information Technology* 9.
- Colpitts T and Smith JA (2002) Targeting Reemployment Services in Canada: Service Outcome Measurement System (SOMS) Experience. In: Eberts RW, O'Leary CJ and Wandner SA (eds) *Targeting Employment Services*. Kalamazoo, MI: W.E. Upjohn Institute, 283-308.
- Connor H, Hillage J, Millar J and Willison R (2001) An Assessment of Skill Needs in Information and Communication Technology <http://www.employment-studies.co.uk/pdflibrary/dfessd5.pdf>
- Cranmer S (2006) *How Families Use the Internet in the Home*, Unpublished PhD thesis, University of London, Institute of Education.
- Creed PA, Patton W and Hood M (2010) Career development and personal functioning differences between work-bound and non-work bound students. *Journal of Vocational Behavior* 76: 37-41.
- Crompton R and Lyonette C (2011) Women's career success and work-life adaptations in the accountancy and medical professions in Britain. *Gender, Work & Organization* 18: 231-254.
- Crump B. and McIlroy A (2003) 'The digital divide: Why the "don't-want-tos" won't compute: Lessons from a New Zealand ICT project', *First Monday* 8(12): [Online].
- Cullen J, Cullen C, Hamilton E and Maes V (2010) *Mapping and Assessing the Impact of ICT-based Initiatives for the Socio-economic Inclusion of Youth at Risk of Exclusion - Conceptual Overview on Youth at Risk and ICT*. Institute for Prospective Technological Studies (IPTS). Unpublished interim report.
- Currie J and Eveline J (2011) E-technology and work/life balance for academics with young children. *Higher Education* 62, 533-550.
- Cushman M and McLean R (2008) Exclusion, inclusion and changing the face of information systems research. *Information, Technology & People* 21, 213-221.
- Dávila A, Ikonen V, Gheno I, Leikas J, Kantola K and Pujol L. (2012) *Needs and Trends Analysis Report*. Available at: <http://www.goldenworkers.org/index.php/public-materials/deliverables> (Accessed: 01/08/12).
- Deterding S, Dixon D, Khaled R and Nacke L (2011) From game design elements to gamefulness: defining "gamification". *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments* 9-15.
- Devins T, Bickerstaffe T, Nunn A, Mitchell B, with McQuaid R, Egdell V and Lindsay C (2011) *The Role of Skills from Worklessness to Sustainable Employment with Progression, UKCES Evidence Report* 38), Wath-upon-Deane.
- Diakonisches Werk der Evangelischen Kirche im Rheinland (not dated) Vernetzung und neue Angebotsformen in der Senioren-Internetarbeit NRW Düsseldorf. pp. 43-60. *6 Jahre Senioren Online*. http://www.forum-seniorenarbeit.de/media/custom/373_1465_1.PDF?1133433734
- Diminescu D (2008) The connected migrant: and epistemological manifesto. *Social Science Information* 47, 565-579.
- Diminescu D, Hepp A, Welling S, Maya-Jariego I. and Yates S (2009) *ICT Supply and Demand in Immigrant and Ethnic Minority Communities in France, Germany, Spain and the United Kingdom*, European Commission, JRC IPTS, Luxembourg.

- Dineen BR, Ling J, Ash SR, and DelVecchio D (2007) 'Aesthetic properties of message communication: navigating the dark side of Web recruitment', *Journal of Applied Psychology* 92 (2), 224-234.
- Doulamis A, Liarakis F, Petridis P and Miaoulis G (2012) Serious Games for Cultural Applications. *Studies in Computational Intelligence* 374: 97-115.
- Driessen M, van Emmerik J, Fuhri K, Nygren-Junkin L and Spotti M (2011) *ICT Use in L2 Education for Adult Migrants: A qualitative study in the Netherlands and Sweden*, European Commission JRC IPTS, Luxembourg.
- Drucker PF (1999) Knowledge-Worker Productivity: The Biggest Challenge, *California Management Review* 41, 78-94.
- du Rausas M, Manyika J, Hazan E, Bughin J, Chui M and Said R. (2011) Internet Matters: The Net's sweeping impact on growth, jobs, and prosperity. McKinsey Global Institute. Available: www.mckinsey.com/mgi/publications/internet_matters/pdfs/MGI_internet_matters_full_report.pdf Accessed 24/10/2011.
- Eberts RW and O'Leary CJ (2002) A Frontline Decision Support System for Georgia Career Centers. Kalamazoo (MI), USA: W.E. Upjohn Institute for Employment Research, 77.
- ECDL Foundation (2011a) *Building a Digitally Literate Europe through Education*. ECDL Foundation Position Papers. Available at: <http://www.ecdl.org/media/White%20Paper%20-%20Digital%20Literacy%20and%20ECDL%20Foundation%20Certifications.pdf> (Accessed 09/08/2012).
- ECDL Foundation (2011b) *Promoting Inclusive Economic Growth and Employment through Enhanced ICT Skills and Knowledge*. ECDL Foundation Position Papers. Available at: http://www.ecdl.org/media/ECDL_Position_Paper-e-Productivity1.pdf (Accessed 09/08/2012).
- EESC (2011) Opinion of the European Economic and Social Committee on 'The economic crisis, education and the labour market' (own-initiative opinion) Official Journal of the European Union, C 318/50 <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:C:2011:318:0050:0055:EN:PDF>
- Enterprising Careers and IER (2006) *Labour market information for career decision-making: A report to Highlands and Islands Enterprise*. Glasgow: University of Strathclyde.
- Ettinger E and Kijl B (2009) Service innovation in online recruiting. *Communications of the IBIMA* 10, 174-185.
- Eurofound (2007) *European Industrial Relations Dictionary*. Available at: <http://www.eurofound.europa.eu/areas/industrialrelations/dictionary/definitions/TELEWORK.htm> (Accessed: 19/04/2012).
- Eurofound (2010) *Telework in the European Union*. Available at: <http://www.eurofound.europa.eu/docs/eiro/tn0910050s/tn0910050s.pdf> 9Accessed: 14/06/2012).
- Eurofound (2011) *Company initiatives for workers with care responsibilities for disabled children or adults* (Authors: Kevin Cullen and Karsten Gareis)
- Eurofound (2012) *Fifth European Working Conditions Survey*, Publications Office of the European Union, <http://www.eurofound.europa.eu/surveys/ewcs/2010/index.htm> (Authors: Agnès Parent-Thirion, Greet Vermeylen, Gijs van Houten, Maija Lyly-Yrjänäinen, Isabella Biletta, Jorge Cabrita, with the assistance of Isabelle Niedhammer).
- European Alliance on Skills for Employability. (2008) *New Skills for New Jobs in Europe*. Available at: http://www.employabilityalliance.eu/docs/2010_EA_Brochure_A4_08.pdf. (Accessed: 10/05/2012).
- European Commission (2012) 'Exploiting the employment potential of ICTs', Commission Staff Working Document SWD (2012) 96 Final, Strasbourg. Available: http://www.google.co.uk/url?sa=t&rct=j&q=exploiting%20the%20employment%20potential%20of%20icts&source=web&cd=1&cad=rja&ved=OCCgQFjAA&url=http%3A%2F%2Fec.europa.eu%2Fsocial%2FBlobServlet%3FdocId%3D7628%26langId%3Den&ei=7MRuUN67DqG_0QX6gIH0AQ&usq=AFQjCNFkAR2I7Hu37wh9aoV8hKj09eURew (Accessed: 05/10/2012).

- Eurostat (2011) *Internet use in households and by individuals in 2011*. Statistics in focus 66/2011 (Author: Heidi Seybert). <http://epp.eurostat.ec.europa.eu>
- Eurostat (2012) *Active ageing and solidarity between generations. A statistical portrait of the European Union 2012*. http://epp.eurostat.ec.europa.eu/portal/page/portal/product_details/publication?p_product_code=KS-EP-11-001
- Evangelista L (2003) *How is the internet changing careers guidance? First results of a survey amongst European Careers Advisers*. Available at: http://www.guidanceforum.net/pages/res_general/surveyresults.pdf (Accessed: 01/11/03).
- Eveland AP, Conyne RK and Blakney VL (1998) University students and career decidedness: effects of two computer-based career guidance interventions. *Computers in Human Behavior* 14:531-541.
- Expert Group on Future Skills Needs (2008) *Future Requirement for High-level ICT Skills in the ICT Sector*. Available at: http://www.skillsireland.ie/media/egfsn080623_future_ict_skills.pdf (Accessed: 29/10/2012).
- Eynon R and Malmberg L-E (2011) A typology of young people's Internet use: Implications for education. *Computers & Education* 56: 585-595.
- Facer K and Furlong R (2001) Beyond the Myth of the 'Cyberkid': Young People at the Margins of the Information Revolution, *Journal of Youth Studies*, 4: 451-469.
- Facer N and Selwyn K (2007) 'Beyond the Digital Divide: Rethinking Digital Inclusion for the 21st Century', Futurelab. http://www2.futurelab.org.uk/resources/documents/opening_education/Digital_Divide.pdf
- Fähling J, Blohm I, Krcmar H, Marco Leimeister J and Fischer J (2011) Accelerating customer integration into innovation processes using Pico Jobs. *International Journal of Technology Marketing* 6130--147.
- Faulkner W. (2004) *Strategies of Inclusion*. Gender and the Information Society http://www.rcss.ed.ac.uk/sigis/public/documents/SIGIS_D08_Final_Public.pdf
- Felstead A (2012) Rapid change or slow evolution? Changing places of work and their consequences in the UK. *Journal of Transport Geography* 21, 31-38.
- Felstead A, Fuller A, Jewson N and Unwin L (2011) *Working to learn, learning to work, Praxis Issue number 7*. Wath-upon-Deerne: UK Commission for Employment and Skills.
- Ferrari A. (2012) *Digital Competence in Practice: An Analysis of Frameworks*. Institute for Prospective Technological Studies. Available at: <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=5099> (Accessed 15/01/2013).
- Fisseler B. and Bühler C (2007) Accessible E-Learning and Educational Technology. Extending Learning Opportunities for People with Disabilities [http://www.telelearn.org/warehouse/242_Final_Paper_\(001725v1\).pdf](http://www.telelearn.org/warehouse/242_Final_Paper_(001725v1).pdf)
- Ford GS (2011a) Internet use and labor market participation: additional insights from old and new data. *Phoenix Center Perspectives* 11/04. Available at <http://www.phoenix-center.org/perspectives/Perspective11-04Final.pdf> (Accessed: 09/05/11).
- Ford GS (2011b) Mobile broadband and job search: an empirical test. *Phoenix Center Perspectives* 11/05. Available at <http://www.phoenix-center.org/perspectives/Perspective11-05Final.pdf> (Accessed: 09/05/11).
- Forster N. (2000) The Potential Impact of Third Wave Technologies on Organisations. *Leadership and Organization Development Journal* 21: 254 - 262.
- Fountain C (2005) Finding a job in the internet age. *Social Forces* 83, 1235-1262.
- FreshMinds (2008) *Understanding Digital Exclusion*. Research Report prepared for the Department for Communities and Local Government, UK. Available at: <http://www.communities.gov.uk/publications/communities/understandingdigitalexclusion> (Accessed: 03/04/2012).
- Friedberg (2003) The impact of technological change on older workers: evidence from data on computer use. *Industrial and Labor Relations Review* 56, 511-529.

- García-Lizana F and Muñoz-Mayorga I (2010) Telemedicine for depression: a systematic review. *Perspectives in Psychiatric Care* 46, 119-126.
- Garrido M, Rissola G, Rastrelli M and Diaz A (2010) *Immigrant women, e-skills and employability in Europe: The case of Hungary, Italy, the Netherlands, Romania and Spain*, Technology and Social Change Group, University of Washington, Seattle.
- Garrido M, Rissola G, Rastrelli M, Diaz A and Ruiz J (2009a) *Immigrant women, e-skills and employability in Europe: The case of Hungary, Italy, the Netherlands, Romania, and Spain*. Available at: http://www.ictwomendirectory.eu/digitalcity/servlet/PublishedFileServlet/AAAARIUI/Immigrantwomen_e-skills_and_employability.pdf (Accessed: 03/04/2012).
- Garrido M, Rothschild C and Oumar T (2009c) *Technology for Employability in Washington State: The Role of ICT Training on the Employment, Compensation and Aspirations of Low-Skilled, Older and Unemployed Workers*. Center for Information and Society, University of Washington. Available at: https://dlib.lib.washington.edu/dspace/bitstream/handle/1773/16298/TASCHA_Washington-State_2009.pdf?sequence=1. (Accessed: 13/06/2012).
- Garrido M, Sullivan J and Gordon A (2010) *Understanding the links between ICT skills training and employability: an analytical framework*, Technology and Social Change Group, University of Washington.
- Garrido MA, Sullivan J, Gordon A and Coward C (2009b) *Researching the Links between ICT and Employability: An Analytical Framework*. Available at: https://digital.lib.washington.edu/dspace/bitstream/handle/1773/16310/TASCHA_ICT-Employability-Framework_2009.pdf?sequence=1 (Accessed: 04/04/2012).
- Gillard H, Mitev N and Scott S (2007) ICT Inclusion and Gender: Tensions in Narratives of Network Engineer Training. *The Information Society* 23, 19-37.
- Goodison T, Green A, Owen D and Rooney S (2004) *ICT and employability: A case study of clients using UK online centres*. Department for Education Research Report No. 534. Available at: <https://www.education.gov.uk/publications/standard/publicationDetail/Page1/RR534#downloadableparts> (Accessed 2/04/2012).
- Goos M and Manning A (2003) *Lousy and lovely jobs: the rising polarization of working in Britain*. Paper produced by the Centre for Economic Performance, Labour Markets Programme. London: London School of Economics.
- Gopalia A (2011) 'Effectiveness of online recruitment and selection process: a case of Tesco', Available at: <http://www.pbr.co.in/Brochure/0002.pdf> (Accessed: 18/4/12).
- Goyal A (2011) Developing women: Why technology can help. *Information Technology for Development* 17, 112-132.
- Granovetter MS (1974) *Getting a Job: A Study of Contacts and Careers* Cambridge, Mass.: Harvard University Press.
- Gray M and Agllias K (2009) Australia: Contemporary Issues and Debates on the Social Welfare System. In: Powell JL and Hendricks J. (eds) *The Welfare State in Post-Industrial Society: A Global Perspective*. New York: Springer, 271-291.
- Greatbatch D, Murphy R, Wilmut J, Lewis P, Macintosh H. and H. Tolley (2004) Generic Employability Skills – Aspirations, Provision and Perception http://www.nottingham.ac.uk/shared/shared_cdell/pdf-reports/gesfinalreport.pdf
- Green A E, de Hoyos M, Barnes S-A, Owen D, Baldauf B and Behle H (2012) Literature Review on Employability, Inclusion and ICT, Report 1: The Concept of Employability, with a specific focus on young people, older workers and migrants JRC Technical Notes Series JRC, Institute for Prospective Technological Studies, Joint Research Centre, European Commission.
- Green AE, de Hoyos M, Li Y and Owen D (2011) Job Search Study: Literature Review and analysis of the Labour Force Survey. *Department for Work and Pensions Research Report 726*. London: DWP.

- Green AE, Li Y, Owen D and de Hoyos M (2012) Inequalities in use of the internet for job search: similarities and contrasts by economic status in Great Britain, *Environment and Planning A* 44 (10), 2344-2358.
- Green H and Hannon C (2007) *Their Space: Education for a digital generation*. London: Demos.
- Greenbank P and Hepworth S. (2008) *Working class students and the career decision-making process: A qualitative study*. Manchester: HECSU.
- Greenhill B (2008) The digital landscape and new education providers. Beyond Current Horizons: Technology, Children, Schools and Families. London: DCSF/Futurelab.
- Gregory A and Milner S (2011) Fathers and work-life balance in France and the UK: policy and practice. *International Journal of Sociology and Social Policy* 31, 34-52.
- Guest editors ITID (2009) 'Deconstructing ICT Skills and Employability', *Information Technologies & International Development* 5(2): iii-vii.
- Guiral A and Le Corvec A (2006). *Guia para la Cultura Digital de los Inmigrantes en Europa. Iniciativas y Recomendaciones*, Fundació Ciutat de Viladecans, Viladecans.
- Haché A, Rissola G, Le Corvec A and Willem C (2011) *Migrants, Ethnic Minorities and ICT: Inventory of Good Practices in Europe the promote ICT for socio-economic integration in culturally diverse contexts*, Bridge-IT Network, <http://www.bridge-it-net.eu/>
- Hadass YS (2003) 'The Effect of Internet Recruiting on the Matching of Workers and Employers', Available at: <http://time.dufe.edu.cn/wencong/laboreconomics/hadass.pdf> (Accessed: 18/04/12).
- Hansen K (2010) 'How the Real-Time Web Changes Job Search: The Internet as One Giant Job Board', *A Quintessential Careers Annual Report 2010*. http://www.quintcareers.com/real-time_job-search.html (Accessed: 09/05/12)
- Hanson S and Pratt G (1991) 'Job search and the occupational segregation of women', *Annals of the Association of American Geographers* 81(2) 229-253.
- Hanson S and Pratt G (1992) 'Dynamic dependencies: a geographic investigation of local labor markets', *Economic Geography* 68 (4), 373-405.
- Hargittai E (2002) Second-level digital divide: Differences in people's online skills. *First Monday* 7(4).
- Hasluck C (2004) *Targeting Services in the Individual Customer Strategy: The Role of Profiling. A Review of Research Evidence*. London: Department for Work and Pensions.
- Hasluck C (2008) The Use of Statistical Profiling for Targeting Employment Services: The International Experience. In GD Domenico and S Spattini (Eds.), *New European Approaches to Long-Term Unemployment: What role for public employment services and what market for private stakeholders?* (pp. 39-56). Netherlands: Kluwer Law International BV.
- Hedberg JG (2011) Towards a disruptive pedagogy: changing classroom practice with technologies and digital content. *Educational Media International* 48(1): 1-16.
- Helsper EJ (2008) *Digital Inclusion: An Analysis of Social Disadvantage and the Information Society*, Department for Communities and Local Government, London.
- Helsper EJ and Eynon R (2010) Digital natives: Where is the evidence? *British Educational Research Journal* 36(3): 503-520.
- Hempell T (2003) *Do Computers Call for Training? Firm-level Evidence on Complementarities between ICT and Human Capital Investment*. Centre for European Economic Research (ZEW), Discussion Paper No. 03.20. Available at: <ftp://ftp.zew.de/pub/zew-docs/dp/dp0320.pdf> (Accessed: 10/5/2010).
- Hirschi A and Läge D (2008) Increasing the career choice readiness of young adolescents: an evaluation study. *International Journal for Educational and Vocational Guidance* 8: 95-110.
- Holman J and Finegold P (2010) *STEM Careers Review*. Report to the Gatsby Charitable Foundation. Available: <http://www.nationalstemcentre.org.uk/res/documents/page/STEM%20CAREERS%20REVIEW%20NOV%202010.pdf>
- Hooley T, Hutchinson J and Watts AG (2010) *Careering through the Web*. Wath-upon-Deerne, South Yorkshire: UKCES.

- Hughes KD and Lowe GS (2000) Surveying the “Post-Industrial” Landscape: Information Technologies and Labour Market Polarization in Canada*. *Canadian Review of Sociology/Revue canadienne de sociologie* 37: 29-53.
- ICT Task Force Working Group (2006) *Topic Paper of the Working Group 5: Skills and Employability*. European Commission. Available at: http://ec.europa.eu/enterprise/sectors/ict/files/wg5_report.pdf (Accessed: 18/04/2012).
- Illegems V and Verbeke A (2004) 'Telework: What does it mean for management?', *Long Range Planning* 37(4): 319-334.
- ILO (2001) Generating decent work for young people: An Issues Paper, prepared for the Secretary-General's Youth Employment Network., www.un.org/esa/socdev/youthemployment/
- IPTS (2010) *Digital Literacy Workshop Report: Digital Competences for Social Inclusion Actors and Intermediaries*. Available at: ftp://ftp.jrc.es/pub/EURdoc/JRC65355_TN.pdf (Accessed: 3/04/2012).
- IPTS (2012) *Institute for Prospective Technological Studies, Joint Research Centre, European Commission*. <http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/intermediaries.html>.
- Janeiro IN and Marques JF (2010) Career coping styles: Differences in career attitudes among secondary school students. *International Journal for Educational and Vocational Guidance* 10: 35-48.
- Johnston B and Webber S (2006) 'As we may think: Information literacy as a discipline for the information age', *Research Strategies* 20(3): 108-121.
- Joling C and Kraan K (2008) Use of technology and working conditions in the European Union. <http://www.eurofound.europa.eu/surveys/ewcs/2005/secondaryanalysis.htm>
- Josue T, Gayondato T and Kim MH (2009) Policy Framework on the Retraining for Reskilling of Older Workers through Specialized TVET Programmes. In: Maclean R and Wilson D (eds) *International Handbook of Education for the Changing World of Work*. Netherlands: Springer, pp. 2385-2399.
- Karla J, Friedrichs HB and Schwioren W (2008) 'Analysis of the importance of e-recruiting for German companies', IADIS International Conference WWW, Internet 2008.
- Keep E and James S (2010) 'Recruitment and selection - the great neglected topic', *SKOPE Research Paper* 88, Universities of Cardiff and Oxford.
- Klecun E (2008) 'Bringing lost sheep into the fold: Questioning the discourse of the digital divide', *Information, Technology & People* 21(3): 267-282.
- Klein (2005) Direkte Kosten mangelnder Ausbildungsreife in Deutschland IW-Trends – Vierteljahresschrift zur empirischen Wirtschaftsforschung, (32) http://www.forum.mpg.de/archiv/veranstaltung3/hintergrund/institut_der_deutschen_wirtschaft.pdf
- Kloosterman RC and Rath J (2001) 'Immigrant entrepreneurs in advanced economies: mixed embeddedness further explored', *Journal of Ethnic and Migration Studies* 27 (2), 189-201.
- Kluve J (2006) The Effectiveness of European Active Labour Market Policy. IZA Discussion Paper No. 2018: <http://cosmic.rrz.uni-hamburg.de/webcat/hwwa/edok06/de2070t/dp2018.pdf>
- Kluzer S and Rissola G (2009) 'E-inclusion policies and initiatives in support of employability of migrants and ethnic minorities in Europe', *Information Technologies and International Development* 5 (2), 67-76.
- Kluzer S, Ferrari A and Centeno C (2011) *Language Learning by Adult Migrants: Policy Challenges and ICT Responses. Policy Brief*. Luxembourg: Publications Office of the European Union http://ftp.jrc.es/EURdoc/JRC63889_TN.pdf
- Kluzer S, Hache A, and Codagnone C (2008) *Overview of Digital Support Initiatives for/by Immigrants and Ethnic Minorities in the EU27*, Office for Official Publications of the European Communities, Luxembourg.
- Koltay T (2011) 'The media and the literacies: media literacy, information literacy, digital literacy', *Media, Culture & Society* 33(2): 211-221.

- Koning J (2007) The Evaluation of Active Labour Market Policies: Measures, Public Private Partnerships and Benchmarking.
- Koumoundourou GA (2004) The reliability and validity of the Greek version of the task-specific occupational self-efficacy scale. *British Journal of Guidance & Counselling* 32: 75-92.
- Kozma R and Wagner DA (2006) Reaching the most disadvantaged with ICT: What works? In: OECD (ed) *Education and Training Policy ICT and Learning Supporting Out-of-School Youth and Adults: Supporting Out-of-School Youth and Adults* OECD, National Center on Adult Literacy.
- Kubicek H. and Welling S (2001) Studie zur betreuten Internetnutzung im Land Bremen. Bestandsaufnahme – Defizitanalyse – Handlungsoptionen. Studie für die Bremer-Regionale-Informationsgesellschaft-Strategieentwicklung (BRISE).
http://www.ifib.de/publikationsdateien/brise_studie.pdf
- Kuhn P and Mansour H (2011) 'Is internet job search still effective?', IZA Working Paper.
- Kuhn P and Skuterud M (2000) 'Job search methods: internet versus traditional', *Monthly Labor Review* 123 (10), 3-11.
- Kuhn P and Skuterud M (2004) 'Internet job search and unemployment durations', *The American Economic Review* 94 (1) 218-232.
- Kukulska-Hulme A. (2012) How should the higher education workforce adapt to advancements in technology for teaching and learning? *Internet & Higher Education* 15(4): 247-254.
- Kutscher N, Klein A, Lojewski J, and Schäfer M (2009) Medienkompetenzförderung für Kinder und Jugendliche in benachteiligten Lebenslagen. Konzept zur inhaltlichen, didaktischen und strukturellen Ausrichtung der medienpädagogischen Praxis in der Kinder- und Jugendarbeit
http://www.diskutiere.de/diskutiere_wp/wp-content/uploads/lfm_medienkompetenzfoerderung.pdf
- Lai Y and Burchell B (2008) Distributed work: communication in an 'officeless firm'. *New Technology, Work and Employment* 23, 61-76.
- Lease SH and Dahlbeck DT (2009) Parental Influences, Career Decision-Making Attributions, and Self-Efficacy: Differences for Men and Women? *Journal of Career Development* 36, 95-113.
- Lee CC, Czaja S and Sharit J (2008) "Training Older Workers for Technology-Based Employment." *Educational Gerontology* 35 (1), 15-31.
- Lehmann IS (2010) 'Footprints in Cyberspace: Employers' Use of the Internet to Screen Job Applicants', *Counselors and Educators Journal* 3(2): 26-35.
- Leikas J (2009) Life-based design: a holistic approach to designing human-technology interaction, VTT Publications. Edita Prima Oy. <http://www.vtt.fi/publications/index.jsp>
- Lenhart A and Madden M (2005) Teen Content Creators and Consumers. Washington DC: Pew Internet and American Life Project.
- Leonardi PM (2007) Activating the Informational Capabilities of Information Technology for Organizational Change. *Organization Science* 18, 813 - 831.
- Levac D, Colquhoun H and O'Brien K (2010) Scoping studies: advancing the methodology. *Implementation Science* 5(1): 69.
- Levy F and Murnane RJ (2004) *The new division of labor: How computers are creating the next job market*, Princeton University Press, Princeton NJ.
- Lindsay C (2005) 'Employability, services for unemployed job seekers and the digital divide', *Urban Studies* 42(2): 325-339.
- Lipp R (2005) Job Seeker Profiling: The Australian Experience. Nuremberg: Keynote EU-Profiling seminar.
- Li-Tsang CWP, Yeung SSS, Choi JCY, Chan CCH and Lam CS (2006) The effect of systematic information and communication technology (ICT) training programme for people with intellectual disabilities. *British Journal of Developmental Disabilities* 52, 3-18.
- Livingstone S and Bober M (2004) UK children go online. Surveying the experiences of young people and their parents. London: LSE Research Online
<http://eprints.lse.ac.uk/395/1/UKCGOsurveyreport.pdf>

- Loretto W, Vickerstaff S and White P (2007) Flexible work and older workers. In: Loretto L, Vickerstaff S and White P (eds) *The future for older workers: New perspectives*. Bristol: Policy Press, 1-6.
- Loveless A, Burton J and Turvey K (2006) Developing conceptual frameworks for creativity, ICT and teacher education. *Thinking Skills & Creativity* 1(1): 3-13.
- Madahar L and Offer M (2004) Managing e-guidance interventions within HE careers services: a new approach to providing guidance at a distance. Manchester: HECSU.
- Madden M. and Jones S. (2008) 'Networked Workers'. PEW Internet and American Life Project. Available:
http://www.pewinternet.org/~media/Files/Reports/2008/PIP_Networked_Workers_FINAL.pdf
 Accessed 7/11/2011.
- Maltby T (2007) The employability of older workers: what works? in Loretto W, Vickerstaff S and White PJ. (eds) *The future for older workers. New perspectives*. Bristol, Policy Press, 161-183.
- Mansell R (2002) 'From Digital Divides to Digital Entitlements in Knowledge Societies', *Current Sociology/La Sociologie Contemporaine* 50(3), 407-426.
- Marks A and Huzzard T (2010) Employability and the ICT worker: a study of employees in Scottish small businesses. *New Technology, Work & Employment*, 25, 167-181.
- Maurer SD and Cook DP (2011) 'Using company web sites to e-recruit qualified applicants: a job marketing based review of theory-based research', *Computers in Human Behavior* 27, 106-117.
- McAfee (2010) *Web 2.0 A Complex Balancing Act: The First Global Study on Web 2.0 Usage, Risks and Best Practices*, McAfee Inc, Santa Clara, California.
<http://www.mcafee.com/us/resources/reports/rp-first-global-study-web-2.0-usage.pdf> Accessed 10/6/2012
- McCollum D (2012) Towards (un)sustainable employment? Exploring policy responses to work-welfare cycling, *Policy Studies* 33, 215-230.
- McDonald C, Marston G and Buckley A (2003) Risk technology in Australia: The role of the job seeker classification instrument in employment services. *Critical Social Policy* 23, 498-525.
- McDonald S and Howell J (2012) Watching, creating and achieving: Creative technologies as a conduit for learning in the early years. *British Journal of Educational Technology* 43(4), 641-651.
- Mesch GS (2012) 'Minority status and the use of computer-mediated communication: a test of the social diversification hypothesis', *Communication Research* 39, 317-337.
- Mesch GS and Talmud I (2011) 'Ethnic differences in internet access', *Information, Communication and Society* 14, 445-471.
- Messer R (2010) 'Going nowhere - but fast! E-Employment - the next internet revolution', *Business Information Review* 27(2): 101-103.
- Michailakis D (2001) Information and Communication Technologies and the Opportunities of Disabled Persons in the Swedish Labour Market. *Disability & Society* 16, 477-500.
- Miles I (1996) The Information Society: Competing Perspectives on the Social and Economic Implications of Information and Communication Technologies. In: Dutton WH (ed) *Information and Communication Technologies: Visions and Realities*. Oxford: Oxford University Press, 36-52.
- Milmeister P and Willems H (ed.) (2008) Unterstützungsangebote für benachteiligte Jugendliche zwischen Schule und Beruf Expertisen aus der Schweiz, Deutschland, Luxemburg
- Montagnier P and Wirthmann A (2011) *Digital Divide: From Computer Access to Online Activities - A Micro Data Analysis*. OECD Digital Economy Papers No 189. Available at: <http://www.oecd-ilibrary.org/docserver/download/fulltext/5kg0lk60rr30.pdf?expires=1333395620&id=id&accname=guest&checksum=30C3DBB3790C341C74A0B66BF4836CB9> (Accessed: 02/04/2012).
- Morgan RE (2004) Teleworking: an assessment of the benefits and challenges. *Accounting and Finance* 16, 344-357.

- Morgan RL (2008) Job matching: Development and evaluation of a web-based instrument to assess degree of match among employment preferences. *Journal of Vocational Rehabilitation*, 29(1), 29-38.
- Morganson VJ, Major DA, Oborn KL et al. (2010) Comparing telework locations and traditional work arrangements: Differences in work-life balance support, job satisfaction, and inclusion. *Journal of Managerial Psychology* 25: 578-595.
- Moynagh M and Worsley R (2005) *Working in the Twenty-first Century*, Leeds: ESRC Future of Work Programme and King's Lynn, The Tomorrow Project.
- Nakamura AO, Shaw KL, Freeman RB, Nakamura E and Pyman A (2009) 'Jobs online', in Autor D. (ed.) *Labor Market Intermediation*, University of Chicago Press, Chicago, 27-65.
- O'Connell PJ, McGuinness S, Kelly E and Walsh J (2009) *National Profiling of the Unemployed in Ireland*, Dublin: ESRI.
- OECD. (2001) *Understanding the Digital Divide*. Available at: <http://www.oecd.org/dataoecd/38/57/1888451.pdf> (Accessed: 2/04/2012).
- OECD. (2005) *New Perspectives on ICT Skills and Employment*. Available at: <http://www.oecd.org/dataoecd/26/35/34769393.pdf> (Accessed: 18/04/2012).
- Ofcom (2008a) *Media Literacy Audit: Media literacy of UK adults from ethnic minority groups*, Ofcom.
- Ofcom (2008b) *Social networking: A quantitative and qualitative research report into attitudes, behaviours and use*, Ofcom.
- Offer M (2002) *Getting started with the internet in adult guidance*. Cambridge: NICEC.
- Offer M (2004a) *Careers Service Web Site Design*, Manchester: Graduate Prospects & HECSU.
- Offer M (2004b) *Giving guidance by email: Advisers' checklist*. Manchester: Graduate Prospects & HECSU.
- Offer M (2004c) *What is e-guidance? Using information and communications technology effectively in guidance services*. Manchester: Graduate Prospects & HECSU.
- Offer M, Sampson JP, and Watts A (2001) *Careers Services: Technology and the Future*. Manchester: HECSU.
- Ofsted (2011) *Girls' Career Aspirations*. The Office for Standards in Education, Children's Services and Skills (Ofsted).
- ONS (2011) *Internet Access Quarterly Update 2011 Q3*. Office for National Statistics, UK. Available at: http://www.ons.gov.uk/ons/dcp171766_242415.pdf (Accessed: 19/04/2012).
- Orlikowski WJ, Yates J, Okmura K, et al. (1995) Shaping Electronic Communication: The Metastructuring of Technology in the Context of Use. *Organization Science* 6: 423 - 444.
- Owen DW, Green AE, McLeod M, Law I, Challis T and Wilkinson D (2003) 'The Use of and attitudes towards information and communication technologies (ICT) by people from black and minority ethnic groups living in deprived areas', *Department for Education and Skills Research Report 450*, DfES Publications, Nottingham.
- Palomba E (2009) ICT for Counseling and Careers Guidance Services. In Méndez-Vilas A, Solano Martín A, Mesa González JA and Mesa González J (Eds.) *Research, reflections and Innovations in Integrating ICT in Education* (pp.70-73). Badajoz, Spain: FORMATEX.
- Parry E and Tyson S (2008) 'An analysis of the use and success of online recruitment methods in the UK', *Human Resource Management Journal* 18 (3), 257-274.
- Passey D, Williams S and Rodgers C (2008) Assessing the potential of e-learning to support re-engagement amongst young people with Not in education, employment or training (NEET) status. An independent research and evaluation study. http://dera.ioe.ac.uk/8292/1/elearning_reengagement_neet_overview.pdf
- Peacock S.(2009) ICT for employability. In: Cabrera M and Malanowski N. *Information and Communication Technologies for Active Ageing: Opportunities and Challenges for the European Union*. Volume 23 Assistive Technology Research Series, IOS Press: Amsterdam, 150 - 165
- Pin JM, Laorden M and Saenz-Diez (2001) 'Internet recruiting power: opportunities and effectiveness', *Research Paper 439*, IESE, University of Navarra.

- Platonova A. and Urso G (2009) *Migration, Employment and Labour Market Integration Policies in the European Union: Part 2: Labour Market Integration Policies in the European Union (2000-2009)*, International Organization of Migration.
- Posfai M and Fejer A (2008) 'The eHungary Programme 2.0', *Innovation: the European Journal of Social Science Research* 21 (4), 407-415.
- Qureshi S (2011) Information technology for development in expanding capabilities. *Information Technology for Development* 17: 91-94.
- Räsänen P (2006) 'Information society for all? Structural characteristics of internet use in 15 European countries', *European Societies* 8(1): 59-81.
- Redecker C, Hache A and Centeno C (2010) *Using Information and Communication Technologies to promote Education and Employment Opportunities for Immigrants and Ethnic Minorities*, IPTS, JRC European Commission.
- Rissola G and Centeno C (2011) *The Role of Information and Communication Technologies in the Integration of Immigrants and Ethnic Minorities*, IPTS, JRC European Commission.
- Ritchie B and Brindley C (2005) ICT Adoption by SMEs: Implications for Relationships and Management. *New Technology, Work and Employment* 20, 205 - 217.
- Roberts K and Reynard A, with contributions from Farnworth H (2012) *OWLE50+ TOOLKIT*. <http://www.owle50plus.eu/downloads.php>
- Rodriguez F (2009) 'Portugal' in Platonova A and Urso G (eds.) *Migration, Employment and Labour Market Integration Policies in the European Union: Part 2: Labour Market Integration Policies in the European Union (2000-2009)*, International Organization of Migration, 201-209.
- Roos H (2009) 'Bridging the gap: social networking through Orkut amongst Indian IT professionals', presentation at 'ICT and migration: mobility and cohesion in the digital age', Vienna, September 2009. Available at: <https://lirias.kuleuven.be/bitstream/123456789/246948/1/Presentation+Hannelore+Roos.pdf> (Accessed: 13/05/2012)
- Ros A, Gonzales E, Marin A and Sow P (2007) Migration and Information flows: A new lens for the study of contemporary international migration, IN 3 Working Paper, Barcelona.
- Rottinghaus PJ. (2009). The Kuder Skills Assessment – College and Adult Version. *Journal of Career Assessment* 17, 56-68.
- Rudolph H (2001) Profiling as an instrument for early identification of people at risk of long-term unemployment. In: Weinert P, Baukens M, Bollerot P, et al. (eds) *Employability: From Theory to Practice*. Edison (NJ), USA: Transaction Publishers, 25-49.
- Ruivo M and Cruz S (2010) *WP4: Microsoft's 'Technology, Innovation and Initiative' Program: can a socially responsible practice be capability-friendly?' – Final Report: Portugal*, Integrated Project CIT4-CT-2006-028549 CAPRIGHT Resources, rights and capabilities: in search of social foundations for Europe.
- Sampson JP Jr. (1997) *Helping clients get the most from computer-aided guidance systems*. Australian Association of Career Counselors 7th National/International Conference. Brisbane, Australia.
- Sampson JP Jr., Carr DL, Panke J, et al. (2003) *Design Strategies for Need-Based Internet Web Sites in Counseling and Career Services* (Technical Report 28). Florida: Florida State University.
- Sampson JPJ, Offer M and Watts A (2001) *Career(s) Services: Technology and the Future* NICEC. Available at: http://www.crac.org.uk/crac_new/pdfs/career_services_tech.pdf.
- Sarmiento T, Harte V, Pickford R and Willoughby L (2007) Enterprise skills for undergrads - never too early to start? *ITALICS: Innovations in Teaching & Learning in Information & Computer Sciences* 6(2).
- Schleife K (2006) Computer Use and Employment Status of Older Workers — An Analysis Based on Individual Data. *Labour* 20, 325–348.
- Schneckenberg D (2010) Overcoming barriers for eLearning in universities—portfolio models for eCompetence development of faculty. *British Journal of Educational Technology* 41(6): 979-991.

- Schneckenberg D, Ehlers U and Adelsberger H. (2011) Web 2.0 and competence-oriented design of learning—Potentials and implications for higher education. *British Journal of Educational Technology* 42(5): 747-762.
- Selwyn N (2007) The use of computer technology in university teaching and learning: a critical perspective. *Journal of Computer Assisted Learning* 23(2): 83-94.
- Sen A (1999) *Development as Freedom*, Oxford: Oxford University Press.
- Sharit J, Czaja SJ, Hernandez MA and Nair S. (2009) The employability of older workers as teleworkers: An appraisal of issues and an empirical study. *Human Factors in Ergonomics & Manufacturing* 19, 457-477.
- Silverii M and Busi B (2009) ICT Skills 2: ICT Tools and Training for E-Guidance Practitioners. Bologna, Italy: ASTER Scienza Tecnologia Impresa S. Cons.p.a.
- Skinner N and Pocock B (2011) Flexibility and Work-Life Interference in Australia *Journal of Industrial Relations* 53: 65-82.
- Smihly M and Storm H (2010) 'ICT usage in enterprises 2009', *Eurostat Data in Focus* 1/2010. Available at: http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-QA-10-001/EN/KS-QA-10-001-EN.PDF (Accessed: 11/05/2012).
- Smith E (2011) Women into science and engineering? Gendered participation in higher education STEM subjects. *British Educational Research Journal* 37(6): 993-1014.
- Sobrado Fernández LM, Ceinos Sanz C and Nogueira Pérez MA (2012) The presence of ICT in vocational guidance: A training proposal. *Problems of Education in the 21st Century* 44(2-4): 72-80.
- Southerton D. (2007) 'Time pressure, technology and gender: the conditioning of temporal experiences in the UK', *Equal Opportunities International* 26(2), 113-128.
- Stamatia I, Lazakidou A and Tsironi M (2010) Information and communication technologies for better patient self-management and self-efficacy. *International Journal of Electronic Healthcare* 5, 327-339.
- Stamm M and Buddeberg-Fischer B (2011) How do physicians and their partners coordinate their careers and private lives?. *Swiss Medical Weekly* 141: w13179.
- Stephens P, McGowan M, Stoner C and Robin J (2007) 'Unintended consequences: IT's disruption of work-life balance', *Issues in Information Systems* VIII(1), 179-184.
- Stevens H (2008) The Impact of E-Portfolio Development on the Employability of Adults Aged 45 and over. *Campus-Wide Information Systems* 25, 209-218.
- Stevenson B (2009) 'The internet and job search' in Autor D. (ed.) *Labor Market Intermediation*, University of Chicago Press, Chicago, 67-86.
- Stiell B and Tang N (2006) *Ethnic Minority Women and Access to the Labour Market in Newcastle*, Centre for Social Inclusion, Sheffield Hallam University and Newcastle City Council.
- Sullivan J, Garrido M, Dridi K, Coward C and Gordon A (2007) ICT training and employability: Integrated service delivery in United States workforce development networks. *Center for Internet Studies Working Paper Series*, University of Washington, Seattle.
- Sung J and Ashton D (2006) Achieving best practice in your business. High performance work practices: Linking strategy and skills to performance outcome. London: Department for Trade and Industry in association with CIPD.
- Super DE (1980) A life-span, life-space approach to career development. *Journal of Vocational Behavior* 16: 282-298.
- Sylva H and Mol ST (2009) 'E-recruitment: a study into applicant perceptions of an online application system', *International Journal of Selection and Assessment* 17, 311-323.
- Szczepanski M (2009) 'ICT in migration governance: an example of the Polish government's website for returnees', presentation at 'ICT and migration: mobility and cohesion in the digital age', Vienna, September 2009. Available at: http://research.icmpd.org/fileadmin/Research-Website/Project_material/Panel_Maciej_Szczepanski_Poland.pdf (Accessed: 13/05/2012)
- TAEN (2012) *Special Publication. ESF projects. Successfully engaging with the Over-50s*. <http://taen.org.uk/resources/view/169>

- Telecentre Europe (2012) Available at: http://www.telecentre-europe.org/?page_id=2 (Accessed: 19/4/2012).
- Telework Association (2012) Available at: <http://www.telework.org.uk> (Accessed: 19/4/2012).
- The Economist (2010) The net generation, unplugged. March 4th. Available: http://www.economist.com/node/15582279?story_id=15582279 (Accessed: 14/05/2012).
- The Economist Intelligence Unit (2004) *Reaping the Benefits of ICT: Europe's Productivity Challenge*. Available at: http://graphics.eiu.com/files/ad_pdfs/MICROSOFT_FINAL.pdf (Accessed 10/08/2012).
- Thomas M (2011) *Deconstructing Digital Natives: Young People, Technology and the New Literacies*. Taylor & Francis eLibrary.
- Tijdens K and Steijn B (2005): The determinants of ICT competencies among employees. *New Technology, Work and Employment* 20: 60-73.
- Toboso M (2011) Rethinking disability in Amartya Sen's approach: ICT and equality of opportunity. *Ethics and Information Technology* 13, 107-118.
- Towers I. , Duxbury L. and Thomas J (2005) Time Thieves and Space Invaders: Technology, Work and the Organisation. *Paper presented at the 4th Annual Critical Management Studies Conference*. Cambridge.
- Tsatsou P, Higgs G and Stafford I (2011) *ICT Use and connectivity of minority communities in Wales: Literature Review*, WISERD, Wales.
- UK Online Centres (2012) *UK Jobs and the Internet*. UK Online Centres. Available at: <http://www.ukonlinecentres.com/about-us/our-publications/item/download/116.html> (Accessed: 07/04/2012).
- UKCES (2011a) *Helping individuals succeed: Transforming career guidance*. London: UK Commission for Employment and Skills.
- UKCES (2011b) *Strategic Objectives and Business Plan for 2011/12*. London: UK Commission for Employment and Skills.
- United Nations (2001) Letter from the Secretary-General to the President of the General Assembly <http://www.un.org/documents/ga/docs/56/a56422.pdf>
- Valcour PM and Hunter LW (2005) Technology, Organizations, and Work-Life Integration. In: Kossek E and Lambert SJ (eds) *Work and Life Integration: Organizational, Cultural and Individual Perspectives*. London: Lawrence Erlbaum Associates, 61-84.
- van Deursen AJAM and van Dijk JAGM (2009) 'Using the Internet: Skill related problems in users' online behavior', *Interacting with Computers* 21(5-6), 393-402.
- van Deursen AJAM, van Dijk JAGM and Peters O (2011) 'Rethinking Internet skills: The contribution of gender, age, education, Internet experience, and hours online to medium- and content-related Internet skills', *Poetics* 39(2), 125-144.
- van Dijk JAGM (2005) *The deepening divide: Inequality in the information society*. Thousand Oaks, London, New Delhi: Sage.
- Venable MA (2010) Using technology to deliver career development services: Supporting today's students in higher education. *Career Development Quarterly* 59(1): 87-96.
- Verhoeven H. and Williams S (2008) 'Advantages and disadvantages of internet recruitment: a UK study into employers' perceptions', *International Review of Business Research Papers* 4 (1), 364-373.
- Villosio C, with Di Pierro D, Giordanengo A, Pasqua P and Richiardi M (2008) Working conditions of an ageing workforce. <http://www.eurofound.europa.eu/surveys/ewcs/2005/secondaryanalysis.htm>
- Vranken J and Vandebosch H (2007). *Aan de onderkant van de technologische samenleving. Armoede en technologie. Een onderzoek naar de relatie tussen armoede en technologie*. Brussel: Instituut voor Samenleving en Technologie (IST - viWTA).
- Vuorinen R (2009) Challenges of Web 2. 0 in developing career guidance. *Career Edge*. New Zealand.
- Wajcman J, Bittman M and Brown JE (2008) 'Families without Borders: Mobile Phones, Connectedness and Work-Home Divisions', *Sociology* 42(4): 635-652.

- Wanberg CR, Zhang Z and Diehn EW (2010). Development of the 'Getting Ready for your Next Job' Inventory for Unemployed Individuals. *Personnel Psychology*, 63(2), 439-478.
- Wandner SA, Messenger JC and Schwartz S (1999) Worker Profiling and Reemployment Services Policy Workgroup: Final Report and Recommendations. District of Columbia, USA: Employment and Training Administration/Office of Policy and Research, 116.
- Watts AG and Offer M (2006) *IAG Review: The current and potential role of ICT in delivering Information, Advice and Guidance*. Derby: Centre for Guidance Studies, University of Derby.
- Watts T (2002) The role of information and communication technologies in integrated career information and guidance systems: A policy perspective. *International Journal for Educational and Vocational Guidance* 2: 139-155.
- Webb S (2006) 'Can ICT reduce social exclusion? The case of an adults' English language learning programme', *British Educational Research Journal* 32(3): 481-507.
- Wei-Cheng M (1999) Effects of Computer-Assisted Career Decision Making on Vocational Identity and Career Exploratory Behaviors. *Journal of Career Development* 25, 261.
- Wells D (2012) Computing in schools: time to move beyond ICT? *Research in Secondary Teacher Education* 2, 8-13.
- Westergaard J (2012) Career guidance and therapeutic counselling: sharing 'what works' in practice with young people. *British Journal of Guidance & Counselling* 40(4): 327-339.
- Whitney G, Keith S, Bühler C, Hewer S, Lhotska L, Miesenberger K, Sandnes FR, Stephanidis C and Velasco CA (2011) Five years of training and education in ICT Design for All and Assistive Technology. *Technology and Disability* 23, 163-170.
- Wilson RA (2008) The Future of Work: What does work mean 2025 and beyond? *Beyond Current Horizons: Technology, Children, Schools and Families*. London: DCSF/Futurelab.
- Wilson RA and Homenidou K (2011) Working Futures 2010-2020, *Evidence Report* 41. Wath-upon-Deane and London: UK Commission for Employment and Skills.
<http://www.ukces.org.uk/assets/ukces/docs/publications/evidence-report-41-working-futures-2010-2020.pdf> (Accessed: 8/8/2012)
- Wilson RA, Homenidou K and Gambin L (2008) Working Futures 2007-2017, *Evidence Report* 2. Wath-upon-Deane and London: UK Commission for Employment and Skills.
<http://www.ukces.org.uk/assets/ukces/docs/publications/evidence-report-2-working-futures-2007-2017.pdf> (Accessed: 8/8/2012)
- Wolfswinkel J, Furtmueller E and Wilderom C (2010) 'Reflecting on e-recruiting using grounded theory', 18th European Conference on Information Systems. Available at: <http://is2.lse.ac.uk/asp/aspectis/20100168.pdf> (Accessed: 17/4/2012).
- Woodfine BP, Baptista Nunes M and Wright DJ (2008). "Text-based synchronous e-learning and dyslexia: Not necessarily the perfect match!", *Computers & Education*, 50(3), 703-717.
- Wortham J (2009) More Employers Use Social Networks to Check out Applicants. *New York Times*. New York.
- Wynarczyk P (2005) The impact of connectivity technologies on e-flexible working practices in small and medium-sized enterprises in the North East of England. *New Technology, Work and Employment* 20, 234-247.
- Zammuto RF, Griffith TL, Majchrzak M, Dougherty DJ and Faraj S (2007) Information Technology and the Changing Fabric of Organization. *Organization Science* 18, 749-762.
- Zytowski DG (2001) Kuder career search with person match: Career assessment for the 21st Century. *Journal of Career Assessment* 9, 229-241.
- Zytowski DG and Luzzo DA (2002) Developing the Kuder skills assessment. *Journal of Career Assessment* 10, 190-199.

APPENDIX 1: LIST OF ACADEMIC DATABASES SEARCHED AND RESULTS

Database:	Search for 'employability' in:	On-screen results	Saved references
Abstracts in Social Gerontology	Covered by EBSCO		
ASSIA: Applied Social Science Index and Abstracts	Title or abstract	87	27
Conference Papers Index (ProQuest)	In all fields	36	14
EBSCOhost	Title and abstract	511	218
E-Journals	Covered by EBSCO		
Emerald	Title or abstract	146	8
ERIC (via Proquest)	Title and abstract	107	66
IBSS	Title and abstract	87	3
Ingenta Connect	Title, Keywords or Abstract contains 'employab*'	96	45
JSTOR	Title or abstract	32	27
Medline	Covered by EBSCO		
Metapress	Title and abstract	40	24
Oxford Journals Online	Title or abstract	14	4
Papers First			
Proquest – ABI/Inform	Title and abstract	150	70
PsycArticles	All fields +Text	72	10
PsycINFO	Title and abstract	128	81
SAGE Online	Title or abstract	113	44
ScienceDirect	Title or abstract	104	15
Sociological Abstracts Proquest	Title or abstract	311	69
Springerlink	Title and abstract	163	9
Taylor & Francis Online	Title or abstract	84	42
Wiley Online	Title or abstract	101	37
Zetoc Journal Search	In all fields	638	41
Total		3,020	854

APPENDIX 2: LIST OF JOURNALS SEARCHED MANUALLY AND RESULTS

Journal (relevant to Research Questions I and II)	Relevant references published between February 2009 and February 2012
Human Relations	8
Journal of Vocational Behaviour	16
Work, Employment and Society	22
Total	46

APPENDIX 3: LIST OF WEBSITES CONSIDERED

Organisation	Link to website
Age Platform Europe	http://www.age-platform.eu/en
Cedefop	http://www.cedefop.europa.eu
Chartered Institute of Personal Development (CIPD)	www.cipd.co.uk
Commission for Equality and Human Rights (CEHR)	www.cehr.org.uk
Department for Education (DfES)	www.education.gov.uk
Department for Work and Pensions (DWP)	www.dwp.gov.uk
Emploi, Travail et Formation Professionnelle	www.travail.gouv.fr/index.asp
Eurofound	http://www.eurofound.europa.eu
European Commission and the EU Directorates	http://ec.europa.eu/about/ds_en.htm
European Sociological Association	http://www.europeansociology.org
Eurydice	www.eurydice.org/portal/page/portal/Eurydice
Goldenworkers	www.goldenworkers.org
Infoconnex	www.infoconnex.de
Institute for Employment Research (IER)	www.warwick.ac.uk/ier
Institute for Prospective Technological Studies	http://ipts.jrc.ec.europa.eu
Institut für Arbeits Markt und Berufsforschung	www.iab.de
Instituto de Empleo; Servicio Público de Empleo Estatal	www.inem.es
Instituto Nacional de Estadística	www.ine.es
Institute for Employment Studies (IES)	www.employment-studies.co.uk
Internet Interdisciplinary Institute (IN3)	http://in3.uoc.edu
Investigaciones Económicas	www.funep.es/invecon/sp/sie.asp
Ministerio de Educación y Ciencia	www.mec.es
Ministerio de Trabajo y Asuntos Sociales	www.mtas.es
National Centre for Vocational Education Research (NCVER)	www.ncver.edu.au
National Foundation for Educational Research (NFER)	www.nfer.ac.uk/
National Guidance Research Forum (NGRF):	www.guidance-research.org
National Institute for Adult Continuing Education (NIACE)	www.niace.org.uk
National Learning and Skills Council	www.lsc.gov.uk
OECD	www.oecd.org
Oxford Internet Institute	http://www.oii.ox.ac.uk/
ReferNet (utilising European network)	www.refernet.org.uk
Research library of the EU-Council of Europe youth partnership	http://youth-partnership-eu.coe.int/youth-partnership/about/index.html
Revista de Economía Aplicada	www.revecap.com/default.html
Royal Society for the Encouragement of Arts, Manufactures and Coerce (RSA)	http://www.thersa.org
Scottish Further Education Unit	www.sfeu.ac.uk

European Commission

EUR 25792 – Joint Research Centre – Institute for Prospective Technological Studies

Title: Main: Literature Review on Employability, Inclusion and ICT, Report 2: ICT and Employability

Authors: Maria de Hoyos, Anne E. Green, Sally-Anne Barnes, Heike Behle, Beate Baldauf and David Owen

Luxembourg: Publications Office of the European Union

2013 – 117 pp. – 21.0 x 29.7 cm

EUR – Scientific and Technical Research series – ISSN 1831-9424 (online)

ISBN 978-92-79-28293-5 (pdf)

doi:10.2791/71448

Abstract

IPTS has launched a project on how ICT can support employability, in the context of its policy support activities for the implementation of the Europe 2020 strategy, and the Digital Agenda for Europe. As a first step, JRC-IPTS contracted the Institute of Employment Research, University of Warwick, UK to prepare: a) a review of the literature on employability, its dimensions and the factors which affect it in general and for groups at risk of exclusion, namely migrants, youth and older workers; and b) a report on how ICT contribute to employability, support the reduction of barriers and create pathways to employment for all, including the three specific groups at risk of exclusion. This report presents the findings of the second part of the research.

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Working in close cooperation with policy Directorates-General, the JRC addresses key societal challenges while stimulating innovation through developing new standards, methods and tools, and sharing and transferring its know-how to the Member States and international community.

Key policy areas include: environment and climate change; energy and transport; agriculture and food security; health and consumer protection; information society and digital agenda; safety and security including nuclear; all supported through a cross-cutting and multi-disciplinary approach.