

The External Evaluation Report of a Doctoral Study Domain

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I. Introduction¹

In this chapter, the following shall be summarized:

- the context in which this external evaluation report was drafted (**the type of evaluation, the period of the evaluation visit, the composition of the Experts Committee** etc.);
- details about the doctoral school(s) of which the doctoral domain under review is part (number of doctoral advisors, number of students, institutional context, short history etc.);
- details about the doctoral study domain under review (number of students, institutional context, short history etc.).

Due to the restrictions of the pandemic crisis, the evaluation was mainly conducted online. Meetings were organized through the platform Zoom in Romanian but with a simultaneous translator service.

The School of Doctoral Studies "Constantin Belea" appeared within the University of Craiova by regrouping in a single doctoral school the three doctoral fields of Systems Engineering, Computers and Information Technology, Mechatronics and Robotics within the Faculty of Automation, Computers and Electronics.

Currently, the doctoral field of Computers and Information Technology has 3 supervisors and 17 PhD students. The main research topics cover the following areas: Data Analysis and High Performance Computing, Cloud Computing, Big Data and Cyber Security, Computer Graphics and Computer Vision, Intelligent Distributed Systems and Advanced Systems and Technologies for Education.

A total of 5 doctoral students graduated from the doctoral program in the last 5 years.

II. Methods used

This chapter will contain the methods and tools used in the external evaluation process, before and during the evaluation visit, including at least:

- The analysis of the internal evaluation report of the doctoral study domain under review and its Annexes;

¹ Each time when applicable the information shall be presented gender-wise.



- The analysis of documents made available by the IOSUD, in physical format, during the evaluation visit (if such documents have been requested);
- The analysis of documents, data and information available on the IOSUD/Doctoral School(s) website, in electronic format;
- Visiting the buildings included in the institution's property, comprising (indicative and non-exhaustive list, which shall be changed according to the context):
 - classrooms;
 - laboratories;
 - the institution's library;
 - research centers;
 - the Career Counselling and Guidance Center;
 - lecture halls for students;
 - the student residences;
 - the student cafeteria;
 - sports ground etc.;
- Meeting/discussions with doctoral students in the doctoral study domain under review;
- Meeting/Discussions with the graduates of the doctoral study domain under review;
- Meeting/Discussions with employers of the graduates in the doctoral study domain under review;
- Meeting/Discussions with the school officials of the Doctoral School(s) in which the doctoral study domain under review is operating;
- Meeting/Discussions with the doctoral advisors in the doctoral study domain under review;
- Meeting/discussions with the representatives of the various structures of the IOSUD/Doctoral School(s) in which the doctoral study domain under review is operating:
 - The Council of the Doctoral School, the University Senate, the Board of Directors, the Quality Assessment and Assurance Commission, the Quality Assurance Department, the Ethics Commission (including with the student representatives of these structures);
 - the Career Counselling and Guidance Center;
 - student organizations;
 - secretariats;
 - various departments/administrative offices (Social/Student residences-Cafeterias etc.);
- Application of questionnaires to doctoral students or academic staff in the doctoral study domain under review.

During the evaluation, the self- assessment report and provided annexes were used as the main elements for the evaluation. This information was complemented with additional documentation, such as the presentations displayed during the online meetings and the physical visit to the educational and research infrastructure.

The online meetings proceeded as scheduled with the different stakeholders: representatives of the institution and of the Council for Academic Doctoral Studies (CSUD), responsible of doctoral domain and the team who drafted the internal evaluation report, doctoral coordinators, PhD students, members of the Ethics Commission, members of the Commission for Quality Evaluation and Assurance, the Directors and persons in charge of the research centers/laboratories, Doctoral Studies Council, employers of doctoral graduates and graduates. The meetings were moderated by the evaluation team, and attendants answered to the question raised by the members of the evaluation panel. In general, all the



meeting were satisfactorily carried out and the discussion with attendants helped to clarify the different issues raised by the evaluation members.

III. Analysis of ARACIS's performance indicators

Domain A. INSTITUTIONAL CAPACITY

The doctoral school has proven to adopt the institutional framework required by legal regulations to conduct the doctoral studies. The research infrastructure is adequate to support students and supervisors. During the last 5 years, only 2 out of 3 advisors met the minimum standards by CNATDCU. The exhibit an active scientific production and international visibility.

As a recommendation, it is suggested to increase the research production to meet the required standards.

Criterion A.1. The administrative, managerial institutional structures and the financial resources

From the institutional and managerial point of view, the doctoral school covered satisfactorily all the issues related to the adoption and implementation of specific regulations for doctorate schools and enough financial and logistics resources are allocated to carry out the doctoral studies' mission. It is suggested to provide an English version for the website and the study contract.

Standard A.1.1. The institution organizing doctoral studies (IOSUD) has implemented the effective functioning mechanisms provided for in the specific legislation on the organization of doctoral studies.

The "Constantin Belea" Doctoral School has adequately implemented all the aspects included in the specific legislation of doctoral studies. Both indicators under the standard A.1.1. are fulfilled and there is evidence that confirm the application of specific regulations, being this information accessible to all students. As a recommendation, the study contract should be also available in English for possible foreign students.

Performance Indicator A.1.1.1. *The existence of specific regulations and their application at the level of the Doctoral School of the respective university doctoral study domain:*

- (a) the internal regulations of the Doctoral School;*
- (b) the Methodology for conducting elections for the position of director of the Council of doctoral school (CSD), as well as elections by the students of their representative in CSD and the evidence of their conduct;*
- (c) the Methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies);*
- (d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad;*
- (e) functional management structures (Council of the doctoral school), giving as well proof of the regularity of meetings;*
- (f) the contract for doctoral studies;*
- (g) internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies.*



The general framework of the doctoral studies is defined by the IOSUD Institutional Regulation, but there is also a regulation at the level of the "Constantin Belea" Doctoral School. The internal regulations cover aspects such as the procedures for conducting elections for the position of Director of the Doctoral School Council (CSD), the organisation of doctoral studies including admission procedures, the recognition of the position of doctoral supervisor, the creation of functional management structures (Doctoral School Council, CSD) to coordinate the doctoral activity, the study contracts with all students admitted to the doctoral programs and the internal procedures for the analysis and approval of topic proposals.

The CSD consists of 3 PhD supervisors at the University of Craiova, 1 external member and 1 PhD student.

Evidence that supports the implementation of the indicator are the general framework and internal procedures of the doctoral school, the study contract and the internal procedures that regulates different aspects related to the organization of the doctoral studies. Additionally, it has been proven that the CSD meetings are held on a regular basis. The minutes of the meetings, also provided in the supplementary documentation, includes the list of attendants, the date and the main agreements reached during the sessions.

As a recommendation, the study contract should be also available in English for possible foreign students.

The indicator is fulfilled.

Performance Indicator A.1.1.2. The doctoral school' Regulation includes mandatory criteria, procedures and standards binding on the aspects specified in Article 17, paragraph (5) of the Government Decision No. 681/2011 on the approval of the Code of Doctoral Studies with subsequent amendments and additions.

The regulations of the School of Doctoral Studies "Constantin Belea" covers the organization of the training program and the procedures for accepting new doctoral supervisors, for changing the doctoral supervisor of a certain PhD student and conflict mediation, for interrupting the doctoral program and for preventing fraud in scientific research.

Supplementary documentation provides evidence for each of the specific aspects covered.

There are no specific recommendations.

The indicator is fulfilled.

Standard A.1.2. The IOSUD has the logistical resources necessary to carry out the doctoral studies' mission.

The IT system is adequate to keep record and analyse the evolution of doctoral students. Information is easily accessible and facilitates the guidance of students. Yet, the information at the website should be also available in English. Accessibility to anti- plagiarism is also guaranteed.

Performance Indicator A.1.2.1. The existence and effectiveness of an appropriate IT system to keep track of doctoral students and their academic background.

The IT system keeps track of doctoral students' basic information and academic background. The website link is provided as evidence.



As a recommendation, the website that keeps track of students' information should be English for foreign students.

The indicator is fulfilled.

Performance Indicator A.1.2.2. *The existence and use of an appropriate software program and evidence of its use to verify the percentage of similarity in all doctoral theses.*

The computer program used to verify the percentage of similarity in all doctoral theses is the Sistemantiplagiat.ro program, recognized by CNATDCU. The similarity report is analysed and interpreted by the PhD supervisor together with the PhD student.

During the meetings with students and supervisors it was confirmed the availability of the anti-plagiarism software.

There are no specific recommendations.

The indicator is fulfilled.

Standard A.1.3. *The IOSUD makes sure that financial resources are used optimally, and the revenues obtained from doctoral studies are supplemented through additional funding besides governmental funding.*

Financial resources are optimally used. Research projects headed by the PhD advisors provide additional funding for scholarships and for supporting students' expenses associated to their training program. There is also additional funding coming from the Faculty of Automatics, Computers and Electronics and the doctoral school.

Performance Indicator A.1.3.1. *Existence of at least one research or institutional / human resources development grant under implementation at the time of submission of the internal evaluation file, per doctoral study domain under evaluation, or existence of at least 2 research or institutional development / human resources grant for the doctoral study domain, obtained by doctoral thesis advisors operating in the evaluated domain within the past 5 years. The grants address relevant themes for the respective domain and, as a rule, are engaging doctoral students.*

Two human resources development projects are reported plus 6 projects in which supervisors have achieved additional funding.

The details of the projects shown in the supplementary documentation shows that they are related to the field of Computer and Information Technology

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator *A.1.3.2. *The percentage of doctoral students active at the time of the evaluation, who for at least six months receive additional funding sources besides government funding, through scholarships awarded by individual persons or by legal entities, or who are financially supported through research or institutional / human resources development grants is not less than 20%.*

3 of the former PhD students and 6 of the 13 current PhD students were supported with an additional income for periods of more than 6 months, which represents a percentage of 46%, higher than the limit of 20%. The self-assessment report details the name of students and the period of time in which they received the funding.



During the meeting with students, it was confirmed that some of them received the additional funding.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator *A.1.3.3.² *At least 10% of the total amount of doctoral grants obtained by the university through institutional contracts and of tuition fees collected from the doctoral students enrolled in the paid tuition system is used to reimburse professional training expenses of doctoral students (attending conferences, summer schools, training, programs abroad, publication of specialty papers or other specific forms of dissemination etc.).*

In the University of Craiova, the accounting statement of income and expenses is made at the level of doctoral schools, and not at the level of doctoral study fields. The sources for funding training expenses of doctoral students come from the University and the doctoral school, but also from the research fund of the Faculty of Automatics, Computers and Electronics and research projects. The self-assessment report conducts an estimation based on the previous sources of funding and the percentage of PhD students in the CTI field compared to the total of the doctoral school and a percentage of 19.97% is obtained. The procedure to obtain such value is considered valid and that means that is above the limit of 10 %.

There are no specific recommendations.

The indicator is fulfilled.

Criterion A.2. Research infrastructure

The research infrastructure is aligned with doctoral studies' research lines and allows students to carry out the required experiments for the validation of their research works.

Standard A.2.1. The IOSUD has a modern research infrastructure to support the conduct of doctoral studies' specific activities.

The research infrastructure is aligned with doctoral studies' research lines and allows students to carry out the required experiments for the validation of their research works.

Performance Indicator A.2.1.1. *The venues and the material equipment available to the doctoral school enable the research activities in the evaluated domain to be carried out, in line with the assumed mission and objectives (computers, specific software, equipment, laboratory equipment, library, access to international databases etc.). The research infrastructure and the provision of research services are presented to the public through a specific platform. The research infrastructure described above, which was purchased and developed within the past 5 years will be presented distinctly.*

The infrastructure of the doctoral domain includes a High-Performance Computing System, a computer lab, and INCESA laboratories, a research infrastructure of the University of Craiova that promotes excellence in the field of applied sciences. INCESA laboratories are equipped with modern

² The indicators marked with an asterisk (*) hold a special status, referring exclusively to the evaluation of doctoral studies domains, as per Article 12 from the annex No.1 of the Order of the minister of education No. 3651/12.04.2021 approving the Methodology for evaluating university doctoral studies and the system of criteria, standards and performance indicators used in the evaluation. In case they are not met, the Agency extends a period of maximum 3 years to IOSUD to correct the respective deficiencies.



equipment and software offering conditions for high-level research and experiments. More details are provided at <http://erris.gov.ro/Research-Infrastructure-in-A>.

The University of Craiova also provides access to over 10 scientific databases, which include the main bibliographic sources related to the field of computers and information technology.

Finally, the doctoral school also has lecturers and seminar rooms and the library of the Faculty of Automatics, Computers and Electronics with a book fund of 62,758 volumes.

Supplementary documentation details the available electronic databases and research infrastructure. During the meetings with students and graduates, the availability of this infrastructure was confirmed.

There are no specific recommendations.

The indicator is fulfilled.

Criterion A.3. Quality of Human Resources

Performance indicator A.3.1.1. is partially fulfilled because less than 3 doctoral thesis advisors meet the minimum standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU). The rest of indicators are accomplished although it is suggested to increase the impact factor of the targeted journals.

Standard A.3.1. At the level of each domain there are sufficient qualified staff to ensure the conduct of doctoral study program.

Performance indicator A.3.1.1. is partially fulfilled because less than 3 doctoral thesis advisors meet the minimum standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU). The rest of indicators under this standard are accomplished: the training program is adequate and supported by full time lecturers with expertise within the domain of the disciplines and there are no supervisors exceeding the coordination of more than 8 students.

Performance Indicator A.3.1.1. Minimum three doctoral thesis advisors within that doctoral domain, and at least 50% of them (but no less than three) meet the minimum standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU) in force at the time when the evaluation is carried out, which standards are required and mandatory for obtaining the enabling certification.

2 out of 3 PhD supervisors meet the minimum CNATDCU standards. Although 50% of the supervisors meet the criterion, they are less than 3 as stated by the indicator. However, despite not accomplishing completely the indicator, it is expected that the supervisor that do not comply the minimum CNATDCU standards will be able to reach it in a period less than 3 years.

As a recommendation, the doctoral field should increase the number of supervisors.

The indicator is partially fulfilled.

Performance Indicator *A.3.1.2. At least 50% of all doctoral advisors have a full-time employment contract for an indefinite period with the IOSUD.

All the 3 PhD supervisors have the didactic degree of university professor and are tenured at the Faculty of Automation, Computers and Electronics, University of Craiova. Supplementary documentation provides the certificates from human resources for the PhD supervisors in the field of Computers and Information Technology.



There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator A.3.1.3. *The study subjects in the education program based on advanced higher education studies pertaining to the doctoral domain are taught by teaching staff or researchers who are doctoral thesis advisors / certified doctoral thesis advisors, professors / CS I or lecturer / CS II, with proved expertise in the field of the study subjects they teach, or other specialists in the field who meet the standards established by the institution in relation with the aforementioned teaching and research functions, as provided by the law.*

The content of the curriculum includes two compulsory subjects of 3 credits each one: Methodology of Scientific Research and Ethics and Academic Integrity, which are the disciplines in the common core, plus several disciplines in the field of "Computers and Information Technology": Algorithms Analysis and Design, Computer Networks, Artificial Intelligence, Multi-Agent Systems, Data Modeling and Analysis, Parallel Computing, Machine Learning, Web Systems and Technologies, Human Computer Interaction and Computer Vision, with 6 credits each one. 4 disciplines belonging to the specific disciplines must be chosen individually after enrolment for each PhD student.

The specific disciplines and one of the common disciplines are taught by the 3 supervisors of the doctoral domain, with proved expertise in the topics. The discipline of Ethics and Academic Integrity is taught by a PhD supervisor in the field of Law.

The curricula of the disciplines are provided in the supplementary documentation as well as the CV of lecturers. The content of the training program is adequate and aligned with the doctoral domain.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator *A.3.1.4. *The percentage of doctoral thesis advisors who concomitantly coordinate more than 8 doctoral students, but no more than 12, who are themselves studying in doctoral programs³ does not exceed 20%.*

The distribution of PhD students over supervisors is:

- Prof. univ. dr. ing. Costin Bădică – 7 PhD students
- Prof. univ. dr. ing. Mihai Mocanu – 2 PhD students
- Prof. univ. dr. ing. Elvira Popescu – 2 PhD students

Therefore, none of the supervisors coordinate more than 8 doctoral students and the indicator is accomplished.

There are no specific recommendations.

The indicator is fulfilled.

Standard A.3.2. *The Doctoral advisors within the domain are carrying out a scientific activity visible at international level.*

All 3 supervisors comply both indicators. However, it is suggested to increase the impact factor of the targeted journals.

³ 3 years for the doctoral university studies with the duration stipulated at Article 159, paragraph (3), respectively 4 years for the doctoral university studies with the duration stipulated at Article 174, paragraph (3) of the Law of national education No.1/2011 with subsequent amendments and additions, with additional extension periods approved as per Article 39, paragraph (3) of the Code of doctoral studies approved by the GD No. 681/2011 with subsequent amendments and additions.



Performance Indicator A.3.2.1. *At least 50% of the doctoral thesis advisors in the evaluated domain have at least 5 Web of Science- or ERIH-indexed publications in magazines of impact, or other achievements of relevant significance for that domain, including international-level contributions that indicate progress in scientific research - development - innovation for the evaluated domain. The aforementioned doctoral thesis advisors enjoy international awareness within the past five years, consisting of: membership on scientific boards of international publications and conferences; membership on boards of international professional associations; guests in conferences or expert groups working abroad, or membership on doctoral defense commissions at universities abroad or co-leading with universities abroad. For Arts and Sports and Physical Education Sciences, doctoral thesis advisors shall prove their international visibility within the past five years by their membership on the boards of professional associations, membership in organizing committees of arts events and international competitions, membership on juries or umpire teams in artistic events or international competitions.*

All 3 PhD supervisors in the field of Computers and Information Technology have more than 5 papers indexed Web of Science in journals with impact factor. However, they should try to increase the number of papers in the Q1-Q2 rank. The 3 supervisors also show an international visibility through their participation in conferences and in editorial scientific committees, and the organization of special issues.

Supplementary documentation details the scientific production of supervisors and their participation in international events.

As a recommendation, supervisors should target journals with higher impact factors, within Q1-Q2 rank.

The indicator is fulfilled.

Performance Indicator *A.3.2.2. *At least 50% of the doctoral thesis advisors in a specific doctoral study domain continue to be active in their scientific field, and acquire at least 25% of the score requested by the minimal CNATDCU standards in force at the time of the evaluation, which are required and mandatory for acquiring their enabling certificate, based on their scientific results within the past five years.*

All three PhD supervisors in the field of Computers and Information Technology meet this requirement, achieving in the last 5 years (2016-2020) over 25% of the score (Prof. univ. dr. ing. Costin Bădică: 169%, Prof. univ. dr. ing. Mihai Mocanu: 52.34%, Prof. univ. dr. ing. Elvira Popescu: 295.14%).

The self-assessment report details the calculations of the score and verification sheets for the last 5 years are provided as complementary documentation.

There are no specific recommendations.

The indicator is fulfilled.

Domain B. EDUCATIONAL EFFECTIVENESS

The educational effectiveness of the doctoral domain is demonstrated by the number of enrolled students each year, with a low dropout rate, and the scientific production. Students receive an adequate guidance from advisory committees and there is enough human resources to support the required guidance. However, several improvements are advised, such as making visible the admission procedures at the website, including explicitly the learning outcomes as part of disciplines' curricula and targeting journals with impact factor.

Criterion B.1. The number, quality and diversity of candidates enrolled for the admission contest



The capacity of attraction of external students is above the required limit. The selection process is carefully implemented according to the established regulations, but the procedures should be visible at the website in Romanian and English.

Standard B.1.1. The institution organizing doctoral studies has the capacity to attract candidates from outside the higher education institution or a number of candidates exceeding the number of seats available.

The capacity of attraction of external students that belong to other higher education institutions is above the required threshold.

Performance Indicator *B.1.1.1. *The ratio between the number of graduates of masters' programs of other higher education institutions, national or foreign, who have enrolled for the doctoral admission contest within the past five years and the number of seats funded by the state budget, put out through contest within the doctoral domain is at least 0.2 or the ratio between the number of candidates within the past five years and the number of seats funded by the state budget put out through contest within the doctoral studies domain is at least 1,2.*

The ratio between the number of master's degree graduates of other higher education institutions in the country or abroad who have entered the competition for admission to doctoral field of study in the last 5 years and the number of places financed from the state budget for the doctoral field of study is 4/9, which gives a value of 0.44 above the limit 0.2.

Supplementary documentation includes the list of PhD students enrolled in the field of Computers and Information Technology and the situation of budgeted places put up for competition.

There are no specific recommendations.

The indicator is fulfilled.

Standard B.1.2 Candidates admitted to doctoral studies demonstrate academic, research and professional performance.

The admission to the doctoral study program is clearly defined by the Doctoral School Regulations. Each applicant is individually evaluated attending to its profiles, previous studies, CV and motivation and scientific interest. A personal interview is also conducted as part of the selection process. However, admission procedures should be visible at the doctoral school website, also in English. The procedures are adequately implemented and help to reduce the dropout rate below the required limit.

Performance Indicator *B.1.2.1. *Admission to doctoral study programs is based on selection criteria including: previous academic, research and professional performance, their interest for scientific or arts/sports research, publications in the domain and a proposal for a research subject. Interviewing the candidate is compulsory, as part of the admission procedure.*

There is a specific document provided in the complementary documentation that address the criteria for admission to the doctoral study program. Criteria considers aspects such as the previous studies and background, the previous professional or research experience, the scientific research concerns, the bibliography studied and the direction in which the doctorate thesis will be written. There is a compulsory personal interview where previous points are discussed with the candidate.

As a recommendation, admission procedures should be visible at the doctoral school website, also in English.

The indicator is fulfilled.



Performance Indicator B.1.2.2. *The expelling rate, including renouncement / dropping out of doctoral students 3, respectively 4, years after admission⁴ does not exceed 30%.*

The number of students enrolled at the end of 2015-2020 is 17, the number of graduates (doctors) between 2015-2020 is 5 and the number of students dropping out during 2015-2020 is 7.

This numbers throw a drop rate of 24.13%, which is under the limit of 30%.

There are no specific recommendations.

The indicator is fulfilled.

Criterion B.2. The content of doctoral programs

The training program is adequate and includes the compulsory subject about Ethics and academic integrity and Methodology of Scientific Research. However, the specific subjects' program should explicitly include the learning outcomes. Students receive a adequate guidance from advisory committees and there is enough human resources to support the required guidance.

Standard B.2.1. The training program based on advanced university studies is appropriate to improve doctoral students' research skills and to strengthen ethical behavior in science.

The training program is adequate and includes the compulsory subject about Ethics and academic integrity. However, the specific subjects' program should explicitly include the learning outcomes. Students receive a adequate guidance from the advisory committee.

Performance Indicator B.2.1.1. *The training program based on advanced academic studies includes at least 3 disciplines relevant to the scientific research training of doctoral students; at least one of these disciplines is intended to study in-depth the research methodology and/or the statistical data processing.*

The training program includes 10 disciplines closely related to the field of Computers and Information Technology plus two transversal disciplines related to Ethics and academic integrity and Methodology of Scientific Research.

The curricula of the disciplines are provided as part of the supplementary documentation. Their content is aligned with the doctoral domain.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator B.2.1.2. *At least one discipline is dedicated to Ethics and Intellectual Property in scientific research or there are well-defined topics on these subjects within a discipline taught in the doctoral program.*

The training program of the "Constantin Belea" Doctoral School contains a common discipline about Ethics and academic integrity taught by a PhD supervisor in the field of Law.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator B.2.1.3. *The IOSUD has mechanisms to ensure that the academic training program based on advanced university studies addresses „the learning outcomes”, specifying the*

⁴ 3 years for the doctoral university studies with the duration stipulated at Article 159, paragraph (3), respectively 4 years for the doctoral university studies with the duration stipulated at Article 174, paragraph (3) of the Law of national education No. 1/2011 with subsequent amendments and additions.



knowledge, skills, responsibility and autonomy that doctoral students should acquire after completing each discipline or through the research activities⁵.

The progress of student is periodically monitored through individualized discussions with the advisory committees. Also, the essential knowledge and skills that must result from advanced training and research programs are also analysed according to the procedures of the doctoral school.

The disciplines' curricula are provided in the supplementary documentation and contains the objectives of subject, the content and the evaluation.

As a recommendation, the disciplines' curricula should explicitly address the learning outcomes that students are expected to achieve. Currently, they include the objectives. But while objectives generally describe the desirable knowledge, learning outcomes are a more specific description of what students will be able to do in some measurable way.

The indicator is fulfilled

Performance Indicator B.2.1.4. All along the duration of the doctoral training, doctoral students in the domain receive counselling/guidance from functional guidance commissions, which is reflected in written guidance and feedback or regular meeting.

The advisory committee is formed by the PhD supervisor and 3 specialist members, teachers or researchers in the field of Computers and Information Technology. This committee provides specialized advice to the PhD student, participates in his/her evaluation of research, reports on the quality of the doctoral thesis and admits or rejects the final defense before the doctoral committee.

During the meetings with students and graduates it was confirmed they keep a fluid communication with the PhD advisor and the advisory committee.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator B.2.1.5. For a doctoral study domain, the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance must not exceed 3:1.

17 PhD students are currently enrolled in the field of Computers and Information Technology. The number of those currently undergoing either the training program based on advanced university studies or the scientific research program is 11, as reported at the website of the doctoral school. The advisory committee of PhD students is provided by the 3 PhD supervisors in the field of study and 3 teachers, which gives a ratio 11:6 below the required limit 3:1.

There are no specific recommendations.

The indicator is fulfilled.

Criterion B.3. The results of doctoral studies and procedures for their evaluation.

Productivity of doctoral students that finished their PhD over the last 5 years is adequate, with many publications but in journal with no impact factor in most cases. External researchers regularly participate in the evaluation commissions with no over-representation of a specific researcher.

⁵ Or by what the graduate should know, understand and to be able to do, according to the provisions of the Methodology of 17 March 2017 regarding inscription and registration of higher education qualifications in the National Register of Qualifications in Higher Education (RNCIS) approved by the Order No.3475/2017 with subsequent amendments and additions.



Standard B.3.1. Doctoral students capitalize on the research through presentations at scientific conferences, scientific publications, technological transfer, patents, products and service orders.

Provided documentation proves that there are joint publications in journals and conferences between students and supervisors, and they are related to the topic of the doctoral field. However, it is recommended to target journals with impact factors.

Performance Indicator B.3.1.1. *For the evaluated domain, the evaluation commission will be provided with at least one paper or some other relevant contribution per doctoral student who has obtained a doctor's title within the past 5 years. From this list, the members of the evaluation commission shall randomly select 5 such papers / relevant contributions per doctoral study domain for review. At least 3 selected papers must contain significant original contributions in the respective domain.*

The 5 graduates in the field of Computers and information technology in the last 5 years have published a total of 78 papers: 16 articles in journals (12 in ISI journals, 4 in BDI journals), 2 book chapters, and about 60 papers presented and published at international scientific events (mostly indexed by ISI Proc. and BDI). Supplementary documentation details the publications of the 5 graduates. The analysis of a sample of publications reveals that the topics of the papers fall within the scope of the field of Computers and Information Technology. Although the number of publications is quite high, it would be better a lower number of publications but in higher ranked journals.

As a recommendation, contributions should target journals with impact factor.

The indicator is fulfilled.

Performance Indicator *B.3.1.2. *The ratio between the number of presentations of doctoral students who completed their doctoral studies within the evaluated period (past 5 years), including posters, exhibitions made at prestigious international events (organized in the country or abroad) and the number of doctoral students who have completed their doctoral studies within the evaluated period (past 5 years) is at least 1.*

Given that the number of doctoral graduates in the last 5 years in the field of Computers and Information Technology is 5 and more than 60 papers were presented in 17 international events, the ratio is clearly above the required value.

Both publications and mobilities are provided in the supplementary documentation.

There are no specific recommendations.

The indicator is fulfilled.

Standard B.3.2. The Doctoral School engages a significant number of external scientific specialists in the commissions for public defense of doctoral theses in the analyzed domain.

The doctoral school keeps contact with other national research groups that regularly participates in the public defense of doctoral theses. Additionally, they are distributed over the defended doctoral thesis so that there no over representation of a specific researcher.

Performance Indicator *B.3.2.1. *The number of doctoral theses allocated to one specialist coming from a higher education institution, other than the evaluated IOSUD should not exceed two (2) in a year for the theses coordinated by the same doctoral thesis advisor.*

The list of doctoral committees for public defense of doctoral theses is provided in the supplementary documentation and it reveals that the number of thesis allocated to specialists coming



from other institution different to the University of Craiova does not exceed two. Therefore, the indicator is accomplished.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator *B.3.2.2. *The ratio between the doctoral theses allocated to one scientific specialist coming from a higher education institution, other than the institution where the defense on the doctoral thesis is organized, and the number of doctoral theses presented in the same doctoral study domain in the doctoral school should not exceed 0.3, considering the past five years. Only those doctoral study domains in which minimum ten doctoral theses have been presented within the past five years should be analyzed.*

The number of doctoral theses defended in the field of study is 5 in the last 5 years. As this value is lower than 10, the indicator is accomplished.

There are no specific recommendations.

The indicator is fulfilled.

Domain C. QUALITY MANAGEMENT

The Quality Assurance System is designed and implemented satisfactorily, although more emphasis on explicit action plans is advised. All the relevant information regarding the doctoral field is available through the website, but it is suggested a better organization of the information and to provide the information both in Romanian and English. The doctoral field keeps several ERASMUS agreements with foreign institutions, but it is also suggested to improve its international visibility by inviting external experts to deliver some classes and by including international experts in the evaluation panels.

Criterion C.1. Existence and periodic implementation of the internal quality assurance system

The Quality Assurance System is designed and implemented. There are procedures to monitor the activity of all the actors of the doctoral domain and to collect feedback information. However, it is suggested to keep track of actions through an explicit action plan.

Standard C.1.1. There are an institutional framework and procedures in place and relevant internal quality assurance policies, applied for monitoring the internal quality assurance.

There is a defined framework for Quality Assurance, with procedures that have been implemented. The framework includes procedures for collecting information about students and advisors, the training program and the infrastructure. There are also specific procedures to measure the students' satisfaction and some actions have been implemented. However, it is suggested to keep track of actions through an explicit action plan where deficiencies are detected and contingency plans are applied with a clear specification of the person responsible, deadline and metrics.

Performance Indicator C.1.1.1. *The Doctoral school in the respective university study domain shall demonstrate the continuous development of the evaluation process and its internal quality assurance following a procedure developed and applied at the level of the IOSUD, the following assessed criteria being mandatory:*

(a) *the scientific work of Doctoral advisors;*



- (b) the infrastructure and logistics necessary to carry out the research activity;
- (c) the procedures and subsequent rules based on which doctoral studies are organized;
- d) the scientific activity of doctoral students;
- e) the training program based on advanced academic studies of doctoral students;
- f) social and academic services (including for participation at different events, publishing papers etc.) and counselling made available to doctoral students.

The internal quality assurance procedures at the level of the IOSUD monitor the scientific activity of PhD supervisors and students, the infrastructure and logistics necessary to carry out the research activity, the regulations and procedures that organize the doctoral studies, the training program and the social and academic support services.

Evaluation is taken periodically, and some reports are included in the supplementary documentation.

As a recommendation, the periodical reports should include an action plan where deficiencies are identified and listed, and remedy actions are proposed along with a deadline, a responsible person and the indicators to measure the evolution of the detected problem.

The indicator is fulfilled.

Performance Indicator *C.1.1.2. Mechanisms are implemented during the stage of the doctoral study program to enable feedback from doctoral students allowing to identify their needs, as well as their overall level of satisfaction with the doctoral study program in order to ensure continuous improvement of the academic and administrative processes. Following the analysis of the results, there is evidence that an action plan was drafted and implemented.

Procedures for collecting information about the students' level of satisfaction have been implemented. Provided documentation includes the specific questionnaire to collect this information and a report where the results were analysed. As a result of this analysis, a private scholarship program QFORIT was implemented and a POCU project about the applicability of research results involving two PhD students was won and it is still ongoing.

There are no specific recommendations.

The indicator is fulfilled.

Criterion C.2. Transparency of information and accessibility of learning resources

All the relevant information regarding the doctoral field is available through the website. However, it is recommended to unify all the information under the same domain y to provide all the information in English. Students have access to the electronic resources relevant for the doctoral field and all the research facilities.

Standard C.2.1. Information of interest to doctoral students, future candidates and public interest information is available for electronic format consultation.

The links for the doctoral school regulations, admission regulations, doctoral studies contract, information for public defence of the thesis and required standards, the content of training programs, the academic and scientific profile of supervisors, list of PhD students and links to abstracts of doctoral theses to be defended publicly are provided and they contain the expected information. However, some of the links are within the doctoral website subdomain and some other within the general University of Craiova domain. For instance, admissions and public defence regulations, doctoral studies contract and links to



doctoral thesis to be defended publicly should be under the subdomain <http://www.ace.ucv.ro/sdcb/>. The website should be also available in Romanian and English.

Performance Indicator C.2.1.1. *The IOSUD publishes on the website of the organizing institution, in compliance with the general regulations on data protection, information such as:*

- (a) the Doctoral School regulation;*
- (b) the admission regulation;*
- (c) the doctoral studies contract;*
- (d) the study completion regulation including the procedure for the public presentation of the thesis;*
- (e) the content of training program based on advanced academic studies;*
- (f) the academic and scientific profile, thematic areas/research themes of the Doctoral advisors within the domain, as well as their institutional contact data;*
- (g) the list of doctoral students within the domain with necessary information (year of registration; advisor);*
- (h) information on the standards for developing the doctoral thesis;*
- (i) links to the doctoral theses' summaries to be publicly presented and the date, time, place where they will be presented; this information will be communicated at least twenty days before the presentation.*

The links for the doctoral school regulations, admission regulations, doctoral studies contract, information for public defence of the thesis and required standards, the content of training programs, the academic and scientific profile of supervisors, list of PhD students and links to abstracts of doctoral theses to be defended publicly are provided and they contain the expected information. However, some of the links are within the doctoral website subdomain and some other within the general University of Craiova domain. For instance, admissions and public defence regulations, doctoral studies contract and links to doctoral thesis to be defended publicly should be under the subdomain <http://www.ace.ucv.ro/sdcb/>. The website should be also available in Romanian and English.

As a recommendation, the doctoral website should be better organized including all the relevant information for student under the same subdomain and it should also be available in English.

The indicator is fulfilled.

Standard C.2.2. *The IOSUD/The Doctoral School provides doctoral students with access to the resources needed for conducting doctoral studies.*

Students have access to the electronic resources through international databases and the University of Craiova library, to anti-plagiarism software and labs and equipments required for their research.

Performance Indicator C.2.2.1. *All doctoral students have free access to one platform providing academic databases relevant to the doctoral studies domain of their thesis.*

All PhD students of IOSUD – UCV have free access to electronic databases relevant in the field of Computers And Information Technology: Science Direct, Springerlink Journals, Institute of Physics Journals, Web Of Knowledge (WoS, Journal Citation Reports, Derwent Innovations Index), SCOPUS, IEEE / IET Electronic Library (IEL). The access is made through the platform provided by the Association of Universities, Research-Development Institutes and Central University Libraries of Romania "ANELIS PLUS". During the meetings with students, the accessibility of electronic resources was confirmed.



There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator C.2.2.2. *Each doctoral student shall have access, upon request, to an electronic system for verifying the degree of similarity with other existing scientific or artistic works.*

Each PhD student has access, upon request and with the consent of the doctoral supervisor, to the Sistemantiplagiat.ro program, recognized by CNATDCU, for verifying the degree of similarity with other existing scientific works. The availability of this tool was confirmed during the meetings with students and supervisors.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator C.2.2.3. *All doctoral students have access to scientific research laboratories or other facilities depending on the specific domain/domains within the Doctoral School, according to internal order procedures.*

The access of PhD students to scientific research laboratories or other facilities, according to the internal regulations, is guaranteed by the doctoral study contracts. The main facilities at the disposal of the PhD students are located in CERCA - Interdisciplinary Research Center in Computers, Automation and Robotics and INCESA, with the Laboratory of Formal Intelligence Integration in Analysis, Testing and Certification of Computer Infrastructures and the Laboratory of Computer Engineering. Additionally, students have also access to the Library of the University of Craiova.

During the meetings with students and graduates, it was confirmed the availability of previous facilities.

There are no specific recommendations.

The indicator is fulfilled.

Criterion C.3. Internationalization

The doctoral field keeps several ERASMUS agreements with foreign institutions and students have participated in mobilities for attending conferences or courses. However, the doctoral domain should reinforce the participation of leading experts through invited sessions within the doctoral school. Additionally, it is advised to improve the international visibility of the doctoral domain and include international experts in the evaluation panels.

Standard C.3.1. There is a strategy in place and it is applied to enhance the internationalization of doctoral studies.

The doctoral field keeps several ERASMUS agreements with foreign institutions and students have participated in mobilities for attending conferences or courses. However, the doctoral domain should reinforce the participation of leading experts through invited sessions within the doctoral school. Additionally, it is advised to improve the international visibility of the doctoral domain and include international experts in the evaluation panels.

Performance Indicator *C.3.1.1. *IOSUD, for every evaluated domain, has concluded mobility agreements with universities abroad, with research institutes, with companies working in the field of study, aimed at the mobility of doctoral students and academic staff (e.g., ERASMUS agreements for the*



doctoral studies). At least 35% of the doctoral students have completed a training course abroad or other mobility forms such as attending international scientific conferences. IOSUD drafts and applies policies and measures aiming at increasing the number of doctoral students participating at mobility periods abroad, up to at least 20%, which is the target at the level of the European Higher Education Area.

The doctoral domain has 16 incoming and outgoing mobility agreements with universities and research institutes abroad that are detailed in the supplementary documentation, being all of them active. 11 students have completed a form of mobility and 5 of them have participated in international conferences or training courses. Therefore, the indicator is accomplished.

There are no specific recommendations.

The indicator is fulfilled.

Performance Indicator C.3.1.2. *In the evaluated doctoral study domain, support is granted, including financial support, to the organization of doctoral studies in international co-tutelage or invitation of leading experts to deliver courses/lectures for doctoral students.*

The Faculty of Automation, Computers and Electronics has co-organized the 24th International Conference on System Theory, Control and Computing Joint Conference (ICSTCC 2020) in October 2020. Also, special sessions are organized dedicated to PhD students and young researchers such as the Round Table session: Young Researchers Meetup in Control Engineering and Computer Science within ICSTCC 2020. There is no co-tutelage of doctoral thesis with other international higher education institution. In 2021, a workshop dedicated to the PhD students will be organized (1st International Doctoral Workshop on Advanced Approaches in Robotics, Control and Computing) with the participation of foreign lecturers.

As a recommendation, the doctoral domain should reinforce the participation of leading experts through invited sessions within the doctoral school and not only within a conference, which is not an activity specifically organized for PhD students.

The indicator is partially fulfilled.

Performance Indicator C.3.1.3. *The internationalization of activities carried out during the doctoral studies is supported by IOSUD through concrete measures (e.g., by participating in educational fairs to attract international doctoral students; by including international experts in guidance committees or doctoral committees etc.).*

The Doctoral School Council has an external member from France to intensify the internationalization activities. One foreign PhD student defended his thesis in 2018 and two more are still ongoing. However, the doctoral committees of thesis defended in the last 5 years do not include international experts.

As a recommendation, the doctoral field should focus on participating in educational fairs to attract international doctoral students and included experts from international institutions in the doctoral committees.

The indicator is partially fulfilled.

IV. SWOT Analysis

<p><u>Strengths:</u></p> <ul style="list-style-type: none"> - Scientific production of PhD students in the last 5 years - Fluid relationships between students and supervisors. 	<p><u>Weaknesses:</u></p> <ul style="list-style-type: none"> - Only 2 supervisors meet the standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU) - Low international visibility and low number of international contacts with other experts in the field
<p><u>Opportunities:</u></p> <ul style="list-style-type: none"> - The field of Computers and Information Technology is now an emergent field due to the topic of Artificial Intelligence. Many students are willing to learn about AI and many companies are interested in developing AI applications. - A small doctorate field facilitates the interaction among supervisors and students. The creation of research teams under the same supervisor could improve the interactions among students and the development of new ideas. - There is an important automotive industry in Craiova that could be used to strength the relationships between industry and University 	<p><u>Threats:</u></p> <ul style="list-style-type: none"> - Low number of scientific advisors that can compromise the achievement of some indicators in the following years

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (*, C)	Performance indicator	Judgment	Recommendations
1		A.1.1.1	Fulfilled	the study contract should be also available in English for possible foreign students
2		A.1.1.2	Fulfilled	
3		A.1.2.1	Fulfilled	the website that keeps track of students' information

				should be English for foreign students
4		A.1.2.2	Fulfilled	
5		A.1.3.1	Fulfilled	
6	*	A.1.3.2	Fulfilled	
7	*	A.1.3.3	Fulfilled	
8	C	A.2.1.1	Fulfilled	
9	C	A.3.1.1	Partially fulfilled	The doctoral field should increase the number of supervisors
10	*	A.3.1.2	Fulfilled	
11		A.3.1.3	Fulfilled	
12	*	A.3.1.4	Fulfilled	
13	C	A.3.2.1	Fulfilled	Supervisors should target journals with higher impact factors, within Q1-Q2 rank
14	*	A.3.2.2	Fulfilled	
15	*	B.1.1.1	Fulfilled	
16	*	B.1.2.1	Fulfilled	Admission procedures should be visible at the doctoral school website, also in English
17		B.1.2.2	Fulfilled	
18		B.2.1.1	Fulfilled	
19		B.2.1.2	Fulfilled	
20		B.2.1.3	Fulfilled	The disciplines' curricula should explicitly address the learning outcomes that students are expected to achieve
21		B.2.1.4	Fulfilled	
22	C	B.2.1.5	Fulfilled	
23	C	B.3.1.1	Fulfilled	Contributions should be target journals with impact factor
24	*	B.3.1.2	Fulfilled	
25	*	B.3.2.1	Fulfilled	
26	*	B.3.2.2	Fulfilled	
27		C.1.1.1	Fulfilled	,The periodical reports should include an action plan where deficiencies are identified and listed, and remedy actions are proposed along with a deadline, a responsible person and the indicators to measure the evolution of the detected problem
28	*	C.1.1.2	Fulfilled	
29	C	C.2.1.1	Fulfilled	the doctoral website should be better organized including all the relevant

				information for student under the same subdomain and it should also be available in English
30		C.2.2.1	Fulfilled	
31		C.2.2.2	Fulfilled	
32		C.2.2.3	Fulfilled	
33	*	C.3.1.1	Fulfilled	
34		C.3.1.2	Partially Fulfilled	The doctoral domain should reinforce the participation of leading experts through invited sessions within the doctoral school and not only within a conference, which is not an activity specifically organized for PhD students
35		C.3.1.3	Partially Fulfilled	the doctoral field should focus on participating in educational fairs to attract international doctoral students and included experts from international institutions in the doctoral committees

The recommendations contained in the report shall be resumed in the indicators' analysis. Other general recommendations may be made that do not fit within a particular indicator.

VERY IMPORTANT!!! – Each identified weakness must be correlated with at least one recommendation to improve the situation!

VI. Conclusions and general recommendations

Several important issues raised during the evaluation are resumed and some general conclusions are drawn on the quality of the education provided within the doctoral study domain under review; the Experts' Panel also presents general assessments about the institution. Other general recommendation may also be presented, which cannot be related to a specific indicator and have not been presented at point V.

A decision is proposed, together with the reasons for granting it (if the Experts' Panel members do not reach a consensus, each of them can propose and argue his/her own decision).



VII. Annexes

The following types of documents shall be attached:

- *The detailed schedule of the evaluation visit – MANDATORY.*
- *The survey questionnaire applied to doctoral students or academic staff in the doctoral study domain under review, the results - optional (e.g., in graphic form) and their interpretation - if applicable.*
- *Scanned documents – any document requested from the IOSUD during the evaluation visit and received, which is not found in the internal evaluation file received before the visit and referred to in the report.*
- *Pictures – if relevant issues are raised regarding the condition of the student residences, cafeterias, premises for teaching and learning activities, library etc.*
- *Screenshots/Print screens of the Doctoral School/IOSUD website proving specific claims in the report, accompanied by the date when they were accessed and saved.*
- *Any other documents relevant to the evaluation process referred to in the report.*