

The External Evaluation Report of a Doctoral Study Domain

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I. Introduction¹

This report was drafted during the evaluation visit of the doctoral studies field SYSTEMS ENGINEERING within the UNIVERSITY OF PETROSANI. The visit took place between October 11 and 15, 2021, and the composition of the commission of evaluators was:

- Coordinator: Prof. univ. dr. Octavian Prostean, Universitatea Politehnica Timișoara
- Prof.dr.ing. Ramon Vilanova Arbos - Autonomous University of Barcelona;
- Drd.ing. Alexandru Marian Chiru - Universitatea Politehnica Timișoara

The University of Petrosani is acknowledged as Institution Organizing Doctoral Studies in the branch of Engineering Sciences, in the following fields: Mines, Oil and Gases; Industrial engineering; Systems engineering and Engineering and management under the supervision of 30 scientific advisers.

The activity of the doctoral studies field “Systems engineering” develops in compliance with the stipulations of the Code of Doctoral Studies (HG nr.684/2011) and of the Regulation for the organization and development of doctoral studies in the doctoral fields belonging to the fundamental field “Engineering sciences”.

At present, the PhD in the field of Systems Engineering, operates with three doctoral advisors.

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



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;
 - secretariat;
 - laboratories and research centers;
- Meeting / online discussions with doctoral students in the field of evaluated doctoral university studies;
- Meeting / online discussions with graduates in the field of doctoral studies evaluated;
- 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 University of Petrosani generally proves 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

IOSUD within the University of Petrosani has approved and implemented the regulations provided in the specific legislation regarding the organization of doctoral studies.

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.

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.*

There do exist specific regulations and their application at school level doctoral studies of which the field of doctoral university studies is part

Recommendations: It is recommended that all decisions of the Doctoral School Board be posted on the school's website, and some pages should be translated into English. Continuing the effort of constantly updating the website of the Doctoral School so that both doctoral supervisors and doctoral students or candidates for admission can find all the necessary information

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.*

Documentary proof is provided of the criteria, procedures and standards.

Recommendations: No further actions are required

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

IOSUD within the University of Petrosani has the software resources necessary to fulfil in good conditions the mission of doctoral studies.

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.*

In the University of Petrosani there is an information system for the record of doctoral students and their academic career. In 2020 through project I CNFIS-FDI-2020-0154, the use of UMS was extended to cover the necessities of the Doctoral School.

Recommendations: No further actions are required

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.*

In the University of Petrosani there is a software system for plagiarism detection - <https://sistemantiplagiat.ro/>. PhD students have access to this software.

Recommendations: It's not necessary.

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 from the UNIVERSITY OF PETROSANI must improve the use of financial resources in order to reach an optimal level.

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 record of research, institutional development and human resources grants being implemented in 2020 and obtained by the doctoral advisers in the evaluated field in the past 5 years is shown in Annex II.21.

Recommendations: The record shows unbalanced leadership among research advisors. It is recommended to expand public-private partnerships with innovation-oriented companies in the field of Systems Engineering.

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 doctoral field under evaluation there are 8 doctoral students who benefit from the state budget funding. The number of students who have benefited/benefit from other financial resources for a minimum period of 6 months is 5, the resulting ratio being 55.55% > 20%.

Recommendations: It's not necessary.

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.).*

During the evaluated period, on the doctoral field in Systems Engineering, the total amounts settled with the professional training expenses of the doctoral students amount to 87115.57 lei, ie 11.95% of the total income on the evaluated doctoral field

Recommendations: It's not necessary.

The indicator is fulfilled

Criterion A.2. Research infrastructure

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

The Doctoral School of the University of Petrosani has a good quality research infrastructure that can properly support the activities specific to doctoral 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.*

The spaces and material basis of the doctoral field *Systems engineering* enable the development of research activities in the field, in accordance with the assumed mission and objectives.

Recommendations: No further actions are required

The indicator is fulfilled

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.



Criterion A.3. Quality of Human Resources

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

The Systems Engineering field at the UNIVERSITY OF PETROSANI has a qualified staff with experience for carrying out the doctoral study program.

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 Systems Engineering, there are 3 doctoral supervisors. According to the internal evaluation report, 3 of them meet the standards of evaluation, necessary and mandatory to obtain the certificate of authorization, so it is a percentage of 100%.

Recommendations: No further actions are required

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.*

A number of 2 doctoral supervisors are holders out of a total number of 3 doctoral supervisors, which represents a percentage of 66.67%.

Recommendations. No further actions are required

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 disciplines within the training program based on advanced university studies related to the field of PhD Systems Engineering are supported by teachers with the title of professor who have the quality of doctoral supervisor, or by professors or lecturers with extensive experience in the field of taught subjects.

Recommendations. No further actions are required

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 is only one doctoral adviser (Prof.univ.dr.habil.dr.ing. LEBA Monica) who coordinates more than 8 doctoral students at the same time, but not more than 12, but only 8 of them are in the doctoral period of 3 years, 3 being in extended studies period.

Recommendations. No further actions are required

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 Systems Engineering field at the UNIVERSITY OF PETROSANI has doctoral supervisors 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*

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.



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.

According to the situation presented in the internal evaluation report, Annex 321, all PhD supervisors in the field of Systems Engineering have at least 5 indexed papers Web Of Science (Clarivate Analytics). Also, the data presented show that they have international visibility in the last five years.

Recommendations. No further actions are required

The indicator is fulfilled

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

All the doctoral advisers in the doctoral studies field continue to be scientifically active, obtaining more than 25% of the score required by the current minimal CNATDCU standards necessary and compulsory for the obtaining of the habilitation certificate, on grounds of the scientific outcome in the past five years.

Recommendations. No further actions are required

The indicator is fulfilled



Domain B. EDUCATIONAL EFFECTIVENESS

IOSUD from the UNIVERSITY OF PETROSANI proves a good educational effectiveness, which allows the development of doctoral studies in appropriate quality conditions.

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

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 UNIVERSITY OF PETROSANI proves in the case of Systems Engineering that it can attract candidates from outside the higher education institution.

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.*

According to the internal evaluation report, the number of master's degree graduates of other higher education institutions in the country or abroad who have registered for the admission competition for doctoral studies and the number of places financed from the state budget put up for competition at the admissions 2015- 2020 in the doctoral field Systems Engineering is 1.10. Considering that the criterion of the performance indicator is at least 0.2, this objective has been met.

Recommendations. No further actions are required

The indicator is fulfilled

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

IOSUD from the UNIVERSITY OF PETROSANI proves in the case of the field of Systems Engineering that it imposes quality standards within the admission, and the field is attractive considering the low dropout rate.



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.

Within University of Petrosani there is a Methodology for organizing and conducting the competition for admission to doctoral studies. According to the internal report, the selection criteria considered for the doctoral studies admission within SD-UP (<https://www.upet.ro/admitere/#doctorat>) are displayed in the *Methodology regarding the organisation and proceeding of the doctoral studies entrance examination* (Annex II.2). The doctoral studies entrance examination consists in (Annex II.65. Doctoral studies admission criteria; Annex II.66. Doctoral admission registers for Systems engineering):

Recommendations: No further actions are required

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%.

According to the internal evaluation report The values of the renunciation rate three years after the admission to the *Systems engineering* doctoral domain are presented in table II.13 and Annex II.39. Expulsion rate. The average abandonment rate during the 5 years under analysis is 0.13 – a percentage of 13%, without exceeding the 0.3 value – the percentage of 30%.

Recommendations. No further actions are required

The indicator is fulfilled

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.



Criterion B.2. The content of doctoral programs

**general description of the criterion analysis.*

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.*

According to the curriculum and internal report, the advanced academic training programme includes disciplines of scientific research methodology, academic ethics and integrity and disciplines relevant to the scientific research training in the *Systems engineering* doctoral domain. The academic disciplines offered are carried out annually within the Doctoral School and approved by CSUD. As a result of the participation in the activities selected from the offer of disciplines within the training programme, doctoral students must obtain a number of 30 credits.

The relevant disciplines are:

- 1. Doctoral research methodology. Doctoral thesis elaboration. Intellectual property*
- 2. Data processing methods and techniques in engineering*
- 3. The development of English language communication skills*

Recommendations. No further actions are required

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.*

According to the curriculum of the advanced study program corresponding to the field of Systems Engineering, the curriculum includes the discipline of Academic Ethics and Integrity, with a content corresponding to the criteria.

Recommendations. No further actions are required

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.*

IOSUD UNIVERSITY OF PETROSANI an internal mechanism through which study programs are initiated, approved, monitored and evaluated, including doctoral programs.

Recommendations. No further actions are required

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 general operating report of these steering committees was presented in the internal evaluation report.

Recommendations. No further actions are required

The indicator is fulfilled

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

The calculus method of this performance indicator is presented in Table II.14., based on the systematised information in Annex II.44. The ratio between the number of doctoral students and the total number of the didactic staff/researchers who provide coordination. The resulted ratio is 1.47:1, which is lower than 3:1.

Recommendations. No further actions are required

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.



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.

In the case of Systems Engineering at the UNIVERSITY OF PETROSANI, 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.*

For the Systems engineering doctoral domain, based on Annex II.46. (List of research papers of doctoral students who have obtained the doctoral degree in the last 5 years) table II.15 shows at least one article or relevant contribution for each doctoral student who was awarded the doctoral degree in the last five years and validated by CNATDCU.

Recommendations. No further actions are required

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.*

According to the internal evaluation report, The ratio value is $Y/X=13/5 = 2.6 > 1$, so it exceeds one unit.

Recommendations. No further actions are required

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.*

According to the internal evaluation report, Table II.17, shows that during the evaluated period of the *Systems engineering* doctoral domain the number of theses coordinated by a certain specialist from a higher education institution, other than the evaluated IOSUD, does not exceed two per year

Recommendations. No further actions are required

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.*

In the field of Systems Engineering in the period 2016-2020, less than ten doctoral theses were defended, namely 5.

Recommendations. No further actions are required

The indicator is fulfilled



Domain C. QUALITY MANAGEMENT

IOSUD from the UNIVERSITY OF PETROSANI proves a good quality management, which allows the development of doctoral studies in appropriate quality conditions.

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

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 from the UNIVERSITY OF PETROSANI has the institutional framework created for internal quality assurance.

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 UNIVERSITY OF PETROSANI Doctoral School has specific procedures that prove the constant development of the process of evaluation and internal quality assurance.

Recommendations. No further actions are required

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.*

At the level of the UNIVERSITY OF PETROSANI, evaluation mechanisms are implemented that aim at identifying the needs of doctoral students. Thus, there is an elaborated procedure for evaluating customer satisfaction, the doctoral students completing a questionnaire in this regard. In order to prove the application of this procedure, a clarification was requested. The answer includes questionnaires completed by doctoral students.

Recommendations: It is recommended to develop a measure plan focused on the needs of students following the questionnaires of needs and satisfaction and its public presentation.

The indicator is fulfilled

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

IOSUD from the UNIVERSITY OF PETROSANI 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.

IOSUD from the UNIVERSITY OF PETROSANI offers for consultation in electronic format the information of interest for doctoral students, future candidates, respectively the information of public interest.

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 results that are published on the University of Petrosani website, the information regarding all aspects of the doctoral studies.:

Recommendations: Ensuring all relevant pages in English as well, especially if they aim to attract students from abroad and improving the appearance.

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.

PhD students have access to the resources necessary to carry out 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.

IOSUD –UNIVERSITY OF PETROSANI accesses and has accessed during the entire evaluated period the services provided through the ANELIS Plus programme, to offer doctoral students free access to a platform with academic data bases relevant for the organised domains. Consequently, within IOSUD – UNIVERSITY OF PETROSANI, all doctoral students have permanent and free access to this platform, with an account and password, by using their email account

Recommendations. No further actions are required

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.

According to the internal evaluation report, at UNIVERSITY OF PETROSANI, on demand and with the coordinator's consent, each doctoral student has access to an electronic system which checks the degree of similitude of the paper with other existent scientific or artistic works.



Recommendations. No further actions are required

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 doctoral students have access to the research laboratories or other facilities of the University of Petroșani, according to the Regulations of Internal Management, within the faculties and as well as the laboratories within INSEMEX Petroșani, based on an inter-institutional partnership agreement (Annex II.64. Partnership agreement UP-INCD-INSEMEX).

Recommendations. No further actions are required

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 Doctoral School of the UNIVERSITY OF PETROSANI proves internationalization, the situation can be substantially improved by adopting 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, as reflected at the internal report, Table II.19 (based on the collected data in Annex II.55. Table of participation in international



conferences abroad) displays in a synthetic form the number of participations of doctoral students within the “Systems engineering” domain in international conferences. It is noted that out of a total number of 23 doctoral students, 16 performed at least one form of mobility by participating in international conferences, ie a percentage of 69.56%.

Recommendations: No further actions are required

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.*

For the field of Systems Engineering, between the period under consideration, 2016-2020, as reflected at the internal report, (Annex II.58. First rate international experts invited to give lectures/courses for doctoral students) reports the academic members that gave lectures to the doctoral students at the Doctoral School of Engineering Sciences, at the Systems engineering domain.

Recommendations: No further actions are required

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.).*

The internal report clearly reflects the different initiatives that are undertaken to promote the internationalization. In addition, it is well received that drawing international doctoral students through an efficiently promoted research activity and identifying the external financial resources to attract candidates constitute a priority of the Strategy of Internationalisation of the University of Petroșani between 2020 – 2027 (Annex II. 68).

Recommendations: No further actions are required

The indicator is fulfilled.





IV. SWOT Analysis

<p style="text-align: center;"><u>Strengths:</u></p> <ul style="list-style-type: none"> • PhD supervisors prove a good research activity; • The research infrastructure corresponds to the assumed mission and objectives; • Attracting international doctoral students on research topics related to the local specific. 	<p style="text-align: center;"><u>Weaknesses:</u></p> <ul style="list-style-type: none"> • Insufficient funding from the total amounts collected by the university related to doctoral grants or tuition fees; • Lack of additional funding compared to government funding; • Lack of mechanisms to effectively encourage doctorates in co-supervision and to invite international experts for lectures in the field
<p style="text-align: center;"><u>Opportunities:</u></p> <ul style="list-style-type: none"> • The quality of doctoral supervisors and the local specifics of the research topics approached allow obtaining a high degree of internationalization; • The topicality of the doctoral field allows attracting a significant number of candidates. 	<p style="text-align: center;"><u>Threats:</u></p> <ul style="list-style-type: none"> • According to the documents provided during the visit, starting with October 1, 2021, the field of Systems Engineering no longer benefits from the full fulfillment of criterion A3.1.2. • Lack of consistent funding with possible implications on access to the facilities required for the doctoral thesis adopted, especially in a leading field such as Systems Engineering.

V. Overview of judgments awarded and of the recommendations

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
1.	PI	<p>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:</p> <p>a) the internal regulations of the Doctoral School;</p> <p>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;</p> <p>c) the Methodologies for organizing and conducting doctoral studies (for the admission of doctoral students, for the completion of doctoral studies);</p> <p>d) the existence of mechanisms for recognizing the status of a Doctoral advisor and the equivalence of the doctoral degree obtained abroad;</p> <p>e) functional management structures (Council of the doctoral school), giving as well proof of the regularity of meetings;</p> <p>f) the contract for doctoral studies;</p> <p>g) internal procedures for the analysis and approval of proposals regarding the training for doctoral study programs based on advanced academic studies.</p>	The indicator is fulfilled	It is recommended that all decisions of the Doctoral School Board be posted on the school's website, and some pages should be translated into English. Continuing the effort of constantly updating the website of the Doctoral School so that both doctoral supervisors and doctoral students or candidates for admission can find all the necessary information
2.	PI	<p>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.</p>	The indicator is fulfilled	No further actions are required
3.	PI	<p>A.1.2.1. The existence and effectiveness of an appropriate IT system to keep track of doctoral students and their academic background.</p>	The indicator is fulfilled	No further actions are required
4.	PI	<p>A.1.2.2. The existence and use of an appropriate software program and evidence of</p>	The indicator is fulfilled	No further actions are required

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		its use to verify the percentage of similarity in all doctoral theses.		
5.	IP	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 indicator is fulfilled	No further actions are required
6.	PI *	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 indicator is fulfilled	No further actions are required
7.	PI *	A.1.3.3. 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 indicator is fulfilled	No further actions are required
8.	CPI	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	The indicator is fulfilled	No further actions are required

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		described above, which was purchased and developed within the past 5 years will be presented distinctly		
9.	CPI	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 indicator is fulfilled	No further actions are required
10.	PI *	A.3.1.2. At least 50% of all doctoral advisors have a full-time employment contract for an indefinite period with the IOSUD.	The indicator is fulfilled	No further actions are required
11.	PI	A.3.1.3. The study subjects in the education program based on advanced higher education studies pertaining to the doctoral domain are taught by teaching staff or researchers who are doctoral thesis advisors / certified doctoral thesis advisors, professors / CS I or lecturer / CS II, with proved expertise in the field of the study subjects they teach, or other specialists in the field who meet the standards established by the institution in relation with the aforementioned teaching and research functions, as provided by the law.	The indicator is fulfilled	No further actions are required
12.	PI *	A.3.1.4. The percentage of doctoral thesis advisors who concomitantly coordinate more than 8 doctoral students, but no more than 12, who are themselves studying in doctoral programs does not exceed 20%.	The indicator is fulfilled	No further actions are required
13.	CPI	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,	The indicator is fulfilled	No further actions are required

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		<p>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.</p>		
14.	PI *	<p>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</p>	<p>The indicator is fulfilled</p>	<p>No further actions are required</p>
15.	PI *	<p>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.</p>	<p>The indicator is fulfilled</p>	<p>No further actions are required</p>
16.	PI *	<p>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.</p>	<p>The indicator is fulfilled</p>	<p>No further actions are required</p>

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		Interviewing the candidate is compulsory, as part of the admission procedure.		
17.	PI	B.1.2.2. The expelling rate, including renouncement / dropping out of doctoral students 3, respectively 4, years after admission does not exceed 30%.	The indicator is fulfilled	No further actions are required
18.	PI	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 indicator is fulfilled	No further actions are required
19.	PI	B.2.1.2. At least one discipline is dedicated to Ethics and Intellectual Property in scientific research or there are well-defined topics on these subjects within a discipline taught in the doctoral program.	The indicator is fulfilled	No further actions are required
20.	PI	B.2.1.3. The IOSUD has mechanisms to ensure that the academic training program based on advanced university studies addresses „the learning outcomes”, specifying the knowledge, skills, responsibility and autonomy that doctoral students should acquire after completing each discipline or through the research activities.	The indicator is fulfilled	No further actions are required
21.	PI	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 indicator is fulfilled	No further actions are required
22.	CPI	B.2.1.5. For a doctoral study domain, the ratio between the number of doctoral students and the number of teaching staff/researchers providing doctoral guidance must not exceed 3:1.	The indicator is fulfilled	No further actions are required
23.	CPI	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	The indicator is fulfilled	No further actions are required

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		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		
24.	PI *	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 indicator is fulfilled	No further actions are required
25.	PI *	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 indicator is fulfilled	No further actions are required
26.	PI *	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 indicator is fulfilled	No further actions are required
27.	PI	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;	The indicator is fulfilled	No further actions are required

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
		<p>c) the procedures and subsequent rules based on which doctoral studies are organized;</p> <p>d) the scientific activity of doctoral students;</p> <p>e) the training program based on advanced academic studies of doctoral students;</p> <p>f) social and academic services (including for participation at different events, publishing papers etc.) and counselling made available to doctoral students.</p>		
28.	PI *	<p>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.</p>	<p>The indicator is fulfilled</p>	<p>No further actions are required</p>
29.	CPI	<p>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:</p> <p>a) the Doctoral School regulation;</p> <p>b) the admission regulation;</p> <p>c) the doctoral studies contract;</p> <p>d) the study completion regulation including the procedure for the public presentation of the thesis;</p> <p>e) the content of training program based on advanced academic studies;</p> <p>f) the academic and scientific profile, thematic areas/research themes of the Doctoral advisors within the domain, as well as their institutional contact data;</p> <p>g) the list of doctoral students within the domain with necessary information (year of registration; advisor);</p> <p>h) information on the standards for developing the doctoral thesis;</p> <p>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.</p>	<p>The indicator is fulfilled</p>	<p>Ensuring all relevant pages in English as well, especially if they aim to attract students from abroad and improving the appearance</p>

No.	Type of indicator (PI, PI *, CPI)	Performance indicator	Judgment	Recommendations
30.	PI	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.	The indicator is fulfilled	No further actions are required
31.	PI	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.	The indicator is fulfilled	No further actions are required
32.	PI	C.2.2.3. All doctoral students have access to scientific research laboratories or other facilities depending on the specific domain/domains within the Doctoral School, according to internal order procedures.	The indicator is fulfilled	No further actions are required
33.	PI *	C.3.1.1. IOSUD, for every evaluated domain, has concluded mobility agreements with universities abroad, with research institutes, with companies working in the field of study, aimed at the mobility of doctoral students and academic staff (e.g., ERASMUS agreements for the doctoral studies). At least 35% of the doctoral students have completed a training course abroad or other mobility forms such as attending international scientific conferences. IOSUD drafts and applies policies and measures aiming at increasing the number of doctoral students participating at mobility periods abroad, up to at least 20%, which is the target at the level of the European Higher Education Area.	The indicator is fulfilled	No further actions are required
34.	PI	C.3.1.2. In the evaluated doctoral study domain, support is granted, including financial support, to the organization of doctoral studies in international co-tutelage or invitation of leading experts to deliver courses/lectures for doctoral students.	The indicator is fulfilled	No further actions are required
35.	PI	C.3.1.3. The internationalization of activities carried out during the doctoral studies is supported by IOSUD through concrete measures (e.g., by participating in educational fairs to attract international doctoral students; by including international experts in guidance committees or doctoral committees etc.).	The indicator is fulfilled	No further actions are required



VI. Conclusions and general recommendations

The doctoral studies in the field of Systems Engineering within the Doctoral School / IOSUD – UNIVERSITY OF PETROSANI generally benefit from an institutional capacity, institutional efficiency and quality management that allow it to be carried out at a high level. This level is mainly due to the quality of doctoral supervisors, but also to the existing research infrastructure. Thus, there is a great development potential for internationalization and connection with other institutions outside Romania, especially taking into account the specificity of the research topics addressed. This potential must be developed by adopting measures to encourage international cooperation. The completed doctoral theses are of quality, aspect highlighted and by the quality of the generated publications.

In view of the self-assessment report, the documents provided in addition to the commission's request, the results of the online meetings, the result of the questionnaire applied to doctoral students and the visit to the hosts, **the external evaluator proposes to for the field of doctoral studies Systems Engineering within the Doctoral School / IOSUD - UNIVERSITY OF PETROSANI.**