



This project has received funding from the European Union's Horizon 2020 Science with and for Society programme under grant agreement no. 872483



Project acronym:

DocEnhance

Project title:

“Enhancing skills intelligence and integration into existing PhD programmes by providing transferable skills training through an open online platform”

Grant agreement No: 872483

**Project funded by the European Commission
within the Horizon 2020 Programme**

Start date of project: 1 January 2020

Duration: 36 months

Deliverable No. 1.1

Good practice recommendations for integration of transferable skills training in PhD programmes

Due date of deliverable	30.06.2020
Submission date	30/06/2020
File Name	D1.1 Good practice recommendations for integration of transferable skills training in PhD programmes
Organisation Responsible of Deliverable	UMB, Slovakia
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Revision number	01
Status	Final ¹
Dissemination Level	PU ²

¹ Document will be a draft until it is approved by the coordinator

² PU: Public, PP: Restricted to other programme participants (including the Commission Services), RE: Restricted to a group specified by the consortium (including the Commission Services), CO: Confidential, only for members of the consortium (including the Commission Services)



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Revision History			
Version	Date	Modified by	Comments
1	29/06/2020	Alexandra Bitušíková, Kamila Borseková	
2	30/06/2020	Lena Korsnes	Final version



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EXECUTIVE SUMMARY

Transferable skills and competences are becoming a substantial part of strategic documents and plans across the globe. The Sustainable Development Goal no. 4 on Quality Education includes a target to substantially increase the number of youth and adults who have relevant skills, including technical and vocational skills, for employment, decent jobs and entrepreneurship by 2030. Clearly, doctoral education is following this path and training of transferable skills is gaining high importance.

The present document brings a comprehensive overview of good practice recommendations for integration of transferable skills training in PhD programmes. The introductory part of the document offers a wider picture on development of doctoral education in Europe and beyond, and highlights the importance of changes towards better preparation of doctoral candidates for their future academic and non-academic careers in various sectors. Therefore, transferable skills are becoming an inevitable part of doctoral education.

The first section is devoted to transferable skills training in reports and scientific literature. The section is divided into two sub-sections oriented towards transferable skills training based on learning by doing, and formal transferable skills training mostly organized through graduate and doctoral schools. The second section offers good practice recommendations on transferable skills training based on multiple research projects. The third section depicts selection of good practice recommendation on transferable skills training by DocEnhance partners from Finland, Germany, Norway and Slovakia. The fourth section brings additional good practice recommendations related to their documentation through STAR principle and offers an inspiration for doctoral candidates to develop their transferable skills through attending different types of hackathons. The last section is devoted to concluding remarks on good practice recommendations for transferable skills training.

The present document brings a comprehensive overview of numerous reports, scholarly publications, projects and particular institutional practices and demonstrates a broad scale of examples of good practice recommendations for the integration of transferable skills training in PhD programmes.



INTRODUCTION: TRANSFERABLE SKILLS IN DOCTORAL EDUCATION

Doctoral education has gone through a number of significant structural changes in the recent decade or two, and not only in the European Higher Education and Research Areas, but globally. Although original research remains the core of doctoral education, “the doctoral journey has been supplemented with a number of additional demands, activities, responsibilities, duties and opportunities for doctoral candidates” (Kovačević – Mihaljevič 2016: 2). One of the reasons for these changes has been the call for better preparation of doctoral candidates for their future academic and non-academic careers in various sectors; increasing efficiency, transparency and accountability of doctoral education processes and the shift from an individual to an institutional responsibility. The global demand for best graduates who can work in any sector and any country led first, to a remarkable increase of numbers of doctoral candidates in many countries, and second, to the introduction of new ways of organising and managing doctoral studies. This included the establishment of structured doctoral programmes, particularly of doctoral schools (of diverse types), targeted focus on supervision (including training or professional development for supervisors) and the implementation of transferable skills training into doctoral curricula (to mention just a few elements of new reforms). Doctoral education that used to be seen as a rather individual type of study (based mainly on the relation between the doctoral candidate and the supervisor), suddenly started to be considered more as an institutional responsibility where the role of the university or doctoral school/ programme has been strengthened.

Doctoral education has become a target of interest of a number of European and international university associations that have been conducting surveys, organising conferences and workshops and writing reports with good practice examples and recommendations. At the same time, doctoral education has been an object of research for many educational experts. It is not possible to demonstrate results of all these reports and research papers. The following part is based on some key facts and recommendations of (mainly, not only) European associations and selected scientific literature.

1. TRANSFERABLE SKILLS TRAINING IN REPORTS AND SCIENTIFIC LITERATURE

The doctoral education reform has become in most European countries a target of interest only after its incorporation into the Bologna Process in 2003, following the meeting of education ministers in Berlin. This started numerous policy and academic debates across Europe concerning the importance of reforms in the training of young researchers and the need to broaden their career opportunities. The debates have received significant input from the European Union's Lisbon Strategy (2000), which set out to create the European Research Area, the Modernisation Agenda for Universities (2006) or the Europe 2020 Flagship Initiative Innovation Union (2010). This chapter aims at demonstrating (chronologically) most significant initiatives of a number of



European associations and institutions in the field of doctoral education reform with the focus on transferable skills training. It defines the context in which the transferable skills agenda has been developing. More data is added based on scientific literature and other sources.

Initiatives and actions to identify and promote good practice in doctoral training were taken initially by the European University Association (EUA). At the first large conference discussing the doctoral education reform – the Bologna Seminar in Salzburg in 2005, Salzburg Conclusions and Recommendations were adopted, better known as “Ten Salzburg Principles” (EUA 2005). The principle No I says: „The core component of doctoral training is the advancement of knowledge through original research. At the same time, it is recognised that doctoral training must increasingly meet the needs of an employment market that is wider than academia. Principle No viii: „The promotion of innovative structures: to meet the challenge of interdisciplinary training and the development of transferable skills“(EUA 2005). For the first time at a European level, transferable skills were identified as an important part of doctoral education.

These principles were re-confirmed and enriched in 2010 in the Salzburg II Recommendations stressing the importance of career support for doctoral candidates and the institutional responsibility to provide this support: „Offering training in transferable skills, including understanding the ethics of research, is central, and should be a priority for doctoral schools and programmes. Professional development of doctoral candidates includes awareness about skills attained through doing research as well as of the wide range of career choices for doctorate holders. Building ties to the other sectors contributes to bridging the communication gap with potential employers and recruiters” (EUA 2010).

LERU (The League of European Research Universities) has also been active in discussing the needs of reform of doctoral education. In its report of 2010 “Doctoral degrees beyond 2010. Training talented researchers for society” the authors also emphasise new needs of doctoral candidates and employers, and the importance of transferability of skills from research and academia to other places of employment. They identify a number of skill sets that include:

Intellectual skills, which comprise the ability to

- think analytically and synthetically,
- be creative, inquisitive, and original,
- take intellectual risks,
- deploy specific technical, research-related tools and techniques;

Academic and technical skills, which comprise the ability to

- understand, test and advance complex theories or hypotheses and to deploy sophisticated concepts, methodologies and tools in the chosen subject to a very high level,
- be able to identify issues and translate them into questions amenable to scholarly enquiry,
- successfully pursue original research in the chosen field,
- use critical judgment in an objective manner based on verifiable evidence,
- apply highest standards of rigour in the proof of ideas,
- manage a high degree of uncertainty both in method and in outcomes,



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- develop and demonstrate academic credibility and become recognised as a member of an international scholarly community,
- understand the workings of a specific high level research-intensive environment,
- transfer new knowledge to scholarly communities and communicate it to society,
- work according to ethical principles
- work in an interdisciplinarity setting or on an inter-disciplinary topic;

Personal and professional management skills, which comprise the ability to

- persist in achieving long term goals,
- manage projects with uncertain outcomes in diverse settings and organisations,
- take a project through all its stages: from developing the original idea, to developing a plan, garnering the evidence, and communicating the results and their significance,
- be self-motivated and autonomous,
- work to achieve results with minimum supervision,
- be flexible and adaptable in approaching complex and uncertain problems, -communicate very complex concepts,
- network internationally,
- work in a team,
- speak and present effectively in public.

The following skills are sometimes also developed:

- the ability to lead other researchers,
- the ability to teach and train others,
- the ability to organise conferences and workshop“(LERU 2010: 7).

In 2011, The European Commission after a series of discussions with various stakeholders and based on Salzburg I and II prepared a “Report of Mapping Exercise on Doctoral Training in Europe - Towards a common approach” and an extract from this report called “Principles for Innovative Doctoral Training” (2011). One of seven key principles in this important EU document stresses: “Transferable skills are skills learned in one context (for example research) that are useful in another (for example future employment whether that is in research, business etc.). They enable subject- and research-related skills to be applied and developed effectively. Transferable skills may be acquired through training or through work experience. It is essential to ensure that enough researchers have the skills demanded by the knowledge-based economy. Examples include communication, teamwork, entrepreneurship, project management, IPR, ethics, standardisation etc.” (Principles 2011).

Following on the report from 2010, LERU published an Advice Paper in 2014, which provides numerous concrete good practices and inspiring examples from the LERU member universities – many related also to skills training and collaboration with other stakeholders (LERU 2014).

EUA and its Council for Doctoral Education (EUA-CDE) has been continuing to work on doctoral education and its old and new challenges. In 2016, it identified a set of emerging



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challenges relevant also for doctoral education (such as research integrity, digital challenge or the global vision). In its report *Doctoral Education - Taking Salzburg Forward: Implementation and New Challenges* (2016) the new perspective was taken when looking at transferable skills training. The report stresses the importance of universities' collaboration with various stakeholders and non-academic partners and the responsibility to prepare doctoral candidates for work in different sectors. This can be done not only by providing good transferable skills training, but also by offering interesting internships outside academia, join collaborative projects or joint programmes. As demonstrated also in the EUA projects DOC-CAREERS I and II, long-term collaborations with companies have shown that common projects and doctoral programmes can contribute not only to doctoral candidates' professional development, but also to the innovation ecosystem, developing human resources and sharing knowledge between universities and non-academic partners (Borrell 2009; Borrell et al. 2015; EUA-CDE Taking Salzburg Forward 2016).

In 2018-2019, EUA-CDE conducted a survey among member universities (EUA Survey 2019). Its aim was to provide an up-to-date picture of institutional approaches to doctoral education in Europe after more than a decade of significant changes. A total of 311 valid responses from 32 countries were received and analysed. The study focused on a series of key aspects: i) doctoral candidates' qualifications, funding, completion rate and time to completion, ii) purposes, iii) organisation, iv) application and admission, v) supervision, vi) training and activities, vii) quality assurance, viii) career development, ix) decision-making powers, and x) strategic priorities in doctoral education and their implementation. For the purpose of this report, we looked at part vi) training and activities. The survey showed that training activities for doctoral candidates were well regulated and focused mainly on developing research competencies. According to survey outcomes, a large majority of universities had rules or regulations in place for key aspects of doctoral education including training (courses or credits). This is an indication of the enhanced professional approach of universities towards doctoral education. Concerning doctoral training activities, there was a clear and strong focus on research competence training complemented by significant attention to transferable skills training. Still, transferable skills training followed at a distance behind specific and generic research competencies. Knowledge valorisation (e.g. intellectual property rights, entrepreneurship, and product development) was a focus for 47% of universities, and management and leadership competencies (e.g. teamwork, conflict management) was a focus for 37% of universities. In addition, teaching competencies (e.g. pedagogy, didactics) were a focus for 45% of universities (p. 15).

Support for non-academic career paths seemed to become increasingly common in doctoral education. Transferable skills training and inter-sectoral mobility schemes were seen as the most spread examples of universities facilitating the transition of doctorate graduates into non-academic career paths.

The results of a recent large survey on European doctoral programmes (*The European Higher Education Area: Between Critical Reflections and Future Policies*, A. Curaj et al, 2015) indicated that in doctoral programmes where training was provided, the mandatory component was focused on subject-specific skills. Transferable skills that might promote personal development or be more useful outside academia were mostly voluntary, and thus participation



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was much lower. The survey results also highlighted that many doctoral supervisors did not feel equipped to help their students develop a career plan, especially if that career was non-academic.

In recent years, the employment landscape for doctoral graduates has been changing significantly. It has become also an object of research in education fields. On the one hand, there has been a significant reduction in the number of researcher and professorship positions available within universities, but on the other, there is a growing interest from industries in recruiting different types of doctoral graduates, including engineering doctoral graduates (Lee et al. 2010, Baruffaldi et al. 2016). Industry expectations on the performance of such graduates are for them to exceed the existing technical and scientific knowledge, particularly by leading the integration of innovative solutions with the appropriate recognition of customer requirements. It is also expected that such doctoral graduates have well-developed project management skills, interpersonal and collaborative ways of working, leadership and people management skills, as well as some business knowledge (Adnan 2008, Treptow 2013, Nyquist and Woodford 2000). The DOC-CAREERS study from the EUA (2016) point out that the competencies developed during doctoral studies seem to be insufficient to fulfil the complete set of requirements of the functions targeted for this population and the expectations of the industry. Therefore, there are gaps in the profiles of these doctoral graduates related to transversal competencies, formerly known as soft or generic skills that are expected to be used (transferred to) in industry. Transversal competencies development opportunities (whether integrated in the curricula or trained extracurricular by academia) are not, yet, widely and formally made available for doctoral candidates. In fact, it is expected that doctoral candidates develop those transversal competencies, which they will need for their functions if they pursue industry jobs, through 'learning by doing on the job', or elsewhere and on their own, i.e., with no formal guidance. On-the-job learning is, of course, an important way of learning, however, formal training opportunities can significantly add value to that learning process (Tynjala 2008).

Several above-mentioned reports about the assessment of doctoral programmes and policy papers (EUA 2010, EC 2011, LERU 2014, EUA 2014) have also been identifying the need to rethink the 3rd cycle curricula to make doctoral candidates competitive in employment opportunities outside academia. More emphasis need to be given to preparing students for their future careers, many of which will not be in academia and most of which will require many more skills than those related to research. Thus, several countries have/are already finding new ways of organizing curricula, adding flexibility, and providing extra training opportunities, focusing on increasing the quality, efficiency and relevance of doctoral education (Adnan 2008, Cyranoski et al. 2011, Thune 2009). The strategy is to train researchers that are not only prepared for a career in the academia, but who possess competencies relevant for other sectors as well (Thune 2009, EC 2003).

The formation and career of researchers are important policy issues, and training for transferable skills – skills that apply in a broad variety of work situations is a challenge that attracts increasing policy interests. These skills are receiving more attention, particularly in higher education programmes, and training opportunities are expanding as research careers diversify. Researchers today need skills related to communication, problem solving, team-work and networking, IT skills, business and management know-how. These give them work competencies



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that are relevant for a broad job market, although the skills they need may vary in different sectors (OECD 2012). Evidence on employment underlines the importance of transferable skills. In response to a United Kingdom survey, 60% of PhD graduates said they used the generic skills developed as research students most of the time in their work (Vitae, 2010, pp. 34-37). This was particularly true for graduates in social sciences, physical sciences, engineering and for those employed in research occupations in higher education or other sectors. Vitae noted that this finding was aligned with an increasing focus on developing researchers' personal and professional skills in addition to their specialist skills. Employers have expressed the needs for graduates with business, communication and leadership skills (OECD 2012, OCED 2011, CIHE 2010).

Transferable skills may also contribute to better research outputs and they can help to maximise them by enabling researchers to be effective in research, as well as adaptable and flexible in an increasingly mobile and global research environment (OECD 201, KIRD 2010). Transferable skills may be increasingly important in collaborative and cross-disciplinary work and for work in teams. The capacity of researchers to communicate with others is essential for interdisciplinary work (EUA, 2009, p. 87). Ultimately, improving researchers' transferable skills may help generate innovation and improve economic outcomes. The European Commission identified skills such as creativity, entrepreneurship, teamwork, risk-taking and project management as essential in order to "increase the innovation performance of individuals, to improve competence of private and public organisations, to facilitate knowledge and technology transfer and thus to improve the overall competitiveness and attractiveness of Europe as a region (EC, 2010, p. 34). Similarly, OECD (2011, 2012) found transferable skills as important for innovation.

The European Council for Doctoral Candidates and Junior Researchers (EURODOC), another important stakeholder in discussions on doctoral education, prepared a report **Identifying Transferable Skills and Competences to Enhance Early-Career Researchers Employability and Competitiveness** (Weber et al. 2018). This report identified transferable skills and competences relevant for early career researchers to gather during their doctoral training programme and beyond, in order to increase their employability in multiple work sectors. It included a skills matrix and infographic (see Figure 1) with nine different categories, containing a total of 66 transferable skills and competences.



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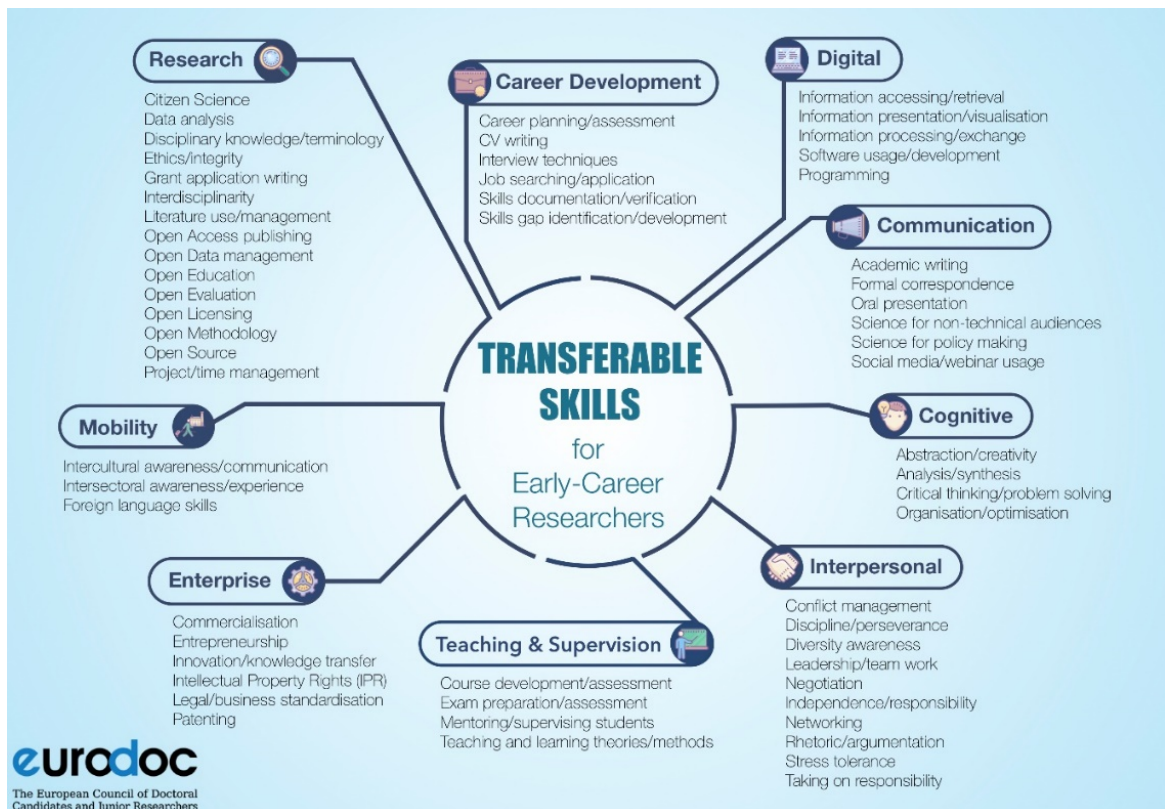


Figure 1. Transferable skills for Early-Career Researchers. Source: Weber et al. (2018)

Transferable skills and competences can be acquired by Early Career Researchers (ECRs) to be used during their doctoral training, but they are not necessarily related to research. These skills, such as effective communication, time and project management, and leadership, are typically learned in one context, e.g. research, but suitable to be used in many other contexts. With these skills, ECRs might contribute to more impactful research, while building a competitive professional profile. Transferable skills combined with original research skills can increase ECRs' employability and allow them to engage different career paths, widening their options in the academic, governmental, and private sector.

The acquisition of transferable skills and competences can come in many forms. Skills can be acquired through **formal training courses** provided by higher education institutions, but is not limited to well-defined courses and professional accreditations. Many transferable skills can be obtained through what is commonly termed as **learning-by-doing**, such as work based learning, internships, and extracurricular experiences. For example, teaching and mentorship skills can be obtained by running workshops, holding lectures, and supervising or mentoring students. Many transferable skills and competences also require continuous learning and development, which can be performed through a variety of experiences and contexts, e.g. through extracurricular activities outside the work environment. Family, social interactions, hobbies, and volunteering can all potentially contribute to transferable skills development, e.g. group sports activities can help attain team-working skills. The following sections bring an overview on good practice recommendations on learning by doing (1.1.) and formal (1.2.) transferable skills training.



1.1. Transferable skills training based on learning by doing

A Synthesis Review Report on **The Career Choices and Impact of PhD Graduates in the UK** prepared by Raddon and Sung (2009) from the Centre for Labour Market Studies (CLMS), University of Leicester, investigated skills and attributes developed through doctoral studies. This report offers an evidence that doctoral candidates are acquiring particular knowledge and skills naturally during their doctoral education and those are transferable into their future career paths in academia and beyond. As noted by Harris (1996), postgraduate (doctoral) education, in general, is widely recognised to make a major contribution to knowledge and national wealth creation. However, concern has long been expressed about the potentially narrow range of skills developed through the PhD in particular. Burgess (1997) points to a number of reports identifying concerns about postgraduate and PhD studies over the last few decades. For example, there is concern about the potential lack of connection to skills for employment outside academia, the seemingly heavy emphasis on the production of a thesis on a narrow topic at the expense of wider knowledge and activities, the need for a broader range of communication and technical skills to be developed as part of such programmes, and for these degrees to have relevance to all careers (OST, 1993; Robbins, 1963; RSC, 1995). Similarly, the National Postgraduate Committee from UK (NPC, 1993, p. 1) note that since employers tend to employ new recruits based on their broad range of skills, and will train for specific skills, it is important that PhDs should “not be too specialised”. Indeed, a 1993 White Paper by Office of Science and Technology (OST, 1993) claimed that the traditional PhD was “not well matched to the needs of a career outside research in academia or an industrial research laboratory”. However, the NPC (1994) refuse this claim, noting the comparatively low (3%) unemployment rate of PhDs and the fact that most PhD graduates in science and engineering work beyond these two settings. Furthermore, it is noted in the NPC document and elsewhere that, as the undergraduate degree becomes more commonplace, the PhD will gain greater market value over the coming years. Nevertheless, the debate continues as to whether the PhD is intended as education or training and the form this should take (Burgess, 1997; Leonard et al, 2004; Salmon, 1992; Scott et al, 2004; Wellington et al, 2005). As Burgess (1997) notes, inquiries in the 1980s - 1990s highlighted the need for different forms of doctoral study as well as raising concern about the need for development of a broader skills set. Despite these concerns, it is clear that a range of skills are developed through study and research at the doctoral level. Any postgraduate (doctoral) course provides a focused “time for reflection and self-development” (Becker, 2004, p. 1). Murray (2002) comments that most doctoral students are unlikely to have prior experience of writing a document like the thesis, either in terms of the length of writing or the processes involved in completing such a demanding project. Thus, some of the core skills that are identified as being developed through the doctorate include:

- the ability to work independently as well as working under supervision;
- self-motivation and -discipline;
- specialist and generalist knowledge within the given field;
- time, project and document management, ability to prioritise tasks;
- critical thinking, analytical and writing skills;



- the ability to read and synthesise a range of documentation;
- research skills;
- developing initiative;
- communication, presentation and interpersonal skills;
- problem-solving, flexibility in the face of change and creative thinking;
- networking;
- professionalism and ethical practice;
- team work (e.g. in scientific team-based studies, or as part of seminar groups, conference organising);
- computing and information searching skills;
- teaching skills;
- taking responsibility for one's own learning and learning how to learn, seen to support lifelong learning for the future (e.g. Becker, 2004; Burgess, 1997; Cryer, 2001; Delamont et al, 2000; DTZ Consulting & Research, 2006; Murray, 2002; Phillips and Pugh, 2005; Rugg and Petre, 2004; Wisker, 2005).

In addition to these, a UK Council for Graduate Education (UKCGE) working group identified a desired outcome of doctoral study in the humanities, which can probably be broadly translated across all fields of doctoral study, as the development of "generally highly-qualified and talented people, who will use a wide range of knowledge, understanding and skills that they have gained through doctoral research in a wide variety of contexts, in employment and beyond, enriching their own lives and the lives of others" (UKCGE, 2000, P. 19).

Another aspect to be emphasised is the **economic value of the PhD or Doctorate**, which is related to strong productivity and economic returns. One of the most powerful levers for improving productivity will be higher-level skills. Postgraduate, or Level 5 skills, such as MBAs and PhDs, can provide significant returns to organisations, individuals and to the economy as a whole. These higher-level skills are key drivers of innovation, entrepreneurship, management, leadership and research and development. All of these are critical to high skills, high performance economy and increasingly in demand from high performance, global employers. Level five skills should also be an important feature of greater employer collaboration with HEI, as recommended in Richard Lambert's Review of Business – University Collaboration Skills (Leitch, 2006, 68). The Worry report, which reviewed the impact of Research Councils, equally emphasises the role of PhDs in sustaining the UK skills and knowledge base: Intellectual capability and creativity is a fundamental part of this. It is created by having Universities that are at the cutting edge of international research and by having a strong stream of graduate and PhD candidates flowing from these Universities into industry and commerce. Indeed, the output of highly educated people rather than research results is widely regarded as the most effective knowledge transfer mechanism. (Research Council Economic Impact Group, 2006: 6) Similarly, Park writes that doctoral graduates bring a range of benefits: for employers, doctoral graduates can offer skilled and creative human capital, and access to innovative thinking and knowledge transfer. For the nation, the obvious benefits of an active community of scholars engaged in doctoral level research include enhanced creativity and



innovation, and the development of a skilled workforce and of intellectual capital and knowledge transfer, which drive the knowledge economy and are engines of the growth of cultural capital. (Park, 2007, 8).

The doctorate is thus becoming recognised as a useful means for practitioners to engage in reflective practice, a concept that has grown in popularity alongside greater “requirements for greater accountability and a rapidly changing environment” within many professions (Scott et al, 2004, p. 2). As Phillips and Pugh write: “Successful candidates - of the professional doctorate - will be skilled and experienced professionals who have not only practiced but pondered on and analysed the use of their academic and practical knowledge” (Phillips and Pugh, 2005, p. 197). Indeed, a survey of employers with staff undertaking professional doctorates found that employers were very positive about the benefits of this level of study for their staff. Benefits identified included:

- the development of individual skills, particularly in the area of research;
- the development of organisational skills, by dissemination from the individual student together with involvement in the programme;
- retention and motivation of staff;
- improved skills in management and leadership;
- improved quality of output/product of the organisation. (UKCGE, 2002: 40).

Moreover, in some non-academic fields a professional doctorate may be regarded as having a greater linkage with the work than a traditional PhD: For the health service and other healthcare employers, the outputs (in terms of skills as well as findings) from professional doctorate training programmes may well have more immediate benefits for day-to-day practice than those from traditional PhD programmes (UKCGE, 2003, p. 34).

Transfer of Doctoral Graduate Skills to the Workplace Studies of PhD graduate employment generally highlight that the skills graduates have developed are useful to them in getting their job and in carrying out their work; although this does tend to be lower in relation to the private sector and industry. The report suggests that there could be some changes in the kinds of skills PhD graduates across all disciplines develop in the future, given the increased emphasis on transferable skills in the doctorate. Nevertheless, a number of general skills in which more support could have been provided – and in which employer surveys raise issues – are identified across the disciplines, in particular:

- project and time management
- leadership
- communication and people skills (e.g. DTZ Consulting & Research, 2006; DTZ Piedad Consulting, 2003; Elias et al, 2005; Jackson, 2007).

Polziehn (2011) elaborated an overview on **skills expected from graduate students in search of employment in academic and non-academic settings**. Making lists of soft skills and offering sessions to students may be the first step to getting graduate students to think about what they can offer future employers. Nicolas (2008) wrote that, “without an overall framework and without



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a link to the research project," we are wasting time and creating superficial knowledge in our graduate students. The Statement of the UK Research Councils' Training Requirements for Research Students provided an excellent framework to layout the expectations we have of doctoral students' research skills in their pursuit of an academic career, and to superimpose the requirements non-academic employers have for our graduate students. The granting agencies NSERC, SSHRC, and CIHR, in collaboration with the Canadian Association of Graduate Studies and the Society for Teaching and Learning in Higher Education, took initiative in 2007 to create their own Statement of Principles on Key Professional Skills for Researchers. In November 2008, the Canadian Association of Graduate Students published a summary of this work that stressed four areas that would have a strong connection in the university milieu: communication, management, teaching, and ethics. This document was initially prepared as a tool to guide the direction of professional development programming for graduate students at the University of Alberta. A greater purpose would be to provide graduate students encouragement, support, and confidence to develop and realize their graduate program was an opportunity to gain valuable employable skills. We can better guide graduate students to prepare themselves for the current job market by using the structure presented by Bilodeau (2008) that outlines common graduate student activities associated with these skills, and combining the most sought after skills by employers. Nine of the ten skills noted below were considered important by Tri-Council and the tenth was added from the UK Research Council's Training Requirement for Research Students. The following text is based on works of Polziehn (2011), Blickley, et al. (2012) and Winterton, Delamare - Le Deist, and Stringfellow (2006).

Communication and interpersonal skills - researchers to be able to: communicate effectively, concisely, and correctly in written, spoken, and visual forms to a variety of audiences using a wide range of media; use effective communication depending on a variety of interpersonal skills including listening, asserting, influencing, persuading, empathizing, and exercising sensitivity and diplomacy; recognize the importance of other aspects of communication including body language and other forms of non-verbal communication; listen to and receive feedback from peers, supervisors, and junior researchers give constructive feedback and respond perceptively to others experiment and apply their interpersonal skills through team building, consensus building, negotiation and conflict management; develop and maintain cooperative networks and working relationships with supervisors, colleagues, and peers within the institution and the wider research community; demonstrate self-understanding and a willingness to build their personal skills.

Related Transferable Skills Sought in Non-Academic Sectors:

- Communication Skills
- Interpersonal Skills
- Computer/Technical Literacy Skills
- Teamwork skills
- Networking and collaboration
- Outreach



Graduate students can demonstrate these skills through:

- **Public Speaking:** research presentations at seminars, conferences, posters sessions, thesis defense, committee meetings, and lab meetings; artistic performances; interviewing test subjects for research purposes; asking/answering questions at seminars; general presentations to industry, public, or government; participating in debates and speech events; volunteering for community events. Presentations to general (not discipline-specific) audiences.
- **Writing:** submitting publications to journals and courses; journal editing/reviewing, designing research posters, writing grant and scholarship applications; providing progress reports, writing proposals and dissertation; writing letters, emails, blogs, and articles for general public
- **Accepting a variety of roles:** mentor, teacher, colleague, leader, student, committee member where one can be in a position to give and receive feedback, as well to respond to various situations requiring differing communication strategies.
- **Networking and collaboration outreach:** work on a team project, co-author a research paper, develop partnership with organizations outside university to answer research questions of interest to the organization, presentation to general audiences.
- **Multi-Media:** participating in blogs, wikis, twitter, video conferences; sharing data electronically; using technology in your presentations/teaching.

Critical and creative thinking – researchers to be able to: gather their information from various senses, including oral and/or written expressions, reflection, observation, experience, and reasoning; analyse and solve problems of various natures (disciplinary, professional, personal, social), to seek to think “outside the box” and maintain an open disposition, allowing them to imagine the impossible and nurture their creative thinking; develop a high degree of innovation, original thinking, and risk taking; conceive new ideas, goods, services, and practices with the intention of improving the current state of knowledge or applying it to a specific purpose in an innovative way; make connections between disciplines and engage in meta-learning, enabling them to contribute novel ideas; assess the relevance and importance of ideas in various contexts, and critique and challenge current ideas, practices, and paradigms.

Related Transferable Skills Sought in Non-Academic Sectors:

- Analytical/Research Skills
- Problem-Solving /Reasoning Skills
- Creativity Skills

Graduate students can demonstrate these skills through:

- **Writing:** proposal and thesis writing; journal submissions, patent submissions, thesis submission, course work, scholarship applications.
- **Research Activities:** collaborative research; developing theoretical concepts; applying methodologies from one discipline to another; attending seminars related to discipline; participating in a journal club; bringing new methodology into research group; identify future research questions to develop from thesis.



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- **Teaching.**

Personal effectiveness – researchers to be able to: engage in meaningful reflection about the historical development and present place of their discipline in the world and where and how they fit in it; have a keen sense of self-awareness of their personal and intellectual strength reassess their positions, values, and future plans in light of their life experience and critical self-analysis; achieve an appropriate life-work balance and to deal effectively with challenging situations and challenging people; follow a flexible course of action that will lead to self-sufficiency and satisfying personal and professional achievements; understand the importance of time and stress management to handle several assignments with conflicting deadlines simultaneously; regularly access and manage up-to-date information regarding career opportunities, the work environment, and professional development.

Related Transferable Skills Sought in Non-Academic Sectors:

- Planning/Organizational Skills
- Detail Oriented
- Balance and Resilience

Graduate students can demonstrate these skills through:

- **Research Awareness:** Prepare a literature review, give research/poster presentations.
- **Progress:** have an annual meeting with committee to evaluate progress; develop research plan; update CV annually at minimum, identify successes.
- **Demonstrate multiple commitments:** research, teaching, committees, volunteering, athletic pursuits, family, personal interests.
- **Balance and resilience:** engage in structured interests and hobbies outside academia.

Integrity and Ethical Conduct – researchers to be able to: be aware of and adhere to professional codes of conduct and standards in and beyond their disciplines; be sensitive to ethical considerations in situations involving conflict of interest, appropriate authorship, and intellectual property attributions; display impartiality and rigor when performing research and when analysing and reporting research results; be sensitive to the ethical aspects of multidisciplinary and multicultural situations; taking into account social and environmental considerations; demonstrate responsible conduct in research and adhere to the standards for academic citation in writing in specific disciplines; handle competing obligations ethically and negotiate and manage ethical dilemmas; engage in critical analysis of rules and standards; ensure that they are fair and equitable.

Related Transferable Skills Sought in Non-Academic Sectors:

- Multicultural Sensitivity and Awareness



Graduate students can demonstrate these skills through:

- **Ethics and integrity requirement:** Graduate Ethics Training course, Institutional Animal User Training Program Certificate, Ethics Approval for use of Human Subjects.
- **Acknowledgement:** proper use of citations, references, copyrights and intellectual property.
- **Role Model:** abiding to research and teaching contractual obligations, adhering to Code of Student Conduct and professional codes of conduct, awareness of human rights.
- **Teamwork activities**

Teaching Competence – researchers to be able to: explain complex concepts related to the content, skills, and process of their discipline in various workplace contexts; provide clear, explicit instructions that facilitate others' understanding and learning; understand the importance of identifying the learning outcomes, first and foremost; facilitate the selection of appropriate content (what to teach/learn), as well as the most effective teaching tools (how to teach/facilitate learning); inspire, motivate, mentor, and develop others; adapt their instructional and mentoring activities to address different learning styles, recognizing different motivations, backgrounds, and experiences, in order to address learning needs in a systematic fashion.

Related Transferable Skills Sought in Non-Academic Sectors:

- Communication Skills
- Interpersonal Skills
- Multicultural Sensitivity and Awareness
- Leadership Skills

Graduate students can demonstrate these skills through:

- **Teaching:** experience through sessional teaching, teaching assistantships and demonstratorships; presenting to elementary and secondary school students; mentoring and tutoring undergraduate and high school students; participating in teaching sessions and workshops; coaching and teaching in community organizations.
- **Administrative roles:** leading discussion groups, chairing meetings, organizing conferences.

Societal and Civic Responsibilities – researchers to be able to: contribute to society through their role as a member of various local, national, and global communities; value civic responsibility, citizenship, and diversity; communicate with members of other cultures in ways that are appropriate in their professional context; demonstrate a broad understanding of the context at the national and international levels, in which research takes place; consider the interests of society by taking responsibility for the impact of their research activities on other researchers, stakeholders, customers, citizens, communities, and the environment, and by accepting the responsibility for communicating the nature and results of their research to the broader community.



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Related Transferable Skills Sought in Non-Academic Sectors:

- Leadership Skills
- Management Skills

Graduate students can demonstrate these skills through:

- **Research Promotion:** contact Public Affairs to communicate research relevance to community; participating in workshops and presentations for the community; publish research in academic and non-academic sources.
- **Community Engagement:** serving as an expert or resource for industry, government, and community organizations.

Leadership – researchers to be able to: influence, motivate, mentor, guide, and enable others to contribute to the effectiveness and success of an organization of which they are members, whether in a lab, in the field, in an institution, or in society; acquire and apply other important skills such as communication, critical thinking, and problem-solving; use effectively their knowledge and credibility to motivate and guide others; articulate a vision, identify problems and solutions; empower and enable others, and facilitate teamwork; adapt to challenging and changing environments and influence others to adapt as well; manage others, including recognizing and rewarding the contributions of others.

Related Transferable Skills Sought in Non-Academic Sectors:

- Leadership
- Planning/Organizational Skills
- Detail Oriented
- Outreach

Graduate students can demonstrate these skills through:

- **Supervisory Roles:** mentor, supervise, and delegate research responsibility to undergraduate - high school students in honours projects or summer internships; take on a chair/executive position in organization with responsibility of managing others.
- **Research Experience:** establish research plan; problem solve; manage time; priority management.
- **Administrative Role:** group facilitation; participate in team project/committee; reflect and document outcomes of conflict resolution.
- **Leadership and personnel management:** incorporate undergraduate interns into research program.

Research management – researchers to be able to: organize the environment in which research is being done for the purpose of seeking new knowledge and the adaptation of that knowledge for practical use; possess suitable organizational skills and an appropriate knowledge of financial management, people management, and project management; work efficiently in situations



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involving many projects with different objectives, different timelines, and different stakeholders; apply effective project management through the setting of research goals and intermediate milestones and through the prioritization of activities; plan, prepare, and manage budgets; set up, interpret, and maintain accounting records; and develop, evaluate, and negotiate contracts; understand the concept of results-based management of research activities and utilize established practices to report to the appropriate officials in the institution, government, and/or industry.

Related Transferable Skills Sought in Non-Academic Sectors:

- Management Skills
- Flexibility/adaptability
- Multi-tasking Skills
- Computer/Technical Literacy Skills
- Project management

Graduate students can demonstrate these skills through:

- **Adaptability:** engage in multiple projects.
- **Project management:** organize conference, organize seminar or other type of creative event outside of department or university, fundraising, incorporate undergraduate interns into research program, manage volunteers during graduate research.
- **Research Experience:** manage diverse and large amounts of information; review budget plan of supervisor's grant application; submit a grant application; provide annual progress report.
- **Technical, information technology:** engage in work or research using technology (beyond course-work).
- **Life Balance:** participate in committees, research, teaching, and personal pursuits.
- **Community Building:** develop professional network; establish relationship with mentors.

Knowledge mobilization and knowledge translation – researchers to be able to: translate research results into knowledge understandable to non-specialists in order to facilitate the uptake and use of knowledge and generate the best social and economic benefits to society; identify, create, represent, and distribute knowledge for use by others through knowledge mobilization/translation; raise awareness and learning through publication (oral and written), intellectual property protection (copyrights, patents, industrial designs, trade secrets), and technology transfer as activities of knowledge mobilization/translation; be familiar with knowledge mobilization/translation as a process within the research cycle; understand the value creation chain related to their specific discipline, and the ongoing relationship that links research and decision making acknowledge the need for long-term partnerships and communication between researchers and knowledge users.



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Related Transferable Skills Sought in Non-Academic Sectors:

- Communication Skills
- Analytical/Research Skills
- Problem-Solving/Reasoning Skills

Graduate students can demonstrate these skills through:

- **Research Promotion:** participate in events for public, government, or industry; develop ideas with other sectors; publish articles in non-scientific forums; identify societal impact of research.
- **Prepare Research Philosophy.**

Career Management – graduate students to be able to: take ownership for and manage one's career progression; set realistic and achievable career goals, and identify and develop ways to improve employability; appreciate the need for and show commitment to continued professional development; demonstrate an insight into the transferable nature of research skills to other work environments and the range of career opportunities within and outside academia; present one's skills, personal attributes and experiences through effective CVs, applications and interviews.

Graduate students can demonstrate these skills through:

- **Career planning:** job applications, CV writing, interviewing, networking and self-marketing, attending professional development sessions/workshops, goal setting, grant writing.

1.2. Formal transferable skills training: good practice examples

The literature identifies several benefits of formal transferable skills training. Doctoral candidates, for example, benefit from acquiring transferable skills during their studies. These help them succeed in carrying out their projects and in their later employment. While researchers naturally acquire some of these skills in the course of their studies and at work (as described in the previous section), others may require more systematic and quality-consistent training. Researchers already in workplace benefit from ongoing acquisition of transferable skills in order to update and build on existing competencies or to fill in gaps, and thus they can work more effectively and benefit from a variety of opportunities. Formal skills training can add value, as can learning through work placements and secondments.

In a survey on doctoral candidates and post-docs, perceptions of the skills, such as time management, writing skills, oral presentations, research skills (data gathering), teaching, interpersonal skills and computer skills (Pritchard et al. 2010). Interviews with companies have shown that skills and attributes such as originality and creativity, teamwork and ability to communicate to non-specialists are highly valued alongside technical proficiency (EUA, 2009, p. 86).



Graduate and Doctoral schools

The concept of graduate schools emerged in North America in the 1960s (Denicolo et al. 2010, p. 15) and has since expanded to other countries including Europe, mainly in a form of doctoral schools. Graduate schools are usually organised across the whole of a university, while doctoral schools tend to be organised along thematic lines and may cross disciplines and institutions (LERU, 2010, p. 9). These schools typically provide a range of support for doctoral candidates, including training in various generic and/or transferrable skills (OECD, 2012). A study from different countries found that doctoral education was enriched by the development of “soft skills” in France (Auriol, 2010), multidisciplinary training that included networking activities and skills beyond the academic speciality in Canada, Denmark, Finland, the Netherlands, New Zealand, Sweden and United Kingdom (Technopolis, 2011). In the United Kingdom, over 75% of universities have graduate schools, most of which are strongly involved in generic skills training programmes (Denicolo et al. 2010, p.19 and 29). Formal training during doctoral studies may also lead to positive attitudes towards ongoing learning (OECD 2012). The Impact and Evaluation Group (2010) found that transferrable skills training and the increase in programmes offered to researchers had “changed the culture” in institutions as researchers and supervisors benefited from transferrable skills training.

- **Transferable skills training at Karolinska Institute**

Doctoral course - Career skills for scientists aims to increase awareness about all the transferable skills obtained during doctoral education. Doctoral candidates can take the opportunity to apply for a one month financed internship in a company or organization within the public or private sector. The course includes reflections over what career options that exist and sessions where academic and non-academic careers paths and entrepreneurial options are presented and discussed. In addition, the course includes the process and steps in a job application procedure, project management, networking practice and how to use communication skills in various contexts. For more information, see: <https://staff.ki.se/doctoral-course-career-skills-for-scientists>

- **Transferable skills training at KU Leuven**

KU Leuven supports its research staff in development of a wide range of professional knowledge and skills. Doctoral or postdoctoral researchers at KU Leuven have access to a broad transferable skills training. These professional skills exceed the specific topic of particular research and aim to enhance personal effectiveness and future employability. For more information see: <https://ghum.kuleuven.be/phd/documents/2019/0460-bro-ojo-2019-v4.pdf>

- **Transferable Skills Training at TU Delft Graduate School**

Transferable skills together with research skills and discipline related skills create doctoral education competence model at TU Delft. A minimum of 15 GS credits should be obtained per category. Competences have been identified to match the profile of a doctoral candidate at TU Delft. Transferable skills focus on personal and professional development, which facilitate the present growth and the future career of doctoral candidates. The main competences include



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Autonomy & Self-management, Working with others, Teaching, Supervising & coaching, Effective Communication. Transferable skills courses are coordinated and facilitated primarily by the University Graduate School.

For more information, see: <https://www.tudelft.nl/en/education/programmes/phd/>

- **Transferable skills training at Technical University of Munich (TUM)**

The TUM Graduate School offers a wide range of courses that support doctoral candidates to further develop transferable skills and expand interdisciplinary experience. The courses are designed as an additional qualification during doctoral studies and offer valuable orientation for next career steps. For more information visit: <https://www.gs.tum.de/en/doctoralcandidates/qualification/transferable-skills-training>

- **Transferable Skills Training at University of Luxembourg**

Currently, University of Luxembourg offers more than 30 courses devoted to transferable skills training. Transferable skills training courses are open to all University of Luxembourg enrolled doctoral candidates. Training takes place in small groups and allows for in-depth knowledge exchange. See the complete list of courses and more information here: https://www.fr.uni.lu/formations/doctoral_education/doctoral_applicant/doctoral_training#TransferableSkillsTraining

- **Transferable Skills Training at UCL**

The UCL Doctoral Skills Development Programme (UCL Doc Skills) is designed to help expand research and transferable skills of doctoral candidates in order to support their research, professional development and employability. The Doctoral Skills Development Programme is open to all postgraduate research students at UCL. Professional development for research students is an important part of UCL 2034 strategy, Doctoral Education Strategy and the QAA Quality Code for Higher Education. The programme is based on the Researcher Development Framework (RDF), the national framework to support the development of researchers. For more information, see: <https://www.ucl.ac.uk/human-resources/learning-development/learning-and-development-portfolio/researcher-development/doctoral-skills>

- **Swiss Transferable Skills Network**

The Swiss Transferable Skills Network began to operate in 2014 and is composed of the managers of transferable skills training and career development for junior researchers (primarily doctoral candidates and postdocs) from across the Swiss university system. It currently includes representatives from the Universities of Basel, Bern, Fribourg, Geneva, Lausanne, Lucerne, St Gallen and Zurich, the ETHZ and EPFL, the CUSO and Regard (Bureaux de l'égalité) programmes in western Switzerland, as well as representation from Swiss universities. The network is open to managers of corresponding programmes and initiatives in all the Swiss universities, as and when they are created. The objective of the network is to provide a space for exchange and support among and between members: to discuss good practice and the challenges faced in common areas, experiences with training courses or trainers, and to share resources in order to provide



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specialized and high quality professional development for their target groups. The network currently meets informally once per year, and remain in contact as and when the opportunity arises. For more information, see: <https://www.unil.ch/graduatecampus/en/home/swiss-transferable-skills-network.html>

The report from OECD (2012) on Transferable Skills Training for Researchers analysed countries policies and practices at governmental and institutional level as they relate to formal training in transferable skills for researchers, from PhD candidates to experienced research managers. The report provides details on a key input to researchers' transferable skills. The report uncovered significant differences across disciplines and countries as follows: *Most training is driven by individual institutions.* Institutions are the main actors in terms of transferable skills training, with the role of government secondary to that of universities, research institutions and other organisations. According to survey results, 1/3 of governments have a strategy on transferable skills training, compared to almost 2/3 of universities. *Main focus of transferable skills training is during the doctoral study.* Training mostly targets doctoral candidates, post-docs and early-stage researchers, not Master's students (for which few governments, universities, research institutions have explicit strategies or programmes). Industrial PhDs, internships and exchanges are the most common forms of workplace experience and almost 1/3 of universities plan to expand workplace experience programmes or to make this a more systematic part of their approach. Respondents also noted the importance of researcher mobility and collaborative research projects in building skills. *There are significant differences across countries.* OECD study (2012) revealed a significant amount of transferable skills training activity, undertaken predominantly by individual institutions. In some countries it is relatively new (e.g. Luxembourg), while in others organised activity has taken place for some time (e.g. United Kingdom). Government involvement is high in some countries (e.g. Korea), but not in others (e.g. Germany). Also differences according to the context (e.g. technical universities may focus more on academic skills than transferable skills because co-operation with industry may be considered sufficient). *There are broad goals of transferable skills training,* including enhancing the employability of researchers in academia, preparing researchers for a wider labour market, improving research, etc. There are also a number of additional strategic goals, which sometimes overlap, e.g. teaching quality, commercialisation and knowledge transfer, international co-operation and a quality research environment. While institutions play the primary role in transferable skills training, *governments* potentially have *roles* ranging from strategic oversight to funding delivery (OECD 2012).

To tackle this gap, multiple research projects are oriented towards transferable skills training. The following section brings and overview of selected good practice recommendations on transferable skills training from scientific and research projects.



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2. GOOD PRACTICE RECOMMENDATIONS BASED ON RESEARCH PROJECTS

The following section brings an overview of good practice recommendations from different types of projects, including international and scientific projects funded by H2020, FP7, Erasmus+ or other schemes. The section contains short overview of the project, indicates scheme of its funding and provides good practice recommendation related to transferable skills training and its integration into doctoral education. Projects are listed in an alphabetical order.

ACCOMPLISSH project: co-creation approach

The full title of the H2020 project is Accelerate co-creation by setting up a multi-actor platform for impact from Social Sciences and Humanities. The project aims to accomplish the challenge of creating an innovative valorisation concept that will strengthen the position and impact generation of SSH research and contribute to innovation for a variety of lead-users and end-users. Traditional valorisation approaches focus on linear processes: from academia to society. In order to bring valorisation to a higher level, all relevant actors need to cooperate in an equal setting: co-creation. Co-creation transcends boundaries, but it does not happen naturally. The ACCOMPLISSH project set up a dialogue platform with representatives from academia, industry, governments and societal partners. The ACCOMPLISSH dialogue platform is organised in such a way that academia, industry, governments and societal partners equally contribute in identifying barriers and enablers of co-creation. The results from both practice and the theory of co-creation form the basis of the valorisation concept and will be tested in the project in a quadruple helix setting. This concept is tested and developed in such a way that it is transferable, scalable and customized for academia, industry, governments and societal partners in the whole of Europe. Co-creation approach used in this project might serve as a good practice recommendation for integration transferable skills into PhD. training. Co-creation brings different parties together in order to jointly produce a mutually valued outcome. In this case co-creation takes place among research, business, government and societal organisations or citizens to identify the requirements and conditions that must be created to ensure effective valorisation of SSH research. Co-creation will bridge the gap between these various actors by developing and testing new models both from the supply side (SSH research / universities) and the demand side (governments, businesses and societal actors / citizens).

Project link: <https://www.accomplish.eu/>

ACT project: implementation of transferable skills training into existing courses

The objective of the Erasmus+ Ka2 Strategic partnership project (full titled: The acceleration method of development of transversal competences in the students' practical training process) is to develop and implement an innovative method of accelerating the development of transversal competences of students by improving the use of practical training. The method consists of seven main stages as follows:



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1. Analysis of the initial state: Analysis of applied methods of teaching transversal competences and practical teaching methods
2. Business needs: Research into demand for transversal competences among entrepreneurs.
3. Matrix: Developing a matrix of the dependencies of practical teaching methods and teaching transversal competences
4. Design and testing: Designing and testing models of processes developing transversal competences within practical competences
5. Analysis: Development of the results of testing process models and drawing conclusions on their basis
6. Evaluation: Selection of the most effective teaching processes or methods
7. Implementation: Application of teaching processes

The principle of continuous improvement and evaluation is adopted in the model of the method. The robust methodology designed and developed in this project is a good practice recommendation how to implement training of transferable skills into existing courses and how to incorporate training of transferable skills through the choice of proper methods into different types of courses across disciplines.

Project link: <http://www.atcerasmus.eu/>

CHANGE – Cultural Heritage Analysis for New Generations: Training of Transferable Skills

The project received funding from H2020 within Marie Skłodowska-Curie actions. The main scientific objective of CHANGE is to develop a methodology to assess and monitor any change to which cultural heritage (CH) artefacts are faced during their exposure to the atmosphere and their conservation treatments. It requires a multi scale and multi modal approach in both acquisition and processing of data collected and harmonization and unification of processing protocols.

The project objectives are reached through the research projects carried out by each Early Stage Researchers (ESR), collaborative work between the ESRs and between them and the beneficiaries/partners. ESRs with different scientific backgrounds relevant to CHANGE were selected and trained to bridge their existing knowledge and the one to gain all along the research programme. In a nutshell, the most innovative aspect of CHANGE is to study change issues on CH artefacts by integrating the expertise of CH experts to a multi modal approach applicable at a variety of scales.

The training (organized as a sole project WP) was organized in three modules: introductory courses, in-depth workshops and transferable skills. Training of transferable skills was provided in addition to the specific skills directly connected to the research programme in participating institutions. Following courses oriented towards transferable skills training were provided: Interdisciplinary dialogue, Intellectual property protection, Responsible Research and Innovation (RRI), Research, project planning and management, Dissemination and outreach, Industry induction and training for start-ups, Commercialisation and financing from investors, Analytical skills, interdisciplinarity, multi-skilling.

For more information visit: <https://change-itn.eu/>



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DOC-CAREERS project – career development and employability of doctoral candidates

The FP6 project "From Innovative Doctoral Training to Enhanced Career Opportunities" (DOC-CAREERS) has been conceived as a ground-breaking project to explore the relations between doctoral training programmes and the career development and employability prospects for doctoral candidates. DOC-CAREERS investigated issues that are central to the European Commission's Human Resources and Mobility Actions focusing on relations of various models of doctoral training in Europe and employability of doctoral candidates in multiple careers and different sectors. Four main issues were studied: the development of transferable skills and competences in doctoral programmes to enhance employability and career perspectives in private and public sectors; the nature and extent of university and industry collaboration in doctoral programmes; mobility strategies for career development (cross-border inter-institutional collaboration and inter-sectorial mobility); and the requirements for more systematic collection of data at the university level to provide the basis for analysis of doctoral candidates' career paths. Within the context of the Lisbon and Barcelona objectives, it is crucial to prepare young researchers for careers in industry, broadly defined, and to open career development paths between private and public sectors by providing high quality research training. The project aimed to identify examples of good practices in currently evolving new structures of doctoral training in Europe and highlighted the necessary conditions for providing better career perspectives for doctoral candidates. The main outcomes of the project were presented in general recommendations to be debated at the university institutional level and through the appropriate policy making practitioner channels.

For more information visit: <https://cordis.europa.eu/project/id/518759>

DOC-CAREERS II project – collaborative doctoral education to enhance career opportunities

The FP7 project "Promoting Collaborative Doctoral Education for Enhanced Career Opportunities" (DOC-CAREERS II) has been conceived as an exploratory action to test the feasibility of Regional Workshops as an instrument to foster university-business/enterprise collaboration. DOC-CAREERS I project confirmed that many views on opportunities, challenges and barriers hindering university-industry cooperation are shared by both partners. In this sense, the "diagnosis" of the situation is sound and the common barriers in Europe are well identified. DOC-CAREERS I Case Studies also confirmed that not only are there no "one-size-fits-all solutions" but also that they tend to be specific to every case including local or regional cultural differences, that is, "the way we do things/business here". In order to capture this diversity, DOC-CAREERS II looked uniquely at how universities work with their regional partners in doctoral education across Europe.

The regional focus of the action allowed project partners to identify examples of university collaboration with local SME, large R&D enterprises, RTD performers, NGO's and other industries (health care, cultural, etc.). Building on DOC-CAREERS I outcomes, a series of five Regional Workshops was organized in selected locations, geographically spread throughout Europe (Eastern, Southern, Central-North), with the intention to bring together interested partners in cooperation through doctoral education. The general aim of the Regional Workshops was to identify specific tools and incentives that may have wider application across Europe. The specific objectives of the project were:



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- To disseminate the outcomes of DOC-CAREERS I in the framework of the “open innovation” model: strategies and good practices on university-industry relations; models and the degree of structure of university-industry doctoral schemes; employability of doctorate holders and its relation with transferable skills; good practices in the tracking of doctorate holders.
- To broaden evidence of good practices validating DOC-CAREERS I outcomes and identifying new models of university-industry collaboration.
- To identify strategies and good practices used by SMEs and other local partners to approach universities and address how their access to university research could be enhanced.
- To bring into the dialogue SMEs who might not be “convinced” of the added value and benefits of university-industry cooperation to identify specific issues to be addressed at local level.
- To explore the perspectives of employability of doctorate holders in the region, mobility opportunities and its relation to regional efforts to reinforce doctoral employability considering the benefits of employing creative workers and their professional expectations.

For more information see: <http://www.eurodoc.net/doc-careers-ii>

DocMob project: tools and good practice in improvement and recognition of doctoral mobility

DocMob is a two-year European Strategic Partnership project that aims to improve the implementation and recognition of PhD students ERASMUS+ mobility. Its main goals are to identify and develop innovative practices regarding the implementation of the Erasmus+ programme for PhD students' mobility; to update the existing ERASMUS+ documents (interinstitutional ERASMUS+ agreement, ERASMUS+ learning agreement, ERASMUS+ diploma supplement) so that they can facilitate doctoral exchanges within the ERASMUS+ programme; and to publish a handbook on doctoral mobility which will serve as a support document for the promotion of the Bologna Process' adaptation to third cycle studies.

The project expects the implementation and management of the Erasmus+ programme for PhD students' mobility to be durably improved, and innovative recommendations to be made for the forthcoming ERASMUS+ programming period 2021-2027, leading in the mid-term to the internationalization of doctoral degrees and the reform of third cycle studies towards integrated European systems. Internationalization of PhD study and good practice recommendations in implementation mobility during the PhD study might help to foster development of transferable skills. Project link: <https://projects.uni-foundation.eu/docmob/>

ECRYPT-NET - interdisciplinary skills training

ECRYPT-NET is a research network of six universities and two companies, as well as 7 associated companies, funded by a Marie Skłodowska-Curie ITN (Integrated Training Network) grant scheme. ECRYPT-NET intends to develop advanced cryptographic techniques for the Internet of Things and the Cloud and to create efficient and secure implementations of those techniques on a broad



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range of platforms. The network educates a group of 15 doctoral candidates with a set of interdisciplinary skills in the areas of mathematics, computer science and electrical engineering. The training is provided in an international context that includes Summer Schools, workshops, internships, and complementary skills. The 15 doctoral candidates recruited to work on the programme will spend at least six months abroad at a different network partner or in one of the 7 associated companies.

For more information see: <https://www.ecrypt.eu.org/index.html>

Engines of scientific careers: workshop for doctoral candidates as a part of a large scientific event

The main aim of the project (financed from RSAI scheme Nurturing New Talent) was to organize the intensive two-days workshop for doctoral candidates as a part of an international conference. A large international conference creates suitable conditions, place and space for young scientists to provide substantive training for their efficient and successful scientific career development, for the presentation of their work and receiving feedback from inspiring personalities, well-known researchers, senior scholars and their peers. The conference creates multicultural and multinational scientific environment and promises valuable scientific results in the form of new common research project proposals, publication outputs, support of young researchers, and development of scientific cooperation and networking. The programme of the workshop included two inspiring keynotes delivered by well-known scholars, regular paper sessions with discussion and feedback from colleagues and an interactive session delivered by professional mentor with focus on career development planning and transferable skills training.

The project might serve as a good practice example how to organize transferable skills training as a part of a larger scientific event leading to synergy effect in career development of doctoral candidates. Project link: <http://www.cers.umb.sk/rsai-engines-of-scientific-career/>

ENHPATHY - Transferable skills training programme

ENHPATHY is a multidisciplinary science consortium created in the frame of the Marie Skłodowska-Curie actions (MSCA)-ITN-ETN European Training Networks call and regrouping 15 academic and 9 non-academic European organisations in the continuum of basic, translational and clinical research on enhancers and associated diseases.

The scientific goals of ENHPATHY are to identify key deregulated enhancers and regulatory mechanisms, and provide new biomarkers and therapeutic avenues for enhanceropathies. To achieve this goal, ENHPATHY has set up an innovative, integrated and disease-focused research programme that brings together European leaders in enhancer biology, computational biology and human genetics. The networks is providing early-stage researchers with a multidisciplinary training oriented towards research skills, transferable skills and events.

Transferable skills training program is organized as a career development program that is an important part of each ESR's training. The career development programme provides workshops and satellite courses that cover a wide range of transferable skills. These transferable skills aim to support the ESR development in topics related to translational research, ethics, exploitation, communication, career options, and management. To implement the workshops and satellite



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courses, the expertise of the ENHPATHY team is complemented by the participation of invited trainers (through letters of commitment). The workshops and courses took place during the ENHPATHY main events. Together, the transferable skills package provides solid bases to ESRs for a successful career in science and/or related career opportunities. Workshop courses were opened to local participants (members from the ENHPATHY laboratories, ENHPATHY institutes). The open access contributes to the success of the workshops and satellite courses and provides an opportunity for training a number of participants outside the project network.

For more information see: <https://www.enhpathy.eu/>

EURAXIND project : relationship between industry and academia

Extensive research has been undertaken as part of the Horizon 2020 funded EURAXIND (EURAXESS for Industry) project with the objective to identify employers' and researchers' needs to support inter-sectoral mobility, collaboration and encourage European researchers to consider working outside of academia. The EURAXIND project serves as a good practice recommendation as it helped to strengthen relationships between industry and academia and provided opportunities for collaborations and strategic partnerships to recruit highly skilled researchers into many employment sectors. The project has resulted in the development of a collection of new online resources available for both employers and researchers to use. EURAXIND promoted the recruitment of highly skilled researchers who can engage with businesses, and are able to promote their skills (including transferable skills) to them.

Project link: <https://cordis.europa.eu/project/id/710294>

PEP-UP - PhDs Enhanced for Prospects project – Fit for Industry Course

European project PEP-UP financed by Erasmus+ was created to enhance the competencies of engineering doctoral candidates planning an industrial career. The project started by the joint identification of 10 key competencies in the transversal area that can be transferred to an industry career. They resulted from a year of research and discussions by the consortium comprising the universities, companies and regional partners, and critically reviewing the literature, local/national practices and needs for companies in industry. The identified competencies were:

- communication skills,
- team working,
- influence and leadership,
- interdisciplinary and intercultural collaboration,
- responsiveness to change and opportunities,
- networking,
- enterprise, consumer and end-user orientation,
- solution-finding,
- strategic thinking,
- "zoom in & out" (focus on detail versus focus on the overall picture).

The project aimed to create an opportunity for industrial partners to share information with HEIs about the competencies they desired in a PhD engineering graduate. This allowed the



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identification of components of doctoral programmes that needed to be emphasized to ensure engineering doctoral graduates are prepared for the employment in industry and more capable in using their talents and training for the benefit of the economy, regions and society. The strategy to accomplish these aims was to co-develop an intensive five-day training course for engineering doctoral candidates contemplating working in industry. With the key-competencies identified, the project team has jointly developed a five-day intensive and immersive training course, named 'Fit for Industry?'

'Fit for Industry?' course's main objectives were: to develop the participants self-awareness of their competencies, to inform the participants on the main traits required by industry from their employees with a doctoral degree in engineering, to provide opportunities for the assessment of the participants' preparedness to a career in industry, to train the participants in key competencies required by industry for doctoral graduates, to encourage them to adopt an economic and business perspective on their activity by establishing a continuous link between the scientific aspects of research and the development of knowledge and skills geared towards innovation and value creation in the business environment, and, to set goals for their personal future development and growth. The course was looking to provide the engineering doctoral candidates with the following gains:

- better self-assessment,
- personal development,
- improved awareness,
- transferable skills,
- valuable networks.

This course opened an opportunity to create a new dynamics of a dialogue involving universities, companies and government entities from different European regions. By bringing together doctoral candidates, academics, industry professionals, and managers with responsibilities in the private sector and in regional authorities a closer dialogue and awareness of the environment and work context and their needs were developed. The project outlined several important recommendations for other possible local training programmes. They include:

- feedback is the key in this programme's philosophy,
- local industry partners must be identified by the universities and should participate in the consortium as early as possible,
- the selection of participants is very important to make sure that doctoral candidate that participate in the course are truly engaged with its purposes and are not just following supervisors' indications, with no motivation to work in industry,
- a coordination of all observers should be performed in the first morning before starting the activities,
- groups of candidates must be formed in advance,
- observers must be allocated to candidates and be acquainted with their tasks and how to perform them in advance.



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In order to adapt the course locally, by keeping its philosophy and including local constraints and expectations, some decisions might be made:

- Who should have the role of observer? It could be the trainers and experts, as was done in PEP-UP project, or external observers, or a mix of both. In justified cases, could former participants be considered as possible observers?
- What should be the role of industry in the process? Should they participate in student's selection?
- Will this be a 5-day course or a more compact 3-day version of the course?
- Should the 'Fit for Industry?' programme integrate local transversal courses available in the institution where it is being held?
- Should the 'Fit for Industry?' programme be integrated in local doctoral programmes?
- Should the course be an intensive and immersive program, requiring participants to travel to a place where they stay for 3 or 5 days (immersive learning) or should it be held in the participants' universities?
- Are credits to be allocated to the course? (Rodrigues et al. 2018).

For more information, see: <http://www.fit-for-industry.com>

PhD HUB: business-driven research

The PhD Hub is an online portal for business-driven research. It centralises research and funding opportunities from the public and private sectors and increases the transferability of the PhD results in the Industry and society. The Mission of the PhD HUB is to answer the converging needs of businesses, universities and PhD candidates for research and innovation. The main vision of the PhD is to foster an inter-disciplinary, inter-sectoral and international dimension in the field of doctoral education and training. The main objective is to create a European-wide marketplace for business-driven research. Several partners from DocEnhance consortium are involved in the PhD Hub with a potential for other partners to join this initiative. The idea of linking and networking HEIs, Businesses and PhD candidates at one platform while networking them on the local but also international level might serve as a good practice example.

Project link: <https://phdhub.eu/about-us/>

POCARIM project

The 7FP project was focused on increasing our understanding of the career paths and employment patterns and contribution of doctoral graduates in the social sciences and humanities. Its core aims were to understand the SSH doctoral populations and their production in the selected European countries; to identify their mobility across disciplines, sectors and borders; and to identify and understand the types of impacts that generated, as well as how and according to what timeframes these impacts were felt. Better understanding of the career paths and employment patterns across different disciplines serves as a good practice recommendation in the proper setting and implementation of transferable skills training in different PhD programmes.

Project link: <https://cordis.europa.eu/project/id/290770>



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SAF21

The aim of the SAF21 (H2020 MSCA ITN scheme) project was to understand how to manage socio-ecological complex systems better. This knowledge is expected to be useful when developing innovative management strategies, particularly to address a shift to new regulatory regimes, which is necessary for the success of future complex pan-European initiatives. The research and development was undertaken by a group of 10 early stage researchers, managed by the SAF21 consortium, which was a mix of academic and commercial organisations. What is unique about the SAF21 project is the way the research and training programme was structured. The SAF21 network offered a practical, collaborative approach to learning, combining research with developing transferable skills through training and secondments. The aim of this doctoral programme was to improve the commercialisation of R&D results, increase the employability of the researchers, expand the impact of such projects through education, outreach and communication to wider communities, as well as enabling more effective fisheries management. If researchers or decision-makers are interested in facilitating interdisciplinary social-ecological system research in practice, SAF21 suggests using the dedicated framework developed during the project. The proposed guidelines for identifying and documenting transferable skills and competences to enhance early career researchers' employability and competitiveness serve as a good practice recommendation. Project link: <http://www.saf21.eu/>

SPRINT: transition from education to the labour market through internships

SPRINT is a strategic partnership project co-funded by the Erasmus+ programme that aims to improve young people's integration into the labour market by creating a European Quality framework for Internships recognized and accepted by employers. The end goal of this project is to work on a unique Quality Framework for Internships valid for the whole Europe. These quality criteria should support students and graduates in transition from education to the labour market. The proposed European Quality framework for Internships recognized and accepted by employers that support transition from education to the labour market might serve as a good practice recommendation for considering internships as a tool for improvement of transferable skills during doctoral studies.

Project link: <https://www.sprint-erasmusplus.fr/>

TOHTOS project: development of online courses

TOHTOS project with the full title Developing the Working Life Relevance of Doctoral Training was financed by the European Social Fund. The goal of the TOHTOS project was to expand and diversify the potential of doctoral candidates to find employment also in other fields than the traditional academic ones, and to develop the working life relevance of doctoral training. The project was coordinated by the University of Tampere (DocEnhance partner), with participating universities of Turku, Vaasa and Oulu.



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The specific actions of the project were to

- create a digital study package to support working life relevance of doctoral training,
- develop a digital channel to support the visibility and recognition of doctoral students' know-how,
- build cooperation between working life actors, doctoral programmes, supervisors, alumni and working life counsellor networks,
- create an operation model on working life relevance in doctoral training, and
- share good practices.

The main products are the online courses that can be used in the partner universities of the project and thus might serve as a good practice recommendation in developing courses as planned in the DocEnhance project. More details on the courses can be found on the national doctoral education network website: <https://findocnet.fi/course/index.php?categoryid=23> or at project link: <https://research.uta.fi/tohtos/>

Transferable Skills Assessment System Project

Great Schools Partnership, in collaboration with EdTechTeam, Inc. is working to build an online system to support the design, implementation and scoring of performance assessment tasks that measure the Transferable Skills. This project aims to build an online system that will bring transferable skills to the centre of teaching & learning. These skills, which include Communication, Problem Solving, Informed Thinking, Self-Direction, and Collaboration, are essential life skills that students should practice across content areas and will need in any form of postgraduate training, study or career. Although this project cannot be defined as a "classical research project", several outcomes, including scoring or design of measurement system for selected transferable skills assessment might serve as a good practice recommendation.

Project link: <https://www.greatschoolspartnership.org/transferableskills/>

TRANSPEER project: development of training programme

The focus of the TRANSPEER project was the creation of a programme to enhance the skills awareness and employability of a cross-disciplinary cohort of 36 participating researchers, drawn from the partner institutions. The programme focused on ECRs, but participants also included doctoral candidates and supervisors, with the aim to encourage students to consider these issues at an early stage, and to ensure that supervisors have the tools required to support them. The same participants will attend all training, enabling the development of an international cohort, who will benefit both from the training, and from their interaction with each other. In addition to enhancing the skills and knowledge of researchers, the project adds to the professional development of the support staff involved, through their exposure to the different areas of expertise and methodologies of the other partners.

The programme covered both academic and wider careers, and benefits from the transnational nature of the project consortium. While many elements of research support are recognisable across Europe, the focus often varies from country to country, with the result that



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different areas of national expertise are developed. A transnational project allows the sharing of best practice in these areas, with the creation of a training programme stronger than one based on a single, national experience. The intention of this training programme was that the programme would be embedded in the training provision of the partner institutions, and be fully reproducible at other universities after the project's end, through the dissemination of high-quality course materials. A range of career tracking surveys can add to the continuous improvement and evaluation of the TRANSPEER training programme post-project. Development of training programme to enhance the skills awareness and employability based on cross-disciplinarity and multi-national experience might serve as a good practice recommendation.

Project link: <https://transpeerdevelopment.org/>

3. GOOD PRACTICE RECOMMENDATIONS FROM DOCENHANCE PARTNERS

UiT The Arctic University of Norway

UiT the Arctic University of Norway offers specific seminar for PhD. candidates: **Take control of your PhD journey** (2 ECTS points seminar)

Writing a PhD thesis benefits from the acquisition of competencies outside of the specific study, e.g. being aware of current academic norms, knowing how to retrieve, evaluate, and treat sources, being up-to-date about open access publishing, and handling scientific research data according to best practice. Take control of your PhD Journey is a biannual seminar series designed for doctoral candidates in their first year, coming from all fields of study. The seminar series consists of five seminars (1. Academic integrity and the transparency of science, 2. Literature search, 3. Open Access publishing, 4. Research data management, and 5. Reference management), organised as interactive sessions combining theory, plenary discussions, group activities, and individual practice. Learning outcomes of the seminar include improving of knowledge, skills and competences as follows:

Knowledge

- Explain correct use of sources in an academic publication and questionable research practices.
- Explain the purpose of literature search for the research process.
- Explain the purpose and advantages of open science, for research and society in general.
- Explain the main sections of a data management plan.

Skills

- Cite academic work, including published research data, in line with existing norms and conventions.
- Select and use scientific databases for advanced literature searches.
- Build advanced searches, using operators (AND, OR, NOT) and search history.
- Evaluate and select suitable publication channels for own research.



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- Find and use repositories for archiving text (publications/manuscripts) and research data.
- Structure and document research data in line with good academic practice.

Competence

- Carry out research with academic integrity.
- Disseminate academic work in line with current publication trends and requirements.
- Communicate with peers and the larger scholarly community about the concept of transparency of science.
- Use the research support services at the University Library.

Tampere University (Finland)

Two key questions in identifying good practices and organising the transferable skills training at Tampere University are 1) what we mean by the transferable skills (definitions), and 2) how doctoral education is currently structured at the university. Starting point in TAU (Tampere University) is that transferable skills support both traditional (university & research) and so called modern doctorate career paths outside the academia. They provide qualities that can be transferred from one job to another. This highlights the fact that also skills learnt-by-doing research and e.g. methods and analytic skills are transferable and highly relevant in kinds of contexts. When training doctoral researchers to become good researchers, TAU also provides them the research competence that is relevant in the wide range of organisations outside academia.

Based on the practices and experience at Tampere University we identify the following examples to be discussed as good practices for integration of transferable skills in the context of doctoral education.

1) Clear division of labour between doctoral programmes and the University's joint doctoral school

At Tampere University, the scientific and artistic doctoral degrees are organised in the form of doctoral programmes. Tampere University has over 2000 doctoral researchers and over 200 doctoral theses are defended yearly in our 23 doctoral programmes.

Doctoral programmes offer doctoral education in accordance to applicable laws and regulations, the research and education strategies of Tampere University, and the focus areas and guidelines of each faculty. The Doctoral School supports the development of diverse, multidisciplinary and international expertise among doctoral researchers and works to promote employability of our doctoral graduates. Along with the doctoral programmes, the Doctoral School provides systematic, up-to-date and high-quality education to all researchers at Tampere University regardless of their career stage. In addition, in The Doctoral School of Industry Innovations (DSII) –educational practices are embedded in the collaboration between academia and industry.

2) The courses providing ECTS, can be included in the doctoral degree

At Tampere University, the curriculum of each doctoral programme is the most important instrument to guide individual studies of doctoral degree. The curriculum describes the objectives, structures and contents of the degree. The doctoral programme provides some courses for



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doctoral researchers as part of their doctoral studies. The profile of the courses offered by the Doctoral School focuses to support doctoral researchers to identify and develop essential core skills related to research, research methodologies and methods, and research ethics.

3) The personal study plans

Reaching the individual career and learning goals related to transferable skills can be ensured by drafting a personal study plan for each doctoral researcher. At Tampere University, the plan made is made together with the supervisor and it follows the general rules and guidelines of the doctoral programme curriculum.

4) Thematic events for doctoral researchers

In addition to formal education with ECTS, the Doctoral School at Tampere University organizes more informal, voluntary events with different topics. The Orientation Day organized twice a year provides information on the available courses (some 50 offered in English/in Finnish, both online and face-to-face, blended teaching). Morning Coffees once a month and Mobility Café serve networking among PhD researchers and supports international and inter-sectoral mobility.

On the national/international level, the Methods Festival organized by the Doctoral School together with the Jyväskylä University is a venue for further education and provides a variety of topics related to the transferable and researcher skills to PhD researchers and post docs alike. The Festival is organized every other year, and reaches some 500-600 participants.

5) Support for Doctoral Researchers to network among themselves

Many faculties provide the room and modest financial support for their doctoral researchers to organize activities that can be essential in terms of transferable skills as well as peer learning and support.

6) The visibility of the transferable training organized by different units and actors at the university

It is not only the doctoral programmes and doctoral school that provide training in transferable skills but also the library, language center etc. At Tampere University, doctoral researchers get the information on the intra www-pages and through from the newsletter sent by the Doctoral School.

7) National and international projects and networks

National and international collaboration within doctoral education transfers the understanding of the good practices in transferable skills training and open resources. The specific challenges in producing project based educational resources and implementing them include first, the time consuming processes of reaching agreements between partner organisations, and second, finding suitable teachers and active users and implementations of the resources at each university.

8) Open website of the Doctoral School at Tampere University

The scientific and artistic doctoral degrees are organised at Tampere University in the form of doctoral programmes. Tampere University has over 2000 doctoral researchers and over 200 doctoral thesis are defended yearly in our 23 doctoral programmes. The university's joint Doctoral School provides systematic, up-to-date and high-quality education to all researchers at Tampere University across faculty borders. The Doctoral School supports the development of diverse, multidisciplinary and international expertise among doctoral researchers and works to promote



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employability of doctoral graduates. The open website, organisation of the doctoral school, the course description and all related information might be very helpful for universities planning to establish Doctoral School at the university level and might serve as a good practice recommendation for doctoral education and training.

For more information see: <https://www.tuni.fi/en/research/doctoral-school>.

The course description under the Doctoral School joint courses is here: https://www.tuni.fi/opiskelijanopas/opintotiedot/?year=2019&organisation=tuni-org-1010_00000T&audience=urn%3Acode%3Acustom%3Atuni-university-root-id%3Aoffering-information%3Ajatko

9) The doctoral programme with the emphasis on building bridges between academia and industry: The Doctoral School of Industry Innovations (DSII)

The Doctoral School of Industry Innovations (DSII) offers companies a new avenue for improving their competitive position and renewing their business. DSII builds bridges between academia and industry and provides companies with access to the latest research knowledge and the opportunity to address research questions that are essential for developing their business. DSII represents a unique combination of dissertation research, real-world business challenges, professional networks and innovations. DSII employs the latest innovation methods and fosters active university-industry collaboration. Doctoral graduates have the expertise to engage in agile and customer-driven research, development and business activities. The University hires the doctoral students admitted to DSII to complete four-year dissertation projects that are sponsored by the partner companies. Research is undertaken under the joint supervision of professors and company representatives. In addition, doctoral students take part in workshops, events and innovation training hosted by the DSII community. For more information see: <https://www.tuni.fi/en/services-and-collaboration/dsii-doctoral-school-industry-innovations>

10) Methods Festival

The three-day Festival engaged researchers, doctoral researchers and methodology teachers alike to develop their skills and knowledge. The presentations from the previous event through embedded links in the programme are here: <https://events.tuni.fi/methodsfestival2019/>

Technical University of Munich (Germany)

Technical University of Munich is the member of The University Association for the Qualification of Scientific Impacts in Germany (UniWiND) that was established in 2009 as a forum for university graduates, intensions and reforms in the future. The network covers more than 70 member universities. The UniWiND and their member universities has been responsible for the development of research and higher education concepts and for the promotion of practice-based learning. The association pays attention also to transferrable skills and in 2019 published the publication "Development of postgraduate students' competences: Promotion and development." The publication emphasizes that a wide variety of career paths of doctoral graduates must be taken into account, and doctoral education does not cover targeted competence development in many cases. It is therefore worthwhile to ask on what basis the respective offers of universities can be designed in a more targeted manner and coordinated with other universities and institutions. To reflect the above mentioned concerns, the UniWiND develop



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Competence Toolbox which aims to advice and support development of transversal competences in universities. The systematization and differentiation of the possible development of competencies in the respective doctoral phases (life cycle) was a goal that led to the development of the competency register. These were developed in addition to or delimitation from other competence models. Another goal was to develop tools and working materials that make the results specifically useful for the advice and planning work of universities and take into account the specifics of German doctoral studies. A total of twelve tools - three overview maps, six card sets and three worksheets were developed. A manual also explains their possible uses. Tools and manuals are published separately in the form of the competence toolbox and are available from UniWiND. The competence toolbox prepared as a co-creation activity of different universities and institutions with the broad national range is very interesting and inspiring good practice recommendation for transferable skills development and training (for more information see Vurgun et al. 2019).

Matej Bel University (Slovakia)

1. Collaborative doctoral education

Multiple study programmes offer a regular possibility to work on the final thesis related to practice. Usually, a company or an institution has specific requirements and proposes together with the supervisor a topic of a thesis related to a concrete issue or problem in the company/institution. Writing of the thesis is accompanied by a short-term internship or at least consultation with representatives of the company/ institution. In this case, the student usually has an additional consultant from the practice who might be the reviewer of the thesis during its defence. The final thesis has practical use and if the collaboration with the student went well, he/she is often asked to stay in the company/institution as a regular employee. This model is very often used by banks, financial institutions, large companies or SMEs. Usually the doctoral candidate works at least partially in the company/institution and partially at the university. Very often, the doctoral scholarship is fully or partially funded by the company/institution involved. In the case of the thesis, doctoral candidates usually work on a problem that requires in-depth analysis and a longer period. As an example we can demonstrate a PhD thesis *The award European Capital of Sport and its impact on the development of city Banská Bystrica*. Banská Bystrica was awarded the title European Capital of Sport in 2017. The scholarship of the doctoral candidate was fully covered by the city of Banská Bystrica. During the award in 2017, the doctoral candidate did a lot of fieldwork and empirical research in Banská Bystrica and conducted research on multiple events related to this award. The next two years, the doctoral candidate worked regularly in the City Council in order to analyse the data, do multiple consultations and prepare materials for the final thesis that was used by the city of Banská Bystrica as a strategic document and evaluation report of the European Capital of Sport Banská Bystrica.

2. Units supporting integration of transferable skills in the context of doctoral education

Matej Bel University does not have a doctoral school at the university level and doctoral programmes are fragmented across faculties. Faculty of Education has established a Doctoral School (as part of a project) that includes doctoral incubator with several activities supporting



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transferable skills training. These activities involve for example the own social network oriented towards supporting mutual communication, problem-solving issues, cooperation in research and personal development of doctoral candidates; or the scientific diary as a tool through which doctoral candidates develop reflexive, self-reflexive and generic skills inevitable for personal development and wider employability of PhD graduates. There are additional units supporting development of transferable skills during the study. Talent and Research Centre (TRC) for talented and passionate students (including doctoral candidates) who are interested to reach practical skills and experience and thus enrich their track record that might be helpful for their future employability. TRC is a creative space with modern equipment including ICT, place for workshops and training and chill-out zone. Talented students have the opportunity to work on specific tasks related to practice beyond their duties under the guidance of professional mentors (in addition to their supervisors) from the university or outside the academia. TRC also provides something like an "office" with all necessary equipment for students working on specific tasks. TRC creates space for cooperation and networking in order to support collaboration among students from different disciplines and thus to come-up with new ideas and creative solutions. The Centre for the Development of Doctoral Candidates serves as a unit supporting collaboration of doctoral candidates and provides place and space for their training. Regularly, there are different types of seminars oriented towards development of their skills, publication activities or mobility promotion. This centre organizes annually the conference for doctoral candidates Scientia Iuventa. The whole organisation including budget, scientific and social programme and conference proceedings production is under guidance of a collaborative group of doctoral candidates, which helps to develop their transferable skills such as time management, cooperation, organisation and planning skills.

4. ADDITIONAL GOOD PRACTICE RECOMMENDATIONS

Good practice recommendations on how to document transferable skills and competences

Regardless how the respective skills and competences were acquired, e.g. formal training courses, work experience, hobbies, the most common way of documenting them is by compiling a transferable skills portfolio. Such a portfolio could be described as a collection of materials e.g. diplomas, certificates, examples of various outputs, put together to demonstrate the acquisition and development of a transferable skill-set. The documentation should follow the **STAR principle**, describing 1) the Situation where a specific transferable skill was acquired, 2) the Tasks that was fulfilled, 3) the Action that was taken and 4) the Result that was achieved. In order to fulfil its purpose, such a portfolio should always be kept up-to-date, which will help the individual to plan the acquisition and development of transferable skills and competences. Portfolio assessment is the internationally most widely accepted way of documenting competences in e.g. pedagogy or medical professions.



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Doctoral candidates attending different types of hackathons

Multiple institutions including universities across world organize hackathons or Hack Days oriented towards different topics. For example, Brain Hackathons are brainstorming and collaborative marathons designed to rapidly produce working prototypes.

Brain-Computer Interface (BCI) Hackathon was organized in 2018 as a part of the conference in Japan. These hackathons aimed to bring together developers, technologists, engineers, students, artists and scientists in teams of 5, over two days to build solutions that they can present. By allowing creative minds from multiple disciplines to come together for a short period of time it gives an opportunity to discover and uncover possibilities for using hardware and software not readily thought of. PhD student from the University of Sheffield Ahmed Azab, who has won an award at this hackathon evaluated this experience: "The hackathon provided a great opportunity to be creative, think outside the box as well as network and collaborate with people from a range of disciplines ". In 2016, CREATE researchers (UK Copyright and Creative Economy Centre, based at the University of Glasgow) Kris Erickson and Jesus Rodriguez Perez organised a series of hackathons and experimented with using the pitch competition format in academic research. They engaged with external communities of software developers, artists, designers and entrepreneurs. They organised the [Copyright Visualisation Hackathon](#) and the [Open Innovation Design Jam](#) events in Glasgow. Skills Development Scotland ³ organized [Skills Development Scotland Hack Day](#). The teams from several Scotland universities took part. The teams were asked to come up with ideas for the best way to present labour market information to young people on SDS's career information and advice web service My World of Work. The judges looked at four criteria – innovation, the final pitch, the benefit of the final product to the customer and how the teams worked together on the day. The winning team came up with the winning idea and a prototype of a heat map to display hotspots for jobs in Scotland using labour market information. This experience was very much appreciated by participants. Hackathons creates a great opportunity for transferable skills training for doctoral candidates.

CONCLUDING REMARKS ON GOOD PRACTICE RECOMMENDATIONS FOR TRANSFERABLE SKILLS TRAINING

Moving Graduate Education into the Future Graduate education is about creating individuals who have a capacity to ask interesting, demanding, and difficult questions. It is also about skill development that takes the student beyond cultivating a strong analytical mind. In the recent review of graduate education for the 21st century, Walker et al. (2008), make the following observation: "Many are ill-prepared for the full range of rules they must play, be they - graduate students - in academe or beyond, and often the experience is marred by a mismatch between the

³ Skills Development Scotland (SDS) is Scotland's national skills body. Their aim is to contribute to Scotland's sustainable economic growth by supporting people and businesses to develop and apply their skills.



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opportunities available to students as they complete their work and their expectations and training along the way.”

Snape et al. (2001) published a study on Postgraduate Career Progression in which all respondents felt that their postgraduate studies had been of some value. Employment related factors were particularly emphasised. Thus, for some it was a prerequisite for their intended career (e.g. HE), whilst for others the qualification brought a certain level of recognition and status and would be valued by employers when looking to gain a first post from which to move on. Equally, as with other studies, the qualification was felt to bring prestige to the employing organisation, particularly where graduates were dealing with clients (Raddon and Sung 2009).

Suggestions to lead graduate students in a direction that will leave them well prepared for the challenges they face in a global environment include a strong focus on professional development, mentorship by faculty, establishing milestones to mark achievement, integrating practice into research, and creating a connection to the community. Recognize that while research skills are essential in an academic pursuit, there are many skills that graduate students can sharpen during this time. During any doctoral program, graduate students need to be aware that employers will evaluate candidates on the basis of how their diverse skill set can enhance their workplace, and how their personality will complement their new community (Polziehn, 2011, 9).

Transferable skills training has become one of the most significant aspects of doctoral education reform in Europe in recent two decades, which has been related to structural changes based mainly on the formation of doctoral schools. The main reason for the integration of transferable skills training in doctoral education curricula has been the need for better preparation of doctoral candidates for their future academic and non-academic careers in various sectors; increasing efficiency, transparency and accountability of doctoral education processes; and the shift from an individual to institutional responsibility. It is now primarily an institutional (university) responsibility to take care of the organisation of doctoral studies including transferable skills training.

The acquisition of transferable skills and competences can come in many forms. Skills can be acquired through formal training courses provided by higher education institutions, or obtained through learning-by-doing activities and training. Training of doctoral candidates related to activities connected with their doctoral study based on **learning by doing** enhance particularly following transferable skills highly appreciated by future employers within and beyond academia:

- **Communication and interpersonal skills including teamwork, networking and collaboration.**

Doctoral candidates have to communicate effectively, concisely, and correctly in written, spoken, and visual forms to a variety of audiences using a wide range of media while efficiency of their communication depends on a variety of interpersonal skills including listening, asserting, influencing, persuading, empathizing, and exercising sensitivity and diplomacy. Doctoral candidates, by learning by doing, could train their interpersonal skills through team building, consensus building, negotiation and conflict management. Besides, they have to develop and maintain cooperative networks and working relationships with supervisors, colleagues, and peers within the institution and the wider research community and thus they demonstrate self-



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understanding and a willingness to build their personal skills transferable to their future career in academia or beyond.

- **Critical and creative thinking, analytical skills.**

Doctoral candidates train during their doctoral study abilities to gather information from various sources and experience, to analyse and solve problems of various natures (disciplinary, professional, personal, social). Very often, doctoral candidates have to think “outside the box” in order to come up with new ideas and creative solutions. Original thinking, and risk taking, making connections between disciplines and engaging in meta-learning, enabling them to contribute novel ideas and innovation that are highly appreciated skills transferable in their future career in academia or industry.

- **Organization, project and management skills and personal resilience.**

Doctoral study and continuous working on dissertation is very good learning by doing training of project management and time management. As researchers, they have to organize the environment in which research is being done for the purpose of seeking new knowledge and the adaptation of that knowledge for practical use. They are trained to develop suitable organizational skills and an appropriate knowledge of financial management, people management, and project management. Very often, doctoral candidates have to work efficiently in situations involving many projects with different objectives, different timelines, and different stakeholders. Doctoral study is a good training to apply effective project management through the setting of research goals and intermediate milestones and through the prioritization of activities, to plan, prepare, and manage budgets but also to report to the appropriate officials in the institution, government, and/or industry. Besides, doctoral candidates are pushed to achieve an appropriate life-work balance and to deal effectively with challenging situations and challenging people. Doctoral candidates learn to understand the importance of time and stress management to handle several assignments with conflicting deadlines simultaneously while they regularly have to access and manage up-to-date information regarding career opportunities, the work environment, and professional development.

- **Leadership and engagement.**

Doctoral candidates are leaders of their dissertation and during completing study they are train to influence, motivate, mentor, guide, and enable others to contribute to the effectiveness and success of their dissertation but also an organization of which they are members, whether in a lab, in the field, in an institution, or in society. They have to learn to articulate a vision, identify problems and solutions and to facilitate teamwork. Very often, they have to adapt to challenging and changing environments and influence others to adapt as well. Doctoral candidates can contribute to society through their role as a member of various local, national, and global communities, they are trained to value civic responsibility, citizenship, and diversity, they are pushed to communicate with members of other cultures in ways that are appropriate in their professional context. As a part of their research they have to demonstrate a broad understanding



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of the context at the national and international levels, in which research takes place; consider the interests of society by taking responsibility for the impact of their research activities on other researchers, stakeholders, customers, citizens, communities, and the environment, and by accepting the responsibility for communicating the nature and results of their research to the broader community.

Formal training of transferable skills is organised through graduate and doctoral schools. These schools typically provide a range of support for doctoral candidates, including training of transferable skills oriented particularly on support of **professional development** and **employability**. **Project management**, **networking** practice and how to use **communication skills** in various contexts create fundamental parts of formal training of transferable skills. Doctoral candidates can take the opportunity to apply for different types of **internships** (in a company or organization within the public or private sector) or to apply for a **research stay** or **mobility** abroad. Formal training often includes reflections over what career options exist and sessions where academic and non-academic careers paths and entrepreneurial options are presented and discussed. Other courses related to formal training are oriented towards **Personal skills** and **self-management**, **Collaboration techniques**, **Teaching**, **Supervising & coaching**, **Effective Communication**. Interesting formal courses are aimed to develop **transferable skills** and **expand interdisciplinary experience**. This analysis brings on overview on good practice recommendations on transferable skills training from multiple **research projects**.

The Co-creation approach brings different parties (researchers, business, government, societal organisations or citizens) together in order to jointly produce a mutually valued outcome. Another good practice recommendation, particularly for universities without graduate or doctoral school, is a robust methodology on how to **implement training of transferable skills into existing courses** and how to incorporate training of transferable skills through the choice of proper methods into different types of courses across disciplines. **Collaborative doctoral education**, **business driven research**, **different types of internships and collaboration with industry** are well-known and well used good practice recommendations for development and training of transferable skills leading to better employability and multiple career options for doctoral graduates. Relationship between industry and academia is reported as a good practice example in multiple research projects (e.g. DOC-CAREERS, EURAXIND, PEP-UP, PhD HUB, SPRINT). **Internationalization** of PhD study, tools and good practice in improvement and recognition of doctoral **mobility** might help to foster development of transferable skills, as reported by DocMob project. Several projects, such as TOHTOS or TRANSPEER project depict good practice recommendation for development of high-quality course materials, including online courses.

Regardless how the transferable skills were acquired, it is very important to document them by compiling a transferable skills portfolio. The good practice recommendation is to apply **STAR principle**, by describing the *Situation* where a specific transferable skill was acquired, *Tasks* fulfilled, the *Action* that was taken and the *Result* that was achieved.

The presented document brings a comprehensive overview of numerous (still, selected) reports, scholarly publications, projects and particular institutional practices demonstrates a broad scale of examples of good practice recommendations for the integration of transferable skills training into PhD programmes.



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This project has received funding from the European Union's Horizon 2020 Science with and for Society programme under grant agreement no. 872483



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