

The External Evaluation Report of a Doctoral Study Domain

Contents

I. Introduction

II. Methods used

III. Analysis of performance indicators

IV. SWOT Analysis

V. Overview of judgments awarded and of the recommendations

VI. Conclusions and general recommendations

VII. Annexes

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.).

This periodic external evaluation report was carried out for the evaluation of the Computers and Information Technology (TI) doctoral programme of IOSUD Polytechnic University of Timisoara (UPT).

Type of evaluation: periodic external evaluation

Evaluation visit period: 27 September - 1 October 2021.

Composition of the expert evaluation committee:

1. Prof. univ. dr. eng. Valentina Emilia Bălaș - Expert evaluator RNE, University "Aurel Vlaicu" Arad, Romania
2. Prof. univ. dr. eng. Gabor Kiss - international expert, Obuda University, Budapest, Hungary
3. Ing. drd. Titus Maghiar - student doctorand, Universitatea Tehnica din Cluj-Napoca Craiova, România.

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.

Within IOSUD-UPT, in accordance with the Institutional Regulations for the organization and conduct of doctoral studies at the Polytechnic University of Timisoara (RIOSUD-UPT), drawn up pursuant to Law 1/2011 and GD 681/2011, doctoral studies are carried out in a single doctoral school, the

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



Doctoral School of Engineering Studies, established with the approval of RIODSUD-UPT by the UPT Senate in 2011 (RIODSUD-UPT is Annex 10 to the UPT Charter). The seat of the Doctoral School of Engineering Studies is in the UPT Rectorate building, P-ța. Victoriei nr. 2, Timișoara, 1st floor, room 103 A,B,C.

The IOSUD-UPT option of setting up and operating a single doctoral school has proved to be very beneficial for the development of doctoral degree programmes, being in line with the mission and specificity of Politehnica University of Timisoara. Thus, it was possible to have a unified approach to the running of the doctoral programmes, with a beneficial impact on the respect of quality standards for all doctoral fields accredited in IOSUD-UPT.

In IOSUD-UPT, the CSUD is headed by a director, appointed following a public competition organized by UPT, in accordance with the Institutional Regulation for the organization and conduct of elections for the organizational structures and management functions of doctoral studies at the level of the institution organizing doctoral studies "Politehnica" University of Timisoara, no. 6937 of 22.05.2012, approved by the UPT Senate Resolution no. 13 of 10.05.2012. According to the Decision no. 914/112/C of 30.08.2012 of the Rector of UPT, the Director of CSUD was appointed Prof.dr.ing Romeo SUSAN-RESIGA, starting from 03.09.2012, for a term of 4 years. Following the public competition for the post of CSUD Director organized by UPT in 2016, the mandate of Prof.dr.eng. Romeo SUSAN-RESIGA was renewed for another 4 years by UPT Rector's Decision no. 1116/112/C of 16.09.2016.

Following the competition organized in 2020, according to the decision no. 1840/112/C of 20.10.2020 of the Rector of UPT, the Director of CSUD was appointed Prof.dr.eng. Radu-Emil PRECUP for a 4-year mandate.

Following the elections for the members of the CSUD, organized in June 2012 in accordance with the Institutional Regulations for the Organization and Conduct of Elections for the Organizational Structures and Management Functions of Doctoral Studies at the IOSUD-UPT Level (approved by HS 13 / 10.05.2012), http://www.upt.ro/Informatii_alegeri-consiliu-csud_299_ro.html, the composition of the CSUD for the 2012-2016 mandate was as follows:

- o Prof.univ.dr.eng. Liviu MARȘAVINA
- o Prof.univ.dr.chem. Mircea ȘTEFĂNESCU
- o Prof.univ.dr.eng. Ștefan-Gheorghe PREITL
- o Prof.univ.dr.eng. Ion BOLDEA
- o Dr.Eng.Attila SIMO

Director of the Doctoral School, Prof.dr.eng. Gheorghe-Daniel ANDREESCU was appointed by the Rector of UPT, on the proposal of the CSUD, by Decision no. 668/112/C of 10.07.2012, for a 5-year mandate, 2012-2017. The Interim Council of the Doctoral School (CȘD) was composed, at the proposal of the CSUD, of

- o Prof.dr.eng. Daniel Mihai GRECEA
- o Prof.dr.eng. Nicolae FAUR
- o Prof.dr. eng. Dorin LELEA (co-opted after obtaining the habilitation certificate)

Taking into account GD no. 3/2021 on the extension of the state of alert on the territory of Romania as of 13 January 2021 respectively, the Institutional Regulation for the organization and conduct of elections for the organizational structures and management functions of doctoral studies at the level of the institution organizing doctoral studies at the Politehnica University of Timișoara, it was approved the



extension of the mandate of the members of the Council for Doctoral Studies and the members of the Doctoral School Council until 17.07.2021.

The technical secretariat of the CSUD/CŞD has been provided in the period 2012-2016 by Ms. dr.eng. Liliana MOŞTEORU, and the submission of doctoral files to the CNATDCU was coordinated by Ms. Eng. Simona DAMIAN.

In January 2017, elections were held for the members of the CSUD and for the members of the CŞD, in accordance with the Regulation on the organization of the processes of constituting the governing structures and of election/appointment/occupation by competition of governing positions at the University POLITEHNICA Timișoara, for the term 2016-2020 (approved by HS 207 / 26.11.2015), with the following results for the composition of the CSUD and CŞD, http://www.upt.ro/img/files/alegeri_2016/mcsud_mcsd/Raport_comisie_electorală_CSUD_CSD.pdf :

CSUD:

- o Prof.dr.eng. Aldo DeSABATA
- o Prof.dr.eng. Lăcrimioara STOICU TIVADAR
- o Prof.dr.eng. Ion BOLDEA
- o Prof.dr.eng. Francisc PETER
- o Prof.dr.eng. Anca DRĂGHICI
- o Prof.dr.eng. Marius MARCU
- o Drd. Magdalena BANDA

CŞD:

- o Prof.dr.eng. Dorin LELEA
- o Prof.dr.eng. Florea DINU
- o Drd. Cezara-Liliana RAȚ

After the end of the 5-year term (2012-2017) as Director of the Doctoral School for Prof.dr.eng. Daniel ANDREESCU, on the proposal of the CSUD, the Rector of UPT, by decision no. 1494/112/C of 19.10.2017, appointed Prof.dr.eng. Dorin LELEA as Director of the Doctoral School for a 5-year term, 2017-2022. Prof.dr.eng. Daniel ANDREESCU remained an alternate member of the SSC.

Currently the technical secretariat of the Doctoral School of Engineering Studies is composed of 3 persons: Ms Eng. Monica JURJIU (admission, study contracts, current problems of doctoral students and supervisors, constitution of the doctoral student's file), Ms Eng. Steliana CUCU (PhD thesis support and submission of PhD files to the CNATDCU in the MEC RMU/REI system, running of the advanced university training programme) and CS III Dr. Nicoleta NEMEȘ (activities related to information reporting to MEC, NSAI, accreditation).

The field of doctoral studies managed by the Doctoral School of Engineering Studies of IOSUD-UPT (objectives, mission, curricula, number of doctoral supervisors, evolution of the number of doctoral students and the number of PhDs in the last 5 years, research centres/laboratories, main scientific achievements, etc.);

The main objective of the Doctoral School of Engineering Studies of IOSUD-UPT and of the doctoral fields coordinated by it is the preparation of human resources, within the third cycle of university studies, for the qualification of independent scientific researcher certified by the awarding of the title of doctor to the doctoral student, after the defense of the doctoral thesis and after the completion of the



doctoral program composed of (a) the training program based on advanced university studies (with a duration of 1 year) respectively (b) the individual doctoral scientific research program (with a duration of minimum 2 years).

The mission of the Doctoral School of Engineering Studies of IOSUD-UPT is to coordinate, in a unitary manner (with unitary academic performance criteria and standards) all doctoral fields accredited for operation in IOSUD-UPT. The Doctoral School provides the optimal organisational framework for the conduct of training programmes based on advanced university studies and individual doctoral scientific research programmes, and for the completion and public defence of doctoral theses. The Doctoral School also provides the organizational framework for the public defense of habilitation theses, and for the sustainable development of the body of doctoral supervisors affiliated to IOSUD-UPT. The Doctoral School provides, for all doctoral students of IOSUD-UPT, cross-curricular courses within the training program based on advanced academic studies, which provides doctoral students with the necessary knowledge and cultivates the appropriate skills and attitudes for scientific research with respect to academic standards of performance, originality, compliance with the rules of ethics and deontology of research.

The Doctoral School of Engineering Studies of IOSUD-UPT manages 13 areas of doctoral studies, according to GD 778/2015, GD 376/2016, GD 140/2017 and GD 158/2018, GD 326/2019, GD. 299/2020. These doctoral areas are presented in the table below, together with the CNATDCU specialist committees to which they are attached.

D#	Domeniul studii doctorale în IOSUD-UPT	Comisia specialitate CNATDCU
D01	Chimie	4. Chimie
D02	Inginerie civilă și instalații	6. Inginerie civilă și management
D03	Ingineria materialelor	7. Ingineria materialelor
D04	Inginerie chimică	8. Inginerie chimică, inginerie medicală, știința materialelor și nanomateriale
D05	Inginerie electrică	9. Inginerie electrică
D06	Inginerie energetică	10. Inginerie energetică
D07	Inginerie electronică, telecomunicații și tehnologii informaționale	11. Electronică, telecomunicații și nanotehnologie
D08	Calculatoare și tehnologia informației	15. Calculatoare, tehnologia informației și ingineria sistemelor
D09	Ingineria sistemelor	
D10	Inginerie industrială	16. Inginerie industrială și management
D11	Inginerie și management	

D12	Inginerie mecanică	17. Inginerie mecanică, mecatronică și robotică și inginerie genistică și de armament
D13	Arhitectură	33. Arhitectură și urbanism

The Doctoral School of Engineering has a body of doctoral supervisors consisting of a total of 148 PhD supervisors affiliated to IOSUD-UPT at the date of this self-evaluation report, of which

- 78 full doctoral supervisors (teaching staff with non-permanent employment contract in IOSUD-UPT), 53 associate doctoral supervisors (with fixed-term employment contract for supervising doctoral students in internship). A small proportion of associate doctoral supervisors do not have a contract with IOSUD-UPT at the time of this report because they are not currently supervising doctoral trainees but are professionally active.

- 61 full PhD supervisors who have obtained the habilitation certificate.

II. Methods used

In the external evaluation process, before and during the evaluation visit to IOSUD- UPT, Doctoral School in the PhD field of Computers and Information Technology, the following methods and tools were used:

- Analysis of the Internal Evaluation Report of the evaluated doctoral degree area - Computers and Information Technology - and its annexes;
- Analysis of documents, data and information available on the IOSUD UPT / DIS website, in electronic format;
- Visit to the buildings of the institution's patrimony, which included:
 - classrooms;
 - research structures;
 - library;
 - the secretariat.
- Online and face-to-face meeting/discussion with PhD students in the PhD field of Computers and Information Technology;
- Online meeting/discussion with graduate students in the PhD degree area Computers and Information Technology;
- Online meeting/discussion with employers of graduates in the field of doctoral studies in Computer Science and Information Technology;
- Online meeting/discussions with the management of the Doctoral School in which the PhD field of Computers and Information Technology is working, as well as with the management of the Faculty of Automation and Computers and the Department of Computers and Information Technology;
- Online and face-to-face meetings/discussions with PhD supervisors in the assessed PhD field;



- Online and face-to-face meeting/discussion with the head of the PhD area of Computer Science and Information Technology and the team that produced the internal evaluation report;
- Online and face-to-face meeting/discussion with the directors/research managers/research structures of the PhD area Computer Science and Information Technology;
- Online meeting/discussions with representatives of the various IOSUD structures where the PhD field of Computer Science and Information Technology operates:
 - IOSUD-UPT Doctoral Studies Council;
 - Doctoral School Council;
 - The Evaluation and Quality Assurance Commission and the Quality Assurance Department;
 - Ethics Commission.
- Application of questionnaires to doctoral students in the evaluated doctoral studies field.

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

The online meetings went according to schedule. They were moderated by the evaluation team and the accompanying persons answered questions posed by the evaluation panel members. In general, all meetings went satisfactorily and the discussion with participants helped to clarify the various issues raised by the evaluation members.

III. Analysis of ARACIS's performance indicators

Domain A. INSTITUTIONAL CAPACITY

All 14 indicators that are part of Domain A have been met. Institutional capacity.

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

From the institutional and managerial point of view, the Computers and Information Technology doctoral school covered satisfactorily all the issues related to the adoption and implementation of specific regulations for doctorate schools and enough financial and logistics resources are allocated to carry out the doctoral studies' mission.

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.

Following the analysis of the fulfilment of the indicators included in standard A.1.1, it is found that the IOSUD of the Polytechnic University of Timisoara has approved and implemented the regulations provided for in the specific legislation on the organization of doctoral studies.

The standard is deemed to be met.



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.*

At the online meeting with doctoral students, they said that they knew about the doctoral student representatives in CDUD and CSD but did not know them personally. Among the doctoral students present was their new representative in the CSUD, elected following elections held in July 2021 based on a methodology and a regulation for the organisation and conduct of elections. In terms of the elections there are two components: the submission of a candidacy file by a certain deadline together with the verification of the eligibility of the candidate for the respective position and, the election and contest committees, which were constituted at the university level consisting of both teaching staff and PhD students. The elections were held physically, in the large Senate Hall of the UPT Rectorate.

Recommendations: It is recommended to update the Doctoral School website on a permanent basis. Some pages should be translated into English.

The Faculty should make arrangements for candidates with disabilities.

It is recommended to introduce a procedure for the replacement of students/faculty who leave the university and have been selected as Board members.

Develop an internal procedure for reviewing and approving proposals for the subject matter of the advanced degree-based training programme. Point g) specifies that the Doctoral School "seeks to ensure that the themes of the training programmes based on advanced university studies are correlated with the research themes proposed by the doctoral supervisors and assumed by IOSUD-UPT" but it is further recommended that the proposals for doctoral themes be formulated by the doctoral supervisors after discussions with representatives of the economic environment.

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.*



According to Art.17 para. 5 of GD 681 / 2011 the Regulation of the Single Doctoral School of IOSUD-UPT (Annex_A.1.1.1.a.) establishes mandatory criteria, procedures and standards concerning the following aspects:

- a) acceptance of new PhD supervisor members, as well as regulations on how a PhD supervisor can be withdrawn from the PhD school (Art. 16, 17);
- b) the mechanisms by which decisions are taken regarding the appropriateness, structure and content of the training programme based on advanced university studies (Art. 55-67);
- c) procedures for changing the supervisor of a particular doctoral student and procedures for mediating conflicts (Art. 15, 25);
- d) conditions under which the doctoral programme may be interrupted (Art. 47, 48);
- e) the procedures for preventing fraud in scientific research, including plagiarism (Art. 77, 79, 85);
- f) ensuring access to research resources; (Art. 68-72)
- g) the obligations of doctoral students to attend (Art. 41, 53).

Recommendations: Continuous updating of the Doctoral School Regulations to the level of existing legislation. A clearer process on the allocation and even distribution of students to PhD supervisors is needed.

The indicator is fulfilled.

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

IOSUD-UPT has the necessary software resources to fulfil the mission of doctoral studies in good conditions.

From the analysis carried out, it was concluded that both IOSUD-UPT and the PhD field of study Computers and Information Technology have the necessary logistics: there is an adequate computer system for the registration of PhD students and their academic career, as well as software (Plagiat.pl, SemPlag but especially iThenticate) for checking the percentage of similarity in all PhD theses.

It is assessed that the standard is met.

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 information system for the registration of doctoral students and academic career used within IOSUD-UPT mainly includes:

- ENROLL admissions platform (designed to manage student admissions information in IOSUD-UPT, currently being extended for doctoral studies to monitor doctoral students' activity and the creation of the doctoral file in electronic format).

- Starting with the academic year 2017/2018 in IOSUD - UPT the PhD registration is carried out computerized, by accessing the ENROLL platform by the candidates at:

<http://admitere.upt.ro/phd/>

- Starting from the academic year 2020/2021, IOSUD - UPT has created the possibility for students to build and submit their entire admission file on the ENROLL platform.



- The instructions for completing the admission file on the ENROLL PhD platform are presented in Annex_A.1.2.1-1.

which are publicly available at

<http://www.upt.ro/img/files/2019->

[2020/admitere/doctorat/Admitere_PHD_2020_Instructiuni_enroll_rev3.pdf](http://www.upt.ro/img/files/2019-2020/admitere/doctorat/Admitere_PHD_2020_Instructiuni_enroll_rev3.pdf)

The academic records of some PhD students in the field of Computers and Information Technology at UPT were also checked by accessing the system.

Recommendations: Use an appropriate platform with access for all persons involved in the management of PhD students' records.

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.

IOSUD-UPT carried out the verification of the similarity percentage in PhD theses elaborated since 2016, using the following software, approved by MENCS cf. OM 3485/2016.

- Plagiat.pl, through the Ministry of Education's computer platform doct.edu.ro/doct, between June 2016 and July 2017.

- SemPlag, through the uefiscdi-direct.ro/semplag/index.php platform, from August 2017 to September 2017.

- iThenticate (acquired by UPT) from October 2017 to date.

- PhD students have access to this software, and examples of the use of the similarity software for PhD students in the area of Computing and Information Technology are presented in Annex_A.1.2.2-2.

Recommendations: Use anonymised samples of PhD theses to educate students about plagiarism, with a presentation of the comparison between the three plagiarism detection systems that UPT has. It is advisable to specify the sanction imposed in case of plagiarism detection.

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 analysis of the three indicators in standard A.1.3 shows that IOSUD-UPT adequately manages the financial resources, the doctoral study area Computers and Information Technology and have managed to supplement the revenues provided by the government through additional funding.

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.

- The team of the PhD studies area Computers and Information Technology
- has participated during the reference period in the implementation and completion of the grants in Annex_A.1.3.1. obtained by the PhD supervisors in the field. Involvement was in both research and institutional grants.

- At the time of submission of the evaluation dossier the situation of research grants is as follows:
- Research or institutional development grants / human resources in implementation: 1
- Research or institutional development grants / human resources obtained by PhD supervisors in the last 5 years: 4

- Total contracts in the field (2016-2020): 20

Research grants address topical issues for the PhD field under review, with doctoral students involved in research projects, according to the legislation in force (see Annex_A.1.3.2-3.)

Recommendations: Link the strategy, research objectives and proposals from the economic environment with research grants.

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%.

In the context of the quality indicator IOSUD-UPT has used and uses the following financial resources from its own income to support doctoral students to carry out their doctoral study programmes:

- Doctoral scholarships from UPT own revenues, awarded for the year 2018 on the basis of HCA no. 44/11.09.2018 and for the year 2019 on the basis of HCA 73/24.09.2019 (Annex_A.1.3.2-1.).

- Doctoral grants from UPT's own revenues for the completion of doctoral studies awarded on the basis of the decision of the UPT Senate or the UPT Board of Directors (Annex_A.1.3.2-2.). In the case of scholarships for the extension of doctoral studies, only those doctoral students who were receiving funding at the time of the evaluation of the doctoral field were considered.

- Engaging doctoral students in research grants according to the legislation in force (Annex_A.1.3.2-3.).

- Annex_A.1.3.2. presents the list of PhD students in the field of Computers and Information Technology, with explicit indication of the PhD students additionally funded from UPT own income.

- Existing PhD students at the time of the evaluation: 41

- Doctoral students existing at the time of the evaluation who also benefit from sources of funding other than government funding: 10

$$10/41*100 = 24.39 \% \text{ CRITERION MET } \geq 20\%$$

The estimated percentage is estimated to be 24.39%, which is above the required limit of 20%.

Recommendations: Attract economic agents to provide fellowships for at least six months to support scientific work.



Disseminate and continuously update the list of additional funding for PhD students together with the different categories of PhD students taking part in them.

Increase the number of research project proposals both nationally and internationally.

It is recommended to expand public-private partnerships with companies interested in innovation in the field of Computing and Information Technology.

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.).

The following is noted:

The data related to the application of the indicator are given in Annex_A.1.3.3.

In summary, according to Annex:

$$S1/S2*100=13.43\% \text{ CRITERION MET } \geq 10\%.$$

The estimated percentage is estimated to be 13.43%, which is above the required limit of 10%.

To a very large extent, doctoral students receive financial support to attend international conferences, with UPT providing travel expenses. Students are also involved in research projects through which they can receive financial support.

Recommendations: It is recommended to increase the amounts used from the funds of the Doctoral School and to distribute them in a balanced way by doctoral fields of study, according to the number of doctoral students and their performance.

Also the allocation of a dedicated budget for the area of Computers and Information Technology, which can be used for the professional training of PhD students.

It is also recommended to allocate an annual funding for each doctoral candidate for both acquisition expenses and expenses for participation in scientific events to support the development of the doctoral thesis, based on the regulations in force.

Disseminate to doctoral students information on additional funding and how to access it by publishing it on the IOSUD and Doctoral School's announcement page.

The Faculty should invest in training doctoral students to attend conferences, exhibitions, summer schools and use open access publication fees more systematically.

There should be KPIs so that at least one training activity is planned for each PhD student during the 3-year period of study. The mentoring committee should monitor students to achieve these targets.

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.



The indicator is fulfilled.

Criterion A.2. Research infrastructure

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

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

From the analysis of the documents provided, as well as from the on-site visit, it appears that both IOSUD-UPT and the PhD field of Computers and Information Technology have a modern research infrastructure, with appropriate facilities, which can adequately support the specific activities of doctoral studies.

The standard is deemed to be met.

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.

For the field of Computers and Information Technology, the Doctoral School of the UPT has an endowment appropriate to the field evaluated and in line with the mission and objectives assumed.

- Within the field of Computers and Information Technology, the PhD supervisors are also part of the Research Centre in Computers and Information Technology.

- The research equipment of the CISA centre can be found on the ERRIS platform by clicking on the link:

<https://erris.eu/ERIF-2000-000R-1157>

The situation has been certified by on-site visit.

From the questionnaire administered, it appears that PhD students have access to international databases to a large extent.

Recommendations:

It is recommended to update the existing material base and to continue investing in the material endowment in a cutting-edge area such as Computers and Information Technology.

Within IOSUD-UPT, relevant arguments should be brought to the decision making in the acquisition of research infrastructure for the field of Computers and Information Technology.

It is recommended to continue and develop collaborations with the economic environment, as well as to obtain the necessary funds to upgrade the research infrastructure.

It is advisable to use research facilities to provide consultancy services to companies.



It is recommended to include all PhD supervisors in the field of Computing and Information Technology in the research directions described on the ERRIS platform for better visibility.

Continuously increase the databases of intentional bibliographic resources and promote how to access them among PhD students..

The indicator is fulfilled.

Criterion A.3. Quality of Human Resources

**general description of the criterion analysis.*

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

The analysis carried out for the 4 indicators of this standard leads to the conclusion that the field of Computers and Information Technology of UPT has a qualified and experienced staff to run the PhD degree programme.

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.

Within the field of Computers and Information Technology there are 19 PhD supervisors affiliated to IOSUD - UPT. Of these 12 meet the minimum standards, i.e. 63.15% > 50%.

In Annex_A.3.1.1. are presented the centralizers with the minimum standards detailed by criteria, for each of the PhD supervisors of the Computers and Information Technology field. Not all of them meet the CNATDCU minimum criteria.

Recommendations: The web profiles of supervisors should provide in different tabs the following information: research area, students, key publications and grants. Such information should be provided in both Romanian and English.

Supervisors who do not meet the minimum requirements must complete these requirements in the following interval.

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.

Within the field of Computers and Information Technology, 19 PhD supervisors affiliated to IOSUD UPT are working. Of these, 10 are holders within IOSUD UPT (Annex_A.3.1.2.).

10/19 = 52,60 % full professors

The estimated percentage is estimated to be 52.60%, which is above the required limit of 50%.



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.*

All the subjects in the advanced undergraduate training programme related to the doctoral programme in Computers and Information Technology are taught by professors who are PhD supervisors, or by professors or lecturers with extensive experience in the field of the subjects taught.

Annex_A.3.1.3. gives examples of the subjects in the advanced degree-based training programme and their holders.

Recommendations: It is recommended to review the course curriculum using the latest research papers. It is advisable to link the research strategy with the research facilities.

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%.*

Out of a total of 19 PhD supervisors in the field of Computers and Information Technology, 0 (zero) PhD supervisors are concurrently supervising more than 8 PhD students, but not more than 12, during their PhD studies (3 or 4 years, depending on the field, plus legally granted extension periods).

The weighting is therefore:

$$(0/8)*100 = 0\%$$

The criterion is met, because the indicator does not exceed the value of 20%

Recommendations: A better distribution of PhD students among the PhD supervisors in the field of Computers and Information Technology is recommended in order to cover the demand as evenly as possible.

The indicator is fulfilled.

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

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 analysis of the two indicators of the standard shows that all PhD supervisors in the field of Computers and Information Technology are internationally visible.

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.*

The 19 PhD supervisors of the Computers and Information Technology domain meet this criterion, of which 9 supervisors partially meet it. A percentage of 52.63%, i.e. more than 50% of the PhD supervisors in the field of Computers and Information Technology meet the criterion. The situations are presented in Annex_A.3.2.1 .

Recommendations: It is recommended that the Faculty adopts a strategy to continuously measure WoS/ISI publications and academic visibility metrics.

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.*

A total of 10 PhD supervisors meet this criterion, i.e. 52.63%. Annex_A.3.2.2. summarises nominally the scores of the activity over the last 5 years (January 2016 - December 2020) and the related calculations.

Recommendations: It is recommended to encourage young researchers to support habilitation, thus ensuring the sustainability of the field.

The indicator is fulfilled.

Domain B. EDUCATIONAL EFFECTIVENESS

**general description of domain analysis.*



In the PhD field of Computers and Information Technology, all 12 indicators for Field B. Educational Effectiveness are met. From the analysis of the report and the related annexes it appears that an adequate number of candidates of a very good quality apply to the CTI PhD field. The content of the doctoral programmes in the CTI field is adequate and meets all the requirements. The results of doctoral studies are also adequate and IOSUD-UPT and the CTI field have appropriate procedures for evaluating these results.

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

**general description of the criterion analysis.*

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 ratio between the number of applicants in the last five years and the number of places available in the doctoral programme is 1.31.

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

The ratio between the number of Master's graduates from educational institutions other than IOSUD - UPT, enrolled in the PhD admission (last 5 years) and the number of places financed from the state budget - Computers and Information Technology field is $1.31 > 1.2$.

The list of candidates enrolled in doctoral studies in IOSUD - UPT, master graduates of other higher education institutions in the country or abroad, is presented in Annex_B.1.1.1-1.

The places funded from the state budget in the last 5 years (2015-2019) are presented in Annex_B.1.1.1-2.

The list of candidates enrolled in doctoral studies in IOSUD - UPT in the last 5 years (2015-2019) is presented in Annex_B.1.1.1-3.

Recommendations: It is recommended that the CTI PhD field improves its ability to attract students coming from other higher education institutions, including from abroad. It is also recommended to create a plan to promote and expand the areas addressed in the PhD theses.

The competitive advantage of the PhD programme and its link with industrial partners should be highlighted. It is recommended to improve the information on the website in both English and Romanian. Use social networks to promote research results. Use alumni to promote the CTI field to attract new students.

The indicator is fulfilled.



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

Following the analysis of the 2 indicators of the standard (met), it appears that admission to PhD studies in the field of Computer and Information Technology is based on selection criteria that ensure academic, research and professional performance. This, coupled with an expulsion (dropout) rate of 6%, demonstrates that the standard is met.

The standard is deemed to be met.

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 studies in IOSUD-UPT is regulated by the Institutional Procedure on the organization and conduct of admission to doctoral studies in UPT, updated annually to be in line with legislative regulations.

According to this procedure, there is a set of criteria for the selection of candidates (Annex 7 of the Admission Procedure) - Annex_B.1.2.1.

- Academic performance is quantified by grades N1-N4 in the Selection Criteria.
- The interview with the applicant - covers the quality and clarity of the study directions and intentions materialised in the presentation of the research topic proposal - is quantified on the basis of N5
- Interest in scientific research is quantified in the N6 - N8 score
- Publications in the field are quantified as N9 - N10

Admission to doctoral studies at IOSUD-UPT takes place on the basis of an admission colloquium.

The Council of the Doctoral School of Engineering Studies of IOSUD-UPT establishes and posts, after the registration period, the doctoral admission committees associated with the doctoral fields of IOSUD-UPT. The doctoral admission committee consists of permanent members, the secretary of the committee and the chairman of the committee. The permanent members of the committee are the same for both admission sessions.

http://www.upt.ro/img/files/2018-2019/admitere/doctorat/IOSUD-UPT-admitere-2019_procedura.pdf

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 list of doctoral students admitted and enrolled in doctoral studies in IOSUD-UPT, for the admission sessions 2015, 2016, 2017, 2018, 2019 who were discharged in the first 3 years of the doctoral program is presented in Annex_B.1.2.2. for the doctoral field Computers and Information Technology.

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.



Total enrolled (2015-2019): 50
Exmatriculated in the first 3 years: 3
Exmatricultation rate = $(3/50) \times 100 = 6\%$

3 out of 50 doctoral students abandoned in the last 5 years, which represents a dropout rate of 6%, below the 30% limit.

There are no specific recommendations.

The indicator is fulfilled.

Criterion B.2. The content of doctoral programs

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 analysis shows that all 5 indicators of the standard are met.

It is assessed that the standard is met.

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 individual plan for the preparation of the doctoral candidate through advanced university studies, which is Annex 1 to the Doctoral Studies Contract, contains three disciplines relevant to the doctoral candidate's training in scientific research. According to UPT regulations (footnote 1 in the Annex):

"The individual plan will include the following types of courses:

- (i) transversal course, organized by the Doctoral School (DS);
- ii) tutorial course in doctoral research (based on individual study proposed and mentored, as holder, by the PhD supervisor);
- iii) course in a Master's programme (not previously attended by the doctoral candidate).

The transversal course is compulsory. The other two courses may be either ii) or iii)."

- The transversal course (it is taken for all first year PhD students), adopted in UPT, is a discipline related to research methodology and ethics of the scientific researcher, a discipline that in the period 2008-2018 was called Scientific Research, Communication and Ethics, and since 2018 has been called Ethics and Academic Integrity in Scientific Research and Dissemination of Results.

The discipline file is public and can be found at:

= http://www.upt.ro/Informatii_cscs_419_ro.html (2008-2017) and

= http://www.upt.ro/Informatii_etica-si-integritate-academica-in-cercetarea-stiintifica-si-1409_ro.html (present).

- Within the discipline there are 7 lectures, 7 conferences (by different lecturers, all scientific personalities) and 7 seminars (by 6 distinguished lecturers, all scientific personalities). This discipline is designed for in-depth study of research methodology, developing skills and competences related to research methodology.



- The second and third subjects in the plan are chosen by the scientific supervisor so as to contribute to the deepening of the PhD field and topic. Individual doctoral training plans for the assessed field are presented in Annex_B.2.1.1-1. as examples.

The record of the results obtained in the subjects of the individual training plan is kept at the UPT Doctoral School in the minutes of examinations in the subjects of the Advanced University Training Programme, summarised in Annex 2 of the Doctoral Studies Contract (Annex_B.2.1.1-2.).

Recommendations:

It is recommended to continuously update the content of these disciplines relevant to the scientific research training of doctoral students. Course material should be revised using state-of-the-art research papers/surveys as the main resource.

Introduce a mandatory module a course related to innovation management (patent filing, route to commercialization of research, startup and start-up process).

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.

In the framework of the advanced academic training program for doctoral students at IOSUD-UPT is included, as a mandatory subject for all doctoral students:

"Scientific Research, Communication and Ethics" (2008-2017).

The discipline sheet is public and can be found at the addresses:

http://www.upt.ro/Informatii_cscs_419_ro.html

http://www.upt.ro/img/files/2016-2017/doctorat/cscd/170511_CSCD.pdf

From 2018 the cross-cutting discipline is entitled "Ethics and academic integrity in scientific research and dissemination of results".

The discipline sheet is public and can be found at:

http://www.upt.ro/img/files/2019-2020/doctorat/EIACSDR/200528_Fisa_disciplinei_EIACSDR-2019-2020.pdf

The discipline sheets for the academic years 2018/2019 and 2019/2020 are presented in Annex_B.2.1.2.

In the doctoral programme the discipline dedicated to academic ethics and integrity is considered by students to be of interest and is relevant to a very high extent.

Recommendations: It is recommended to explore the possibility of introducing course modules focused on field-specific ethics topics (e.g. digital ethics, artificial intelligence ethics).

Continuously update the content of the Ethics discipline for the training of PhD students in scientific research.

Constant updating of the discipline in line with Western norms on ethics in academia.

To support this discipline in the first semester of the first year of the doctoral training.

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 main objective of the doctoral degree programmes is to prepare doctoral students, through mentored doctoral research, to become independent scientific researchers, a quality confirmed by obtaining the doctoral degree following the public defence of the doctoral thesis, with the fulfilment of the minimum performance indicators established by IOSUD-UPT, or the indicators established by the CNATDCU specialist committees if they exceed the UPT minimum indicators.

At present, the competences, skills and aptitudes obtained by doctoral students through the subjects of the advanced university training programme are specified in the course descriptions as follows:

- For the transversal course, followed by all PhD students, competences and skills related to research methodology (structured on specific projects of scientific research, technological development and innovation based on R&D) are developed, as well as the correct attitude towards the rules of research ethics and dissemination of research results, according to the transversal course subject sheet (Annex_B.2.1.3-1.), which for the academic year 2019-2020 is publicly available at:

http://www.upt.ro/img/files/2019-2020/doctorat/EIACSDR/200528_Fisa_disciplinei_EIACSDR-2019-2020.pdf

- For the disciplines of the Master programmes, recommended to the doctoral candidate by the supervisor, the competences, skills and aptitudes developed are included in the discipline sheet, cf. Annex_B.2.1.3-2. - Example of Master discipline sheet. By completing such Master's subjects, complementary to the previous Master's level training, the doctoral candidate acquires additional professional competences related to the topic of the doctoral thesis.

- Following the tutorial courses, the doctoral candidate will study topics specific to the doctoral theme, indicated by the doctoral supervisor, and the examination will be carried out by the doctoral supervisor together with the tutoring committee.

- The subjects covered in the training programme based on advanced university studies or doctoral research activities are aimed at acquiring competences and skills related to level 8 of qualification according to the National Qualifications Framework (NQF). In this regard, IOSUD-UPT applies a procedure for verifying the fulfilment of the requirements for doctoral studies (Annex_B.2.1.3.).

Recommendations: It is recommended that the curricula of the disciplines explicitly address the learning outcomes that doctoral students are expected to achieve.

Critical thinking and independent research methodology should be incorporated into instruction. A systematic approach to internship opportunities and training needs to be defined. Learning outcomes can be achieved through coursework.

The indicator is fulfilled

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.



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.*

After the doctoral student's registration following the admission session for doctoral studies in IOSUD-UPT, the doctoral supervisor proposes the composition of the mentoring committee, which is approved by the Director of the Doctoral School.

- The supervision committee includes specialists in the field and topic of the doctoral thesis, who assist and guide the doctoral candidate on specific aspects of the doctoral research program.

- The mentoring committee participates in all public meetings where the doctoral candidate presents the doctoral research project and the research reports on the dates set out in the summary sheet of the research programme.

- The mentoring committee records the doctoral candidate's presentation of the activities set out in the summary sheet of the scientific research programme and notes whether the activity is identical to that set out in the summary sheet, expressing its opinion on the importance and level of the activity carried out (footnote 4 of the minutes of the evaluation of the activities in the scientific research programme).

Annex_B.2.1.4. contains, by way of example, documents appointing the mentoring committee and minutes of support for the doctoral research project and research reports for doctoral students in the field of Computers and Information Technology.

Recommendations: It is recommended to keep a written record of meetings between doctoral students and the mentoring committee even in electronic format.

An IT system is needed to record meetings, agenda and action plan.

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.*

Annex_B.2.1.5. shows the PhD students existing at the time of the evaluation and the composition of the mentoring committees for the field of Computers and Information Technology.

Criterion is met $\leq 3:1$

Recommendations: It is recommended that the number of PhD supervisors and teaching staff should be increased to improve the ratio and coordination of PhD students.

Co-operation more international experts in the field to the mentoring committees.

The indicator is fulfilled.

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

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 analysis shows that the two indicators of the standard are met. PhD students in the CTI field have a research activity that is valued, including presentations at scientific conferences and scientific publications, in large numbers and of very good quality.

The standard is found to be met.

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

The number of PhD students who obtained their PhD degree in 2016-2020 is 17.

- The list of relevant papers produced by PhD students who obtained the PhD title in the period 2016-2020 can be found in Annex_B.3.1.1.

The committee randomly selected 5 articles for analysis, the situation is shown in the following table. All evaluated papers show significant contributions in the field of Computers and Information Technology.

Nume absolvent	Titlul tezei de doctorat	Articol selectat	Prezintă contribuții originale semnificati ve în domeniu
A. Topirceanu	Structural and behavioral analysis and modeling of the society	A. Topirceanu , M. Udrescu, M. Vladutiu, R. Marculescu, "Tolerance-based interaction: a new model targeting opinion formation and diffusion in social networks," PeerJ Computer Science, e42, 2016, WOS:00043744920000	DA
M.L. Sebu	Business process modeling solution supporting cross-organizational collaboration	M. L. Sebu and H. Ciocarlie, "Collaborative Business Process Solution Considering an Ontological Dimension of Process Models," Soft Computing Applications, Sofa 2016, Vol 2, vol. 634, pp. 177-193, 2018, WOS:000433139800014.	DA
S. Nimara	Transient errors impact analysis for sub-powered CMOS circuits and multiple levels of abstraction of a digital system	S. Nimara , A. Amaricai, O. Boncalo, and M. Popa, "Multi-Level Simulated Fault Injection for Data Dependent Reliability Analysis of RTL Circuit Descriptions," Advances in Electrical and Computer Engineering, vol. 16, pp. 93-98, 2016, WOS:000376995400013.	DA
O.S. Lupse	Providing flexible solutions for continuous services (SEAMLESS) in healthcare	O. S. Lupse and L. Stoicu-Tivadar, "Profiling In Obstetrics For Premature Birth Risk Patients," 2017 Ieee International Conference on E-Health and Bioengineering Conference (Ehb), pp. 289-292, 2017, WOS:000445457500073.	DA



A. Stancovici	Relative Localization Methodology in Collaborative Robotic Environments	A.Stancovici , M. V. Micea, and V. Cretu, "Cooperative Positioning System for Indoor Surveillance Applications," 2016 International Conference on Indoor Positioning and Indoor Navigation (Ipin), 2016, WOS:000390141300004.	DA
--------------------------	---	---	----

Recommendations: It is recommended that PhD students submit their research results for publication mainly to journals with an impact factor.

A strategy should also be defined so that as many research results as possible become internationally excellent.

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.*

- Number of doctoral students who obtained a PhD in 2016-2020: 17
- Number of papers presented at conferences: 67

Each PhD student has a minimum of one paper presented at prestigious international events, details can be found in Annex_B.3.1.2. - List of students who have obtained the PhD title in the period 2016-2020 and number of conference participations - Computers and Information Technology field.

$$67 / 17 = 3,94$$

CRITERION MET ≥ 1

Recommendations: the Faculty should adopt a strategy where research results are presented in excellent international events supported by scientific organizations such as IEEE, ACM, etc..

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.*

For the CTI field, the Doctoral School calls upon a significant number of external scientific referees in the committees for the public defense of doctoral theses for the field under review.

The analysis shows that there are no cases where the same external scientific referee has been co-opted in more than two committees in the same academic year.

The standard is found to be met.



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.*

For the field of Computers and Information Technology, in the period 2016-2020, there were NO cases in which the same expert was part of more than two doctoral committees for the public defense of theses coordinated by the same PhD supervisor in one year, as follows:

- 2016: 5 theses defended. No scientific supervisor had more than two defended theses.
- 2017: 4 theses defended. No scientific supervisor had more than two defended theses.
- 2018: 3 theses defended. No scientific supervisor has had two theses defended.
- 2019: 2 theses defended, under the supervision of two different supervisors.
- 2020: 3 theses defended. Two theses had the same scientific supervisor. The number of two theses coordinated by the same supervisor and assigned to the same supervisor from a higher education institution was not exceeded.

The list of students who defended PhD theses in the period 2016-2020 and the committees of scientific referees - Computers and Information Technology are presented in Annex_B.3.2.1.

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.*

For the field of Computers and Information Technology, 17 PhD theses were defended in the period 2016-2020 (Annex_B.3.2.2.).

The referee Liviu MICLEA (Polytechnic University of Bucharest) was assigned 5 PhD theses, the ratio between the number of PhD theses assigned to a specific external referee and the number of PhD theses defended in the same PhD field in the PhD school in the last 5 years is: $5/17 = 0.29$.

Viorel NEGRU (West University of Timisoara) was assigned 4 doctoral theses, the ratio between the number of doctoral theses assigned to a specific external referee and the number of doctoral theses defended in the same doctoral field in the doctoral school in the last 5 years is: $4/17 = 0.23$.

All other external referees have been assigned at most 3 doctoral theses, therefore no ratio between the number of doctoral theses assigned to a specific scientific referee coming from a higher education institution other than the one where the doctoral thesis is organised and the number of doctoral theses defended in the same doctoral field in the doctoral school in the last 5 years is higher than 0.3.

The indicator is fulfilled.

Domain C. QUALITY MANAGEMENT

IOSUD-UPT proves a good quality management, which allows the development of doctoral studies in adequate quality conditions.



All 9 indicators related to Area C. Quality Management are met. The Quality Assurance and Monitoring Procedure is implemented and followed within IOSUDUPT. IOSUD also ensures transparency of information and accessibility to learning resources. The degree of internationalisation of doctoral studies is also very good and the indicators related to this criterion are met.

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

There is a defined framework for quality assurance, with procedures that have been or are being implemented. The framework includes procedures for collecting information on students and supervisors, the training programme and the necessary infrastructure. There are also procedures for the detection of deficiencies and an action plan for the management of detected deficiencies.

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.

IOSUD of UPT has the institutional framework in place for internal quality assurance.

From the analysis carried out, it appears that there are Policies and procedures for quality monitoring and evaluation at both IOSUD-UPT and DIS levels. IOSUD has developed and regularly applies the Quality Monitoring and Evaluation Procedure. There are also mechanisms in place to collect feedback from doctoral students, followed by measures to improve academic and administrative processes.

It is assessed that the standard is met.

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

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

The UPT Doctoral School has specific procedures in place that demonstrate the constant conduct of its evaluation and internal quality assurance process. The procedures developed and applied at IOSUD level are presented in Annexes C111 together with the URL addresses where available.

Recommendations: It is recommended that the Quality Monitoring and Evaluation Procedure be reviewed periodically. It is also recommended that periodic reports include an action plan in which deficiencies are identified and listed and remedial actions are proposed together with deadlines, a responsible person and indicators to measure the evolution of the detected problem.



It is recommended to involve different stakeholders (e.g. companies, public organisations) in the design of the programme.

Promote to a greater extent the possibilities made available by the university to students in terms of social or academic support, but also the counsellors they can call upon.

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.*

Within the UPT Doctoral School there are mechanisms to evaluate the level of satisfaction of doctoral students. Feedback mechanisms are implemented to obtain annual information from PhD students by:

Evaluation mechanisms are implemented at UPT Doctoral School level to identify the needs of doctoral students. Thus, a customer satisfaction evaluation procedure is developed, with doctoral students completing questionnaires for this purpose. Both documents were presented in Annexes C112 of the internal evaluation report.

Recommendations: It is recommended to hold regular discussion sessions following the results of the feedback provided by doctoral students to identify satisfaction issues and to improve the doctoral training programme.

The indicator is fulfilled.

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

The UPT Doctoral School ensures transparency in the presentation of information and accessibility to learning resources.

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

In the case of the Computers and Information Technology area of the Doctoral School, information of interest to doctoral students, future candidates and information of public interest is available for consultation in electronic format on the University website http://www.upt.ro/Informatii_studii-universitare-de-doctorat_266_ro.html.

IOSUD UPT publishes on its website, in compliance with the regulations in force on data protection, all the information required by candidates, doctoral students and other interested parties.

The standard is deemed to be met.

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.*

From the internal evaluation report it appears that information on:

- doctoral school regulations, admission regulations,
 - doctoral study contract, 20
 - the regulations for the completion of studies, including the procedure for the public defence of the thesis,
 - the content of training programmes based on advanced university studies,
 - the scientific profile and thematic areas/research topics of the doctoral supervisors in the field, as well as their institutional contact details,
 - list of doctoral candidates in the field with basic information (year of registration; supervisor),
- information on the standards for writing the doctoral thesis,
- summaries of doctoral theses to be publicly defended, as well as the date, time and place where they will be defended, at least 20 days before the defence.

The Doctoral School, through IOSUD, publishes on the website of the organizing institution information such as:

Institutional Regulations for the Organisation and Conduct of Doctoral Studies at the Polytechnic University of Timișoara

Recommendations: It is also recommended to publish other useful information for doctoral students. Thus, it is recommended to better organize the PhD School's website, including all relevant information in Romanian and English.

Constantly update the IOSUD website and the PhD school website.

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.

Doctoral students have access to the resources needed to carry out their doctoral studies in good conditions.

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.



UPT PhD students have access to general databases with publications relevant to the field: Elsevier, SpringerLink Journals, Clarivate Analytics, Scopus, IEEE XPLORE, Legis. They have free access to the databases via the Anelis Plus and E-nformation platform, remotely from home via the institutional account provided by the university. In exceptional situations they call upon their PhD coordinator to access certain international databases.

PhD students have access to the literature and can also easily access the UPT library both online <https://library.upt.ro/baze-de-date/> and physically, and members of the professional associations IEEE, SRAIT were among the PhD students present. These aspects were supported both during the meeting with the PhD students and from the answers received in the satisfaction questionnaire applied during the visit. 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.

IOSUD-UPT has purchased the iThenticate software (<http://www.ithenticate.com/>) used to analyse the degree of similarity of the content of doctoral theses with other documents.

During the completion phase of the PhD thesis, the Doctoral School, through the person specifically designated for similarity analysis, generates a similarity report with the iThenticate software, which is sent to the PhD thesis supervisor.

Such similarity reports may be generated, at the request of the doctoral candidate or the doctoral supervisor, at various stages of the doctoral thesis or scientific work associated with the doctoral research programme.

For the doctoral thesis, the doctoral supervisor draws up a similarity report, to which the report generated by the iThenticate software is attached.

Annex_C.2.2.2. presents examples of the use of the iThenticate software for PhD students in the field of Computers and Information Technology.

According to the self-assessment report IOSUD-UPT has purchased the iThenticate software (<http://www.ithenticate.com/>) mainly used for the analysis of the degree of similarity of the content of PhD theses with other documents. Doctoral students have access on request or through their supervisor to use this platform. During the meeting with PhD students one of them pointed out that he did not have access to anti-plagiarism software for checking scientific papers. Other reports from PhD students regarding access to such anti-plagiarism software, such as Turnitin, refer to a call to the PhD coordinator to check certain papers and identify the degree of similarity. Also, the answers given by PhD students through the questionnaire administered during the visit highlight the fact that they have largely free access to this electronic platform on request.

Recommendations: Specify the sanctions applied in case of plagiarism.

Promote the possibility of checking the degree of similarity of the content of doctoral theses with other documents among all doctoral students.

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.*

Doctoral students have free access to the laboratories, libraries and other research facilities specific to the field of Computers and Information Technology, visited on site.

In the contract of doctoral studies, concluded between IOSUD-UPT and each registered doctoral student, the obligations assumed by IOSUD-UPT regarding the access of doctoral students to the research infrastructure/facilities are explicitly stipulated, as follows:

- Art.6.B.3 - to ensure the access of the doctoral student to the material basis of teaching and research within the doctoral studies (Annex_C.2.2.3. - Doctoral studies contract).
- Depending on the specifics of the research laboratory, the doctoral candidate is trained to strictly comply with the rules of work protection and fire prevention and extinction.

Students have access to the material base and research infrastructure. They are very satisfied with the equipment and materials they need for their research work, with all the answers to the questionnaire having the highest score for this question.

There are no specific recommendations.

The indicator is fulfilled.

Criterion C.3. Internationalization

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

The UPT Doctoral School demonstrates internationalisation and the situation could be substantially improved by adopting an internationalisation plan with clear and specific measures that are part of the mission of doctoral studies.

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.*

- Annex_C.3.1.1-1. presents the ERASMUS mobility agreements between UPT and universities abroad.

- ERASMUS mobility agreements between UPT and universities abroad are publicly available at: http://www.upt.ro/international/Mobilitati-Si-Cooperari-Internationale_Acorduri-bilaterale-Erasmus+_8_ro.html

- The UPT Framework Cooperation Agreements with universities at home and abroad are publicly available at: http://www.upt.ro/international/Mobilitati-Si-Cooperari-Internationale_Acorduri-cadru-de-cooperare-cu-universitati-din-tara-si-strainatate_31_ro.html

- Cooperation agreements with enterprises, associations and research centres are publicly available at:

http://www.upt.ro/international/Mobilitati-Si-Cooperari-Internationale_Acorduri-de-cooperare-cu-intreprinderi,-asociatii-si-centre-de-cercetare_65_ro.html

IOSUD-UPT has constant concerns for increasing the degree of internationalization of students, implemented through the Strategic Plan for Internationalization of Education (2015-2020, respectively 2021-2028):

http://www.upt.ro/img/file/Proceduri/Strategy%20for%20Internationalisation_UPT_2021_2028.pdf

http://www.upt.ro/img/file/Proceduri/Strategy_for_internationalisation_UPT_2015_2020.pdf

Annex_C.3.1.1. shows the list of PhD students who have carried out mobility placements, for the CTI field.

Following the analysis of the satisfaction questionnaire applied, the percentage of responses regarding the possibility to participate in different types of mobility is highlighted by the option Not at all in the proportion of 37.5%.

Domeniu de doctorat	Număr studenți existenți la momentul evaluării, din cei înmatriculați în intervalul 2015-2019	Număr studenți care au obținut titlul de doctor în perioada 2016-2020	Număr studenți beneficiari de mobilități			Raport (%) studenți care au efectuat mobilitate / studenți existenți și care au obținut titlu de doctor
			ISI	Alte deplasări	Erasmus	
Calculatoare și tehnologia informației	41	17	23	8	1	55,17

CRITERION MET \geq 35%

The majority of doctoral students are aware of mobility opportunities and are satisfied with access to research institutes or companies, but there are also students who are satisfied to a lesser extent with these facilities.

Recommendations: It is recommended to encourage and motivate doctoral students to undertake at least one mobility as part of their doctoral internship.

Encourage PhD supervisors to conclude Erasmus+ or other international mobility agreements or grants.

It is recommended to define a KPI (Key Performance Indicator) on participation in events and winter/summer schools.

Increase the accessibility of doctoral students to research institutions or partner companies.

Encouraging mobility programmes during the doctoral studentship among doctoral students.

The indicator is fulfilled.



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

- Between January 2016 and December 2020, no thesis was defended in cotutelle with foreign experts in the field of Computers and Information Technology. At IOSUD UPT level, 2 theses in international cotutelle were defended during this period. Currently in IOSUD - UPT there are 3 doctoral students whose thesis is in cotutelle coordination with foreign experts. The data are detailed in Annex_C.3.1.2-1. - Minutes of public defense of doctoral theses coordinated in cotutelle with foreign experts and list of doctoral students in IOSUD-UPT whose theses are coordinated in cotutelle with foreign experts.

- Annex_C.3.1.2-2. - presents the list of invited - leading experts who gave lectures/lectures for PhD students.

- Annex_C.3.1.2-3. - presents the list of invited - leading experts who gave lectures/lectures for PhD students as a result of mobility through the programme P1: Development of the national research - development system Sub-programme 1.1 - Human resources "Mobility projects for young researchers from the Diaspora".

Following discussions with PhD students, they attended lectures by invited expert professors, both in the university (e.g. one of the founders of the Linux operating system, Richard Stallman) and at international conferences they attended. According to the self-assessment report and the findings during the visit, no co-authored thesis with foreign experts in the field of Computing and Information Technology was defended between January 2016 and December 2020.

Recommendations: It is recommended to expand international collaborations and propose topics for international cotutelle.

It is also recommended to include international experts in the committees for the supervision or defence of doctoral theses.

It is recommended to implement stronger measures to organise international doctoral cotutelle studies and to define a strategy to organise invited lectures in a systematic way.

The indicator is partially fulfilled.

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

Internationalization of activities is supported through: short-term mobility abroad of PhD students, participation of PhD students in summer schools, conferences and other events abroad (Annex_C.3.1.1.); inviting leading experts who have given courses and lectures for PhD students at UPT (Annex_C.3.1.2-2. and Annex_C.3.1.2-3.); informing the public and stakeholders about the PhD field by posting on Study in Romania platforms (Annex_C.3.1.3. .1.3.3-2.); increasing the international visibility of PhD supervisors and implicitly of the Doctoral School through relevant publications in the field (Annex_A.3.2.1-1.), members of scientific committees of international publications and conferences, members of boards of international professional associations; invited to conferences or expert groups held abroad, members of PhD thesis committees at top universities abroad (Annex_A.3.2.1-2.).



In order to internationalize the activities of the doctoral school, IOSUD - UPT participated in various promotional missions, in educational fairs to attract international doctoral students, signed collaboration agreements with prestigious universities.

Within the field of Computers and Information Technology in the period 2016-2020, no PhD thesis was defended that had international experts in the public defense committee.

Recommendations: it is recommended: to invite specialists from foreign institutions in the committees for the mentoring and thesis defense, as well as to participate in educational fairs to attract international PhD students.

Also in the direction of internationalisation, measures such as:

- Initiatives to increase the number of foreign PhD students in the field of Computers and Information Technology;
- Initiation of Erasmus+ contracts and projects to organize thematic events with invited foreign specialists;
- Attracting UPT associate researchers from traditional university centres abroad, who can drive a better dynamics of the doctoral school.

It is recommended to define a strategy to attract international experts and students.

The indicator is fulfilled.

IV. SWOT Analysis

<u>Strengths:</u>	<u>Weaknesses:</u>
<ul style="list-style-type: none"> - The experience of the teaching staff in the field of CTI doctoral studies, with a high international visibility. - CTI graduates are highly qualified specialists in demand by higher education, research institutes and company R&D departments. - PhD students have a very good level of training, with results disseminated in impactful publications, as well as a very good collaboration with PhD supervisors. - The material base has modern facilities, equipment, laboratories, library and access to BDI, and the research infrastructure in the research facilities is outstanding. - Co-organisation of internationally recognised conferences (IEEE, ACM). - Development of collaboration with strong companies in the field: NOKIA, CONTINENTAL, HELLA (PhD students, laboratory and infrastructure equipment). 	<ul style="list-style-type: none"> - Low number of places in the budget given the increased attractiveness in the field: additional places should be requested from IOSUD / Ministry. - Additional information provided on the Doctoral School website on opportunities for PhD students. -Lack of culture to establish collaboration between doctoral students. -Lack of use of questionnaire feedback to improve the program. -Lack of a clear strategy to attract PhD students and foreign researchers. - Lack of mechanisms to effectively encourage cotutelle PhDs and to invite international experts to lecture in the field.

<ul style="list-style-type: none"> - Providing additional incentives for performing PhD students (scholarships). - Provide funding to support scientific work. -Modernisation of the curriculum. -Collaboration with industrial partners. -Well-defined workflow for admission and monitoring of PhD students. - Excellent international research work. 	
<p style="text-align: center;"><u>Opportunities:</u></p> <ul style="list-style-type: none"> - National and European policy in which the development of the field of Computers and Information Technology is considered a priority. - Increasing openness towards the industrial environment, with specificity in automotive and related fields, provided that a favourable environment exists. - Attracting foreign PhD students from Europe, but also from Asia and North African countries. - Competitive advantage of the region to attract students from neighbouring countries (Serbia, Bulgaria, Moldova, Hungary). -Systematic innovation management through patent filing and IPR (Intellectual Property Rights). 	<p style="text-align: center;"><u>Threats:</u></p> <ul style="list-style-type: none"> - Competition from similar fields of study at national and European level. - Decreasing interest of young people in doctoral technical higher education, coupled with the rising cost of living and the effects of the pandemic. - Reduced national funding for research, with consequences for teachers and PhD students. - Relatively small number of PhD supervisors: however, obtaining habilitation and affiliation of new supervisors is affected by the higher minimum habilitation standards than in other engineering fields. -Financial support may not be attractive to talented graduates who prefer to pursue PhD studies abroad. -Research activities overlap with other doctoral schools raises questions about sustainability and attracting sufficient numbers of students. -Pandemics have a major impact on studies and online teaching methodologies need to be adopted.

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (*, C)	Performance indicator	Judgment	Recommendations
1		A.1.1.1	Fulfilled	It is recommended that the Doctoral School's website be updated on an ongoing

				<p>basis. Some pages should be translated into English. The Faculty should make arrangements for candidates with disabilities. It is recommended to introduce a procedure for the replacement of students/faculty who leave the university and have been selected as Board members.</p> <p>Develop an internal procedure for reviewing and approving proposals for the subject matter of the advanced degree-based training programme. Point g) specifies that the Doctoral School "seeks to ensure that the themes of the training programmes based on advanced university studies are correlated with the research themes proposed by the doctoral supervisors and assumed by IOSUD-UPT" but it is further recommended that the proposals for doctoral themes be formulated by the doctoral supervisors after discussions with representatives of the economic environment.</p>
2		A.1.1.2	Fulfilled	<p>Continuous updating of the Doctoral School Regulations in line with existing legislation. A clearer process is needed regarding the allocation and even distribution of students to PhD supervisors.</p>
3		A.1.2.1	Fulfilled	<p>Use of an appropriate platform with access for all persons involved in the management of doctoral student records.</p>
4		A.1.2.2	Fulfilled	<p>Using anonymised samples of PhD theses to educate</p>

				students about plagiarism, with a comparison of the three plagiarism detection systems that UPT has. It is advisable to specify the sanction imposed in case of plagiarism detection.
5		A.1.3.1	Fulfilled	Linking strategy, research objectives and proposals from business with research grants.
6	*	A.1.3.2	Fulfilled	Attract economic agents to provide grants for at least six months to support scientific activity. Disseminate and continuously update the list of additional funding for doctoral students together with the different categories of doctoral students taking part in them. Increase the number of research project proposals both nationally and internationally. It is recommended to expand public-private partnerships with companies interested in innovation in the field of Computing and Information Technology.
7	*	A.1.3.3	Fulfilled	It is recommended to increase the amounts used from the funds of the Doctoral School and the balanced distribution by doctoral fields of study according to the number of doctoral students and their performance. Also the allocation of a dedicated budget for the field of Computers and Information Technology, which can be used for the professional training of PhD students. It is also recommended to allocate an annual funding for each doctoral candidate

				<p>for both acquisition expenses and expenses for participation in scientific events to support the development of the doctoral thesis, based on the regulations in force. Disseminate to doctoral students information on additional funding and how to access it by publishing it on the IOSUD and Doctoral School's announcement page.</p> <p>The Faculty should invest in training doctoral students to attend conferences, exhibitions, summer schools and use open access publication fees more systematically. There should be KPIs so that at least one training activity is planned for each PhD student during the 3-year period of study. The mentoring committee should monitor students to achieve these targets.</p>
8	C	A.2.1.1	Fulfilled	<p>It is recommended to update the existing material base and to continue investing in material equipment in a leading area such as Computers and Information Technology. Within IOSUD-UPT, relevant arguments for decision making in the acquisition of research infrastructure for the field of Computers and Information Technology should be provided. It is recommended to continue and develop collaborations with the economic environment, as well as to obtain the necessary funds to upgrade the research infrastructure. It is advisable to use research facilities to</p>

				<p>provide consultancy services to companies. It is recommended to include all PhD supervisors in the field of Computing and Information Technology in the research directions described on the ERRIS platform for better visibility.</p> <p>Continuously increase the databases of intentional bibliographic resources and promote how to access them among PhD students.</p>
9	C	A.3.1.1	Fulfilled	<p>Supervisors' web profiles should provide the following information in different tabs: research area, students, key publications and grants. Such information should be provided in both Romanian and English.</p> <p>Supervisors who do not meet the minimum requirements must complete these requirements within the following timeframe.</p>
10	*	A.3.1.2	Fulfilled	-
11		A.3.1.3	Fulfilled	<p>It is recommended to review the course curriculum using the latest research papers. It is advisable to link the research strategy with the research facilities.</p>
12	*	A.3.1.4	Fulfilled	<p>A better distribution of doctoral students among PhD supervisors in the field of Computers and Information Technology is advisable in order to cover the demand as evenly as possible.</p>
13	C	A.3.2.1	Fulfilled	<p>It is recommended that the Faculty adopt a strategy to continuously measure WoS/ISI publications and academic visibility metrics.</p>

14	*	A.3.2.2	Fulfilled	It was recommended to encourage young researchers to support habilitation, thus ensuring the sustainability of the field.
15	*	B.1.1.1	Fulfilled	It is recommended that the CTI PhD field improves its ability to attract students from other higher education institutions, including from abroad. It is also recommended to create a plan to promote and expand the areas covered in the PhD theses. The competitive advantage of the PhD programme and its link with industrial partners should be highlighted. It is recommended to improve the information on the website in both English and Romanian. Use social networks to promote research results. Use alumni to promote the CTI field to attract new students.
16	*	B.1.2.1	Fulfilled	-
17		B.1.2.2	Fulfilled	-
18		B.2.1.1	Fulfilled	It is recommended to continuously update the content of these disciplines relevant to the scientific research training of PhD students. Course material should be revised using state-of-the-art research papers/surveys as the main resource. Introduce a mandatory module a course related to innovation management (patent filing, route to commercialization of research, startup and start-up process).
19		B.2.1.2	Fulfilled	It is recommended to explore the possibility of introducing course

				<p>modules focused on specific ethics topics (e.g. digital ethics, ethics of artificial intelligence). Continuously update the content of the Ethics discipline for the training of PhD students in scientific research.</p> <p>Constant updating of the discipline in line with Western norms on ethics in academia.</p> <p>To support this discipline in the first semester of the first year of the doctoral training.</p>
20		B.2.1.3	Fulfilled	<p>It is recommended that subject curricula explicitly address the learning outcomes that doctoral students are expected to achieve.</p> <p>Critical thinking and independent research methodology should be incorporated into instruction. A systematic approach to internship opportunities and training needs to be defined.</p> <p>Learning outcomes can be achieved through coursework</p>
21		B.2.1.4	Fulfilled	<p>It is recommended that a written record of the meetings between doctoral students and the mentoring committee be kept, even in electronic format.</p> <p>An IT system is needed to record meetings, agenda and action plan</p>
22	C	B.2.1.5	Fulfilled	<p>It is recommended that the number of PhD supervisors and teaching staff should be increased to improve the ratio and coordination of PhD students.</p> <p>Involve more international experts in the field in mentoring committees.</p>

23	C	B.3.1.1	Fulfilled	<p>It is recommended that PhD students submit their research results for publication mainly to journals with an impact factor.</p> <p>A strategy should also be defined so that as many research results as possible become internationally excellent.</p>
24	*	B.3.1.2	Fulfilled	<p>Faculty should adopt a strategy in which research results are presented in excellent international events supported by scientific organizations such as IEEE, ACM, etc.</p>
25	*	B.3.2.1	Fulfilled	-
26	*	B.3.2.2	Fulfilled	-
27		C.1.1.1	Fulfilled	<p>It is recommended that the Quality Monitoring and Evaluation Procedure is reviewed regularly. It is also recommended that regular reports include an action plan in which deficiencies are identified and listed and remedial actions are proposed together with deadlines, a responsible person and indicators to measure the progress of the detected problem.</p> <p>It is recommended to involve different stakeholders (e.g. companies, public organisations) in the design of the programme.</p> <p>Promote to a greater extent the possibilities made available by the university to students in terms of social or academic support, but also the counsellors they can call upon.</p>
28	*	C.1.1.2	Fulfilled	<p>It is recommended to hold regular discussion sessions following the results of the feedback</p>

				provided by doctoral students in order to identify satisfaction issues and to improve the doctoral training programme.
29	C	C.2.1.1	Fulfilled	Other useful information for doctoral students should also be published. Thus, it is recommended to better organize the PhD school's webpage, including all relevant information in Romanian and English. Constant updating of the IOSUD website and the doctoral school website
30		C.2.2.1	Fulfilled	-
31		C.2.2.2	Fulfilled	Specify the sanctions applied in the case of plagiarism. Promote the possibility of checking the degree of similarity of the content of doctoral theses with other documents among all doctoral students.
32		C.2.2.3	Fulfilled	-
33	*	C.3.1.1	Fulfilled	It is recommended to encourage and motivate doctoral students to undertake at least one mobility as part of their doctoral traineeship. Encourage PhD supervisors to conclude Erasmus+ or other international mobility agreements or grants. It is recommended to define a KPI (Key Performance Indicator) on participation in events and winter/summer schools. Increase the accessibility of doctoral students to research institutions or partner companies. Encouraging mobility programmes during the doctoral studentship among doctoral students.

34		C.3.1.2	Fulfilled	<p>It is recommended to expand international collaborations and to propose topics for international co-tutelle.</p> <p>It is also recommended that international experts be included in committees for the supervision or defence of doctoral theses.</p> <p>It is recommended to implement stronger measures to organise doctoral studies in international cotutelle and to define a strategy to organise invited lectures in a systematic way.</p>
35		C.3.1.3	Fulfilled	<p>It is recommended: to invite specialists from foreign institutions to the thesis supervision and defense committees and to participate in educational fairs to attract international PhD students.</p> <p>Also in the direction of internationalisation, measures such as:</p> <ul style="list-style-type: none"> - Initiatives to increase the number of foreign PhD students in the field of Computers and Information Technology; - Initiation of Erasmus+ contracts and projects to organize thematic events with invited foreign specialists; - Attracting UPT associate researchers from traditional university centres abroad, who can drive a better dynamics of the doctoral school. <p>It is recommended to define a strategy to attract international experts and students.</p>

VI. Conclusions and general recommendations



The present periodic external evaluation report was conducted for the evaluation of the Doctoral Studies Area Computers and Information Technology (CTI), Doctoral School (DS), IOSUD UPT.

From the analysis carried out on the Internal Evaluation Report, following the meetings held at all levels, as well as from the on-site visit to inspect the teaching and research infrastructure, it emerged that overall the Computers and Information Technology doctoral degree area has a clear and well-defined mission, well thought-out objectives and programmes, successfully responding to growing market needs, being an interdisciplinary doctoral programme providing highly qualified specialists for research-development-innovation and educational work in higher education institutions, research institutes and R&D departments of companies in the field.

Doctoral students have access to a properly dimensioned research infrastructure of the Doctoral School, benefiting also from a university library with extensive bibliographical resources, including online, as well as the support of a modern research infrastructure. Doctoral students also have access to additional financial resources: from structural funds, private scholarships, and participation in summer schools and international scientific events.

The IOSUD-UPT Doctoral School for Computers and Information Technology comprises 19 PhD supervisors, with a very good international visibility. In the last 5 years, many research grants obtained by PhD supervisors in the field of Computers and Information Technology have been carried out at the level of the doctoral school, in which PhD students have also been involved.

All quality indicators related to the standards and evaluation criteria are met, except for one indicator which is partially met, and only specific recommendations are proposed for further good practice and continuous improvement of the quality of doctoral studies in Computers and Information Technology.

As general recommendations, it was found that the existing potential for internationalisation and linking with other institutions outside Romania should be developed. More international students should be attracted and more opportunities for international mobility, cotutelle and academic relations with international experts should be created. Also, public-private partnerships with companies oriented towards RDI activity in the field of Computing and Information Technology should be expanded so as to exploit the existing opportunity in the industrial environment.

General conclusions highlighted by the PhD students following the online meeting and the answers given in the "Questionnaire on the degree of satisfaction of PhD students at the Polytechnic University of Timisoara - Computers and Information Technology":

- Expectations of doctoral students vis-a-vis the completion of their doctoral studies are in the foreground:

- The possibility to continue their academic career within UPT and to have access to as many national and international grant competitions as possible;

- Integration into the academic environment and continuation of the research started;

- The impossibility of participating in mobility programmes during the doctoral studies was reported.

- It was noted that access to research institutes or economic agents for collaborative research is low.

- Facilitation by various state institutions to employ doctoral students;

- The ability to relate and apply the knowledge acquired during doctoral studies in everyday contexts, related to economics, logistics, medicine and so on;



- Matching their own level of training and knowledge with the latest trends in their chosen field of study (correlation with elements of "state of the art");

- Possession of the necessary skills to be involved in multidisciplinary research projects as well as in the elaboration of scientific papers, in the context of the chosen field of study and its constant evolution;

- Aspects that could be changed/improved within the doctoral school concern:

- "Elimination of bureaucracy, more respect from UPT employees towards students in general, more fairness in the admission process, more funding to encourage deserving PhD students";

- A better understanding of needs in the context of the current health situation;

- Diversification of the channels of communication of information to doctoral students, by correlating them with current technologies that are used for this purpose;

- Optimisation/simplification and digitisation of administrative processes concerning doctoral students and their relationship with the university;

- Development and proper implementation of an academic writing course;

I am satisfied with the overall doctoral training programme. The faculty has designed and implemented an interesting PhD program in the field of Computing and Information Technology. Research results have been published both at international conferences and in impact factor or BDI journals. Few weaknesses have been identified that should be addressed to grow the PhD community and produce excellent scientific results.

Budapest, 2021. november 15.

International Evaluator

Dr. habil. Gabor Kiss PhD.