

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 Doctoral School of “Gheorghe Asachi” Technical University of Iași (SD-TUIASI) organises doctoral studies in 10 different areas. At present, SD-TUIASI hosts the activity of 132 PhD advisors and 769 PhD students. One of these areas is the doctoral domain in Electronic Engineering, Telecommunications and Information Technologies, located at the Faculty of Electronics, Telecommunications and Information Technology, with 10 PhD advisors and 36 PhD students in 2020. It covers the following research topics:

- Power electronics: efficient power converters, green energy;
- Communications: mobile, coding techniques, wireless;
- Digital signal processing: compression, pattern recognition;
- Nonlinear image processing;
- Intelligent technologies: neural, fuzzy, genetic algorithms, machine learning, deep learning, artificial intelligence;
- Biometrics, Human Computer Interfaces;
- VLSI design techniques for analog and digital circuits.

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



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;
- 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 managerial and administrative structures of the doctoral domain have been implemented. From the financial point of view, it is also suggested to increase the funding of doctoral students. The IT system is proved to be adequate. 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. Finally, human resources are adequate, but it is suggested to better distribute PhD students among supervisors.

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

Standards A1.1 and A1.2 are accomplished. Standard A1.3 requires more efforts to increase the funding of doctoral students.

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 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.

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 Doctoral School of the “Gheorghe Asachi” Technical University of Iași provides evidence of the existence of specific regulations and their implementation. More specifically, the self-assessment report includes links to the regulation of the Doctoral School, the procedures for the organisation of elections for the position of director of the Doctoral School Council (DSC) and the results of the last election, the methodologies for the organisation and delivery of doctoral studies and admission of doctoral students, the mechanisms for the recognition of the capability to supervise doctoral research, the functional management structures and the organisation chart of CSUD, the doctoral studies agreement and the internal procedures for the analysis and approval of propositions regarding the topics of the training programme. All the information is accessible through the website of the doctoral school at <http://www.doctorat.tuiasi.ro/>.

There are no specific recommendations.

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 Regulation of the Doctoral School includes procedures by which the doctoral advisors are accepted or replaced, the mechanisms for the decision-making regarding the content of the training programme, the conditions under which the PhD programme can be interrupted, the accessibility to research resources and fraud prevention, and the attendance obligations.

Supplementary documentation provides evidence of the doctoral school regulations.

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. 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 offers a personalized access with a Unique Matriculation Register. The IT system keeps record of the basic information of students, his or her supervisor, date of enrolment, and supplementary information such as doctoral student studies, school history, accommodation situation



and record of transport cards. Each new event or situation during the period of the doctoral studies is registered so the information is constantly updated.

Supplementary documentation shows some screenshots about the IT system.

There are no specific recommendations.

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 doctoral school signed a contract with Plagiat-Sistem Antiplagiat prin Internet SR so that Plagiarism Detector application (<https://plagiarism-detector.com/c/en/index.php>) is available for students and supervisors. The Similarity report is sent to the supervisor and the guidance committee for its analysis.

During the meetings with supervisors and PhD students, it was confirmed the availability of 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.*

The first two indicators of this standard are accomplished but close to the requires limit while the third criterion is not met. It is recommended to increase the expenses on the training of students.

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.*

At the moment of the submission of the self-assessment report, there is one research grant under implementation and 5 research or institutional/human resources development grants obtained by the doctoral advisors in the last five years. Their topics are relevant in the field of Electronic Engineering, Telecommunications and Information Technologies. The self-assessment report and the supplementary documentation in annexes provides the details of the grants. Therefore, the indicator is accomplished.

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%.*

Currently, the number of doctoral students is 36. The number of doctoral students members in research grants is 3 and the number of PhD students benefiting from doctoral scholarships is 6. That gives a ratio of $9/36=25\%$ over the required threshold of 20%. Therefore, the indicator is met.



The self-assessment report and the annexes provided as supplementary documentation provides evidence of the students that have received additional funding besides government 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.).*

This indicator is not accomplished as the percentage as 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 below the required 10%. The calculation method is detailed in the supplementary documentation and considers the costs associated to the training of doctoral students (participation in conferences, summer schools, courses, internships abroad, publication of specialized articles or other specific forms of dissemination, etc.). The incomes side considers the weight of each doctoral domain taking into account the amounts received by each faculty and the number of doctoral students on each faculty and field. Although the indicator is not met, there is a plan to increase the percentage of training expenses for doctoral students, also detailed in the supplementary documentation.

As a recommendation, it is suggested to define a specific action plan to increase the percentage of training expenses for doctoral students, with a responsible person and a deadline to accomplish the indicator.

The indicator is partially 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*

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.



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 research infrastructure of the of the Electronic Engineering, Telecommunications and Information Technologies doctoral domain includes computers, specific software, equipment, laboratory equipment, library, and access to international databases. More specifically, the following labs are available:

- Signal Processing and Communications Research Center (PRODATA)
- Center for Research in Fuzzy Systems, Intelligent Systems and Biomedical Engineering (CERFS)
- Research Center for Modeling and Simulation in Nanoelectronics (MODSIMNANO)
- Research Laboratory for Innovative Materials Electromagnetic Study - LABELMAG
- Research laboratory Electronics, Telecommunications and Information Technology (30501)

Supplementary documentation describes the equipment of each lab, and the self-assessment report also provides a link under the European Research Infrastructure System. 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

The human resources of the doctoral domain comply with the minimum standards of the National Council for Attestation of University Degrees, Diplomas and Certificates (CNATDCU) and most of them holds permanent positions. As a recommendation, PhD students should be more fairly distributed among advisors. Advisor also exhibit a good scientific production and international visibility.

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

Human resources belonging to the doctoral domain of Electronic Engineering, Telecommunications and Information Technologies fully meet the current CNATDCU minimum standards and exhibit a high level of expertise in the topics of the doctoral domain. PhD students should be more fairly distributed among advisors.

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.

9 out of 10 PhD supervisors affiliated to the field of Electronic Engineering, Telecommunications and Information Technologies meet CNATDCU standards, which means that the corresponding percentage is 90 %, over the required limit of 50%. The minimum standards checklists for all PhD supervisors are detailed in the supplementary documentation.

There are no specific recommendations.

The indicator is 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.



7 out of 10 PhD supervisors affiliated to the field of Electronic Engineering, Telecommunications and Information Technologies are tenured doctoral advisors, so the ratio is 70% higher than the required limit.

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 subjects in the education programme corresponding to the area Electronic Engineering, Telecommunications and Information Technologies are delivered by 9 lecturers that hold the title of professor/CS I or associate professor/CS II with proven expertise in the field of taught subjects.

The disciplines curricula and CVs of lecturers are provided as part of the complementary documentation.

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 number of doctoral advisors in the area of Electronic Engineering, Telecommunications and Information Technologies supervising a number of 8-12 doctoral students is 0 excluding those students in the grace period. However, three supervisors accumulate the majority of doctoral students.

As a recommendation, it is suggested to better distribute PhD students among supervisors.

The indicator is fulfilled.

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

The scientific production of the advisors is more than adequate, and they also exhibit a good international visibility.

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;*

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.



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 the doctoral advisors have more than 5 Web of Science-indexed or ERIH-indexed publications in journals with an impact factor- Additionally, all of them are members in the scientific or organising boards of international conferences within the past 5 years.

Supplementary documentation includes a list of the 5 most representative publications indexed Web of Science or ERIH in journals with impact factor for each PhD supervisor. A separate annex also include the complete list of publications and CVs of the doctoral advisors. The topic of publications falls within the scope of the doctoral domain, and it is worth mentioning that many of the publications are published in high ranked journals. The international visibility of doctoral supervisors in the last five years is evidenced by their membership in the scientific committees of international publications, conferences and professional associations or by their quality of member of group of experts or some commissions for the assessment of doctoral theses at foreign universities.

There are no specific recommendations.

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.*

The number of doctoral advisors in the area of study who are still active in their scientific field, obtaining, on the basis of scientific results within the past 5 years and according to the conditions set by the indicator is 10, which means that 100% of the advisor met the indicator.

There are no specific recommendations.

The indicator is fulfilled.

Domain B. EDUCATIONAL EFFECTIVENESS

The capacity of attraction of students coming from other higher education institutions is within the limits but so close that the doctoral field should try to improve these numbers. The admission procedure is adequately implemented. The training program is adequate and includes the compulsory subject about Academic Ethics and Integrity. However, the specific subjects' program should explicitly include the learning outcomes. Students receive an adequate guidance from the advisory committee. Finally, productivity of doctoral students that finished their PhD over the last 5 years is adequate, with many publications although it is suggested to target more journals with impact factor. External researchers regularly participate in the evaluation commissions.



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

The capacity of attraction of students coming from other higher education institutions is within the limits but so close that the doctoral field should try to improve these numbers. The admission procedure is adequately implemented.

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 students coming from other higher education institutions is within the limit but so close that the doctoral field should try to improve these numbers.

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.*

In the past five years, 7 graduates from other institutions registered for the admission exam with 34 budget funded places, which gives a ratio of $0.206 > 0.2$. Regarding the second part of the indicator, the ratio between the number of candidates in the past five years and the number of budget-funded places advertised in the Electronic Engineering, Telecommunications and Information Technologies area of study is: $44/34 = 1.29 > 1.2$. Therefore, both parts of the criterion are met.

Supplementary documentation details the name of students coming from other institutions and student's home university.

As a recommendation, it is suggested to improve the visibility of the doctoral domain in other institutions, as the two ratios given by the criterion are very close to the limit.

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 their language level, academic performance, and research and professional development, their interest in scientific research and publications. A personal interview is also conducted as part of the selection process. 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.*

Admission to doctoral study programs in the field of Electronic Engineering, Telecommunications and information technologies are made on the basis of their own selection criteria, according to the Admission Procedure (art. 12 and art. 13), and includes: a foreign language test,



academic performance, of research and professional development of candidates, their interest in scientific research, publications in the field of Electronic Engineering, Telecommunications and Information Technologies and a research topic proposal. The minimum grade for passing the admission is 7. An interview with the applicant is a mandatory part of the admission procedure.

The selection criteria and the weighting score is detailed un the supplementary documentation.

There are no specific recommendations.

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 total number of registered students in the period 2015-2019 is 44 and the number of PhD students expelled after 3 years is 9, which gives a dropout rate: 20.45 % below the limit of 30 %. Supplementary documentation details the situation of each student during the period 2015-2019.

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 Academic Ethics and Integrity. However, the specific subjects' program should explicitly include the learning outcomes. Students receive a adequate guidance from the advisory committee, and the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance is clearly below the limits.

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 Academic Ethics and Integrity. However, the specific subjects' program should explicitly include the learning outcomes. Students receive a adequate guidance from the advisory committee, and the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance is clearly below the limits.

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 at least three relevant disciplines in the preparation of all doctoral students, namely:

- Ethics and academic integrity
- Research methods
- A specialized discipline, at the choice of the doctoral supervisor in collaboration with the doctoral student

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.



- Individual study, as an optional subject, at the choice of CCPD (Coordination Councils of Doctoral Programmes)

The subjects' curricula are provided as part of the supplementary documentation. Their content is aligned with the field of 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 subject 'Academic Ethics and Integrity' is offered by the Doctoral School as part of the training program. This subject covers the concepts of ethics, deontology and academic integrity in educational and scientific creative activities and the knowledge, understanding, assimilation and assumption of implicit and explicit norms that regulate research processes and the legislative elements related to intellectual property.

The subject's curriculum is provided in the supplementary documentation.

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

The Doctoral School has specific procedures for the analysis of the content of study program. The disciplines' curricula are provided in the supplementary documentation and contains the objectives of subject and competences, 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 and competences. 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.

There are no specific recommendations.

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.*

PhD students benefit from the counselling/guidance of functional advisory committees. The functions of the guiding commissions can be found in the Regulations of the Doctoral School TUIASI, being one of them the approval of the doctoral thesis. PhD keeps regular meeting with their advisors. Supplementary documentation provides the guidance committees for each PhD student. Collected

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.



information from students through satisfaction questionnaires reveals that in general they are highly satisfied with the work of the advisory committee. These results were also confirmed during the online meetings with students and graduates.

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.*

The number of PhD students at the time of the evaluation is 40, while the number of instructors/researchers providing guidance is 35, which gives a ratio of 1.14:1 lower than 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 although it is suggested to target more journals with impact factor. External researchers regularly participate in the evaluation commissions.

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 higher 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.*

In the past five years, 7 students completed the doctoral studies programme in the area of Electronic Engineering, Telecommunications and Information Technologies. All of them presented papers at scientific conferences and/or published them in journals in the field, so that at least one paper per doctoral student is available. The list of students' publications is provided in the supplementary documentation. All of them fall with the topics of the doctoral field. However, not all of them have impact factor, so it is suggested to target higher ranked journals.

As a recommendation, publications should target higher ranked 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.*



The 7 students completed the doctoral studies programme in the area of Electronic Engineering, Telecommunications and Information Technologies made a total of 45 presentations, so the ratio is $6.43 > 1$ and the criterion is met.

The complete list of publications is available through 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 defence of doctoral theses. There is no over participation of external evaluators.

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 criterion is met as none of all the thesis defended the same year were supervised by different advisors. The commissions for defending the doctoral theses in the doctoral domain are detailed in the supplementary documentation.

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 PhD theses defended in the area of Electronic Engineering, Telecommunications and Information Technologies in the past five years is 7 lower than 10. Therefore, the criterion is not applicable.

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. The doctoral field keeps several agreements with foreign institutions, but it is also suggested to increase the mobilities of PhD students and to include more 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.*

TUIASI Doctoral School has specific procedures for the internal quality assurance and mechanisms for the periodic evaluation of the PhD supervisors, the PhD students' research activities, the infrastructure and facilities, the organization of the doctoral programme and the social and academic support services.

Supplementary documentation includes the links to the different procedures covering the quality assurance system.

As a recommendation, minutes of the meetings and periodical reports must be explicit in the provided documentation.

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.*

Information is collected through questionnaires to measure the level of satisfaction and needs of different groups and issues: the administrative services; the education programme, the assessment and grading; the communication with the PhD advisor; the research infrastructure, the scientific relationship with the PhD advisors, the relationship with the DSC (Doctoral School Council) and the need to implement various measures.



The analysis of collected information reveals that the level of satisfaction regarding the criteria stated above is "very satisfied" and "satisfied" except for the criterion "research infrastructure", where dissatisfied PhD students claimed the research infrastructure could not cover the experimental needs. The supplementary documentation lists a plan of measures for the future, but with no planned specific actions nor deadlines.

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.

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

All the relevant information regarding the doctoral field is available through the website. 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.

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. The website should be also available in Romanian and English.

There are no specific recommendations.



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, to anti-plagiarism software and labs and the 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 have access to international databases on any computer registered in the TUIASI network through the ANELIS (National Electronic Access to the Scientific Literature for Supporting the Research and Education System in Romania) contract. The databases provide access to the most relevant electronic resources in the area of Electronic Engineering, Telecommunications and Information Technologies: Web of Science, SCOPUS, Science Direct, IEEE, Springer etc. 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.

TUIASI signed a contract of service with the 'Plagiat-Sistem Antiplagiat prin internet SRL' (Plagiarism- Anti-plagiarism System via the Internet LLC) company to check the degree of similarity. This contract is renewed annually. Each PhD student has access, upon request and through their PhD supervisor, to the electronic system to check the degree of similarity with other 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.

PhD students have access to research laboratories with the consent of the teacher in charge of the laboratory, as mentioned by DSC regulations (art. 1). Furthermore, a specific access regulation was developed considering the pandemic situation in the country and starting in March 2020.

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 agreements with foreign institutions and students have participated in mobilities for attending conferences or courses. Invited lecturers have also participated in the training program. However, the doctoral domain should increase the number PhD students participating in external events and include more 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 agreements with foreign institutions and students have participated in mobilities for attending conferences or courses. Invited lecturers have also participated in the training program. However, the doctoral domain should increase the number PhD students participating in external events and include more 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 number of mobility agreements with foreign universities in Europe is 15 plus 4 agreements outside the EU. The number PhD students who have benefited from mobilities or have participated in international scientific conferences is 8. Given that the number of PhD students at the time of the evaluation is 40, that represents a percentage of 20% below the required value of 35%. Supplementary documentation details the foreign institutions with mobility agreements and the students that have benefited from mobilities or have participated in international scientific conferences. The Doctoral School have implemented policies aimed at increasing the number of doctoral students participating in training courses abroad.

As a recommendation, the number PhD students who have benefited from mobilities or have participated in international scientific conferences should be increased to fully accomplish the indicator.

The indicator is partially 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.*

There are 3 international supervision agreements and the number of experts that held classes/lectures in the last 5 years is 17. Supplementary documentation provides the details of the international supervision agreements and the name of external experts the held classes in the last 5 years.

There are no specific recommendations.

The indicator is 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.).*

TUIASI regularly participates in educational fairs to attract international doctoral students. Supplementary documentation details up to 27 educational events. Other strategies implemented to increase the visibility of doctoral studies are:



- The inclusion of TUIASI in the European University Association – Council for Doctoral Education.
- The visibility of TUIASI in the European PhD Hub, which is an online portal dedicated to applied research that aims at intensifying the cooperation between the public and the private sectors in identifying new topics of research and at transferring them towards industry and society.
- The membership of TUIASI in PRIDE, which is an associative project of the universities in the European area, and EUF (European universities foundation), which is an organisation functioning at the EU level, aiming to increase the doctoral students' mobility.

As a recommendation, more international experts should be included in the evaluation panels.

The indicator is fulfilled.

IV. SWOT Analysis

<p><u>Strengths:</u></p> <ul style="list-style-type: none"> - Several students enjoy a private scholarship from technological companies. - Good scientific production 	<p><u>Weaknesses:</u></p> <ul style="list-style-type: none"> - Low number of defended PhD thesis. - Reimbursement of incomes into training of doctoral students does not reach the required 10% - PhD students publications should target higher ranked journals with impact factor
<p><u>Opportunities:</u></p> <ul style="list-style-type: none"> - The presence of an important technological industry in Iași could be used to strength the relationships between industry and University - Fluid communication between the University and companies 	<p><u>Threats:</u></p> <ul style="list-style-type: none"> - The capacity of attraction of students coming from other higher education institutions is low, and it can limit the future number of PhD students.

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (*, C)	Performance indicator	Judgment	Recommendations
1		A.1.1.1	Fulfilled	
2		A.1.1.2	Fulfilled	
3		A.1.2.1	Fulfilled	
4		A.1.2.2	Fulfilled	
5		A.1.3.1	Fulfilled	

6	*	A.1.3.2	Fulfilled	
7	*	A.1.3.3	Partially fulfilled	It is suggested to define a specific action plan to increase the percentage of training expenses for doctoral students, with a responsible person and a deadline to accomplish the indicator
8	C	A.2.1.1	Fulfilled	
9	C	A.3.1.1	Fulfilled	
10	*	A.3.1.2	Fulfilled	
11		A.3.1.3	Fulfilled	
12	*	A.3.1.4	Fulfilled	It is suggested to better distribute PhD students among supervisors
13	C	A.3.2.1	Fulfilled	
14	*	A.3.2.2	Fulfilled	
15	*	B.1.1.1	Fulfilled	it is suggested to improve the visibility of the doctoral domain in other institutions, as the two ratios given by the criterion are very close to the limit
16	*	B.1.2.1	Fulfilled	
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	Publications should target higher ranked 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	Minutes of the meetings and periodical reports must be explicit in the provided documentation
28	*	C.1.1.2	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
29	C	C.2.1.1	Fulfilled	
30		C.2.2.1	Fulfilled	
31		C.2.2.2	Fulfilled	
32		C.2.2.3	Fulfilled	
33	*	C.3.1.1	Partially fulfilled	The number PhD students who have benefited from mobilities or have participated in international scientific conferences should be increased to fully accomplish the indicator
34		C.3.1.2	Fulfilled	
35		C.3.1.3	Fulfilled	More international experts should be included in the evaluation panels

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).

From the analysis performed on the Internal Evaluation Report, as a result of the meetings held at all levels, it can be concluded that the doctoral domain of Electronic Engineering, Telecommunications and Information Technologies has a clear mission and well-defined objectives and programs, successfully responding to the growing needs of the market, being an interdisciplinary doctoral program that offers highly qualified specialists for research.

PhD students have access to the research infrastructure of the Doctoral School, the electronic resources more relevant in the field and anti-plagiarism software. Supervisors reach the CNATDCU requirements and are quite active in terms of their participation in projects and scientific production.

All quality indicators related to the standards and evaluation criteria are met, except for only two that are partially met. Some recommendations are proposed to fully accomplish both indicators, such as



the definition of a specific action plan to increase the percentage of training expenses for doctoral students and the number PhD students who have benefited from mobilities and participation in international conferences.

Some other recommendations have been made for the continuation of good practices and for the permanent improvement of the quality of the doctoral field. They are summarized in the table of section V.

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.*