REPORT
OF THE EXPERT PANEL
ON THE RE-ACCREDITATION
OF THE UNIVERSITY POSTGRADUATE (DOCTORAL)
PROGRAMME
INFORMATICS
DEPARTMENT OF INFORMATICS, UNIVERSITY OF RIJEKA

Date of the visit:
April 5th 2017

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INTRODUCTION

The Expert Panel appointed by the Agency for Science and Higher Education (ASHE) created this Report on the Re-accreditation of the University Postgraduate (Doctoral) Programme **Informatics** on the basis of the Self-Evaluation Report of the Programme, other documentation submitted and a visit to the **Department of Informatics, University of Rijeka**.

The Agency for Science and Higher Education (ASHE), a public body listed in EQAR (European Quality Assurance Register for Higher Education) and a full member of ENQA (European Association for Quality Assurance in Higher Education), re-accredits higher education institutions (hereinafter: HEIs) and their study programmes in line with the Act on Quality Assurance in Science and Higher Education (Official Gazette 45/09) and the Ordinance on the Content of a Licence and Conditions for Issuing a Licence for Performing Higher Education Activity, Carrying out a Study Programme and Re-Accreditation of Higher Education Institutions (OG 24/10). In this procedure parts of activities of higher education institutions and university postgraduate study programmes are re-accredited.

Expert Panel is appointed by the Agency's Accreditation Council, an independent expert body, to carry out independent evaluation of post-graduate university study programmes.

The Report contains the following elements:
- Short description of the study programme,
- The recommendation of the Expert Panel to the Agency's Accreditation Council,
- Recommendations for institutional improvement and measures to be implemented in the following period (and checked within a follow-up procedure),
- A brief analysis of the institutional advantages and disadvantages,
- A list of good practices found at the institution,
- Conclusions on compliance with the prescribed conditions of delivery of a study programme,
- Conclusions on compliance with the criteria for quality assessment.

Members of the Expert Panel:
- President of the Expert Panel, Professor Andrew McGettrick, University of Strathclyde, United Kingdom
- Professor Bjørn Erik Munkvold, Universitetet i Agder, Norway
- Professor Henrique Madeira, Universidade de Coimbra, Portugal
- Professor Sofia Gaio, University Fernando Pessoa, Portugal
- Professor Theo Thomassen, University of Amsterdam, Netherlands
- Professor Tanja Oblak Črnič, University of Ljubljana, Slovenia
- Akram El-Korashy, Max Planck Institute for Software Systems, Germany, doctoral candidate
- Abhishek Tiwari, Potsdam University, Germany, doctoral candidate

The higher education institution was visited by the following Expert Panel members:

- Moderator, Prof. Henrique Madeira, Universidade de Coimbra, Portugal
- Prof. Andrew McGettrick, University of Strathclyde, United Kingdom
- Prof. Bjørn Erik Munkvold, Universitetet i Agder, Norway

- Akram El-Korashy, doctoral candidate, Max Planck Institute for Software Systems, Germany.

In the analysis of the documentation, site visit and writing of the report the Panel was supported by:
- Emita Blagdan, coordinator, ASHE
- Lida Lamza, interpreter at the site visit and Report translator, ASHE.

During the visit to the Institution the Expert Panel held meetings with the representatives of the following groups:
- Management;
- Study programme coordinators;
- Doctoral candidates;
- Teachers and supervisors;
- External stakeholders;
- Alumni.

The Expert Panel also had a tour of the library, IT rooms, data centre, and classrooms, as well as the room to accommodate occasional visiting professors and researchers.

SHORT DESCRIPTION OF THE STUDY PROGRAMME

Name of the study programme contained in the licence: **University postgraduate study of Informatics**
Institution delivering the programme: **University of Rijeka – Department of Informatics**
Institution providing the programme: **University of Rijeka – Department of Informatics**
Place of delivery: **Rijeka**
Scientific area and field: **Social Sciences, Information and Communication Sciences**

Number of doctoral candidates: **49**
- Number of PhD candidates with higher education institutions financing:
  - Assistants of the Department of Informatics: 7
  - PhD candidates from other higher education institutions: 6
- Number of self-financing candidates and those for whom the employer bears the cost: 36 (self-financing: 30; employer: 6)
- Number of active PhD candidates: 37
- Number of inactive PhD candidates: 12

Number of teachers: **19**
- Number of teachers at PhD study programme: 19 (12 professors form the University —more accurately, 11.4,— and 7 professors associated to the PhD programme)

Number of supervisors: **22**
- A total of 22 appointed supervisors, study advisors and co-supervisors at PhD study programme guide a total of 37 active PhD candidates (PhD candidate: supervisor ratio = 1:1.68).
- Number of active PhD candidates who have been appointed an official supervisor (they have defended their PhD thesis proposal): 10
- Number of active PhD candidates who have been appointed an advisor: 27

Learning outcomes of the study programme:

LO1: Doing independent research in the area of fundamental and applied Information and Computer Sciences at the level of internationally recognized quality standards and by applying appropriate scientific methodologies and in the spirit of generally accepted research ethics.

LO2: Researching on specific problems in the field of ICT in an interdisciplinary way and applying the results in the context different from that in which they started.

LO3: Conducting advanced scientific and research work in planning, designing, modelling, simulation, management and analysis of complex systems in the area of Information and Computer Sciences, as well as developing and promoting such systems independently and in a team.

LO4: Critically analysing and judging one's own research and published original research results of other authors in the area of Information and Computer Sciences.

LO5: Writing and successfully publishing one or more original scientific papers in peer-review journals.

LO6: Preparing and presenting a public statement on the results achieved at an international conference and arguing an opinion in debates with other scientists.

LO7: Being active within the academic and wider community, transferring scientific research achievements to future generations of students and presenting them to the public with the aim of popularizing science, the development of human society and sustainable development.

LO8: Writing a complete PhD thesis, presenting it publicly and defending it successfully.

RECOMMENDATION BY THE EXPERT PANEL TO THE ASHE'S ACCREDITATION COUNCIL

Upon the completion of the re-accreditation procedure and the examination of the materials submitted (Self-Evaluation Report etc.), the visit to the higher education institution and interviews with HEI members in accordance with the visit protocol, the Expert Panel renders its opinion in which it recommends to the Accreditation Council of the Agency the following:

Issue a confirmation on compliance for performing parts of activities (renew the licence)

RECOMMENDATIONS FOR THE IMPROVEMENT OF THE STUDY PROGRAMME

1. The research structure supporting the PhD programme should be strengthened and made more visible to the PhD students (i.e., entities such as research groups and research projects should not only exist effectively but also be visible to the PhD students).

2. The general scientific level of the Department of Informatics should be strengthened in terms of impact of the research results. The Panel considers that the Department is in a positive trend concerning improving research quality, but this effort must be intensified.

3. The number of students that are fully focused on the PhD programme should be increased, for example through funded projects that can employ PhD students or can support PhD grants. Even if not all the students can reach the optimal situation of being 100% devoted to their PhD work, it is of the utmost importance to increase the number of these students, when compared to PhD students that have to work simultaneously on their jobs (not related to the PhD studies).

4. The internationalization level of the PhD programme is still rather limited. It is important to encourage more students to write their doctoral theses in English, in order to allow the participation of international experts in the PhD evaluation committees. The current policy at the University of Rijeka concerning theses written in English should be revised to waive the PhD students from asking permission to write the thesis in English. Additionally, the Panel would like to encourage the future use of the Scandinavian model (collection of papers) for PhD theses, as another way to open the possibility of having international external members in the PhD thesis evaluation committees, as well as to increase the focus on quality publications even more. Finally, the internationalization level should also be improved through an increased effort towards international student recruitment and increased student/supervisor mobility.

5. The number of external members in the PhD evaluation committees should be at least two (i.e., above the minimum number of one external member) and, whenever possible, these external members should be selected among international researchers/professors.

6. The thesis proposal should not be regarded as a very preliminary version of the final thesis, already containing some new contribution from the student, but it should be focused on the clear definition of the research problem. That is, the thesis proposal should follow the more traditional view (as the starting point of the focused research work) that includes:
   - clear identification of the research problem;

- discussion of the problem relevance in the context of the state of the art;

- research approach that the student intends to follow and expected outcome.

It should be possible for the candidates to complete their thesis proposals by the end of the first year of the programme.

7. A mandatory course on research methods in informatics should be offered as part of the set of courses available to the students in the first year. Furthermore, the number of courses and modules should be reduced (in reality, some courses are not available every year) and students should be encouraged to use MOOCs that will increase the range of possibilities and will expose students to the very best courses on most of the Informatics topics.

8. The high performance computer is a great resource but it seems to be used by a small number of researchers (often from outside the Department). The Department should take advantage of this important (and rather expensive) resource and assure that more PhD students will use it in their research work.

9. The Department of Informatics should acquire institutional membership of ACM and IEEE Xplore (perhaps via a consortium) to allow PhD students and staff full access to many of the best journals and conference proceedings, as well as to webinars, tech packs, and videos.

10. The LOs should be revised as they can be improved in several ways. For example, the important topic of ethics (and indeed informatics ethics) must be included in the LOs, LO3 should be rephrased as it seems overly ambitious and in general the LOs should be more in line with the Bologna level three descriptors.

ADVANTAGES OF THE STUDY PROGRAMME

1. The programme benefits from the high motivation and the high ambition shared by all the stakeholders, especially by both the faculty members and the PhD students. At the same time, although highly motivated, all the stakeholders (department management, programme coordinators, thesis supervisors, and even the PhD candidates) are very aware of the difficulties they are facing and are reacting adequately.

2. The course structure is generally adequate (although it can be improved) and is flexible enough. The programme has an adequate balance between the effort required for the courses (48 ECTS) and the effort devoted to the research (>138 ECTS). The PhD programme as a whole is already producing the first results, as 3 students have already successfully defended their theses.

3. The Department has good potential for the establishment of internal collaborations (and to develop the emerging ones) in order to create/consolidate a strong research structure based on research groups and externally funded research projects.

4. The Department has new facilities and good equipment that seem very adequate for the needs of the PhD programme.

5. The PhD programme has access to generally well-qualified supervisors and counts with the cooperation of a few international professors/researchers that cooperate with the PhD programme and bring a very positive international view (e.g., Professor Bojan Čukić from University of North Carolina at Charlotte, USA).

DISADVANTAGES OF THE STUDY PROGRAMME

1. The absence of an explicit research structure, supported by research groups and externally funded projects, represents a limitation to the full development of the PhD programme.

2. The internationalization level of the PhD programme is still rather limited and needs a vigorous effort to increase, for instance, the number of PhD theses written in English (to allow external evaluators in the PhD defence).

3. The inbreeding is still high, as many faculty members and PhD students have graduated from the Department of Informatics from University of Rijeka and the PhD theses are mainly evaluated by local professors.

4. The PhD thesis proposal is typically defined and defended at the end of the second year, which is relatively late when compared to similar international PhD programmes (that see the thesis proposal simply as the clear definition of the research problem, followed by the discussion of its relevance facing the state of the art, and not as a preliminary version of the PhD thesis).

5. Many PhD candidates have too little time available for their PhD studies due to a high teaching load (for the candidates employed in the academia) or other work duties (for candidates from the industry).

EXAMPLES OF GOOD PRACTICE

1. The PhD program is attracting some students from other universities and providing a flexible plan (e.g., equivalence of courses previously done by the students) for them to join the PhD programme at the University of Rijeka and these students had been successful in their studies.

2. The cooperation model established with some top international professors (e.g., Professor Bojan Čukić from University of North Carolina at Charlotte, USA) seems to work fairly well. Surely, having such experienced international researchers acting as thesis supervisors and teachers in the courses is a valuable tool to increase the internalization level of the programme.

3. The PhD students referred as very positive the fact that the scientific programmes from potential supervisors are publicly available in the website of the PhD programme study, and are updated when a new cycle of candidates' enrolment starts. Although this is available only in Croatian (and should be available in English as well), the Panel recognizes the fact that the PhD students consider this point as a good practice.

COMPLIANCE WITH THE PRESCRIBED CONDITIONS FOR THE DELIVERY OF A STUDY PROGRAMME

Minimal legal conditions:	YES/NO notes
1. Higher education institution (HEI) is listed in the Register of Scientific Organisations in the scientific area of the programme, and has a positive reaccreditation decision on performing higher education activities and scientific activity.	**YES**
2. HEI delivers programmes in the two cycles leading to the doctoral programme, i.e., first two cycles in the same area and field/fields (for interdisciplinary programmes), and employs a sufficient number of teachers as defined by Article 6 of the Ordinance on the Content of a Licence and Conditions for Issuing a Licence for Performing Higher Education Activity, Carrying out a Study Programme and Re-Accreditation of Higher Education Institutions (OG 24/10).	**YES**
3. HEI employs a sufficient number of researchers, as defined by Article 7 of the Ordinance on Conditions for Issuing Licence for Scientific Activity, Conditions for Re-Accreditation of Scientific Organisations and Content of Licence (OG 83/2010).	**YES**
4. At least 50% of teaching as expressed in norm-hours is delivered by teachers employed at the HEI (full-time, elected into scientific-teaching titles).	**YES**
5. Student: teacher ratio at the HEI is below 30:1.	**YES** 1:25
6. HEI ensures that doctoral theses are public.	**YES** Repository of the Department of Informatics, University of Rijeka (https://repository.inf.uniri.hr)
7. HEI launches the procedure of revoking the academic title if it is determined that it has been attained contrary to the conditions stipulated for its attainment, by severe violation of the studying rules or based on a doctoral thesis (dissertation) that has proved to be a plagiarism or a forgery according to provisions of the statute or other enactments.	**YES** It is ensured by Article 44 of postgraduate PhD study
Additional/ recommended conditions of the ASHE Accreditation Council for passing a positive opinion	**YES/NO notes**
1. HEI (or HEIs in joint programmes) has at least five teachers appointed to scientific-teaching titles in the field, or fields relevant for the programme involved in its delivery.	**YES**
2. In the most recent reaccreditation, HEI had the standard Scientific and Professional Activity marked as at least "partly implemented" (3).	**YES**
3. The doctoral programme is aligned with the HEI's research	**YES**

strategy.	
4. The candidate : supervisor ratio at the HEI is not above 3:1.	**YES** It is 1:1.68
5. All supervisors meet the following conditions: a) PhD, elected into a scientific title, holds a scientific or a scientific-teaching position and/or has at least two years of postdoctoral research experience; b) active researcher in the scientific area of the programme, as evidenced by publications, participation in scientific conferences and/or projects in the past five years (table 2, Supervisors and candidates); c) confirms feasibility of the draft research plan upon admission of the candidate (or submission of the proposal); d) ensures the conditions (and funding) necessary to implement the candidate's research (in line with the draft research plan) as a research project leader, co-leader, participant, collaborator or in other ways; e) trained for the role before assuming it (through workshops, co-supervisions etc.); f) received a positive opinion of the HEI on previous supervisory work.	**a) YES** **b) YES** **c) YES** (when submitting the topic) **d) YES /NO** Some supervisors provide adequate conditions; the adjustment period at the University is 2018 **e) YES** New supervisors are trained through co-supervising and through workshops. **f) YES** The Committee for postgraduate study follows the work of supervisors and proposes the appointment of a supervisor to the Council of the Department.
6. All teachers meet the following conditions: a) holds a scientific or a scientific-teaching position; b) active researcher, recognized in the field relevant for the course (table 1, Teachers).	**YES**
7. The supervisor normally does not participate in the assessment committees.	**YES**
8. The programme ensures that all candidates spend at least three years doing independent research (while studying, individually, within or outside courses), which includes writing the thesis, publishing, participating in international conferences, field work, attending courses relevant for research etc.	**YES**
9. For joint programmes and doctoral schools (at the university level): cooperation between HEIs is based on adequate contracts; joint programmes are delivered in cooperation with accredited HEIs; the HEI delivers the programme within a doctoral school in line with the regulations and ensures good coordination aimed at supporting the candidates; at least 80% of courses are delivered by teachers employed at HEIs within the consortium.	**N. A.**

QUALITY ASSESSMENT

	Quality assessment ("high level of quality" or "improvements are necessary") and the explanation of the Expert Panel
1. RESOURCES: TEACHERS, SUPERVISORS, RESEARCH CAPACITIES AND INFRASTRUCTURE	
1.1. HEI is distinguished by its scientific/ artistic achievements in the discipline in which the doctoral study programme is delivered.	**Improvements are necessary** The scientific production of the teachers and supervisors at the PhD programme in the period 2012-2017 is uneven. Some professors have had a good production, with considerable impact (citations), but some others still have a modest level of scientific results. Generally, the trend is positive, but the number of papers is strongly biased by the production of a few professors that collaborate with the PhD Programme but are not faculty members of the Department of Informatics of University of Rijeka (e.g., only the Professors Vladan Jovanović, Georgia Southern University, USA, and Bojan Čukić, University of North Carolina, USA, are responsible for 60 papers in the 5 years period, including 16 journal papers). The University of Rijeka has adopted regulations that prescribe a minimum target scientific production of teachers and supervisors for a period of 5 years and most of the teachers and supervisors have already met the minimum requirements. However, great care is recommended in the use of these minimum requirements to avoid excluding (e.g., from the role of thesis supervisor) young professors that may not reach the minimum simply because they are at a starting phase. In addition to the general recommendations of improving the research structure and the internationalization level (e.g., develop research groups, increase internal intra-disciplinary cooperation, etc.), the Panel recommends a clear focus of faculty members on trying to increase the number of funded projects, especially international projects, as the main tool to improve research quality.
1.2. The number and workload of teachers involved in the study programme ensure quality doctoral education.	**High level of quality** The PhD programme involves 12 teachers/supervisors from the Department of Informatics and 7 are associated

	to the programme but belong to other institutions. The teaching/advising workload is adequate.
1.3. The teachers are highly qualified researchers who actively engage with the topics they teach, providing a quality doctoral programme.	**High level of quality** The research activity of teachers, although uneven, can assure a high quality PhD programme. There is a good potential for improvement, concerning both the number and the level of publications relevant for the PhD programme, but the trend observed from 2012 on, when the PhD programme was launched, is positive.
1.4. The number of supervisors and their qualifications provide for quality in producing the doctoral thesis.	**High level of quality** Currently, there are 37 active PhD candidates for a total of 22 supervisors, which corresponds to a rate of 1:1.68. Nevertheless, it is necessary to improve the balance of the number of PhD students among the supervisors. The SER states the number of papers published by the PhD candidates (22 journal papers, 62 international conference papers, and 5 book chapters/book), which is a fairly good number. Manual analysis of the papers venues shows a rather heterogeneous situation, with a good potential to increase quality.
1.5. The HEI has developed methods of assessing the qualifications and competencies of teachers and supervisors.	**High level of quality** The Department of Informatics has adequate procedures to assure the qualifications and competencies of teachers and supervisors.
1.6. The HEI has access to high-quality resources for research, as required by the programme discipline.	**High level of quality** The Department of Informatics has new and well-equipped facilities and the PhD students have satisfactory access to library resources (although this could be improved by providing them full access to the ACM or IEEE CS online libraries). The Department also has access to a supercomputer, although it is not fully clear whether this resource is currently being used for research related to the PhD programme or not.
2. INTERNAL QUALITY ASSURANCE OF THE PROGRAMME	
2.1. The HEI has established and accepted effective procedures for proposing, approving and delivering doctoral education. The procedures include identification of scientific/ artistic, cultural, social and economic needs.	**High level of quality** The PhD programme was established according to the procedures required for full accreditation and was internally evaluated by the University of Rijeka. The analysis justifying the decision of launching the PhD programme presented in the SER is sound.
2.2. The programme is aligned with the HEI research mission and vision, i.e.	**High level of quality** The PhD programme is aligned with the mission, vision

	research strategy.	and research strategy of the Department of Informatics for the period from 2015 to 2020, as outlined in the SER.
2.3.	The HEI systematically monitors the success of the programmes through periodic reviews, and implements improvements.	**High level of quality** The Department of Informatics evaluates the quality of the PhD programme following the "Regulations on postgraduate study of Informatics". The PhD programme is also evaluated by the students using the Likert scale regarding students' satisfaction with the programme. Since the PhD programme was recently established (2012), there is a natural and expected process of adjustment of the evaluation mechanisms. In spite of this, the Panel recognizes the detailed periodic evaluation process and the good summary provided in the SER.
2.4.	HEI continuously monitors supervisors' performance and has mechanisms for evaluating supervisors, and, if necessary, changing them and mediating between the supervisors and the candidates.	**High level of quality** The mechanisms for monitoring and improving the quality of supervision seem adequate and are well documented in the SER.
2.5.	HEI assures academic integrity and freedom.	**High level of quality** The Department of Informatics follows the Code of Ethics of the University of Rijeka, supporting academic freedom and preventing plagiarism and other unethical behaviour. The basic principles of the Code of Ethics are clearly documented in the SER. However, ethics inherent to informatics, such as privacy, security, code and design reuse should be explicitly included as a learning outcome of the PhD programme.
2.6.	The process of developing and defending the thesis proposal is transparent and objective, and includes a public presentation.	**High level of quality** All the formal criteria considered in this evaluation item are met. The SER provides a good summary.
2.7.	Thesis assessment results from a scientifically sound assessment of an independent committee.	**Improvements are necessary** In general, the PhD programme meets most of the criteria related to this evaluation topic. Nevertheless, the Panel believes that there is clear room for improvement. In particular, the Panel highly recommends including more than one external member in the PhD thesis evaluation committee and strongly encourages theses written in English, which is essential to allow the participation of members from the international research community in the thesis defence. This is of the utmost importance to fight inbreeding and increase programme internationalization. Furthermore, since the programme started in 2012 and

		very few PhD theses have been defended, this is the right moment to introduce the proposed improvements.
		It is worth noting that according to the current policy at the University of Rijeka concerning thesis written in English, the candidate must "submit an application specifying the candidate's language competences and reasons for writing a thesis in English to the Committee for postgraduate study." In our opinion, changing this University policy should be considered in the future.
		Since PhD thesis according to the Scandinavian model (collection of papers) are allowed, the Panel would like to encourage the future use of such model as another way to open the possibility of having international external members in the PhD thesis evaluation committees, as well as to increase the focus on quality publications even more.
2.8.	The HEI publishes all necessary information on the study programme, admissions, delivery and conditions for progression and completion, in accessible outlets and media.	**High level of quality** The Department of Informatics publishes the necessary information on its web pages. However, only part of the information is available in English.
2.9.	Funds collected for the needs of doctoral education are distributed transparently and in a way that ensures sustainability and further development of doctoral education (ensures that candidates' research is carried out and supported, so that doctoral education can be completed successfully).	**High level of quality** The SER provides detailed information on the funds distribution. Although the Panel does not have full visibility to the mechanisms in place, the distribution of funds looks transparent. Not related to the transparency of the mechanisms used to distribute funds (considered adequate), the Panel thinks there is a clear need to increase the amount of funding devoted to research, which includes funds to support PhD students (grants) and funds to allow more positions as research assistants. The most obvious instrument to increase such funding is to encourage faculty members to submit more project proposals to national and international research funding entities, such as the European Commission.
2.10.	Tuition fees are determined on the basis of transparent criteria (and real costs of studying).	**High level of quality** The criteria are described with enough detail in the SER and seem transparent.
3.	**SUPPORT TO DOCTORAL CANDIDATES AND THEIR PROGRESSION**	

3.1. The HEI establishes admission quotas with respect to its teaching and supervision capacities.	**High level of quality** Quotas are defined and managed by the Committee for postgraduate study. The ratio of active PhD candidates / supervisors is 1: 1.68, but some effort is required to promote an even distribution of PhD students among supervisors.
3.2. The HEI establishes admission quotas on the basis of scientific/ artistic, cultural, social, economic and other needs.	**High level of quality** The brief analysis presented in the SER shows that the Department of Informatics takes into account the society needs with a PhD degree in this area when the admission quotas were established.
3.3. The HEI establishes the admission quotas taking into account the funding available to the candidates, that is, on the basis of the absorption potentials of research projects or other sources of funding.	**Improvements are necessary** The Department of Informatics provides funds to support most of the students in activities such as publication of papers in conference proceedings and/or participation in conferences and workshops. However, this represents just a very small part of the funding needs. The PhD programme is still quite far from the ideal scenario in which the students are fully funded or co-funded by research projects or grants, in such a way that the students can concentrate only on their research work and not take the PhD work as a partial job among other activities not related to research. Most of the current students are employed at the Department or are employed in the public and business sectors, which means that they have a job and support their tuition fees (positive side) but, at the same time, they also see their time available for the PhD work significantly reduced.
3.4. The HEI should pay attention to the number of candidates admitted as to provide each with an advisor (a potential supervisor). From the point of admission to the end of doctoral education, efforts are invested so that each candidate has a sustainable research plan and is able to complete doctoral research successfully.	**Improvements are necessary** There is a clear effort to assign an advisor (which is a potential supervisor) at the very beginning, and the "Regulations on postgraduate study" define the criteria for the selection of candidates. However, the current understanding shared by most of the stakeholders of the PhD programme (management, supervisors, students,..) tends to see the thesis proposal (that coincides with the moment when the supervisor is fully confirmed) as a very preliminary version of the PhD thesis, that already includes some new contribution from the student. The Panel recommends the more traditional view of the thesis proposal that includes basically a clear identification of the research problem, a discussion of its relevance and of the state of the art, and the research approach that the

	student intends to follow. It should be possible for the candidates to complete the thesis proposal during the first year of the programme, which assures that the supervisor is defined and is in fact supervising the research done by the student.
3.5. The HEI ensures that interested, talented and highly motivated candidates are recruited internationally.	**Improvements are necessary** The selection and recruitment of PhD candidates are clearly described in the SER and seem adequate. If talented and highly motivated candidates are interested in the PhD programme, certainly the process in place is able to identify them (as talented and promising candidates) and select them. Concerning the capacity of the PhD programme to attract talented and highly motivated international students, the room for improvement is still quite big. The panel recommends strengthening the advertisement effort not only by focusing on the neighbour countries but also by generally disseminating information on the programme in English. Furthermore, the doctoral courses should be offered in English and students should be encouraged to use the English language in their doctoral thesis.
3.6. The selection process is public and based on choosing the best applicants.	**High level of quality** The candidate selection is done according to the "Regulations on postgraduate study" and is adequately described in the SER. The key steps of the process are publicly available (in Croatian) in the webpage of the Department of Informatics.
3.7. The HEI ensures that the selection procedure is transparent and in line with published criteria, and that there is a transparent complaints procedure.	**High level of quality** The selection procedure, as described in the SER, is transparent and the ranked list of selected candidates is publicly available.
3.8. There is a possibility to recognize applicants' and candidates' prior learning.	**High level of quality** The "Regulations on postgraduate study" explicitly recognize prior learning and achievements of PhD programme candidates, including scientific results such as scientific and technical publications.
3.9. Candidates' rights and obligations are defined in relevant HEI regulations and a contract on studying that provides for a high level of supervisory and institutional support to the candidates.	**High level of quality** Students' rights and obligations are known in advance, as defined by the university regulations. The information provided in the SER is satisfactory.
3.10. There are institutional support mechanisms for candidates' successful	**High level of quality** The SER presents detailed information on the institutional

progression.	support provided to the candidates in the specific points considered in this evaluation item.
4. PROGRAMME AND OUTCOMES	
4.1. The content and quality of the doctoral programme are aligned with internationally recognized standards.	**Improvements are necessary** The PhD program requires 48 ECTS credits for the courses and a minimum of 132 ECTS credits of independent research work for the candidates that managed to complete the PhD programme in 3 years. The SER does not present detailed comparison with similar courses that can be considered representative of the international standard level. Considering that the PhD programme started in 2012 (very recently), the current stage of development is quite acceptable. The programme is comparable with international standards in many aspects such as programme objectives, admission criteria, admission procedures, programme duration, specialisations, volume of teaching and the ratio between teaching and research, number of compulsory and elective courses. However, considering aspects such as the research structure that supports the work done by students and supervisors, the internationalization level, the quality and density of research projects and the theses language, the PhD program still has a considerable room for improvement. The perception of the Panel is that the PhD programme is on the right track to meet the international standards of similar PhD programmes.
4.2. Programme learning outcomes, as well as the learning outcomes of modules and subject units, are aligned with the level 8.2 of the CroQF. They clearly describe the competencies the candidates will develop during the doctoral programme, including the ethical requirements of doing research.	**High level of quality** In general, the SER describes the programme learning outcomes with enough detail, as well as their mapping with the descriptors in the Croatian Qualification Framework level 8.2. The Panel recommends a mandatory course on research methods in information science as part of the set of courses available to the students in the first year.
4.3. Programme learning outcomes are logically and clearly connected with teaching contents, as well as the contents included in supervision and research.	**High level of quality** The information provided in the SER and obtained by the Panel during the visit assures that the learning outcomes are acceptably connected with the teaching contents.
4.4. The doctoral programme ensures the achievement of learning outcomes and competencies aligned with the level 8.2 of the CroQF.	**High level of quality** Although only 2 PhD theses have been successfully concluded (and a third one was also concluded after the preparation of the SER), the learning outcomes and the

		concrete results (papers published so far by all the candidates) show a satisfactory alignment with the Croatian Qualification Framework.
4.5.	Teaching methods (and ECTS, if applicable) are appropriate for level 8.2 of the CroQF and assure achievement of clearly defined learning outcomes.	**High level of quality** The teaching methods and the proportion of courses versus independent research work are adequate.
4.6.	The programme enables acquisition of general (transferable) skills.	**High level of quality** The programme, as a whole, enables the general acquisition of the skills expected for a PhD level, including specialized knowledge on the area, research competences and generic skills such as scientific and technical writing and organizational skills.
4.7.	Teaching content is adapted to the needs of current and future research and candidates' training (individual course plans, generic skills etc.).	**High level of quality** The information provided in the SER and the insight obtained by the Panel during the visit confirm that the teaching content is adequately adapted to the candidates' needs of current and future research. However, the Panel is uncertain about the high level of quality due to the unavailability of information on the course curricula in English. The assessment is only based on the indirect information received.
4.8.	The programme ensures quality through international connections and teacher and candidate mobility.	**Improvements are necessary** The PhD programme is still in its infancy (started in 2012), but has already a very interesting number of connections with active international researchers/professors that collaborate as PhD thesis supervisors. Nevertheless, improvements are necessary in several aspects of the programme (one is internationalization level, as already mentioned). This includes the need to increase student and supervisor mobility, increase international cooperation in several forms especially through international research projects (e.g., European Commission funded projects), encourage candidates to write their PhD thesis in English to allow the participation of international researchers in the PhD defences, increase the efforts to attract more international students and improve advertisement of the programme (in English).

* NOTE: RECOMMENDATIONS OF THE EXPERT PANEL TO THE ASHE'S ACCREDITATION COUNCIL AND QUALITY LABEL

The role of the Expert Panel in the re-accreditation of doctoral study programmes is manifold. The Expert Panel or part of the Expert Panel visiting a higher education institution drafts a report on the basis of a self-evaluation report, the accompanying relevant documentation, and a site visit to HEI. The draft report is adopted by all members of the Cluster Expert Panel, while the president of the Cluster Expert Panel is responsible for coordinating the assessment levels.

The report contains an assessment on whether a doctoral study programme delivered at a higher education institution complies with the prescribed laws and by-laws, as well as any additional/recommended requirements defined by the Agency's Accreditation Council, and whether a higher education institution can obtain a positive, i.e. satisfactory quality assessment according to the criteria set out in this document. Moreover, the Expert Panel must make recommendations for quality improvement.
Based on the assessment of all these elements, the Expert Panel may propose to the Accreditation Council of the Agency to issue either a confirmation on compliance, a letter of expectation for the period up to three (3) years in which period the higher education institution should eliminate the identified deficiencies, or to deny the license.

If the Expert Panel has assessed that a doctoral study programme delivered by a higher education institution does not meet legal and other requirements or that the quality of a study programme is not ensured (i.e. that HEI does not meet additional requirements or recommendations made by the Accreditation Council, or has a very poor quality assessment), they should propose to the Accreditation Council to deny the license.

If the Expert Panel considers that the relevant laws and bylaws have been met by a higher education institution, but that certain elements mentioned above do not meet the quality requirements, while they consider that the identified shortcomings can be corrected within a time frame of three years, they should issue a letter of expectation.

If the Expert Panel considers that all legal and additional/recommended requirements have been met and the quality assessment is satisfactory, i.e. that a study programme fulfils the learning outcomes appropriately defined for that level and scientific area, they may propose the issuance of a certificate and have a HEI commit to quality improvement and reporting to the Agency during the follow-up period.

Finally, if the Expert Panel has, in accordance with the criteria mentioned above, proposed issuing the certificate of compliance and assessed that, in addition to meeting the minimum quality requirements – i.e. the qualification framework level - for a study programme, the programme should be identified as a doctoral programme of a 'high level of quality', the Expert Panel may propose to the Agency's Accreditation Council that such a doctoral study programme be awarded the 'high quality label'. Thus the Agency, with the consent of the Accreditation Council, grants a higher education institution the right to use the label for their academic and promotional purposes.
The 'high quality label' cannot be proposed or awarded to a programme or a higher education institution that does not comply with the requirements laid down by the laws and bylaws mentioned in this document, and any additional requirements recommended by the Accreditation Council. Moreover, the quality assessment awarded to a study programme should reflect a high level of quality inasmuch that at least half of the sub-criteria in each of the quality assessment criteria are assessed as

being of high quality. The Accreditation Council of the Agency issues a final opinion on the label awarded. The content and form of the quality labels shall be prescribed by the Agency in a relevant general act.

The Accreditation Council of the Agency discusses the final report with all recommendations and suggestions, and issues their opinion on the report. Based on a prior opinion of the Accreditation Council, the Agency issues an Accreditation Recommendation to the minister responsible for science and higher education, and upon receipt of the minister's final decision on the outcome of the procedure, awards the 'high quality label" to a higher education institution.