Annex No. 3

The External Evaluation Report of a Doctoral Study Domain

Contents

I. Introduction[1]

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.).

I was assigned with the evaluation of the Doctor Training Program at the Faculty of Electronic Engineering, Telecommunications and Information Technologies. The internal evaluation was carried out using Zoom on-line platform. The meeting started from the 12th of July 2021 until 16th of July 2021. The ARACIS President provided to the entire team on the 12th of July the framework of evaluation. Afterwards, there was meeting with the Rectors and Vice Rectors of the Technical University of Cluz-Napoca.
According to Art. 6 para. 3 of the Institutional Regulation for the organization and functioning of the doctoral study programs within the Doctoral School at the Faculty of Electronic Engineering, Telecommunications and Information Technologies, the members of the Doctoral School Council are elected by universal, direct, secret and equal vote of the Doctoral supervisors from the Doctoral School.
The Doctoral School participates, through the affiliated Doctoral supervisors, in the implementation of research or institutional development / human resources grants in the field of Electronic Engineering, Telecommunications and Information Technologies. After examining the Internal Self-Evaluation Report, the following meeting had been arranged with the Head of the Doctoral Training Program, Professor Romulus Terebes who provided very useful information regarding the Faculty and the training program.

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);

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

• 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.

The analysis is based on the Zoom meeting that took place online with different stakeholders (e.g. Head of the Doctoral Training Program, PhD supervisors, PhD students, PhD graduates and employers). These meetings gave the opportunity to external committee to liaise with the different stakeholders of the University. The evaluation report includes basic information regarding historical information about the Faculty, research mission and objectives, quality of the supervision and research output. The Self-Evaluation report is provided in English. However, all the Annexes have been provided in Romanian. However, the responsible team of preparing the Self-Evaluation report has provided assistance to understand the structure of the Doctoral school.

More specifically, the following clarifications have been provided by the Faculty:

-Evaluation of the course
-Research infrastructure
-Research Outcome
- Secondments in industry
- Employability opportunities

The regulations, methodologies, procedures and decisions of the Doctoral training in the reporting period are presented on the University's web site: http://iosud.utcluj.ro/regulamente.html and http://iosud.utcluj.ro/hotarari-si-decizii-TUCN.html as well on Annex_II.2.
The duration of the doctoral program is usually 3 years. The duration of the doctoral program can be extended by 1-2 years, with the approval of the University Senate, at the proposal of the PhD supervisor.
The training has two compulsory components:
-Training program based on advanced university studies (PPUA), within the doctoral school; The doctoral student participates in the first year of doctoral studies in the activities within 3-4 subjects of doctoral studies. These subjects are chosen in such a way that they are all offered in the first year of the doctoral internship, and the cumulative duration of the training program based on advanced university studies cannot exceed 3 months.
b) Individual Scientific Research Program (PCS): Oral presentations are planned within the scientific research program in front of the PhD supervisor and the guidance commission.
Each student must present his/her progress on regular basis in each year. The Self-Evaluation report illustrates the number of PhD that have been graduated over the reporting period. It would be interested to have information regarding the average number years spent in the program until PhD graduate.
The University has been engaged in various international events to promote research outcome and link with regional companies so that the students can explore.

III. Analysis of ARACIS's performance indicators

Domain A. INSTITUTIONAL CAPACITY

There is evidence where the Faculty applies broadly accepted metrics (e.g. quantity and quality of publications, journals' quality as well as standard citation indices) in the Doctoral training program. As an effect, the Doctoral program in the is deemed as good. There are few areas where there is space for improvements. It seems that the relatively longer graduation period and difficulties facing the job-hunting efforts of Doctoral students can be only partly attributed to an overloaded schedule of project engagement, and suboptimum career placement efforts.

The Doctoral School carries out research in the following fields:

- Data processing and security, genomic signal processing,
- Multimedia systems and applications, Smart City smart systems,
- Image processing (including multimodal) and artificial vision,
- Unified Communications in the Cloud,
- Wireless systems
- Composability, dynamic adaptation of services, cognitive communications,
- High coverage and high spectral and power efficient high bit rate data transmission systems
- Speech processing: analysis, synthesis and recognition of the speaker,
- Bioinformatics and biometric applications.
- Power electronics and renewable energy
- Electronic monitoring and control systems
- Technologies and materials in electronics
- Modelling of electronic and optical systems
- Advanced design techniques in microelectronics

This is a rather broad area, considering that 22 academic staff are engaged with all these research activities.

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

The University has adopted a holistic approach towards administrative, management and financial planning of different Doctoral training programs.

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 Faculty of has provided Annexes in Romanian regarding the Internal regulations of the Doctoral School. This information is also available in the Web site: http://iosud.utcluj.ro/files/Files/Legislatie%202020/REGULAMENT_Institutional_Doctorat_aprobat_Senat_24.09.2020.pdf. The methodology for organizing the elections and appointing the members of the Board for University Doctoral Studies (CSUD) is also available on the following web site: http://iosud.utcluj.ro/files/Files/Metodologie%20alegeri%20CSUD_f.pdf.
The CSUD currently consists of a maximum of 17 members, as follows:

a) the CSUD director, appointed by competition;
b) 1 member elected directly by universal, direct, secret and equal vote of the doctoral supervisors from IOSUD-TUCN;
c) 3 doctoral students representing different scientific profiles, chosen by universal, direct, secret and equal vote of the doctoral students of IOSUD-TUCN
d) 12 members of IOSUD-TUCN or outside are appointed by the rector of TUCN (scientific personalities whose activity has a significant international recognition and/or personalities from the relevant industrial and socio-economic sectors).

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: The regulation of the Doctoral School is described in Annex A.1.1. The description is in Romanian language. It is not clear whether leadership and conflict management skills are considered in the criteria for the elections of the Director.

(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. The methodology for the election is presented in Annex A.1.1. The description is in Romanian language. There is also evidence about the people that have voted for the election of the Council that took place in 2020. The diversity and characteristics of the 12 members are not presented in detail. This is important for the strategy and mission of the Doctoral training program.

c) the Methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies). There is a link with a pdf file describing the organisation of the doctoral studies. The description is in Romanian.

d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad. After reading the Self-Evaluation report, there is a clear supervisor assigned to each student (http://iosud.utcluj.ro/files/Files/Legislatie%202020/Procedura%20sustinere%20teza_aprobat_Senat_24.09. 2020.pdf).

e) functional management structures (Council of the doctoral school), giving as well proof of the regularity of meetings; The Doctoral students will submit to the secretariat of the Doctoral School an application for registration accompanied by a CV and a certificate issued by the Doctoral School attesting the status of student, doctoral field, year of enrolment and year of study.

f) the contract for doctoral studies; The contract template is provided in the Annexes.

g) internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies. There is procedure regarding the evaluation of the research proposals from the academics.

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Evaluation has been carried out remotely.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. There is good procedure regarding the management of the Doctoral program. There is a need for the Faculty to use a workflow system to support transparency (e.g. meeting of the PhD student with the PhD committee).

Recommendations:

The Faculty should make arrangements for candidates with disabilities

It seems that there is no process regarding the replacement of students/academics that leave the University and have been selected as members of the Council.

The Council should ensure that the 12 members of the Council have got overlapping leadership and technical skills contributing to the strategy and mission of the Doctoral training program

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The doctoral study programme of the Faculty is organized using National education law no.1/2011. The regulation was approved in the CSUD meeting of 23.01.2019 and in the Board of Directors of 23.01.2019. The whole information has been provided in Romanian.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- There is detailed information regarding the supervisor allocation, decision-making, changing supervisor, interruption conditions and research ethos and integrity. From Annex 3, 18 out of 22 Academics are engaged in the supervisory process. There is a need to engage the remaining 4 academics in the PhD supervision.

Recommendations:

***-A clearer process is required regarding the allocation and even distribution of students to* supervisors. Some of the academics are not engaged in the Doctoral school as PhD supervisors.**

- There is a need to establish more systematic collaboration between the Doctoral students and the other researchers within the Faculty.

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

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

The analysis is mainly based on the Internal Self-Evaluation report that it is provided in English. The Faculty has resources to support the Doctoral training program.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Faculty has already deployed an IT system to administer students in Cycles I,

II and III. Any change in the status of the Doctoral student is recorded in the electronic records at the level of each faculty office within which the Doctoral School operates. The IT system provides statistics and generates tables with graduates of doctoral studies based on which doctoral degrees are issued.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The Annex A.1.2.–IM provides evidence of the IT system to support Doctoral Program. This Annex is provided in Romanian.

Recommendations:

Use of central system to record meetings and the action points between the Supervisor Team and the PhD student

Use of the IT system to support the alumni.

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University utilises Turnitin software tool that compares the text from the thesis with texts from external databases (of other users of the application). The software may indicate similarities between the verified text and the texts with which it was compared. It seems that a straightforward process has been used for both scientific manuscripts submitted to international journals and conferences and theses.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. It seems that a straightforward process has been used. However, there was no evidence about the similarity index of theses that have been submitted for evaluation. There is no evidence provided regarding the plagiarism output.

Recommendations:

Use of anonymised samples of PhD theses to train students.

Make clear the penalty imposed in case plagiarism detected.

The indicator is fulfilled/~~partially fulfilled/not 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 Faculty has been using state, project and internships funds to support the Doctoral training program.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- Annex A.1.3.1a_ETTI_Research_grants includes the list of these grants and projects reported by the doctoral supervisors in the evaluated period.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- Both research grants and institutional development grants have been shown that the Faculty

is active to attract research grants and foster innovation. However, Table 11 illustrates that only 11 out of 22 academic academics have been engaged with research projects and grants.

Recommendations:

Link the research strategy and objectives with the research grants

Adopt a strategy where academic engagement in research grant writing and management reaches at least 75%.

The indicator is fulfilled/~~partially fulfilled/not 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%.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. According to the Self-Evaluation report, Annex A.1.3.2 lists the doctoral students who have received or are receiving funding from the state budget for doctoral studies and who have received additional financial support under the conditions indicated by this indicator. The degree of fulfilment of this indicator is indicated in Table 12. In a cohort of 113 students, 20 students funded from the budget who received additional funding, 8 were engaged in research or institutional development projects, 12 received grants from TUCN's own revenues and 6 received external TUCN scholarships. Within the reported period, 29 PhD students have defended their doctoral theses were completed. The ratio of 22% (= 25/113) is higher in this case as well, the indicator has been met.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The number of students that received beneficiaries is rather small (25). The ratio is just above the 20% threshold.

Recommendations:

Liaise with the industrial and public authorities and stakeholders to further exploit opportunities for the PhD students.

Increase the number of research proposals at both national and international level.

Adopt a strategy to engage academics that are not active in research projects.

The indicator is fulfilled/~~partially fulfilled/not 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.).*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The Self Evaluation report provides a summary of the logistics and financial support for the training of the Doctoral students. According to the Self-Evaluation report, there are vthree categories of expenses associated with the training:

1) Institutional expenses paid from basic financing and from own revenues for access to specialized information (purchase of books, ANELIS subscription, licenses, TURNITIN subscription).

[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.

2) Institutional expenditures paid from the basic financing regarding the salary of the persons involved in the professional training of the doctoral students (departmental positions and IOSUD positions).

3) Institutional expenses incurred in relation to mobility and participation in conferences etc.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The percentage allocated for the Electronics engineering, Telecomunications and Information Technologies domain is 29.04%. The information provided is not very clear. I was expecting that there is percentage of costs associated with categories such as TURNIT subscription and salary of the academics. The purchases of books cannot be justified since most of the primary source of research includes access to scientific papers. It is not clear, how this budget is distributed per student and per year.

Recommendations:

-The Faculty must invest to train PhD students to attend conferences, exhibitions, summer schools and utilise open access publication fees in a more systematic manner.

-There must be a KPI so that at least one dissemination activity is planned for each PhD student within the 3 year periods of study. Ideally, one dissemination activity must be planned at the end of each year.

-The supervisory committee could monitor the students to meet these targets.

The indicator is ~~fulfilled~~/partially fulfilled/~~not fulfilled~~.

Criterion A.2. Research infrastructure

The Faculty provides a very good environment regarding research facilities, equipment and infrastructure and access to scientific databases so that the PhD students can carry their PhD projects.

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

The research is supported by the following Research Centers: Multimedia Technologies and Telecommunications Research Centre, Information Technology in Electronics Research and Development Center, Centre of competence for wireless Intra-SATellite Technologies, Speech Processing Research Group, Digitally Enhanced Analog and RF Integrated Circuits, Signal Processing Group, Integrated Circuits and Systems Group, speech technology and communication, Renewable Energy Group, Cellular and Wireless Communications, Unified communications in Cloud laboratories, Centre for Programming Engineering with Applications in Telecommunications and Bioinformatics, Intra-satellite Wireless Technology Competence Centre, Adaptive Systems Research Laboratory and Digital Transmissions and Communication Systems. I have counted 15 research centers where there are 22 academic staff. This is not realistic. Several research centers should be merged together (e.g. wireless Intra-SATellite Technologies should be merged Cellular and Wireless Communications, Intra-satellite Wireless Technology Competence Centre and Digital Transmissions and Communication Systems) or Speech Processing should be merged with Signal Processing and speech technology and communication).

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The Self-Evaluation report provides links to the research infrastructure that could be used for research. Examples of such specialised equipment includes spectrum analyser, signal

generators, DSP development systems, IoT and specialised software (e.g. Matlab, FPGA design, EMI measurement tool etc).

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. By analysing the information provided, it is evident there is high quality infrastructure to support applied research and experimentation in the research community. However, the research activity is rather fragmented among many research centers with overlapping activities. It is suggested to merge several research groups together so that research quality output is improved.

Recommendations:

The Faculty should adopt a strategy to restructure the research centers with an maximum number of four.

The Faculty may need to obtain funds so that calibration of equipment is carried out in a systematic manner on frequent basis.

There is a process required within the school regarding the decision making for the purchase of the research infrastructure.

The indicator is fulfilled~~/partially fulfilled/not fulfilled~~.

Criterion A.3. Quality of Human Resources

There is enough information in the Self Evaluation Report regarding the human resources. The resources seem to be satisfactory by taking into account the students' cohort.

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

There are twenty-two (22) academics, that have proven experience to carry out research in the field. However, 13 of then meet the CNATDCU minimum standards necessary and mandatory for obtaining the habilitation certificate. Additionally, 18 out 22 meet the criteria A1-A2-A3.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. This indicator meets the minimum threshold requirements. The Faculty has provided the minimum number of required advisors.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. More information is expected to be provided in the Self Evaluation Report to determine the algorithm for the calculation of A1, A2 and A3 metrics for each academic. The percentage regarding *CNATDCU is just above the required threshold.*

Recommendations:

The Faculty must adopt so that the percentage of academics that meet CNATDCU minimum standards should be above 80%.

The Web profile of the supervisors must provide in different tabs the following information: research area, research students, key publications and grants. Such information must be provided in both Romanian and English.

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- Annex A_3.1.2_certificates includes employment certificates obtained from the Human Resources Department of TUCN. The Self-Evaluation report states that 17 out of 22 (17/22=77.27%) are tenured.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- There is sufficient number of academics that can support the PhD students. The workload distribution is not even. This number is not enough to support all research areas that have been identified by the Faculty.

Recommendations:

Reduce the number of research areas and engage few academics per research area

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself.

The Self-Evaluation report provides a short summary of the skills of the academics. More detailed information is provided in Annex A.3.1.2. that it is in Romanian. From the CVs of the academics, it seems that they have the expertise to deliver the planned training. The Academics cover the delivery and training of 32 different courses.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself-

The Faculty provides training and carries out research in different areas within the specific domain. Through the interaction with the PhD students, the Doctoral program provides the same courses as the Master program in the first year. There is no mechanism to check the fact that a PhD student may repeat a course during the Doctoral program. The method of evaluation is not focussed on critical analysis and preparation of the PhD students to write scientific reports. The material for the courses should be mainly scientific papers from high-impact journals and conferences that have been published within the last 5 years. The evaluation of the curriculum from the first year is not very clear and should be revised.

Recommendations:

The number of courses offered must be reduced.

Revise course curriculum using latest research papers. Use coursework in each module as a method of assessment

Link the research strategy with the research facilities

The indicator is ~~fulfilled~~/partially fulfilled/~~not 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 programs[3] does not exceed 20%.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- Table 15 lists the doctoral students and their coordination by doctoral supervisors in the reference period.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- There is sufficient number of academics that supervise the PhD students. There is only one academic that has supervised more than 8 students but less than 12 students in the reporting period. The allocation of the PhD students among the supervisors is unbalanced.

Recommendations:

Engage in a systematic manner all academics in the supervisor process

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

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

The Academics have experience of carrying out research with research outcomes presented and published at both national and international level in journals and conferences.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- Annex A_3.2.1.Summary highlights the information from the CNATDCU files for verifying the degree of fulfilment of the minimum standards for acquiring the quality of university professor and obtaining the habilitation, completed for the entire activity and for the last 5 years. The first component P1 is linked with relevant publication results while the second component P2 refers to the Visibility in the scientific world.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The number of academics who cumulatively meet the two performance indicators A.3.2.1 of OM 3651/2021 is 13 out of 22 (59.09%).

Recommendations:

[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.

The Department needs to adopt strategy so that academic staff whose criteria are below the required metric must be improved.

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- Annex A_3.1.1_CNATCDU provides a summary of the score from academics obtained in the last 5 years. It shows that 17 of 22 supervisors have obtained for the last 5 years at least 25% of the minimum score required by CNATDCU. The calculated ratio is 77.27% (= 17/22) being higher than the threshold of 50%. The indicator has been met.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The aforementioned table indicates that all Academic staff are research active and meet the criteria of CNATDCU.

Recommendations:

The Faculty must provide incentives for academics with low score to improve their performance.

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

Domain B. EDUCATIONAL EFFECTIVENESS

The Faculty has organised a number of taught courses at the first year of the program. It seems that all these courses overlap with the Master program. There is a research plan with an objective to carry out training in the context of internship, research project and secondment opportunities.

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

The Faculty has attracted candidates that have graduated not only from the Technical University of Cluz but from other Universities within Romania (e.g. Polytechnic University of Bucharest, Alexandru Ioan Cuza University, Ștefancel Mare University etc). Additionally, there are few graduates from abroad from countries such as Italy, Netherlands, UK and USA.

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 Faculty mas managed to attract candidates that have graduated either from other Romanian Universities or from abroad.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The ratio between the total number of candidates for admission, who are graduates of master's degree programs or equivalent studies, conducted outside IOSUD and the total number of places funded from the budget is 21.6% (19 candidates - external graduates from 88 available places)

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. It seems that a 20% intake includes the students that they have graduated from the other Universities. There is a need to improve research results that are presented on the Web site.

Recommendations:

Improve the openness to attract students from other Universities

Competitive advantage of the Doctoral Program and its link with industrial partner must be highlighted

Improve the information of the web site in both English and Romanian

Use of social media to promote research outputs

Use alumni to attract new students

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

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

The process regarding admission, monitoring and evaluation seems to be transparent.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The admission uses a variety of criteria considering the academic performance of the candidates, previous research engagement, CV and research proposal. An interview is taken place where the admission committee evaluates the professional knowledge of the candidate and the research proposal. Additionally, a language proficiency test has been carried out. It is not clear whether the language proficiency is refereed to the English language.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The knowledge of English language is not considered as a criterion, since most scientific publications in the field are in English. The overall process seems to be transparent. There are no special arrangements for DDS students.

Recommendations:

English knowledge (speaking and writing) is essential. Certification such as IELTS should be considered.

Special arrangements should be considered for DDS students.

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

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

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. *In Self-Evaluation report, Table 16 presents the synthetic statement regarding the number of students enrolled at the beginning of each year of the reporting period and the dropout/abandoning/expulsion of students by university years. Within the reporting period, the average expel rate is 6.74% that is below the required threshold.*

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The expelling rate varies over the years. The report does not explain the reasons for these dropouts (e.g. skills, financial, personal reasons). The Faculty needs to provide support to students that face different challenges throughout the PhD studies. There may be a need to formalise the progress of the students on annual basis.

Recommendations:

Analyse the expel rate and provide mechanism to reduce it.

Provide extra support to students that have failed in the first attempt in the course evaluation.

The indicator is fulfilled~~/partially fulfilled/not fulfilled~~.

Criterion B.2. The content of doctoral programs

The program offers a variety of training activities including courses, secondment in another peer institution, conference and events participation, papers published in international journals and internships in companies.

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 curriculum provides technical training to different technical topics in the field of Electronic Engineering, Telecommunications and Information Systems as well as training on academic integrity.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself.

The first semester of the training program contains:

- 2 in-depth disciplines - at the choice of the doctoral student.
- 2-specialization discipline - at the choice of the doctoral student.
- 1 discipline dedicated to ethics and academic integrity - mandatory.
- Research activity – mandatory.
- The project of the scientific research program that requires the consent of the scientific supervisor.

4 of the disciplines included in the curriculum address aspects regarding, respectively, the methodology of scientific research (Scientific communication techniques) and ETTI specific statistical data processing (Statistical modelling of signals, Modelling and data analysis for management decisions, Processing genomic signals). The disciplines included in the curriculum ensure the acquisition of

[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.

competencies grouped by professional skills and cross skills according to the discipline files presented in the annexes.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The curriculum includes a diversity of technical courses as well as important courses related to research methods and academic integrity. This is a very large number of courses ideal for a Master course with specialisations. The learning outcomes of each course are not clear. It is not clear whether students study scientific papers in the English language. The same applies to the evaluation of each course and the process to handle failures. Do the students have to do resit exams within the same year? What happens if students fail in more than 1 more module? Is there any interruption process? Looking at the statistics, it is very challenging to finish the program within 4 years of study.

Recommendations:

Introduce rules regarding progression in the courses that are attended in the first year.

The number of courses should be reduced.

The course material should be revised by using state of the art/survey research papers as a primary resource.

Coursework must be one of the components for evaluation.

Introduce a compulsory module related to innovation management (patent filing, research commercialisation route, spin-off and start-up process).

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Doctoral students attend in the first year the ethics and academic integrity course, dedicated to ethics in scientific research and intellectual property are delivered.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University has introduced a mandatory course related to ethics, plagiarism and academic integrity to all Doctoral training programs.

Recommendations:

Define the course evaluation for the Ethics course.

The indicator is fulfilled/~~partially fulfilled/not 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 activities[5].*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The doctoral study programmes within the Doctoral School ensures, through the curriculum, the development of professional skills (content, cognitive and research) in the field of Electronic Engineering, Telecommunications and Information Technologies as well as transversal skills.

[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.

The Faculty ensures that there is a PhD supervisor allocated per student to provide mentoring and guidance support as well as guidance towards his/her training.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself- It is not clear how critical thinking and analysis is embedded in the teaching methodology. There is also a questionnaire that is used to get feedback from students regarding their experience. It is not clear and there is no evidence how this feedback is used to improve training delivery.

Recommendations:

Critical Thinking and research independence methodology must be embedded in the training.

A systematic approach on internship opportunities and training roadmap must be defined for each PhD student.

The indicator is ~~fulfilled~~/partially fulfilled~~/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself- The Self-Evaluation report presents the joint activities through the collaboration between the PhD student and the supervisory committee for theoretical developments and the development and interpretation of experimental results, on the one hand, as well as collaboration for the development of scientific papers and articles or patent applications and laboratory stands or innovative product (Annex B.2.1.4.3-IM). The report provides clear information regarding the feedback that students receive from these meetings.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Annexes indicate that the supervisors meet their PhD students to contribute to theoretical and scientific collaboration. However, there is limited information regarding the meetings, the topics of discussion and action points. This is important for conflict management.

Recommendations:

An IT system is required to record the meetings of the PhD student with the supervisory team and the agreed action plans.

The indicator is ~~fulfilled~~/partially fulfilled~~/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Table 17 in the Self-Evaluation report presents the ratio between the number of PhD students and the number of academic providing mentoring and guidance. This ration is less than 3:1 for all years in the reporting period. The calculation of the indicator has not taken into account the components of the guidance commissions for the 29 doctoral students who presented their thesis during the reporting period.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Faculty has enough resources to support the PhD students.

Recommendations:

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

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

The evaluation has been carried out taking into account doctoral students activities (training and internships) and research output per student.

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

The Self-Evaluation report presents a good overview of the results from the PhD Students in terms of presentations, paper published, research project participation, internship engagement and event training.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. This is a very challenging task to read and evaluate the following randomly selected 5 research papers.

- Moca, V.V., Bârzan, H., Nagy-Dăbâcan, A. and Mureșan, R.C., 2021. Time-frequency super-resolution with superlets. Nature communications, 12(1), pp.1-18.
- Popa, S., Strileţchi, C. and Vaida, M.F., 2016, October. Implications of a consistency-oriented sync API in an ERP to cloud integration library-a case study. In 2016 12th IEEE International Symposium on Electronics and Telecommunications (ISETC) (pp. 43-46). IEEE.
- Ilea, I., Bombrun, L., Terebes, R., Borda, M. and Germain, C., 2016. An M-estimator for robust centroid estimation on the manifold of covariance matrices. IEEE Signal Processing Letters, 23(9), pp.1255-1259.
- Vlad, T., Pitică, D., Man, L. and Rajmond, J., 2012, May. Optimized methods for theoretical and practical training. In 2012 35th International Spring Seminar on Electronics Technology (pp. 459-464). IEEE.
- Ciortea, F., Nemes, M. and Hintea, S., 2018. Graphical Interpretation of the Extended Kalman Filter: Estimating the State-of-Charge of a Lithium Iron Phosphate Cell. Advances in Electrical and Computer Engineering, 18(3), pp.29-36.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The selected papers include original contributions with theoretical analysis and experimentation. The conferences have been presented in international journal that have peer review process. Two of the selected journal publications are recognized excellent. After reviewing the entire publication list, there is a large portion of papers published either in national conferences or national journals.

Recommendations:

The Faculty must define a strategy so that the research outputs become internationally excellent.

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Table 19 in Self-Evaluation report lists the number of presentations of doctoral students who completed their doctoral studies in the evaluated period. There are 29 presentations of doctoral students who completed their studies in the reporting period (metric: 112/29=3.86). This is well above the required threshold.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Students have been presented their research outcome in conferences that are internationally recognised.

Recommendations:

The Faculty must adopt a strategy where outputs can be presented in international excellent events that are supported by scientific organisations such as Institution of Mechanical Engineers and Institute of Electrical and Electronic Engineers. A KPI must be defined for each student regarding the conferences participated as an author presenter.

The indicator is fulfilled/~~partially fulfilled/not 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 Faculty is engaged with academics from other national/international institutes for the defence of PhD theses.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Annex B_3.2.1 lists the 29 doctoral theses presented in the reporting period. It appears that there were no situations in which an external referee from a higher education institution, external IOSUD TUCN, had evaluated more than 2 theses coordinated in a single year by the same supervisor.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The results of this evaluation highlighted the fact that the academics taking part in the Thesis defence committees did not exceed 2 participations for the theses coordinated by the same doctoral supervisor in one year.

Recommendations:

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Annex B_3.2.2 list the names and universities from which the IOSUD TUCN external referees come from the commissions for presenting the 29 doctoral theses from the reporting period. The maximum value of this indicator is 0.22, i.e. 6 theses allocated to the same external IOSUD TUCN referee during the reporting period, is lower than the threshold set by this indicator, the criterion being met.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. There is only one reviewer/evaluator that does not meet the criteria.

Recommendations:

The Faculty must keep track of the defence committees so the criterion is fulfilled.

The indicator is fulfilled/~~partially fulfilled/not fulfilled.~~

Domain C. QUALITY MANAGEMENT

There is an internal quality management system that has been used for the monitoring and performance evaluation of the PhD students.

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

The Faculty has used a reasonable and realistic process in terms of admission, rules and expectations and monitoring of the activities associated with the PhD students. Such process is provided centrally by the University and has been adopted by the Faculty.

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.

The Faculty has used a reasonable and realistic process in terms of admission, rules and expectations and monitoring of the activities associated with the PhD students. Such process is provided centrally by the University and has been adopted by the Faculty.

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.

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University evaluates and monitors the evolution of all the Doctoral Schools centrally. More information is provided in the relevant Annexes. It must be highlighted that the University has used ARACIS guidelines and combined them with ISO 9001 standards.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University has taken measures to enhance the engagement of the supervisory team. I am satisfied from the fact that ISO 9001 family standards have been considered in the quality assurance process.

Recommendations:

Engagement of different stakeholders (e.g companies, public organisation) on the program design.

A workflow system is required for the conflict management.

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. In order to evaluate the degree of satisfaction of Doctoral students regarding the quality of doctoral programmes, an anonymised questionnaire for student evaluation of the Doctoral School, was circulated with instructions. There are 10 different questions regarding the training. The questionnaire has been used to request the opinion of the Doctoral students regarding the University Programme of Advanced Training (PPUA), "the learning outcomes" and the competencies, skills and attitudes that Doctoral students should develop. The data collected using the electronic system are analysed by the University's Office using appropriate quantitative and qualitative tools and further processed to generate an annual report on the degree of satisfaction of Doctoral students. There are no questions that can highlight areas of requiring improvement. Additionally, it is not clear how students' feedback is used to improve the program.

Recommendations:

Use a systematic approach so that students' feedback is used to enhance the Doctoral training program.

The indicator is ~~fulfilled~~/partially fulfilled/~~not fulfilled~~.

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

There is information on Web site of the Faculty regarding the Doctoral training program and the expectations from the PhD students. There is also enough support regarding the learning resources through access to important scientific databases.

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

Most of the information on the Web is presented in Romanian. After interacting with the Faculty members and the students, there are some events organised where the PhD program is presented to the Master students.

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.

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University uses a web link (http://iosud.utcluj.ro/) for the doctoral students. The portal includes information such as the Regulation of the Doctoral School, the doctoral study agreement, Institutional Regulation and the standards associated with the thesis.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Faculty has provided all the requested information. There is solid workflow system regarding the management of the training school. More detailed and qualitative analysis cannot be done since the information is in Romanian.

Recommendations:

The Academics and the Doctoral students must use their corporate email for all University activities. This important to maintain the GDPR policy.

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

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

Overall, I have seen that the Faculty provides the appropriate resources to students to carry out their research activities.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Faculty has provided the appropriate resources to the PhD students. This includes access to scientific databases such as Science Direct, IEEE, Springer, PROQUEST Central, Wiley Journals, Web of Science, PubMed. These databases could be used as a reference point from the students to carry out research in the area of Electronic Engineering, Telecommunications and Information Technologies.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Faculty provides good resources to support the students.

Recommendations:

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself.

The University ensures the verification of the authenticity and originality of doctoral thesis and other scientific papers using Turniin software. It is very encouraging that Turnitin is used across all phases of the training program.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. It is very positive that plagiarism/academic misconduct is managed centrally. It is not clear what penalty is applied and there is no evidence regarding use cases that have been flagged.

Recommendations:
Make clear the penalties applied to plagiarism.

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself.

As described in Section B, the students have access to state-of-the-art labs that could be used for the research experimentation. The access of Doctoral students to these facilities is unrestricted and a well-established schedule with the Doctoral supervisor has been used. Through the discussion with Faculty staff and students, I have found that some of these labs are pioneer in the field (e.g. Siemens, Nokia). In these laboratories, Doctoral students are assisted by an engineer or technician, who facilitates the operation of various equipment. Limited information can be retrieved from the URL provided in the Self-Evaluation report.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The quality and quantity of the research infrastructure is very good to support the research activities of the students.

Recommendations:

The indicator is fulfilled/~~partially fulfilled/not fulfilled~~.

Criterion C.3. Internationalization

To enhance internationalization, the University has signed 17 ERASMUS agreements with universities from abroad.

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

There is a clear strategy of the University to enhance its Internationalization. There are few events organised annually where attendees from abroad participated. However, not enough evidence has been provided regarding joint research programs and collaborative post-doc research.

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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University has established ERASMUS+ partnership agreements with 17 universities. Within the reporting period, 90 mobilities were identified (e.g. training courses, participation in international conferences held abroad). The resulting percentage for participation in international conferences held abroad is 37% = (43/116 = 29 defended PhD theses + 87 PhD students). Another 76

participations were taken in international conferences organized in Romania. For all international conferences (in the country and abroad) the percentage is 50%(= 58/116) .

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. Most of students have participated in events and training schools at both national and international level. I would suggest to define a KPI so that each student must participate at least in 1 event during the three years.

Recommendations:

Define a KPI regarding participation in events and winter/summer schools

The indicator is fulfilled/~~partially fulfilled/not 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.*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The Self-Evaluation reports 3 PhD co-supervisions from institutions from abroad. An academic staff is participated as a member of the doctoral dissertation committee for a doctoral student in Cameroon. The Faculty has tried to invite guest lectures to give talks to the PhD students. Such guest lectures are advertised on Faculty's Web site.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The co-supervision from abroad has been done on ad-hoc basis. The Faculty needs to define a strategy to organize guest lectures in a systematic manner and liaise with Institute of Electrical and Electronic Engineers. Guest Lectures are reported for 2018 mainly (only one guest lecture in 2019 and 2017). The University should exploit ERASMUS agreements so that peer academic from the collaborative institutions give guest lectures to the students.

Recommendations:
Define a strategy to organise guest lectures in a systematic manner

The indicator is fulfilled/~~partially fulfilled/not 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.).*

- description of the facts, the findings from the assessed institution's documents and the evaluation visit itself. The University participated in various events to promote various research activities. There are few experts from abroad participating in the PhD supervisory committees. There are five (5) PhD students from foreign institutions that visited for three (3) months the Faculty within the reporting period. Additionally, five (5) postdoctoral researchers visited for three (3) months the Faculty.

- analysis of the facts, the findings from the assessed institution's documents and the evaluation visit itself. There is a need to provide a strategy to establish this collaboration in a more systematic manner. There is no defined strategy to attract international students. The Faculty will need to advertise PhD positions in English.

Recommendations:
Define a strategy to attract international students

The indicator is ~~fulfilled~~/partially fulfilled/~~not fulfilled~~.

IV. SWOT Analysis

Strengths:	**Weaknesses:**
- Modernisation of the curriculum. - Industrial collaboration with industrial partners - Investment in building infrastructure and research equipment -Well-defined workflow for admission and monitoring of the PhD students.	- The research areas are too broad in comparison with the number of academic staff. -Too many research centers. -Lack of systematic collaboration with national industries and public stakeholders. -Lack of a culture to establish collaboration among the PhD students. -Lack of utilising questionnaire feedback to improve program delivery. -Lack of clear strategy to attract foreign PhD students. -Few academics do not meet the CNATDCU criteria.
Opportunities:	**Threats:**
- Explore the competitive advantage of the region to attract students from the neighbouring countries (Serbia, Bulgaria). -Manage the innovation systematically through patent filing and IPR.	- The level financial support may not be attractive for the talented graduates who prefer to pursue PhD studies abroad. -The overlapping research activities with other Doctoral School poses questions regarding sustainability and the attraction of sufficient number of students. - Pandemic has major impact on studies and on-line teaching methodologies must be adopted.

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (*, C)	Performance indicator	Judgment	Recommendations
1	**A**	**A.1.1.1.**	**Fulfilled**	***-The Faculty should make arrangements for candidates with disabilities.*** ***-It seems that there is no process regarding the replacement of students/academics that leave the University and have been selected as members of the Council.***

				-The Council should ensure that the 12 members of the Council have got overlapping leadership and technical skills contributing to the strategy and mission of the Doctoral training program.
2	**A**	***A.1.1.2***	**Fulfilled**	***-A clearer process is required regarding the allocation and even distribution of students to*** **supervisors. Some of the academics are not engaged in the Doctoral school as PhD supervisors.** **- There is a need to establish more systematic collaboration between the Doctoral students and the other researchers within the Faculty.**
3		***A.1.2.1***	**Fulfilled**	**- Use of central system to record meetings and the action points between the Supervisor Team and the PhD student** **-Use of the IT system to support the alumni.**
4	**A**	***A.1.2.2***	**Fulfilled**	**-Use of anonymised samples of PhD theses to train students on plagiarism.** **-Make clear the penalty imposed in case plagiarism detected.**
5	**A**	***A.1.3.1***	**Fulfilled**	**-Link the research strategy & objectives with the research grants.** **-Adopt a strategy where academic engagement in research grant writing**

				and management reaches at least 75%.
6	A	*A.1.3.2*	Fulfilled	- Liaise with the industrial and public authorities and stakeholders to further exploit opportunities for the PhD students. -Increase the number of research proposals at both national and international level. -Adopt a strategy to engage academics that are not active in research projects.
7	A	*A.1.3.3.*	Fulfilled	-The Faculty must invest to train PhD students to attend conferences, exhibitions, summer schools and utilise open access publication fees in a more systematic manner. -There must be a KPI so that at least one training activity is planned for each PhD student within the 3 year period of study. The supervisory committee could monitor the students to meet these targets.
8	A	*A.2.1.1.*	Fulfilled	-The Faculty should adopt a strategy to restructure the research centers with an maximum number of four. -The Faculty may need to obtain funds so that calibration of equipment is carried out in a systematic manner on frequent basis.

				-There is a process required within the school regarding the decision making for the purchase of the research infrastructure.
9	A	*A.3.1.1.*	Fulfilled	-The Faculty must adopt so that the percentage of academics that meet CNATDCU minimum standards should be above 80%. -The Web profile of the supervisors must provide in different tabs the following information: research area, research students, key publications and grants. Such information must be provided in both Romanian and English.
10	A	*A.3.1.2.*	Fulfilled	-Reduce the number of research areas and engage few academics.
11	A	*A.3.1.3*	Partially Fulfilled	-The number of courses offered must be reduced. -Revise course curriculum using latest research papers. Use coursework in each module as a method of assessment. -Link the research strategy with the research facilities.
12	A	*A.3.1.4*	Fulfilled	- Engage in a systematic manner all academics in the supervisor process.
13	A	*A.3.2.1*	Fulfilled	-The Faculty needs to adopt strategy to measure WoS/ISI publications and

				visibility metrics per academic.
14	A	*A.3.2.2*	Fulfilled	N/A
15	B	*B.1.1.1*	Fulfilled	-Competitive advantage of the Doctoral Program and its link with industrial partner must be highlighted. -Improve the information of the web site in both English and Romanian. -Use of social media to promote research outputs. -Use alumni to attract new students.
16	B	*B.1.2.1.*	Fulfilled	-Special arrangements should be considered for DDS students. -The good knowledge of the English language should be considered in the admission criteria.
17	B	*B.1.2.2.*	Fulfilled	N/A
18	B	*B.2.1.1.*	Fulfilled	- The courses offered are too large taken into account the cohort. You should make the course training more focussed. -Introduce rules regarding progression in the courses that are attended in the first year. - The number of courses should be reduced. -The course material should be revised by using state of the art/survey research papers as a primary resource.

				-Coursework must be one of the components for evaluation. -Introduce a compulsory module related to innovation management (patent filing, research commercialisation route, spin-off and start-up process).
19	B	*B.2.1.2.*	Fulfilled	-Define the course evaluation for the Ethics.
20	B	*B.2.1.3.*	Partially Fulfilled	-Critical Thinking and research independence methodology must be embedded in the training. -A systematic approach on internship opportunities and training must be defined.
21	B	*B.2.1.4.*	Not Fulfilled	An IT system is required to record the meetings, agenda and the action plan.
22	B	*B.2.1.5.*	Fulfilled	N/A
23	B	*B.3.1.1*	Fulfilled	The Faculty must define a strategy so that more research outputs become internationally excellent.
24	B	*B.3.1.2.*	Fulfilled	-The Faculty must adopt a strategy where outputs can be presented in international excellent events that are supported by scientific organisations such as Institution of Mechanical Engineers and Institute of Electrical and Electronic Engineers. A KPI must be defined for each student regarding

				the conferences participated as an author presenter.
25	**B**	***B.3.2.1.***	**Fulfilled**	**N/A**
26	**B**	***B.3.2.2***	**Fulfilled**	**The Faculty must keep track of the defence committees so the criterion is fulfilled.**
27	**C**	***C.1.1.1.***	**Fulfilled**	**-Engagement of different stakeholders (e.g companies, public organisation) on the program design. -A workflow system is required for the conflict management.**
28	**C**	***C.1.1.2.***	**Partially Fulfilled**	**-Use a systematic approach so that students' feedback is used to enhance the Doctoral training program.**
29	**C**	***C.2.1.1.***	**Fulfilled**	**- The Academics and the Doctoral students must use their corporate email for all University activities. This important to maintain the GDPR policy.**
30	**C**	***C.2.2.1.***	**Fulfilled**	**N/A**
31	**C**	***C.2.2.2.***	**Fulfilled**	**-Make clear the penalties applied to plagiarism.**
32	**C**	***C.2.2.3.***	**Fulfilled**	**N/A**
33	**C**	***C.3.1.1.***		**Define a KPI regarding the participation in events and winter/summer schools**
34	**C**	***C.3.1.2.***	**Fulfilled**	**N/A**
35	**C**	***C.3.1.3.***	**Fulfilled**	**Define a strategy to attract international experts and students**

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

I am satisfied with the overall Doctoral training program. The Faculty has designed and implemented an interested Doctoral program in the area of Mechanical Engineering. The PhD supervisor team has produced interested research results published at both international conferences and journals. Few weaknesses have been identified that should be considered to grow the PhD community and produce excellent scientific results.

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.*