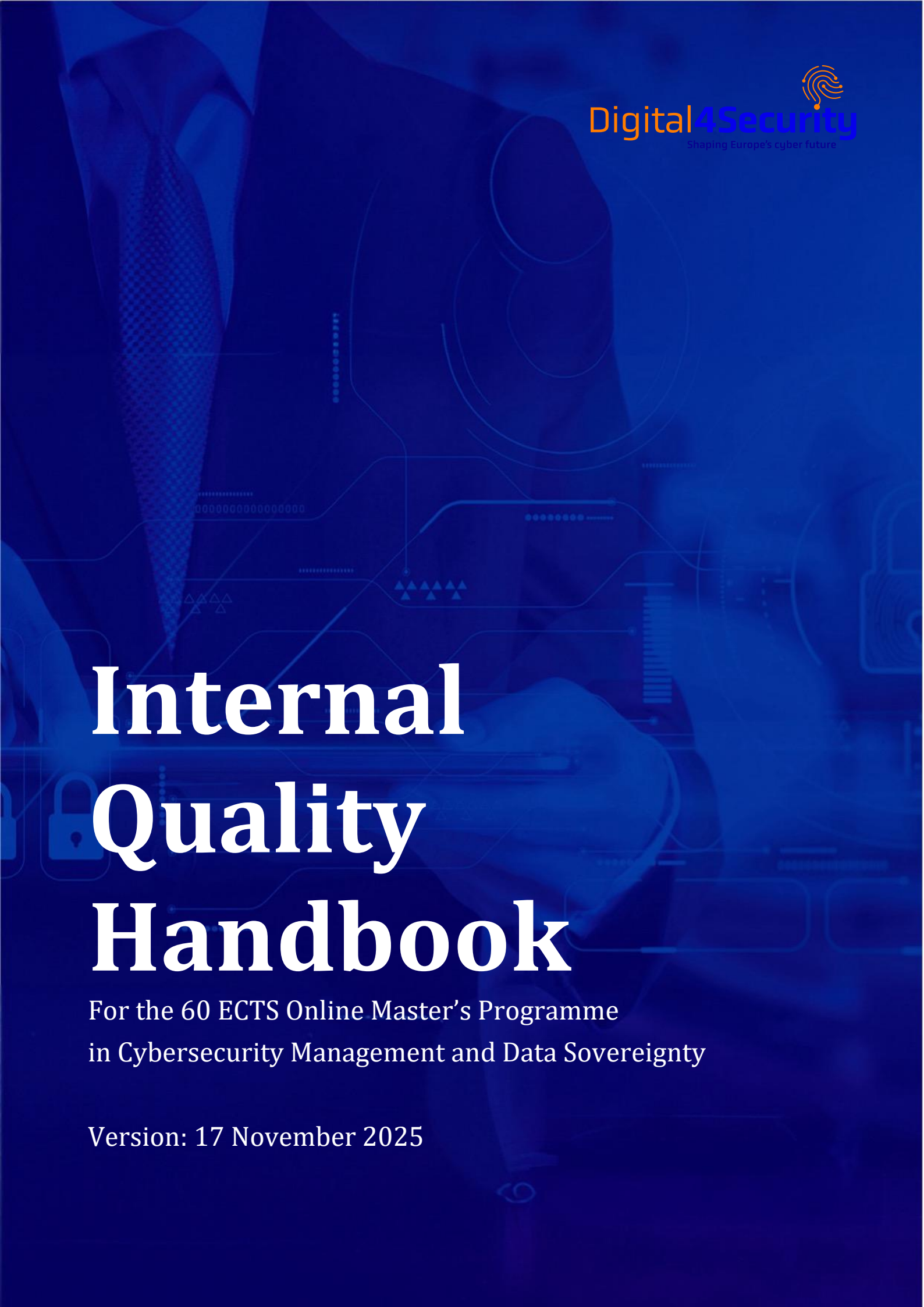


Digital4Security
Shaping Europe's cyber future

Internal Quality Handbook

For the 60 ECTS Online Master's Programme
in Cybersecurity Management and Data Sovereignty

Version: 17 November 2025

Table of Contents

Introduction

The Joint Master's Programme in **Cybersecurity Management and Data Sovereignty** is a 60 ECTS, fully online degree jointly awarded by the German University of Digital Science (UDS, Germany), Munster Technological University (MTU, Ireland), and Universidad Internacional de La Rioja (UNIR, Spain).

The programme has been created within the framework of the **Digital4Security** project (Grant Agreement No. 101123430), co-funded by the European Union under the *DIGITAL Europe Programme* (DIGITAL-2022-SKILLS-03 – Advanced Digital Skills).

Designed to meet Europe's growing demand for strategic cybersecurity expertise, the programme combines academic excellence with strong industry relevance. It supports professionals in developing the advanced competencies required to lead cybersecurity efforts across public and private sectors, particularly in Small and Medium-Sized Enterprises (SMEs) and critical infrastructure domains.

This **Internal Quality Handbook** outlines the structures, responsibilities, and quality assurance procedures that underpin the academic standards and continuous improvement of the programme. It reflects the joint governance model agreed by the three partner institutions and aligns with the requirements of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). The quality assurance mechanisms defined in this handbook are furthermore designed to actively support and advance the vision and mission of the Digital4Security project.

The Digital4Security project is a pan-European initiative dedicated to developing innovative, sustainable master's-level education in Cybersecurity Management and Data Sovereignty. It addresses the critical shortage of cybersecurity expertise across European SMEs and other organizations by fostering advanced technical, regulatory, and managerial skills. Bringing together a broad network of academic institutions, industry partners, and research centres, Digital4Security delivers cutting-edge, practice-oriented programmes that blend academic rigour with real-

world insights. Through flexible educational formats, the project supports diverse learners, from recent graduates to experienced professionals, promoting lifelong learning and career advancement. By aligning with the European Cybersecurity Skills Framework and engaging an independent Industry Advisory Board, Digital4Security ensures curricula remain relevant to market needs, while emphasizing leadership, ethical responsibility, and strategic autonomy.

OUR KEY VALUES AND GOALS

1. Cybersecurity Leadership
Foster the advanced knowledge, skills, and competencies needed to lead cybersecurity initiatives, enabling graduates to make well-reasoned decisions, drive proactive risk management, and shape organisational cybersecurity practices effectively.

2. Excellence in Online Education
Deliver a high-quality, fully online learning experience that combines applied project work, stakeholder engagement, and personalised learning pathways, equipping learners to achieve their career goals and apply knowledge in real-world contexts.

3. Lifelong Learning
Support ongoing professional development through flexible, modular study options that enable reskilling, upskilling, and agile adaptation to emerging threats, technologies, and regulatory environments.

4. Industry-Aligned Education
Ensure the curriculum and assessment address current and emerging industry needs, preparing learners for management and leadership roles across enterprises, SMEs, and the public sector.

5. European Sovereignty
Develop expertise in cybersecurity management and data governance that advances the EU's strategic autonomy and safeguards digital infrastructures across critical sectors.

6. Inclusion, Accessibility and Gender Equality
Promote accessibility, gender balance, and inclusion of underrepresented groups by removing participation barriers and fostering a diverse cybersecurity talent pipeline.

7. Responsible Innovation and Ethics in Cybersecurity
Foster ethical reasoning, legal understanding, and social awareness to promote responsible, foresighted leadership and regulatory compliance.

Governance Bodies Relevant to Quality Assurance and Programme Development

The governance of the Joint Master's Programme is coordinated through several joint bodies, operating in accordance with the internal policies of the partner institutions awarding the master's degree, while jointly overseeing strategic, academic, and operational aspects of the programme. The formation and composition of these bodies is regulated in the Cooperation Agreement between the degree-awarding partner institutions.

For purposes of quality assurance, curriculum development, and stakeholder engagement, the following bodies are of central relevance:

Master's Board of Directors

The Master's Board is the highest decision-making body of the Joint Master's Programme. It holds final authority over strategic direction, academic governance, curriculum approval, and decisions following internal review processes. The Board formally adopts or rejects quality-related recommendations, including those submitted by the Quality Service Committee.

Quality Service Committee

The Quality Service Committee is a specialised advisory and analytical body reporting to the Master's Board. It leads quality enhancement processes and monitors the academic standards and curriculum in alignment with the **Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG)**. These ESG standards provide a Europe-wide reference framework for internal and external quality assurance in higher education.
The Committee's core responsibilities include:

- Conducting internal system and policy reviews;
- Implementing quality assurance procedures, including surveys and performance analytics;
- Recommending data-driven improvements to curriculum design, student experience, and teaching quality;
- Hosting the annual **Future of Learning Convention**, a stakeholder-driven forum for quality reflection and programme innovation;
- Compiling the **Annual Programme Review Report**, synthesising key data sources.

Secretariat

Based at the Coordinating Institution, the Secretariat ensures the effective daily administration of the programme and supports quality-related processes. It is also involved in data acquisition and facilitates meetings of the Master's Board and the Quality Service Committee.

Industry Advisory Board (IAB)

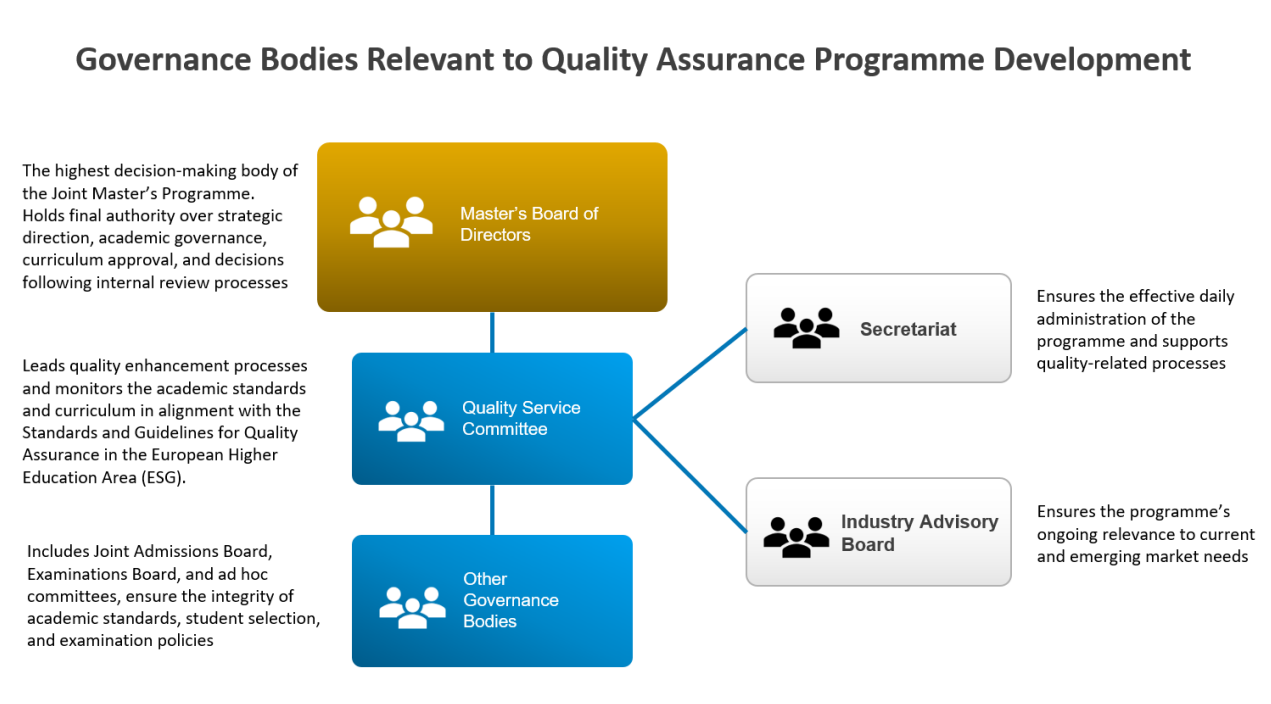
The Industry Advisory Board (IAB) contributes to external quality assurance by helping to ensure the programme's ongoing relevance to current and emerging market needs. The IAB is composed of leading industry experts, particularly from the Digital4Security network. One of its core responsibilities is to conduct independent reviews of the curriculum – at both module and programme level – to assess alignment with industry requirements. In this context, *independent* refers to the fact that IAB reviewers are not involved in the delivery of the modules under review and do not hold formal responsibilities within the Joint Master's Programme. However, they are typically affiliated with the Digital4Security project and may be signatories to its Grant Agreement. Further information on the Industry Advisory Board and its members is provided in the *Industry Advisory Board Manual* (Annex 6).

Other Governance Bodies

Additional governing bodies, such as the **Joint Admissions Board**, **Examinations Board**, and **ad hoc committees**, ensure the integrity of academic standards, student selection, and examination policies. While not directly responsible for quality enhancement strategy, they play important operational roles in maintaining excellence across programme components.

Figure 1 provides an overview of key governing bodies involved in quality assurance within the master's programme.

Figure 1: Central governance bodies concerned with quality assurance and programme development.



Quality Assurance Procedures

The following procedures illustrate how quality assurance is implemented within the Joint Master's Programme. These procedures may be extended or modified over time. The Master's Board holds formal responsibility for approving any changes, while the Quality Service Committee is tasked with reviewing, discussing, and recommending such changes.

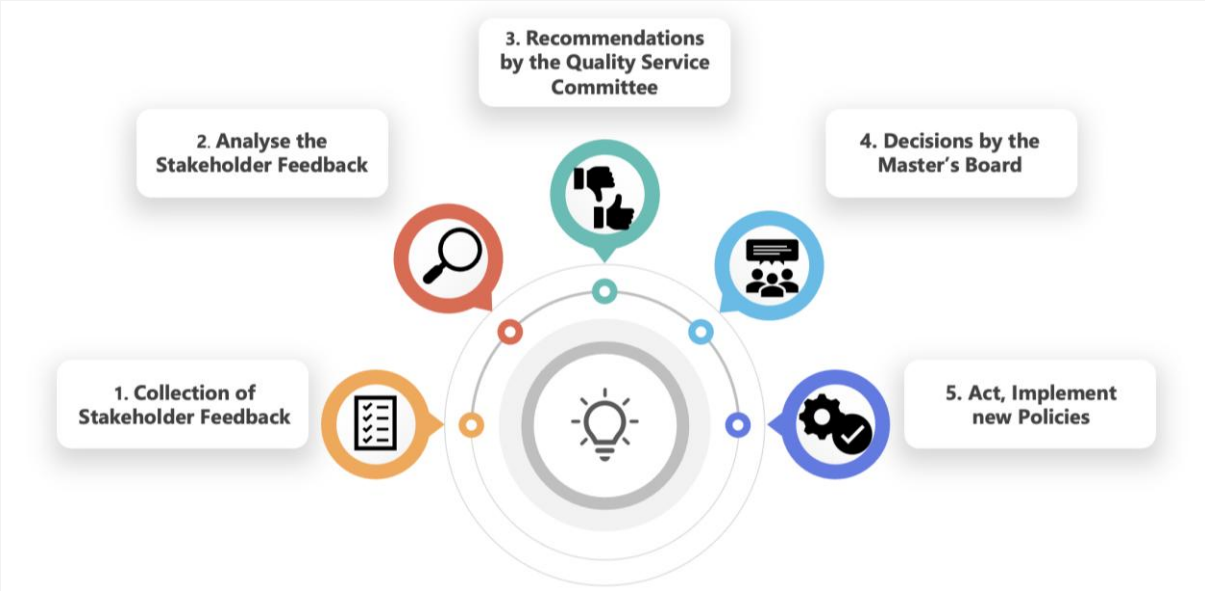
Other governing bodies – including the Joint Admissions Board, the Examinations Board, and the Programme Secretariat – are invited to contribute observations and suggestions. These bodies are also directly involved in the practical implementation of approved procedures.

Moreover, involving students in quality assurance and programme development is essential to the student-centred vision of this Master's programme. Elected student representatives help ensure that diverse learner perspectives are integrated into academic governance and innovation processes. The diverse roles of student representatives are described, and the election process is regulated, in the *Student Handbook* (Annex 8). As an example of such involvement, two student representatives serve as voting members on the Quality Service Committee, as defined in the *Cooperation Agreement* (Annex 1).

In addition, all faculty, staff, students, and industry representatives are encouraged to submit feedback or proposals, as outlined in the procedures below. The Future of Learning Convention serves as a dedicated forum for stakeholder discussion, reflection, and the generation of innovative proposals for programme development.

Figure 2 provides a graphical overview of the annual quality assurance cycle used in this Master's programme.

Figure 2: Overview of the programme's quality assurance loop driven by stakeholder feedback and data analytics.



In this Master's programme, quality assurance is based on the reliable implementation of Quality Assurance Procedures (QAPs), which are outlined below along with their objectives, data collection methods, and enhancement mechanisms. These include:

- **QAP.01 Academic Performance Analysis**
- **QAP.02 Student Survey Feedback**
- **QAP.03 Course Progression Records**
- **QAP.04 Multi-Stakeholder Assessments**
- **QAP.05 Module Guarantor Reviews**
- **QAP.06 I Wish, I Like, and Clarify**
- **QAP.07 Complementary Automated Analysis**
- **QAP.08 Future of Learning Convention**
- **QAP.09 Annual Programme Review Report**

In addition, the programme captures KPI metrics annually in relation to key programme goals.

Academic Performance Analysis

Reference	**QAP.01**
Data Collection	After each new cohort intake cycle, the Secretariat extracts relevant data from the central administration system to determine cohort indicators for students who: • Applied during the previous period; • Were admitted based on their application documents; • Were rejected due to missing eligibility requirements, categorised by reason (e.g. missing Bachelor's degree, insufficient language proficiency); • Enrolled by completing payment; • Registered for the expected number of modules per term, or registered for more or fewer modules.
Data Analysis	Within one month of each new cohort intake cycle, the Secretariat shares the raw data with the Quality Service Committee and the Master's Board. The Quality Service Committee calculates descriptive statistics and identifies timeline trends by comparing data with previous intake cycles, where available. It conducts an in-depth analysis of academic performance indicators, identifies possible causes of deviation from reference values, and prepares a draft **Annual Programme Review Report** with strategic recommendations. This report is submitted to the Master's Board in February each year.
Improvement Mechanism	In March, the Master's Board convenes to discuss the data and recommendations, and to take informed decisions. The final **Annual Programme Review Report** is published within one month of the Master's Board meeting.

Student Survey Feedback

Reference	**QAP.02**
Data Collection	The Secretariat distributes online student questionnaires to collect feedback on each running module. Surveys are typically conducted towards the end of the teaching term, but before the final examination period, unless exceptional circumstances advice otherwise. The module satisfaction survey generally includes feedback on course content and structure, perceived workload relative to ECTS credits, practical applicability, clarity of language and communication, as well as inclusivity and accessibility. Additional areas may be addressed as needed. Students have two weeks to complete the questionnaire. The data collection makes use of the *Programme Survey Scales* (Annex 5).
Data Analysis	The Quality Service Committee ensures that individual lecturers receive anonymised, module-specific aggregated feedback once survey results are compiled. In addition, lecturers are provided with university-wide average scores for key performance dimensions across all modules, allowing for contextual comparison. These benchmarks - such as average student-assigned ratings across modules - support instructors in interpreting participant feedback and understanding how their module outcomes relate to broader programme trends. The Quality Service Committee consolidates this data, such as by calculating average satisfaction scores, and prepares a summary to be included in the draft of the **Annual Programme Review Report**.
Improvement Mechanism	Lecturers use the module-specific feedback to assess whether alternative pedagogical strategies should be considered to enhance course delivery. A multi-iterative analysis and review process, from the Quality Service Committee to the Master's Board, ensures comprehensive data utilisation and continuous improvement. This process follows the same structure as described in QAP.01.

Course Progression Records

Reference	QAP.03
Data Collection	The Secretariat extracts weekly module-level metrics on student and instructor participation. This may be done once per term, ensuring that the data resolution allows for comparisons across weeks. The Quality Service Committee processes this data, capturing both central tendency indicators (e.g. means) and dispersion metrics (e.g. standard deviations). Key indicators include: • Percentage of submitted homework and self-test exercises • Number of forum posts per student • Number of forum posts per lecturer • Average hours spent logged into the module per enrolled participant • Frequency of student interaction with course materials (e.g. downloads, video views) - disaggregated across different media types • Extent of peer interactions (e.g. group work, peer review activities) • Participation in supplementary activities (e.g. polls) • Achievement scores across student submissions
Data Analysis	The Quality Service Committee conducts data analyses and presents results. Descriptive statistics, including visual timeline representations, are produced to identify trends over time and allow comparisons between modules and academic years. Data may be stratified by enrolment variables such as study mode (full-time vs. part-time) and registration type (full Master's programme vs. micro-credential enrolment). In addition to standard statistical techniques (e.g. regression analysis), automated methods are applied using tools such as machine learning, predictive analytics, and data mining to identify key predictors of student engagement, academic success, and module completion. Assessments include a dedicated section analysing cohort-wide outcomes in relation to different study behaviours. This covers, for example, learners who engage consistently across weeks versus those with irregular participation, students who submit assignments close to deadlines versus well in advance, and those who use a variety of

Reference	QAP.03
	learning media (e.g., videos, readings, discussions, hands-on tools) versus those who rely primarily on a single medium. The analysis also examines the extent to which demographic factors and enrolment pathways (e.g., full Master's students versus micro-credential learners) are associated with comparable outcomes, or whether certain groups may benefit from additional support. The findings and resulting recommendations are included by the Quality Service Committee in the draft of the **Annual Programme Review Report**.
Improvement Mechanism	The **Annual Programme Review Report Draft** serves as the basis for discussion and strategic decision-making by the Master's Board, in alignment with the process outlined in QAP.01.

Multi-Stakeholder Assessments

Reference	QAP.04
Data Collection	**Student Feedback:** The Secretariat distributes online questionnaires to students. In accompaniment of Module Satisfaction Surveys (QAP.02), learners are invited once annually to provide feedback on their experiences with the online learning format. For instance, this may be done in the Winter Term. Feedback sections cover the overall online study platform, navigation and usability, as well as the online learning experience. Survey recipients have two weeks to complete the questionnaire. In another term, alongside the Module Satisfaction Surveys, the Secretariat circulates a survey on learners' satisfaction with student services. For instance, this may be done in the Spring Term. Students have two weeks to complete the questionnaire. The teaching terms during which the online learning and student service scales shall be distributed are determined by the Quality Service Committee. **Lecturer Feedback:** Upon request by the Quality Service Committee, the Secretariat distributes online questionnaires to lecturers. Within three weeks after each term, lecturers may be invited to provide feedback on general module reflections, the online teaching modality, student involvement and inclusivity, learning materials and tools, the balance of practical versus theoretical content, interaction and support, as well as the assessment process and grading. Feedback may also address the appropriateness of assessment tasks for EQF level 7 (master's), alignment with programme learning outcomes, and the objectivity, reliability, and validity of grading, including completeness of topic coverage by comparing module content with assessment tasks. Survey recipients have three weeks to complete the questionnaire. The Quality Service Committee determines if, how often, and how comprehensively lecturer feedback shall be collected. **Alumni Feedback:** One year and five years post-graduation, the Secretariat contacts alumni to inquire about their experiences and work developments post-graduation. Recipients have three weeks to complete the questionnaire. **Supervisor / Mentor / Employer Assessments:** For students and graduates who work on practical projects, in internships, or in employment post-graduation, voluntary feedback scales are distributed by the Secretariat to trace the display of abilities targeted by the study programme. Recipients have three weeks to send their feedback.

Reference	QAP.04
	Thesis Review: Supervisors / assessors of a thesis are requested to report on the student's display of relevant abilities in the thesis. Respective scales are distributed by the Secretariat and need to be filled alongside the grade issuance by the committee. The scales must be completed and returned to the Secretariat no later than two weeks after the oral exam and grade issuance. **Industry Expert Feedback:** The Quality Service Committee sends module review invitations annually to the Industry Advisory Board (IAB). The Board's Executive Director and Steering Committee coordinate reviewer assignments, ensuring a good match between module content and industry expertise, with two reviewers assigned per module. Reviewers receive access to module teaching materials including assessments, and the online questionnaire. Feedback focuses on module relevance to industry needs, content quality, inclusion of up-to-date issues and technologies, practical applications, and an overall module assessment. Given the time-intensive nature of reviewing comprehensive teaching materials, industry experts have three months to complete the questionnaire after gaining access. The process of identifying suitable reviewers and gathering their feedback shall be completed within six months after the initial feedback invitation by the Quality Service Committee. In all cases, the data collection makes use of the *Programme Survey Scales* (Annex 5).
Data Analysis	The Quality Service Committee processes the survey responses and shares results in aggregated form. This process utilizes the **Annual Programme Review Report Draft** as previously described to consolidate all feedback, identify patterns, and highlight areas requiring attention.
Improvement Mechanism	The procedure is the same as in QAP.01.

Module Guarantor Reviews

Reference	QAP.05
Data Collection	*Module Guarantor Evaluation Part I:* Modules delivered by partner institutions undergo review by one of the three degree-awarding universities – UDS, MTU, or UNIR – which serve as Module Guarantor Institutions. Among other tasks, the guarantor is responsible for: • Ensuring alignment with programme-level learning outcomes • Verifying that the module content supports the achievement of module-level learning outcomes • Reviewing and approving teaching materials and assessment strategies. The data subject to review includes the complete set of teaching materials, the assessment strategy, and the proposed proctoring approach. Two months before each module begins, the Secretariat reaches out to Delivering Partners, reminding them to send access to the required materials no later than one month before the module is taught. --- *Module Guarantor Evaluation Part II:* In addition, Module Guarantor Institutions undertake reciprocal reviews of each other's modules, to ensure that the modules of degree-awarding institutions are subject to quality assurance procedures no less rigorous than those applied to external Delivering Partners. This operates on an annual cycle. With three awarding institutions A, B, and C, the review alternates so that, for example, in one year institution B reviews a module delivered by institution A, and in the following year institution C reviews that module. Each January, the Secretariat reminds the Module Guarantors to provide access to their own teaching materials, assessment strategies, and proctoring methods. Access must be granted no later than the Spring term.
Data Analysis	The Module Guarantor Institution reviews the materials and arranges with the Delivering Partner any necessary refinement to ensure the programme's academic and pedagogical standards are met. In any correspondence between Module Guarantors and Delivering Partners, the Quality Service Committee shall be copied. The data analysis makes use of the *Programme Survey Scales* (Annex 5).

Reference	QAP.05
	Where the Delivering Partner confirmed that no changes have been made to the module since its last delivery, including assessment and proctoring arrangements, the Guarantor Institution may opt to confirm the outcome of their previous review. --- In addition, Module Guarantor Institutions review each other's modules using the same scales as above. Reviews must be completed no later than the Autumn term, with the results communicated to both the degree-awarding institution responsible for delivering the module and the Quality Service Committee.
Improvement Mechanism	If refinements are necessary, the Guarantor Institution enters into dialogue with the Delivering Partner to support improvement. Where appropriate, the Guarantor Institution may implement examination and grading, or delegate implementation to the Delivering Partner while reserving the right to confirm final grades after review. The final evaluation, including the approved procedures, shall be submitted by the Module Guarantor Institution to the Quality Service Committee no later than two weeks after the start of the teaching term. The Committee reviews all submissions to ensure consistency across partner institutions and alignment with programme-wide standards. Should it identify significant divergence in how awarding institutions approve assessments or grading practices, it shall refer the matter to the Examinations Board for further action. --- The same assessment of alignment shall be conducted by the Quality Service Committee on behalf of the peer reviews undertaken by Module Guarantor Institutions. Where inconsistencies are identified, the awarding universities and the Examinations Board shall be notified, in order to initiate actions to ensure alignment and compliance.

I Wish, I like, and Clarify

Reference	QAP.06
Data Collection	Students ready to share feedback on programme policies, academic or non-academic services, or their general experience may do so informally through various channels: • Raising matters directly with tutors or lecturers • Providing feedback via the digital learning platform • Speaking with one or more student representatives • Contacting one or more of the programme coordinators • Contacting the ombudsperson when facing conflicts and needing guidance around complaints or appeals. If informal channels do not suffice or the issue requires formal attention, students may submit suggestions or complaints by contacting the ombudsperson, student representatives, the study-affairs team, the Quality Service Committee or the Examinations Board, depending on the nature of the issue. The procedure for Formal Complaints is detailed in the *Student Handbook* (Annex 8). In addition to addressing concerns, the Quality Service Committee actively encourages regular feedback and the submission of constructive proposals: not only complaints, but also suggestions for innovation and improvement.
Data Analysis	The Quality Service Committee reviews content submitted under the categories "I Wish," "I Like," and "Clarify" to identify relevant themes and patterns. Feedback is categorised, anonymised, and abstracted to support an actionable overview. Key insights are summarised and included in a dedicated section of the **Annual Programme Review Report Draft** and may also be discussed at the annual **Future of Learning Convention**. In cases of complaints, the recipient ensures confidentiality unless the student explicitly consents to being identified. The Committee works to facilitate timely and appropriate resolutions. Where escalation is necessary, the following chain of responsibility applies: • From instructors or Delivering Partner Institutions to Module Guarantor Institutions, as defined in the *Module Handbook* (Annex 7)

Reference	QAP.06
	• From teaching support staff (e.g., tutors) to the main module lecturer (typically a professor) to the Quality Service Committee or Examinations Board, depending on the nature of the issue • From student representatives to the Quality Service Committee • From programme coordinators to the programme directors In all cases, the final authority for resolution lies with the Master's Board, which may also appoint ad hoc committees to support dispute resolution.
Improvement Mechanism	To contest a grade, students may request an informal assessment review with the examiner within one week of the grade being issued; the review should occur within one week of the request. If no resolution is reached, a formal complaint may be filed within three weeks of the original grade. Formal grade appeals allow four weeks for resolution at the institutional level (two weeks at the Delivering Institution and two weeks at the Module Guarantor Institution). If unresolved, the appeal may be escalated to the Examinations Board, which will respond within four weeks. The Master's Board of Directors serves as the final authority and shall issue a decision within four weeks. In peer-review appeals, a student has one week to contest the peer feedback. The instructor reviews the case within one week. If the student still disagrees after the instructor's decision, they have one further week from the confirmed grade date to request an informal review, after which the formal grade appeals procedure applies. For all other cases, a response will be issued within four weeks. Holiday periods defined in the Joint Programme Calendar do not count towards the response periods. Once a decision is made, corrective or improvement measures are implemented without undue delay, ensuring a responsive and effective quality enhancement process.

Complementary Automated Analyses

Reference	QAP.07
Data Collection	The data collection procedure includes all sources available, such as: • Enrolment and progression statistics as provided by the Secretariat • All module teaching materials (e.g., slides, assignments, quizzes) • The module handbook and instructor CVs • Data extracted from the learning platform (e.g., frequency of interaction, forum and media usage) • Project submissions and theses • Grading and assessment data • Survey feedback (cf. *Programme Survey Scales*, Annex 5) • Alumni and employer statistics published via social media or other sources Measures are implemented to ensure that data is processed in an anonymised manner, prioritising aggregate-level analysis wherever feasible.
Data Analysis	Automated analyses focus on assessments such as the following: • Module content alignment with programme and module-level learning outcomes • Workload estimates and assessments across weeks; module-specific and programme-wide • Analytics to assess media balance (e.g., text vs. imagery in slides) • Availability of visual and auditory content access, ensuring options for students with visual or auditory impairments • Language understandability; evaluation of technical language complexity • Detection of representation gaps in the teaching materials (e.g., unbalanced gender representation or gaps in cultural inclusivity) • Involvement of industry experts and experts of European regulation in the teaching delivery

Reference	**QAP.07**
	• Programme KPI attainment, including employment statistics among alumni
Improvement Mechanism	Findings are synthesised by the Quality Service Committee. Where appropriate, feedback is provided to instructors as a basis for teaching material improvements. Aggregate data, insights and recommendations are included in the **Annual Programme Review Report.** Subsequently, this content is presented and discussed at the **Future of Learning Convention**, where participants critically reflect on the subject and develop innovative proposals for programme enhancement.

Future of Learning Convention

Reference	**QAP.08**
Data Collection	The **Annual Programme Review Report** is distributed by the beginning of the Spring Term to instructors, administrative staff, students, and members of the Industry Advisory Board.
Data Analysis	All recipients are invited to review the report, with particular attention to insights related to the seven programme goals, especially student satisfaction, learning progress, and employability. Participants may identify new avenues of analysis or propose alternative interpretations, contributing fresh insights and pioneering suggestions. Students are encouraged to compare the report findings with their personal experiences and learning journey.
Improvement Mechanism	Towards the end of the Spring Term, the Quality Service Committee hosts the **Future of Learning Convention**, typically structured as follows: • Presentation of the Annual Programme Review Report by the Quality Service Committee and/or representatives of the Master's Board • Thematic discussion sessions with instructors and members of the Industry Advisory Board, offering observations and suggestions • Student and alumni contributions highlighting personal experiences and recommendations • A reflection and ideation panel with the Master's Board, the Quality Service Committee, invited panelists and audience contributions to discuss next steps for curriculum development, the university-as-a-service model, and the learning experience overall. After the event, the Quality Service Committee compiles a summary that is distributed to all participants, which will also be included in the next **Annual Programme Review Report Draft.**

Annual Programme Review Report

Reference	**QAP.09**
Data Collection	Beyond various approaches to data collection and analysis (including QAP.01, QAP.03, QAP.05 and QAP.07), there are four main pathways for actively submitting suggestions on behalf of programme improvement: • Survey feedback from students and other stakeholders (OAP.02 and QAP.04) • Feedback collected through the "I Wish, I Like, and Clarify" procedure (QAP.06) • Contributions made during the Future of Learning Convention (QAP.08) • Discussions in the Quality Service Committee, including group-specific input, for instance by the student representatives or members of the Industry Advisory Board
Data Analysis	The Quality Service Committee discusses all collected inputs and integrates them into the next Annual Programme Review Report Draft. Following the procedure outlined in QAP.01, the draft is submitted to the Master's Board for further evaluation and decision-making.
Improvement Mechanism	The final Annual Programme Review Report defines binding actions, identifies the responsible parties for implementation, and documents the basis for strategic decisions. It typically includes: • Retention, progression, and completion statistics (annual and historical, where available) • Learner intake review • Module-level learner data and interpretations • Summaries of stakeholder feedback (e.g., students, lecturers, industry experts) and recommendations • Summaries of automated analyses and recommendations • Study habit assessments with associated learning outcomes, and data-driven learning strategy recommendations • A summary of insights and proposals from the Future of Learning Convention • KPI statistics related to the programme goals • Reflections on programme performance and improvements

Reference	QAP.09
	• Approved curriculum changes or policies

Importance of Stakeholder Feedback

Personal feedback is a cornerstone of our ongoing commitment to excellence. Continuous input from students, alumni, lecturers, supervisors, mentors, employers, and the Industry Advisory Board enables us to enhance teaching methods, ensure cutting-edge content, and optimize the use of e-learning technologies.

Supporting this Internal Quality Handbook, the **Programme Survey Scales** (Annex 5), provide a comprehensive and modular toolkit for capturing stakeholder feedback. This approach emphasizes the importance of regular, systematic input for monitoring and improvement across all dimensions of the study programme. It includes adaptable instruments for different audiences and moments in the programme cycle.

For students, survey instruments include scales on:

- The **Pre-Training Situation** upon Enrolment:
  - **Demographic Information:** Collects key personal and background data on a voluntary basis, such as age, gender, and caregiving responsibilities, to monitor diversity and ensure the availability of sufficient student support.
  - **Project Preferences:** Assesses cognitive factors that can influence satisfaction and success in online learning environments.
  - **Community and Exchange:** Captures preferences for interaction intensity with instructors and peers, serving as a predictor of satisfaction and success, and informing responsive support strategies.
  - **Cybersecurity Background:** Records learners' prior experience, education, certifications, and leadership confidence at programme start to establish a baseline for tracking growth.
- **Module Reviews:**
  - **Content and Delivery**: Evaluating the perceived clarity, structure, and relevance of course materials, and interactivity.
  - **Workload**: Assessment of the actual workload compared to what is expected in terms of ECTS.

    - **Practical Project**: Where applicable, the scale assesses satisfaction with a practical project, collaboration around the project, and feedback culture.
    - **Language and Communication**: Measures the ease of using English as the language of instruction and collaboration.
    - **Inclusivity and Accessibility**: Traces how well a module has supported a diverse student body with varying needs.
- **Online Learning Experience**: Evaluating the functionality and usability of the platform, navigation, online communication and collaboration.
- **Student Service Satisfaction**: Assessing the usage of varying student support services, service satisfaction, and ideas for improvement.

For **lecturers**, structured feedback tools support reflection on their teaching practices and experiences within the joint online programme. The **lecturer survey** is designed to support both individual reflection and programme-level quality enhancement. It includes the following thematic scales:

- **General Module Reflection:** Facilitates overall reflection on the module's delivery, goals, and outcomes.
- **Online Teaching Modality:** Assesses the effectiveness and suitability of the online format, including tools and pedagogical approaches.
- **Student Involvement and Inclusivity:** Evaluates student participation, engagement, and the inclusivity of teaching practices.
- **Learning Materials and Tools:** Reviews the appropriateness, clarity, and usability of the materials and platforms used.
- **Practical vs. Theoretical Balance:** Reflects on the integration of applied content and theoretical foundations.
- **Interaction and Support:** Addresses the level of academic support provided.
- **Assessment and Grading:** Assesses the workability of the grading approach, along with quality evaluations such as objectivity, reliability, validity, content coverage, and alignment with EQF level 7.

For **Module Guarantor Institutions**, a structured review tool is provided to assess the academic integrity and assessment quality of modules delivered by Partner Institutions. Reviews include the following components:

- **Appropriateness of Assessment Tasks for Master's Level:** Evaluates whether assessment tasks are suitably challenging and aligned with EQF Level 7 expectations.
- **Grading Objectivity:** Assesses the clarity of grading rules to ensure outcomes are independent of individual assessors.
- **Grading Reliability:** Inquires if grading outcomes are consistent if students with the same ability level are tested.
- **Grading Validity:** Represents the alignment between assessment tasks and the module's intended learning outcomes.
- **Proctoring:** Confirms if a sufficient proportion of the final grade is based on proctored assessments, and that proctoring procedures follow programme regulations.
- **Relation of Teaching Content to Assessments:** Examines whether assessments proportionately reflect the content covered in lectures, readings, and other instructional materials.
- **Relation to Programme-Level Learning Outcomes:** Evaluates how well the module content and assessments address the programme's overarching learning outcomes (PLOs), particularly those assigned to that module.
- **Relation to Module-Level Learning Outcomes:** Inquires how well the teaching materials and assessment tasks address the module-level learning outcomes (MLOs).
- **Learning Material Review:** Examines the accuracy, inclusivity, accessibility, balance between applied works vs. theory, alignment with delivery best practices, and more in the module's teaching materials.
- **Workload:** Reviews overall student workload expectations, weekly distribution of effort, timing of assessments, and alignment with ECTS guidelines (25 hours per credit).

To ensure the continuous improvement and long-term relevance of the joint programme, **Alumni** survey instruments are designed to gather medium- and long-

term experiences of programme participants. Surveys are distributed one year and five years after graduation and focus on the following key areas:

- **Post-Graduation Employment**: Captures insights into graduates' career trajectories, including job placement, promotions, areas of responsibility (e.g., compliance, innovation), involvement in cybersecurity sectors, geographic employment location (such as EU or non-EU), and confidence in leadership proficiency.
- **Industry Certifications**: Tracks the acquisition of additional professional qualifications, illustrating how alumni continue to build on the programme's foundation to meet evolving industry standards and expectations.
- **Employer Assessment**: An optional scale that alumni may forward to their employers to assess their workplace contributions, including performance across dimensions such as leadership, technical cybersecurity proficiency, communication and collaboration, ethical sensitivity, and innovation.

To gain insight into students' real-world performance, **Supervisor/Mentor Assessments** are completed by workplace supervisors or mentors from the Digital4Security (D4S) network who oversee internships or work-based learning projects during the programme.

- **Student Preparedness Evaluation**: Captures professional impressions of the student's applied knowledge, skills, and behaviours across managerial, technical, communicative, ethical, and collaborative dimensions.

To evaluate how well students demonstrate the Programme's intended learning outcomes and reflect core values of the Master's programme, **Thesis Reviews** are completed by thesis supervisors / examination committees, in addition to the formal thesis grading process.

- **Programme Learning Outcomes (PLOs) and Core Values**: Assesses the extent to which students demonstrate the competencies outlined in the PLOs

and embody the guiding values of the Master's programme through their thesis work.

To ensure that teaching content remains aligned with evolving professional standards, **Industry Reviews** are conducted by external experts who evaluate full module documentation without having attended the class. These reviews focus on the following areas:

- **Evaluator Information:** Captures the professional background and industry experiences of the reviewer.
- **Module Relevance to Industry Needs**: Assesses how well the module addresses current and emerging challenges in the reviewer's sector and in industry more broadly.
- **Content Quality**: Evaluates the accuracy, clarity, and comprehensiveness of the teaching materials, identifying any outdated or missing topics.
- **Inclusion of Up-to-Date Issues and Technologies**: Reviews the integration of current trends, technologies, and regulatory developments relevant across industries.
- **Practical Applications**: Measures the extent and usefulness of hands-on components such as case studies, simulations, and exercises in preparing learners for real-world tasks.
- **Overall Assessment**: Captures the expert's final judgment on the module's effectiveness and relevance, including an overall rating and improvement suggestions.

By systematically collecting and analysing this multi-stakeholder feedback, we remain committed to fostering an environment of continuous improvement, enhancing the educational experience and ensuring the programme's long-term relevance for all parties involved.

Traditional and Automated Data Analysis

Data analytics serve as a vital tool for continuous improvement. By systematically gathering and analysing **data from students**, the university can gain insights into engagement levels, learning outcomes, and progression patterns. This information enables the identification of trends and potential areas for intervention, ensuring that academic support is tailored to individual learning needs. For instance, analysing student performance data can help educators pinpoint where students are struggling, allowing for timely adjustments to teaching strategies or the implementation of targeted support programs.

Furthermore, the analysis of **data from lecturers** provides valuable insights into their teaching practices, time management, and administrative workflows. For example, when significant time is allocated to particular administrative tasks at the expense of academic student support, these "pain points" can be identified, enabling the Master's Board to streamline operations through managerial and task-flow adjustments.

Another line of investigation involves the use of **automated technologies** to generate additional insights for quality assurance. This approach enables comprehensive reviews of teaching materials used in class (such as lecture slides, quizzes, and other instructional content) across a variety of dimensions. Analyses may include alignment of teaching content with **programme-level and module-level learning outcomes**, as well as consistency with the standards of **EQF Level 7** (Master's level), and the national equivalents in the awarding partner countries. Furthermore, automated tools can support **pedagogical reviews** by analysing the balance of text versus imagery, the degree of technicality in language, and **inclusivity metrics**, such as gender representation in role attributions or indicators of cultural inclusion in the teaching materials.

Analyses can furthermore evaluate the suitability of learning materials and assessments for a diverse student body, whose prior knowledge may stem from managerial, technical, compliance-related, or other professional domains, though

no specific knowledge area can be assumed. In addition, many learners may balance substantial work or caregiving responsibilities alongside their studies. The programme's target audience are participants with prior professional experience rather than recent graduates. Against this background, the *Practical Guide for Lecturers* (Annex 10) recommends that lecturers respect the students' professional expertise by avoiding beginner-level framing, that they provide nuggeted learning materials that support flexible study schedules, and design assessments that promote real-world application through student-selected, workplace-relevant cases. Assessments should also accommodate both technical and non-technical learners through varied and adaptive task options. The extent to which these recommendations are implemented can be further monitored through automated analyses of study materials and assessment designs.

Media diversity can also be assessed, identifying the availability of video, audio, and text-based resources. This not only supports different learning preferences, but should also help to ensure that all content is accessible to students with visual or auditory impairments.

Furthermore, **workload analytics** can be conducted both within and across modules, evaluating the weekly distribution of learning content, the number of assessments or exercises, and the cumulative workload students face in parallel over the course of a term.

While these automated assessments do not replace human judgement, they can give rise to enhanced feedback services for instructors, highlighting potential avenues for improvement in the course materials and overall module design. Automated approaches can also support the Quality Service Committee in identifying workload peaks or accessibility gaps that may require further attention to maintain a high-quality and inclusive learning experience.

Overall, we are dedicated to effective and comprehensive strategies for data acquisition and analysis**, integrating research and education** to enhance educational services, experiences, and learning outcomes continuously. The programme's fully

digital operations provide a solid foundation for extensive data availability, enabling the development of tailored support systems that significantly surpass the capabilities of traditional analogue education.

KPI Analytics on the Programme's Key Values and Goals

As part of the **Annual Programme Review Report**, the Quality Service Committee reports data related to each of the seven overarching programme aims. The following Key Performance Indicators (KPIs) may serve as a standard framework, but may also be updated based on the Committee's recommendations and decisions by the Master's Board.

Overall, the KPI tracking procedures within this 60 ECTS Online Master's Programme are designed to extend the performance metrics originally developed under the Digital4Security Grant Agreement, continuing them beyond the period of EU co-funding. In addition, they leverage newly available data sources, such as student and other stakeholder feedback, the analysis of teaching materials, and alumni outcomes, to implement a systematic quality assurance framework that is responsive to empirical findings.

1. Cybersecurity Leadership

- **KPI 1.1**: Percentage of graduates employed in cybersecurity leadership or strategic roles within 1 year and 5 years after graduation.
  Operationalisation: Alumni follow-up surveys.
- **KPI 1.2**: Expert-based assessment of the students' ability to lead complex cybersecurity projects.
  Operationalisation: Supervisor/mentor/employer feedback; assessment rubrics applied to the master's thesis, with scoring components such as leadership, strategic planning, technical proficiency, and stakeholder coordination.
- **KPI 1.3**: Student self-evaluation of leadership confidence and decision-making capacity.
  Operationalisation: Programme-entry and completion surveys.

2. Excellence in Online Education

- **KPI 2.1**: Number of students who apply to the master's programme; number of admitted students; completion rates and average time-to-degree.
  Operationalisation: Internal tracking data, disaggregated by full-/part-time status, region, and learner profile.
- **KPI 2.2**: Student satisfaction with platform usability, instructional design, and academic support.
  Operationalisation: Module, platform and service evaluations by students and, where applicable, by module guarantor institutions and course instructors; platform engagement analytics (e.g. completion rates, drop-offs, time-on-task).
- **KPI 2.3**: AI-supported evaluation of instructional quality.
  Operationalisation: Automated analysis of course materials (e.g. alignment with learning outcomes, clarity, multi-media balance).

3. Lifelong Learning

- **KPI 3.1**: Age distribution of enrolled students.
  Operationalisation: Admission statistics.
- **KPI 3.2**: Share of learners enrolled in part-time tracks, micro-credentials, or retraining for a career shift.
  Operationalisation: Onboarding data and learner trajectory classification; career surveys.
- **KPI 3.3**: Age- and group-dependent satisfaction and performance rates.
  Operationalisation: Disaggregated data on survey results and academic achievement, with attention to inclusion and equal benefits across age groups and different enrolment groups (e.g., master's students and micro-credential participants).

4. Industry-Aligned Education

- **KPI 4.1**: Industry Advisory Board (IAB) satisfaction with curriculum relevance and graduate preparedness.
  Operationalisation: Annual module reviews by IAB members.
- **KPI 4.2**: Number of industry certifications in the cybersecurity field achieved by students during their study, and within 12 months post graduation.
  Operationalisation: Certification logs; alumni follow-up survey.
- **KPI 4.3**: Number of weekend workshops, networking events, guest lectures, cybersecurity challenges / cyber ranges, hackathons, bootcamps, practical problem-solving projects, internships, webinars, or job-placements implemented with industry partners.
- **Operationalisation**: Tracking through event calendar logs, attendance records, internship agreements, partnership reports, and documentation of co-organised activities. Events are categorised by type and mapped to contributing industry partners.

5. European Sovereignty

- **KPI 5.1**: Share of alumni employed in European organisations post-graduation.
  Operationalisation: Alumni follow-up survey 1 year and 5 years post graduation.
- **KPI 5.2**: Proportion of teaching materials per module explicitly addressing EU governance, legal, or policy frameworks.
  Operationalisation: AI-based syllabus audit and content tagging in the teaching materials.
- **KPI 5.3**: Representation of EU policy or regulatory experts in teaching and advisory roles.
  Operationalisation: Instructor and reviewer records.

6. Inclusion, Accessibility, and Gender Equality

- **KPI 6.1**: Diversity indicators in student admissions (e.g. gender, country of origin, caregiving responsibilities); number of students from diversity groups (with and without scholarship).
  Operationalisation: Voluntary demographic surveys at admission; anonymised reporting; scholarship application data.
- **KPI 6.2**: Satisfaction with accessibility and support structures.
  Operationalisation: Student, instructor and module guarantor reviews; AI-based review of language inclusivity and media accessibility.
- **KPI 6.3**: Completion and performance rates by demographic category.
  Operationalisation: Internal statistics disaggregated by gender and other key diversity indicators.

7. Responsible Innovation and Ethics in Cybersecurity

- **KPI 7.1**: Student ability to engage with ethical, legal, and governance issues.
  Operationalisation: Thesis reviewer assessments; automated evaluation of coursework/theses/forum contributions with scoring of ethical or legal reasoning and foresight.
- **KPI 7.2**: Proportion of teaching materials across modules concerned with ethics, law, and innovation governance
  Operationalisation: AI-based syllabus audit and content tagging in the teaching materials.
- **KPI 7.3**: External perception of graduates' ethical awareness and responsibility.
  Operationalisation: Supervisor/mentor/employer assessment.

Document Governance

Any changes to this Internal Quality Handbook may be recommended by the Quality Service Committee in the ordinary course of business, or by other qualified programme bodies and authorities where relevant, and must be approved by a two-thirds majority vote of the Master's Board.

All proposed changes shall be collected and compiled by the Secretariat and prepared for inclusion in the official meeting invitations of the Master's Board, which are circulated at least two weeks prior to the meeting. Proposed amendments shall be indicated using track changes within the document. Information on the proposer and the rationale for the change may be included via the comment function.

Correspondence regarding proposed changes shall be addressed to **secretariat@digital4security.eu**, with **masters.board@digital4security.eu** copied (Cc). The Secretariat also supports the Master's Board in monitoring the full set of programme documents to ensure that any substantive changes – i.e. those beyond an editorial nature – are duly reflected across all affected documents.

Proposals for change shall be submitted to the Master's Board with due consideration, and only where there are well-founded reasons, as the official programme documents are intended to serve as stable and reliable sources of reference. At the same time, the programme is committed to excellence and continuous improvement, and valuable proposals should not be disregarded. Where appropriate, the Board may collect and consolidate such proposals, so that fewer revisions of the Handbook are issued, with each update encompassing a broader set of refinements.

Individuals, including students and staff, who have ideas for enhancement are warmly encouraged to share their observations and proposals with **quality.committee@digital4security.eu**. The Board will give each submission careful consideration and, where appropriate, refer the proposal to the Secretariat for decision by the Master's Board.

The Secretariat shall inform all programme participants and affiliates whenever a new version of this Handbook enters into effect. This notification shall be issued no later than two weeks after the decision by the Master's Board. The Secretariat shall ensure that up-to-date information is available through the programme's designated publication channels.

The current document is designated as *Internal Quality Handbook, Version 1* (V1). Editorial changes, such as spelling corrections, do not affect the version number. Version numbering remains unchanged until student agreements have been signed. Upon official publication, each version shall be dated; the version history shall be accessible to students, staff, and other relevant programme stakeholders from the initiation of version numbering, typically through a version history table.

Document Context and Publication

This **Internal Quality Handbook** forms part of a comprehensive set of materials that introduce, govern, and support the **60 ECTS Online Master's in Cybersecurity Management and Data Sovereignty**, a fully online joint programme coordinated and delivered by the following three higher education institutions:

- German University of Digital Science (UDS) – Coordinator
  Marlene-Dietrich-Allee 14, 14482 Potsdam, Germany
- Munster Technological University (MTU)
  Rossa Avenue, Bishopstown, Cork T12 P928, Ireland
- Universidad Internacional de La Rioja (UNIR)
  Avenida de la Paz 137, 26006 Logroño, Spain

The programme's structure, academic standards, quality assurance mechanisms, and operational procedures are described across the following documentation package:

Self-Assessment Report - a reference document for external evaluation and accreditation under the European Approach for Quality Assurance of Joint Programmes

I. Governance and Quality Assurance

- Annex 1. Cooperation Agreement
- Annex 2. Study and Examination Regulations
- Annex 3. Rules of Procedure for the Master's Board
- **Annex 4. Internal Quality Handbook**
- Annex 5. Programme Survey Scales
- Annex 6. Industry Advisory Board Manual

II. Curriculum, Learning and Teaching Staff

- Annex 7. Module Handbook
- Annex 8. Student Handbook
- Annex 9. Teaching Staff CVs

- Annex 10. Practical Guide for Lecturers

III. Certification and Recognition

- Annex 11. Sample Degree Certificate
- Annex 12. Sample Diploma Supplement

IV. Administrative and Operational Documents

- Annex 13. Sample Student Agreement
- Annex 14. Sample Supporting Partner Contract
- Annex 15. Sample Remuneration Manual

The programme documentation is maintained as follows:

- **SharePoint** serves as the repository for all programme documents.
- The **Welcome Module** publishes most programme documents (except those requiring protection against forgery or containing confidential information), ensuring transparency for enrolled students and staff.
- The **Digital4Security website** provides open access to selected information for prospective students and other interested parties, including admission requirements and procedures, the course catalogue, examination and assessment regulations, and other key programme details.

No.	Document	SharePoint	Welcome Module	Website
0	Self-Assessment Report	✓	✓	
1	Cooperation Agreement	✓	✓	
2	Study and Examination Regulations	✓	✓	✓
3	Rules of Procedure for the Master's Board	✓	✓	
4	Internal Quality Handbook	✓	✓	✓
5	Programme Survey Scales	✓	✓	
6	Industry Advisory Board Manual	✓	✓	(✓)
7	Module Handbook	✓	✓	(✓)

8	Student Handbook	✓	✓	✓
9	Teaching Staff CVs	✓	✓	
10	Practical Guide for Lecturers	✓	✓	
11	Sample Degree Certificate	✓		
12	Sample Diploma Supplement	✓		
13	Sample Student Agreement	✓	✓	
14	Sample Supporting Partner Contract	✓		
15	Sample Remuneration Manual	✓		

In the event of inconsistencies or conflicting interpretations among these documents, the following **order of precedence** applies:

1. Cooperation Agreement
2. Study and Examination Regulations
3. Rules of Procedure for the Master's Board
4. Internal Quality Handbook
5. Module Handbook
6. Student Handbook
7. Student Agreement
7. Programme Survey Scales
8. Supporting Partner Contracts
9. Other supporting documents

This hierarchy, as officially defined in the *Cooperation Agreement*, serves to ensure that foundational arrangements and formally adopted regulations take precedence over illustrative or operational materials.

Should the reader become aware of, or suspect, any inconsistency or misalignment between the documents, please contact **Secretariat@digital4security.eu**.

Together, these materials form the backbone of a transformative joint programme that seeks to integrate academic excellence, industry relevance, and social responsibility. It reflects the shared commitment of academic leaders, instructors, students, industry experts, and partner institutions, to shaping a student-centred, accessible, and future-oriented study environment.

This collective effort supports:

- **Empowering cybersecurity leaders** with the capacity to anticipate and manage risks, while collaborating effectively across stakeholders;
- **Delivering high-quality, flexible online learning** grounded in real-world application;
- **Supporting lifelong learning and workforce adaptability** in a rapidly evolving digital landscape;
- **Aligning education with industry and market needs** to ensure professional relevance;
- **Facilitating European strategic autonomy** through digital sovereignty and resilient infrastructure;
- **Advancing inclusion, accessibility, and gender equality** in the cybersecurity field; and
- **Promoting responsible innovation, ethics, and regulatory compliance** in all aspects of digital security.

We thank all contributors for their continued collaboration in advancing the **Digital4Security** vision: to empower learners, institutions, and societies in shaping a more secure, inclusive, and sovereign digital future.

Legal Disclaimer

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Digital4Security

Shaping Europe's cyber future

ADVANCED DIGITAL SKILLS

DIGITAL EUROPE PROGRAMME

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