

Doctoral School on Materials Science and Technology



Strategy (2025–2030)

Prepared by:

Prof. Dr. Mihály Réger
Head of the Doctoral School

October 2025, revised Febr 2026

Contents

1	Introduction and Overview of the Institutional Environment.....	4
2	Situation Analysis (SWOT).....	5
2.1	Strengths:	5
2.2	Weaknesses:	6
2.3	Opportunities:.....	7
2.4	Threats (Challenges):.....	8
3	Research and Training Priorities (2025–2030)	9
3.1	Strengthening research focus and scientific performance	9
3.2	Modernizing the doctoral program and developing student competencies.....	9
3.3	Recruiting new faculty and supervisors, and developing their competencies	10
3.4	The role of external partners in the operation of the DI.....	10
3.5	Monitoring and feedback on the training program	11
4	Development of a quality assurance system (ESG and MAB requirements).....	11
4.1	Quality policy and strategic planning	12
4.2	Quality assurance structure and responsibilities	12
4.3	Regulation and documentation of processes.....	12
4.4	Data collection and information management (ESG 1.7)	13
4.5	External and internal evaluations, preparation for accreditation (ESG 1.10)	13
5	Student success and career support	14
5.1	Improving graduation rates	14
5.2	Student support system.....	15
5.3	Career and Professional Development Support After Graduation.....	16
6	Research infrastructure and organizational development.....	16
6.1	Development of research infrastructure.....	17
6.2	Digital transformation and administrative support	17
6.3	Organizational structure and governance development	17
6.4	Capacity building and sustainability	17
7	Internationalization and increasing international visibility	18

7.1	Enhancing international student mobility	18
7.2	Integration of international students and faculty, foreign-language instruction ..	18
7.3	Increasing international visibility and marketing	19
8	Risk analysis and management plans	19
8.1	Student recruitment and dropout risks.....	19
8.2	Risks related to faculty and thesis advisor capacity	20
8.3	Financial and resource risks.....	20
8.4	Quality and accreditation risks	21
8.5	External environmental risks	21
9	Implementation schedule	22
10	Monitoring and evaluation system.....	23
10.1	Key indicators and data reporting, annual evaluation cycle:.....	23
10.2	Feedback mechanisms and decision-making.....	23
10.3	Transparency and communication	24
10.4	External evaluation and benchmarking	24
11	Summary.....	24

1 Introduction and overview of the institutional environment

The Doctoral School of Materials Science and Technology (ATDI) at Óbuda University was established in 2012 and has since served as the university's leading doctoral program in the field of materials science. Its mission is to train high-level professionals who possess comprehensive knowledge of materials science, specialize in a specific niche area during their research, and are capable of creative, independent research in the field of materials science and its practical applications. The educational and research profile of the doctoral school is aimed at understanding the relationships between the structure and properties of materials and developing new structural and functional materials. The interdisciplinary nature of the program is its strength, as the faculty and advisors at ATDI are primarily drawn from the university's three faculties (Sándor Rejtő Faculty of Light Industry and Environmental Engineering; Kálmán Kandó Faculty of Electrical Engineering; Donát Bánki Faculty of Mechanical and Safety Engineering), supplemented by invited experts from other Hungarian universities and the research institutes of the HUN REN Research Network. To date, a total of 103 students have been admitted to the doctoral school's program; thirty of them have earned their PhDs, and currently about fifty active students are participating in the program. The doctoral school has 11 core faculty members, which ensures the maintenance of academic standards and meets the minimum requirements set by the MAB.

The Hungarian Higher Education Accreditation Committee (MAB) first approved the ATDI's accreditation in 2012, and the program began in September 2012. The most recent comprehensive MAB evaluation took place in 2023, which accredited the doctoral school until February 23, 2027, while also prescribing a monitoring procedure due to significant areas requiring improvement. The MAB accreditation report noted that the university's new, ESG-based quality assurance system is in the process of being implemented, and that the doctoral school's quality assurance is beginning to take shape within a unified framework; however, it also pointed out that an institutional-level strategy had not previously been sufficiently identifiable within the doctoral school. The MAB monitoring review conducted in February–March 2025 confirmed that the implementation of the required changes is proceeding at a good pace: of the 20 monitoring criteria, 10 have been met, 8 have been partially met, and 2 have not yet been met. The committee recommended maintaining accreditation, while emphasizing that greater attention must be paid in the future to coordinating quality assurance processes between the university and the doctoral school. In light of these experiences, it has become a top priority to develop a comprehensive, long-term strategic plan that defines the doctoral school's development directions and measures for the period 2025–2030.

This document contains the ATDI's strategic plan for 2025–2030. The strategy aligns with the mission of Óbuda University and its emerging institutional strategy, takes into account the

expectations and recommendations formulated by the Hungarian Accreditation Committee (MAB) in accordance with the European Standards and Guidelines (ESG), and incorporates the university-level quality objectives defined by the University Doctoral and Habilitation Council (EDHT). In 2025, the EDHT identified university-level quality improvement priorities for doctoral schools—including increasing the proportion of Q1–Q2-ranked international publications,

introducing mentoring and student welfare programs aimed at improving graduation rates and reducing dropout rates, rewarding doctoral students' publication activities, and strengthening the internationalization of doctoral education (increasing student mobility, involving visiting lecturers from abroad, expanding international collaborations, increasing the number of courses taught in foreign languages). This strategic plan—in line with the EDHT call—provides a comprehensive framework for the ATDI for the next five years, supporting the doctoral school's development vision with specific goals and indicators. The document provides a detailed overview of the institution's current situation (SWOT analysis), defines research and educational priorities, outlines directions for quality assurance development, and plans for the development of student support, research infrastructure, international relations, and other strategic areas. The roadmap for implementing the strategy, the analysis and management of potential risks, and the monitoring and evaluation system for implementation are also presented. The concluding chapter refers to the table of quality objectives and indicators in the appendix, which contains the operational indicators for the strategic objectives set forth here for the 2025/26 academic year.

2 Situation Analysis (SWOT)

To assess the current situation of the ATDI, we review the internal strengths and weaknesses, as well as the external opportunities and threats that influence the operation of the doctoral school.

2.1 Strengths:

- One of the doctoral school's main strengths is its broad disciplinary coverage and interdisciplinarity, which allows students to conduct research in various fields of materials science (polymers, metals, ceramics, composites, nanotechnology, etc.).
- The ATDI brings together the best faculty from several departments of the university and has more than ten core members holding advanced degrees, ensuring the quality of supervision and teaching.
- The DI has significant experience in admitting applicants who completed their undergraduate studies several years prior. These older students have extensive professional experience; their research topics and advisors are typically tied to their workplaces, and the doctoral school provides them with personalized instruction and

- supervision. Research conducted on their workplace-related topics enriches both the workplace and the DI.
- The DI is attractive to colleagues with more research experience who pursue their degree through individual study. We have already involved one such graduate in the DI's work as a co-advisor.
 - At the other end of the student age spectrum are students without an MSc degree: starting in September 2025, one student will begin their studies in the doctoral school in this manner.
 - The research infrastructure and support services currently provide an adequate framework for the program: the university's laboratories, equipment, and IT systems are accessible to students, and the financial and administrative support is stable.
 - The doctoral school has the necessary formal frameworks (e.g., an approved curriculum, operating regulations, and a quality assurance plan), and has successfully awarded degrees to numerous students during its operation to date. Another strength is our existing connections with domestic research institutes and industry: cooperation agreements have linked the university with, among others, the Bay Zoltán Institute of Applied Research, the research centers of HUN-REN (formerly MTA) (Energy Research Center, Wigner Physics Research Center, Natural Sciences Research Center), and other Hungarian universities (János Neumann University, University of Dunaújváros). These partnerships provide opportunities for joint research, collaboration between thesis advisors, and student work in external laboratories.
 - Another strength of ATDI is the professional activity of the student community: through regular materials science seminars and doctoral conferences, students can present their results, thereby developing their presentation skills and receiving constructive feedback on their research.
 - DI students successfully participate in the cooperative doctoral program, as well as in the ÚNKP and EKÖP grant competitions.

2.2 Weaknesses:

- Among the internal factors hindering the doctoral school's development is the fact that we have not yet had a written, comprehensive strategic plan, so developments have been less consciously coordinated—this document addresses that shortcoming.
- Another weakness is the limited international visibility of the research conducted at the doctoral school.

- Although the dropout rate has not been strikingly high in numerical terms, delays in completing the program are observable among several students; some struggle to progress toward degree completion after the comprehensive exam.
- In addition, it is a challenge that the research conducted within the doctoral school and the curriculum structure require continuous updating in the rapidly evolving fields of materials science—the faculty must keep pace with new findings and technologies, which is a resource-intensive task.
- Finally, it should be noted that due to the doctoral school’s size and relative youth, its alumni network and international reputation are limited, which may make it difficult to attract international students and faculty.

2.3 Opportunities:

- The external environment offers numerous opportunities for ATDI. Materials science and related engineering fields play a key role in technological innovation and sustainable development, resulting in a growing demand for highly skilled materials science professionals in both industry and academia. By capitalizing on this, the doctoral school can expand its industrial partnerships: in collaboration with domestic industry players (e.g., automotive, chemical, and electronics sectors), additional applied research projects can be launched, industry-themed dissertations can be developed, and scholarship funding can even be secured from the corporate sector.
- There is also the opportunity to participate in national and international calls for proposals: the doctoral school can join research consortia funded by the EU or domestic (NKFIH) sources, thereby generating new resources for students (for research infrastructure development, conference participation, and hosting visiting researchers).
- Opportunities also exist at the international level: the Stipendium Hungaricum program continues to offer the possibility of hosting international students, and new bilateral agreements can be established with foreign universities for joint training programs or student exchange programs.
- Due to the interdisciplinary nature of the field, there is an opportunity to expand the research profile by incorporating interdisciplinary areas (biomaterials, smart materials, materials informatics), which could result in new supervisors and students joining the program.

2.4 Threats (Challenges):

- One significant threat is demographic and recruitment uncertainty: the number of potential doctoral students is declining in certain fields within the country, and many talented young people prefer to pursue their studies abroad or enter the private sector. This phenomenon may make it difficult to maintain student numbers and quality.
- A major challenge for the doctoral school is competition with doctoral schools at other institutions: for example, the doctoral schools with similar profiles at the University of Miskolc, the Budapest University of Technology and Economics, or other major research universities have stronger international ties and greater resources. The ATDI
 - must strengthen the areas of specialization in which it can excel and remain competitive.
 - Failure to improve quality assurance could also pose a threat, as the MAB may identify shortcomings during the next accreditation. The current accreditation expires in 2027; if previous recommendations are not fully implemented, renewing accreditation could pose a risk. To minimize this risk, consistent implementation and documentation of the strategic plan are essential.
 - Another threat concerns the replenishment of human resources: several core faculty members may be approaching retirement by 2030, and if new, young researchers are not successfully recruited into the core faculty in time, the professional foundation of the doctoral school may weaken.
 - In addition, risks may arise in the area of research infrastructure: the obsolescence or malfunction of equipment, as well as a lack of funds for the procurement of new equipment, may hinder the achievement of the set research goals.
 - Finally, changes in the funding environment (such as modifications to the rules governing state doctoral scholarships or a reduction in grant funding) may also jeopardize the fulfillment of plans. The strategic plan outlines specific measures to address all these challenges, which can help prevent or mitigate these risks.

Based on the SWOT analysis, it is evident that ATDI has a solid foundation and valuable resources; however, deliberate development steps are needed to overcome its weaknesses and capitalize on identified opportunities. The following chapters detail these development directions and objectives.

3 Research and Education Priorities (2025–2030)

Central to the strategic objectives of the Doctoral School of Materials Science and Technology is the development of scientific research activities and the continuous improvement of the quality of the training program. These two areas are closely interrelated: effective research requires high-quality education, and well-trained students contribute to increasing scientific output. Below, we detail the main scientific and educational priorities for the strategic period.

3.1 Strengthening Research Focus and Scientific Performance

In the coming years, ATDI will maintain and further develop its current scientific profile, aligning with international trends and socio-economic needs. We prioritize the development of new materials and their applicability in sustainable technologies. Our key research areas remain polymer materials (with a particular

bioplastics and recyclable polymers), nano- and microstructured functional materials (e.g., nanocomposites, nanosensors), advanced metals and ceramics, and materials technologies (e.g., additive manufacturing, surface treatment processes, materials testing methods). In these areas, we strive to ensure that doctoral students achieve competitive research results that can be published at the international level. By the end of the strategic period, the goal is for every graduating doctoral student to be the first or co-author of at least one article in a prestigious international Q1–Q2 journal, and for the doctoral school’s overall publication output to increase. To this end, we will support the preparation of high-level publications through supervisor consultations and internal workshops, and encourage students to participate in conferences and engage in networking. The doctoral school will support the development of patents, prototypes, or industrial collaborations from students’ research results, thereby strengthening the impact of innovation.

3.2 Modernizing the doctoral program and developing student competencies

From an educational perspective, a key priority is the continuous review and modernization of the doctoral curriculum and requirements. During the 2025–2030 period, the Doctoral School Council will regularly review the ATDI curriculum and course offerings to ensure they align with the latest scientific knowledge and labor market expectations. These new courses will broaden students’ horizons and enhance their interdisciplinary skills. In addition, we are further strengthening the role of student seminars and workshops at the doctoral school: whenever possible, we organize Materials Science Seminars, where, in addition to students and faculty, industry experts and international researchers can also give presentations on specific topics. This ensures that students are exposed to the latest trends and develop critical thinking skills. Another key goal is to develop students’ educational and other skills:

we give them the opportunity to participate in undergraduate education at the university as teaching assistants or adjunct instructors (to support their professional development), and we organize training sessions for them on scientific writing, presentation techniques, project management, and entrepreneurship. With regard to the outcomes of the doctoral program, we strive to improve the graduation rate and ensure that the duration of the program does not become unreasonably long.

3.3 Recruitment and professional development of faculty and advisors

The key to academic and educational excellence lies in a team of outstanding supervisors and faculty members. Our strategic goal is to continuously renew and develop the core faculty and supervisory team at ATDI. On the one hand, we encourage as many of the university's young faculty members as possible to become involved in doctoral training, initially as thesis writers or co-advisors, and then, after gaining sufficient publication and teaching experience, to become core members. Our goal is to ensure that the number of core members remains consistently above 8 in the coming years (this is currently being met, but due to retirements, new recruits will be needed). On the other hand

We ensure the professional development of our current faculty members: we encourage and support them in participating in study abroad programs, postdoctoral programs, and pedagogical and methodological training. Every semester, we organize internal workshop discussions for thesis advisors, where they can share their experiences regarding student supervision, publishing, and the development of the educational process. This fosters a shared learning process among the advisors, contributing to a consistent set of quality standards and a consistent student experience. To ensure the quality of the faculty, all staff members update their academic profiles annually in the doktori.hu database. Core faculty members publish, on average, at least one Q1–Q2-ranked article per year.

3.4 The Role of External Partners in the Operation of the DI

According to the MAB's assessment, since the participation of external collaborating partners in the development of the curriculum at the ATDI is significant, clearer regulations are needed than currently exist regarding the management of these partners' involvement in the program. The doctoral school considers the continuous maintenance and development of relationships with external partners to be a priority. The basic rules for working with external partners are set forth in the cooperation agreements. Four members of the DIT represent external partners (BME, HUN REN), so the opinions of external partners can be reflected in the DIT's work and decisions, including the development of the curriculum. A survey to gauge the opinions of external partners is conducted every February. We will establish a strategic advisory board to evaluate the DI's existing and planned research areas, as well as the results achieved therein, and to provide advice to the DI's leadership regarding the focus areas of materials science research. According to current plans, the advisory board will have four external members representing leading institutions in materials science

research in Hungary (HUN REN, BME, ME, Bay Zoltán Research Institute). In light of the above, the network of relationships established with external partners operates on three levels: operationally through external staff members playing a role within the DIT, in the form of anonymous surveys with all external partners, and through the strategic advisory board. The details of these forms of external partner collaboration will be set forth in a policy document.

3.5 Monitoring and Feedback on the Training Program

The continuous improvement of educational activities requires regular monitoring of the program's effectiveness and the incorporation of feedback from stakeholders. Therefore, the introduction of an annual program evaluation is a strategic priority. At the beginning of each academic year, the doctoral school's leadership holds an evaluation meeting to review the fulfillment of indicators: how many students have successfully passed the comprehensive exam (target: at least 95% success rate), how long it takes students to earn their degree, the grading of defenses (target: at least 50% *summa cum laude* in defenses), the dropout rate, etc. The Doctoral School Council and the student representative also participate in this meeting to discuss any issues that arise and consider suggestions. We pay special attention to student feedback:

anonymous student satisfaction survey regarding the program and the work of supervisors is completed by doctoral students every year, and every five years we also ask graduates about their experiences. We take the information gained from these into account when planning the next academic year and make changes as necessary. This process ensures that the doctoral program adapts flexibly to challenges.

Overall, the research and educational priorities are aimed at enabling ATDI to achieve high-level research outcomes and excellent educational quality during the 2025–2030 period. The doctoral school aims for its students to succeed in both academic and industrial careers, contributing to the advancement of materials science through their research while enhancing the reputation of the university and the doctoral school. Achieving these goals requires an appropriate quality assurance environment, the development of which is discussed in the following chapter.

4 Development of the Quality Assurance System (ESG and MAB Requirements)

A fundamental element of ATDI's strategic development is the development of the quality assurance system, which ensures compliance with ESG (European Standards and Guidelines) guidelines and MAB accreditation requirements. The doctoral school's quality assurance is aligned with the new, unified quality management system introduced by Óbuda University. The main development directions in this area are outlined below.

4.1 Quality Policy and Strategic Planning

Based on the MAB's comments, it is of primary importance to formulate an independent doctoral school quality policy that aligns with the university's quality policy but is specifically tailored to the operation of the ATDI. The new quality policy will define the doctoral school's mission, values, quality objectives, and guiding principles for implementation, with particular emphasis on the quality of teaching and research, student performance and satisfaction, and continuous improvement. According to our plans, the ATDI quality policy will be finalized in 2026 and made publicly available on the doctoral school's website in both Hungarian and English. In addition, the current strategic plan is also part of the quality assurance system: the multi-year strategy, prepared in accordance with the MAB's recommendations, is reviewed every two years and modified as necessary. We also use the annual self-evaluation reports required by the EDHT to monitor the strategy: in these annual reports, we assess the progress of the indicators associated with the strategic goals and report to the Doctoral School Council on the status of developments.

4.2 Quality Assurance Structure and Responsibilities

Within the ATDI, quality assurance is overseen by the Doctoral School Council under the direction of the head of the doctoral school. This council coordinates quality improvement activities, monitors the achievement of set goals, and formulates recommendations and corrective actions. The head of the DI participates in developing the concept for a committee to monitor university-level research activities, in accordance with the EDHT's proposal. This committee would operate within the framework of the Doctoral Student Council, and its tasks would include monitoring students' research progress, reporting issues to the administration, and identifying mentoring needs. As part of the quality assurance system, we also clearly define areas of responsibility: the director and council of the doctoral school are responsible for setting and implementing strategic goals; supervisors are responsible for ensuring students' individual development and the quality of their work; and students are responsible for their own academic and research progress, as well as for providing feedback. These three levels of responsibility complement each other to form the foundation of a culture of quality.

4.3 Regulation and Documentation of Processes

In the coming period, we will continue to pay special attention to the regulated operation and documentation of the doctoral school's key processes (admission procedure, comprehensive examination, thesis topic selection and supervision, progress evaluation, and degree conferral procedure). We will conduct a review of the doctoral school's own procedures, with particular attention to those areas previously identified by the MAB as requiring improvement. One such area is student admission and progress (ESG 1.4): transparent admission criteria, preliminary screening, and the documentation of decisions

must be ensured. To this end, we have implemented a requirement that a written recommendation and score be prepared for every oral admission interview, which the admissions committee sends to the EDHT, thereby ensuring that the selection process is traceable and justifiable. Regarding student progress, we are standardizing the procedure for semester reports: every active student is required to give a presentation at the doctoral student conference and submit a written research report every semester. Supervisors and the Doctoral School Council decide on their acceptance; the goal is to accept at least 90% of the reports on the first attempt, indicating consistent and high-quality work. If a student's report is not acceptable, we will initiate an individual consultation involving the supervisor to resolve the issues. In the area of learning support and student services (ESG 1.6), we are reviewing how we can better assist doctoral students: for example, by updating the information available on the doctoral school's website (e.g., regularly updating the FAQ document, preparing guides for the comprehensive exam, writing a research plan, and publishing activities), and by operating a mentoring program in situations deemed necessary. For all such initiatives, we ensure that procedures are documented in writing and made accessible to those concerned (on the website, in brochures), ensuring transparency and public disclosure (ESG 1.8). For example, we publish the description of the doctoral school's training program, the requirements, and the list and profiles of faculty members and advisors (in both Hungarian and English) for the public.

4.4 Data Collection and Information Management (ESG 1.7)

The collection and analysis of reliable data are essential for quality assurance. According to current plans, ATDI will create an MTMT-based publication tracking system with the help of the ÓE Library to monitor the publication performance of doctoral students, faculty members, advisors, and faculty members (an automatically updated publication database that displays, in real time, the publications of ATDI students, faculty, and staff registered in MTMT). This enables us to generate reports on publication activity every semester. The results are included in the annual self-evaluation report and the strategic evaluation. Another important element of information management is the tracking of graduates. We continuously update the alumni registry, where our PhD graduates can voluntarily provide their current workplace, position, and contact information. We update this database annually and, based on the feedback, evaluate every five years to what extent the graduates' career paths align with the doctoral school's profile and objectives. By analyzing the data collected in this way, we can identify any potential issues.

4.5 External and internal evaluations, preparation for accreditation (ESG 1.10)

During this strategic period, we will prepare for the next MAB accreditation, which is expected to begin in 2027. As part of this process, we will review the reports and lessons learned from previous MAB accreditations and monitoring reports. The university's quality

assurance specialists will also participate in the preliminary internal audit to assist with the preparations. The goal is for the doctoral school to meet all ESG standards by early 2027, in time for the accreditation visit. In response to the results of the monitoring review, we will pay special attention to fulfilling the monitoring criteria that *have been only partially met or not met* at all. As mentioned, the lack of a strategy and the documentation of the quality assurance system were critical among these—in this area, the current plan represents significant progress. We will continue to rely on feedback from external experts in the future: we plan to invite an external doctoral school director or quality assurance expert from another institution around 2028 to review our operations and provide advice (even informally, in a *peer review* capacity). In addition, we continuously monitor changes in legislation and amendments to university regulations. For example, in 2024, the EDHT amended the Doctoral Regulations such that, for students admitted after January 1, 2024, one of the official reviewers must be a foreign expert. To meet this requirement, we have already begun compiling a database of potential foreign and expatriate reviewers in the research areas of our current students (out of 24 students, 5 are foreign scholarship recipients and 19 are Hungarian—in their cases as well, we must identify suitable international experts). To ensure the availability of high-quality international reviewers, we support the option for students to write their dissertations in English.

5 Student Success and Career Support

A doctoral school can be considered successful if its students successfully complete their studies, earn their PhD degrees, and subsequently pursue outstanding careers in academia or in industrial settings. To achieve this, ATDI implements strategic measures to enhance student success and support doctoral students' career paths both during and after their studies.

5.1 Improving the degree completion rate

Our primary goal is for as many students as possible who begin doctoral studies to complete their degrees, and for as few as possible to drop out of the program prematurely. Based on the doctoral school's data to date, the dropout rate is not critical; however, maintaining this level requires increased attention. We are taking several preventive steps to ensure an adequate degree completion rate. We strive to prevent future dropout rates as early as the admissions process: we have introduced a pre-screening of applicants, which means that the admissions committee evaluates the submitted research proposal and publication record before the oral interview, and we recommend for admission only those candidates who are adequately prepared. During the admission interview, we assess not only academic background but also motivation and commitment—this is how we try to screen out those who might later drop out due to a lack of interest. Based on the resulting ranking, we submit a recommendation for admission to the EDHT, ensuring that only those who are suitable and determined to earn a PhD are admitted. Even among those admitted, the most critical period

is the first year, when many are confronted with doctoral-level requirements. To prepare first-year students, we hold an orientation session at the beginning of each semester, where the director of the doctoral school and more experienced faculty members outline the requirements, offer tips on time management and publishing, and explain funding opportunities. In addition—if necessary—we implement a mentoring program: we assign a senior PhD student or a recent PhD graduate to serve as a mentor for the new student, from whom they can seek informal advice and who helps them settle in. Mentors and mentees hold regular (at least monthly) meetings, and mentors notify the doctoral school’s administration if they observe that the student is struggling (e.g., with motivation issues or being overwhelmed).

We also intervene at key milestones in the training process to ensure success. The goal is for students to complete the first, so-called academic and research phase of the doctoral program in no more than 4 active semesters. Based on experience to date, some students have delayed the completion of courses or registration for the comprehensive exam beyond this timeframe. Starting in 2025, we will monitor progress more closely: at the beginning of each semester, based on data provided by the Academic Affairs Office, we will review where each student stands in terms of credit accumulation and notify those who are falling behind. At the same time, we will involve the thesis advisors: we expect them to consult regularly (at least monthly) with their students regarding research progress and course completion. The strategic goal is for at least 85% of students to successfully pass the comprehensive exam within 4 active semesters. Similarly, during the dissertation phase, we aim for students to reach the point of obtaining their absolutorium—that is, to fulfill the research and publication requirements—within a maximum of 4 active semesters. After obtaining the absolutorium, we provide support to those in the degree conferral process so that they can defend their dissertation within 3 years of passing the comprehensive exam.

5.2 Student Support System

Doctoral studies can be a significant burden, both mentally and financially. Our strategic goal is to operate a comprehensive student support system that addresses both the professional and personal challenges that arise during doctoral studies. As part of this—in addition to the aforementioned mentoring program—it is important to provide personalized consultations. Once a semester, the doctoral school’s leadership holds a group discussion with doctoral students in connection with their progress reports, where students can raise their concerns and suggestions. If a student finds themselves in a special life situation (e.g., starting a family, health issues, a temporary professional setback), we assist them by developing an individual study plan so they can continue their studies as flexibly as possible (e.g., by granting a leave of absence for a semester). We also actively recommend the psychological counseling and career counseling services offered by the university to doctoral students, and we strive to ensure that these services are specifically tailored to the needs of doctoral students (e.g., stress management in a research career, overcoming

presentation anxiety, time management). Financial support for students is also an important aspect of well-being: while the amount of state scholarships is fixed, we would like to open up additional funding sources for them. As part of this, starting in 2025, we will institutionalize the ÓE doctoral publication award competition, through which students with the best publications can win additional funding (this will be part of the university-level reward system, in the development of which the ATDI is also participating). In addition, we encourage students to apply for external scholarships (e.g., ÚNKP – New National Excellence Program, and other academic awards), and we provide regular updates on these opportunities. The doctoral school also provides financial support for students' conference participation: we provide a conference grant of 100,000 forints once a year.

5.3 Career and professional development support after graduation

ATDI cares for its students not only during their studies but also afterward. As part of our career support, we strive to maintain contact with alumni and involve them in the life of the doctoral school. As highlighted in the 2023 self-evaluation, many graduates have become faculty members at Óbuda University or work at the Energy Research Center and other research institutes. We collaborate with the university's Career Office to ensure that PhD students receive personalized career advice (e.g., resume writing, interview preparation, and building industry connections). Furthermore, since materials science has applications in numerous industries, we continue to build relationships with industrial partners to ensure that our graduates are offered internship or entry-level positions.

In summary, the strategic measures for student success and career support reflect a people-centered approach: the doctoral school does not merely set requirements but acts as an active partner in helping students achieve their goals. The new elements introduced in the areas of mentoring, rewards, support, and career planning are expected to significantly improve student satisfaction, increase the degree completion rate, and, in the long term, strengthen ATDI's reputation as a doctoral school that not only trains outstanding scholars but also pays close attention to students' personal development and well-being.

6 Research Infrastructure and Organizational Development

High-quality research and doctoral training require the presence of appropriate infrastructure and an effective organizational framework. An important element of ATDI's strategic plan is therefore the development of available research tools and facilities and the optimization of the doctoral school's organizational operations. In this chapter, we present the measures we intend to implement to ensure the continuous improvement of physical and organizational conditions between 2025 and 2030.

6.1 Development of Research Infrastructure

Due to the interdisciplinary nature of materials science, doctoral school students use laboratories across multiple faculties and also conduct experiments at partner institutions. Currently, the university's laboratory network (the polymer and textile laboratories of the Faculty of Light Industry, the materials testing laboratories of the Faculty of Mechanical Engineering, the microtechnology laboratories of the Faculty of Electrical Engineering, etc.) provides an adequate foundation for research, but rapid technological development requires continuous modernization. A strategic goal is for ATDI's research infrastructure to keep pace with international standards over the next five years. Our agreements with the Bay Zoltán Research Institute and the HUN-REN research institutes allow doctoral students to use certain specialized instruments. We will continue to rely on these partnerships in the future, as they are a cost-effective way to expand access. In addition, by leveraging the university's library services, we ensure that every student has access to the latest academic literature.

6.2 Digital Transformation and Administrative Support

An important aspect of organizational development is digitization and the simplification of administrative processes. Between 2025 and 2030, ATDI will transition to handling doctoral affairs electronically to the greatest extent possible.

6.3 Development of Organizational Structure and Governance

The organizational framework of the doctoral school is provided by the Doctoral School Council (DIT) and the head of the doctoral school, in cooperation with the EDHT. Our strategic goal is to ensure that decision-making and governance are transparent and effective.

6.4 Capacity expansion and sustainability

During the strategic period, we anticipate that the number of ATDI students may increase moderately (partly due to internationalization and the strengthening of industry ties). We must prepare to accommodate as many as 60–70 active students by 2030. In this context, capacity planning is part of organizational development: for example, we are already preparing for an increase in the number of comprehensive exams and thesis defense committees by expanding the pool of potential committee members (including alumni and external experts; see the internationalization chapter). In addition, if student enrollment warrants it, we will propose to the university administration the creation of a full-time doctoral school administrator position to handle coordination, grant applications, and partner relations—thereby relieving the academic leadership of administrative tasks.

The above steps taken to develop the research infrastructure and organization ensure that ATDI's physical and administrative framework supports its ambitious academic and educational goals. Excellent research results require modern tools and an efficient, supportive organization—which is why we treat these areas as integral parts of the strategy. With this strengthened foundation, the doctoral school will be able to adapt to the challenges and opportunities of the future.

7 Internationalization and Increasing International Visibility

In the field of materials science, scientific excellence is inseparable from international integration. In a globalizing scientific community, the success of the doctoral school depends largely on the quality of its international connections, visibility, and appeal. ATDI therefore treats the strengthening of internationalization as a strategic priority, both in terms of student and faculty mobility and in the areas of international collaboration and visibility.

7.1 Increasing international student mobility

Our goal is for as many doctoral students as possible to gain research experience abroad during their studies. On the one hand, this contributes to their professional development (they can learn new methods in foreign laboratories and build professional networks); on the other hand, it raises the profile of the doctoral school abroad. Starting in 2025, we will introduce a recommendation (though not a requirement) for all doctoral students to complete at least one 1–3-month research stay abroad or a study trip as part of the “ ” program during their PhD years. Our goal is for at least 10–15% of students to participate in some form of international mobility each year, and to increase this percentage annually. In addition, we encourage students to participate in international conferences: wherever possible, they should actively present their work (in the form of a presentation or poster). We provide financial support for conference participation. We track the outcomes of international mobility and conference participation.

7.2 Integration of international students and faculty, foreign-language instruction

An important indicator of internationalization is the proportion of international students. Currently, the majority of ATDI students are Hungarian, with a few international students (Stipendium Hungaricum scholarship recipients). A realistic strategic goal could be for 15–20% of the doctoral school's students to be international by 2030. To this end, we will strengthen our ties with the offices coordinating the Stipendium Hungaricum program and proactively advertise our thesis topics in English.

We aim to increase our international presence not only among students but also among faculty and researchers. One of our goals is to host at least one visiting lecturer or visiting professor from abroad each year, who will participate in the life of the doctoral school for a shorter or longer period (e.g., by teaching an intensive course or conducting research with students). To this end, we will utilize the university's visiting professor programs and international researcher exchange collaborations.

7.3 Increasing international visibility and marketing

To attract the attention of more international students and partners, we must consciously build our international visibility. One tool for this is the development of the doctoral school's website: we are expanding English-language content and regularly updating it with news and success stories.

In summary, in the area of internationalization, the strategy aims to make ATDI an integral part of the international academic community. Encouraging student and faculty mobility, developing English-language programs and services, expanding collaborations, and conducting targeted international marketing all serve to make the ATDI's name better known beyond our borders between 2025 and 2030, and to make the doctoral school an attractive choice for international talent as well. By strengthening its international perspective, the doctoral school will significantly contribute to raising the university's international standing and ensure global competitiveness for its students.

8 Risk Analysis and Management Plans

In the process of achieving strategic goals, it is essential to identify potential risks and anticipate the necessary responses. Below, we summarize the most significant risks that could threaten the operation of ATDI between 2025 and 2030, and present the mitigation plans designed to reduce the impact of these risks.

8.1 Risks Related to Student Recruitment and Dropout Rates

One of the main risks is that we will fail to admit a sufficient number of new students with the appropriate qualifications to the program. This could be due to a declining number of applicants (such as a demographic trough or the low willingness of master's graduates to pursue a PhD) or strong competition from doctoral schools at other institutions. If the number of admitted students consistently falls short of our capacity, this could jeopardize the program's sustainability and funding. Action plan: We will strengthen marketing and recruitment (detailed further in the internationalization section). We will establish closer cooperation with the University of Pécs's MSc programs: we will integrate research methodology courses into the MSc curriculum to spark interest in the PhD program, and we will involve the best MSc students in ATDI research projects as demonstrators or through

TDK and OTDK work while they are still in the MSc program. In addition, we compensate for any potential shortage of domestic candidates through the Stipendium Hungaricum and other international channels. The other related risk is dropout: if many students drop out, it undermines the program's performance metrics and reputation. Management plan: the mentoring program, support system, and timely warning mechanisms detailed under student success are all aimed at preventing dropout. We monitor key indicators (e.g., the number of students who fail to earn credits in two consecutive semesters) and identify the causes of dropout (e.g., financial reasons or lack of time for part-time PhD students; we seek tailored solutions for these issues).

8.2 Risks related to faculty and advisor capacity

The operation of the doctoral school is heavily dependent on the availability and performance of core faculty members and advisors. It poses a risk if certain key individuals (advisors) leave—for example, due to retirement, moving abroad, or being overburdened—resulting in a lack of adequate professional leadership in certain fields. Furthermore, if the number of core faculty members falls below 7 (the MAB minimum), it would jeopardize the program's accreditation. Action Plan: We are proactively preparing for the generational transition. Early in the strategic period, we will identify which current core faculty members are expected to retire within the next 5–6 years and seek potential successors to replace them. Within the university, we encourage young faculty members who are preparing for habilitation to increase their publication output and to become involved in doctoral supervision—so that by the time the transition becomes imminent, they will already meet the requirements for appointment as core faculty members. If there are no in-house successors in a particular niche field, we are open to involving external experts as tenured faculty members (for example, through programs jointly held with other universities or via visiting professor appointments). We also address the issue of overburdening: we ensure that a supervisor has a maximum of 3–4 students in active status at any given time; if there are more, we bring in new supervisors to ensure students receive adequate attention. To maintain faculty motivation, we utilize the aforementioned recognition system (e.g., the Outstanding Supervisor Award), and involve them in strategic decisions so they feel they can shape the program's future.

8.3 Financial and Resource Risks

The operation of the doctoral school relies heavily on state scholarships and budgetary support from the university. A risk arises if the funding environment shrinks—for example, if the number of state-funded positions or the amount of doctoral scholarships decreases. It is also a risk if we do not secure sufficient funding for planned infrastructure developments, or if a major piece of equipment malfunctions and requires immediate replacement but there is no budget for it. Management plan: we will mitigate the funding risk by diversifying our sources. We aim to increase revenue from industrial collaborations (e.g., research contracts and commissions in which students also participate, with the revenue used to

supplement scholarships). In addition, we will make better use of the opportunities offered by the Cooperative Doctoral Program (KDP), which provides additional funding for joint projects with industry partners—we aim to involve at least 1–2 KDP scholarship students each year, thereby reducing our exclusive dependence on state funding. We are preparing a contingency plan in case state scholarships are reduced: in this scenario, we may temporarily admit more fee-paying students (e.g., with corporate funding) or strive to provide scholarship supplements from the university’s internal resources to retain students. Regarding infrastructure, we maintain a contingency reserve in the annual budget for unexpected repairs/purchases (this is planned at the university level, but please also take the needs of the doctoral schools into account).

8.4 Quality and Accreditation Risks

A critical success factor for the implementation of the strategy is meeting the expectations in the MAB’s next accreditation. A risk arises if we fall short of the set goals in certain areas (e.g., publication performance, student performance indicators) or if the implementation of the quality assurance system is delayed, as this could result in a negative evaluation. Management plan: We will implement the measures outlined in the quality assurance section by the deadline. Part of risk management is ensuring that the strategy is flexible and can be modified as needed. For example, if the MAB (or ESG) introduces an unforeseen criterion after 2025, the doctoral school will respond quickly and incorporate the requirement into its internal regulations.

8.5 External environmental risks

These include uncontrollable factors such as a potential economic crisis, a pandemic, or significant changes in higher education regulations. These can also affect the doctoral school. Action plan: if necessary, we will prioritize strategic elements and focus on the most important ones (e.g., quality assurance, student support), while rescheduling certain developments. We will also adapt flexibly to changes in legislation: for example, if the government introduces a new evaluation system for doctoral schools, we will update the strategy accordingly.

This risk analysis serves the purpose of ensuring that the doctoral school faces uncertainties in a prepared and informed manner. The strategy not only sets optimistic goals but also anticipates challenges and outlines specific steps to address them. This allows us to navigate the 2025–2030 period with greater confidence, minimizing the likelihood of negative surprises.

9 Implementation Timeline

Achieving the strategic goals requires a clear roadmap that defines the timeline for each measure. Below, we outline the main tasks and milestones for the 2025–2030 period, broken down into short-, medium-, and long-term categories.

Short-term tasks (2025–2027): The first phase of the strategic period is a time for laying the groundwork and implementing urgent tasks. In 2025, the most important milestone is the adoption and publication of the strategic plan itself (university approval, submission to the EDHT). Concurrently, by the end of 2025, we will prepare a new draft of the ATDI quality policy and coordinate it with the university leadership

A key element of the short-term period is preparation for MAB accreditation: we will prepare the necessary documents during 2026

Early 2027 is critical: this is when the MAB accreditation visit and decision are expected to take place (the current accreditation expires in February/March 2027). Our short-term goal is for ATDI to successfully renew its accreditation in 2027, preferably without monitoring conditions, which is an important milestone in the implementation of the measures set out in the strategy.

Mid-term tasks: The mid-term period (2027–2028) is a time for monitoring and fine-tuning the strategy, now with the secure foundation of what we hope will be a successfully extended accreditation. In the fall of 2027—based on the accreditation feedback—we will review the strategic plan and, if necessary, modify the goals or measures (e.g., if the MAB sets new requirements). In 2027/28, we will continue the programs already underway.

In the medium term, we consider it a key achievement if the student enrollment remains consistently above 50, with at least 6–8 of them being international students.

In terms of organizational development, in 2028 we will evaluate the effectiveness of our internal operating regulations over a three-year period and, if necessary, modify them (e.g., refine the DIT's rules of procedure or the doctoral school's operating regulations based on practical experience). In 2028, monitoring the annual quality report and strategic indicators will remain an ongoing task—by this time, a routine will have been established whereby every October, the doctoral school's leadership and committees evaluate the previous academic year and plan the next one in light of the strategy.

Long-term plans (2029–2030): The final two years of the strategic timeframe will focus on fulfilling the set goals and preparing the new strategy. By 2029, we will already see the results of these interventions in concrete numbers: for example, we expect the degree completion rate (the percentage of students successfully completing the program with a PhD) to be satisfactory. The number of Q1-Q2 publications is increasing both per faculty member and per student; we will measure this and compare it to the baseline year in 2029. The proportion

of international students will hopefully also reach the targeted ~15%. In 2029, based on all of this, we will conduct a comprehensive evaluation of the strategy's results: the Doctoral School Council will examine, in an expanded meeting (possibly involving external experts), in which areas we have achieved success and where there may still be shortcomings.

Looking ahead to 2030, we will begin outlining a new strategic plan for the next cycle (2030–2035). We will launch this planning process as early as 2029, involving the university leadership to ensure it aligns with the institutional goals in effect at that time. By 2030, we will essentially complete the major projects of the current strategy. By 2030, we aim to see ATDI operating as a stable, high-quality doctoral school as it prepares for its next accreditation cycle

10 Monitoring and Evaluation System

A monitoring and evaluation system is necessary to ensure the effectiveness and efficiency of the strategic plan. Within this framework, we regularly track the achievement of set goals, measure performance indicators, and provide feedback on progress to the doctoral school's leadership and the university. Below, we outline how this monitoring system is structured.

10.1 Key indicators and data reporting, annual evaluation cycle:

We have assigned quantifiable indicators (metrics) to each of the strategic plan's main objectives. Some of these are already included in the appendix summarizing the ATDI quality objectives (e.g., dropout rate, success rate of comprehensive exams, publication metrics, etc.). The monitoring system is based on collecting and evaluating this data at least once a year, at a fixed time. Each year, the doctoral school compiles an annual doctoral school report that evaluates progress both quantitatively and qualitatively. Sources of indicators: the Neptun academic system (student progress data), the MTMT (publication data), the doctoral school's internal records (defense results, student activities), and questionnaire surveys (feedback from current and former students). Examples of key indicators: number of students admitted annually; total number of active students; number of students receiving a certificate of completion; number of theses defended annually; student dropout rate; average duration of study; number of Q1-Q2 ranked articles; number of publications per student; percentage of students participating in international mobility; number of foreign-language courses; number of visiting lecturers per year; number of new cooperation agreements, etc. All of these can be quantified and compared with data from the previous year(s) or with the set target values.

10.2 Feedback mechanisms and decision-making

The most important role of the monitoring system is feedback, that is, ensuring that actual decisions and measures are taken based on the measured results. This is ensured by the

Doctoral School Council formally discussing the annual report and making decisions regarding any necessary strategic adjustments and points of intervention. Student and faculty opinion surveys also serve as a source of feedback.

10.3 Transparency and Communication

We strive to communicate the results of monitoring transparently to all stakeholders. This does not mean that we publish every single figure, but we do inform the doctoral school community of the main conclusions. We also report on the doctoral school's results to the university community, which enhances the program's prestige within the faculties and the university.

10.4 External Evaluation and Benchmarking

In addition to internal monitoring, we also track the performance of other doctoral schools (e.g., public MAB reports, national statistics) to put our own results into context. Whenever possible, we participate in external benchmarking programs where doctoral schools with similar profiles compare their practices

In summary, the monitoring and evaluation system ensures that the strategic plan is a living, monitored process that can be adjusted as needed.

11 Summary

This strategic plan provided a comprehensive overview of the planned development directions for the Doctoral School of Materials Science and Technology at Óbuda University for the period 2025–2030. The document presented the current situation, identified strengths and areas for improvement, and set specific goals in the areas of academic excellence, educational quality, student success, quality assurance, international collaborations, and organizational operations. In implementing the strategy, ATDI intends to move forward flexibly while keeping the set goals constantly in mind, involving its faculty, students, and partners in this shared mission.