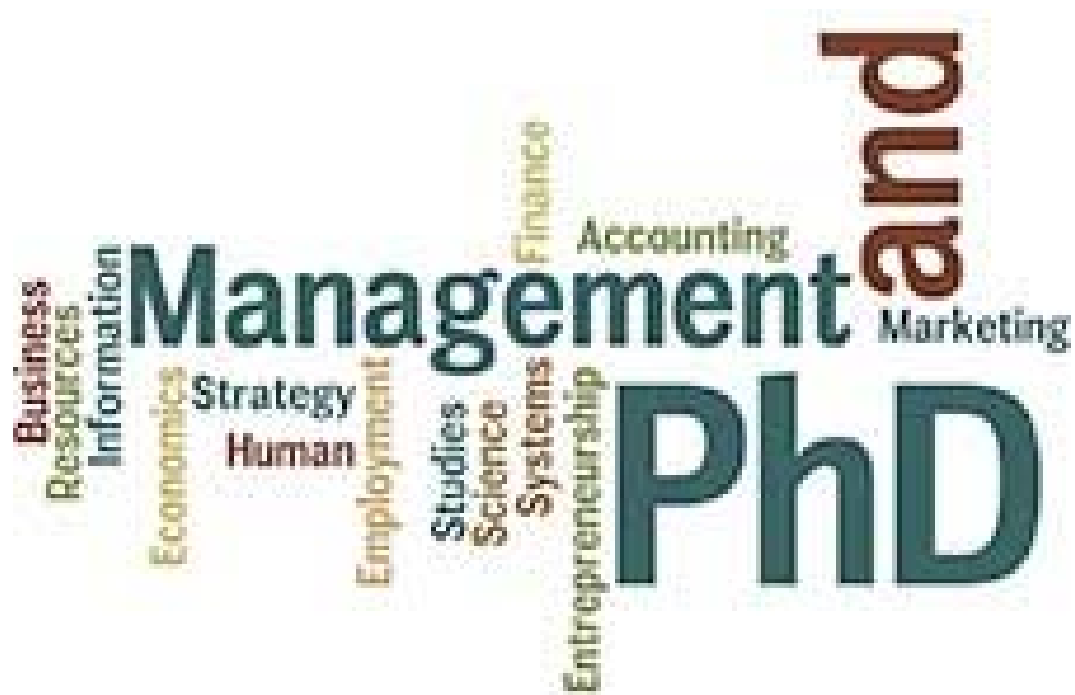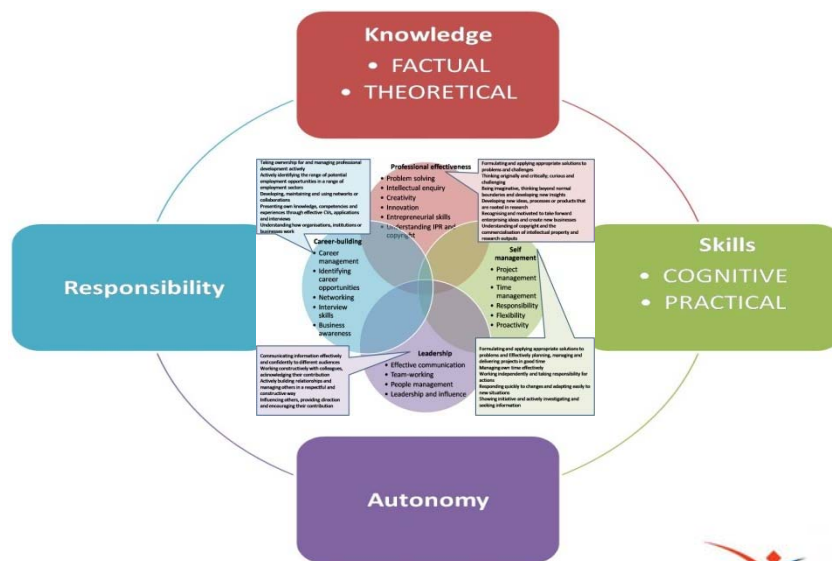MODOC

**Doctoral Education for
transferable skills in Croatia
Guidelines for further development**

'A framework for the Future'

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Guidelines to enable further implementation and development of doctoral candidates' professional and personal competences.

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Doctoral education in European higher education and at European universities has undergone a significant reconstruction in the past decade. Doctoral education has a specific place in the European Higher Education Area and the European Research Area. The structural changes of doctoral education in Europe have been recognised as a "quiet revolution", affecting both the structure and the content, with the most notable change being the establishment of doctoral schools. Doctoral education is a core activity of universities and plays one of the key roles in cultivating research and bringing new knowledge to society. In addition, the quality of doctoral education is relevant for the overall competitiveness of a university. Doctoral education is becoming a global endeavour while at the same time universities can potentially act as key players in developing their regions. As much as doctoral education contributes to the development of human resources, it also generates knowledge transfer. While some of the holders of doctoral degrees will further develop their research at universities and research institutions, others will contribute in different roles outside higher education: in industry, the public sector and private companies. Universities are responsible for ensuring career support for doctoral candidates, taking into account a wide range of careers for doctoral graduates. As stated in the Salzburg Recommendations II (2010), the institution has the responsibility to provide support for professional development and to offer training in transferable skills.

In all of Europe, doctoral graduates are being increasingly employed outside academia, and in some EU countries up to 90 per cent. In Croatia doctorate holders are also starting to look more often for careers outside universities and research institutions. However, at the same time, positions outside academia for doctorate holders are still very few. What initiatives need to be taken? Is the dialogue between universities and non-academic sectors good enough? How should doctoral education respond to the new demands?

The project of Modernising Doctoral Education through Implementation of CROQF (MODOC) has been designed to provide answers to some of these questions with the main aim to better prepare doctorate holders for a wide range of careers. Establishing communication with other sectors could definitely help reduce the gulf between universities and potential employers from other sectors. The University of Zagreb has already started significant structural changes in doctoral education, while recognising the issue of a relatively high number of new holders of doctoral degrees and a small number of positions in the labour market, both at the universities and outside higher education. This has been perceived as an issue of relevance for all the Croatian public universities.

We would like to extend our thanks to all of the Project partners for their contribution to the successful completion of the Project. This Project would not have been possible without their commitment from the very beginning. Working together showed us how much more quickly we can move forward. We would like to express our special appreciation to all our collaborators and colleagues from other EU institutions and universities, outside Croatia, who generously shared their experience and expertise. Learning about their environments, we learned how much faster we must move forward. We have gained new and relevant information from potential employers outside academia. Listening to them, we learned that we must talk more. Last but not least, thanks to our doctoral candidates who helped us to identify weak spots in the process of doctoral education and to shape the training of transferable skills. Their career development is the best feedback we can get!

The Project formally ends on February 18. However, we wish that February 18 be the beginning of further development of doctoral education in the Croatian Higher Education Area, and in particular the development of career support for doctoral candidates that acknowledges a wide range of potential careers.

Melita Kovačević

Head of the Project

EUA CDE Steering Committee Chair

Zagreb, February 10, 2015

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'Doctoral education' a note on terminology and context

People going through doctoral education, aiming at a third cycle degree (often a doctoral degree) are referred to in various ways. Common terms are "doctoral students", "doctoral candidates", "PhDs", "young researchers" and "early stage researchers". Throughout these Guidelines all the individuals included in the above-mentioned terms will be referred to as **'doctoral candidates'** and the term 'doctoral' will be used for all doctoral training and education. This approach is in line with the decision making and policy bodies such as the EC (European Commission), the EURODOC (European Council of Doctoral Candidates and Junior Researchers), the ESU (European Students' Union formerly known as ESIB) and the EUA CDE (European University Association Council for Doctoral Education).

This approach reflects the policy laid down in the 2005 Salzburg Principles that doctoral candidates should be considered both as students and as early stage researchers, thus holding a double status. They should be recognized as professionals with commensurate rights, who make a key contribution to the creation of new knowledge.

Doctoral education constitutes the main link between the European Higher Education Area (EHEA) and the European Research Area (ERA). As such doctoral education plays a crucial role in building Europe as a knowledge-based society and as a knowledge-driven economy. Developing viable policies to strengthen the quality of doctoral education is necessary if Europe is to achieve smart, sustainable and inclusive growth and reach its 'new renaissance'. Graduates of doctoral education should be prepared for a wide range of future roles, including a research based one, so Universities and other Higher Education Institutions (HEIs) need to provide opportunities for the doctoral candidate to be able to develop the appropriate skills to take up future responsibilities.

Doctoral education is organised differently in different European countries and institutions. For many years the standard approach could best be described as 'an individual study programme based on an informal to formal working alliance between a supervisor and a doctoral candidate (an apprenticeship model) with no structured coursework phase'[1]. This description still largely fits the present situation in Croatia. However, there have been some recent and significant moves, particularly at the University of Zagreb, to establish the necessary structural conditions to establish doctoral schools which will function in the more modern format.

In general this more modern format comprises of 'a structured programme, organised within research groups or research/graduate/doctoral schools with two phases: a taught phase (mandatory and voluntary courses or modules) and a research phase'[2]. These two 'phases' run concurrently not consecutively with research present from the very beginning. Within Europe some 85% of HEIs conformed to this more modern typography for doctoral education by 2012, up from just 30% in 2007. A further phasing out of the traditional approach is expected. At the University of Zagreb one doctoral school, as an umbrella doctoral school, has so far been approved by Senate.

In either case, traditional or modern, the core of doctoral education is original research, which can be either basic or applied. Doctoral candidates are trained to become fully independent professional researchers. This indicates that the creation of new knowledge, building a researcher mindset and personal development to be a professional researcher are the main goals of doctoral education.

Graduates of doctoral education should be prepared for a research based career. Universities need to provide opportunities for the doctoral candidate to be able to develop the appropriate skills to take up future responsibilities. Adequate career guidance or counselling is crucial for doctoral candidates who may wish to pursue an academic or non-academic career. Doctoral graduates need to become more aware of their competencies, the importance of generic skills and job opportunities

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[1] European University Association

[2] Ibid.

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inside and outside academia. Universities should take more responsibility for this, both towards the doctoral candidates as well as towards society at large.

These guidelines have been developed by the EU funded **MO**dernising **DOC**toral Education Project (MODOC) in response to this need to provide career support, particularly in the area of transferable skills. *"**Transferable skills** (also known as **generic 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".*

The guidelines contain contributions from all seven University partners, their non academic project partners, the trainers from the MODOC pilot courses and those attending the pilot trainings.

Zagreb 2015

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Acronyms

CROQF	Croatian Qualification Framework
EC	European Commission
ECTS	European Credit Transfer Scheme
EHEA	European Higher Education Area
EMBO	European Molecular Biology Organisation
EQF	European Qualification Framework
ERA	European Research Area
EU	European Union
EUA	European University Association
EUA CDE	European University Association Council for Doctoral Education
EURODOC	European Council of Doctoral Candidates and Junior Researchers
ESU	European Students Union
ESIB	European Student Information Bureau
EQF	European Qualifications Framework
HKO	Croatian Qualification Framework (Croatian language acronym)
KPI	Key Performance Indicator
LERU	League of European Research Universities
MODOC	MOdernising DOCtoral Education (Project)
PDP	Personal Development Plan
PLP	Personal Learning Plan
R&D	Research and Development
RDF	Researcher Development Framework
RDS	Researcher Development Statement
TS	Transferable Skills

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A vision for transferable skills training as an integral part of doctoral education in Croatia

The Croatian higher education system has a long educational tradition preserved primarily through the work of its seven public universities based in Zagreb, Rijeka, Split, Osijek, Pula, Zadar and Dubrovnik.

Since 2003 Croatia has been involved in an intensive reform of its higher education system in line with its national needs and European standards, and according to the principles of the Bologna Declaration. The Croatian education system is now fully aligned with the guidelines of Bologna and Croatia's higher education institutions are part of the EHEA. Doctoral studies last three years and are intended for scientific and research training aimed at the production of scientific excellence as well as the renewal of teaching staff in the higher education (HE) system.

Connecting higher education and science and research with the private sector is a process that runs parallel to the reform of higher education. An important step in this process in Croatia was the creation in 2003 of the National Foundation for Science, Higher Education and Technological Development with the mission to transform Croatian society into society of knowledge, enhance development of globally recognized research and a knowledge-based economy. In 2010 the organisation was renamed the Croatian Science Foundation[3] and in 2011 it joined the European Charter for Researchers and Code of Conduct for the Recruitment of Researchers thus accepting an alignment of its rules with those of other European countries. Its revised mission is *to promote science, higher education and technological development in Croatia in order to ensure the development of economy and to support employment*.

The important contributory role of doctoral research to modern society and commerce as well as the usefulness of doctoral training beyond the doctorate e.g. in roles beyond public research and higher education, has been recognized in recent national strategies for education. Universities are increasingly aware of the importance of doctoral research for the scientific output of a university and its link to international rankings of universities.

As the climate for doctoral studies changes there is a widely accepted need for targeted investments in the personal and professional development of PhD candidates, support for structures such as doctoral schools, and improved quality of scientific supervision. This change in the framework needs to be accompanied by investment in the professional development of administrative staff needed to support the overall endeavour.

Croatian Universities recognise the changing nature of the doctorate in Croatia and in particular that an increasingly large number of doctorate holders will not remain in academia but will move to take up positions in other sectors of society. As the environment for study and the final destination for doctoral candidates transforms, Croatian Universities also accept the importance of institutional responsibility for the quality of doctoral education, the development of structure in doctoral education, for example the doctoral school, which provides an umbrella for modern doctorate models and taking responsibility for providing relevant and high quality support for doctoral candidates.

As outlined in the EUA Salzburg II recommendations (2010) career support for doctoral candidates must take into account individual goals and motivations and acknowledge the wide range of careers for doctorate holders. While the doctoral candidate is responsible for their career choices given the situation on the labour market, it is the institution's responsibility to provide support structures for professional development. 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

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[3] The National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia was transformed in 2010 in the Croatian Science Foundation (CSF) based on the new Law on CSF (Official Gazette 92/2010).

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. In particular, development of professional and personal competences should provide the capacity for multi-disciplinarily and cross-disciplinarily, because this is a pre-condition for collaboration. In such a small country, as Croatia, collaborative capacity in research is of the utmost importance.

Finally, in order to provide the baseline for quality assurance, there is a need to develop external indicators (for measuring relevance/accountability) and internal indicators (for measuring efficiency of used resources). Relevance/accountability of doctoral education requires the development of indicators for monitoring the outcomes of the research and research-based education (as contributors to societal changes which lead to better society for everyone). Efficiency of doctoral education requires the development of indicators that measure how well resources are used in this process.

Through the future promotion of innovative structures Croatia will meet the challenge of interdisciplinary training and the development of transferable skills for its doctoral candidates. By doing so Croatia will feel an enhanced contribution to modern society and commerce both from doctoral research itself and from the usefulness of doctoral training beyond the doctorate e.g. in roles beyond public research and education.

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Introduction and purpose of the guidelines

These guidelines have been developed in order to build on the valuable experience gained under the EU Funded MODOC Project ("Modernising Doctoral Education through Implementation of CROQF") and to help create comprehensive support for future development and implementation of professional and personal competences of doctoral candidates at a national level in Croatia. They lay out the importance and benefits of providing transferable skills training for doctoral candidates in Croatia and offer a framework and associated example curriculum for delivering transferable skills training through workshops. They also include valuable feedback from early piloting of training.

The MODOC project was led by the University of Zagreb in partnership with all other 6 public universities in Croatia namely University of Rijeka, University of Zadar, University of Split, Josip Juraj Strossmayer University of Osijek, University of Dubrovnik, and Juraj Dobrila University of Pula. The partners were supported by Associates from the Agency for Mobility and EU Programmes, the Croatian Employment Service (HZZ) and the Young Scientist Network – MLAZ.

In developing these guidelines the MODOC partners have recognised that currently no such guide exists, and most efforts at supporting transferrable skills training at Croatian universities are therefore based on individual initiatives that "start from scratch", while efforts on the national level are often uncoordinated with those on the institutional level. The primary purpose of the guidelines is therefore to help further implementation and development of doctoral candidates' professional and personal competences by providing this much needed documented starting point for Croatian Universities and a foundation for national level development. It is hoped that the impact of the guidelines will ultimately be felt in a measurable increase in the number of highly educated researchers finding employment outside of publically funded research institutes at the end of their doctoral programs.

The Guidelines are also intended to contribute to the further development of the Croatian Qualification Framework (CROQF) by providing both Universities and Doctoral candidates with a description of the professional and personal competences that should be developed during doctoral study and placing this firmly in the CROQF 'learning outcomes' framework. This approach ensures that any further development and implementation of professional and personal competences in doctoral education will be done in accordance with firm standards specified in CROQF and based on concrete data and experience, thus facilitating a coordinated approach to change.

These guidelines are also designed to ensure that the Higher Education (HE) sector will have better conditions for the implementation of CROQF in doctoral education. Their creation has been directly supported by the top management of all seven public Croatian Universities, clearly demonstrating the importance placed in Croatia on the development of professional and personal competencies in the area of transferable skills as an integral component of modern doctoral education. This endorsement should provide improved options for the further modernisation of doctoral education in Croatia.

Finally, an improved environment for the development of professional and personal competences of doctoral candidates will benefit public authorities. These Guidelines are intended to directly contribute to planned changes in higher education at the national level.

The guidelines are intended primarily for HE policy makers and university top management. They will also benefit doctoral candidates themselves and employers. They are based on the results of activities within the MODOC project including consultation activities, studies and a designed curriculum, as well as valuable input from individuals who have been trained as trainers and the evaluation results of the MODOC pilot courses plus other relevant inputs from MODOC partners and associates.

1. The importance of and benefits to be gained from developing the professional and personal competences of doctoral candidates

Introduction and background

The issue of doctoral training has gained considerable importance in recent years and significant changes have occurred in doctoral training over the last decade. The changes are driven by national, international and EU level policies designed to strengthen the research intensity of the European economy both by creating and adsorbing new knowledge. It is estimated that attaining the EU target for R&D of 3% of GDP will necessitate the creation of one million new research jobs[4]. This in its turn will require a better matching of supply (training of researchers) and demand (recruitment of researchers).

International context and approach

The reform of doctoral education in Europe has strong foundations in the 2005 EUA Salzburg Principles, established in the Bologna Process as the basis of the reforms for doctoral education.[5] Representing 850 members across 47 countries, who enrol 17 million students at their member universities, EUA (European University Association) is the largest and most comprehensive organization representing universities in Europe. The Salzburg Principles represented a key milestone in the reform process of doctoral education in Europe, as they drew new common directions from the diverse reforms ongoing at that time in European countries.

The subsequent Salzburg II Recommendations (2010)[6] were the result of the Salzburg II initiative. This was an intensive consultation with the members of the EUA Council for Doctoral Education (EUA-CDE). The outcomes of the consultations were discussed by more than 220 participants at the Annual Meeting of the EUA-CDE at the Free University of Berlin in June 2010, representing 165 institutions from 36 countries. The recommendations were unanimously approved by the EUA Council for Doctoral Education, made up of representatives of the European rectors' conferences. The recommendations build on the original Salzburg Principles; they affirm the validity of the basic principles and give them additional, concrete content.

A document along the same lines is the 2011 EC document entitled Principles for Innovative Doctoral Training[7]. This document suggests that it is essential to ensure that enough doctoral candidates have the skills demanded by the knowledge based economy such as communication, teamwork, entrepreneurship, project management, IPR, ethics, standardisation etc. It also proposes building on the work of the University Business Forum and the outcomes of the EUA DOC-CAREERS to involve business more in curricula development and doctoral training so that skills better match industry needs.

EU Policy

The EU has reiterated an awareness that doctoral training is a primary progenitor of new knowledge, which is crucial to the development of a prosperous and developed society and that further progress in this field will not only depend on enhancing doctoral training, but also on increasing the absorptive capacity of the economy. In a 2011 paper[8] DG RTD noted that it is in particular important

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[4] http://ec.europa.eu/eracareers/pdf/am509774CEE_EN_E4.pdf

[5] http://www.eua.be/eua/jsp/en/upload/Salzburg_Conclusions.1108990538850.pdf

[6] http://www.eua.be/Libraries/Publications_homepage_list/Salzburg_II_Recommendations.sflb.ashx

[7] http://ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pd

[8] European Commission Directorate-General For Research & Innovation Report of Mapping Exercise on Doctoral Training in Europe "Towards a common approach 27 June 2011 http://ec.europa.eu/euraxess/pdf/research_policies/Report_of_Mapping_Exercise_on_Doctoral_Training_FINAL.pdf

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to convince the managers of small and medium sized enterprises (SMEs) of the value of employing doctorate holders.

In order to support this initiative within the ERA the European Commission (EC) developed a set of seven principles for innovative doctoral training. The seven EU principles were based on the ten Salzburg principles, good practice in Member States and the Marie Curie experience. They were endorsed by the EU Council of Ministers in their conclusions on the modernisation of higher education on 28/29 November 2011.

The Commission also proposed a **Common Approach (CA)** to help ensure that the next generation of doctorate holders can actively contribute to the Innovation Union. The CA, now codified in the **Principals for Innovative Doctoral Training**[9], seeks to support the development of researcher career opportunities and includes the recommendation that doctoral training should include *transferable skills training*. Transferable skills are defined in this document as:

*"*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".

The **European Charter for Researchers** reiterates this statement under their **Code of Conduct for the Recruitment of Researchers** which states that *Researchers at all career stages should seek to continually improve themselves by regularly updating and expanding their skills and competencies. This may be achieved by a variety of means including, but not restricted to, formal training, workshops, conferences and e-learning*[10].

It should be noted that while the Salzburg Principles and the Principals for Innovative Doctoral Training are in general agreement there are notable differences with the EC document emphasising more strongly the importance of industry and a knowledge-driven economy.

The **European Partnership for Researchers** has called attention to the need for researchers to possess all the skills required for assuming different roles in modern economies and knowledge based societies. Companies are increasingly oriented toward open innovation and rely on collaboration with other companies and research organisations for the development of ideas and product enhancement. Furthermore, science has been gradually moving towards multidisciplinary and interdisciplinary research, competitive financing, international cooperation and focus on turning research results into successful innovations.

In order to involve the business sector in the development of associated curricula and doctoral study programmes, the establishment of **Knowledge Alliances** was announced within the Innovation Union initiative. Knowledge Alliances will spur collaboration between business sectors and education sectors on the development of curricula. The goal is to include contents and skills that are needed in industry in the curricula.

National context and direction

Croatia has strongly acknowledged the importance of aligning the number and type of study programs with social and economic needs, developing researcher competencies and in particular to addressing the need for development of personal and professional competencies. Key documents are the **Action Plan for the Mobility of Researchers 2011 - 2012'** and the new **Strategy for Education, Science and Technology 2014**. These documents propose aligning the number and type of study programs with social and economic needs and customizing the content of study programs to clearly define learning outcomes. They also foresee the role of doctoral schools and post doctoral

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[9] Principles for Innovative Doctoral Training European Commission Directorate-General For Research & Innovation Directorate B - European Research Area Unit B.2 "Skills" Brussels, 27/06/2011
http://ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pdf
[10] http://ec.europa.eu/euraxess/index.cfm/rights/europeanCharter

training in helping PhD candidates to acquire education beyond the scientific and educational for the labour market. Targets set before the doctoral schools are now range from research excellence and the possibility of interdisciplinary research to the acquisition of transversal skills and professional development of researcher.

The Action Plan for the Mobility of Researchers 2011 - 2012[11] (Action Plan) set forth six objectives. The sixth is the ***development of researcher competences***. In seeking to develop researcher competencies the Action Plan recognises that for researchers to be successful in both the academic and the industrial setting, their competences must "surpass the expertise in their respective research field and outstanding communication, management skills, and the ability to work in a multicultural environment have been increasingly valuable skills for researchers".

The Action Plan acknowledges research carried out by the European Molecular Biology Organisation (EMBO) in 2008[12] and the American Meteorological Society (AMS) [13]. The former showed that the acquisition of some complementary skills would boost researcher competitiveness in both the academic and the industrial setting. The results of the EMBO research suggested that "late-stage researchers consider managerial, administrative and communications skills to be top complementary skills in the research sector, and that early-stage researchers should receive more extensive education in the fields of research ethics, communications (especially presentation skills), and time management". The AMS study showed that "research communications skills featured most prominently among researcher skills, followed by writing skills, presentational skills and technical writing skills".

Competences listed in the document **Key Competences for Lifelong Learning - a European Framework** have been incorporated into Croatia's education policy through their integration into the **National Framework Curriculum** and the **Croatian Qualifications Framework (CROQF)**.

Croatian Qualifications Framework (CROQF)

The CROQF Act was adopted by the Croatian parliament on February 8, 2013 and came in to force on March 2, 2013[14].The CROQF defines a ***qualification*** as a set of ***learning outcomes***, whose acquisition is validated and supported by a certificate issued by a competent body. Learning outcomes are defined as sets of ***competences***, represented in terms of ***knowledge and skills***, and the associated ***autonomy*** and ***responsibility***.

Knowledge denotes a set of acquired and related pieces of information. In the CROQF, knowledge refers to factual and theoretical knowledge.

Skills denote a set of knowledge applications and the use of know-how in completing tasks and solving problems. In the CROQF, skills refer to cognitive (logical and creative thinking), practical (manual dexterity and the use of methods, instruments, tools and materials) and social (establishing and developing interpersonal relationships) skills.

Autonomy and Responsibility (Competence) denote the achieved employment of specific knowledge and skills, against given standards.

It should be noted that in developing level indicators for the CROQF, EQF (European Qualifications Framework) descriptors were partially used, but they were not directly copied. They were designed to serve primarily for orientation and better understanding of their idea and role.

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[11] http://www.euraxess.hr/sitegenius/article.php?id=717

[12] *Transferable skills for life scientists*, A report produced by the EMBO Science & Society Programme for the European Molecular Biology Conference, 2008

[13] David M.Schultz: *Eloquent Science: A Practical Guide to Becoming a Better Writer, Speaker, & Atmospheric Scientist*. The University of Chicago Press, 2009

[14] http://www.kvalifikacije.hr/documents-and-publications

The Act notes that learning competences will be acquired by an individual through learning and should be proven after a learning process. Two types of learning are recognized:

- Formal learning: an organised activity by an accredited legal entity or an individual, carried out according to accredited programmes, aimed at acquiring and upgrading competences for personal, social and professional needs. It shall be proven by a certificate, diploma or other public document issued by an authorised legal entity.

- Non-formal learning: an organised learning activity aimed at acquiring and upgrading competences for personal, social and professional needs. It shall not be proven by a public document.

The CROQF has eight levels of units of learning outcomes. Their descriptors represent minimal conditions for placing units of learning outcomes at respective CROQF levels. Higher levels of units of learning outcomes include lower levels of a respective profile.

In the CROQF, level indicators (descriptors) are laid down in such a way that they encompass the whole spectrum of learning outcomes, independent of the form of learning or the institution; from primary school, through all educational levels, to the doctoral level, and even further when applicable. They cover work activities, studying, academic activities, as well as vocational education for the primary purpose of entering the labour market. They also include the entire initial education, as well as that directed towards professional development, i.e. all forms of learning – formal, non-formal and informal – during the course of a lifetime.

Annex 1 shows the **complexity** of each competence for each of the 8 levels. Level 8 is the level associated with doctoral education.

Transferable skills training for doctoral candidates – the present situation in Croatia

Most researchers in Croatia are still undergoing traditional education programmes, which frequently provide insufficient knowledge in some important areas. The **Action Plan for the Mobility of Researchers** identifies these as 'intellectual property management, research project funding, and setting up spin-offs' and points out that 'researchers employed in SMEs are often required to manage projects, company communications and intellectual property'. Additionally, late-stage researchers sometimes cannot keep up with cutting-edge technologies and methods and do not have sufficient support in the development of their skills as they climb the career ladder and assume management positions in their respective organisations.

With a view toward building human resource capacities in the science sector in Croatia, increasing inter-sectoral and transnational mobility and maximising the absorption of funds allocated for this type of cooperation, the Action Plan proposes that professional development and training programmes must be created with the goal of sharpening researcher competences in the following areas:

- Management skills and entrepreneurship
- Academic entrepreneurship
- Project proposal development
- Time management
- Drawing up investment and feasibility studies
- Research project management
- Cooperation with industry
- Human resources management
- Team work, networking
- Commercialization of innovation

- General business skills (development of a business plan, basic market analysis, strategic thinking, SWOT analysis)
- Research skills
- Writing scientific papers
- Research ethics
- Intellectual property
- Technology and knowledge transfer
- Presentation and communication skills in research
- Administrative skills

However, despite the very positive approach and concrete measures laid out in the Action Plan, many of the measures foreseen for object 6: The Development of Researcher Competences have yet to be realised. Annex 2 shows the measures as originally envisaged for this action. Some of the measures may now be realised through the **Strategy for Education, Science and Technology (Strategy for ES&T) 2014**.

The Strategy for ES&T 2014 proposes (Measure 1.1.1) an analysis of study programs according to content and compliance of learning outcomes and competences they acquire ***with the real needs of the society***. It is proposed to use the results of this analysis to rationalize the number of study programs and in doing so, use instruments such as the Croatian Qualification Framework (HKO) to encourage higher education institutions to create standards of qualifications.

This step is intended to address a number of issues. Firstly that when new programs were introducing in Croatia, aligned with the Bologna reform, they did not define output parameters such as learning outcomes and competencies of students nor were they able to make use of the HKO as it had not been finalised. Secondly, with rare exceptions, the new study programs were made in the context of higher education without any special consultation with other stakeholders such as employers and relevant institutions and bodies. This approach is contrary to that proposed by the EC in its paper Principals for Innovative Doctoral Training which states that "Business should also be more involved in curricula development and doctoral training so that skills better match industry needs, building on the work of the University Business Forum[15] and the outcomes of the EUA DOC-CAREERS project[16]". There are good examples of interdisciplinary approaches in universities bringing together skills ranging from research to financial and business skills and from creativity and design to intercultural skills.

The overall result in Croatia of omitting a learning outcomes and quality framework and lack of consultation with key stakeholders has been "unevenness in the quality of programs, in their acceptance by the labour market, and in their general contribution to society"[17].

The Strategy for ES&T 2014 acknowledges that study programs must ensure the acquisition of prescribed learning outcomes, but also to retain the flexibility that will adapt to the constant and rapid changes in wider social context. For this reason, an efficient way of checking these outcomes needs to be developed and implemented and in particular one that moves away from a test of memorized content knowledge towards on that assessed acquired knowledge, skills and competencies.

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[15] http://ec.europa.eu/education/higher-education/doc1261_en.htm
[16] http://www.eua.be/eua-work-and-policy-area/research-and-innovation/doctoral-education/doc-careers
[17] ES&T 2014

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The strategy also highlights that existing curricula are still missing methods for developing **transversal competences** such as communication skills and presentation, management skills or initiative. The share of practical teaching is still too small, and part of the study programs is a lack of student practice and fieldwork. Quality performance of professional practice for much of the study is a prerequisite for the acquisition competence and thus a prerequisite for employability of graduates, or their better preparedness requirements for future employers. Therefore, in the context of sectoral interest networks (Measure 4.2.4.) it is necessary to establish the appropriate models of organizing this kind of practical part of the study. The strategy indicates that a special place in the study should be devoted to the development of creativity and innovation.

2. The need to harmonise competences developed during doctoral education in Croatia with the demands of the labour market;

The dynamics of supply and demand

The past decade has witnessed a steady increase in the number of doctoral degrees being awarded across the OECD, rising by 38% from 154 000 new doctoral graduates in 2000 to 213 000 in 2009. As outlined above, doctoral education is undergoing significant change throughout Europe, in order that it not only provides a pipeline of qualified people to become academic staff in higher education (HE) but also contributes to development of a highly skilled labour force in other sectors of the economy. This also reflects the fact that there has been greater growth in the number of people undertaking doctoral programmes than capacity to absorb them as academic staff in HE. To increase the potential employability of doctoral graduates and enhance their transition into the wider labour market, it is clear that doctoral candidates need to acquire a wide range of professional and personal competencies.

The present labour demand for people who have completed doctorate education in Croatia is extremely low. This is an increasingly critical issue as the number of doctoral graduates in Croatia cannot be absorbed by existing demand from national HE. Doctoral graduates who opt to continue in HE outside Croatia contribute to the existing brain drain. However, continuing investments in human capital are necessary in Croatia to ensure economic development in line with the global growing demand for such highly skilled workers. Simply reducing the number of doctoral candidates is not a viable solution to the problem. Making doctoral graduates more attractive to the non HE sector is key to addressing the problem of supply, demand and successful transfer to a knowledge based economy. Although the workforce in Croatia is mainly well educated, employers often have difficulty in finding workers with the right skills. Improving relevant skills and competencies is clearly one of the major tasks to be achieved in order to overcome the problem of the present skill mismatch.

Competency development and career aspirations – results of recent studies

Currently doctoral education in Croatia comprises taught courses and research to provide doctoral candidates with insight into the knowledge and skills required to become a specialist in their field of research. Although this system prepares doctoral candidates for an academic-oriented career, it has been considered that it may fall short in producing doctoral graduates with the range of competencies required in the current wider labour market (i.e. outside HE). Currently, relatively few doctoral graduates in Croatia work in the business sector (5% according to the Croatian Bureau of Statistics, 2009), which could be attributed to their lack of preparedness for such a career, and/or a lack of awareness in the business sector of their potential.

In a 2013 study of Croatian doctoral candidates[18] just over 60% of respondents aspired to have a long-term career in HE, and nearly half (44%) expected to achieve this. Few had aspirations to work in non-research careers or for self-employment/setting up a business (less than 10%, respectively). However, over half of all respondents did not feel that their doctoral programme was preparing them well for a career outside HE. A counter-part study[19] indicated that many employers felt that current doctoral programmes are not effective in developing personal and professional competencies, and that current doctoral candidates are not very well prepared for the wider job market in Croatia. In addition, while many employers felt that recent doctoral graduates displayed

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[18] Personal and professional competencies of current Croatian doctoral students, Janet Metcalfe and Robin Mellors-Bourne, Careers Research & Advisory Centre (CRAC) / Vitae, March 2013
[19] Croatian employers' expectations and perceptions of doctoral graduates and their competencies, Robin Mellors-Bourne and Janet Metcalfe, Careers Research & Advisory Centre (CRAC) / Vitae, March 2013

many useful competencies to a reasonable extent, certain competencies they deemed very important (such as proactivity) were not thought to be strong amongst doctoral graduates.

These studies, undertaken as part of the MODOC project, highlighted the need for better harmonisation between competences developed by doctoral candidates and those valued by prospective employers. In particular:
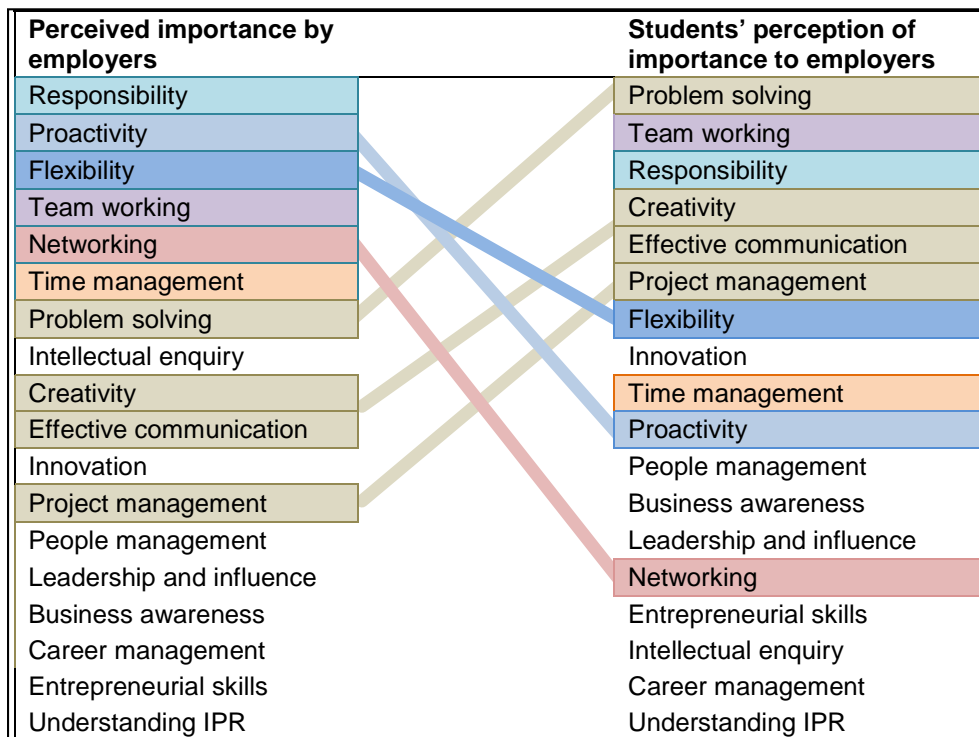
- The extent to which the present doctoral programmes at Croatian Universities help to develop competencies is very variable. Many doctoral candidates feel that they develop most competencies through informal activities and other experiences during their doctoral programme, than through formal training courses. More than half of those questioned did not feel that their programme had developed their career-building or leadership skills.

- The competencies in which most Croatian doctoral candidates feel they are strong are largely in the area of professional effectiveness, group and team-working. Management skills such as managing people and projects are rated as somewhat less highly developed and the least well developed group of competencies are career-building skills.

- There was no clear evidence of development of competencies over the course of the doctoral programme, when using a comparison of the perceptions of the strength of competencies of full-time doctoral candidates in their first year with those in the final years of their programme as a proxy. This raises the question of whether current doctoral programmes are having a major impact on the development of these competencies.

- Career building and management competencies were not thought to be as important, for either a doctoral candidate's own career development or for non-HE employers, as research-related competencies such as intellectual enquiry and creativity, or professional effectiveness such as responsibility or proactivity. Very few doctoral candidates felt that business awareness or entrepreneurial skills were important.

- Doctoral candidate's belief in how well they could articulate or provide evidence for their competencies to employers largely matched their perceived skill level in that competency. For every competency over half of respondents were confident that they could articulate it to a potential employer.

- Most respondents felt encouraged to engage in personal and professional development, and reported that they took ownership for their career development. More of those who aspired to a career in HE felt that their mentor was helping to achieve their career aspirations, than of those who sought careers outside HE. However, the majority did not think that their mentors regularly discussed their career development or were helping them to achieve their career ambitions.

Conclusions

Overall, the 2013 survey indicated that there was a clear mismatch between the skills that doctoral candidates assumed would be valued by employers and those that the employers themselves placed emphasis on. In addition, as illustrated by the figure below, competencies such as intellectual property, innovation and entrepreneurship which have also been highlighted by national government documents were not seen to be as important to employers as competencies such as proactively. Even Project Management was not deemed to be highly important to an employer compared to networking and time management skills.

MODOC

Perceived importance by employers	Students' perception of importance to employers
Responsibility	Problem solving
Proactivity	Team working
Flexibility	Responsibility
Team working	Creativity
Networking	Effective communication
Time management	Project management
Problem solving	Flexibility
Intellectual enquiry	Innovation
Creativity	Time management
Effective communication	Proactivity
Innovation	People management
Project management	Business awareness
People management	Leadership and influence
Leadership and influence	Networking
Business awareness	Entrepreneurial skills
Career management	Intellectual enquiry
Entrepreneurial skills	Career management
Understanding IPR	Understanding IPR

Source: MODOC survey 2013 (NB. The term 'student' as used above should be interpreted as Doctoral Candidate)

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MODOC

3. Methods for acquiring new competences

Definitions and starting points

The EC recognizes that transferable skills may be acquired through 'training' or through work experience methods[20]. This description differs somewhat from the definitions of the CROQF where 'formal training' implies a formal qualification while 'Non-formal training' has no requirement for competencies to be proven by a public document and can take the form of both 'organised' programmes where candidates come together to explore specific skills for example in workshops or via work experience, or 'informal' training which is done on the job. Informal training under the CROQF definition also includes mentoring, one-to-one conversations and self -reflection.

Training through work experience

Transferable skills may be acquired through increased mobility between the university and business sectors; in this way Doctoral candidates combine theoretical knowledge with practical learning. Strong existing experience in training through work experience in Croatia comes from those who employ and value doctoral researchers e.g. companies like Končar, Ericsson NT and Pliva. Within Europe a Best Practice example is the **Marie Skłodowska-Curie** actions[21]. By supporting industrial doctorates, combining academic research study with work in companies, and other innovative training that enhances employability and career development the Marie Skłodowska-Curie actions will become the main EU programme for doctoral training, financing 25,000 PhDs. It is suggested that this might be used as an example and recommendation for future actions on the national level.

For exposing a researcher to academic and non-academic sectors, and offering transferable skills relevant for innovation and long-term employability, the **Innovative Training Networks (ITN) and included European Industrial Doctorates (EID**) offer a strong example. This joint doctoral training is delivered by at least one academic partner entitled to award doctoral degrees, and at least one partner from non-academic sector (enterprise). The aim is for the early stage researchers or doctoral candidates to develop skills inside and outside academia that respond to public and private sector needs. Skills can be developed through the researcher's mobility from the academic and non-academic sector. The researcher will spend at least 50% of their time in each sector. Training through international, intersectoral and multidisciplinary mobility is designed to produce creative, entrepreneurial and innovative students able to face current and future challenges.

The development of doctoral candidates' professional and personal competences through work experience is of mutual benefit for the doctoral candidates, universities and enterprise/ or research centers. In particular:

- Doctoral candidates with transferable skills and practical research will be more competitive in labor market in academic and non- academic sectors and will give doctoral candidates competences for self-employment

- Doctoral candidates will be able to convert knowledge and ideas into commercial products and services for economic and social benefit

- Providing doctoral candidates with transferable skills and a wider range of competences, while offering working conditions in the non-academic sector will raise the excellence of doctoral training which will in turn motivate a new generation of doctoral candidates
- This will contribute to strengthening the collaboration between universities and the non-academics sector through transmission of knowledge and enhancing the joint research projects

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[20] Research Careers in Europe Landscape and Horizons", European Science Foundation 2010
http://www.esf.org/fileadmin/links/CEO/ResearchCareers_60p%20A4_13Jan.pdf
[21] See http://ec.europa.eu/research/mariecurieactions/about-msca/actions/index_en.htm

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- For companies/ research centers it is added value which will enhance corporate social responsibility as modern concept of doing business

- As a stakeholders in creating favorable social conditions, companies/ research centers will become a desirable and respected employers

The benefits of non-formal training

Significantly, through both organised and informal professional development programmes doctoral candidates are able to develop the skills they need for their project and for their future careers, without having to rely on their supervisor(s) for this training. Doctoral graduates become more prepared for the workplace in both academic and non-academic organizations. The programmes also have the benefit of developing research networks beyond their own discipline for a future research career which is unlikely to stay in one narrow domain. Many EUA members now also offer support for the development of transferable skills training and LERU Universities (League of European Research Universities) now all offer comprehensive professional development programmes for their researchers.

Starting points for defining an individual training program

Central to an effective training process is the requirements for students to start by identifying their own training needs in consultation with their supervisory team – a process of 'self-assessment and self-awareness'. A **Personal Development Plan** (PDP), (also known as a Personal Learning Plan or PLP), lies at the heart of successful and impactful doctoral training programmes. Many European Universities now support the development and implementation of a PDP through their intranet using custom software and by publicising training activities that will enable the student to locate activities that will support their professional development plan. A minimum requirement for engagement in training is set, with 5-10 days of training being a common target in Europe. Supervisors and students are both required to engage in the process and assume responsibility for progress towards attaining realistic goals.

Transferable skills training for doctoral candidates in Croatia

As revealed by a MODOC 2013 study an increasing number of Faculties at Croatia's seven public universities make it compulsory for their doctoral candidates to attend training related to core research methods and core skills related to the specific discipline. A smaller number have now also made transferable or 'generic' skills training part of the compulsory doctoral programme. Such training is typically delivered as workshops and presently tied to the institutional responsibility for doctoral training, but also linked to the much wider issue of doctoral candidates not being prepared in core research methods before they enrol on a doctoral programme. Although some faculties do have compulsory training in these areas, the quality of doctoral research proposals is still problematic.

However, it is notable that while some workshops are clearly aimed at development of recognisable transferable skills e.g. *Career Development Planning with e-Portfolio* (Faculty of Organization and Informatics), *Seminar on Entrepreneurship* – 'Dr&Co' (Faculty of Electrical Engineering and Computing University of Zagreb), others cited in the MODOC survey as 'transferable skills training' are strongly linked to their discipline e.g. *Partial differential equations and experimental methods of physics in biophysics* and *Sedimentary Facies Analysis with field exercises in the Dinaric Foreland Basins*. This suggests that some Faculties are still not are aware of the sort of skills and competencies that are regarded as 'transferable' by prospective employers.

Existing workshop training in Croatia varies in duration from 60 hours with some classes awarding ECTS (European Credit Transfer Scheme) points to a few hours for a seminar. Doctoral training in the English language is well represented with around 50% of training confirmed as being in the English

language. There is a balance between mandatory and optional attendance at classes and between the target years.

Overall, although doctoral training is clearly not systematically offered at Faculties in Croatia it is represented and there are some good starting points to explore Good Practice.

It is proposed that transferable skills training should be obligatory in a way that doctoral candidate can chose from the list of offered transferable skills training , depending in which areas he/she wants to develop. Such development should be linked to a Personal Development Plan (PDP). But, every candidate should choose something, and essentially, transferable skills should be part of all doctoral training/programmes. Some University regulations on doctoral programmes encourage this e.g. in the case of the University of Zagreb, where the Regulations On Doctoral Studies (art. 5) state that "The **mandatory formats** of work in a doctoral study programme are research seminars, workshops and discussion groups, designed for the purpose of developing research work, critical thinking, acquisition of methodology and **acquisition of generic (transferable) skills**" (emphasis added).

Perceived effectiveness of training methods by Croatian doctoral candidates

As part of the MODOC project, doctoral candidates were asked to comment on the effectiveness of different forms of 'training'[22]. The responses are summarised below. While mentoring and one-to-one engagements rank most highly, interactive workshops currently rate most highly of the group exercises. However, these were not at a significantly higher level that other group methods e.g. presentations or online communal resources. Perhaps surprisingly more modern methods of learning i.e. Webinars and online discussion forums are not currently rated as being very helpful for development. It is suggested that these preferences should be considered before an institution launches transferable skills training.

Figure 2 Preferred style of engagement with professional development activities
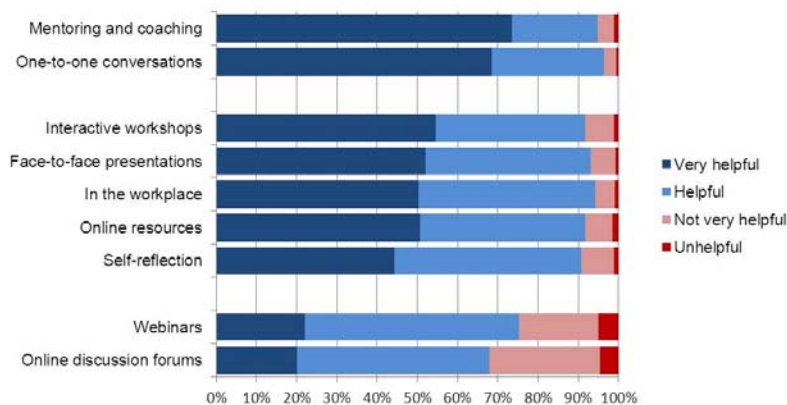
Source: MODOC Activity Cluster 1

Use of workshops to deliver transferable skill training

The majority of PROs who offer transferable skills training now include workshops as part of the training programme. These range from one hour 'bite sized' events to 3 day summer schools. Where a framework has been provided at national level for transferable skills training for doctoral candidates institutional workshops are typically designated to a particular sub-domain of the framework using a simple code (e.g. A,B,C,D for a domain followed by then A1, A2, A3 etc for sub-domains) allowing students to select training that contributes to their own PDP[23].

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[22] Personal and professional competencies of current Croatian doctoral students, Janet Metcalfe and Robin Mellors-Bourne, Careers Research & Advisory Centre (CRAC) / Vitae, March 2013

[23] For an example of this approach see: www.strath.ac.uk/rdp and the Keel Research Training Handbook and Researcher-Development-Programme-2013-14

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The MODOC project developed pilot workshops to cover 4 domains and 16 sub-domains:

A Professional effectiveness

A1 Creativity, problem solving and intellectual inquiry

A2 Innovation

A3 Entrepreneurship

A4 Understanding IPR and copyright

B Self management skills

B1 Self-management

B2 Project management

B3 Time management

C Leadership skills

C1 Effective communication

C2 Team-working

C3 People management

C4 Leadership and influence

D Career-building skills

D1 Career management

D2 Identifying career opportunities

D3 Developing a professional network and networking skills

D4 Interview skills

D5 Business awareness

This framework lies at the heart of the MODOC project. Mapping existing and planned training activities from both inside and outside of an organisation on to the framework enables doctoral candidates to match their identified needs to available training. This approach:

- offers flexibility in achieving the organisational aims and objectives of making transferable skills training available to their doctoral candidates by widening the pool of training beyond core TS internal workshops;

- encourages doctoral candidates to take ownership for implementing a Personal Development Plan that identifies specific needs and appropriate training rather than just attending 'set' training courses ;

- supports pooling of training activities;

- enables training offered by external organisations to be utilised for specialised topics that may be beyond the experience and expertise of academic teaching staff.

The associated framework and curriculum is discussed more below and described in detail in Annexe 3: MODOC adopted Framework and Annexe 4: MODOC Proposed Curriculum.

MODOC

Development and delivery of training

The development of transferable skills training for doctoral candidates should start with defining a curriculum based clearly on the associated aims and learning outcomes. Coherent courses should have defined learning outcomes, timetables, content, appropriate training, learning and assessment methods and which utilise relevant and available learning resources. Institutions then need to develop an appropriate and deliverable evaluation strategy.

There are two models of curriculum development and implementation: The objectives or outcomes model and the process model. These are shown below.

The **objectives model** defines learning in terms of what students should be able to do after studying the programme as learning outcomes or objectives. Curriculum design according to this model follows four steps:

1. Reach agreement on broad aims and specific objectives for the course
2. Construct the course to achieve these objectives
3. Define the curriculum in practice by testing capacity to achieve objectives
4. Communicate the curriculum to teachers.

A curriculum, based on an **objectives or outcomes model**, offers scope for individual trainers to then apply a **Process model**. The process model sees content and learning activities as having intrinsic value, and not just as a means of achieving learning objectives.

Figure 3 Models of curriculum design and development
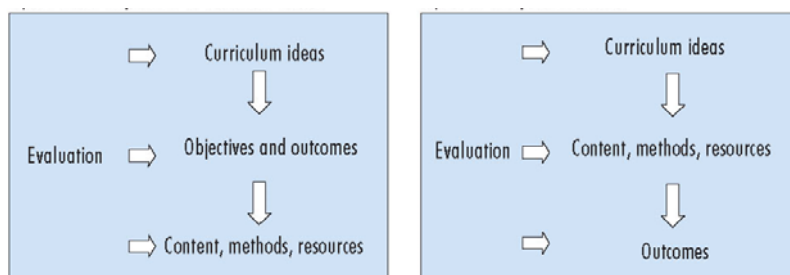
The objectives or outcomes model   *The process model.*

The process model encourages creative or experiential approaches where learning is situated through experiences and group dynamics and outcomes emerge through the learning process

Effective curriculum design combines both approaches according to student need, teacher experience and organizational structure and resources.

For example, it is useful to design the overall shape of the course, the main aims and learning objectives, broad content areas and time allocation centrally but then devolve out the detailed planning and design to teachers who deliver the course so that they have ownership.

Following the training of trainers and the subsequent delivery of the pilot courses the training cohort was asked to provide practical recommendations on future delivery of such courses. Their suggestions are summarised below.

MODOC

1. **Suggestions relating to the curriculum of the workshop delivered (e.g. learning outcomes, content, duration and approach to developing the competencies?)**

Duration: One or two days may not be sufficient to develop the desired transferable skills because learning is a process. One to three days is enough to get an overview but not a concrete knowledge. Those attending the training were hoping to receive more concrete knowledge. Being able to offer ideas and recommendations for where to find useful information is a good starting point but some trainees may feel that they could do this by themselves and seek more concrete knowledge in the workshops.

2. **Practical suggestions to improve the actual implementation of the workshop (e.g. optimum size of group, mix of the group, need for breakout areas, shorter/ longer sessions, splitting the workshop over more than one day with a break between the sessions)**

Size of group: Optimum size of group should be limited to a maximum of 15 candidates.

Mixed prior experience of the groups: Doctoral candidates can have a range of ages and in some cases, some of those attending the workshops already had more than 30 years of work experience. It can be very useful to have them in a group, both for the trainer and other trainees. However, while heterogeneous groups can be useful this is most valuable only when it comes to diverse areas of studies. In other cases it can be very difficult to make a TS workshop useful for everyone. Such TS workshops may be best addressed to young people that have no or little previous work experience.

Breaks: it is very important to have at least one short and one bigger pause per day. It may also help to split the workshop across 2 days. Breaks are useful to enable trainees to talk to each other and exchange experiences.

3. **Improving the impact of workshops (e.g. advanced preparation by the participants, follow up sessions, use of external experts, etc.)**

A number of trainers commented that use of external experts may be the key to improving the quality of workshops. This is particularly true of specialist areas or for topics that do not lend themselves to an academic style of learning.

It was also suggested that participants should be prepared. They should have a detailed description of a workshop and to understand clearly what they can expect from it and therefore why they should attend.

4. **Specific suggestions on how to check the impact of such TK training on a doctoral candidate's career development (follow up in 3/5 years time?)**

It was suggested that trainees should be invited back to participate in a workshop after 3 years and to share their experience.

5. **How best to support future trainers to use and develop the framework and curriculum in Croatia.**

Trainers should gather together to discuss the program, share experience and use this to further develop the curriculum.

Trainers should be better educated. The Ministry and the University should give them a chance to improve their own skills (work with external experts) so they could then use these skills to the benefit of the participants.

It would be helpful if the curriculum could be further developed in to detailed training packages which could be supplied to the trainers responsible for presenting a program.

The Ministry and Universities should consider remunerating trainers for their TS training activities.

MODOC

To date there have been few if any attempts in Croatia to devise such a TS curriculum; the MODOC project represented the first such attempt. However, a curricula document which is simply a list of some good recommendations and classification is not sufficient. A detail program covering the complete education must be written and given to the trainers. Detailed means a completely written education program.

Following the delivery of the pilot courses those attending the trainings were asked to provide practical recommendations on future delivery of such courses. Their suggestions are summarised below.

- Ensure a clear focus on practical examples, work, interactions and detailed processing of the topics;

- Minimize trainer presentations and maximum participant interaction;

- Try to organize training in the afternoon or after work time.

MODOC

4. Examples of Best Practices for implementation

The following are examples of best practice in developing and delivering transferable skills training that have been identified by partners from the MODOC project.

Good Practice Innovative Training Networks (ITN)

Title	Innovative Training Networks (ITN)
Main Theme	**HORIZON 2020/ Excellent Science /The Marie Skłodowska-Curie actions**
Sub-theme	Innovative Training Networks (ITN) - European Industrial Doctorates (EID).
Context:	Joint doctoral training delivered by at least one academic partner entitled to award doctoral degrees and at least one partner from outside academia, primarily enterprises.
Objectives:	The aim is for the doctoral candidates to develop skills inside and outside academia that respond to public and private sector needs.
Processes/ Activities:	• **Training through research** by means of individual, personalised projects, including meaningful exposure to different sectors. • **Development of network-wide training activities** (e.g. workshops, summer schools) that exploit the inter/multi-disciplinary and intersectoral aspects and expose the researchers to different schools of thought. • **Provision of structured training courses** (e.g. tutorials, lectures) that are available either locally or at another participant. Training programmes between the participants are expected to be coordinated to maximise added value (e.g. joint syllabus development, opening up of local training to other network teams, joint PhD programmes, etc.). • **Exchanging knowledge with the members of the network** through undertaking intersectoral visits and secondments. • **Invitation of visiting researchers** originating from the academic or non- academic sector. This would be aimed at improving the skills and know-how.
Recommendations	Further training activities with a particular view to widening the career prospects of the researchers would include transferable skills training both within and outside the network. Topics of interest could include: • **Training related to research and innovation**: management of IPR, take up and exploitation of research results, communication, standardisation, ethics, scientific writing, personal development, team skills, multicultural awareness, gender issues, research integrity, etc. • **Training related to management or grant searching**: involvement in the organisation of network activities, entrepreneurship, management, proposal writing, enterprise start-up, task co-ordination, etc.
Outcomes: Key concrete benefits for defined groups	• Doctoral candidates with transferable skills and practical research will be more competitive in labor market in both academic and non- academic sectors and will give doctoral candidates competences for self-employment • Doctoral candidates will be able to convert knowledge and ideas into commercial products and services for economic and social benefit • Providing doctoral candidates with transferable skills and a wider range of competences, while offering working conditions in the non-academic sector will

	raise the excellence of doctoral training which will motivate a new generation of doctoral candidates
	• This will contribute to strengthening the collaboration between universities and the non-academics sector through transmission of knowledge and enhancing joint research projects
	• For companies/ research centers it is added value which will enhance corporate social responsibility as modern concept of doing business
	• As a stakeholders in creating a favorable social conditions, companies/ research centers will become a desirable and respected employers

Critical success factors:	• Showing how the outcomes are relevant to our everyday lives:
	    ○ Creating new jobs, contributing to the competitiveness
	    ○ Introducing novel technologies
	    ○ Solving societal challenges
	    ○ Influence on policy-making

Key lessons learnt:	One of the major Europe 2020 Strategy targets is reaching 75% of the employed population aged 20-64. By enhancing the performance/international attractiveness of Europe's universities and improving all levels of education and training (academic excellence, equal opportunities), the share of the younger generation (aged 30-34) with third level education degree should be at least 40%. One of the ways to achieve that is possibilities given through ITN actions which aim to strengthen the collaboration between universities and non-academics sector. Collaboration between academic and non-academic sector will raise the competitiveness of the Europe on the global market and will create new jobs as a solution to one of the biggest societal challenges.

Source: Guide for applicants – Innovative Training Networks[24]

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[24] Available at: http://ec.europa.eu/research/participants/portal/doc/call/h2020/h2020-msca-itn-2015/1622613-itn_2015_-_guide_for_applicants_v1_en.pdf

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Title	MODOC
Main Theme	**Development of Transferable skills training for doctoral candidates**
Sub-theme	Curriculum development for transferable skills and implementation through pilot workshops
Context:	Pilot actions by all 7 Croatian Universities with involvement of key stakeholders
Objectives:	To establish a framework and curriculum for transferable skills training for doctoral candidates based on CROQF and identified needs of potential employers.
Processes/ Activities:	• Complimentary surveys of potential employers and doctoral candidates to establish relevant skills that need to be developed • Development of a Good Practice Framework based on EU and national context • Development of a curriculum based on the CROQF approach of competencies
Outcomes: Key concrete benefits for defined groups	• Clear framework based on 4 domains and 16 sub-domains to enhance the employability of doctoral candidates • Detailed curriculum including content and learning outcomes for use by PROs, doctoral candidates and trainers
Critical success factors:	• Strong response needed to the surveys by both students and employers
Key lessons learnt:	Unless the sample survey appears to be truly representative of the target groups then the outcomes are likely to be questioned by key stakeholders.

MODOC

Good Practice MODOC: Modernising Doctoral Education through CROQF Train the trainers and pilot workshop development

Title	MODOC
Main Theme	**Development of transferable skills training for doctoral candidates**
Sub-theme	Curriculum implementation through pilot workshops
Context:	Pilot actions by all 7 Croatian Universities with involvement of key stakeholders
Objectives:	• To train academics from HR Universities to use the associated curriculum to develop and deliver their own transferable skills training workshops • To pilot the workshops with doctoral candidates • To collect feedback to enable further improvement to the curriculum and proposed delivery
Processes/ Activities:	• 'Training to train' workshops from a training expert to help academics develop a new approach to training • Workshops developed on the basis of the core curriculum • Workshops held around Croatia • Feedback gathered and analysed
Outcomes: Key concrete benefits for defined groups	• Recognizing the possibilities for career development • Increased awareness of internal potential • Ability to present own knowledge and skills • Understanding the opportunities at the labour market • Awareness of different search job techniques • Understanding the methods and process of selecting and recruiting employees • New ideas for better time management, for overcoming procrastination at PhD studies, for better communication with mentor. • Planning and managing a PhD as a project • Exchange of experience among PhD students
Critical success factors:	• The need to build awareness in the trainers of the possibilities of presenting knowledge and skills • Motivating trainers to take part • Groups 10-20 people, active listening about the problems, discussions in teams, finding ideas for behaviour change • Knowing what questions to ask and how (questions also come from active listening of participants), how to moderate a discussion • Participants should be informed well about learning outcomes • Enable enough time for discussion and questions
Key lessons learnt:	• Learn how to become aware of own knowledge and skills and how to presented them in interviews and CVs • You can always learn something new about yourself! • Many PhD students have problems with procrastination, some don't find enough time for their PhD, some are not motivated enough, communication with mentor is often a challenge too • Importance of good exercises, team work, games, asking good questions, moderated discussions.

Croatian Doctoral Education for transferable skills: Guidelines for further development

MODOC

Title	Doctoral Education Using Train-The-Teachers Approach
Main Theme	International inter-university postgraduate interdisciplinary doctoral program
Sub-theme	Entrepreneurship and Innovativeness
Context:	Developed within the framework of the TEMPUS Joint European Project - ICES - International Centre for Entrepreneurial Studies financed by the EU, 2007-2009 Josip Juraj Strossmayer University in Osijek, Croatia University of Turku, Finland Univerza v Mariboru, Slovenia Universitaet Klagenfurt, Austria Durham University, United Kingdom
Objectives:	• develop a modular European Ph.D. Programme in Entrepreneurship and Innovativeness • build a cohort of young faculty with the capacity to teach and research in the field of entrepreneurship based on problem/opportunity centered approach and holistic integration of knowledge and imaginative use of it, which is relevant to interdisciplinary feature of the entrepreneurship paradigm. • prove the feasibility of the Triple Helix concept based on social accountability of all stakeholders (universities, business sector, government).
Processes/ Activities:	• put existing (experienced) teachers in "the shoes" of learners / students (in the case of the doctoral program ENTREPRENEURSHIP AND INNOVATIVENESS, eleven teachers enrolled 4 months long distance learning course on Authentic Leadership, at the Naropa University, Boulder, Colorado, US) • put experienced teachers and the newcomers in changeable teams and expose them to acquiring different skills (team teaching, interactive teaching, case method teaching, problem centered learning…) • continuously raise the bar, by bringing visiting first class lecturers and putting local lecturers to shadow them • send local lecturers around the world (Syracuse University, Harvard Business School) to be a part of refreshing train-the-teachers programs, to contribute to broading the network • if necessary to purchase such a course
Outcomes: Key concrete benefits for defined groups	lifelong learning culture among faculty members (cultivate curiosity among faculty for what's happening outside of their immediate professional circle) faculty members developed competences to communicate across disciplines, by learning how to teach in teams using problem-centered approach ability to see the relationships among fragmented pieces of information (knowledge) and to integrate them in innovative manner, depending on the context
Critical success factors:	Committed local group of teachers open to work in international teams, open for learning outside their own disciplines To have access to the best teaching / learning / researching experience around the world (building and maintaining a very diversified network of lecturers, researchers in the fields of entrepreneurship and innovativeness) to be able to contextualize, i.e. to identify problems from the immediate surroundings and then to look for innovative solutions, by combining different pieces of information and learning from good practices around the world

MODOC

Key lessons learnt:	Building educational capacity at all levels of education for training for proactiveness, innovativeness and responsibility for own choices (entrepreneurial competences) requires creating a critical mass of educators who understand transdisciplinary and interdisciplinary features of entrepreneurship and who are able to deliver such programs in problem centered mode, i.e. to contextualize entrepreneurship education programs at different educational levels, from primary to tertiary.

International examples

Many examples of Best Practice in developing and delivering transferable skills training for doctoral candidates can be found in the 2013 LERU publication Good Practice Elements in Doctoral Training. Some from the **University of Ghent** and **University Pierre & Marie Curie** are outlined below.

Ghent University Doctoral Training Programme

Study programme

The Ghent University Doctoral Training Programme (DTP) is a flexible programme consisting of four activity types: (1) specialist courses, (2) transferable skills seminars, (3) research activities (conferences and publications) and (4) the annual progress report.

The public defence of the dissertation is an additional prerequisite for PhD students wanting to obtain the certificate of the Doctoral Training Programme. The certificate of the Doctoral Training Programme is exclusive and is not being awarded to PhD researchers leaving Ghent University without a PhD Degree.

(Part of) the Doctoral Training Programme is compulsory for certain doctoral titles (e.g. Arts), within certain faculties (Psychology and Educational Sciences; Economics and Business Administration), and for certain types of students (e.g. depending on the MA degree they hold). The annual progress report is compulsory for all PhD students at Ghent University.

Programme structure

Courses

Each Doctoral School organises specialist courses and transferable skills seminars as part of the Doctoral Training Programme. PhD students are also encouraged to attend doctoral training courses organised by other institutions and/or to include relevant regular (master) course units in their Doctoral Training Programme.

The course catalogue of each Doctoral School offers an overview of the courses organised by the Doctoral School and a selection of courses organised by other institutions.

For each course type specific registration, recognition and funding procedures apply.

Individual curriculum of the Doctoral Training Programme (OASIS)

PhD students can actively manage (part of) their curriculum of the Doctoral Training Programme in OASIS:

- Register for regular course units
- Add proof of successful participation
- Submit the annual progress report
- Request the final approval of the curriculum (incl. add conferences and publication)

Source: www.ugent.be/doctoralschools/en/doctoraltraining

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Pierre & Marie Curie University

The Institute for Doctoral Education

French regulations devolve the organisation of PhD studies to Doctoral Schools (ED-Ecoles Doctorales), which are federations of research teams headed by a director.

At UPMC, all 16 EDs belong to the Institute for Doctoral Education (IFD), a department of UPMC under the Vice-President Research. IFD is responsible for implementing the University's doctoral policy and consolidates all services dedicated to the doctorate. The IFD is headed by a Director, assisted by a Council composed of all Directors of EDs, elected representatives of doctoral candidates, supervisors, and administrative personnel, as well as external members. The Council validates the use of the budget attributed by UPMC to doctoral education, regarding both the distribution of doctoral contracts and financial means between the ED. Furthermore, the Council provides a forum for stakeholders of the doctorate where they can compare experiences, and converge towards the common adoption of best practices. IFD ensures the coordination and the pooling of many missions that regulations attribute to doctoral schools, in particular:

- production of statistics and indicators on doctoral education (number of candidates and doctors, genders, nationalities, number of candidates per supervisor, duration, financing, etc.) and on the professional future of doctors (unemployment rate, types of employment and employers, location of doctors, job satisfaction, etc.) in a perspective of self-assessment and continuous improvement;
- support for doctoral candidates in planning their professional project and the preparation of their career, as well as training supervisors about the problems of the employment of doctors and doctoral projects management;
- development of international and European cooperation, such as EUA, LERU, UNICA.

The objective is to free the ED of a large number of common tasks and allow them to focus on close monitoring of the doctoral projects in their field of science, including the selection/validation of doctoral projects proposed by the research teams, recruitment of doctoral candidates, follow-up of the doctoral research projects (monitoring committees, mid-term defences, etc.), individualised follow-up of the doctoral candidates with an individual training plan, etc.

Individual Training Plan

Early in the doctorate, each PhD candidate must, in consultation with her/his supervisor, elaborate an Individual Training Plan (ITP), which is validated by the doctoral school (ED). This ITP evolves as needed throughout the PhD. Training is organised by the Institute for Doctoral Education (IFD), by the doctoral schools (ED) and by external partners. The ED is responsible for a proper balance of the ITPs between scientific and transversal training.

The IFD training policy is based on the accountability of all actors, through information, counselling, accompaniment and encouragement, and not on a requirement of equal training volume for all: all candidates do not have the same needs for training. Nevertheless, IFD recommends an average of five to ten days of training annually across all topics.

The key message that the IFD wants to give to doctoral candidates and their supervisors is that the more doctoral candidates anticipate the preparation for their career, the greater will be their job satisfaction and the easier their job search. This message is confirmed by surveys of UPMC doctors which found that the risk of being unemployed, even several years after PhD, is lower for doctors who start to plan their professional project and their job search early. Similarly, 76% of the doctors who are 'very satisfied' in their first job after their doctorate started planning their professional project before the last year of their doctorate.

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International co-supervision

One way in which international cooperation at UPMC is implemented is through international doctoral programmes, whose role is to promote co-supervision.

An example is the International Doctoral Programme 'Modelling complex systems' (PDI - MSC), which was implemented in 2010 at the initiative of UPMC and the Institut de Recherche pour le Développement (IRD). This programme has four objectives, namely to:

- put in place a structure that grants doctoral candidates from Southern countries high-level doctoral training,
- promote the mobility of graduates from different disciplinary backgrounds, both in Northern and Southern countries,
- bring together and animate this community for enhancing interdisciplinarity,
- focus on modelling concrete problems with actual data to foster the development of the South.

PDI - MSC is supported by the UPMC doctoral schools in the North and the IRD teams in the South. Three weeks of training, bringing together all of doctoral students, are held each year on the IRD campus in Bondy. The programme currently comprises 40 doctoral candidates in co-supervision with Southern countries.

5. Recommendations for future actions on the national level for the further development of doctoral candidates' professional and personal competences.

Development and implementation of transferable skills training at Croatian Universities faces a complex environment. The recent National Strategy for Education Science and Technology 2014 (Strategija Obrazovanja, Znanosti I Tehnologije 2014) along with other similar institutional documents makes clear the support for developing transferable skills in the doctoral student community. The MODOC project gained the support of senior managers from all seven public universities on the importance of improving doctoral education, has built on previous experience in the field and helped expand the pool of trained and enthusiastic trainers. There is a clear demand from doctoral candidates for competency development through transferable skills training and Understanding of top management of Croatian universities.

However, there is also a lack of funding opportunities to train new trainers and still a lack of support from both government and universities to include transferable skills training as a requirement of doctoral programs and the quality system. There is still a very low inclusion of doctorate holders in the business sector and a similar low inclusion of the business sector in doctoral education. Collaborations between employers and PhD students are insufficient. New trainers are highly constrained by their existing work load as are doctoral candidates themselves.

Despite this, there are good opportunities for realising transferable skills training for this target group in Croatia. The most obvious is the national initiative for the improvement of doctoral education but individual implementation at University or Faculty level offers opportunities to build better relationships with the business sector and to improve the overall quality of doctoral candidates and doctorate holders. In the longer term, introduction of such training has the potential to strengthen the intensity of collaboration between universities and employers, encourage PhD studies to be organized in different languages (English and other) and to link different doctoral studies (intra, inter and trans disciplinary). It may also encourage the mobility of faculty, researchers and doctoral candidates.

To realize these opportunities a number of threats will need to be addressed. Chief among these may be resistance from university staff, mentors/ supervisors and doctoral candidates to any proposed changes in the curriculum. Reluctance to embrace change by mentors may stem from concern as to an increased workload and unfamiliarity with the changing role. Resistance from Doctoral Candidates may stem from a lack of understanding on the importance of some transferable skills and may be exacerbated if the quality of early training workshops is low. In addition initiating change may be harder due to the unfavourable economic situation, negative demographic trend and the competitive advantage of doctoral programs abroad. However, positive pressure from doctoral candidates is also anticipated as they begin to recognise the narrowing career options available from national HEIs and the need to demonstrate clear value to a private sector employer. Pressure from doctoral candidates is also likely to place positive pressure on mentors. The emergence of more doctoral schools and increasing familiarity with development of transferable skills may help to encourage more mentors to embrace a new role.

The following recommendations are made regarding future actions on the national level for the further development of doctoral candidates' professional and personal competences. They are addressed to each of the stakeholder groups individually and collectively.

- **Policy makers, governments and funding agencies**
- **Croatian Universities and doctoral candidate mentors/ supervisors**
- **Doctoral candidates**
- **Employers**

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Policy makers, governments and funding agencies should:

- Recognise transferable skills as an integral part of doctoral education;

- Include KPIs (Key Performance Indicators) for transferable skills into the general dr ed KPIs. presently being established for Higher Education.

- Find ways and measures to coherently link all stakeholders in to the implementation of transferable skills training and encourage further collaboration between all stakeholders.

Croatian Universities should:

- Include continuous transferable skills development as an integral part of each doctoral programme;

- Emphasise the role that transferable skills training plays in career develop and encourage doctoral candidates to participate;

- Ensure that a minimum level of transferable skills training is made accessible to doctoral candidates, if necessary by pooling resources including administrative support;

- Involve industry more in to the development of TS training including in to curriculum development and delivery of training;

- Motivate and recognise the importance of developing and retaining trainers and supporting and educating mentors;

- Include transferable skills training and doctoral candidate development in to the quality framework and develop and monitor associated indicators.

Mentors / Supervisors should

- Encourage their doctoral candidates to develop transferable skills as part of their doctoral education;

- Work with their doctoral candidates to develop and implement a Personal Development Plan.

Doctoral candidates should:

- Consider career options and different career paths from the very beginning of their studies.

- Become aware of the added value of transferable skills;

- Take responsibility for their personal and professional development including the construction and implementation of a Personal Development Plan;

- Seek support from their mentor/ supervisors for implementing their plan

- Articulate their needs and make them known to the organisation

Employers should:

- Recognise the added value of higher education to their business;

- Establish a stronger dialogue with Universities and Faculties with the intention of improving the supply of highly skilled and employable labour;

- Clearly articulate their needs in a way that can be transformed in to skills development and doctoral training;

- Actively participate in the creation and implementation of transferable skills training at universities.

Universities and Business should work together to:

- support dialogue, partnership and networking between education and business by:

  o Making the benefits and good practice of education and business cooperation more visible in the media;

  o Offering stronger support to partnership and networking between education and business at national, regional and local level;

  o Involving more social partners, enterprises, researchers, counsellors and vocational guidance in order to achieve a better understanding.

In addition, all stakeholders should participate in a joint discussion with other actors of the Triple Helix to identify the long term issues of the immediate environment and translate these into research challenges, connected to global issues such as the New Millennium Goals. This should be a permanent activity, organized in the form of open discussion, conducted through an annual multidisciplinary panel. Without this, the relevance of research is impossible to define, neither organisational format which stimulates multi-disciplinarily nor collaboration in doctoral education.

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6. Monitoring and evaluation frameworks: Indicators of sound practice

Quality standards for Universities

Higher education providers offering research degrees safeguard the academic standards of such programmes by putting in place arrangements that enable them to be delivered according to national and, where relevant, international expectations.

Development and evaluation of research and other skills

The importance of acquiring research and other skills during doctoral programmes is recognised by doctoral candidates, academic staff, sponsoring organisations, employers and doctoral graduates. These skills improve the doctoral candidate's ability to complete the research programme successfully and the development and application of such skills is a significant element in the doctoral candidate's capability for sustaining learning throughout his or her career, whether in an academic role or in other employment. Doctoral candidates should be encouraged to take ownership and responsibility for their own learning, during and after their programme of study, and to recognise the value of developing transferable skills. Research organisations who are delivering doctoral programmes should put in place evaluation processes incorporating meaningful indicators that enable them to evaluate and improve all aspects of the programme, including the aspect of transferable skills training. This can be challenging particularly with regard to creating good feedback mechanisms to develop and improve TS training.

Many institutions have adopted quality standards and implemented monitoring and evaluation procedures for their doctoral programmes. Below some Good Practice indicators are proposed and discussed specifically for transferable skills training. These are strongly based on lessons learned from the Quality Assurance in Doctoral Education –results of the ARDE project and the UK Quality Code for Higher Education Part B: Assuring and enhancing academic quality.

Support for Transferable Skills (TS) development

Research students may well need support to develop the subject-specific, research, communication and other skills they require to become effective researchers, to enhance their employability and to assist their career progress after completion of their degree. These skills may be present when doctoral candidates commence their studies but to varying extents. They may require further development, be explicitly taught, or be developed during the research programme.

Opportunities for developing personal and professional skills should take account the differing needs of individual research students arising from the diversity both of their prior experience and of the environments in which they may later draw upon these skills. A range of mechanisms can be used to support learning, and they should be sufficiently flexible to address an individual's needs. The emphasis in formal training is on *quality, relevance and timeliness*.

Informing TS improvement

If Transferable Skills (TS) are to be relevant and up to date, they need to be informed by accurate information and the experience and perspective of employers. This is especially important in the context of rapidly changing employment markets. Systems and procedures need to be in place to ensure that these feedback loops operate effectively at the level of TS provision, including staff development and training, and of curriculum design and programme specification.

Surveys

National surveys can be useful tools for benchmarking purposes. However, satisfaction surveys have been shown to have drawbacks when it comes to assessing quality. Mostly, such exercises measure satisfaction in relation to expectations and responses risk being rather subjective and connected to the individual's personal expectations. These expectations are typically influenced by the local

institutional culture. For this reason, feedback from questionnaires should be combined with other methods to ensure and enhance the quality of career development.

Employer feed-back

Some Universities used employer feedback. Continued dialogue with future employers is a constructive way to adjust and improve TS training programmes, not least to raise awareness among doctoral candidates about the applicability of research skills and the research mindset in the private sector, as well as for the development of specific skills training.

Career Tracking

Using career tracking to collect data for improving career development in Universities has been widely discussed. However, systematic tracking is a challenging, costly and time-consuming exercise. Using tracking results as a key performance indicator (KPI) is still regarded as a risky undertaking for individual universities however, using tracking as a feedback mechanism can be positive and many Universities include it in their portfolio of indicators as evidence for strategic decisions rather than as an indicator of efficiency.

Candidate feed-back

Doctoral candidates should be encouraged to reflect on their learning, supported by frameworks developed by providers for recording personal development. Higher education providers should ensure that research students who may be unfamiliar with keeping records of their progress and development receive additional guidance and support. Higher education providers may develop ways of formally recognising the acquisition of transferable skills in parallel with, or as part of, the academic assessment of the doctoral candidate's progress.

Good Practice Resources

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Chapter B4: Student support, learning resources and careers education, information, advice and guidance

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Chapter B11: Research degrees

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Proposed indicators of sound practice:

General principles

Indicator 1

Institutions ensure that the commitment to TS training for doctoral candidates contribute to their approaches to strategic planning.

Indicator 2

Institutions are responsible for ensuring that TS training is provided and have in place policies and procedures where their responsibilities are clearly defined and met.

Curriculum design

Indicator 3

Where career education is embedded in the curriculum, awarding institutions ensure that intended learning outcomes:

- contribute to the aims and objectives of the programme
- clearly identify knowledge, understanding and skills
- are assessed appropriately.

Universities

Indicator 4

Institutions make it clear to prospective and doctoral candidates how the knowledge, understanding and skills acquired during study are intended to be of use to them in the development of their future academic or career progression routes.

Students

Indicator 5

Research students have appropriate opportunities for developing research, personal and professional skills. Each research student's development needs are identified and agreed jointly by the student and appropriate staff at the start of the degree; these are regularly reviewed and updated as appropriate.

Staff

Indicator 6

Institutions ensure that all members of staff across the institution involved with providing TS training are appropriately supported and resourced to fulfil this aspect of their roles.

Monitoring, feedback, evaluation and improvement

Indicator 6

Awarding institutions ensure that provision of TS training forms part of the institution's quality assurance and enhancement processes.

Indicator 7

Providers of TS training account formally and regularly for the quality and standards of their services with the objective of promoting continuous improvement.

Indicator 8

Awarding institutions use relevant data and information to inform its TS training provision.

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Annex 1 CROQF LEVEL DESCRIPTORS OF LEARNING OUTCOMES

LEVEL	KNOWLEDGE	SKILLS			AUTONOMY	RESPONSIBILITY
		Cognitive skills	Practical skills	Social skills		
8	Creating and evaluating new facts, concepts, procedures, principles and theories in a field of research that extends the frontier of knowledge.	Using advanced, complex, original, highly specialized knowledge, skills, activities and procedures required for developing new knowledge and new methods as well as for integrating different fields.	Creating, evaluating and performing new proposed specialized activities and new methods, instruments, tools and materials.	Creating and applying new social and generally acceptable forms of communication and cooperation in interaction with individuals and groups of different affiliations and different cultural and ethnical origin.	Demonstrating personal professional and ethical authority, managing scientific c research activities and a commitment to development of new ideas and/or processes.	Taking ethical and social responsibility for successful execution of research, socially beneficial results and potential social consequences.
7	Evaluating highly specialized knowledge in a field of work and/ or learning some of which are at the forefront of the field and can provide the basis for original thinking and scientific research as well as for integrating different fields of knowledge.	Critical evaluation and creative thinking in solving new and complex problems, required as the basis for the development of new knowledge and the ability to integrate knowledge in unpredictable situations.	Performing complex activities and applying complex methods, instruments, tools and materials, developing instruments, tools and materials required in research and innovation processes and adjusting complex methods.	Managing and leading a complex communication process, interactions with others and cooperation in different social groups in unpredictable social situations.	Managing and leading development activities in unpredictable surrounding conditions and making decisions in uncertain conditions.	Taking personal and group responsibility for strategic decision-making and successful execution and completion of tasks in unpredictable situations, as well as social and ethical responsibility during the execution of tasks and for their resulting consequences.
6	Evaluating specialized facts, concepts, procedures, principles and theories in a field of work and/or learning, including their critical comprehension.	Collecting, interpreting, estimating, selecting and creatively applying different relevant facts, concepts and procedures required to generate solutions and for solving complex tasks or problems within a specialized field of work in unpredictable situations, as well as ability to transfer knowledge to other areas and problems.	Performing complex activities and applying complex methods, instruments, tools and materials in unpredictable situations, developing instruments, tools and materials and adjusting complex methods.	Managing complex communication, interactions with others and cooperation in different social groups in unpredictable social contexts.	Managing professional projects in unpredictable situations.	Taking ethical and social responsibility for managing and evaluating professional individual and group development in unpredictable situations.
5	Analysing, synthesizing and evaluating specialized facts, concepts, procedures,	Interpreting, estimating, selecting and creatively applying different relevant facts, concepts and	Performing complex actions and applying complex methods, instruments,	Partial management of complex communication in interactions with	Taking part in the management of activities in partially	Taking responsibility for managing evaluation and for improving activities in

	principles and theories in a field of work and/ or learning, giving rise to an awareness of the frontier of knowledge.	procedures required to generate solutions and for solving complex tasks or problems within a specific field of work and/or learning in partially unpredictable situations, as well as ability to transfer knowledge to other areas and problems.	tools and materials in partially unpredictable situations, developing instruments, tools and materials and adjusting simple methods.	others and establishing cooperation in a group in partially unpredictable social contexts.	unpredictable situations.	partially unpredictable situations.
4	Analysing wider spectrum of facts, concepts, procedures, principles and theories in a field of work and/ or learning.	Simple abstract logical thinking required to analyse available facts, concepts and procedures in the course of execution of a series of complex tasks in a field of work and/or learning in situations that are usually predictable, but are subject to change.	Performing a set of complex actions and applying complex methods, instruments, tools and materials (in executing a series of specific complex tasks) in situations that are usually predictable, but are subject to change.	Realization of complex communication in interactions with others and a possibility of cooperation in a group in social contexts that are usually predictable, but are subject to change.	Executing a set of complex tasks and adapting one's own behaviour to a set of given guidelines in situations that are usually predictable, but are subject to change.	Taking responsibility for evaluating and improving activities in situations that are usually predictable, but are subject to change.
3	Comprehending facts, concepts, procedures and principles important for a field of work and/or learning in partially familiar situations.	Explaining, estimating, selecting and using important facts, concepts and procedures required to execute a series of complex, defined tasks or problems within specific field of work and/or learning in familiar situations.	Performing complex actions by applying a set of different simple methods, instruments, tools and materials in partially familiar conditions.	Realization of complex communication in interaction with other individuals and possibility of cooperation in a group in familiar social contexts.	Executing a set of complex tasks and adapting own behavior to a set of given guidelines in familiar situations.	Taking responsibility for executing a set of complex tasks in familiar situations.
2	Comprehending basic facts and concepts in simple and familiar situations specific to a field of work and/or learning.	Concrete logical thinking required to apply known facts and procedures in the course of execution of a series of simple connected tasks in familiar situations.	Performing actions and applying simple methods, instruments, tools and materials in familiar conditions.	Realization of simple communication and cooperation in interaction with other individuals in familiar social contexts.	Executing simple tasks under direct and occasional supervision in familiar situations.	Taking responsibility for executing simple tasks and for establishing relationships with other individuals in familiar situations.
1	Comprehending basic general facts and concepts in simple and familiar everyday situations.	Simple concrete logical thinking required to execute simple, clearly defined tasks in familiar situations.	Performing simple actions in familiar situations.	Following general rules of behavior in familiar social contexts.	Executing simple tasks under direct and constant professional supervision in familiar situations.	Taking responsibility for executing simple tasks in familiar situations.

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Summary Action Plan for the Mobility of Researchers 2011 - 2012

6. The Development of Researcher Competences					
No.	MEASURE	RELEVANT PIECE OF LEGISLATION	ADMINISTRATIVE PROCEDURES AND OTHER ACTIVITIES	IMPLEMENTING AUTHORITY	TIMEFRAME FOR IMPLEMENTATION
6. 1	Propose launching of an initiative for the development of researchers' complementary skills		Launch the initiative	MSES	In the second half of 2011
6.2.	Assess the present state of affairs		Determine which organisations in Croatia offer this type of education to researchers and make this information public on the EURAXESS portal	AMEUP	By the end of the second quarter of 2011.
6.3	Promote the introduction of supplementary higher education Programmes on entrepreneurship and intellectual property.		The MSES will recommend that these Supplementary programmes be offered to students at all three levels of higher education as well as to researchers at higher education organisations.	MSES	By the end of 2012
6.4	Promote the establishment of specialised study programmes		The MSES will uphold the establishment of postgraduate specialist study programmes (e.g. Research Management) instrumental in building business capabilities of researchers	MSES	Continually

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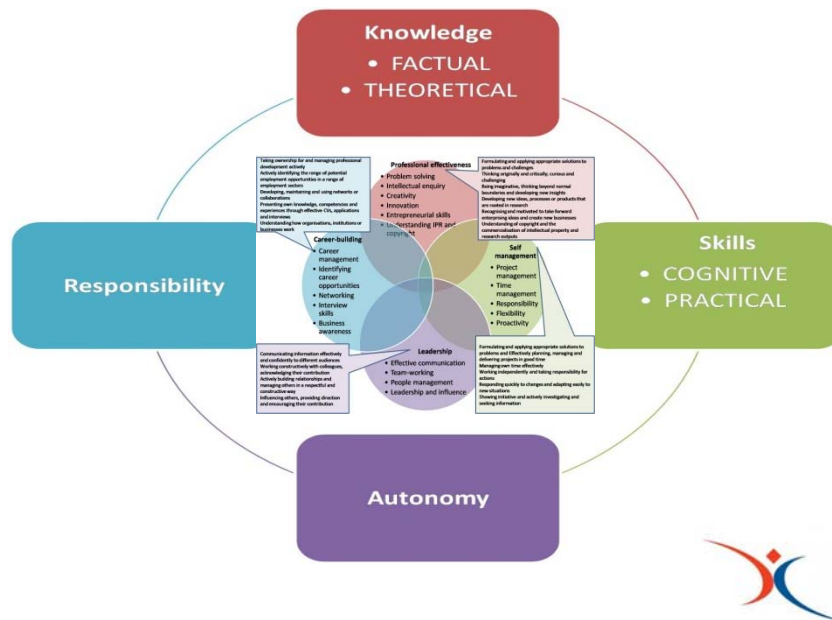Annexe 3: MODOC adopted Framework for Transferable Skills Training

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Annexe 4: MODOC Proposed Curriculum and notes

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Annexe 3: MODOC adopted Framework for Transferable Skills Training

Doctoral Education in Croatia:

A conceptual national framework for future curriculum design in the area of transferable skills

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ACRONYMS

CA	Common Approach
CROQF	Croatian Qualification Framework
EC	European Commission
ECTS	European Credit Transfer Scheme
EQF	European Qualification Framework
ERA	European Research Area
EU	European Union
EUA	European University Association
EUA CDE	European University Association Council for Doctoral Education
DG RTD	Director General Research Technology Development (now referred to as 'DG Research and Innovation')
LERU	League of European Research Universities
MODOC	MOdernising DOCtoral Education (Project)
R&D	Research and Development
RDF	Researcher Development Framework
RDS	Researcher Development Statement
SME	Small and Medium sized Enterprises
EUA	European University Association

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Executive Overview of the core features of proposed framework

Outlined below are the main features of the proposed MODOC framework for transferable skills development for doctoral students. These reflect consensus of opinion reached at the MODOC partner meeting on the 26.06.2014.

1. The MODOC framework for transferable skills training in Croatia acknowledges the 2005 European University Association (EUA) **Salzburg Principles**, established in the Bologna Process as the basis of the reforms for doctoral education, the subsequent **Salzburg II Recommendations** (2010) developed by the EUA Council for Doctoral Education (EUA CDE) and the **Common Approach (CA)** to doctoral training proposed by the European Commission, designed to provide a framework of reference, whilst preserving flexibility and autonomy for institutions and doctoral candidates.

2. The Croatian Qualification Framework **CROQF** provides the overall framework for the MODOC transferable skills conceptual framework. Namely, the transferable skills framework is built around *competences*, represented in terms of *knowledge and skills*, and their associated *autonomy* and *responsibility.*

3. The MODOC framework for transferable skills training in Croatia will be built around 4 main skill *sets*, namely **Professional effectiveness**, **Self Management**, **Leadership** and **Career-building.**

4. Detailed descriptors of the competencies in these 4 areas, at the level needed to detail a curriculum and design workshop training are based on descriptors from the **UK Researcher Development Framework**. These descriptors were originally developed based on research involving employers across the EU. These descriptors align well with those used in the transferable skills framework developed by LERU (**League of European Research Universities LERU**).

5. For the purposes of the MODOC framework the transferable skills will be acquired by 'Non-formal' training i.e. there is no requirement for these skills to be proven by a public document.

Non-formal training can take the form of organised programmes where candidates come together to explore specific skills, or informal training which is done on the job. MODOC will develop organised pilot training through workshops.

6. Transferable skills training for doctoral candidates should contribute to their ability to attain the Level 8 complexity of the CROQF framework but that learning outcomes for associated training do not have to automatically align with CROQF Level 8 complexity descriptors.

The overall framework is shown in Figure 1 below.

Figure 4 MODOC Conceptual framework for transferable skills training for doctoral students.

Knowledge
- FACTUAL
- THEORETICAL

Skills
- COGNITIVE
- PRACTICAL

Responsibility

Autonomy

Taking ownership for and managing professional development actively
Actively identifying the range of potential employment opportunities in a range of employment sectors
Developing, maintaining and using networks or collaborations
Presenting own knowledge, competencies and experiences through effective CVs, applications and interviews
Understanding how organisations, institutions or businesses work

Professional effectiveness
- Problem solving
- Intellectual enquiry
- Creativity
- Innovation
- Entrepreneurial skills
- Understanding IPR and copyright

Formulating and applying appropriate solutions to problems and challenges
Thinking originally and critically; curious and challenging
Being imaginative, thinking beyond normal boundaries and developing new insights
Developing new ideas, processes or products that are rooted in research
Recognising and motivated to take forward enterprising ideas and create new businesses
Understanding of copyright and the commercialisation of intellectual property and research outputs

Career-building
- Career management
- Identifying career opportunities
- Networking
- Interview skills
- Business awareness

Self management
- Project management
- Time management
- Responsibility
- Flexibility
- Proactivity

Communicating information effectively and confidently to different audiences
Working constructively with colleagues, acknowledging their contribution
Actively building relationships and managing others in a respectful and constructive way
Influencing others, providing direction and encouraging their contribution

Leadership
- Effective communication
- Team-working
- People management
- Leadership and influence

Formulating and applying appropriate solutions to problems and Effectively planning, managing and delivering projects in good time
Managing own time effectively
Working independently and taking responsibility for actions
Responding quickly to changes and adapting easily to new situations
Showing initiative and actively investigating and seeking information

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Doctoral Education in Croatia: A conceptual national framework for future curriculum design

Introduction

This document is based on the discussions held in Zagreb at the MODOC Partner meeting 26.06.2014 and written feedback received on the discussion paper **MODOC Proposed Conceptual Framework 23.06.2014.docx**. The purpose of this document is to finalise the framework for transferable skills training. This framework will permit the development of a detailed curriculum.

The framework structure outlined below is based on consensus of opinion reached at the meeting on the 26.06.2014. Comments and questions that were raised, predominantly in writing, relating to issues outside the framework, but related to the overall MODOC project have been referred to the MODOC partners. Framework issues have been addressed directly or indirectly in footnotes.

Agreed Inputs for the framework

The following inputs have been retained or confirmed for the MODOC proposed framework:

1. The **2005 EUA Salzburg Principles**, established in the Bologna Process as the basis of the reforms for doctoral education and setting out ten basic principles for doctoral programmes in the ERA[25] including (**6**) transferable skills training. The subsequent **Salzburg II Recommendations** (2010)[26] developed by the European University Association Council for Doctoral Education, (EUA CDE).

2. The common approach (CA) proposed by the European Commission, designed to provide a framework of reference, whilst preserving flexibility and autonomy for institutions and doctoral candidates. This reference point is intended by the Commission to be independent of national and institutional issues. It reflects the aspirations of the ERA.

The European Commission framework of reference consists of seven essential elements for Doctoral Research in Europe. The sixth element is transferable skills. The EC defines this element and outlines how the skills may be acquired and their scope as follows:

*"**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***

Examples of transferable skills offered by the Commission include "***communication, teamwork, entrepreneurship, project management, IPR, ethics, standardisation etc***."

3. The Croatian Qualifications Framework CROQF, adopted by the Croatian parliament on February 8, 2013 entering in to force on March 2, 2013[27] and associated with a number of important, relevant and clearly defined terms (see below).

The CROQF defines a ***qualification*** as a set of ***learning outcomes***. Learning outcomes are defined as sets of ***competences***, represented in terms of ***knowledge and skills***, and the associated ***autonomy*** and ***responsibility***.

The CROQF provides the overall framework for the MODOC transferable skills conceptual framework. Namely, the MODOC transferable skills framework is built around ***competences***, represented in terms of ***knowledge and skills***, and their associated ***autonomy*** and ***responsibility.*** This approach is illustrated in Figure 2 below with the descriptors at a level of complexity for Level 8.

Knowledge denotes a set of acquired and related pieces of information. In the CROQF, knowledge refers to **factual** and **theoretical** knowledge.

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[25] http://www.eua.be/eua/jsp/en/upload/Salzburg_Conclusions.1108990538850.pdf
[26] http://www.eua.be/Libraries/Publications_homepage_list/Salzburg_II_Recommendations.sflb.ashx
[27] http://www.kvalifikacije.hr/documents-and-publications

Skills denote a set of knowledge applications and the use of know-how in completing tasks and solving problems. In the CROQF, skills refer to cognitive (logical and creative thinking), practical (manual dexterity and the use of methods, instruments, tools and materials) and social (establishing and developing interpersonal relationships) skills.

Autonomy and Responsibility (Competence) denote the achieved employment of specific knowledge and skills, against given standards.

Competences denote a set of knowledge and skills, and the associated autonomy and responsibility.

Figure 5 CROQF Learning outcomes and associated Level 8 descriptors
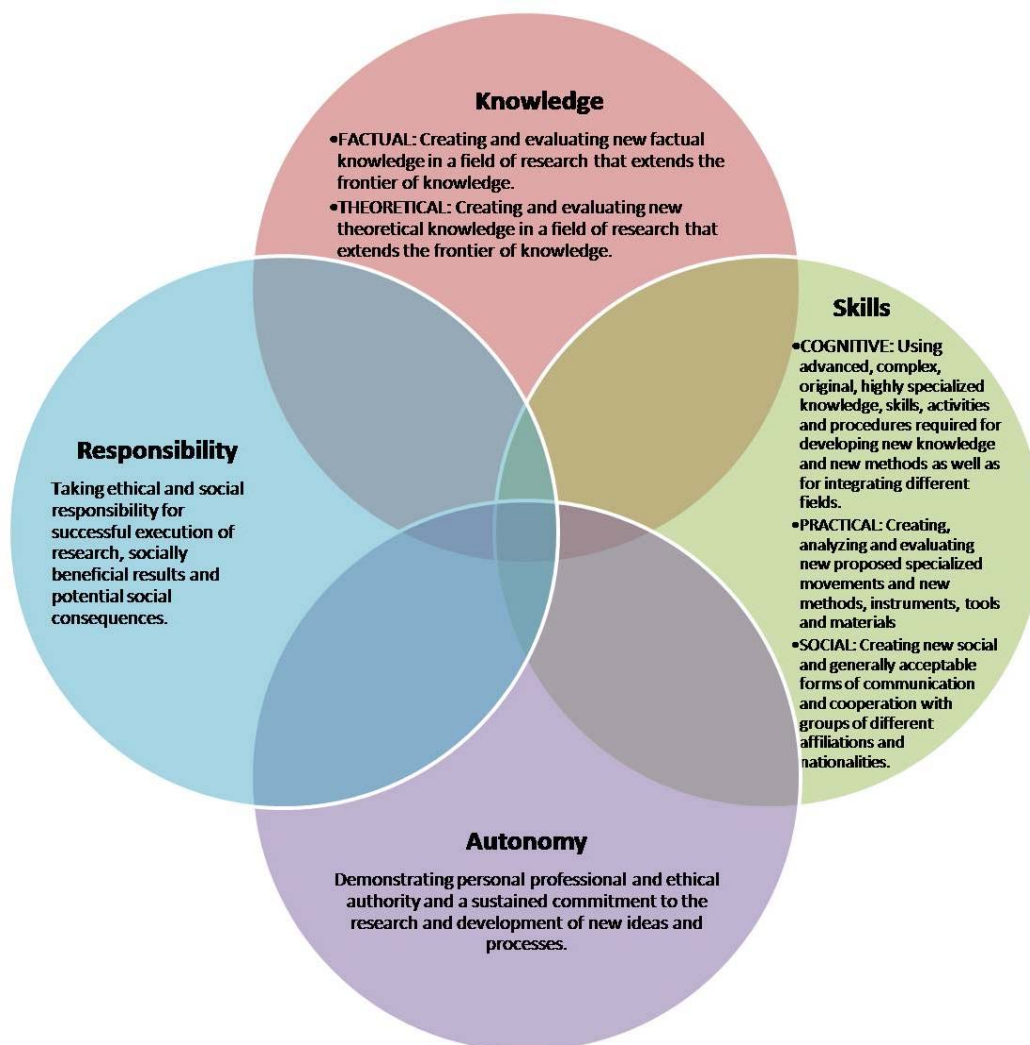
In the CROQF the learning outcomes are expressed through *factual and theoretical knowledge, cognitive, practical and social skills and respective autonomy and responsibility*.

The CROQF has eight levels of units of learning outcomes. Their descriptors represent minimal conditions for placing units of learning outcomes at respective CROQF levels. Higher levels of units of learning outcomes include lower levels of a respective profile.

In the CROQF, level indicators (descriptors) are laid down in such a way that they encompass the whole spectrum of learning outcomes, independent of the form of learning or the institution; from primary school, through all educational levels, to the doctoral level, and even further when applicable. They cover work activities, studying, academic activities, as well as vocational education for the primary purpose of entering the labour market. They also include the entire initial education, as well as that directed towards professional development, i.e. all forms of learning – formal, non-

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formal and informal – during the course of a lifetime. It should be noted that in developing level indicators for the CROQF, EQF descriptors were partially used, but they were not directly copied. They were designed to serve primarily for orientation and better understanding of their idea and role.

Table 1 shows the **complexity** of each competence for level 8. This is the level associated with doctoral education.

Table 1 Complexity for each representation of level 8 competences

Reference level 8	Complexity for each representation of competences.
Knowledge: factual	Creating and evaluating new factual knowledge in a field of research that extends the frontier of knowledge.
Knowledge: theoretical	Creating and evaluating new theoretical knowledge in a field of research that extends the frontier of knowledge.
Skills: cognitive	Using advanced, complex, original, highly specialized knowledge, skills, activities and procedures required for developing new knowledge and new methods as well as for integrating different fields.
Skills: practical	Creating, analyzing and evaluating new proposed specialized movements and new methods, instruments, tools and materials.
Skills: social	Creating new social and generally acceptable forms of communication and cooperation with groups of different affiliations and nationalities.
Autonomy	Demonstrating personal professional and ethical authority and a sustained commitment to the research and development of new ideas and processes.
Responsibility	Taking ethical and social responsibility for successful execution of research, socially beneficial results and potential social consequences.

Annex 1 CROQF LEVEL DESCRIPTORS OF LEARNING OUTCOMES shows the level descriptors of learning outcomes as laid down under the Act for *all 8 levels.*

Following discussions with the MODOC partners is has been agreed that *transferable skills training for doctoral candidates should contribute to their ability to attain Level 8 of the CROQF framework but that learning outcomes for associated training do not have to automatically align with Level 8 descriptors*.

The Act notes that learning competences will be acquired by an individual through learning and should be proven after a learning process. Two types of learning are recognized:

- Formal learning: an organised activity by an accredited legal entity or an individual, carried out according to accredited programmes, aimed at acquiring and upgrading competences for personal, social and professional needs. It shall be proven by a certificate, diploma or other public document issued by an authorised legal entity.

- Non-formal learning: an organised learning activity aimed at acquiring and upgrading competences for personal, social and professional needs. It shall not be proven by a public document.

For the purposes of the MODOC framework the transferable skills will be acquired by Non-formal training. There is no requirement for these skills to be proven by a public document.

Competency descriptions

A list of key professional and personal competencies identified through previous EU wide studies as being particularly relevant to 'employability' of doctoral candidates are shown in **Error! Reference source not found.** These competencies were selected at an early stage in the MODOC project and used to carry out national level surveys in Croatia. They strongly take in to account the stated aims of the modernising doctoral education project and are based partly on the Vitae **employability lens**

of the UK **Researcher Development Framework (RDF)**[28]. The Vitae employability lens describes the attributes and capabilities typically developed by researchers that are most frequently cited as desirable by employers outside higher education, including the public sector, international organisations and charities. The lens was originally derived using research with employers across the Europe Union. The RDF employability lens was also used in developing an additional module on the competencies of doctorate holders to complement the core data set of the OECD Careers of Doctoral Holders (CDH) survey[29,30]. The descriptions that are used to enable survey respondents to understand the meaning of each of the 20 competencies are shown in Table 2. These were drawn from the OECD CDH module. A figurative representation of the Employability lens can be found in Annex 2 UK Researcher Development Framework Employability lens.

These competencies have been arranged figuratively into 4 sub-domains as shown in Figure 6 MODOC Competencies and associated descriptors for the main skill sets.

Figure 6 MODOC Competencies and associated descriptors for the main skill sets.

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[28] https://www.vitae.ac.uk/researchers-professional-development/about-the-vitae-researcher-development-framework/lenses-on-the-vitae-researcher-development-framework

[29] Key Findings Of The OECD-Knowinno Project On The Careers Of Doctorate Holders Coordination And Support Actions FP7-Adhoc-2007-13 Making The Most Of Knowledge (KNOWINNO) 2010
http://www.oecd.org/sti/inno/CDH%20FINAL%20REPORT-.pdf

[30] Auriol, L., M. Schaaper and B. Felix (2012), "Mapping Careers and Mobility of Doctorate Holders: Draft Guidelines, Model Questionnaire and Indicators – Third Edition", OECD Science, Technology and Industry Working Papers, 2012/07, OECD Publishing.
http://dx.doi.org/10.1787/5k4dnq2h4n5c-en

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Proposed framework for Doctoral skill development in Croatia

The framework above provides an overall concept for developing doctoral training in Croatia around the CROQF structure of:

- knowledge
  - factual
  - theoretical
- skills
  - cognitive
  - practical
  - social
- and the associated autonomy and responsibility.

And the 4 sub-domains of

- Professional effectiveness skills;

- Self management skills;

- Leadership;

- Career-building skills;

and the associate descriptors shown in Table 2.

The full framework is shown figuratively in Figure 1 (above).

Based on the framework a more detailed curriculum will now be developed and proposed for discussion.

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Table 2 Competencies descriptors to be employed for the MODOC curriculum

Competency title	Description
A. Professional effectiveness skills	
Problem solving	Formulating and applying appropriate solutions to problems and challenges
Intellectual enquiry	Thinking originally and critically; curious and challenging
Creativity	Being imaginative, thinking beyond normal boundaries and developing new insights
Innovation	Developing new ideas, processes or products that are rooted in research
Entrepreneurial skills	Recognising and motivated to take forward enterprising ideas and create new businesses
Understanding IPR and copyright	Understanding of copyright and the commercialisation of intellectual property and research outputs
B. Self management skills	
Project management	Effectively planning, managing and delivering projects in good time
Time management	Managing own time effectively
Responsibility	Working independently and taking responsibility for actions
Flexibility	Responding quickly to changes and adapting easily to new situations
Proactivity	Showing initiative and actively investigating and seeking information
C. Leadership skills	
Effective communication	Communicating information effectively and confidently to different audiences
Team-working	Working constructively with colleagues, acknowledging their contribution
People management	Actively building relationships and managing others in a respectful and constructive way
Leadership and influence	Influencing others, providing direction and encouraging their contribution
D. Career-building skills	
Career management	Taking ownership for and managing professional development actively
Identifying career opportunities	Actively identifying the range of potential employment opportunities in a range of employment sectors
Networking	Developing, maintaining and using networks or collaborations
Interview skills	Presenting own knowledge, competencies and experiences through effective CVs, applications and interviews
Business awareness	Understanding how organisations, institutions or businesses work

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References and Bibliography

Principles for Innovative Doctoral Training European Commission Directorate-General for Research & Innovation Directorate B - European Research Area Unit B.2 "Skills" Brussels, 27/06/2011 http://ec.europa.eu/euraxess/pdf/research_policies/Principles_for_Innovative_Doctoral_Training.pdf

Doctoral degrees beyond 2010: Training talented researchers for society LERU March 2010 http://www.leru.org/files/publications/LERU_Doctoral_degrees_beyond_2010.pdf

The CROQF Act, and in particular **ANNEX A** showing competences at all levels. Available for download at: ***http://www.kvalifikacije.hr/dokumenti-i-publikacije***

Croatian Qualifications Framework Introduction to Qualifications (developed as part of the development of CROQF and a historically useful paper).

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Croatian employers' expectations and perceptions of doctoral graduates and their competencies, Robin Mellors-Bourne and Janet Metcalfe, Careers Research & Advisory Centre (CRAC) / Vitae, March 2013

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Annex 1 CROQF LEVEL DESCRIPTORS OF LEARNING OUTCOMES

LEVEL	KNOWLEDGE	SKILLS			AUTONOMY	RESPONSIBILITY
		Cognitive skills	Practical skills	Social skills		
8	Creating and evaluating new facts, concepts, procedures, principles and theories in a field of research that extends the frontier of knowledge.	Using advanced, complex, original, highly specialized knowledge, skills, activities and procedures required for developing new knowledge and new methods as well as for integrating different fields.	Creating, evaluating and performing new proposed specialized activities and new methods, instruments, tools and materials.	Creating and applying new social and generally acceptable forms of communication and cooperation in interaction with individuals and groups of different affiliations and different cultural and ethnical origin.	Demonstrating personal professional and ethical authority, managing scientific c research activities and a commitment to development of new ideas and/or processes.	Taking ethical and social responsibility for successful execution of research, socially beneficial results and potential social consequences.
7	Evaluating highly specialized knowledge in a field of work and/ or learning some of which are at the forefront of the field and can provide the basis for original thinking and scientific research as well as for integrating different fields of knowledge.	Critical evaluation and creative thinking in solving new and complex problems, required as the basis for the development of new knowledge and the ability to integrate knowledge in unpredictable situations.	Performing complex activities and applying complex methods, instruments, tools and materials, developing instruments, tools and materials required in research and innovation processes and adjusting complex methods.	Managing and leading a complex communication process, interactions with others and cooperation in different social groups in unpredictable social situations.	Managing and leading development activities in unpredictable surrounding conditions and making decisions in uncertain conditions.	Taking personal and group responsibility for strategic decision-making and successful execution and completion of tasks in unpredictable situations, as well as social and ethical responsibility during the execution of tasks and for their resulting consequences.
6	Evaluating specialized facts, concepts, procedures, principles and theories in a field of work and/or learning, including their critical comprehension.	Collecting, interpreting, estimating, selecting and creatively applying different relevant facts, concepts and procedures required to generate solutions and for solving complex tasks or problems within a specialized field of work in unpredictable situations, as well as ability to transfer knowledge to other areas and problems.	Performing complex activities and applying complex methods, instruments, tools and materials in unpredictable situations, developing instruments, tools and materials and adjusting complex methods.	Managing complex communication, interactions with others and cooperation in different social groups in unpredictable social contexts.	Managing professional projects in unpredictable situations.	Taking ethical and social responsibility for managing and evaluating professional individual and group development in unpredictable situations.
5	Analysing,	Interpreting,	Performing	Partial	Taking part in	Taking

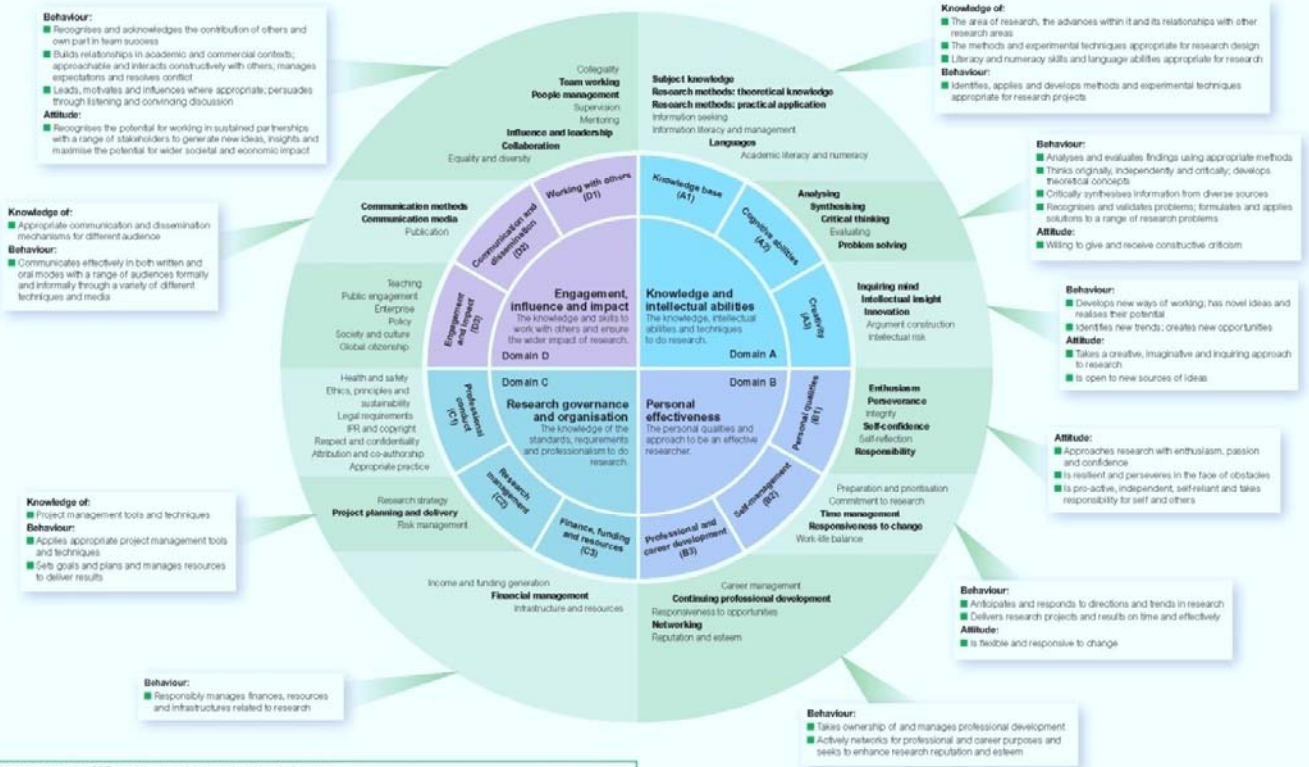|						
	synthesizing and evaluating specialized facts, concepts, procedures, principles and theories in a field of work and/ or learning, giving rise to an awareness of the frontier of knowledge.	estimating, selecting and creatively applying different relevant facts, concepts and procedures required to generate solutions and for solving complex tasks or problems within a specific field of work and/or learning in partially unpredictable situations, as well as ability to transfer knowledge to other areas and problems.	complex actions and applying complex methods, instruments, tools and materials in partially unpredictable situations, developing instruments, tools and materials and adjusting simple methods.	management of complex communication in interactions with others and establishing cooperation in a group in partially unpredictable social contexts.	the management of activities in partially unpredictable situations.	responsibility for managing evaluation and for improving activities in partially unpredictable situations.
4	Analysing wider spectrum of facts, concepts, procedures, principles and theories in a field of work and/ or learning.	Simple abstract logical thinking required to analyse available facts, concepts and procedures in the course of execution of a series of complex tasks in a field of work and/or learning in situations that are usually predictable, but are subject to change.	Performing a set of complex actions and applying complex methods, instruments, tools and materials (in executing a series of specific complex tasks) in situations that are usually predictable, but are subject to change.	Realization of complex communication in interactions with others and a possibility of cooperation in a group in social contexts that are usually predictable, but are subject to change.	Executing a set of complex tasks and adapting one's own behaviour to a set of given guidelines in situations that are usually predictable, but are subject to change.	Taking responsibility for evaluating and improving activities in situations that are usually predictable, but are subject to change.
3	Comprehending facts, concepts, procedures and principles important for a field of work and/or learning in partially familiar situations.	Explaining, estimating, selecting and using important facts, concepts and procedures required to execute a series of complex, defined tasks or problems within specific field of work and/or learning in familiar situations.	Performing complex actions by applying a set of different simple methods, instruments, tools and materials in partially familiar conditions.	Realization of complex communication in interaction with other individuals and possibility of cooperation in a group in familiar social contexts.	Executing a set of complex tasks and adapting own behavior to a set of given guidelines in familiar situations.	Taking responsibility for executing a set of complex tasks in familiar situations.
2	Comprehending basic facts and concepts in simple and familiar situations specific to a field of work and/or learning.	Concrete logical thinking required to apply known facts and procedures in the course of execution of a series of simple connected tasks in familiar situations.	Performing actions and applying simple methods, instruments, tools and materials in familiar conditions.	Realization of simple communication and cooperation in interaction with other individuals in familiar social contexts.	Executing simple tasks under direct and occasional supervision in familiar situations.	Taking responsibility for executing simple tasks and for establishing relationships with other individuals in familiar situations.

1	Comprehending basic general facts and concepts in simple and familiar everyday situations.	Simple concrete logical thinking required to execute simple, clearly defined tasks in familiar situations.	Performing simple actions in familiar situations.	Following general rules of behavior in familiar social contexts.	Executing simple tasks under direct and constant professional supervision in familiar situations.	Taking responsibility for executing simple tasks in familiar situations.

Annex 2 UK Researcher Development Framework Employability lens (VITEA)

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