Tempus

VERITAS

STRUCTURAL DEVELOPMENT OF THE THIRD CYCLE BASED ON SALZBURG PRINCIPLES

Implementation of Salzburg Principles in Republic of Armenia

TRAINING KIT

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Introduction to Salzburg principles

WUS Austria

As a result of the Bologna Seminar on „Doctoral Programmes for the European Knowledge Society" (Salzburg 3-5 February 2005), ten basic principles for the third cycle were established with an overall aim to provide the foundation for the reforms in higher education institutions in Europe. According to the European Commission's Europe 2020 strategy, reforms in doctoral education have been identified as a vital component of the Bologna Process and significant to establishing "smart, sustainable and inclusive growth"[1]. To facilitate excellence in innovation, doctoral education is faced with challenges in research conduct and research outputs which are essentially the backbone of the fast-paced, information-hungry age in which we live. In the race for research competency on the global level, it is worth noting that doctoral education has reached a peak in collaboration amongst higher education institutions in data sharing; "as the tools that generate research data increasingly provide digital output, the Internet has provided the catalyst for distributing access to research data and instruments, furthering research collaboration. No longer must a scientist be located with the instrument to access, analyze, manipulate, and interpret data. The capabilities for accessing research data and collections and collaborative capabilities are also being exploited by the social sciences and humanities".[2]

In addition to providing foundation for the reforms, the intent of establishing the Salzburg principles was to make the connection between the European Research Area and the European Higher Education Area. The Salzburg principles address points of immense importance and "these points identify the key challenges that have to be faced in seeking to achieve consensus-building on future recommendations".[3]

The set of standards for establishing and implementing third cycle are as follows:

I. **The core component of doctoral training is the advancement of knowledge through original research**
II. **Embedding in institutional strategies and policies**
III. **The importance of diversity**
IV. **Doctoral candidates as early stage researchers**
V. **The crucial role of supervision and assessment**

[1] European Commission (2010), Europe 2020. A European strategy for smart, sustainable and inclusive growth
[2] http://net.educause.edu/ir/library/pdf/pub7202.pdf; 89

[3] The Bologna Seminar on "Doctoral Programmes for the European Knowledge Society" (Salzburg 3-5 February 2005)

VI. Achieving critical mass
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VIII. The promotion of innovative structures
IX. Increasing mobility
X. Ensuring appropriate funding

Five years after the establishment and implementation of the Salzburg principles across the European universities, the European University Association (EUA) organized a conference in Berlin in order to offer an even clearer overview of the Salzburg principles, addressing further needs. The "Salzburg II Recommendations" were the outcome of the conference and, in brief, the Recommendations embrace three focal messages:

1. The importance of conducting doctoral research within diverse supportive research environments different than that of first and second cycles, delivering originality and innovation
2. Recommendations for a solid improvement of doctoral education at higher education institutions and responsible bodies providing legal frameworks for doctoral education
3. Recommendations addressing non-university stakeholders and governmental policy makers, autonomy of institutions and assuring sustainable funding for doctoral schools.

A heterogenic system across Europe requires specific approaches tailored for each country individually when implementing new PhD structures in accordance with the Salzburg Principles. The Salzburg Principles are foreseen as the new common European standard for the establishment and development of new PhD study programs, as well as the link between European Higher Education Area and European Research Area.
This Training-kit embodies a different experience for the ten Salzburg principles, which should be adapted to the current explicit needs in the Republic of Armenia.

Salzburg Principle I

Bath Spa University

The core component of doctoral training is the advancement of knowledge through original research. At the same time it is recognized that doctoral training must increasingly meet the needs of an employment market that is wider than academia.

The most common form of doctoral degree in the European Union is the Doctor of Philosophy (Ph.D.) award. This degree originated in Humboldt University, Germany during the 19th Century, before spreading to Yale and other US universities from 1861. It became widespread in English-speaking countries during the 20th Century and was adopted across the European Union as part of the Bologna process from 1999. The term 'philosophy' in PhD should be interpreted much more broadly than the academic discipline of philosophy; it refers to the Ancient Greek 'love of knowledge', so can be taken in any academic field. Within the *Framework for Qualifications of the European Higher Education Area*(Bologna Working Group 2005), the 'Dublin Descriptors' offer generic statements of typical expectations of achievements and abilities associated with each qualification level. For doctoral degrees (including Ph.D.) the descriptors are as follows:

> **Knowledge and understanding**: *a systematic understanding of their field of study and mastery of the methods of research associated with that field.*
> **Application of knowledge and understanding:** *the ability to conceive, design, implement and adapt a substantial process of research with scholarly integrity .. [that has] made a contribution that extends the frontier of knowledge by developing a substantial body of work some of which merits national or international peer-reviewed publication.*
> **Ability to make judgments:** *[through] critical analysis, evaluation and synthesis of new and complex ideas.*
> **Ability to communicate:** *with their peers, the larger scholarly community and with society in general about their areas of expertise.*
> **Learning skills:** *expected to be able to promote, within academic and professional contexts, technological, social or cultural advancement.*

This set of descriptors constitutes a fairly comprehensive view of what Ph.D. level study involves, what Ph.D. candidates are expected to demonstrate and therefore what the core components of doctoral training should be. It is worth unpicking each of the statements above to explore its implications for universities seeking to develop Ph.D. programmes.

Firstly, with regard to knowledge and understanding, the requirement to have a 'systematic understanding' of their field of study implies that Ph.D. candidates need to have clearly defined the field within which their research is located. Doctoral supervisors need to provide support to students during the initial period of their study to restrict the scope of their enquiry to a topic where they can realistically develop a systematic understanding of all the previously-published research. Typically, many Ph.D. candidates start with a proposal that is too broad in scope, which could result in a review of existing literature which is unlikely to be comprehensive, and often a poorly-focused research design. It is often as difficult to decide which aspects of a topic will not be researched as those which will form the focus of the enquiry, but this scoping and limiting process is essential. The student then needs to be provided with access to relevant research literature through university library and online resources, together with the information retrieval skills to conduct a systematic literature review. Although the Ph.D. student will thereby become the 'expert' in their chosen topic, the supervisor needs to have sufficient expertise in the field and familiarity with the literature to identify potential gaps in this review. Throughout the period of the research, the student needs to keep up to date with the state of knowledge in this field, so that their final thesis provides a comprehensive review of current understanding. During the oral *viva voce* examination, examiners will be testing the extent and depth of this knowledge to assure themselves that the candidate is a world authority in their chosen field.

The other component of knowledge and understanding implies rigorous research methods training as part of doctoral study. Because research methods vary between disciplines – approaches in the physical sciences will typically differ significantly from those in the social sciences, arts or humanities – providers of doctoral training need to establish discipline-specific research methods training programmes. Most Ph.D. students will have undertaken some form of research methods training during their undergraduate or Master's degrees, so doctoral training will typically deal with higher-order methodological issues. Guidance on the selection of appropriate methodologies and data-gathering instruments will typically be provided by the Ph.D. supervisor who has a detailed knowledge of the student's project and the research questions it is seeking to address.

The 'application of knowledge and understanding' descriptor gets to the heart of the doctoral training process. The 'substantial process of research' required of the student need not necessarily be empirical – it is possible to write a Ph.D. thesis consisting of philosophical argument – but in the majority of cases it will involve the collection of substantial quantities of data. The overall research design and the instruments selected to collect these data will need to be of sufficient quality to ensure validity and reliability. The skills students require to conduct this quality of enquiry will typically have been developed during research methods training (see above) but will need to be closely monitored by the supervisor to ensure that rigour is maintained. Part of the requirement for 'scholarly integrity' is to ensure that all data collection is conducted ethically. Therefore each doctoral training centre will need to establish a research ethics committee which reviews and approves Ph.D. proposals before data are collected.

Perhaps the most daunting requirement for Ph.D. students is for their research to 'extend the frontier of knowledge.' This implies making an original contribution to the field which no other scholar has made before. Clearly this has implications for the breadth of study (see above) since there is much greater potential to make an original contribution to a narrow field than across a broad range of knowledge. But what counts as 'originality'? This is a vexed question to which there have been many answers. Phillips and Pugh (2000) suggest the following list of definitions:

1. Saying something nobody has said before.
2. Carrying out empirical work that has not been done before.
3. Making a synthesis of things that have not been put together before.
4. Making a new interpretation of someone else's material or ideas.
5. Trying out something in this country that has previously been done only elsewhere.
6. Taking a new technique and applying it to a new area.
7. Being cross-disciplinary and using different methodologies.
8. Looking at topics that people in my discipline have not looked at before.
9. Adding to knowledge in a way that has not been done before.
10. Testing existing knowledge in an original way.
11. Writing down a new piece of information for the first time.
12. Giving a good exposition of another's idea.
13. Continuing a previously original piece of work.
14. Carrying out original work designed by the supervisor.
15. Providing a single original technique, observation or result in an otherwise unoriginal but competent piece of research.
16. Having followed instructions and understood the original concepts.
17. Having many original ideas, methods and interpretations all performed by others under the direction of the postgraduate.
18. Bringing new evidence to bear on an old issue.

Whilst some of these interpretations of originality appear to meet the requirement to 'extend the frontier of knowledge' others are less clear. It is an interesting exercise to discuss them with a

group of Ph.D. supervisors and examiners to see which they would accept as of doctoral standard. One way to make this decision is to effectively defer it to the editors and reviewers of academic journals. In some EU countries (e.g. Germany, Sweden) Ph.D. candidates are expected to have already published several articles in 'national or international peer-reviewed publications' before submitting their thesis. In other countries such as UK the examiners are expected to exercise their judgment and experience of peer review to decide whether the research *would be* acceptable to an academic journal. Clearly it is of benefit to students to have been encouraged and supported by their supervisors to publish throughout the process of their Ph.D. research, to demonstrate the originality of their contribution even if this is not a formal requirement of the examination process.

The 'ability to make judgments' through critical analysis and synthesis should be demonstrated through the student's thesis, requiring supervisor monitoring and feedback throughout the writing-up process. As with publication, it is generally good practice for students to 'write up' their research as they go along rather than waiting until the end, allowing time for these analytical skills to develop. Development activities such as participation in departmental research seminars and symposia can help foster these attributes. Similarly, presenting their ongoing work for scrutiny and discussion at these forums and student sections of international conferences can develop students' 'ability to communicate' both orally and in writing, whilst also providing useful feedback from a wider range of perspectives. Doctoral training therefore needs to provide support for students to submit abstracts and present at suitable conferences.

The final area of 'learning skills' to promote 'technological, social or cultural advancement' touches on the broader purpose of Ph.D. study. Whilst in the past, a doctorate might have been regarded as a 'licence to teach in a university'; increasingly Ph.D. students use their highly-developed analytical and creative skills in a wide range of professional contexts. It is therefore essential that doctoral training programmes are accompanied by an extensive process of continuing professional development (CPD) to equip students for using their doctoral skills in the workplace. The Concordat to Support the Career Development of Research Staffis a UK initiative designed to help universities achieve the European Commission HR Excellence in Research award, which is accompanied by a Researcher Development Framework planning tool (https://rdfplanner.vitae.ac.uk). This has a focus on employability, enterprise and leadership for Ph.D. students and other researchers, and can be used by supervisors to identify and plan appropriate training activities for an 'employment market that is wider than academic'.

References

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Salzburg Principle II

Bath Spa University

Universities as institutions need to assume responsibility for ensuring that the doctoral programmes and research training the offer are designed to meet new challenges and include appropriate professional career development opportunities.

Structure

Salzburg principle 2.2 stresses the importance of institutional responsibility and strategies to support doctoral education.

Although doctoral research is first and foremost an individual effort, a well thought out institutional setting will help bring the best out of the individual.

When developing processes the starting point should be the institutional mission and profile. Doctoral training should be seen as one of the core missions of the university. To enable this, universities should establish strategic leadership for research development, together with a supporting framework for doctoral programmes and support for the professional development of doctoral candidates.

Universities should develop long-term strategies for doctoral programmes that focus on building strong research environments and mechanisms for enhancing the quality of their doctoral programmes.

Environment

The research environment should be designed to empower doctoral candidates to become independent researchers at an early stage. This means taking responsibility for the scope, direction and progress of their project.

Universities are responsible for cultivating a research mindset and a supportive environment within which doctoral candidates can flourish. Doctoral research should take place within inclusive research environments that allow doctoral candidates to actively participate with fellow researchers in the on-going research culture.

Autonomy

Institutions must have sufficient autonomy to be able to develop their systems for quality assurance and enhancement independently within their national frameworks. They need the freedom to develop their own indicators for quality that meet the standards across all individual disciplines as well as corresponding with the overall institutional strategy.

A university's structures should be developed at the appropriate level of governance and not be imposed from outside or from above within the institution. Academic staff must take responsibility and ownership of these structures through inclusive procedures that include membership of relevant committees and involvement at the admissions stage.

Regulations

Doctoral education is changing from a supervisor/student relationship to a system that takes advantage of full institutional support. This represents a move from an individualized system without much accountability, career guidance or institutional support to a collective programme of rights and responsibilities that incorporates training for a wider labour market.

The university is responsible for the design, structure and organisation of its doctoral programmes. It should develop and employ appropriate academic regulations, guidelines and/or a code of practice to govern doctoral programmes. These should be established at the highest

level of the university, as well as at department or faculty level.

Each candidate's path of progress will be unique, both in terms of the research project and the individual's professional development. Structures must be designed to allow independence and flexibility to grow and to support individual development along a highly individual journey. The aim is not to produce uniformity or predictability. Instead, a diverse and inclusive research environment of a high quality should be the basis of doctoral education.

Regulations and procedures should cover rules from recruitment and admissions, through supervision, exams, assessments and monitoring, all the way to the defence of the thesis and the final award. These should apply throughout the university.

There should be only one doctorate and one award certificate common to all subject areas of the university. This is intended to clarify and strengthen the value and recognition of the doctorate.

Information on all doctoral programmes and the associated regulations and guidance should be available on university websites via a common portal for all doctoral candidates, ideally the home page of the doctoral school.

Doctoral schools have grown throughout Europe. Between 2007 and 2009 universities that had a doctoral school grew from 30% to 65%. They have been a key instrument to implement reforms and to continuously develop doctoral education.

Recruitment & admissions
In the 2005 Salzburg Principles, the issue of admissions was not touched upon directly, but could be seen as included as part of this second principle.

Recruitment strategies and transparent admission procedures should be developed to correspond to a university's particular mission and profile and to reflect the research, supervisory and financial capacity of the university. Admissions criteria should be public and well-defined.

These strategies and procedures should be connected to explicit outcomes, identifying clear profiles of the candidates sought. Such profiles should address a range of different qualities and ensure equality of opportunity by taking into account the following criteria:

- international profile,
- gender equality,
- social background,
- age groups.

Admissions are an institutional responsibility, which must allow key input from research active staff. Policies should also allow appropriate flexibility in the choice of supervisors.

The research potential of the candidate at the time of admission should be valued more than past performance. Not all good Master's students will become good researchers.

Transparency and accountability will be strengthened by having a single, identifiable place to apply, perhaps via a web portal.

Admitting doctoral candidates represents a risk that universities should accept and then allow them to demonstrate their potential through a system of regular monitoring that runs throughout their period of registration.

Credits
A more negative aspect is the reported trend towards 'over-structuring'. EUA's Trends 2010 report suggests that the development of institutional structures, such as doctoral schools, has been accompanied by an increase in taught elements in doctoral programmes.

Over-structured doctoral education sometimes sees doctoral candidates behaving more like students. They may begin to simply follow the structure without developing sufficient independence. Too many offers of courses and skills development risks procrastination and complex systems of credit may derail candidates' motivation away from research towards credit gathering.

Some universities consider credits useful for the taught components of a PhD, especially in cross-institutional programmes, but credits do not make sense when measuring research or its dissemination. Taught courses are an important *support* for doctoral education, but it is vital to re-affirm the main message of the Salzburg Principles, which is that the PhD is based on the conduct of original research. The major outcomes of doctoral education, i.e. creative thinking, autonomy, flexible mindsets, etc, can only be attained through the conduct of research. We must not lose the essence of what makes doctoral education valuable.

What doctoral education needs is a stimulating research environment driven by enthusiasm, curiosity and creativity, not motivated by the collection of credits. Universities must strike a balance between seeking to make more of doctoral programmes and at the same time protecting the core of the process, which remains the original research project.

Assessment
There is a strong link between the assessment of a university's research and the assessment of its research environments that form the basis of doctoral education.

In order to be accountable for the quality of doctoral programmes, universities should monitor supervision quality and provide professional training for PhD supervisors.

Assessment of the academic quality of doctoral education should be based on peer review and remain sensitive to differences between disciplines.

Career development
Doctoral candidates should be made to feel they are needed, respected and welcome and that career opportunities are available to them after completing their PhD. Universities must consider the professional development of the researcher as well as the progress of the research project.

It is important to stress that training through research creates a certain mindset for many employment sectors and careers which is cultivated by the work of carrying out original research.

Doctoral education gains a large part of its value from the unique and individual paths that doctoral candidates pursue. They encounter a wide variety of unforeseen problems and obstacles and learn to tackle them. As a product of their research experience and/or exposure to different environments PhD graduates emerge with individual career profiles.

Career development opportunities for all researchers including doctoral candidates should form part of the university's strategies. These opportunities should be in line with the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers.

Structures should be flexible enough to expose postgraduate researchers to a wide range of opportunities, to ensure personal and professional development and provide support for career development and mobility. Taught courses, although not central to doctoral education, should be

a support to individual professional development.

While the individual remains responsible for their career decisions, it is the institution's responsibility to provide support structures for professional development. Career development support must take into account individual goals and motivations and acknowledge the wide range of possible careers for PhD graduates.

It should be a priority to offer training in transferable skills, including understanding the ethics of research. The professional development of doctoral candidates includes gaining awareness of the range of skills attained through the conduct of research as well as of the wide range of career choices for PhD graduates. This development work contributes to bridging the communication gap with potential employers.

References

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EUA-CDE News, December 2010.

Kovacevic, Melita 'How to Process with Doctoral Education in Europe:
Salzburg II Recommendations and Enhancement of Quality', presentation to EUA-CDE Steering Committee, 2013.

'Salzburg II recommendations: European universities' achievements since 2005 in implementing the Salzburg principles', European University Association, 2010.

'Seven principles for innovative doctoral training' EU Directorate General for Research & Innovation, 2011.

Salzburg Principle III

WUS Austria

The importance of diversity

The third Salzburg principle implies the importance of diversity. As per the Salzburg II recommendations, "the goals of structuring doctoral education must be to assure diverse and inclusive research environments of a high quality as the basis of doctoral education."[4] In the process of establishing structures, attention should be drawn to the importance, the need and the understanding of diversity in different institutional, cultural and scientific core values. Those values give a profile to the development of doctoral programs in various countries across Europe, which at their root reflect the national and regional fundamental requirements.[5]

Joint doctoral programmes

Joint doctoral programmes should hold a special place within higher education institutions. As part of this process and prior to engaging with diverse higher education institutions, universities should be held accountable for quality assurance of their own doctoral programs. In identifying its own goals in line with the vision and mission of the institution, higher education institutions should seek cooperation with other higher education institutions who share the same goals. Each objective set forth involving joint doctoral programmes ought to be comprehensively defined and there should be verifications supporting the need. The planned joint programmes in doctoral education among different universities (whether they be national and international) should be formulated based on specific needs which otherwise couldn't be addressed and therefore require the capacity of two higher education institutions to be carried out. Inter-university cooperation which aims, for the mutual benefit of the two joining institutions, at creating new knowledge in keeping with today's fast-paced growing economy could be one of the approaches which helps increase effectiveness and efficiency of existing resources. Engaging in joint doctorates (or dual diploma programs) very likely at the same time allows for faculty and researchers to obtain a different approach to their own research.

The implementation of joint doctoral programmes consists of series of activities for which physical and financial resources are required. Therefore, sharing the costs of joint doctoral programmes, research capacities, infrastructure and human resources should be approached carefully and practically prior to implementation. Nevertheless, this could be accomplished only if a well-organized structure for managing joint doctoral programmes exists at each joining institution. The span of interests varies from one university partner to another, and in accordance with the interest differentiations, mutual understanding and suppleness must be two-sided.

Defining general requirements for joint doctorates is crucial. Some of the steps for initiation of the process include but are not limited to the following:

1. Creating a dual degree for a doctoral programme
2. Defining admission requirements and recruitment and selection criteria
3. Creating easy interaction environments between institutions
4. Establishing joint research projects
5. Defining precisely the methods and strategies of supervision (policy or bylaw)
6. Promoting and assuring accreditation of the program
7. Identifying the impact of the joint programme [6]

[4] European University's achievements since 2005 in implementing the Salzburg principles; European University Association, *Salzburg II Recommendations*

[5] Thomas Ekman Jorgensen: CODOC-COOPERATION ON DOCTORAL EDUCATION BETWEEN AFRICA, ASIA, LATIN AMERICA AND EUROPE, EUA

[6] http://groups.ist.utl.pt/unidades/nri/files/Sino-CLUSTER-PhD-programmes1.pdf

Salzburg II Recommendations propose that 'the issue of critical mass makes institutions look closely at ways to ensure good research environments eventually through collaborations and joint programmes.'[7]

Interdisciplinary doctoral programmes

A number of countries face difficulty in launching innovative doctoral degree programmes due to strict regulations and the law imposed by the responsible Ministries or Higher Education Agencies. The difficult situation in Armenia, being one of the countries to which this applies, was addressed by Thomas Esterman, the Director of EUA, at the ATHENA workshop held in Yerevan on March 6, 2014 (*The State of University Autonomy in Armenia: an external analysis*).

These restrictive circumstances affect further enhancement of the following:

i. Strengthening of institutional autonomy
ii. Collaboration between institutional departments, institutes and units which stimulate faculty, staff and students
iii. Providing dynamic and challenging academic programs
iv. Building firmer relationships with relevant stakeholders
v. Addressing the real needs of country's developments and demands
vi. Addressing the regional and European market demands in the 21st century
vii. Increasing quality and quantity of interdisciplinary research
viii. Attracting high quality applicants and producing capable PhD students and researchers
ix. Positioning of institutions at the forefront of innovations in the national, regional and world ranking
x. Opening gates to obtain additional external funding

Hence, interdisciplinary studies are on one hand demanding to establish, while on the other they require exceptionally strong existing doctoral programmes – representing a double-challenge for institutions. Introducing interdisciplinary programmes at universities requires the change of institutional structures, strategies and overall approach on many levels. A high level of commitment to the existing programmes is likewise required and their strengths must not be diminished. Institutions should seek ways to empower faculty and researchers in their pursuit of innovation and self-enhancement. Faculty interested in cross-department cooperation who believes that PhD students should be prepared for diverse career options should be supported and encouraged. Characteristically, this type of faculty sees the broader picture and believes in the beyond-department potentials.

Advancing fundamental knowledge on a department level and resolving potential problems that go beyond a single discipline or field of research results in the creation of new knowledge. For that reason, introduction and establishment of interdisciplinary programmes is significant. Also, it could be an institutional goal for the newly established interdisciplinary programmes which are relevant and have their strengths, to become the disciplines in the near future.

Some advantages of interdisciplinary studies within doctoral education are:

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http://www.sefi.be/conference-2012/Papers/SEFI%20Book%20complete.pdf

[7] Byrne Joanne, Jorgensen Thomas, Loukkola Tia: Quality Assurance in Doctoral Education- Results of the ARDE Project, EUA Publications 2013, p. 25.

1. Students are specialized in one particular field, yet there is a demand for a multifaceted working environment
2. Growing need for cross-department cooperation and research due to technological advancement
3. Innovation in curriculum development and breaking of a traditional view of knowledge for upcoming generations of PhD students
4. Increase in educational choices
5. Establishing new networks within the academic world – internationalization

The idea behind the course of interdisciplinary studies is that the Bologna processes creates a 'global village' throughout Europe so that networking and exchange of information eases the quest of breaking new ground in doctoral education. In practice, no discipline is purely independent and this is in particularly true for social and human sciences. Just as one example, aside from law, Criminal law requires background knowledge of history, political science, sociology, philosophy, religion, ethics and numerous other disciplinary studies. Back in the early 1970's this was recognized by the academic world and Criminal justice became an interdisciplinary endeavor drawing upon all the aforementioned disciplines. For the most part, those disciplines served as key components of supporting interdisciplinary research.

Yet another good example where the presence of interdisciplinarity was appreciated, requiring world-class research, is in the field of engineering. As noted at the SEFI's 40th annual conference in Thessaloniki in 2012, "new programmes are developed and traditional ones restructure their curricula and orchestrate educational experiences aiming to sensitize, prepare and ready engineers today for the complex future ahead. In many engineering schools the doors have swung open for educational ideas, pedagogical innovations and other influences from the fields of communication, sociology, and history to interface with traditional practices. These trends have begun to alter the landscape of engineering education experiences for students and professors alike.'[8]

By enriching the learning environment nonetheless, it is imperative that interdisciplinary initiations do not remain at departmental level involving solely a single professor or a single researcher, or a small group of professors and researchers, yet influence the development of the entire institutional system. As expressed by Maurice Kogan and Ulrich Teichler 'the new emphasis of the knowledge society is on useful knowledge or the 'scholarship of application'. This scholarship often involves the pooling and melding of insights from several disciplines and tends to focus on outcomes that have a direct impact on everyday life.'[9]

[8] http://www.sefi.be/conference-2012/Papers/SEFI%20Book%20complete.pdf
[9] Kogan Maurice and Teichler Ulrich, Hg.: Key Challenges to the Academic Profession. (INCHER-Werkstatttbericht 65). Paris-Kassel: UNESCO-INCHER 2007, p. 10

Salzburg Principle IV

WUS Austria

Doctoral candidates as early stage researchers

> *The one issue attracting quite some criticism in practically all European countries is that doctoral education and training should meet the needs of an employment market that is wider than academia (EUA 2005).*

At Armenian universities a doctoral thesis is often a review paper derived from books in Armenian or Russian, rather than original work of independent research. According to statistics, over 45% qualified scientists and researchers have left Armenia in the past twenty years seeking better quality research environments outside its borders.[10] While the Armenian higher education system battles for improvements within the realm of the third cycle study to find most adequate ways to incorporate quality research in doctoral education, throughout Europe battles and transformations are occurring just the same. It has been noted that the 'change in focus in doctoral education from the research output, the thesis, to the doctoral holder has been vital to the development of career services. The outcome is no longer the research results to be defended in front of an expert panel, but a doctorate holder with specific research and transferable skills and experiences, which can be used in a wide range of careers.'[11]

Given the fact that since 1999 the Bologna process has been spreading and developing from its initial establishment, fostering mobility and acknowledgment of diplomas across Europe, a phenomenon occurred marking the emergence of increasing capacity in higher education, and an increase in general education. In vast majority of cases, higher education ends with the second cycle between ages 21 to 23 when pre-conditions for enrolling into the third cycle are formed. In line with the vision and mission of most higher education institutions, the University ought to be proactive and recognize the criteria which enable young researchers to continue their schooling within the frame of doctoral education.

The Salzburg II Recommendations stress the fact that 'the main outcome of doctoral education is the early stage researchers and their contribution to society through knowledge'. Their work ought to be original and provide some sort of ground-breaking study to the benefit of the scientific society. This includes any activities related to "basic research", "strategic research", "applied research", experimental development and "transfer of knowledge" including innovation and advisory, supervisory and teaching capacities, the management of knowledge and intellectual property rights, the exploitation of research results or scientific journalism.[12]

Diverse approaches to and types of doctoral education allow entrée by young researches to their further career development, at the same time recalling upon the societal, economic and industrial needs which is of immense importance.

Training through research – contribution to the creation of new knowledge

The number of doctoral candidates successfully completing their studies is on the rise in the past two decades. As a result of the increase in PhD candidates successfully completing their degrees, 'it is expected that far more trained researchers than before will seek and will have to seek jobs outside academia and research institutions. Relevance of research topics and the

[10] TEMPUS: Structural Development of the Third Cycle Based on Salzburg Principles, VERITAS project

[11] Byrne Joanne, Jorgensen Thomas, Loukkola Tia: Quality Assurance in Doctoral Education- Results of the ARDE Project, EUA Publications 2013, p. 36.

[12] European Commission: The European Charter for Researchers , The code of Conduct for Recruitment of Researchers, p. 28.

acquisition of additional skills and competences for non-academic labour markets have therefore become key challenges in doctoral education and training.

Currently doctoral students are believed to be
− educated and trained too narrowly,
− lacking key professional skills,
− ill prepared to teach,
− taking too long to complete their degree or not completing it at all,
− ill-informed about employment opportunities outside academia, and
− having a overly long transition period from PhD completion to stable employment.'[13]

The increase in demand for the engagement of young researchers and their involvement in the professional sphere which is not directly tied to an academic career subsequent to obtaining the doctoral degree are closely associated with clearly defined competences, or the outcomes of the acquired knowledge which emphasize the needs of society and young researchers.

A number of studies suggest that doctoral degree holders progress significantly faster than other degree holders - 'they progress faster than others, to the point where some companies fill 80% of management positions with doctorate holders. However, many universities are very aware that the transition from the academic to the non-academic labour market could be made easier and that doctoral candidates should be prepared for this transition from an early point onwards.'[14] There are important links between PhD candidates' research and economic growth. The benefits of training through research are that they prepare PhD candidates for diverse career choices, and 'particularly for management positions.'[15] Hence, as part of the professional development of all researchers, every higher education institution holding doctoral studies should offer appropriate training.

A number of countries (e.g. USA, the Netherlands, UK, Austria with one pilot project) have started to introduce what is being called a *"professional doctorate"* which is distinct from the traditional research-oriented doctorate. Professional doctorates (e.g. in management studies, education, applied sciences, public services, or architecture) tend to be somewhat less demanding as regards the requirement of producing an "original piece of research". They are often related to projects carried out within an enterprise or in another future field of employment and jointly supervised by the home university and the respective enterprise. The course work emphasises more generic skills, interdisciplinary approaches, and problem-solving capabilities. The inception of such professional doctorates is closely linked to a growing concern about the employability of doctoral degree holders in the labour market outside academia (also cf. Bourner et al. 2000). Currently it is still unclear, however, whether this type of research training is linked to the student or to the employee status of the respective doctoral candidates.[16]

One of the main tasks of researchers is to focus on continuous improvement of their research skills and competences. The enhancement of knowledge through research is attainable through 'formal training, workshops, conferences and e-learning'.[17]

[13] Kogan Maurice and Teichler Ulrich, Hg.: Key Challenges to the Academic Profession. (INCHER-Werkstatttbericht 65). Paris-Kassel: UNESCO-INCHER 2007, p. 111
[14] Byrne Joanne, Jorgensen Thomas, Loukkola Tia: Quality Assurance in Doctoral Education- Results of the ARDE Project, EUA Publications 2013, p. 36.
[15] Byrne Joanne, Jorgensen Thomas, Loukkola Tia: Quality Assurance in Doctoral Education- Results of the ARDE Project, EUA Publications 2013, p. 36.
[16] Kogan Maurice and Teichler Ulrich, Hg.: Key Challenges to the Academic Profession. (INCHER-Werkstatttbericht 65). Paris-Kassel: UNESCO-INCHER 2007, p. 114
[17] European Commission: The European Charter for Researchers, The code of Conduct for Recruitment of Researchers, p. 17.

Recognition of the profession and career development

All researchers who revolve their career around research, whether it is within academia or outside of it, ought to be acknowledged as professionals. The recognition of researchers 'should commence at the beginning of their careers, namely at postgraduate level, and should include all levels, regardless of their classification at national level (e.g. employee, postgraduate student, doctoral candidate, postdoctoral fellow, civil servant).'[18]

A tool that will assist in defining the notion of a researcher is a well-defined system of quality assurance in research, which should be an integral part of any PhD study programme, yet - equally as important – should be in accordance with the defined requirements of the doctoral thesis. Directing young researchers by providing guidance in their research approach is one of the fundamental tasks in creating and realizing the goals of doctoral studies.

Specific career development strategies for researchers at all stages of their careers should exist in spite of researchers' contract arrangements (at an HEI, a company, a research institute, etc.). These strategies should outline the potential for their career development and include mentoring guidelines to assure the necessary support in development phases. It is imperative that researchers are familiar with how they can use the research environment, all available funding, tools and equipment, up-to-date international sources – journals and books, etc. Providing a professional research development environment, with appropriate structures which encourage professional development, should be the goal of every institution. Professional development of doctoral candidates includes awareness about skills attained through doing research as well as of the wide range of career choices for doctoral holders.[19]

Lastly, the status of researchers at institutions, as decisions makers, should be clear and transparent. In fact, it is desirable that researchers as producers of new-knowledge participate in decision making and are consulted when decisions are being made which are relevant to their own work in order to preserve and promote individual and collective pursuits for the overall well-being of the institution.[20]

[18] European Commission: The European Charter for Researchers, The code of Conduct for Recruitment of Researchers, p. 18.
[19] European University Association, Salzburg II Recommendations
[20] European Commission: The European Charter for Researchers, The code of Conduct for Recruitment of Researchers, p. 19.

Salzburg Principle V

University of Girona

The crucial role of supervision and assessment - in respect of individual doctoral candidates, arrangements for supervision and assessment - should be based on a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors and the institution (and where appropriate including other partners).

The profound changes in European doctoral education present a challenge for supervision and assessment. The introduction of structured programmes with more explicit rights and duties of both doctoral candidates and supervisors, demands the introduction of new supervision practices, methods and procedures and new methods of assessment. But despite being considered a crucial part of doctoral training, sometimes these processes are not well defined at national level or at each university. It is necessary to define and clarify the conditions and rules, and the commitment required to achieve the common goal.

In the report prepared for European universities and ministers of higher education (European University Association –EUA-, 2007) "Doctoral Programs in Europe's Universities: Achievements and Challenges", based on Salzburg Principles, some important topics about supervision and assessment are highlighted:

The first one is that arrangements for supervision and assessment need to be developed based upon a transparent contractual framework of shared responsibilities between doctoral candidates, supervisors and the institution. More specifically, attention should be paid in multiple supervision arrangements to the continuous professional skills development of academic staff, and performance reviews of supervisors.

The second topic is related to recognition. A good supervision needs to be properly recognized and should be included in the workload and task descriptions of the professor, and also taken into consideration in decisions of promotion. It is also important to ensure that a supervisor dedicates enough time in support of each doctoral candidate.

A third aspect to take account of is that the role of the supervisor can be different depending on changes in the doctoral programmes and in the labour market. It is important to ensure professional skills development for supervisors.

The last issue highlighted in this report is that the assessment of the thesis is crucial, and the assessment procedures should be based on objective and transparent criteria.

To advance in the concretion of these main points, the EUA organized one specific workshop (London 8-9 January 2009) where experts from different countries offered different points of view and remarked the main points to take in account to develop the doctoral programmes. Among them, on the framework of VERITAS project, it would be interesting to highlight:

- Supervision has to reflect changing circumstances and conditions of doctoral education, like global competitiveness, limited funding, the changing nature of the student body and tougher evaluation criteria, among others.

- Professional development of supervisors/training may have different formats depending on the academic culture, but to organize it within a structured framework such as a doctoral school could be easier; also sharing the experiences of senior supervisors with younger colleagues could be rewarding for both (a win-win situation).

- Supervision culture has to be moved away from the carrot-and-stick mentality. Universities have to create a supervision culture, provide supervisors with the competences that they need rather than incentives, establishing dialogue between

supervisors within the institution and involving doctoral candidates in a structured manner.

- It is important to understand supervision as a key part of quality in doctoral education, with the associated need to define tasks and structures.

Taking as a starting point these ideas gathered from experts in different fields and from different countries, it seems that two of the most important indicators of quality in a doctoral programme are transparency and accountability, and that clearly defining the assessment and supervision procedures is a good way to achieve this level of quality.

It is also necessary for each university to define and describe its assessment and supervision procedures, taking into account the whole process, from students' information requests to participate in the programme until the PhD dissertation and also taking into account the different actors involved in the process and their rights and duties.

Some **procedures to think about** in relation to the quality of assessment and supervision could be:

Before accessing the doctoral programme advise the students and help them to choose the best option. This advice can contain different types of administrative and academic information, and can be offered by academic or administrative staff. It can include sections such as:

- How to choose the doctoral program and the line of research
- what kinds of information and qualifications are required to apply
- whether candidates need to complete additional training
- specific requirements of the programme (full-time or part-time, the time limit to finish the thesis etc.)

Each university should answer the following questions:

Who should be involved in this process?	What supervision should be provided?
…	

During the process it is important to think about how to monitor and evaluate the **students' progress**. Universities should introduce institutional regulations for the terms and obligations of doctoral candidates, supervisors and institutions. There are some criteria and instruments to guarantee the quality of the process and ensure that each partner is aware of their role.

Some of these instruments could include:

- The doctoral thesis charter with the object of establishing the functions, rights and obligations of the research trainee and of the thesis supervisor, and to specify the procedures for solving conflicts and any other aspects related to any intellectual or industrial property rights arising during the research carried out to complete this doctoral thesis.

- The research plan: a document specifying the scheduled working plan for the thesis.

- The annual report: to evaluate, on a pass/fail basis, the research plan and the doctoral candidate activities.

Each university should answer the following questions:

Who should be involved in the process?	What evidence is needed?
…	

On the other hand, it is necessary, also, to define accurately **the role of the supervisors**, how they are selected and how the research progress is monitored. The competences of the supervisors could include:

- Directing and monitoring the student during the research stage of the doctoral programme: seminars, thesis registration and developing original research work.

- Facilitating access to the means required to carry out this work.

- Guaranteeing the quality of the work and the dissemination of the contributions it has made.

- Maximizing the research stay of doctoral candidates at other universities.

Each university should answer the following questions:

Who is involved?	What requirements are needed?
…	

Last steps include presenting the doctoral thesis and thesis dissertation and are the stage where assessment is usually more regulated because they mean the outcomes of the process. Even so, there isn't one European agreement; there are different national regulations and different interpretations in each university. One important issue to guarantee the quality of the monitoring and assessment at this stage is multiple supervision, with internal and external experts in the field of knowledge and research.

Who should be involved?	What requirements are needed?
….	

Doctorate programme assessment should be done at regular intervals, analyzing the level of quality and the ways to improve.

Who should be involved?	Ways to improve
…	

It is not necessary to take these procedures like rules; each university can decide its model of organization for the assessment and supervision of doctoral programs. The most important thing is to think about it and have a clear and shared way to do it.

Salzburg Principle VI

University of Heidelberg

Introduction

The establishment and funding of graduate schools should aim at profiling a number of excellent, competitive universities. They focus on the support of junior staff during the PhD phase. Excellent, extraordinarily talented young researchers get the chance to qualify in an ideal infrastructure, which guarantees a professional management of the PhD phase.

Establishing a competitive graduate school

The vision of an excellent graduate school is to attract the best and brightest doctoral researchers from the country or even at an international level to pursue doctoral studies at our university. This should be achieved by offering excellent research opportunities in a creative and stimulating environment, and by providing the comprehensive academic and complementary training required to prepare early-stage researchers for exciting and challenging careers in academia as well as in the public and private sectors. During an initial seed period, the graduate school should first of all implement an innovative approach to doctoral training, with a strong emphasis on interdisciplinarity, a structured PhD programme, a shared supervision by thesis advisory committees, a career development concept and the implementation of measures to promote women and candidates with young families.

The graduate programme should be fully integrated into the organizational structure of the university and closely cooperate with respective faculties without losing its aim to reflect interdisciplinarity. This means that the relevant faculties have to agree to adopt the standards for PhD student selection and training set by the graduate school and delegate responsibilities for the student selection, quality control and possibly even the graduation to the respective graduate school.

Specific objectives of the doctoral training programme

Doctoral researchers may come from different countries, or at least from different regions of the same country and have different educational backgrounds, thus having heterogeneous levels of training and knowledge. A central goal of the training concept ought to be to bring all students to the same high level of proficiency, theoretical knowledge and technical expertise right from the beginning of the PhD term. Since the projects offered by an interdisciplinary graduate school encompass a wide range of approaches, a diverse training and teaching programme is required. It is, therefore, essential that the course programme offered by the graduate school is as flexible as possible in order to adapt to the scientific interests and needs of the doctoral researchers, while at the same time ensuring high common standards across the entire graduate school. The PhD training concept implements the recommendations made by the European University Association (Salzburg II recommendations) as well as the International Union of Biochemistry and Molecular Biology, taking into consideration the increasing emphasis on technical and transferable skills that graduates are expected to acquire nowadays in order to compete on the open job market.

Achieving Critical Mass

Achieving critical mass without losing selectivity for excellence: bringing together large peer groups of doctoral students in a highly competitive selection procedure

The advantage of peer groups with productive critical mass

A competitive graduate school concept should attract far more qualified applications per year than students that can be accepted for a PhD. The interdisciplinary character should ensure a critical mass, ideal for forming peer groups. The number of outstanding applications should allow a selection e.g. every six months when new PhD students come together in the Complementary Skills Programme. A figure for that number is flexible but the graduate school would certainly benefit from having a school-class-size number of new graduate students every half a year or whenever the selection takes place. Apart from the advantages of

interdisciplinarity, **regular gatherings at various mural and extramural functions (PhD core courses, common lectures, meetings and retreats, as well as social events) create a doctoral culture of dialogue and cooperation. As a result, peer networks form, which allow doctoral researchers to solve scientific problems individually, while at the same time profiting from their peer group.** The annual or biannual peer group of doctoral students that come to a graduate school ensure that the highest standards for a modern PhD program can be maintained. This is reflected by:

i. The overall visibility of the programme: as stated above, each PhD position should be oversubscribed, i.e. there should be several qualified applications per advertised position. The applicants for the PhD track come from all over the country or even from abroad.

ii. The diversity of the doctoral students on a national or even international basis: an international doctoral student body raises the standard of any PhD programme. International students bring cultural diversity, fresh ideas and a global perspective to the programme. National students benefit tremendously from the presence of international students. By working side-by-side with international students, local doctoral researchers are exposed to different views and values. They acquire cultural knowledge and empathy, establishing scientific and social networks, better preparing them for the global workplace after graduation.

iii. The standing and visibility of the graduate school amongst doctoral researchers: when PhD students are asked what prompts their decision to join a graduate school, the scientific environment and the overall reputation of the University and the associated graduate school scores very high on their list. The scientific quality and the reputation of the PhD program(s) are perceived as equally important. The career service, the family support program, and the social activities offered by graduate school are particularly important to the PhD students. Another decisive factor that influences a large number of PhD students is the strong recommendation of the graduate program by former academic teachers and supervisors.

iv. The interdisciplinarity of our doctoral students: recognizing that scientific progress occurs increasingly via the collaboration between different disciplines, we envision heading for an interdisciplinary doctoral student body. An initial establishment of a graduate school should be defined across different fields of study, while taking advantage of research opportunities, which emerge from the interaction between the different fields. Doctoral students from the same graduate school may cover a broad range of disciplines. In Life and Biological Sciences, this may bring together individual PhD projects from Molecular and Cellular Biology, Biochemistry, Physiology, Infectious Diseases, Biotechnology, and Bioinformatics, but also increasingly from neighboring disciplines such as Medicine, Natural Sciences and Mathematics.

Maintaining selectivity and excellence: a competitive selection process

Despite the high number of students that are managed under the umbrella of a graduate school, the selection procedure still limits the number of new doctoral students. An acceptance rate of less than 20% is the basis for excellent student and, in turn, motivates the best national or even international candidates to apply to an excellent graduate school**.** Application to the graduate school and the subsequent selection procedure ought to be highly transparent, as well as efficient. One may structure the selection process on the following criteria:

- All open PhD positions are posted on a central, open homepage and/or on other Internet platforms. On average, the request to fill a particular PhD position is open for application for three months. It is also advisable to send out posters and flyers to national and international universities, as well as research institutions, to inform interested students about research opportunities and about the PhD programme. There should be several positions advertised on a monthly basis, or alternatively a larger package and common application round, every half-year.
- All candidates have to submit their application, including all relevant documents, exclusively via an online application system.

- Applicants must submit a CV, a letter of motivation, two references, all academic transcripts and certificates. In addition, foreign students are asked to hand in a language certificate which must be submitted if the teaching language of their previous study programme was not compatible with the teaching language of the graduate school. In the long run, an international PhD programme will require implementing English as the "working language", in which all official conversation, including the selection procedure, is executed. In turn, an English homepage, English project descriptions, English teaching and training courses will train the student body for future jobs in international environments.
- After an eligibility check, the PI who advertised a project gains access to the files, can review the applications and can then select up to three candidates based on research interest, qualifications and letters of reference. These candidates may then be invited to carry out interviews via voice-over-IP by the PI and/or a professional of the graduate school to assess the candidate's scientific background, qualifications and motivation.
- Short-listed candidates are subsequently invited for an interview to the university. A possible scenario may be that on-site interviews are held once every three months or every half-year (see above). The entire assessment may last for two days. On the first day the candidates meet the PI, as well as the group members and are required to give an oral presentation of their previous research project. The PI assesses each candidate's performance and documents the interview process in a written report. After group visits, the candidates write a general or specific GRE-like subject test consisting of sets of questions covering the candidate's academic background and the subject area of the PhD project. On the second day, candidates are interviewed by a panel consisting of at least three faculty members. The PI by whom the candidate is interviewed is not a member of the panel, but he/she may attend the panel interview as a silent observer (this has been crucial to demonstrate transparency of the process and to win the acceptance of the PIs). During the panel interview (25 min), the candidate has to give an oral, 6 to 8 minute presentation of their previous research project (free speech, no media allowed). In addition, the candidate is asked to explain how their qualifications meet the requirements of the research project for which they have applied. The oral presentation is followed by a question-and-answer session in which the candidate's motivation and qualification are assessed. The chairperson of the panel prepares a written consensus report on the candidate's performance.
- At the end of the second day, both the candidates and the group leaders convey their preferences. The Executive Board of the graduate school, possibly together with faculty members, selects the most qualified candidate for a given position on the basis of the submitted academic records, the letters of recommendation, the PI's evaluation report, the assessment of the panel, and the written subject test score. Selected students will be informed of the decision of the Executive Board within two working days following the interview process.

Salzburg Principle VII

University of Heidelberg

Duration of the doctoral programme

Sustaining progress of PhD education in all disciplines requires a new generation of graduate students with an interdisciplinary training, combined with a broad vision and understanding of specific, disciplinary knowledge. In order to prepare doctoral students for the upcoming challenges and to enable them to apply the new technologies to future research questions, it is necessary to make structural and conceptual changes in the way doctoral researchers are being trained. Moreover, as the PhD is continuously discussed in the US as well as in Europe, PhD education must address a number of issues, which **include the time-to-degree, the completion rate and the employability of the doctoral researchers. These are necessary in order to fulfill the obligations and responsibilities of the PhD education towards the doctoral researchers and for society at large.** Responding to these requirements, an ideal PhD programme should:

- guarantee that there is an upper limit to the amount of empirical work which can be expected to be included in a PhD thesis. This is an effective way to avoid the requirements for a PhD degree escalating over time;
- encourage each PhD student to devote concentrated time to their studies, and to ensure that the programme is based on original research;
- It should allow graduate schools to develop structures for handling a steady stream of PhD students.

New PhD programmes should combine the benefits of the traditional individual PhD with structured training. This concept should give doctoral researchers ample time for problem-solving independent research and for developing critical thinking skills. At the same time the programme ought to provide the doctoral researchers with the tools and skills required to successfully conduct a challenging PhD. **A structured, interdisciplinary teaching programme (PhD core courses; regular research seminars; lectures and method courses; workshops in bioethics and complementary skills) comprises not only the definition of educational objectives. It also includes career development plans and a coaching concept, consisting of annual Thesis Advisory Committee (TAC) meetings to aid doctoral researchers in reaching their academic goals within a defined period of time of approximately 3.5 years.**

A modern PhD training concept responds to demands to reduce the overall study-time and the time-to-completion of the PhD, while improving the overall quality of training and mentoring. **The training concept of the graduate school consists of the following elements:**

- PhD core course: to bring doctoral researchers to the same high level of theoretical knowledge and technical expertise, all doctoral researchers must take the three-week PhD core course once they enter the PhD programme. Details of the structure of the PhD core course are provided below.
- Thesis advisory committee (TAC) meetings: annual TAC meetings offer expert advice to each individual PhD student. They also allow doctoral researchers to practice their oral and presentation skills, as well as to develop their ability to respond to critical questions in a scientific manner.
- A common lecture series: lectures from the faculties may cover a large spectrum of new trends and developments in all areas of sciences that impact science and society. The lectures may be further intended to present the full spectrum of job opportunities for graduates in life sciences, also highlighting dynamic areas where new high-wage jobs are being created. Lectures may be held bi-monthly and are open to the scientific community. Lecturers should be available for discussion with the doctoral researchers

during a students' lunch and during the reception, following the talk. The lectures should be part of establishing a scientific culture of exchange and discussion.

- Annual PhD students' retreat: the doctoral researchers organize the annual retreat to experience academic culture first-hand. This includes inviting guest speakers, selecting the programme, and judging scientific quality. During the retreat, the doctoral researchers have the opportunity to present their work and to socialize with their colleagues.
- Training by the host laboratory (in the case of science PhDs): all students are required to attend weekly scientific meetings (lab meeting) and literature seminars (journal club) organized by the host laboratory.
- Institutional training: doctoral researchers are required to attend the regular seminar series organized by their hosting institution.
- Academic conferences: The students will attend at least one national and one international scientific conference during the term of the PhD.
- Scientific exchange: the graduate school encourages scientific exchange at all levels. The graduate school may reward PhD students who conduct their first TAC meeting within the first 6 months after commencement of the PhD term with a financial bonus The money can be spent e.g. for attending national or international meetings or for short-term lab visits to learn techniques and approaches relevant for the PhD project.
- Complementary skills: teaching of complementary skills should be an integrated part of the curriculum. A professional career advisor may offer courses in professional standards, personnel coaching, motivation and conflict management, team spirit and interpersonal skills. The graduate school may further offer personal interviews and career seminars where participants train in interview skills and learn how to write a job application.
- Accompanying programme: In addition to the PhD core course, the graduate school may offer scientific courses and training opportunities throughout the year. The doctoral researchers are invited to sign-up for these courses at any time.
- Summer School: these are held once a year and are usually organized in collaboration with a partner university. Summer Schools focus on a topic relevant to current PhDs, usually including 10 - 15 senior researchers and 15 - 20 doctoral researchers. Summer schools create a unique atmosphere of scientific exchange. They offer the opportunity for doctoral researchers to closely interact with and learn from experienced academics.

Moreover, in order to increase the likelihood of candidates completing their PhD theses in due time, graduate schools and the PhD students have to work together to ensure the following requirements:

Consensus in the peer group

There should be a strong consensus within the peer group to finish the PhD education in due time. In addition, the group ought to agree to help solve any student's difficulties with their project. This philosophy should be shared between all members of the programme. Right from the start, PhD students are brought together in their peer group and motivated to establish a corporate identity that comprises a cooperative yet competitive attitude. The students motivate and stimulate each other to compete, while contributing to a stimulating environment overall.

Early selection of PhD students

Motivation for research should start during students' undergraduate education. At the latest, competent students should be marked as potential PhD candidates during the second cycle, i.e. during the Masters programme. At this time, students need to be given intense research support, while helping them to find their individual focus for their prospective PhD work.

Salzburg Principle VIII

University of Girona

The promotion of innovative structures: to meet the challenge of interdisciplinary training and the development of transferable skills

1. Introduction

First of all, we must clarify the main concepts in this Salzburg Principle. If not, we risk misunderstandings, which are often at the origin of unsuccessful works and projects.
At the University of Girona, after implementing the Bologna process at three levels of study during a period of more than 10 years, we have decided that the core concept on which to base the management of the teaching and learning process, regardless of the level, is COMPETENCE.

By competence we mean what one can do. It is a complex notion involving simpler competences (skills?), knowledge (contents of academic programmes) and values. This is our option and it is the option we highly recommend, based on the idea that a competence is always evaluable in action. It is observable, and if you observe people *doing* something, you can implicitly assess their level of knowledge (if they are doing it well, they have enough knowledge), their capacity to get along with others and their way of being.

For this reason, we will only use the word competence from this point on, and will mean it to include the concept of skill. We will therefore talk about transferable competences. These are often called soft or generic competences, and refer mainly to communication and values. They are applicable in very different fields of knowledge, connect disciplines in important ways, and function as tools to promote interdisciplinarity. It is well known that these kinds of competences are in great demand in today's society and labour market. As a result, the university must assure that all its graduates, including, of course, PhD graduates, have good levels of transferable competences.

2. Important open issues from the Bologna seminar about doctoral programmes

"Some university representatives argue that doctoral candidates cannot acquire transferable skills in courses, but only in everyday work by doing research and related activities such as teaching, writing, active participating in seminars, conferences and projects, etc. (learning by doing approach)."

From our point of view there are two levels of competences – also transferable competences – to take into account. On one hand, the competences need to be used and applied, and this is only possible in real contexts like society and the labour market, where real roles are played, and real projects and jobs are developed. When competences are applied on the job, performance improves from *learning by doing*.

On the other hand, educational institutions can and must help students acquire competences that favour social inclusion and employment. After their studies, graduates will increase their level of competence with practice, in social settings and in the work place:

"Although there may be a disagreement among university representatives whether courses in transferable skills should be mandatory or voluntary; all agree that it is very important to offer these courses to all doctoral candidates".

One can conclude from this last argument that PhD programmes must include compulsory activities to develop transferable competences as a crucial part of the training they offer.

"No consensus was found on this issue. Most university representatives agreed that ECTS, if used in doctoral programmes at all, should be restricted to the structured course-part of doctoral programmes (e.g., courses in transferable skills)."

It depends on the organisation of the PhD studies in each university. In the case of the University of Girona (as explained below), some of the educational activities related to transferable competences in PhD programmes are expressed in ECTS terms (the compulsory part), while the rest is not (the optional part).

4.The University of Girona model

3.1. PhD studies in Catalonia consist of two parts:
- A teaching part, which is taught in the master's programmes (60 ECTS credits) and is planned in the same way as bachelor's degrees: based on competences (specific and transferable ones) and using ECTS.
- The elaboration of a thesis. This process is highly regulated, with the participation of a director, possibly a tutor, and a clear monitoring system and evaluation model.

3.1. The place of transferable competences.
The Governing Council of the University of Girona has agreed to the following:
"The transferable competences are those that are applicable to any field of knowledge, to get a diploma from the University of Girona. The transferable competences approved by the Governing Council of 5 June 2008 are as follows:

1. Use of the English language.
2. Gather and select information effectively.
3. Use information and communication tools.
4. Work in teams.
5. Communicate orally and in writing.
6. Evaluate sustainability of one's own proposals and actions.
7. Analyze the ethical implications of professional activities.
8. Design creative proposals."

Each of these transferable competences has been divided into several levels of complexity. The last one corresponds to the master's level. So, in Girona, the compulsory master's level transferable competences are the following:
"1. Communicate in English about topics in one's own specialisation, in various formats and contexts (work environments, presentations, lectures, forums, seminars, conferences) with the academic community and society at large.
2. Independently gather and select sources and relevant information to develop original research that will provide new knowledge in one's own area of specialisation.
3. Select and use specialised information and communication technologies for pursued research objectives.
4. Lead teamwork (also in multidisciplinary and/or international settings), assessing the processes established and the roles developed, incorporating any changes resulting from shared reflection.
5. Communicate orally and in writing about topics in one's area of specialisation in an original and creative way, adapting oneself to the audience (specialist and non-specialist) and using the supporting material and/or resources that make oral presentations more effective.
6. Promote reflection favourable to progress towards improved ecological, economic and human sustainability, in the proposals for action made within one's own field of research and/or work environment.
7. Critically analyse the code of ethics and promote progress on ethical reflections and formulations associated with professional practice.

8. Elaborate different creative alternatives related to research objectives and choose one of the options after assessing its uncertainty and risks."

That means that each student doing a PhD has previously acquired these eight transferable competences (related to employment and to research) at the Master's level.

3.3. Assuring the development of competences in Girona

To help students develop their competences, the University of Girona implemented a system to manage the information taught. Three main features characterise this system:

- Competences are formulated in an evaluable way (like the transferable competences we have presented).
- Each competence is linked to concrete subjects.
- Learning and evaluation activities are created with a competence in mind.

This model is fully explained in our Guidelines for the adaptation to the European Higher Education Area. http://www.udg.edu/Portals/109/Teaching%20management.pdf.

3.4. A complementary offer of courses about transferable competences

Once students have their Master's degree, have worked on transferable competences in the way we have described, and are enrolled in a PhD programme, they have the opportunity to complement their education with specific aspects related to transferable competences by participating in different courses offered by the School of Doctoral Studies.

These are some of the courses offered during the 2013-2014 academic year:

- Scientific Communication
- How-to-Write a Paper in Technology
- Ethics Applied to Scientific Activity
- Tech-transfer: From Academia to Market

Salzburg Principle IX

Royal Institute of Technology, Stockholm

Increasing mobility

Salzburg principles are partly based on the following assumptions. The employment market is wider than academia and academia must provide PhD students with appropriate professional careers both inside and outside universities and other academic institutions. It is a special challenge to develop new knowledge in a global world with hard competition between organizations and countries. Deep knowledge as well as diversified knowledge is therefore important. To handle those challenges, institutions, professors and PhD students have a common interest and responsibility to develop good PhD environments with critical mass and relevant solutions for different subjects at the universities. Mobility is one tool for supporting these ideas.

Basically, mobility can be built up through:

i. Virtual mobility
ii. Conferences
iii. PhD courses at other universities
iv. Longer study visits at other universities
v. Employment for shorter or longer periods at other universities

One interesting possibility for mobility is to create PhD schools (point iii) that accept students from other departments and universities. These can be based on

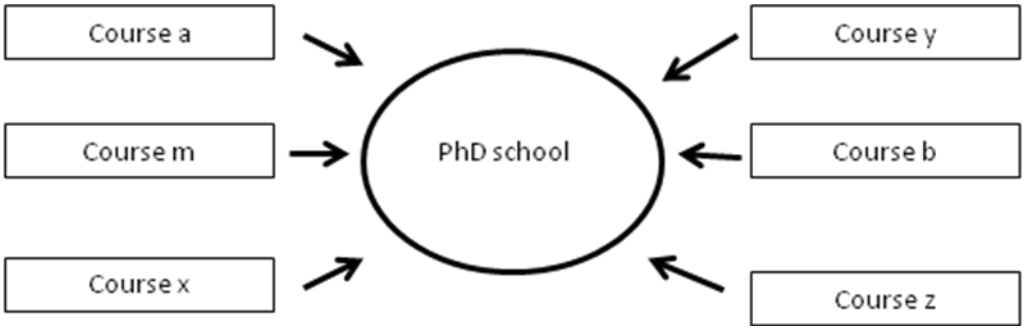
i. A researcher (e.g. professor) within one subject/discipline
ii. A group of researchers (e.g. professors) at a big department
iii. A group of researchers (e.g. professors) at a faculty
iv. A group of researchers (e.g. professors) at a university
v. A group of researchers (e.g. professors) at several national universities
vi. A group of researchers (e.g. professors) at several international universities

A PhD school can be 100% devoted to research projects, but can also or alternatively be a provider of research courses. If the students meet at such courses, they will automatically belong to a group of many PhD students with the same interests in research and the same problems to be brought to older researchers. Discussions in such bigger groups related to the course content can open students' eyes to new approaches to their own research.

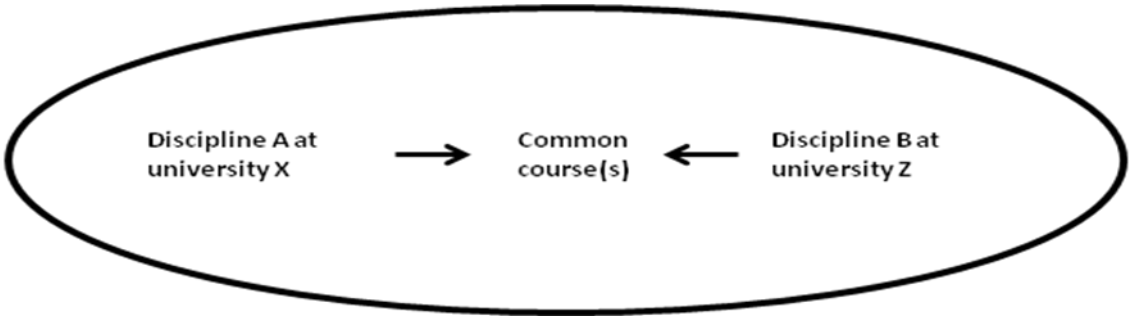
The main question is what type of PhD schools provides mobility possibilities for the PhD students in the best way? The following school types are based on course provision, but similar models can be used for pure research meetings where courses are replaced by seminars or research work.

1. A school can be based on the creation of platforms for gradually increased knowledge within a research field (discipline). Each course is based on the knowledge from the last course. To accept new "mobile" PhD students entering a late course without passing the other courses can be difficult. If the courses are to be given regularly, the mass of students must be high.

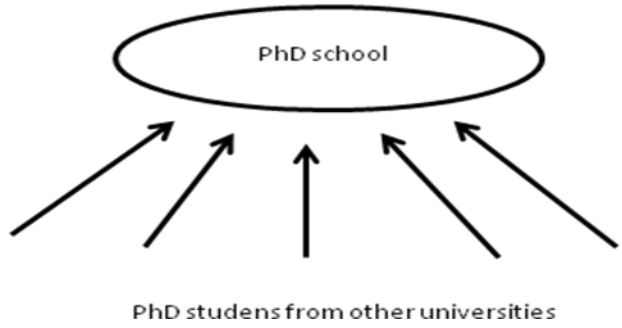
2. A school that provides knowledge for widening the perspectives of the PhD student. Researchers from other places, perhaps in the same discipline, are invited to give courses. The goal is to raise awareness of alternative approaches to research in a subject. It can also be people that come from other disciplines for widening the perspectives. The topics can be chosen in relation to the PhD students' interests. Such school has a possibility to attract students from other places if the courses are of interest.



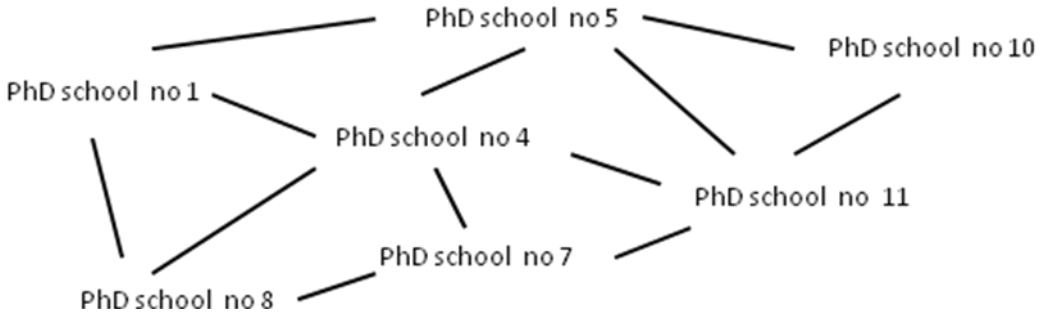
3. A school for creation of synergy effects and combinations of different ideas and approaches taken from different disciplines, e.g. technology and medicine (innovative ideas often come up when different subjects/disciplines meet). Such a school demands more of the student as he/she must be open-minded to (more or less) new knowledge that is not obviously supporting their own PhD thesis work



4. A school for creating a dominant national or international department/university. The idea is that all visiting students shall contribute to the hosting PhD school and hopefully contribute to the host's status.



5. Networking schools where the students are totally free to choose courses that fit them from a research point of view or by some other criteria. The students can access many interesting courses and learn a lot from other people in the academic world. In this way they create an own future network that can be used by them or by their own future PhD students. Such networks can also be good if they leave the academic world and go over to professional world.



Independent of which type of school we wish to create, the admission procedure ought not to be too heavy as otherwise PhD students may avoid using their time on applications where there is little chance of success. The goal of the school should not be to show how difficult it is to enter, but to support the work of a bigger group of PhD students to gain critical mass and at the same time support networking for the future. Students should have the feeling of belonging to an international academic community and not only to one department or professor/docent.

It should also be said that it is not enough to think about the PhD studies alone. What is happening after the exam needs also to be taken into consideration. Shall a student be forced to move to another university if he/she wants to make an academic career? There are advantages with this. At the same time there is a risk that talented researchers leave the academy as they do not want to move (e.g. for family reasons). Can this be one of the reasons for high-tech areas growing close to universities?

A tenure track system can also be good to think about for continuing to build up personal knowledge. With the support of such systems, the researcher can show the development of his/her competence. The risk is that the university in the end will contain people without practical, professional experience, something students very often dislike as a lot of them want to gain practical knowledge for future professional life. There is also another risk with a tenure track system without adding experience from the professional world. This is that the academics give too little attention to teaching, as research publishing becomes their priority.

Salzburg Principle X

Royal Institute of Technology, Stockholm

Ensuring appropriate funding

There seems to be a tendency for universities to become more and more like business companies in the field of student education and research. Student funding can come directly from the State or from student fees, with combinations possible. However, research is increasingly funded by money that is not automatically given to universities. Instead, different techniques for applying for resources from have been developed. This makes it difficult for individual researchers and for university organizations to handle the new type of "business" administration that is needed. An exposed group in this system is PhD students as they are not students at BSc and MSc levels that have more or less clear funding if they are accepted at the universities. At the same time PhD students are not parts of the academic world with the same access to research money as established researchers have. PhD students are instead heavily dependent on established researchers and the university organizations.

The conclusion is that research funding is important to think about if a university wants to be a "serious player" in the academic market. Some aspects relating to PhD students of this new world are listed below.

Engagement type for PhD students

i. *PhD student without funding*: The student uses his or her own resources to survive and is connected with the university to get supervision and finally be awarded a PhD. As there can be difficulties to survive, often this type of student takes a long time to finish their studies. As this gives extra work for the university supervisors, this type of students will probably disappear in the long run.
ii. *Scholarship students*: This type gets scholarships, but they can often be low and in such cases there will be more or less the same problems as with self-financing students.
iii. *Employed by the University from Faculty Resources*: This is an easy group to handle as there are normally not so many conditions related to funding. These groups of students can also be used for education and administrative work at the departments. The problem can be to establish a clear deadline for finishing their PhD studies.
iv. *PhD student applies for funding:* This is probably rare, especially for funding for the whole PhD study period (3-4 years). A provider of resources can never be sure about the capacity of the person. The result will be a lot of small contributions, often from different sources. The time span for finalizing the studies can be very long.
v. *Established researchers (professors, docents etc.) apply for money to employ PhD students*: There is no risk from the student side, but there is a risk for the applicant that the student leaves the project and the responsible applicant has to fulfill the proposed work by him- or herself.

Project types

There are many project types related to funding.

i. *Funding for a single project*
ii. *Funding for big projects within a department/university with many researchers and PhD students*: A problem with this type of projects is that they can be difficult to start and finalize as a lot of people are engaged at the beginning and can also be pushed out at the end of the project when the money has run out. The completion for such big projects is often intense.
iii. *Funding for big projects between different universities, sometimes between universities in different countries*: This presents the same problem as above and in addition to this there can be coordination problems. These big projects given to top performing institutions seem to be more important for research funds. The results can be very good as so much is focused in one direction. At the same time they take resources from other

researchers who do not get those big grants, even if they can be very good and productive.

Funding
Funding institutions have their own rules and priorities. The list below is provided without comments, but sometimes ethical problems can be involved with taking money from some types of organizations.

i. University (funding with own resources)
ii. State research funds
iii. Research academies
iv. Authorities
v. Enterprises
vi. Private trust
vii. International trusts
viii. International funds, e.g. EU
ix. Donations

Often, funding bodies demand co-financing from the university or from other sponsors. Sometimes the contribution for research can be very small and then the researcher has to try to find other suppliers of resources to get enough for a PhD student's full work during 3-4 years. To gain this type of funding, the researcher must often be really creative.

What can be funded?
At the same time as universities increasingly try to get resources from outside sources, they need to think about what be covered by such funding. Here are some suggestions.

i. *PhD student salary (totally or partly):* tax, pension payment, health insurance, etc. can be added to the salary.
ii. *Overheads*: most universities have a lot of administrative staff that need to be paid. These costs can be covered by OH contributions to the university
iii. *Working space*: to keep buildings and to construct new buildings costs a lot.
iv. *Equipment*: computers, laboratories and other equipment are often needed to do successful research
v. *Experimental research and field studies*: here there can be a need to involve outside people and also to have resources for travelling
vi. *Data*: for some research, it can be enough to get data from other providers. This can be free of charge but can also cost a lot
vii. *Conferences, visits to PhD schools*: PhD students ought to participate in conferences to meet other researchers, to get the latest information and to test their own ideas through presenting papers and posters. Other PhD schools can be even better places to visit.
viii. *Research visits to other universities*: If a PhD student is to become part of the national and international academic community and also to be able to integrate with other researchers, it can be good for them to visit another university for a longer period
ix. *Dissertation*: Depending on the rules for dissertation/thesis examination, resources can be needed for this process. If it involves international examiners, it can be quite expensive
x. *Supervisor*: The supervisor ought to put in a lot of time for discussions with the PhD student. Are extra resources needed for this or is his/her knowledge and up-dating of knowledge free of charge?

Depending on how many of the above are financed from outside, the university must decide what can be subsidized internally.

Organization
If we take into account all of the above it can be quite difficult to handle an application, especially at a "business type of university" with a lot of resources from outside. Clear rules must be developed within the university. Researchers (professors, docents etc.), deans, research committees and rector must work in the same direction with such rules and it is also important that they are not changed all the time. At the same time there must be a respect for the individual researcher and then especially for the PhD students' situation, so those are performing well.

The dream to be financed by the State based on confidence is probably not possible any longer.

3.1. PROMOTION OF POSTGRADUATE RESEARCH

Bath Spa University

PART 1 - NATIONAL FRAMEWORK AND GUIDANCE

- About the Quality Code
- Information about HE provision - for prospective students
- Responsibilities/general principles/expectations
- Indicators of sound practice

When considering how to promote doctoral education, UK universities are guided by the UK Quality Code For Higher Education Part C, which deals with Information about Higher Education provision. The Quality Code is the definitive reference point for all UK higher education providers. It makes clear what they are required to do, what they can expect of each other, and what the general public can expect of them. The Code has been developed in consultation with providers, students, professional bodies and other interested parties. It's not imposed on universities, but something they have all agreed and signed up to. Higher education providers are required to meet all the Code's expectations, but how they do so is their own responsibility. The Quality Assurance Agency carries out reviews to check they are being met.

It is important to maintain public confidence in the value of higher education. One way to do this is to produce appropriate information, focused on particular audiences, about the learning opportunities on offer. Because the Quality Assurance Agency respects the autonomy and diversity of universities, the code is not concerned with how information is produced or communicated, but whether it is:

- fit for purpose,
- accessible,
- trustworthy.

Purposes for which universities produce information

• To communicate the purposes and value of higher education to the public at large.
• To enable current students to make the most of their higher education learning opportunities.
• To confirm the achievements of students on completion of their studies.
• To safeguard academic standards and assure and enhance academic quality.

and, the one we're most concerned with:

• To help prospective students make informed decisions about where, what, when and how they will study.

Principles

1. Information should be clear, timely, current, transparent, and focused on the needs of its intended audience.

2. Universities are responsible and accountable for their information. At the same time, they may choose their own mechanisms and media to communicate this information.

3. Information should be available and retrievable where users could reasonably expect to find it. The format and delivery of information should take account of the access requirements of a diverse audience.

4. Information should be fair and accurate.

Indicators of good practice

Publish information that describes mission, values and overall strategy.

- Explain the nature of the institution and locate it within an increasingly diverse sector.
- Show organisational structure, the composition of the student population, different modes of study, and the programmes and awards offered. It may include governance arrangements, corporate and strategic plans, and annual reports, and policies on information and data.

Describe the process for application and admission

Give detailed information to help prospective students make informed decisions about where they will study; their programme and award; their mode of study; and the support they will need. Direct prospective students to the application, admission and registration process, whether internal or external, and point to other relevant information. Give entry requirements along with any required prior experience. Explain any non-standard entry possibilities and how to use them. International applicants are directed to any additional requirements (e.g. English language requirements). Indicate fees payable and any additional costs (e.g. bench fees), general living expenses, and any bursaries or scholarships available.

Describe the academic environment and the support available.

Prospective students need to make an informed decision to feel confident they are choosing a good study environment. Outline what will be expected of students, and what they can expect of the institution. Give indicative information about:

- supervision arrangements, progression points and the monitoring students can expect;
- resources and facilities available to support and enhance their learning;
- how an inclusive learning environment ensures equality of opportunity;
- how they anticipate and respond to the diverse needs of students;
- research/supervisory staff;
- learning support staff; learning and teaching spaces; libraries; specialist learning environments such as laboratories and studios;
- communication and information technologies, including Virtual Learning Environments;
- advisory services, student union;
- various study modes and options;
- connections with industry and business and links with employers and professional bodies;
- how well their programme is performing, which may include information about post-doctoral destinations and opportunities for employment; and how satisfied students are, if such data is available;
- the structural and administrative arrangements, e.g. graduate school, doctoral training centre, department, research centres & groups, research institutes, etc;

- information for current students may also be available, e.g. guides, handbooks, code of practice or the equivalent, either electronically or in print;
- signpost to the regulatory framework in which their programme of study is located;
- information about deferral of study or assessment, and about regulations and procedures for the interruption of study, is provided.

PART 2 - IN PRACTICE

Research strategy

Recruitment of PhD students is not primarily about marketing. It should fundamentally be aligned with the institution's research strategy. The research interests of the applicant and the institution have to match and recruitment of students is often connected with research grants, e.g. funded projects or studentships.

What information do prospective PGR students want?

Particularly those re-entering higher education after a period away from study may be looking for answers to these questions:

- Can I study this?
- Do I want to study this here?

What factors influence their decisions?

- Can I find a suitable supervisor?
- How will I be supported by the supervisory team and department/school/faculty/graduate school?
- Will funding be available?
- What academic facilities and resources are on offer?
- What are the social aspects of being a PhD student at this institution?

Where do they find information?

Prospective doctoral candidates tend to approach universities rather than being approached by them.

- Web search 50%
- Word of mouth 36%
- Education UK 6%
- Print advertising 3%
- Printed guides 2%
- Other 3%

(enquiry data from University of Leicester)

Website

Prospective candidates primarily look for information on institutions' websites. Therefore the most important aspect of PhD promotion is to ensure websites are fit for purpose:

- Website navigation, links, content specifically for PhD

- Dedicated webpages for research profile, strategy and funding
- Graduate school – doctoral training partnerships and other collaborations, profiles of current and completed students.
- Research centres and groups - context of research.
- Research environment - dedicated study space, computer rooms, specialist equipment, labs etc., PhD student development programmes, seminar programmes.
- Guidelines for minimum supervision levels - rising expectations and value for money are an increasing priority, especially for self-funded students.

Academic staff profiles

- Staff research experience, specialisms and interest in supervising PhDs are clear, up to date and well-presented.
- List future research interests so as to invite enquiries about potential topics for supervision rather than applicants approaching with their own already narrowly defined proposal, or with the project already specified by the institution.
- Try to describe research interests in a way people would search for them online
- Use the university website and academia.edu, linkedin, even Facebook, Twitter etc. - any ways in which academics represent their research via networks.

Handling enquiries

- PhD promotion work isn't finished when someone makes an enquiry. There can still be a long way to go.
- Making an enquiry should be as easy as possible - individual academics, school contacts e.g. Higher Degrees Tutors in each school/faculty with responsibility for admissions
- Raise the profile of research as a conduit into the website and for enquiries
- In a competitive market describing how students will be supported might give a competitive edge.

In order to manage the relationship after the initial contact it is good practice to follow up contacts within a certain period. This shows applicants that the university is interested in them and hopefully sparks further interaction. Applicants don't always know what a good research project is; getting into a discussion by email will help define this. Make quick decisions - research by the Russell Group of top UK universities shows that postgraduates are 6 times more likely to accept an offer that is faster than average rather than slower than average.

Other marketing activities

- Postgraduate prospectus - (online & print) - with up-to-date staff contact details & their research interests;
- Promotional material should specifically address international students as well as PhD study in general;
- Open days;
- Social media - e.g. Graduate School Twitter
- Promoting directly to current Masters students - encourage them to continue with you
- Create distinct pathways from master's degrees to research, for example Master's in Research (MRes) or professional doctorate programmes.

Research celebration week

This annual event takes place at Bath Spa University (BSU) in June to coincide with the UK's Universities Week. It provides an opportunity for the public to engage with, participate in and learn about current research projects at the University and to reflect on the role research plays in today's society. For 2014, a programme of activity has been developed to emphasise the relevance of BSU's research and its everyday impact on our lives. With this in mind, Research Celebration Week seeks to involve the local community and local businesses through a programme of specially devised talks, workshops, performances, and events. It includes an early stage researcher conference, which includes PhD students and invited external keynote speakers. It shows the full range of research across the university and enables prospective students to come along and get a taste of the research environment.

Knowledge Exchange

PhD students can be placed with relevant businesses to grow their professional networks:

- BSU encourages staff to cultivate their relationships with business and other external organisations. These relationships are leveraged to provide PhD students with opportunities to expand their own network through co-lecturing with third parties, taking part in research round-tables or workplace internships.
- BSU uses every opportunity to showcase the research that is taking place inside its walls to the business community, and these opportunities extend to PhD students. We plan next year to host a business breakfast with PhDs presenting their work in a way that makes it relevant to local businesses.

PhD students can work with businesses in paid employment or through funded research opportunities:

- The UK government invests heavily in driving economic growth through academic-business collaboration. They offer funded opportunities, such as Knowledge Transfer Partnerships, that place a graduate in a company for 6 months to 3 years. BSU postgraduates may take advantage of these opportunities which provide valuable 'real world' experience to help them in the job market.
- Opportunities exist for PhD students to undertake paid consultancy within their programme of study. For example within Horizon2020 PhDs who have already held professional roles may become 'business mentors' to support small European businesses under the 'SME instrument'. Similarly, European Regional Development money has been used in the South West of England to support a 'Grads for Growth Scheme'. PhD students become mentors to recent graduates undertaking a company internship. In both cases the PhD student is paid for their time, grows their professional network and reputation, and acquires valuable employability skills.

3.2. GENERAL APPROACH AND INTERNAL ACTIONS.

Josep Juandó, Magüi Pérez, University of Girona

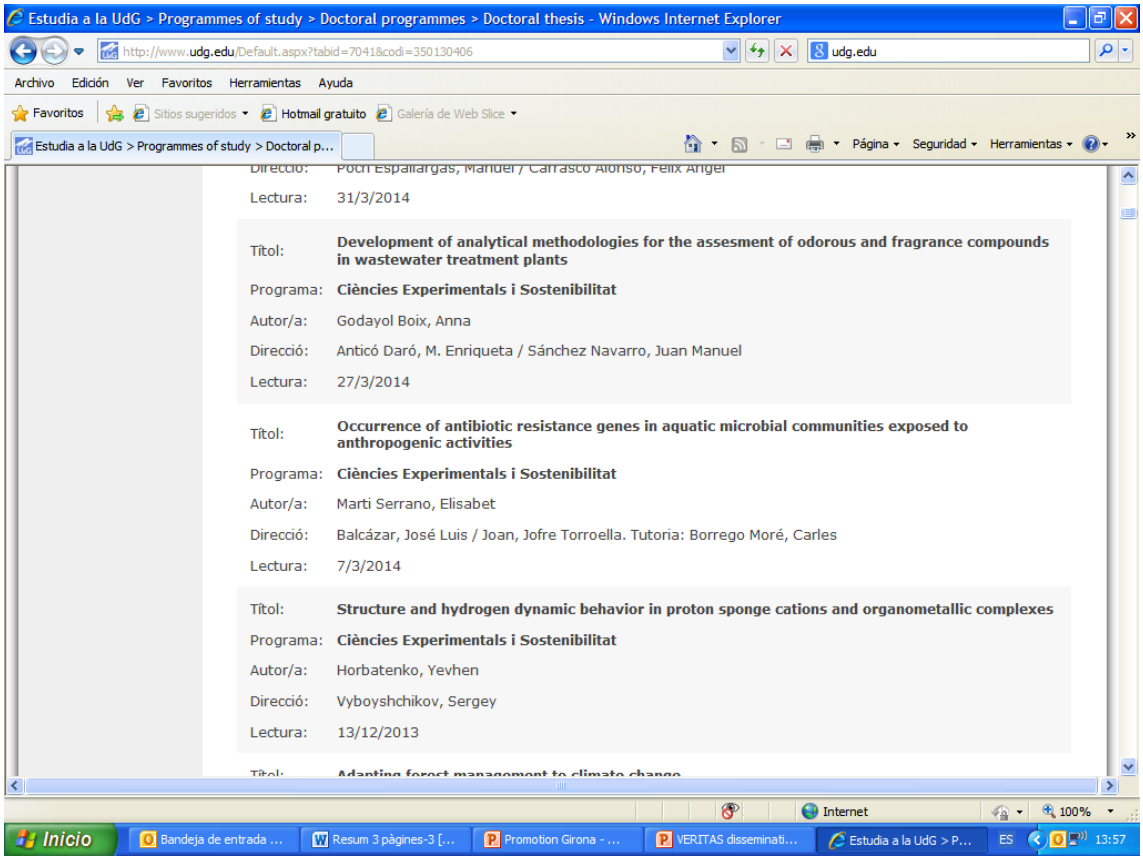
Once we have defined our doctoral programmes, based on a correct and complete interpretation of Salzburg principles and once we have enough resources to offer our new PhD programmes to

society, we are in position to promote the enrolment and the participation of professors and students in our programs.

Is always important to insist that 21st century educational programmes are, at all levels, Competence Based Teaching programmes. That means that the first step to promote new PhD programmes is to define the competences that our PhD students will develop through their studies. This is probably one of the main messages to send today to our target group: "if you enrol yourself in this (…) specific doctoral programme, you will grow in these (…) concrete competences that will help you progress in society and the labour market."

Obviously, to send this type of message, we need to be sure that our team of supervisors understands completely this new situation, believes in the future that this new approach is oriented towards, and are able to develop really new defined PhD programmes. When we are at this point, the first set of measures to promote the enrolment of the students in our new PhD programs must be focused on our own Bachelor's and Master's students.

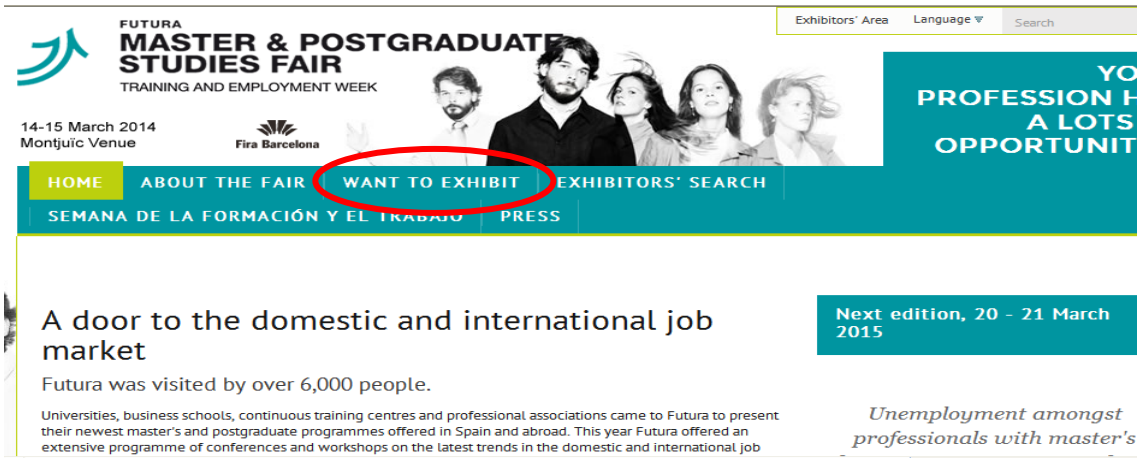
Probably a good webpage is another tool in this first set of promotion measures. Is important to show, in our Doctoral Studies Website, in several languages if possible, the results that we are able to reach; for example theses produced through similar programmes (examples of good outputs). The next screenshot shows this type of information:



Special promotion actions: Internationalization

If the vocation of our university is towards internationalization, we need to undertake special promotion actions for our PhD programme. This may involved participation in international events presenting our doctorates using dedicated published materials such as booklets or

brochures in different languages. In many cases international educational fairs offer these opportunities. For example, Futura fair is organized every year in Barcelona:
http://www.salofutura.com/en/inicio



Special promotion actions: connection with the labour market.

To meet the challenge of industrial PhDs, companies need to include doctoral students among their staff to develop research, development and innovation. Through an agreement between the university and the company a strategic research project is developed, and the doctoral student will do his or her training in this project that finishes with the PhD thesis.

Industrial PhD projects in Catalonia are co-financed by the Catalan Government following some rules:

- A collaboration agreement for three years is signed.
- The PhD student is hired by the company.
- Average gross annual remuneration should be € 22,000.
- The company has to be located in Catalonia.
- The PhD student has be exclusively dedication to the doctoral project.

The Government of Catalonia fund:

- fees and tuition rates for the candidate in the doctoral programme;
- tutoring in the company;
- exchange mobility for the PhD candidate;
- 30 hours of cross-training for the first year;
- indirect costs (overheads) incurred by the university.
- costs associated with coordination, if applicable.

Minimum Requirements:

- The candidate has to have minimum grade point average of 1.60 in their transcript of previous studies.

- The director of the thesis has to belong to the research group recognized by the Government of Catalonia.

The benefits of this arrangement include the following:

- For the company:
  1. Collaboration with well-known researchers
  2. Improved internationalisation and competitiveness
  3. Researchers are trained in company needs and interests
  4. Establishment of strategic alliances
  5. Access to equipment and infrastructure

- For the university:
  1. Access to technological expertise of a range of companies
  2. Exploiting the potential of research
  3. Strengthening university-business relations

- For the PhD students:
  1. Working on issues of scientific and professional interest
  2. Training in transversal competences in public and private sectors
  3. International mobility
  4. Supervision from both academics and company staff

As an added benefit for the PhD students it is important to highlight that they receive an added specific training in transferrable competences such as:

- conceiving, designing, implementing and adapting a substantial process of research;
- analysis, evaluation and critical synthesis of new and complex ideas;
- Promotion of technological, social or cultural knowledge;
- leadership, coordination and management of research, development and innovation (RDI);
- transfer of research results;
- development of new businesses, entrepreneurship, business management, and funding sources;
- learning about patents, intellectual property and industrial property.

This cross-training lasts 60 hours, divided into two parts:
a) 30 hours in the first year common to all students who participate in the programme, financed by Government of Catalonia.
b) 30 hours during the execution of the project by the company and/or the university.

At present there are 73 projects in progress (8 of which are been developed at the University of Girona) and 58 companies are involved in the Industrial PhD programme.

3.3. PROMOTING PHD PROGRAMMES

HBIGS Heidelberg University

Advertisement

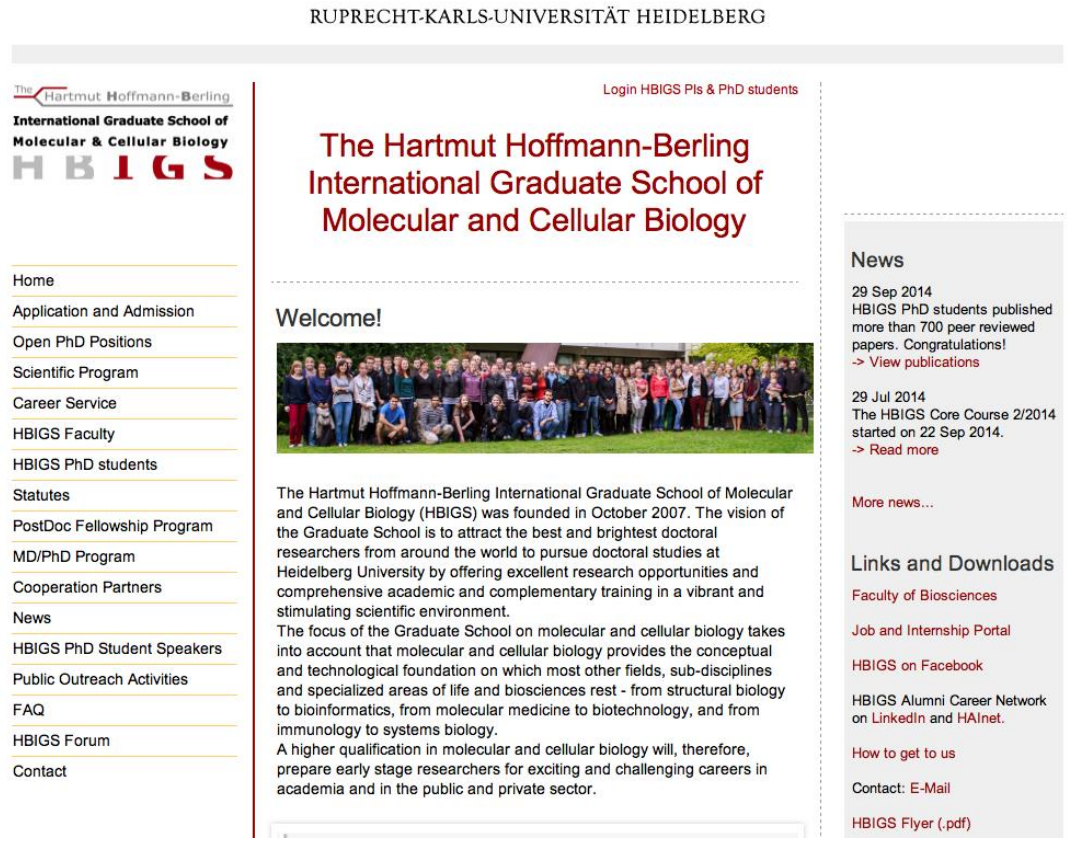
Since 2007, Heidelberg University has run a structured PhD programme in life sciences based in the Hartmut Hoffman-Berling International Graduate School (HBIGS). HBIGS has managed more than 10 000 applications from all around the world. The visibility of our programme is key to the high number of qualified applicants. Visibility is based on two key features of our advertisements:

1. An open transparent selection procedure in accordance with European guidelines for open PhD selection:
In the past, HBIGS has managed large calls for PhD candidates, such as the annual HBIGS PhD fellowships programme (e.g. 18 positions in 2013) or PhD programmes associated with collaborative research centres funded by the German Research Foundation (DFG) (e.g. SFB 1036, Cellular surveillance and damage response -15 positions in 2012). HBIGS advertises a given project portfolio on leading internet portals (e.g. Nature jobs, Science jobs, jobvector) to ensure world-wide visibility. The sending out of posters and flyers to national (e.g. Munich and Berlin Universities, Göttingen, Cologne, Freiburg, Tübingen Universities) and international universities and research institutions (e.g. Indian Institute of Technology; Middle East Technical University, Ankara, Turkey; University of Milan, Italy) accompanies online advertisements. Personal contacts at PhD fairs (e.g. European Career Fairs at Boston, USA; Nature Jobs Fair in London, UK; PhD workshops in Beijing, China) completes the appropriate spreading of a large collective call.

2. The HBIGS online application platform gives transparent information about formal requirements for application and the selection procedure:

The HBIGS online platform (www.hbigs.uni-heidelberg.de) is key in providing all essential information for interested candidates in a fully detailed and clear presentation. Here, all open projects are continuously advertised (www.hbigs.uni-heidelberg.de: “Open PhD positions”). Key characteristics of the projects, general and specific eligibility criteria, expected qualifications of candidates, funding, and the selection procedure are clearly explained. Project advertisements and 150 principal investigator profiles (www.hbigs.uni-heidelberg.de: “HBIGS faculty”) provide applicants with links to individual laboratories and important background information. Advertised projects generally come with funding guaranteed for the experimental phase of the PhD work. PhD candidates selected for a project will usually receive a competitive salary in the form of a regular employment contract with all social benefits in accordance with national law.

Of particular importance is the "frequently asked questions" link (FAQ), in which we anticipate obvious questions related to the application and selection procedures.



The HBIGS Internet Platform. Please note the "FAQ" link in the left column.

Advertisements and the HBIGS Internet platform also inform potential candidates about the eligibility criteria for the HBIGS PhD programme. Candidates must have a Masters degree, or equivalent, from an internationally accredited university. All candidates will be asked to submit a standardised application via the HBIGS online application system (www.hbigs.uni-heidelberg.de: "Register for Application"). Candidates who are interested in making an application are guided by the system to generate their own personal, password-protected accounts. Their data are treated confidentially. By logging onto the system, they can always check the status of their application. The application documents requested are a one-page standardised CV, two letters of reference from supervisors of previous research projects, all academic transcripts (i.e. Bachelor's transcript with all marks, Master's transcript with all current marks), as well as an English language certificate if the teaching language of their previous study programme was not English (TOEFL or IELTS test). **In addition, candidates are asked to supply a letter of motivation (one page, max. 400 words). Here, they are giving the rationale for applying to the laboratories that they are interested in. Candidates will apply to one laboratory in particular (first choice) but may name up to two alternative laboratories they are interested in.**

Selection Procedure:

The HBIGS Executive Board, the HBIGS selection committee and individual PIs select the most qualified candidates for PhD positions on the basis of their:

(1) submitted academic records,
(2) motivation letter,
(3) voice-over-IP interview,
(4) PI's evaluation report,
(5) consensus evaluation of the panel,
(6) score on the written subject test.

Handing in the wrong documents, fraud in interviews or the test will immediately eliminate any application. **Criteria (1) to (3) mark the first level of selection, in which candidates can score up to 45 points and are shortlisted accordingly. The concise and standardised application form on the first level allows us to process a large number of applications and to select the best candidates. The candidates combined performances during the second phase (one-on-one interview with the PI, written test score, panel interview) will be marked out of 45 points.** In our experience, the overall score in this second part strongly correlates with the candidate's subsequent performance during their PhD work. The evaluation process therefore gives a highly reliable indication for the selection of the best and most suitable candidates to successfully complete their PhDs in life sciences and to face worldwide competition.
Students will be informed of the Executive Board's decision within two working days following the interview process. In the case of a formal appeal the selection committee will double-check the evaluation procedure and give a detailed report. In particular, they will explain how the scores in all categories (1 to 6) were arrived at. The transparent, competitive but fair selection procedure that HBIGS has established minimizes enquiries and has, up to now, avoided any formal appeals against the decisions of the selection. In this way, HBIGS handled almost 2200 PhD applications from more than 90 countries in 2013.

Shortlisted candidates who have passed the first round of selection (1 to 3) will be invited for the assessment to Heidelberg. Only now will the PIs get access to the application documents. Candidates will meet the respective PI as well as group members and give an oral presentation of their previous research project on their first day in Heidelberg. The PI assesses the candidate's performance, documenting the interview process in a written report and gives a score of up to 15 points (4).

After the lab visit, candidates will write a graduate record examination (GRE)-type subject test consisting of four modules of questions covering the candidate's academic background. The modules "general biology" and "molecular biology" are obligatory to all candidates, while each candidate can freely choose two additional modules from a large portfolio fitting all individual backgrounds (e.g. biochemistry, biophysics, computational biology, pharmacology, developmental biology, ecology, biomedicine etc.). The best score in this test is again 15 points (5). This written test was established at HBIGS in 2009 and has been used successfully for candidate selection since then.

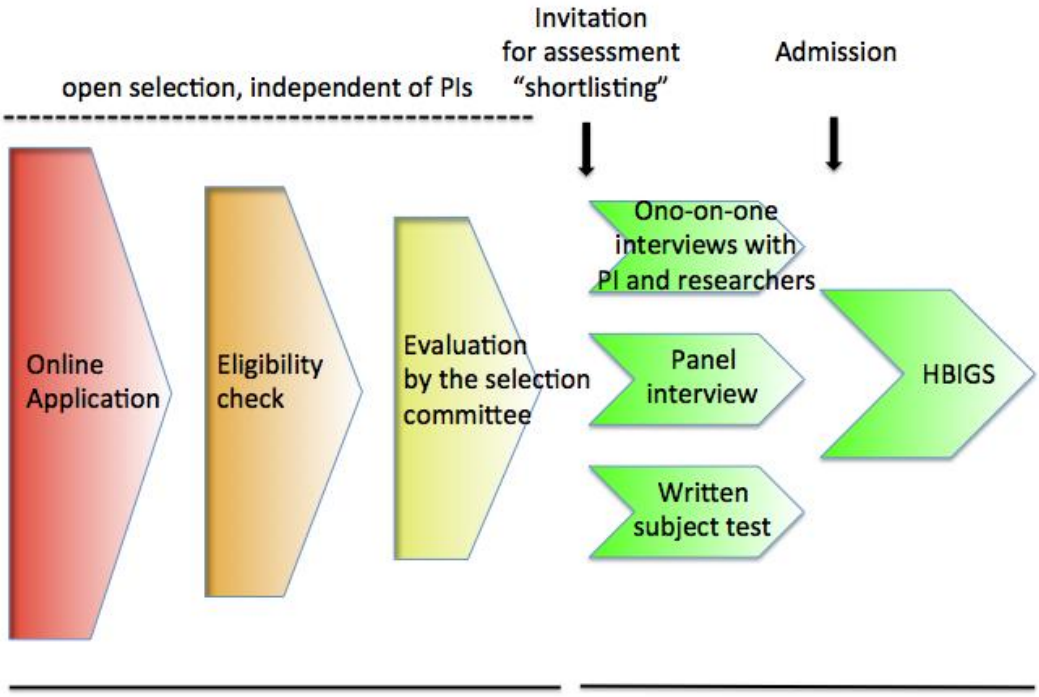


Fig. 2: Overview of the selection Procedure at HBIGS graduate school.