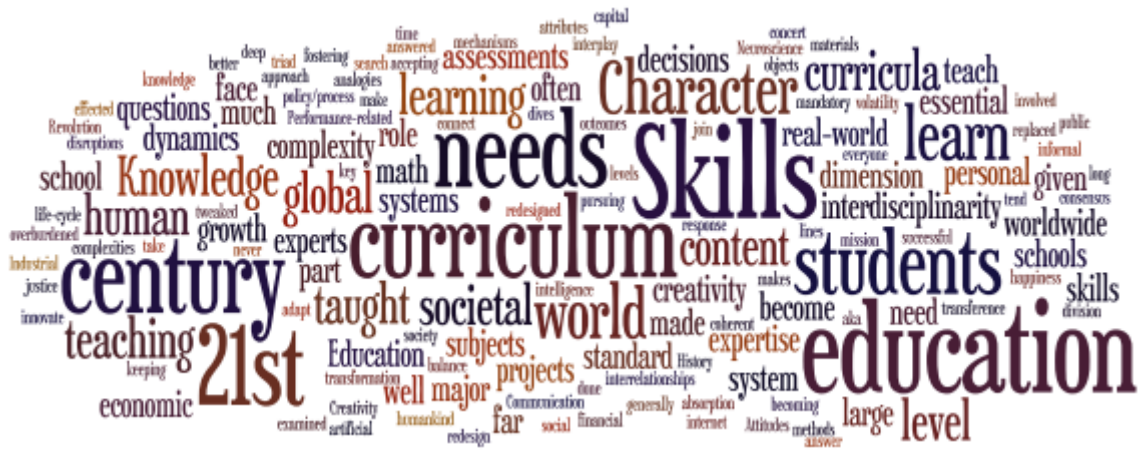
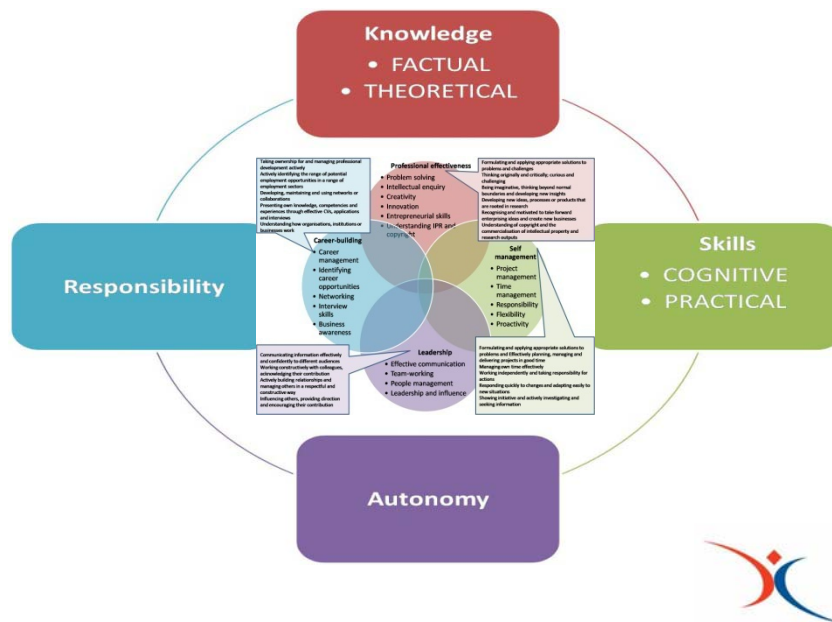


Croatian Doctoral Development: Introduction to the proposed curriculum



Curriculum: *Outlines the skills, performances, attitudes, and values that students can expect to gain from the learning activity .It includes statements of desired student outcomes, descriptions of materials, and the planned sequence that will be used to help students attain the outcomes.*



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ACRONYMS

| | |
|-------|--|
| CROQF | Croatian Qualification Framework |
| EC | European Commission |
| ECTS | European Credit Transfer Scheme |
| EQF | European Qualification Framework |
| ERA | European Research Area |
| EU | European Union |
| LERU | League of European Research Universities |
| MODOC | MODernising DOctoral Education (Project) |
| PLP | Personal Learning Plan |
| R&D | Research and Development |
| RDF | Researcher Development Framework |
| RDS | Researcher Development Statement |

1.0 Introduction to the task

The task to create the MODOC curriculum has followed the common stages of curriculum development within the curriculum design cycle. These are to:

- Determine and agree on the educational or professional context in which the curriculum is to be developed and delivered;
- Incorporate the needs of doctoral students and the requirements of labour market;

These stages have been addressed under **Activity cluster 1** of the project.

- Determine the aims and learning outcomes of the curriculum;

Aims and learning outcomes at the highest level have been set by the aims and objectives of the projects i.e. to develop transferable skills training with a particular focus on improving the employability of Croatian doctoral students.

Activity cluster 2 now addresses the following tasks:

- Agree on the structure and framework of the courses for professional and personal skills development, the main areas of training and learning, the sequence of the main topics and the key assessments;

The structure and framework for the curriculum have been agreed with the MODOC partners under Activity cluster 1 Task 1.

- Develop of coherent courses which have defined learning outcomes, timetables, content, appropriate training, learning and assessment methods and which utilise relevant and available learning resources;
- Develop an appropriate and deliverable evaluation strategy;

Following these main tasks the following activity will take place:

- Review and revise the courses in line with universities' top management feedback, in order to meet the identified needs of the doctoral students and labour market.

Outlined below are the main features of the proposed MODOC curriculum for transferable skills development for doctoral students including defined learning outcomes; timetables; content; appropriate training learning and assessment methods which utilise relevant and available learning resources.

The issue of an appropriate and deliverable evaluation strategy is also discussed.

These proposed features will be discussed at a meeting of the MODOC Partners on the 24th of September 2014.

2.0 Overview of the core features of the proposed curriculum

2.1. The approach

As can be seen from the introduction to the task, MODOC curriculum is clearly foreseen to be developed based on the common stages of curriculum development within the curriculum design cycle – see Figure 1 The curriculum development and implementation cycle. This approach recognises 2 associated models see Figure 2 Models of curriculum design and development .

Figure 1 The curriculum development and implementation cycle

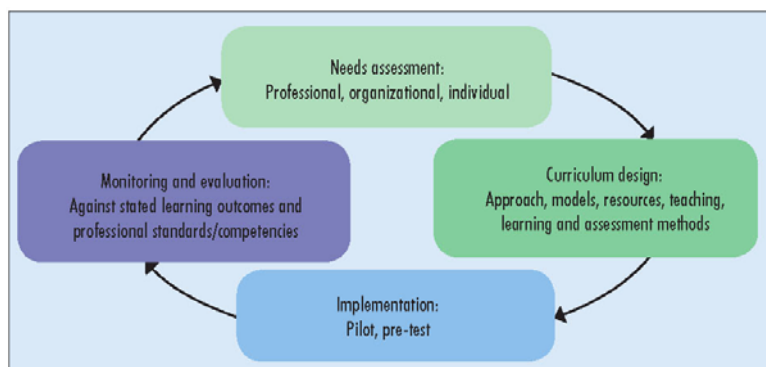
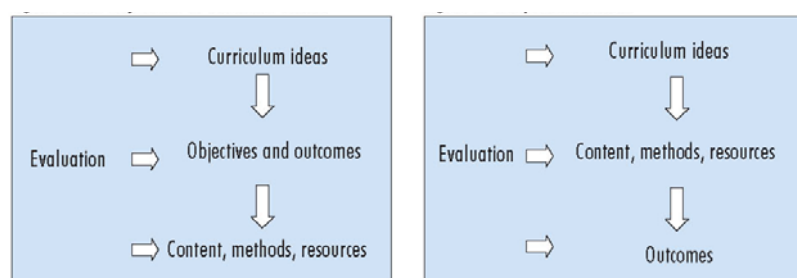


Figure 2 Models of curriculum design and development



The objectives or outcomes model

The process model.

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.

The proposed 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.

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.

This is the approach proposed for the MODOC curriculum.

2.2. The framework

The curriculum is built within the framework agreed with the MODOC partners in June 2014. This acknowledges the **Common Approach (CA)** to doctoral training proposed by the European Commission and strongly reflects the **Croatian Qualification Framework CROQF**. The overall framework is shown in **Figure 3** below.

The common approach (CA) proposed by the European Commission is 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.”**

The Croatian Qualifications Framework CROQF was adopted by the Croatian parliament on February 8, 2013 entering in to force on March 2, 2013¹ and is associated with a number of important, relevant and clearly defined terms.

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 4 below with the descriptors at a level of complexity for Level 8 (Table 1). Annex 1 shows the level descriptors of learning outcomes as laid down under the Act for **all 8 levels**.

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.

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

The MODOC curriculum uses the CROQF definition of **competences**, composed of **knowledge and skills**, and their associated **autonomy** and **responsibility**. The MODOC curriculum focuses on 4 main skill sets: **Professional Effectiveness, Self Management, Leadership** and **Career-building**.

¹ <http://www.kvalifikacije.hr/documents-and-publications>

Detailed descriptors of the competencies in these 4 areas are based on descriptors taken from the **UK Researcher Development Framework (RDF)** and also those used in the transferable skills framework developed by LERU (**League of European Research Universities LERU**).

These competencies have been arranged figuratively into 4 sub-domains as shown in Figure 5.

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. |

2.3. Defining curriculum content and training delivery

The MODOC curriculum content is intended to reflect the activities in which doctoral students will find themselves engaged, relate directly to learning outcomes, reflect balance between topics and theory and practice and be pitched at an appropriate ‘level’. As agreed with the MODOC partners this level should contribute towards attaining level 8 of CROQF but does not have to be set at Level 8.

Ideas for MODOC course content were gathered from existing and previous transferable skills courses for doctoral students from across Europe and in particular. Those identified as Good Practice by the LERU2 .

The curriculum that follows defines the objectives and learning outcomes in the 4 broad skills areas under 16 suggested workshop sub-topics. It is suggested that individual trainers use the curriculum to devise and customize a learning program and timetable which allocates time for course elements and maps out a logical sequence of learning to enable student progression.

2.4. Delivery

As agreed by the MODOC partners, the curriculum can be delivered through ‘Non-formal’ training as defined by CROQF i.e. there is no requirement for 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.

2.5. Duration, working methods

It was agreed that the transferable skills training developed under MODOC should not aim to attract ECTS³ point. There is therefore no proposed duration for a training activity although an indication of possible duration indicative duration has been offered, based on similar courses taught at other

² Doctoral degrees beyond 2010: Training talented researchers for society

³ European Credit Transfer Scheme

universities It is arguably more important to set an annual target for doctoral students, endorsed by their doctoral school, e.g. **5-10 days per year**, and then allow the students to take responsibility for best use of the available time to help them implement a Personal Learning Plan (PLP). This is a practical approach that is endorsed at most institutions. Some training programs, e.g. the LERU summer schools on transferable skills will offer 3 days of consecutive training. This approach makes sense give then many candidates will have travelled, often internationally, to join the activity. In other cases training is offered in much smaller ‘bite sized’ chunks, e.g. for an hour to fit into a lunch break. In between these two extreme are conventional half day and full train courses (4-8 hours).

Trainers should be sufficiently competent to set the duration of a course to fit the leaning outcomes, the needs of the target group and their own training style rather than feeling the need to follow prescriptive rules. The same approach is proposed for working methods. The emphasis of these training courses is to help doctoral students to develop skills. The working method should reflect the topic of the training but may also reflect the preferred style of the trainer and also the learning style of the students. Some activates will lend themselves to case studies and individual problem solving while others may benefit from role play and group working. Experienced trainers will also recognise the different learning styles and try to make sure that the materials include ‘something for everyone’ by changing their methods over the course of the workshop.

Evaluation of training outcomes

Evaluation is designed to asses a number of issues including if the training has achieved its stated objectives and in particular, if the trainees felt that is has helped them to develop the desired competencies and contribute to the goals of their personal learning plan. The assessment should also enable those organising the workshop to assess the success of the training and the suitability of the trainer and working methods. Finally, it should also help the trainer to make possible refinements in the future to content, approach and delivery increase the impact of their training for that target audience.

It is increasingly common for workshop evaluation to be placed on line so that students can reflect before responding and that metrics can be accrued and analysed easily. SurveyMonkey.com offers a free 10 question online evaluation survey method that is increasingly used by workshop organisers. However, other approaches are also valuable and should be considered and sued wherever possible e.g. conversations with the attendees during the breaks or at an interval after the training so that they have had time to reflect and consider further and perhaps even have concrete evidence of the outcomes and impact of the training (self-evaluation).

3.0 Monitoring and evaluation of the curriculum

The MODOC curriculum needs to be monitored and evaluated to ensure that it is achieving the desired results and to identify areas for improvement. Standard evaluation involves ‘ongoing formal feedback activities aimed at gathering timely information about the quality of a programme’. It is important to build in evaluation activities now to identify successes and failures of the curriculum with a view to correcting deficiencies, to measure if stated objectives have been achieved, to assess if the curriculum is meeting the needs of learners and the community. If appropriate this activity should also measure the cost effectiveness of the curriculum.

Monitoring and evaluation methods include:

- observation
- feedback questionnaires
- focus groups
- interviews
- student assessment results and
- institutional reports which are required for internal use (e.g. attendance/ absence statistics) or for external agencies.



It is proposed that different evaluation methods be piloted during the pilot workshop stage of the project. This should enable the MODOC partners to identify evaluation methods that would work when the transferable skills training become an embedded part of Croatian Doctoral education.

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Curriculum and course design British Journal of Hospital Medicine, December 2009, Vol 70, No 12

http://www.faculty.londondeanery.ac.uk/other-resources/files/BJHM_article%2011_curriculum%20design.pdf

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).

Available in EN and HR from the MZOS publication site for 2011 publications see:

<http://public.mzos.hr/Default.aspx?art=8984>.

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

Personal and professional competencies of current Croatian doctoral students, Janet Metcalfe and

Robin Mellors-Bourne, Careers Research & Advisory Centre (CRAC) / Vitae, March 2013

Report of Mapping Exercise on Doctoral Training in Europe "Towards a common approach"

European Commission Directorate-General for Research & Innovation Directorate B - European Research Area Unit B.2 "Skills" Brussels, 27/06/2011

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http://ec.europa.eu/euraxess/pdf/research_policies/Report_of_Mapping_Exercise_on_Doctoral_Training_FINAL.pdf

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Figure 3 MODOC Conceptual framework for transferable skills training for doctoral students.

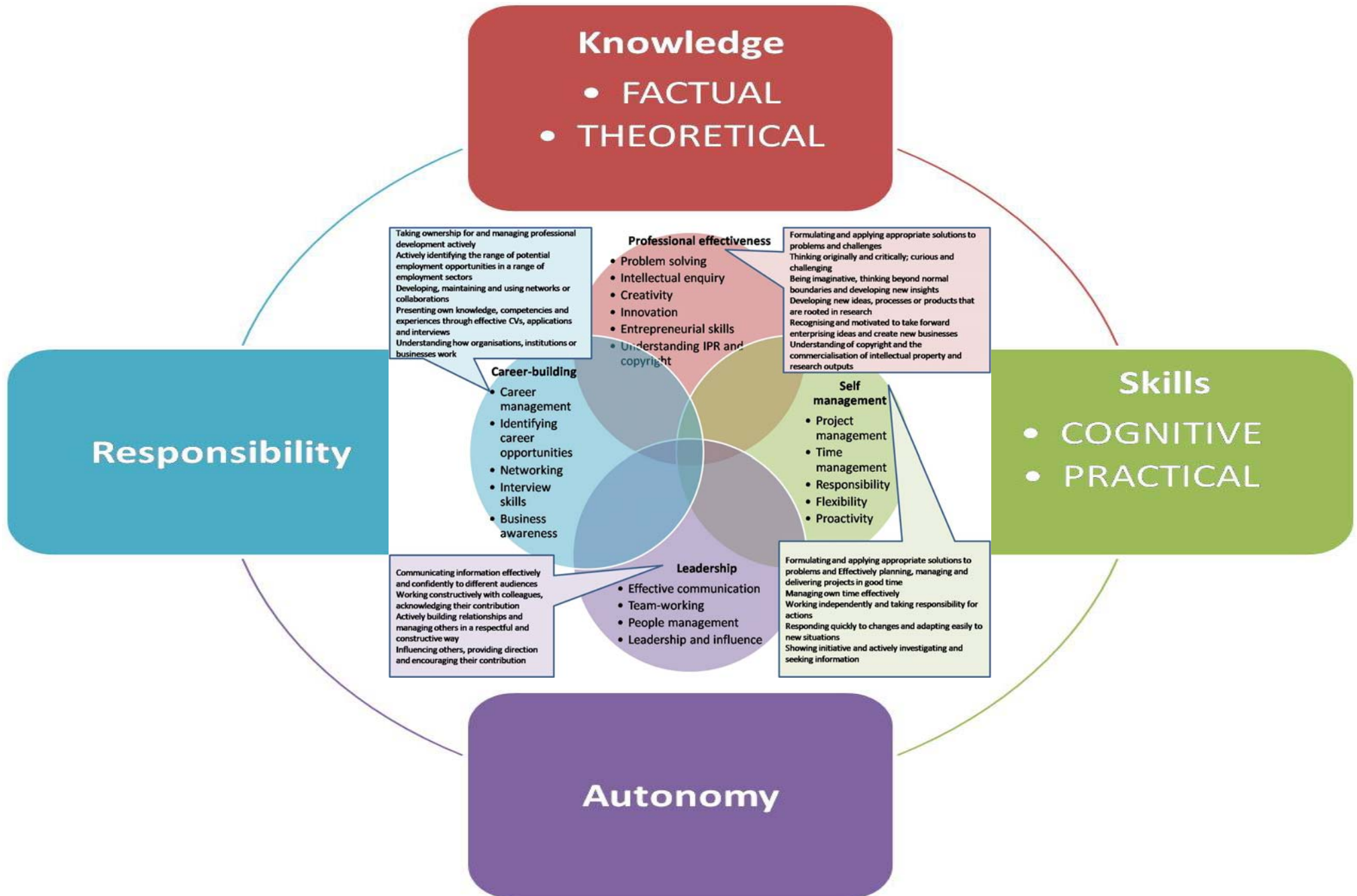


Figure 4 CROQF Learning outcomes and associated Level 8 descriptors.

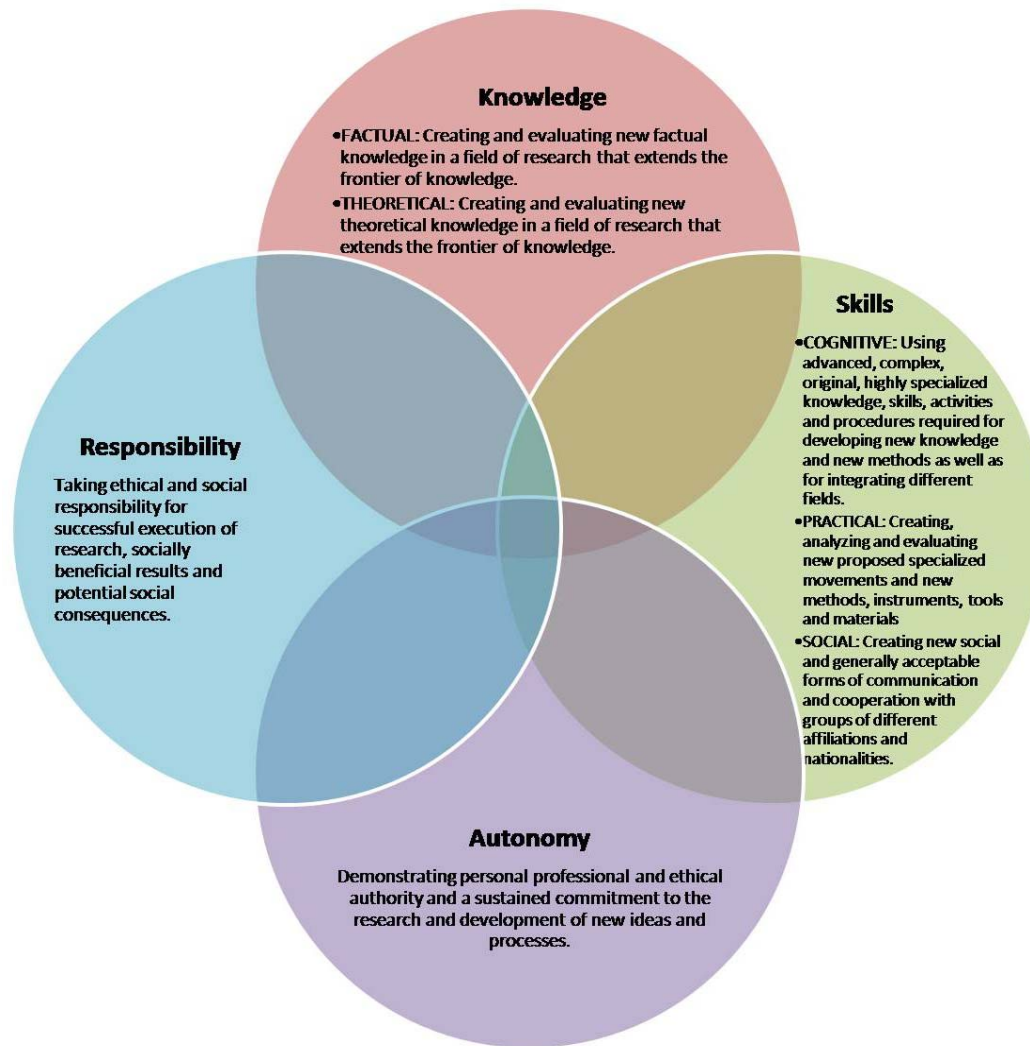


Figure 5 MODOC Competencies and associated descriptors for the main skill sets.

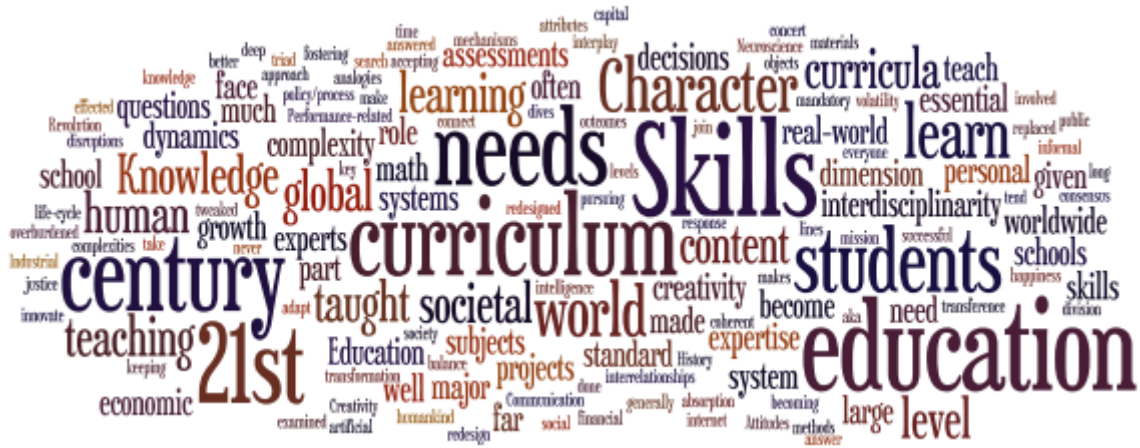


Annex 1 CROQF LEVEL DESCRIPTORS OF LEARNING OUTCOMES

| 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 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. |

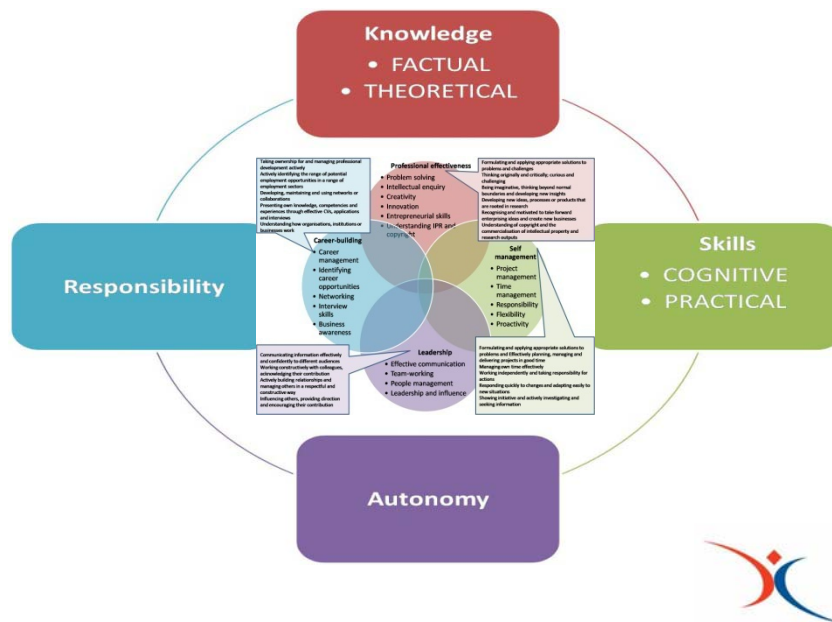
Croatian Doctoral Development: Proposed Curriculum



First draft: August 2014 (Lisa Cowey)

Revised based on MODOC Partner proposals: September 2014

Curriculum: *Outlines the skills, performances, attitudes, and values that students can expect to gain from the learning activity .It includes statements of desired student outcomes, descriptions of materials, and the planned sequence that will be used to help students attain the outcomes.*



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- **Understanding IPR and copyright:** Understanding of copyright and the commercialisation of intellectual property and research outputs.

1.1. Creativity, problem solving and intellectual inquiry

Introduction to the sub-domain

The key to success in research is, first of all, being able to ask the right question. Being able to interpret the data, to see new patterns and to make links between less obvious associations are skills that are developed to provide new and creative answers to research challenges.

Doctoral students seeking to develop this area of their skills and competencies need to be supported to develop their ability to ask questions, to ‘think outside the box’, to see things differently and generate a wider range of possibilities and outcomes.

Suggested content

There is no easily definable ‘content’ for this sub-domain, as demonstrated by the approach taken by other Universities. Some Universities offer inspirational “Master Classes’ where a well know researchers speaks about their approach to research¹. Other universities focus on supporting use of library services, software and IT.

Approaches to running a workshop to stimulate creating thinking and problem solving include introduction and use of techniques to support this form of learning e.g. ideating techniques including Delphi and brain storming, mind mapping, group discussion, group activities and targeted exercises to develop creative thinking and problem solving skills. Workshops should encourage students to take away ideas for working on their own research ideas, problems or challenges and be prepared to develop unexpected or surprising possibilities.

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- Appreciate that the first step to solving a problem is to ask the right question
- Be able to use a range of techniques for stimulating creative processes
- Understand how learning styles and behaviour influence creative activity
- Have techniques to generate ideas and select solutions
- Access resources for creative thinking, problem solving and decision making.

Typical mode of delivery: Half to one day workshop on problem solving techniques. Multiple short workshops on IT, professional resources and their use.

Useful resources

The creative researcher (Vitae)

<http://www.bris.ac.uk/researchstaff/yourcareer/vitae-booklets/creative-researcher.pdf>

Encouraging creativity in PhD and postdoc researchers: Good Practice Guides to Creativity in STEM Research

For PhD students

[Doing creative research: a good practice guide for postgraduate researchers in STEM disciplines](https://workspace.imperial.ac.uk/graduateschool/Public/Creative%20Research/Pg%20in%20STEM.pdf)

<https://workspace.imperial.ac.uk/graduateschool/Public/Creative%20Research/Pg%20in%20STEM.pdf>

For postdocs

[Doing creative research: a good practice guide for postdocs in STEM disciplines](https://workspace.imperial.ac.uk/graduateschool/Public/Creative%20Research/Postdoc%20in%20STEM.pdf)

<https://workspace.imperial.ac.uk/graduateschool/Public/Creative%20Research/Postdoc%20in%20STEM.pdf>

¹ Masterclass Inspiring Research (UCL)



For supervisors and principal investigators

[Encouraging creativity in PhD and postdoc researchers: a guide for supervisors and principal investigators
https://workspace.imperial.ac.uk/graduateschool/Public/Creative%20Research/Supervisors%20and%20PI%20\(2\).pdf](https://workspace.imperial.ac.uk/graduateschool/Public/Creative%20Research/Supervisors%20and%20PI%20(2).pdf)

Tutorials to support Mind Mapping

<http://www.thinkbuzan.com/uk/support/tutorials>

How to make a Mind Map

<http://www.mind-mapping.co.uk/make-mind-map.htm>

Freemind

http://freemind.sourceforge.net/wiki/index.php/Main_Page

Gantt Project

<http://www.ganttproject.biz/>

1.2. Innovation

Introduction to the sub-domain

By definition doctoral research should be original and should contribute to progressing an academic subject. However, most researchers struggle at some point to ensure that their research evolves rather than being simply derivative or incremental. Increasingly doctoral research is seen to have additional value if it is 'innovative' rather than 'original' and potentially offers impact that goes beyond the academic sector e.g. by Technology Transfer and subsequent commercialisation by the private sector. Much has been written about innovation Technology Transfer and commercialisation and their application to many fields including science, engineering, management, media and many others. This is becoming an increasingly important field for researchers seeking to secure grants, demonstrate impact and make full use of new metrics for career progression and project evaluation.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from a brief history to the subject including the economic growth of national and the increasing importance of the knowledge economy. They should receive information on metrics used to monitor and benchmark innovation activity and be aware of where they can go to obtain information e.g. the EU Innovation Union Index (IUD), the Global Innovation Index. They should be introduced to the use of metrics to benchmark and make inter-country comparisons and e.g. Europe/ USA/ Japan/ China.

The course should cover common terms and indicate the scope of the field. Definitions should include the different types of innovation e.g. technological and non-technological, product and service, process, marketing and organisational, incremental, radical and disruptive. The Oslo Manual may provide a useful reference point. The product development cycle should be introduced as a way to place different types of innovation in to a research and commerce environment e. g. R&D /Idea /patent /prototype /product / company launch / company growth.

The course should place innovation in a public research context by introducing the triple helix and Open Innovation Models and outline the main pillars of university innovation activity e.g. collaboration, contract research, technology licensing and spinout. If the University has a declared innovation strategy then this can be discussed.

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- Have a clear understanding of the role that innovation plays in developing a knowledge economy and how it can be supported by Governments and PROs;
- have an over-view of Global Innovation activity and be able to locate reliable and recent metrics of innovation activity;
- be able to identify the main types of innovation;
- understand the role that their own research can play in the innovation cycle

Typical mode of delivery: One day workshop

Useful resources

The Oslo manual

<http://www.oecd.org/science/inno/2367580.pdf>

Innovation Union Scoreboard (IUS)

http://ec.europa.eu/enterprise/policies/innovation/policy/innovation-scoreboard/index_en.htm

1.3. Entrepreneurship

Introduction to the sub-domain

New businesses create employment and can bring the outputs of science research to application for the benefit of industry and the general public (socio-economic benefit). University spinout companies and academic entrepreneurship are increasingly promoted as research outcomes and career options for researchers. However, creating and sustaining a business based on the outputs of research is a complex and challenging activity. In addition, academic entrepreneurship involves the development of skills not normally associated with a research career including raising risk (venture) finance and understanding how companies are structured. It combines both product development and company development. Researchers who are interested in expanding their career in to this area often worry that they will not have the innate skills to run a business or that the two environments will prove incompatible.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an understanding of the fundamental aspects of Entrepreneurship and some practical methods used by Entrepreneurs. They should also be offered an overview of the expanding scope of the field including social entrepreneurship. They should be introduced to the skills needed in entrepreneurship and shown how entrepreneurship fits into the academic life.

An overview should be provided of the main steps needed to bring a new technology to the market including getting to market, business models, financial plan and valuation and sources of finance.

Preferably an opportunity should be provided to gain the skills to effectively develop ideas into a real business by working in small groups to take an idea through the various stages of development including preparing and presenting a business 'pitch'.

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- Understand what characterises an entrepreneur and where academic entrepreneurship fits in to the wider spectrum of activity including acquiring skills and knowledge for project proposal development, research project management and for identifying and applying to different funds i.e. sources of finance
- Understand development phases of project ideas including those for a research project and to be able to develop a well structured and organised a research plan
- Have an over-view of the development of models for practical usage of research results and similar
- Be able to map out the main stages that need to be negotiated to turn an idea in to a viable business plan and apply them to an original idea
- Appreciate the differences between risk and bank finance
- Develop and practice presentation skills

Typical mode of delivery: One to three day workshop

For a 3 days workshops time is typically included for discussion and practical exercises. Participants are invited to bring along a business idea or invention of their own. Participants work in teams to bring a number of ideas one step at a time closer to market.

NB: Some Universities combine this workshop with Innovation and IPR. This is then typically a 3 day activity.

Useful resources

The Third Way: Becoming an Academic Entrepreneur [Javier Garcia-Martinez](#) March 20, 2014

Guidelines for proposals writing Peter A. Lawrence: Real Lives and White Lies in the Funding of Scientific Research. PLoS Biology, September 2009, Volume 7, 1-4, <http://www.plosbiology.org/article/fetchObject.action?uri=info%3Adoi%2F10.1371%2Fjournal.pbio.1000197&representation=PDF>

http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2014_03_20/caredit.a1400073

Indicators of academic entrepreneurship (PAXIS)

ftp://ftp.cordis.europa.eu/pub/paxis/docs/indicators_acad_entrepreneurship.pdf

University of Zagreb School of Medicine, Structure, methodology and functioning of scientific work, Module **Research Projects**

1.4. Understanding IPR and copyright

Introduction to the sub-domain

Most doctoral students are aware that their research should be 'original' and that they should avoid plagiarism in their written work and teaching. However, the link between originality and intellectual property (IP) rights is much less well understood with many doctoral students unaware that plagiarism constitutes an infringement of legal copyright.

PhD students also find themselves increasingly encouraged to patent their research. This can raise tensions between academic publication and 'premature disclosure' of a patent application. PhD students are also often uninformed about the patenting process including associated costs and how a patent can be used to assist in the commercialisation process.

An understanding of IP and its use in the work place and universities should include how to protect and use one's own rights and also how to ensure compliance with the rights of others.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an introduction to intellectual property that covers the various forms of IP including industrial property (patents, designs, trade Marks etc) and non industrial rights e.g. copyright . They should also have a clear idea of what each form of IP protects, the associated rights and how they can be obtained. Most importantly, they should reach a clear understanding that their ideas have potential value and can be protected and monopolised for a desired socio-economic purpose. A clear parallel between the process of academic publishing in a peer review paper and the process of obtaining a patent though substantial examination should be included and discussed.

Learning outcomes

The learning outcomes for this sub-domain include the following:

- An understanding of what Intellectual property is and why it is important.
- A clear definition of different categories of Intellectual Property, including patents and copyright and their relevance in relation to University research and commerce.
- An understanding of how a patent is obtained and the clear parallels with the process of peer review of an academic paper.
- A more rounded understanding of copyright within the public research and higher education context, with particular reference to digital material.
- How to avoid plagiarism and infringement, 'fair use' and the 'research exemption' and what can happen if copyright or industrial rights are ignored (infringement).
- The implication of contractual terms in research collaborations with a private sector sponsor particularly in relation to rights to publish and to carry out further research in connection with the results of a particular research project.

Where appropriate learning outcomes can also include

- The University or Faculty Intellectual Property Policy and any national legislation that affects IP ownership.

Typical mode of delivery: One day workshop

Useful resources

EPO teaching kits

<http://www.epo.org/learning-events/materials/kit.html>

2.1. Self-management

Introduction to the sub-domain

Self-management can be defined as is a set of methods, skills, and strategies to effectively direct your activities toward your objectives. Exercising responsibility for good self management helps doctoral students to deal with the specific work load and pressure of a research project. It also helps them to take stronger responsibility for research activities in a group with improved outcomes.

Many Universities include workshops on time management and project management into the sub-domain of self-management.

Content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an overview over the field and support to help them identify areas of improvement for their individual self-management system and in particular individual and immediately applicable strategies. They should introduce three main areas: **effectiveness, efficiency, and balance** and also address **procrastination, perfectionism, and other typical issues**. The linkages between these areas and other issues should be highlighted e.g. time management and project management.

The training should enable participants to examine their own approach to self-management, learn about the causes of inefficiency and work on developing a more effective approach. They should also examine limiting factors to understand why their intentions and actions do not have the desired effect.

Learning outcomes

Participants should

- learn how to develop and install self-management habits to leverage success in a doctorate research program including setting realistic objectives, managing their own time, managing the resources, priorities, expectations and outcomes associated with the project itself
- leave the course with greater personal resolve

Typical mode of delivery: 1- ½ day workshop

See note above on project management and time management.

Useful resources:

The balanced researcher (Vitae)

<http://www.bris.ac.uk/researchstaff/yourcareer/vitae-booklets/balanced-researcher.pdf>

2.2. Project management

Introduction to the sub-domain

The skill of managing projects is a core skill for researchers and increasingly becoming a career route for researchers in both industry and academia. Applying project management methods such as stakeholder analysis, work-breakdown structures, critical path identification and risk management can help ensure that a project delivers the best results it can, while simultaneously reducing stress. Applying these tools within the research environment creates an additional challenge as the exact nature of the tasks to be undertaken is ambiguous making it hard to plan with confidence. This uncertainty needs to be part of the project assessment and integrated in to the overall plan. Applying these tools in a commercial environment is a highly transferable skill as companies seek to achieve maximum impact from their research work.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an understanding of the following topics:

Introduction to Project Management

- Managing time, cost, cope and quality

Project Management in the Research Environment

- Setting up and managing a PhD research project.

- Research aims and objectives, research problems and questions,

- Standard activities and main stages

- Doctoral research in the project context

- Creating a GANTT chart

- Managing Risk

- Tracking the project

- Writing reports

- Creating check lists

Transferring PM skills – managing projects outside academia

- Project management in the private sector

- Using PM software

- Developing and using a PM tool-kit

Learning Outcomes

As a result of attending this course participants should feel confident to plan and manage their research projects to gain optimum use of resources and to minimize and manage risk; understand the main stages of planning a research project and the associated activities; be able to create and up-date GANTT charts and understand how modern software can help them to manage the project; identify the significant differences between managing a project in the public and private sector and have created check-lists and a tool kit to take away and work with in their university and future career.

Typical mode of delivery: One day workshop

Useful resources



Project Management for Scientists – Science Careers

Available for download at:

http://sciencecareers.sciencemag.org/career_magazine/previous_issues/articles/2002_07_12/noDOI.11589789757837229753

Project Management in the Research Environment

Available for download at: http://www.bestthinking.com/articles/science/applied_science/project-management-in-the-research-environment

Training Videos and Webinars

Project Management – getting to grips with managing research projects

Speaker: Robin Henderson, in Transferable Skills at May 10, 2011 (Approximately one hour in duration and strongly recommended.)

<http://bitesizebio.com/webinars/project-management-getting-to-grips-with-managing-research-projects/>

2.3. Time management

Introduction to the sub-domain

Researchers often find themselves concerned about the amount of time they have to complete tasks and meet deadlines. They struggle to balance the conflicting demands of time for study, leisure, earning money and job-hunting. This can lead to a build-up of stress. Finding the right balance between the various aspects of their lives so that they are happy and relaxed can be one of the most difficult tasks for a researcher.

It's important to develop effective strategies and skills for managing time during a Research Project but also in many other aspects of life including job-hunting, preparing for examinations and working in a part time job. Time management skills can be improved through a better understanding of both theoretical and practical approaches to the many issues surrounding the management of time. This includes understanding how to identify the problems, prioritise short and long term tasks and balance different aspects of life using approaches that suit an individual.

Having identified ways in which they can improve the management of their time researcher can begin to adjust their routines and patterns of behaviour to reduce time-related stress in their lives.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from examining the skills associated with planning and setting priorities; effective communication including decision making; delegation; procrastination; managing information and how best to deal with interruptions.

It should cover how to establish and review their approach to managing their own time, and how this impacts on the work of others. It should introduce a range of different tools and techniques and help participants select those which are best suited to their needs and the needs of those that they are responsible for

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- Have identified the issues that are preventing them from managing their time effectively
- Have identified the areas where they wish to make changes
- Understand how to use a variety of time management tools
- Have begun to identify appropriate tools to use in order for those changes to take place

Typical mode of delivery: Half to one day workshop (often delivered as part of a wider workshop on self-management).

Useful resources:

University of Kent On-line Time Management Questionnaire

<http://www.kent.ac.uk/careers/sk/time.htm>

3.1. Effective communication

Introduction to the sub-domain

Researchers must be able to explain their work and its implications clearly to a range of specialist and non-specialist audiences using both written and oral methods. Increasingly EU funded research projects require a formal communication component to demonstrate the ways in which the research is contributing to a European 'Innovation Union' and account for public spending by providing tangible proof that collaborative research adds value. Various approaches and strategies can be learned and used for communicating research more effectively to different audiences.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an understanding of:

- The main aspects of a communications strategy
- Setting audience-centered objectives, effective planning and preparation, structuring a presentation and managing an audience.
- How to design and deliver a presentation which is clear, interesting and memorable for the target audience.
- Developing communication strategy check-lists

Participants should be offered an opportunity to put their learning in to practice by providing an opportunity for everyone to practice and receive feedback on a short presentation.

Learning Outcomes

As a result of attending this course participants should.

- Understand what a communications strategy is, including its main components and how to develop an effective strategy to communicate with different target audiences.
- Develop knowledge and practical skills in aspects of preparing and structuring written and aural presentations.
- Increase their confidence in the management and delivery of presentations in order to obtain desired results and impact.
- Be equipped with tools to improve management of their communication activities in the future.

Typical mode of delivery: Half day workshop

Useful resources

Paper: Graduate Education Should Include Training in Science Communication

<http://www.cmu.edu/student-org/pcr/media-files/pcr-sessions/pcr-article-for-nsf.pdf>

European Commission Guide to successful communications

http://ec.europa.eu/research/science-society/science-communication/index_en.htm

and

Communicating EU Research & Innovation A guide for project participants

http://ec.europa.eu/research/social-sciences/pdf/communicating-research_en.pdf

(Includes an example of a Good Practice check-list)

The engaging researcher: inspiring people to engage with your research

<http://www.bris.ac.uk/researchstaff/yourcareer/vitae-booklets/engaging-researcher.pdf>

3.2. Team-working

Introduction to the sub-domain

Research is increasingly becoming a collaborative activity in many disciplines. However, for many postgraduate students their PhD research may often be a solitary activity that does not provide much opportunity for developing team-working skills. Understanding the principles of effective teamwork and identifying resources to help them obtain a better understanding of the unique strengths that they can contribute to any team will both strengthen their research and help them to make the transition to a company where team working is the norm.

Suggested content

Workshops in this area can vary widely depending on the resources available to those providing them. Increasingly Universities are investing funds in on-line psychometric/ team role testing to enable participants to come to a workshop with their own profile. This approach will not be available to all Universities. In addition, being able to interpret such results often requires a specialist trainer.

However, doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from a basic understanding of the following topics:

- The various roles that make for a well balanced, effective team based on theoretical frameworks e.g. Belbin and Myers Briggs Type Indicator (MBTI)
- How to work constructively with a diversity of preferences and styles within a team including divergent and convergent thinking, conflict management and cultural norms
- The roles they prefer to take on, or may default to when working in a team

It may be helpful for the workshop to include team exercises to illustrate team working behavior e.g. the Spaghetti tower.

Learning Outcomes

As a result of attending this course participants should.

- Have an enhanced understanding of their own behaviour and preferences for team working and the behaviour and preferences of others.
- Understand how their own behaviour will impact on others when working in and contributing to the success of formal and informal teams
- Improve their ability to listen, give and receive feedback and respond perceptively to others

Typical mode of delivery: One day workshop. However, see note above under suggested content for constraints.

Useful resources

Belbin Team Roles

<http://www.belbin.com/>

Myers Briggs Type Indicator

<http://www.myersbriggs.org/my-mbti-personality-type/mbti-basics/>

Thomas-Kilmann Conflict Mode Instrument (TKI)

<http://www.kilmanndiagnostics.com/overview-thomas-kilmann-conflict-mode-instrument-tki>

The spaghetti tower challenge: multiple resources but see

https://www.abdn.ac.uk/rowett/documents/Spaghetti_towers_Nov12.pdf

3.3. People management

Introduction to the sub-domain

People with responsibility for personal and team outcomes often have to cope with difficult individuals and conflict. This can include relationships with a supervisor or mentor. Researchers are often unable to find ways to approach difficulties in the supervisory relationship. These difficulties prevent students from asking questions, challenging expectations and building a respectful professional relationship with their supervisor that benefits both parties.

Researchers can benefit early in their career for developing ways of dealing with this and from acquiring strategies and tools to help preparation for daily interactions and occasional confrontations. Strategies, tools and techniques can help make supervision more effective and also more enjoyable.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an understanding of the following topics:

- How to respond professionally to difficult behaviour
- Transactional analysis theory and principles
- How to give and receive feedback from colleagues including ones supervisor/ mentor
- how to challenge unrealistic expectations in yourself or your supervisor/ mentor
- Techniques for Managing Conflict
- How to have difficult conversations with colleagues/customers and staff
- A range of resources and tools for decision making

Learning Outcomes

As a result of attending this course participants should.

- be able to give and receive constructive criticism
- Produce individual and joint solutions to problem areas and issues in a clear and speedy manner.
- Acquire skills that will enable them to get more from a supervisory relationship and so increase self-confidence and levels of achievement.

Typical mode of delivery: One day workshop (Note: Many Universities incorporate this training in to a longer **Effective-Self Management (ESM)** course)

Useful resources

Working with your supervisor (University of Reading UK)

http://www.reading.ac.uk/web/FILES/sta/A5_Postgraduates_3_Working_with_your_supervisor.pdf

The Graduate School guide to You and your supervisor (University of Reading UK)

http://www.reading.ac.uk/web/FILES/graduateschool/GSG_YouAndYourSupervisor.pdf

Thomas-Kilmann Conflict Mode Instrument (TKI)

<http://www.kilmanndiagnostics.com/overview-thomas-kilmann-conflict-mode-instrument-tki>

3.4. Leadership and influence

Introduction to the sub-domain

Working well with other people can improve results, increase efficiency and create a better working environment. Pioneering research is carried out in teams, and being able to work effectively as part of a team is rapidly becoming a major key to academic success. Effective teamworking requires good leadership and also support of leadership through "following and collaborating". A good leader can avoid de-motivation, under-developed staff, poor results and conflict. An individual can support leadership through their communication, team-working and networking skills.

Some PhD students coming to the end of their research period will start to lead teams within the Faculty and also go out to search for employment where motivating, inspiring, and taking responsibility for a team will be a requirement of the new position. For those that do not directly enter into a leadership role, understanding the leadership role taken by others can help them to better integrate into teams and work with their own leaders.

The aim of this course is to provide an overview of the different leadership competences and how they can impact one's own performance and the performance of others.

Suggested content

Doctoral researchers seeking to develop skills and competencies in this sub-domain will benefit from an understanding of the following topics:

- what leadership is about and how they can start by leading themselves authentically;
- the characteristics of leadership and how leaders inspire, motivate and develop themselves and the people around them.
- leadership vision and how to communicate this with others;
- how to build, motivate and influence a team;
- how to balance the needs of a team and manage a project.

Learning Outcomes

As a result of attending this course participants should:

- understand the characteristics of leadership and what effective leaders do
- appreciate how they might inspire, motivate and develop themselves and the people around them.

Typical mode of delivery: One day workshop. For examples of longer (2-3 day courses) see the Useful resources section below.

Useful resources

The Leading Researcher (Vitae)

<http://www.bris.ac.uk/researchstaff/yourcareer/vitae-booklets/leading-researcher.pdf>

Examples of longer (2-3 day courses)

Leadership in Action (3 days University College London UK)

<http://www.ucl.ac.uk/hr/od/pdp/sdlia/>

Leadership skills for postdocs (2 days University Zürich)

4.1. Career management

Taking ownership for and managing professional development actively.

Introduction to the sub-domain

PhD students need to be able to manage their careers. This includes developing the knowledge and skills required to take ownership for and manage career progression. Exploring career pathways relies on understanding how to identifying an ideal job and future possible career paths within, or outside of, academia, building a clear picture of the key factors relating to career and personal circumstances and being able to set realistic and achievable career goals.

Suggested content

The course should cover reflections on where the career is now; creating as ideal job; job satisfaction and career motivations; identifying personal values and transferable skills; how to identify possible career pathways and move forward effectively. It is also beneficial if the activity can culminate in participants drawing their insights together to begin a realistic personal career plan and to consider their next steps.

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- Step back and reflect on career to date
- Understand and assess key internal/external factors in making career decisions
- Begin to identify key aspects of your ideal job
- Understand and analyse the transferable skills developed in research
- Gain a clearer idea of possible career pathways
- Gain knowledge of the resources available to assist future career management
- Begin developing personal career objectives

Typical mode of delivery: Half to one day workshop

Useful resources

The career-wise researcher: develop your career management skills and get the right job for you (Vitae May 2013)

<http://www.bris.ac.uk/researchstaff/yourcareer/vitae-booklets/careerwise-researcher.pdf>

4.2. Identifying career opportunities

Actively identifying the range of potential employment opportunities in a range of employment sectors.

Introduction to the sub-domain

As PhD students come to the end of their research they are faced with the need to make career decisions. These can include staying in the academic sector, seeking a career in private sector research or moving on to a totally new job. It is important to start early and to explore all options. This can involve employing career management techniques and utilizing networks. It also requires an understanding of how the target job market undertakes recruitment including the processes which employers are increasingly using to recruit and select staff.

Suggested content

- understanding the processes which employers are increasingly using to select staff
- effective job search techniques. for both academic and non-academic applications
- Use of networks and non-traditional recruitment

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- develop awareness of different job search techniques, including how to employ practical networking techniques
- have an appreciation of the positive and negative aspects of different approaches.
- Develop knowledge and skills for effective job searching.

If possible

- Examine real case studies of researchers and the methods they used to secure positions outside academia.

Typical mode of delivery: Half to one day workshop. Note that many Universities run this training as part of career management and CV and interview skills.

Useful resources

University of London Guide to Job Hunting

http://www.careers.lon.ac.uk/files/pdf/CEP_JobHunting.pdf

Networking and Information Interviews (University of Oxford UK)

http://www.careers.ox.ac.uk/wp-content/uploads/2013/10/NETWORKING-and-INFORMATION_INTERVIEWS-2013.pdf

4.3. Developing a professional network and networking skills

Developing, maintaining and using networks or collaborations

Introduction to the sub-domain

Developing your own networks is an essential part of doctoral study. Learning to network is a crucial skill, both in career progression to learn about careers and find jobs and also in building an understanding of how the field and those who work within it operate. For some, it is a simple, straightforward and enjoyable activity. For others it has very negative connotations. However, to be successful, all of us need to engage in this activity at least some of the time. This workshop examines approaches to view networking as a positive activity and looks at how to do it more effectively, naturally and confidently.

Suggested content

- the importance of networking and strategies for developing networks
- developing personal, professional and virtual networks
- how to make contacts, how to approach people, what to say, - practical techniques and approaches
- how to follow up
- tips for shy networkers.

Learning outcomes

As a result of attending a workshop in this sub-domain participants should:

- Learn what networking is and why it is important
- Learn practical tips and techniques on how to effectively develop and manage their networks
- Be able to reflect on and develop personal networking objectives and an action plan

Typical mode of delivery: Half to one day workshop

Useful resources

Confident Networking- a presentation by Dr Sara Shinton, who provides careers advice, information and professional development training to scientists, academic researchers, research students and academic staff

<http://www.slideshare.net/sarashinton/confident-networking-10365094>

4.4. Interview skills

Presenting own knowledge, competencies and experiences through effective CVs, applications and interviews.

Introduction to the sub-domain

Recruitment processes can take a variety of different forms and include multiple tasks such as in-tray exercises, aptitude tests and group exercises alongside the traditional question and answer interview. However, the traditional interview approach is still widely used and can be the most nerve-wracking for a PhD student who is new to the recruitment process. In order to perform well it helps to have some understanding of what the process might involve, for example what kind of questions might come up, what might the recruiters want to know and how can this information be best presented. This topic is intended to help PhD students to understanding more about academic and non-academic interviews and appreciate the different ways in which candidates can make a positive impression on a recruiter.

Suggested content

- understanding the interview processes
- different types and formats of interviews
- effective preparation for interviews
- tackling difficult interview questions
- constructive post-interview reviewing

Learning outcomes

As a result of attending a workshop in this sub-domain participants should:

- be equipped with practical advice to enable them to prepare for and perform well at a variety of interview formats and types including those for academic and non-academic positions.

Typical mode of delivery: Half to one day workshop. Often run as part of a longer workshop on career management, job hunting and CV preparation.

Useful resources

Interview Tips for Researchers (University of Sheffield UK)

<http://www.careers.dept.shef.ac.uk/phd/interviews.pdf>

4.5. Business awareness

Understanding how organisations, institutions or businesses work

Introduction to the sub-domain

Business, or commercial, awareness is an understanding of how an organisation works and what outside factors influence it. It is the ability to view events and circumstances from a business perspective. Commercial awareness of one industry sector could be quite different to commercial awareness of another sector. For those intending to work in a commercial organization or collaborate with a particular business sector it is helpful to understand how an individual role fits with the organization's objectives and the wider career sector. This requires an understanding of how the business operates and what outside influences are likely to affect it. These may include the economic climate, new legislation, new technology and competitors' activity.

Suggested content

- Defining commercial awareness and its purpose and importance to PhD students.
- Identifying what you need to know about an organization, the sector and wider business environment.
- Useful analytical tools (SWOT, PESTLE, risk analysis)
- Identifying and interpreting different information sources including social media and networks

Learning outcomes

As a result of attending workshops in this sub-domain participants should:

- Recognise why and how graduate employers look for commercial awareness in their recruitment processes
- Develop techniques for increasing commercial awareness in order to apply for jobs and attend interviews
- Communicate your commercial awareness more effectively to graduate recruiters
- Gain the tools to evaluate your level of commercial awareness when applying for your next role

Typical mode of delivery: Half to one day workshop

Useful resources

Commercial Awareness (University of Bristol UK guide)

http://www.bris.ac.uk/careers/documents/commercial_awareness.pdf