

The External Evaluation Report of a Doctoral Study Domain

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I. Introduction¹

This report was drafted during the evaluation of the doctoral studies field SYSTEMS ENGINEERING within the Universitatea Tehnică „Gheorghe Asachi” din Iași. The audiences took place between 12 and 16 July 2021, and the composition of the commission of evaluators was:

- Prof.dr.ing. Marian Barbu - “Dunarea de Jos” University of Galati;
- Prof.dr.ing. Ramon Vilanova Arbos - Universitat Autònoma de Barcelona;
- Drd.ing.- Chiru Alexandru-Marian - Universitatea Politehnică Timișoara

“Gheorghe Asachi” Technical University of Iași includes the Council for Doctoral Studies (CSUD) in its organizational structure, established through the rector’s decision no. 2184 of October 9, 2012 which initially managed 10 Doctoral Schools, constituted in areas of doctoral studies or interdisciplinarity, which were run at the level of the faculties of : Automatic Control and Computer Engineering; Civil Engineering and Building Services; Machine Manufacturing and Industrial Management; Electrical Engineering, Energetics and Applied Informatics; Electronics, Telecommunications and Information Technology; Hydrotechnics, Geodesy and Environmental Engineering; Chemical Engineering and Environmental Protection; Mechanics; Materials Science and Engineering; Textiles, Leather and Industrial Management (Faculty of Industrial Design and Business Management).

These Doctoral Schools were established through the Senate Decision no. 174 of May 10, 2016. Through the Senate decision no. 347/of October 27, 2017, the unification procedure of all ten doctoral schools within TUIASI in one Doctoral School, which began its activity after the Senate decision of March 30, 2018, was started.

At present, SD-TUIASI hosts the activity of 132 PhD advisors and 769 PhD students, among which 17 are from countries such as Germany, Syria, France, Ethiopia, Palestine, Iran, India, Italy and the Republic of Moldavia. PhD students conduct research in the university laboratories, which have modern facilities, and in research centres, described from the point of view of resources on the www.erris.ro platform.

According to the internal evaluation report, the SD-TUIASI mission is the main provider of high-achieving scientific research, and the development of research is a permanent preoccupation regarding the interaction with the economic, social and academic environment locally, nationally and internationally.

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



In compliance with the internal evaluation report, the field of study Systems Engineering within SD-TUIASI has as mission to develop highly-specialized human resources through research and development research, skilled in in the design and management of technical systems and technological processes (with varying degrees of complexity of automation), capable of insertion in the highly-qualified workforce, by providing the appropriate creative and deontological framework for academic studies, interdisciplinary research and the promotion of scientific collaborations at the national and international level.

To accomplish the undertaken mission, the fundamental objective of higher education doctoral studies in the area of Systems Engineering consists in the development of professional skills, as well as field-specific transversal competences during the education programme based on advanced higher education studies as well as throughout the scientific research programme. The fundamental objective is accomplished through the following specific objectives:

- Training highly-qualified specialists in the areas of research, design, higher education or in the social and production spheres, with versatile orientations, capable of assimilating and integrating practical and theoretical knowledge in automation and applied informatics for immediate insertion in the workforce, with great flexibility; in the long run, these specialists will be able to contribute to the evolution of the educational, industrial and research sectors in all sectors that the Systems Engineering area of doctoral studies can contribute;
- Deepening the scientific research of PhD training by drawing PhD students in various research programmes through which they complete their PhD theses.
- The high use of the already existing research experience of “Gheorghe Asachi” Technical University’s human resource and the training of new human resource capable of developing and applying projects concerning automation
- Doctoral higher education quality assurance in the area of Systems Engineering through the promotion of criteria, standards and procedures in accordance with international norms.
- Observing the international intellectual values, professional standards and academic ethics in research and intellectual training.
- Obtaining results which allow for the increase of scientific outcomes through the publication of high-ranking national and international papers.
- Connecting the research programmes from the Systems Engineering doctoral area of study from the Faculty of Automatic Control and Control Engineering with other research programmes home and abroad, in accordance with European policies and strategies.
- Ensuring the training of professional competence in the area of Systems Engineering, of communication, information technology and teamwork competence for young PhD students;
- Training highly qualified young researchers and generating opportunities for the integration of future holders of PhD degrees in the workforce.

The Scientific research programme is conceived in “Gheorghe Asachi” University of Iași research laboratories, Faculty of Automatic Control and Control Engineering under the coordination of 8 PhD advisors.

II. Methods used

In the external evaluation process, before, and during the evaluation visit, the following methods and tools were used:

- Analysis of the Report of internal evaluation of the field of doctoral university studies evaluated and its annexes;
- Analysis of documents, data and information available on the IOSUD / School / Schools website Doctorates, in electronic format.
- Visit to buildings from the institution's patrimony, which include:
 - classrooms.
 - laboratories.
 - the institution's library.
 - research centers.
 - reading rooms for students.
- Meeting / online discussions with doctoral students in the field of evaluated doctoral university studies.
- Meeting / online discussions with graduates in the field of evaluated doctoral university studies.



- Meeting / online discussions with employers of graduates in the field of doctoral studies evaluated.
- Online meeting / discussions with the management of the Doctoral School in which the field of evaluated doctoral university studies operates.
- Online meeting / discussions with doctoral supervisors in the field of evaluated doctoral university studies.
- Online meeting / discussions with the person in charge of the evaluated doctoral university field and with the team that made the internal evaluation report.
- Online meeting / discussions with directors / managers / research laboratories related to the field of doctoral studies.
- Meeting / discussions with representatives of the various structures of IOSUD / School / Schools Doctoral degrees in which the evaluated doctoral university field of work operates:
 - The Doctoral School Council, the University Senate, the Board of Directors, the Evaluation and Quality Assurance Commission, the Quality Assurance Department, the Ethics Commission (including with the students representing these structures);
 - Career Counseling and Guidance Center.
 - student organizations.
- Application of questionnaires to doctoral students in the field of evaluated doctoral university studies.



III. Analysis of ARACIS's performance indicators

Domain A. INSTITUTIONAL CAPACITY

IOSUD from the Gheorghe Asachi" University of Iași, prove a good institutional capacity, which allows the development of doctoral studies in appropriate quality conditions.

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

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.

IOSUD within the Gheorghe Asachi" University of Iași has approved and implemented the regulations provided in the specific legislation regarding the organization of doctoral studies.

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

The implementation of internal regulations is accomplished satisfactorily. The institution provided the necessary documents and proofs of such implementation. The organization has reached an appropriate level of maturity.

Recommendations: Some pages of the site devoted to doctoral studies are found only in Romanian. No English version. It would be better if both languages could be widely offered, especially



if the admission of foreign doctoral students is foreseen. However, quite a lot of the information is also in English, which is appreciated.

The indicator is fulfilled

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

The Doctoral School Regulations are available and include criteria, procedures and mandatory standards for the aspects specified in art. 17 paragraph (5) of the Code of doctoral studies (Annex 2.2).

Recommendations: Documentary proof is provided of the criteria, procedures and standards. No further actions are needed

The indicator is fulfilled.

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

IOSUD within the Gheorghe Asachi" University of Iași has availability of the necessary software resources to support and carry out the doctoral studies in appropriate conditions.

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.*

Electronic platforms provided by TUIASI are used. The system is observed as complete and effective

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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.*

For the verification of the degree of originality of the doctoral theses, starting with 2016, the anti-plagiarism software Sistemantiplagiat.ro is used, to which the access for the CSUD secretariat was initially created (<https://panel.sistemantiplagiat.ro/#/>) (Annex 2.4). The procedure for verifying all doctoral theses is detailed.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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.*



IOSUD within the Gheorghe Asachi" University of Iași ensures that globally the financial resources are used optimally, and the revenues obtained from doctoral studies are supplemented by additional funding to that provided by the government.

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.*

There are two research grants (PN-II-ID-PCE- 2011-3-1038 / RU-TE-2014-4-0970) obtained by doctoral supervisors in the evaluated field in the last 5 years according to Annex 2.5. The grants address topics relevant to the field of Systems Engineering (Diagonal stability and flow invariance in system engineering. Specialized techniques for dynamics classes, encompassed by a unified framework / Multi-agent model predictive control for vehicle platooning) and took place with the involvement of PhD students (Alexandru Țigănașu, Anca Maxim in the project RU-TE-2014-4-0970), according to Annex 2.6.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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%.*

The number of doctoral students existing at the time of evaluation is equal to 8, and the number of doctoral students who benefit for a minimum of six months from funding sources other than government funding is equal to 2 (Alexandru Țigănașu and Ovidiu Păucă), the calculated proportion being 25%, according to Annex 2.6

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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.).*

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 calculation presented in Annex 2.7 was performed in a centralized manner and weighted on each field, taking into account the amounts received by each faculty / CCPD and the number of doctoral students on each faculty and field, resulting in a percentage of less than 10% (average for 2015- 2020 - 5.9%).

Despite these seemingly small percentages, all PhD students benefited from the support of PhD supervisors and IOSUD for participating in training events specific to the PhD in Systems Engineering, as they provided other forms of funding through national or international projects (research grants, COST actions, or Erasmus projects), as well as reductions or exemptions from publication fees (Annex 2.7).

Recommendations: Despite the previous observations, IOSUD should perform according to the established regulations. An annual amount should be allocated for each doctoral student so it allows for a provision of actions that help to better conduct and complete the doctoral thesis.

The indicator is partially fulfilled



Criterion A.2. Research infrastructure

**general description of the criterion analysis.*

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

The Doctoral School from the "Gheorghe Asachi" University of Iași has a very good quality research infrastructure that can properly support the activities specific to doctoral university studies.

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.*

According to Annex 2.8, the scientific research program is carried out in the laboratories: Design of systems with discrete and hybrid events, Embedded control systems for electric drives, Automatic control of automotive systems (CASA), which are integrated in the research centers Systems engineering and information technology, presented on the ERRIS profile platform <https://eeris.eu/ERIF-2000-000A-0565> and Automation and Technical Informatics, presented on the ERRIS profile platform, at the web address <https://eeris.eu/ERIF-2000-000A-0623>. Also, all the acquired research infrastructure, as well as the research infrastructure acquired and developed in the last 5 years is presented in detail in the same annex.

Recommendations: Annexes provided with the description of material and infrastructure equipment is provide din rumanian. For next occasions, those aspects should be better provided also in English.

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 Doctoral School from the "Gheorghe Asachi" University of Iași has qualified staff to conduct the doctoral university studies.

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.

The number of doctoral supervisors affiliated to the field is equal to 8, of which 5 with PhD students in training. The number of doctoral supervisors affiliated to the field who meet the CNATDCU standards, as follows (according to Annex 2.9):

- 8 doctoral supervisors (i.e., 100%) - meet the Global Criterion (Total (A)> 850),
- 5 doctoral supervisors (i.e., 62.50%) - meet all the criteria

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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.

From the total number of doctoral supervisors affiliated to the field (equal to 8), a number of 6 doctoral supervisors are enrolled within IOSUD TUIASI, which represents a percentage of 75%, according to Annex 2.10.

Recommendations: Young researchers are encouraged to obtain the habilitation ensuring the domain sustainability.

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.

Out of the total number of disciplines in the training program based on advanced university studies, a number of 15 disciplines (all) have as instructors PhD supervisors / ability holders, professor / CS I or associate professor / CS II with proven expertise in the field of taught subjects, according to Annex 2.11 .

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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%.*

There are no cases of PhD supervisors that coordinates more than 8 PhD students.

Recommendations: No recommendations are issued.

The indicator is fulfilled

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

The Doctoral School from the “Gheorghe Asachi” University of Iași has doctoral advisors with an internationally visible scientific activity.

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.*

PhD supervisors in the field show a very good record of publications and international research recognition. All of them meet the threshold.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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*

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 minimal CNATDCU standards in force at the time of the evaluation, which are required and mandatory for acquiring their enabling certificate, based on their scientific results within the past five years.

All of the PhD advisors provide the required level.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled



Domain B. EDUCATIONAL EFFECTIVENESS

**general description of domain analysis.*

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

IOSUD from The Doctoral School from the “Gheorghe Asachi” University of Iași, prove a good educational effectiveness, which allows the development of doctoral studies in appropriate quality conditions.

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.

IOSUD from The Doctoral School from the “Gheorghe Asachi” University of Iași prove, in the Systems engineering domain, they can attract doctoral candidates from outside the institutions.

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

In the last 5 years (October 2015 - September 2020), a total of 8 places financed from the state budget were allocated and a number of 2 graduates from other institutions were admitted to doctoral studies, which means $2/8 = 0.25$. During this period, the ratio between the number of candidates and the number of places financed from the state budget is $9/8 = 1,125$. The visit validated the information transmitted.

The consistent offer of many employment companies in favorable conditions for graduates of bachelor studies in the field of Systems Engineering significantly reduces the interest for the doctoral studies cycle.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled

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

IOSUD from The Doctoral School from the “Gheorghe Asachi” University of Iași prove, the Systems Engineering admitted candidates demonstrate good academic and professional level.

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.

Selection criteria include English language test, the academic, research and professional performance of the candidates, the motivation for scientific activity (publications in the field) and a research topic proposal. The minimum grade for passing the admission colloquium is a minimum of 7 (seven). An interview with the candidate is a mandatory part of the admission procedure. Detailed information is provided in Annex 2.16a.

Discussions with PhD students confirmed the use of the mentioned selection criteria. It should be noted that many master's graduates with commendable professional results do not apply for doctoral studies, preferring to be employed in companies with generous offers.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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%.*

In the last 5 years (October 2015 - September 2020), 9 PhD students were enrolled, of which 2 students renounced, which means the dropout rate $2/9 = 22.2\%$.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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 training program based on advanced university studies in the field of Systems Engineering is adequate to improve the research skills of doctoral students and to strengthen ethical behavior in science.

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 curricula include three disciplines relevant for the scientific training of each doctoral student and a discipline for research methodology. Detailed information (Curricula and Syllabuses for the last 5 years) is provided by Annex 2.17. The syllabus for the subject "Ethics and academic integrity" is provided by Annex 2.18.

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.



Recommendations: Some additional courses with topic related to Systems Engineering would be useful for the PhD Students.

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 last 5 years (October 2015 - September 2020), all PhD students have studied the discipline “Ethics and academic integrity”, according to the curricula reproduced in the files in Annex 2.17. The syllabus of the discipline is provided by Annex 2.18.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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 competencies considered by this criterion as well as the existing correlations between them are presented in the CSUD regulation, in the SD regulation, as well as in the procedures elaborated within the CSUD. Detailed information is presented in Annex 2.19

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled

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

The information provided is in terms of official meetings records and administrative evidence. The guidance commissions of doctoral students in the field are presented in Annex 2.20a. This appendix also discusses the answers (from a questionnaire completed by PhD students) that refer to the

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.



collaboration with the members of the guidance commissions. At the same time, the list of papers published by the doctoral students reflect (by the groups of authors) the cooperation between students and the guidance commissions.

Recommendations: A more detailed evidence would be useful. For example, guidance feedback in forms of PhD student report should be provided.

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 2.20b reports 8 doctoral students and 13 teachers who provide guidance. The requested indicator has the value $8/13 = 0.61$.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled.

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

**general description of the criterion analysis.*

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

In the case of the field of Systems Engineering within the Universitatea Tehnică „Gheorghe Asachi” din Iași, the research is capitalized by doctoral students through presentations at scientific conferences and scientific publications.

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.

Each doctoral student who has obtained a doctorate in the last five years has at least one publication or contribution relevant to the domain. Detailed information is provided in Annex 2.21. Research that is reflected in the papers can be considered relevant.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled.



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

The number of doctoral students who have completed their doctoral studies in the last five years is 2. The number of presentations in the field given by them is 12. The requested indicator has the value $12/2 = 6$. Detailed information is provided in Annex 2.22.

Recommendations: Should be mandatory for the PhD students to have at least one presentation during the doctoral studies.

The indicator is fulfilled.

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

The Doctoral School appeals, for the field of Systems Engineering, to a significant number of external scientific references in the commissions for public defense of doctoral theses for the analyzed field.

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

The number of doctoral theses assigned to a certain external specialist from a higher education institution (other than IOSUD of the Technical University "Gheorghe Asachi" of Iasi) does not exceed two (2) for theses coordinated by the same doctoral supervisor in a year. Detailed information is provided in Annex 2.23.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled.

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

The number of doctoral theses defended in the domain of Systems Engineering in the last five years is 2. Detailed information is provided in Annex 2.24. Therefore it does not apply to compute the described ratio.



Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

The indicator is fulfilled



Domain C. QUALITY MANAGEMENT

**general description of domain analysis.*

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

IOSUD from the Universitatea Tehnică „Gheorghe Asachi” din Iași, generally prove a good quality management, which allows the development of doctoral studies in appropriate quality conditions. An improvement in the degree of internationalization is needed.

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

The Doctoral School has the institutional framework created for internal quality assurance, but measures are needed for its effective application.

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

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

TUIASI Doctoral School has specific procedures that prove the constant development of the process of evaluation and internal quality assurance. The procedures developed and applied at IOSUD level are presented in Annex 2.25 together with the URLs where they are available, including mandatory evaluation criteria such as: scientific activity of doctoral supervisors; infrastructure and logistics necessary for conducting research; regulations and procedures on the basis of which the doctoral studies are organized; the scientific activity of the doctoral students, the training program based on advanced university studies of the doctoral students, the social support and counseling services made available to the doctoral students.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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 field of Systems Engineering, six PhD students filled satisfaction questionnaires (from total of eight PhD students enrolled in 2020). Satisfaction questionnaires took into account the following aspects: Administrative services, Advanced training program based on advanced university studies, Evaluation and grading, Communication with the doctoral supervisor, Research infrastructure and other criteria for choosing the doctoral student (Annex 2.26). The analysis of the responses resulted in a high degree of satisfaction that does not require the development of a plan of measures.

Recommendations: The action plan resulted from the feedback from doctoral students should be presented to all the students.

The indicator is partially fulfilled.

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

The Doctoral School proves 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 Systems Engineering, the information of interest for doctoral students, future candidates, respectively the information of public interest are available for consultation in electronic format.

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 Annex (2.27) it results that the information regarding: the doctoral school regulation, the admission regulation, the doctoral study contract, the study completion regulation which should also include the public thesis defense procedure, the content of training programs 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 data, the list of doctoral students in the field with the basic information (year of registration; supervisor), information about the standards for elaborating the doctoral thesis, the summaries of the doctoral theses to be defended publicly, as well as the date, time, place where they will be defended, at least 20 days before the defense are published on the TUIasi website being given the related links

Recommendations: Ensure all relevant pages can also be found in english. If they are supposed to also attract students from abroad, potential candidates should find the information in english.

The indicator is fulfilled

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

In the case of Systems Engineering, provides the necessary resources for conducting the doctoral studies.

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.

Using any computer connected to the TUIASI network, all PhD students have access to specific international databases, offered through the ANELIS Plus program. Thus, doctoral students have access to the following databases with publications relevant to the field: SCOPUS, Science Direct, Web of Science, IEEE, Springer, Wiley (Annex 2.28)

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued

The indicator is fulfilled.

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

TUIASI has concluded a service contract with the company Plagiat-Sistem Antiplagiat through internet SRL in order to verify the degree of similarity. The contract is renewed annually. The verification of the originality of the scientific papers, implicitly that of the doctoral theses, is performed within TUIASI starting with 2016, by using the anti-plagiarism software Sistemantiplagiat.ro, software to which the person designated at the CSUD secretariat has access (Annex 2.29)

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.



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.*

All PhD students have permanent access to the research laboratories available. In the case of shared resources or limited, access is planned by prior appointment.

Recommendations: Indicator accomplished satisfactorily. No recommendations are issued.

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.

Within the Doctoral School, it is necessary to adopt an internationalization plan with clear and specific measures that will be 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.*

For the field of Systems Engineering, IOSUD has signed agreements with 7 foreign universities mentioned in Annex A 2.31. According to the data included in annex A.2.31, the number of doctoral students who performed mobility is equal to 3, resulting in a mobility percentage of $3/8 = 37.5\%$. It also shows that 100% of doctoral students who defended their thesis between 2016 and 2020 completed a training course abroad or another form of mobility, such as participation in international scientific conferences.

IOSUD TUIASI develops and implements policies and action plans aimed at increasing the number of doctoral students participating in training courses abroad, up to at least 20%, which is the target at the level of the European Higher Education Area. Among the measures are: the implementation of the new Erasmus Plus program, the encouragement of the organization of International Summer Schools for PhD students, the partnership with the phd-hub.eu platform, the introduction of the European doctorate (Annex 2.31).

Recommendations: It is recommended to increase the opportunities for funding training internships abroad. A higher percentage of students (if not all) should at some time, conduct such internship.

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 2014 and 2019, a doctorate was organized in co-supervision with Ghent University, the persons involved being: doctoral student - engineer Anca Maxim, coordinator TUIASI - prof. Corneliu Lazăr, coordinators UGhent - prof. Robin de Keyser and prof. Clara Ionescu (Annex 2.32)

Recommendations: It is recommended to better promote co-supervised PhDs.

The indicator is fulfilled.

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

TUIasi's participation in educational fairs to attract international doctoral students is presented in Annex A 2.33 for the period 2018-2020. At the level of Systems Engineering, international experts were included in the commission for the defense of the doctoral thesis in co-supervision at TUIasi by drd. Anca Maxim (2019) (prof. Robin de Keyser, prof. Clara Ionescu, prof. Eveline Volcke - UGhent and conf. Torreblanca Jose Maria Maestre - USeville).

Recommendations: PhD advisors should be encouraged to include international experts in the guidance and public defending commissions.

The indicator is fulfilled.

IV. SWOT Analysis

<p><u>Strengths:</u></p> <ul style="list-style-type: none"> • PhD supervisors prove a high-level research activity. • The research infrastructure is corresponding to the assumed mission and objectives. 	<p><u>Weaknesses:</u></p> <ul style="list-style-type: none"> • Lack of clear evidence of the activity of the guidance commissions. • Lack of existence and follow-up of an internationalization plan with clear and specific measures.
<p><u>Opportunities:</u></p> <ul style="list-style-type: none"> • The quality of doctoral supervisors allows obtaining a high degree of internationalization. • The topicality of the doctoral field allows attracting a significant number of candidates. 	<p><u>Threats:</u></p> <ul style="list-style-type: none"> • Lack of internship or stays at other institutions from the PhD students. • The necessity to obtain the habilitation from other young researcher in order to ensure the sustainability of the domain.

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (*, C)	Performance indicator	Judgment	Recommendations
1		A.1.1.1	The indicator is fulfilled.	Some pages of the site devoted to doctoral studies are found only in Romanian. No English version. It would be better if both languages could be widely offered, especially if the admission of foreign doctoral students is foreseen. However, quite a lot of the information is also in English, which is appreciated.
2		A.1.1.2	The indicator is fulfilled.	Documentary proof is provided of the criteria, procedures and standards. No further actions are needed.
3		A.1.2.1	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
4		A.1.2.2.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
5		A.1.3.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
6	*	A.1.3.2	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
7	*	A.1.3.3.	The indicator is partially fulfilled.	IOSUD should perform according to the established regulations. An annual amount should be allocated for each doctoral student so it allows for a provision of actions that help to better conduct and complete the doctoral thesis.
8	IPC	A.2.1.1.	The indicator is fulfilled.	Annexes provided with the description of material and infrastructure equipment is provide din rumanian. For next occasions, those aspects should be better provided also in English.
9	IPC	A.3.1.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
10	*	A.3.1.2.	The indicator is fulfilled.	Young researchers are encouraged to obtain the habilitation ensuring the domain sustainability.
11		A.3.1.3.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
12	*	A.3.1.4.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
13	IPC	A.3.2.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
14	*	A.3.2.2.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
15	*	B.1.1.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
16	*	B.1.2.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
17		B.1.2.2.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
18		B.2.1.1.	The indicator is fulfilled.	Some additional courses with topic related to Systems Engineering would be useful for the PhD Students.

19		B.2.1.2.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
20		B.2.1.3.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
21		B.2.1.4.	The indicator is fulfilled.	A more detailed evidence would be useful. For example, guidance feedback in forms of PhD student report should be provided
22	IPC	B.2.1.5.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
23	IPC	B.3.1.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
24	*	B.3.1.2.	The indicator is fulfilled.	Should be mandatory for the PhD students to have at least one presentation during the doctoral studies.
25	*	B.3.2.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
26	*	B.3.2.2.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
27		C.1.1.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
28	*	C.1.1.2.	The indicator is fulfilled.	The action plan resulted from the feedback from doctoral students should be presented to all the students.
29	IPC	C.2.1.1.	The indicator is fulfilled.	Ensure all relevant pages can also be found in english. If they are supposed to also attract students from abroad, potential candidates should find the information in english.
30		C.2.2.1.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
31		C.2.2.2.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
32		C.2.2.3.	The indicator is fulfilled.	Indicator accomplished satisfactorily. No recommendations are issued.
33	*	C.3.1.1.	The indicator is fulfilled.	It is recommended to increase the opportunities for funding training internships abroad. A higher percentage of students (if not all) should at some time, conduct such internship.
34		C.3.1.2.	The indicator is fulfilled.	It is recommended to better promote co-supervised PhDs.
35		C.3.1.3.	The indicator is fulfilled.	PhD advisors should be encouraged to include international experts in the guidance and public defending commissions

VI. Conclusions and general recommendations

The Doctoral Domain in Systems Engineering is part of IOSUD - **Universitatea Tehnică „Gheorghe Asachi” din Iași** (TUIASI). From the analysis of the materials made available at institutional level it can be seen that all the criteria have been met.

I present the general conclusions derived from the analysis within the field of Systems Engineering. The doctoral studies have proven to be of high level according to other International doctoral study

programmes. This level of excellence is achieved thanks to the high-level research activity of TUIASI academics that, also, act as PhD supervisors. In addition, doctoral students, in turn, do have the appropriated research infrastructure to conduct their research activity.

There is identified great potential for internationalization and networking with other institutions outside Romania, those are emerging from high level supervisors. However, that potential is not developed as it could. This fact could represent a great attraction of international doctoral



students and more opportunities for academic relationship with international experts.



VII. Annexes

The following types of documents shall be attached:

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