



Quality Assurance Plan

Deliverable 5.1



Versioning and Contribution History

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Acronyms, abbreviations and definitions

Acronyms	Definition
CPS	Cyber-Physical Systems
CHBE	Capacity Building in Higher Education
ECTS	European Credit Transfer and Accumulation System
EHEA	European Higher Education Area
HEI	Higher Education Institution
LP	Leading Partner
MC	Management Committee
QAP	Quality Assurance Plan
QAMT	Quality Assurance and Monitoring Team
PC	Partner Country
PQAP	Project Quality Assurance Plan
PM	Project Manual



The CybPhys Project

CybPhys aims to upgrade bachelor/master-level curricula and study programs in Belarusian and Ukrainian universities in the area of Cyber-Physical Systems modelling and simulation, according to the Bologna process. These curricula focus on innovative physical, mathematical and engineering sciences and High-Tech industry topics. An important area where the project places emphasis in is the implementation of ICT which will be achieved through networking activities to respond to the labor market needs and through the enhancement of the quality and relevance of education.

The project aims to undertake actions that will promote further structural reforms in PCs' HEIs, according to the ET2020 strategy of European Union which aims to:

- Modernize the bachelor/master-level curricula and study programs for the Physical/Mathematical /Engineering Faculties in 6 universities in Belarus and Ukraine, according to EU HEIs' practices, in the area of innovative modelling and simulation of CPS for High-Tech industry and scientific research institutions;
- Enhance the quality of education in the area of modelling and simulation of CPS, based on the modernized bachelor/master-level training programs, with a particular focus on the use of innovative ICT environments to realize the declared targets;
- Align HE in the area of modelling and simulation of CPS in Belarus and Ukraine to the main instruments and principles of the Bologna process, and other-related European Higher Education Area (EHEA) standards, such as ISCED 2011, a Framework for Qualifications of the EHEA, ECTS and Standards for quality assurance in the EHEA;
- Develop/update lecture courses, virtual laboratory practices and teaching materials for bachelor/master-level training programs in the area of modelling and simulation of CPS;
- Implement modern technical infrastructure with innovative ICT-based teaching/learning environments for the improvement of teachers' qualifications and skills in the area of modelling and simulations of CPS;
- Improve teachers, academic staff and students' skills in technical English;
- Accredite and implement the new programs, according to the Bologna requirements and the labor market needs, and increase employability of college graduates;
- Strengthen the collaboration between business and universities in PCs;
- Supply the labor market in Belarus and Ukraine with highly-educated bachelor/ master level graduates in the engineering-oriented modelling and simulation of CPS topics that can respond to the needs of High-Tech industry and scientific research institutions.

For more information, please visit <https://cybphys.rtu.lv/>



Executive Summary

The current document is the **Quality Assurance Plan** for the “Development of practically-oriented student-centred education in the field of modelling of Cyber-Physical Systems” (CybPhys) project, which was funded under the Erasmus+ Capacity Building in Higher Education (CBHE) framework. The QAP is led by the University of Cyprus and aims to establish quality procedures that will promote a uniform approach in realizing and delivering all project tasks and deliverables. The Quality Assurance Plan will be implemented to prepare evaluation forms and guidelines, as well as internal and external evaluation of deliverables, reporting and accreditation/validation of the newly developed curricula.

A **Quality Assurance and Monitoring Team (QAMT)** has also been established which is responsible for developing the Project Quality Assurance Plan (PQAP). The PQAP aims to establish, deploy and implement quality measures which will be used against benchmarks and indicators in order to deliver high quality outcomes and deliverables within the indicated timeframe. The QAP is critical for monitoring and evaluating the progress of the project activities and for anticipating any emerging challenges and proposing corrective actions to ensure the completion of the project.



1 Introduction

To set effective mechanisms in place to deliver high quality outcomes, a **Quality Assurance Plan (QAP)** has been developed. This QAP includes all activities related to the monitoring, control and evaluation of the project throughout its lifespan. These activities will form the path to developing pedagogically potent curricula and course materials in the field of Cyber Physical Systems and to offering high quality training activities to students. At the same time, the QAP will be pivotal for the development and implementation of constructive internal quality procedures and preparation of the required evaluation forms and guidelines, as well as for the establishment, deployment and implementation of quality measures for internal and external evaluation of deliverables, reporting and accreditation/evaluation of the newly developed curricula. The quality assurance procedures will also set the roadmap to national/international benchmarking.

The QAP will monitor closely the progress of the project, anticipate and overcome any emerging challenges and propose corrective actions that will assist in realizing the project's objectives and in delivering high quality outcomes. Throughout the duration of the project, the QAP will ensure that

- Intended learning outcomes are established and are included in the newly developed syllabi;
- Industry representatives and students participate in the syllabi design;
- Curriculum and program design and content, as well as the output of each Work Package, are reviewed and evaluated by all involved parties and stakeholders suggestions are offered and follow-up procedures are established;
- The specific needs of the various modes of delivery, such as lectures, lab work, online learning and target pool of students are taken into consideration;
- Multiple learning resources are accessible to teachers and students;
- Formal program approval procedures are initiated by the appropriate academic institution units and are completed in a timely manner;
- The progress and performance of participating students are effectively monitored.

The **Quality Assurance and Monitoring Team (QAMT)** will actively and collectively contribute to the realization of these goals and the establishment, deployment and implementation of a feasible and effective contingency plan to overcome any emerging challenges and complexities. The Quality Assurance and Monitoring Team will also collaborate very closely with the Project Coordinator to ensure the high quality of all project activities and delivery of important milestones and deliverables in a timely and effective manner. At the same time, the Project Coordinator will undertake all the necessary actions related to the technical and management aspects of the project, including monitoring the project progress, identifying any emerging challenges and working with the Project Quality Assurance and Monitoring Team to propose and undertake corrective actions. The quality of the project outcomes and deliverables will be measured by the Interim and Final Quality Reports from partners, as well as the Consolidated Quality Reports which will be developed by the **Leading Partner (LP)**.



2 Assumptions and risks

Considering the nature and scope of the project, several contingencies that can have a negative impact on the project outcomes and deliverables have been taken into account and the required risk management and contingency plan has been established. The objective of risk management is to facilitate the implementation of the project strategy, deliverables, outcomes and budget. The Project Coordinator and QAMT members will monitor very closely the project’s progress, anticipate and identify any contingencies, propose corrective actions and deliver high quality results. The Project Coordinator and QAMT members will promote open communication and flow of information among all consortium partners. This step will promote transparency. At the same time, it will help identify any major deviations and undertake prompt contingency actions, redistribute resources, evaluate the project deliverables and outcomes against the indicated benchmarks and indicators and ensure the high quality of all project results. The progress, identified risks and corrective actions will be reported at **Management Committee** (MC) meetings and all relevant documentation will be provided.

Risk Management is comprised of different processes including risk identification, assessment and evaluation (severity and possibility), mitigation actions, monitoring and revisions. All contingencies and emerging risks will be evaluated very closely and a risk analysis activity will be developed when necessary and the appropriate mitigation actions will be undertaken in a timely and constructive manner. The CybPhys consortium has already identified a set of strategic, organizational and technical risks which were discussed with consortium members. A feasible contingency plan was also formulated for each risk. A synopsis of these risks is provided in Table 1 below, where the severity and the possibility of risks have been classified under three categories: low (L), medium (M), and high (H).

Table 1

Risk Description (severity–possibility)	WP	Mitigation Strategy	Contingency Plan
Extended protective measures against the COVID-19 pandemic impeding the realization of project objectives and deliverables (M-M)	WP1-7	Consortium partners have already discussed alternative, viable solutions to ensure that all project objectives and deliverables are realized on time	If any of the project objectives and deliverables cannot be realized on time, all consortium partners will identify feasible solutions to realize those goals
Limited or insufficient involvement of all related stakeholders, i.e., Ministry, professional association and industry representatives (M-L)	WP1 WP2	Consortium partners have already begun exchanging information, knowledge and expertise to ensure all interested stakeholders are involved in the project	If the number of involved stakeholders is lower than anticipated, HEIs will invest more time and effort to promote the project and its goals and objectives



Limited or insufficient involvement of students and academic/teaching staff (M–L)	WP4	To maximize participation, consortium partners have been promoting the training courses from the onset of the project. They have also been promoting Double Master Degree programs between EU and PC universities	In case the number of participants is lower than anticipated, HEI consortium members will invest more time and energy in promoting the value of the training courses
Lack of uniformity/compatibility of teaching/learning approaches (curricula, study programs, didactic materials, etc.) and tools (equipment, soft, manuals) in participating academic institutions (M-L)	WP1 WP3 WP4	Consortium partners have joined forces to collaboratively develop compatible/unified teaching/learning methods, didactic materials. Hardware and software will also be purchased for training in the indicated field	If there is no uniformity in the teaching/learning approaches and tools, consortium partners will promote further deployment and implementation of teaching methods, didactic materials, tools and software in order to reach the required goals
Lack of or limited cooperation and communication among consortium partners (M–M)	WP1 WP7	A simplified and transparent management procedure has been implemented. The PC will collaborate with WP leaders and consortium partners to monitor the project’s progress, i.e., during project meetings	Prompt corrective actions to open the communication channels and enhance the flow of information among consortium partners
Quality and pedagogical value of newly developed didactic materials may not be as high as expected (H–L)	WP3 WP5	Internal and external mechanisms have been set in place to evaluate the newly developed materials	The Quality Assurance and Monitoring Team (QAMT) will propose corrective actions
Technically inept e-learning system and Simulation Environment (M–L)	WP4	BSU has extensive expertise and experience in the development of e-learning and simulation environments and will monitor closely the virtual environments to propose alternative platforms	Alternative platforms have already been identified
Study program validation, testing and international	WP1 WP7	Some groundwork has already been done in order to promote the	Industry and potential employers have already provided invaluable input

Riga Technical University and University of Cyprus

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benchmarking, i.e., accreditation from Ministries of Education, Universities and industry representatives (L–M)		development of industry-oriented curricula based on the Bologna conventions	and have consented to support further the project and the realization of its goals and objectives
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3 Approach and methodology

CybPhys aims to develop and modernize both undergraduate- and postgraduate-level curricula and training courses in the field of Cyber-Physical Systems in six academic institutions in Belarus and Ukraine in order to adhere to the Bologna process, which promotes coherence in the standards and quality in Higher Education systems. More precisely, the quality of education will be enhanced in the area of innovation modelling and simulations of CPS and high-tech industry and scientific research, with particular emphasis being placed on the deployment and implementation of innovative ICT environments. The newly developed curricula will be accredited by Ministry of Education of Belarus and other-related university or official authorities, such as the Ministry of Education and Science of Ukraine. Belarusian State University (BSU) will develop 11 new courses, Gomel State University (GSU) will develop 10 new courses, MSPU will introduce 4 new courses, Ukraine will introduce 5 new and 2 updated courses, KhNAHU will develop 2 new and 4 updated courses and KNU will introduce 3 new and 4 updated courses.

The development of the curricula and training courses will be instigated during the first year of the project, while the initial implementation phase of the two newly developed baccalaureate and two-year master-level courses will begin during the second year of the project. The testing phase will offer invaluable feedback from the target groups: teaching staff and students. The feedback will be examined as part of Work Package 5: Quality Assurance. PC organizations will prepare the testing reports and present the outcomes during Management Committee meetings. Most importantly, the feedback will guide in undertaking further changes to enhance the courses, labs and instructional materials. Consortium members from Partner Country academic institutions will then translate the newly developed materials from English to Belarusian and Ukrainian. Both Bachelor- and Master-level programs will continue to be tested after the completion of the project. Upon completion of the testing, further changes and improvements will be undertaken before the newly developed courses and lab practices will be adopted by other academic institutions in Belarus and Ukraine.

Faculty members/teaching and technical staff will be trained on the content and goals of newly developed curricula, new ICT tools, and other-related technologies. In return, they will organize and deliver cascade training to share the newly acquired knowledge and practices. A large pool of highly motivated students will also be trained on the newly developed curricula and study programs.

Finally, a total of nine e-books in both English and Russian/Ukrainian will also be developed. These e-books will serve as tools for equipping both undergraduate and graduate-level students with the required knowledge in multiple areas, including physical sciences and engineering physics, mechanics and mathematical modelling and Web-coding and Internet technologies.



3.1 Internal monitoring and control

To assure the quality of all project results and the on-time execution of all project activities, further internal project monitoring and control mechanisms have been set in place. The University of Cyprus will also lead the development of a Quality Assurance and Monitoring Team, which will be responsible for deploying quality control metrics to ensure that all project milestones are realized in a timely and effective manner. Each participating organization will be invited to appoint an academic staff member to join the Quality Assurance and Monitoring Team (QAMT). The QAMT will be responsible for developing the Project Quality Assurance Plan (PQAP). All consortium members in the QAMT are included in Table 2 below. In addition, a working group for internal quality control and monitoring of project-related activities will be established at each participating academic institution. The internal Quality Assurance and Monitoring Team will develop a set of quality measures, which will serve as evaluation outcomes against benchmarks and indicators, and will implement a reporting system in the Quality Assurance Plan.

Further, the internal Quality Assurance and Monitoring Team will be responsible for overseeing the methodology for obtaining feedback from prospective employers, such as research institutions, high-tech companies and professional associations on the newly developed curricula. Prospective employers will be involved throughout this process, including the preparation, development and evaluation stages. This process will contribute to setting the roadmap for international benchmarking and labor market preparation.

All teacher and student training events and sessions will be subject to internal evaluation. With the guidance of experienced consortium members and the University of Cyprus, the Quality Assurance and Monitoring Team will develop a methodology for self-evaluation including a set of criteria of evaluation, questionnaires and analysis of responses. The QAMT will report to consortium partners during Management meetings.



Table 2: Quality Assurance and Monitoring Team Members

Name of Consortium Member	Academic Institution	Email Address:
Anastasija Žiravecka	Riga Technical University	Anastasija.Ziravecka@rtu.lv
Joan Peuteman	Katholieke Universiteit Leuven (KU Leuven)	joan.peuteman@kuleuven.be
Stella K. Hadjistassou	University of Cyprus (UCY)	stella1@asu.edu
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	Institute of Nuclear Problems of Belarusian State University (INP BSU)	
Iryna Yakymenko,	Chernihiv National Technological University (CNTU)	iryayakymenko93@gmail.com
Andrii Hnatov	Kharkiv National Automobile and Highway University (KhNAHU)	kalifus76@gmail.com
Volodymyr Sistuk	Kryvyi Rih National University (KNU)	vkazymyr@gmail.com



3.2 External monitoring and control

For external quality control and monitoring, two experts from EU academic institutions that are not part of the consortium will be subcontracted in order to deploy and implement a set of external quality control activities. The external evaluation will take place during the second and third year of the project, before and after the course implementation.

On behalf of EACEA, the National Erasmus+ Office (NEO) in Ukraine and in Belarus plan to visit the Ukrainian and Belarusian partner universities. After the field monitoring, the EACEA will provide written feedback on the project with specific recommendations.

The quality of the project deliverables and outcomes will be measured by the Interim and Final Quality Reports, while input will also be provided by the project Quality Assurance Plan and reports generated by the external experts. Corrective action will be undertaken when necessary to deliver high quality outcomes.

3.3 Internal procedures and documents

The Project Coordination develops A “Project Manual” (PM) which will include the rules, methods and tools that will be deployed to successfully realize the project objectives and provide a detailed analysis of products, tasks and other relevant resources, including personnel and financial resources. It will introduce the project tasks and will offer a feasible and reliable time and financial schedule. It will also describe all the required measures to realize all project objectives within the allocated budget. All procedures described in the PM adhere to the Erasmus+ guidelines and requirements.

The Project Coordinator will also provide consortium partners with the required support on the technical and administrative aspects of the project. For instance, he will distribute and archive paperwork and/or electronic forms of all related project correspondence, including the agenda for each project meeting and the project minutes, reports and financial documents.

To promote transparency and open up the communication channels among consortium partners, the Project Coordinator will undertake all the necessary actions, including circulating emails and distributing project information in a timely manner. He will also guide partners in developing and submitting within the indicated deadlines all the required forms, thus promoting effective report distribution on curricula development, feedback and other related technical and financial aspects of the project.

The Project Coordinator will also monitor very closely the project progress and will identify any emerging problems, challenges or contingencies, which will be reported to the Management Committee members. The Project Coordinator will also collaborate with the EACEA and the MC to propose a corrective action to overcome any emerging risks or challenges.

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The quality of project activities will be evaluated using various measures and tools, including Quality Reports from consortium partners, Reports generated by external experts and Consolidated Quality Reports generated by the Project Coordinator.



4 Implementation schedule

As the central contact point and representative of the CybPhys consortium, the Project Coordinator will coordinate, oversee and submit in a timely manner all required official reports, financial statements, amendments and project reviews to the Executive Agency, as indicated in the Grant Agreement. All beneficiary organizations are obliged to provide the Project Coordinator with all the required information and, if necessary, all supporting documentation required for the preparation of official reports, financial statements and any other-related documents, as indicated in the Grant Agreement.

The Project Coordinator will ensure that all reports adhere to the highest standards and to the Executive Agency's guidelines and requirements. These official reporting processes will also form a tool to report to the Executive Agency the project's progress, tasks, deliverables and outcomes, as well as the financial aspects of the project and any deviation and/or corrective actions undertaken throughout the duration of the project. The Project Coordinator will collaborate very closely with all Work Package Leaders to ensure that all tasks and deliverables are realized in a timely and effective manner and are accurately reported. In case an issue is raised in the periodic reports, the Project Coordinator will work closely with Work Package Leaders to respond to and undertake further action in order to ensure that all issues are addressed and all project objectives and goals are realized in a timely and constructive way.

As indicated in the Partnership Agreement, the deadlines for Partner Reports are the following: September 15, 2020, May 15, 2021, January 15, 2022 and November 30, 2022.

The Project Coordinator is responsible for providing the beneficiaries with the required reporting forms that demonstrate the project's progress, the quality of newly developed curricula, the declaration of expenses/activities and the relevant instructions for their completion.

Finally, the Project Coordinator is responsible for setting a timeline for the Quality Assurance Plan, which will include Log-Frame matrix tasks and deliverables in the form. He will also ensure all consortium partners consent to the content of the Quality Assurance Plan and will guide partners in avoiding any overlapping in the reporting process; please refer to Table 3 below.



Table 3: Schedule of the Quality Assurance Plan

Nº	Deliverables - Reports	Date	UCY	EU	Partner Universities	Professional Associations
WP7 (D7.3-D7.5)	Financial reports (According to the PA between RTU and consortium partners)	15.09.20 15.05.21 15.01.22 30.11.22	Yes	Yes	Yes	Yes
WP 7 (D7.5)	Activity reports: integrated report on project progress, development of curricula, QA issues, etc. (According to the PA between RTU and consortium partners)	15.09.20 15.05.21 15.01.22 30.11.22	Yes	Yes	Yes	Yes
WP1 (D1.2)	Ex-Ante Reports elaboration report on the compatibilities of educational regulations	31.03.20	Yes		Yes	
(D1.3)	A Survey of industry, research institutions, HEIs and professional association representatives	14.03.19	Yes		Yes	Yes
(D1.3)	Study Report on survey results on the specific needs of the labor market	02.05.20	Yes		Yes	
WP2 (D2.9)	Partners' report on curricula development: development and enhancement of lectures, lab practices and compatible teaching (didactic) materials (lecture synopses, presentations, lab guides etc.)	14.08.21	Yes		Yes	
(D2.8)	Partners reports on new curricula testing with feedback from teaching staff, students, Ministry' officers and entrepreneurs (professional associations, enterprises, etc.) involved in student teaching and curricula enhancement	14.08.21	Yes		Yes	
WP3 (D3.1-3.3)	Development of novel virtual environments for distance learning: 3.1 E-library 3.2 The number of teaching/didactic materials uploaded to e-Library	14.03.20	Yes	Yes	Yes	



	3.3 Virtual lab practices in a framework of the developed SMSE platform					
WP4 (D4.1-4.4)	Development of a Sharing Modelling and Simulation Environment for online and virtual laboratory work 4.1 Analysis of experience of the contemporary technical solutions and development of a concept of the SMSE. 4.2. Development of the technical platform of the SMSE and designing of web interface for SMSE platform. 4.3. Development of computer classes with on-distance/ virtual laboratory in framework of SMSE platform	14.10.22	Yes	Yes	Yes	Yes
WP5 (D5.2)	Quality Assurance with milestones. Project Manual – a synopsis of rules, guidelines, methods and tools required for the process implementation	30.12.20	Yes	Yes	Yes	
(D5.3)	Establishment of a Quality Assurance and Monitoring Team	30.02.20	Yes	Yes	Yes	
(D5.5)	A survey on the quality of the newly developed/enhanced courses after the first year of testing	30.12.19	Yes		Yes	
(D5.5)	Reports on external experts on quality monitoring: Intermediate QA report Final QA report					
(D5.5)	NEO in Ukraine and in Belarus plan to undertake visits on behalf of EACEA to the Ukrainian and Belarusian partner universities	14.11.21	Yes		Yes	
(D5.5)	NEO in Ukraine and in Belarus plan to undertake visits on behalf of EACEA to the Ukrainian and Belarusian partner universities	14.11.21	yes		yes	yes
WP6 (D6.4)	Recommendations for new master-level program: introduction in PCs universities beyond the project.	14.11.22	Yes	Yes	Yes	Yes
WP7	Management, coordination and communication: meetings?	14.11.22	Yes	Yes	Yes	Yes



(D7.1-7.5)	agenda, participants lists, minutes of the meetings with the decisions, reviews of the previous meetings.					
(D7.7)	External financial audit	14.11.22	Yes	Yes	Yes	Yes