

BRNO UNIVERSITY OF TECHNOLOGY

EVALUATION REPORT

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Contents

1. Introduction.....	3
2. Governance and institutional decision-making.....	6
3. Quality culture.....	9
4. Teaching and learning	12
5. Research	15
6. Service to society.....	18
7. Internationalisation	20
8. Conclusion	23

1. Introduction

This report is the result of the evaluation of Brno University of Technology. The evaluation took place in 2018, with the first visit in February and the second visit in April.

1.1 Institutional Evaluation Programme

The Institutional Evaluation Programme (IEP) is an independent membership service of the European University Association (EUA) that offers evaluations to support the participating institutions in the continuing development of their strategic management and internal quality culture. IEP is a full member of the European Association for Quality Assurance in Higher Education (ENQA) and is listed in the European Quality Assurance Register for Higher Education (EQAR).

The distinctive features of IEP are:

- A strong emphasis on the self-evaluation phase
- A European and international perspective
- A peer-review approach
- A support to improvement

The focus of IEP is the institution as a whole and not the individual study programmes or units. It focuses upon:

- Decision-making processes and institutional structures and effectiveness of strategic management
- Relevance of internal quality processes and the degree to which their outcomes are used in decision-making and strategic management as well as perceived gaps in these internal mechanisms.

All aspects of the evaluation are guided by four key questions, which are based on a “fitness for (and of) purpose” approach:

- What is the institution trying to do?
- How is the institution trying to do it?
- How does the institution know it works?
- How does the institution change in order to improve?

1.2 Brno University of Technology’s profile

The history of Brno University of Technology (BUT) dates back to 1899, when it was established as the Czech University of Technology, the first Czech higher education institution in Moravia and the second in the country at the time. After a short period as a military academy in the 1950s, the scientific and engineering faculties were then re-established as a civil institution, and further extended over a period of some years. From 1989, new faculties were established and since 1990 the institution has consolidated over three main areas of the

city. BUT now presents itself as 'an internationally renowned education institution offering state-of-the-art scientific and expert knowledge at eight faculties and three university institutes, covering a broad range of technical, economical and artistic fields as well as fields of natural sciences' (Self-Evaluation Report (SER), p. 11). Whilst maintaining its position as one of three major general technical universities in the Czech Republic, BUT has diverse faculties (Faculty of Civil Engineering, Faculty of Mechanical Engineering, Faculty of Electrical Engineering and Communication, Faculty of Architecture, Faculty of Chemistry, Faculty of Business and Management, Faculty of Fine Arts, Faculty of Information Technology). The university estate underwent an extensive programme of construction and renovation in the years 2010-2016 (SER, p. 125).

As of October 2017, BUT had over 19,000 students, of which 11,618 were undergraduates, with just over 6,000 enrolled on Master's programmes and 1,664 on doctoral programmes (SER, p.14). The recent demographic decline in 18-20 year olds entering higher education in the Czech Republic has affected BUT, although an institution may admit up to 10% fewer than its maximum capacity without its funding being reduced.

Policy and funding regulations for higher education institutions in the Czech Republic are determined by the Ministry of Education, Youth and Sports, and for science and research by the Council for Research, Development and Innovation. In terms of internal governance, structures and details are prescribed in the requirements of the Higher Education Act. Academic faculties have a strong tradition of devolved autonomy within institutions.

An amendment to the national Higher Education Act in 2016 established new rules for the organisation of higher education institutions, and introduced a new system of institutional accreditation, quality assurance and assessment. The institutional accreditation process, under the responsibility of the National Accreditation Authority for Higher Education, represents a significant change in the approach to accreditation of study programmes. Under the new system, an accredited institution may prepare and approve its own study programmes in specified subject areas, using its own approved internal processes, without having to describe each one specifically to gain separate approval at national level. The award of institutional accreditation requires a demonstration of appropriate staffing; engagement with industry to develop relevant programmes; and quality assurance mechanisms for teaching, research and financial management. BUT aims to gain institutional accreditation in 2018.

1.3 The evaluation process

The self-evaluation report (SER) of Brno University of Technology, together with the appendices, was sent to the evaluation team in January 2018. The two visits of the evaluation team took place from 21 to 23 February 2018 and from 18 to 20 April 2018, respectively. In between the visits the institution provided the evaluation team with some additional documentation, as requested.

The SER was prepared by quite a large group, divided into teams. The core team included members of the BUT senior management, the chair of the academic Senate and a student representative. The wider team included representatives of faculties and institutes, and of academic and administrative staff, students and the main bodies of the university. The procedure was published, and discussed with vice-rectors and deans, and at Senate.

To enable university-wide engagement, much of the process of sharing, commenting on and developing the SER was undertaken online, in an iterative process. The SER therefore was assembled from views across the institution and care was taken to ensure a representative range of constituencies contributed to the report. This produced a very thorough and detailed document, albeit with some repetition in parts. A meeting was also held at which a SWOT analysis of every area generated ideas for future development of BUT. A conference was organised at which the report was shared, issues discussed and then final amendments made.

The evaluation team (hereinafter named the team) consisted of:

- Associate Prof Georg Schulz, former Rector, University of Music and Performing Arts, Graz, Austria, team chair
- Prof Edward Jezierski, former Vice-Rector, Lodz University of Technology, Poland
- Prof Stavros Koubias, former Rector, University of Patras, Greece
- Mr Michael Heintl, student, University of Ulm, Germany
- Dr Karen Willis, Dean of Academic Quality and Enhancement, University of Chester, UK, team coordinator

The team thanks all staff and students whom they met during their visits for their warm hospitality and the openness with which they engaged in discussions. Particular thanks are extended to Hana Doležalová and her colleagues for the efficient preparation and organisation of all arrangements and meetings for the visits, and to the Rector Prof. RNDr. Ing. Petr Štěpánek, CSc. for welcoming the team.

2. Governance and institutional decision-making

The team heard from senior managers that BUT was among the five strongest universities in the Czech Republic, both in terms of funding and number of students, and found that the leadership of BUT was keen to develop and improve the institution, whilst acknowledging the importance of its history and tradition. The rector of the university had recently been re-elected for a second term of office.

The team was told that national funding allocations from the Ministry of Education, Youth and Sports were based on a range of output indicators and also that there was a new methodology for funding universities in research. The set formula for the distribution of money from the Ministry was also applied internally to distribute money to faculties. Further faculty income was generated from companies and by research. The budget was approved annually by the Senate, after which faculties set their own budgets autonomously. Money was redirected back to the rectorate for overhead costs. To create a new faculty or unit required negotiation and mutual agreement to settle the contribution from existing faculties. The team was told that inflation had eroded government funding and that restricted resources therefore required clear prioritisation in implementing the strategic plan.

It was explained to the team that a fixed notional division of academics' time between teaching and research determined state funding but created a complication in rewarding good teachers. Because the reported staff:student ratio also affected institutional rankings, it was also thought to disadvantage BUT (which was listed in the top 650 in the World University Rankings 2018). The funding for teaching was quite small in comparison to income from fixed term research projects, so the rewarding of good teaching staff was found to be problematic by academic managers whom the team met. Staff were recruited at faculty or department level, and pay above basic level was determined by heads of department managing their own budgets for staff.

The team was told of a strong tradition of faculties leading and administering their own activities, and heard from staff at different levels of a perceived growth in administration and bureaucracy. It was acknowledged by some that this was due in part to the differing rules and requirements of numerous external funding and grant providers. There were, however, differing views on internal bureaucracy, some staff emphasising the need for thorough and robust internal regulation whereas others expressed concern about unduly adding to external requirements. Generally, good collaboration was reported between the faculties and the central university administration.

The team heard that central departments provided technology transfer, human resources and legal services. Whilst smaller faculties in particular found these helpful, some larger faculties also used their own resources on these types of activities, including marketing. It was reported to the team that the grants and technology transfer office offered services to the

faculties by providing support for grant applications and monitoring returns, and by administering documentation for submission to the rectorate. The office also had technology transfer managers linked to some faculties, who assisted with patent and intellectual property administration, and had business development managers reporting mainly to faculty deans. Discussions in meetings with faculties and central services indicated that some faculties operated more independently from the central level than others in using their own resource to run some of the same functions at local level. From this, it appeared to the team that the services offered by central offices were not always used consistently or fully across the institution, and that there was therefore some risk of duplication of process and effort. The team formed the impression that in some areas, aspects of the division of work between faculties and central offices was unclear, and therefore *recommends that the university initiate a review of all support processes to clarify the balance of both responsibility and enactment at faculty and central levels, respectively, and to minimise duplication.*

The team was informed that the central university management information system held data about research, teaching, students and budget. Each faculty currently held its own staffing information, which it was planned to centralise in due course. The team also heard that different information systems were used for a variety of purposes in faculties; most of the main systems were connected but two faculties used their own, from which information was then transferred centrally. The team heard that statistical information was supplied from the rectorate and that faculties or departments could request further reports. A Vice-Rector for Information Systems had been appointed, with responsibility for simplifying the current systems, centralising information consistently, and making it accessible for use on different devices, including mobiles. It was recognised by the institution that this would take both resource and time. The team supports this initiative and *recommends that the university establish more consistency of data between faculties and the central level, and the use of a shared, comprehensive tool or information system, for transparent evidence-based decision-making.*

Faculties, several situated on dispersed campuses, were generally regarded by staff whom the team met as quite independent units, with a flat structure thought to be beneficial in addressing problems directly at local level. The team also heard that the strength of the faculty system could at the same time present challenges in fostering interdisciplinary working, with the institutional structure tending to reinforce the isolation between different faculties and institutes, despite some exceptions. Approaches by senior management to breaking down boundaries and promoting more cooperation between subject areas had included nominating individuals from different faculties to undertake complex projects, for example Industry 4.0, and engaging in discussions on preparing an interdisciplinary programme with another Czech University. It was noted that such developments could bring additional income but took time to progress. The team *recommends that the university consider how its structures might be used to facilitate more interdisciplinarity in research and education to meet the current needs of the technological sector and of society.*

The team was told that the Senate, as the main deliberative decision-making body, included three elected representatives from each faculty, two academics and one student. Additionally, the central institutes shared three Senate representatives. The team heard that, as the largest institute, the Central European Institute of Technology (CEITEC) would welcome its own direct representatives and thereby more influence on budgetary and other matters at institutional level. By law, neither the rector nor the deans can be members of the Senate.

The team was informed that strategy was shaped by the rector, senior management and deans. The main role of Senate and its committees was to discuss critically, review, give feedback on and approve ideas and proposals, and influence to an extent the long-term strategy of the university. BUT had a comprehensive long-term plan for 2016-20, identifying priority goals, with a more specific short-term plan presented each year. Whilst these plans were generally agreed by Senate, differences of views over implementation might require further discussion. Faculty strategic plans were derived from the university strategic plan and discussed with the rector. The view was expressed to the team that preparing for major change could be challenging in the historical context of universities in the Czech Republic.

The team heard that the process of preparing the SER had aligned well with the BUT's preparations to meet the new national requirements for institutional accreditation, with helpful synergies. Senior managers reported that producing the SWOT analysis had been very helpful in enabling the institution to take a wider view and a proactive approach to its development and provided a strong basis for future planning, in the context of national legislative influences and challenges. The team found the SWOT analysis and evaluation to be clearer and more focused than the main SER document.

The team observed that the Senate and its committees formed part of a complex structure of decision-making, with a separation of powers between the rectorate and the faculties reflecting the requirements of national law. The power of the rector and the deans was therefore delineated in practice by the institution's structures. Although deans were generally comfortable with the current arrangements, the team formed the impression that these arrangements defined and sometimes restricted capacity for operational change and innovation in response to external needs and drivers. The strong sense of internal democracy in the faculties, with university decision-making informed by communication and negotiation, could also risk generating internal bureaucracy and slowing the process of change. These factors suggested to the team that a stable and longer-term approach to strategic planning, supported by the SWOT analysis and annual operational plans, would be required in order for the university to maintain a clear course and achieve the benefits of driving change at a steady pace. The team therefore *recommends the university consider that planning for longer than five years may be necessary in order to tackle some of the structural and legal constraints.*

3. Quality culture

As mentioned in the introduction to this report, the team was informed that an amendment to the national higher education law in 2016 had changed the system of accreditation in the Czech Republic, enabling universities first to apply for institutional accreditation and then, if successful, to internally approve their own programmes in designated areas of study. In preparation for applying for institutional accreditation, which the team was told was expected of leading universities in the Czech Republic, the team heard that BUT had been reviewing its own internal quality assurance procedures to reflect the new national requirements. In doing so, BUT had established an internal evaluation board, headed by the rector, to oversee the evaluation of study programmes and their teaching staff. This internal evaluation process, which had already commenced, was designed to evaluate programmes every five years, focusing on faculties' continuous improvement of quality and student outcomes, as overseen by the faculty scientific boards and by the Senate. Students and external representatives, from industry or other universities, were included in the internal evaluation panels, which also considered student feedback.

It was explained to the team that institutional oversight should be sufficiently robust to prevent issues arising which might lead to institutional or programme accreditation being suspended, thus affecting reputation. The rectorate expressed the view that institutional accreditation provided an opportunity to create a strong but straightforward quality assurance system at university level, based on open evaluation and also drawing on experience in the university of delivering provision validated by a UK university.

The team found some differences between faculties in their understanding and implementation of quality assurance, and considerable uncertainty over the likely impact of institutional accreditation. Some senior staff questioned whether the current level of 3.5 members of staff in the central quality department would provide sufficient resources to devise and implement new internal processes across the institution. The team was told that current quality assurance processes were not consistently embedded in the work of all academic staff, and heard differing views on the potential implications of external institutional accreditation requirements. Some staff thought that institutional accreditation provided an opportunity for current quality processes to be simplified, whilst others thought that the rules for internal programme accreditation should not be lighter than for the previous external programme accreditation approach. The team *recommends that BUT consider how institutional accreditation might be used to reduce bureaucracy through synergies.*

The team was told that the university's small central quality team used a generic quality assurance framework derived from the International Organisational Standards (ISO), in order to apply the same standards to all aspects of the university's activities, academic and otherwise. However, the team heard from academic staff who did not identify with these

industry-related standards, and concluded that quality assurance procedures were widely seen in the university as additional tasks to perform, that detracted from time available to improve teaching rather than promoting enhancement. The team also found little awareness or understanding in faculties of the Standards and Guidelines for Quality Assurance in the European Higher Education Area (ESG). The team suggests that ISO may not be the most effective framework for use in higher education and therefore *recommends that the university re-evaluate the appropriacy of the ISO methodology as a tool to establish common understanding of academic quality culture.*

Faculty staff met by the team were strongly supportive of enhancing the reputation of the university, not just that of their own faculties. Interpretations of the meaning of 'quality in education', as expressed to the team, varied widely and the team found considerable differences between faculties in their awareness and understanding of quality culture.

The team found a very strong commitment in the rectorate to developing quality culture by using evaluation as a positive process for enhancement. It was explained to the team that the term 'evaluation' had historically been associated with more judgemental national systems, and that a challenge in developing quality culture was therefore to reframe the concept and practices of 'evaluation' as reflective, developmental and constructive. The team also heard more widely that quality assurance was currently often experienced as top-down, add-on processes with low ownership by academic staff, and mostly thought of as a means of meeting external requirements rather than for promoting quality enhancement. In order to strengthen the understanding of evaluation as an integral part of developing and improving teaching and programmes of study, the team *recommends that BUT work towards ownership by staff and students of evaluation processes in order to build quality culture.*

The team saw no evidence to date of the use of quality assurance methods to drive teacher development or rewards for good teaching, and did not hear of data being routinely interpreted, understood or used at local faculty or department level for quality enhancement purposes. The team formed the impression that there was inconsistent or little use of evidence, including student feedback, to evaluate and enhance teaching or the student experience. It appeared to the team that, as the institution worked towards a more consistent gathering and reporting of data and information, this could then be used as a source of evidence to enable self-reflection and analysis for the purpose of evaluation and enhancement. The team therefore *recommends that BUT undertake more consistent collection, and make better use, of evidence to support quality evaluation and enhancement.*

The team was informed that teaching evaluation questionnaires were completed by students after every semester. Each year the rector discussed these with relevant members of academic staff, reporting to the faculty dean on their readiness to become assistant professors or professors, according to prescribed internal rules. This was then progressed through respective faculty scientific boards. The team heard that new procedures were being prepared to formalise more modern human resources (HR) processes for career development. New appointments were usually for three years; according to the law, fixed-term contracts

could only be given twice, with most staff then moving to permanent contracts. It was indicated to the team that it was difficult after that to dismiss unsatisfactory staff, which in some cases could affect student satisfaction with teaching.

The team found differing views between faculties on the use and value of student questionnaires on teaching. They were informed by staff in one faculty that these questionnaires had to be filtered because feedback was occasionally too personal. In some other faculties, however, academic staff reported that the results of student questionnaires were helpful in preparing future lectures or making changes to the course content. Staff could be asked to speak with the dean about these when feedback was very good, as well as when it was negative. Staff were unsure of student response rates and some commented that they much preferred students to write or talk with them directly, which did also happen.

A further staff view also expressed to the team was that students were often reluctant to speak or were unfamiliar with quality culture; improving effective student engagement was therefore seen as a major challenge. In one department, the team heard, staff considered student evaluations to be ineffective, because response rates were very low and the information therefore considered unreliable. The students in this department whom the team met commented that there was no motivation for students to fill in questionnaires with detailed and honest feedback as no actions were usually taken. Although one student reported that an unsatisfactory teacher had been moved to another course because of feedback from his class through both questionnaires and discussion, students generally considered that questionnaires alone would not alter anything, and that they had to exert other pressure to effect change. The team also heard, however, that staff teaching on those programmes validated by a UK university had experience of robust UK quality systems, which included gathering and using feedback from students.

Overall, the team found that the students they met expressed varying views regarding the consistency of responses to their feedback and concerns. Some reported local actions having been made as a result of their comments but most found that little changed year on year, and reported that they often received little or no response to their comments. The team therefore *recommends that the university ensure follow-up from all quality processes to provide feedback on their outcomes to involved members of BUT, both staff and students.*

The team noted that, despite being an over-lengthy and detailed document, the SER had also shown limited use of evidence to support the statements made. However, the SER had given rise to a very helpful institutional SWOT analysis document, which modelled good self-evaluation and a reflective approach to quality culture. The team therefore *recommends that BUT make full use of the strong SWOT analysis by taking appropriate follow-up actions.*

4. Teaching and learning

The team visited several faculties and institutes, and observed good investment in facilities, equipment and infrastructure, creating a high standard learning environment for students. Some opportunities existed for students to gain a broader education by taking electives from other faculties, although this varied according to programme of study, and the team was told that fewer electives were now available since mandatory elements had been strengthened. The team was also told that the credit value of courses (or modules), which formerly had been based on contact hours, was now aligned to notional student workload, which accounted for the variation of credit between courses in different subjects.

Students whom the team met, at both Bachelor and taught Master levels, were generally very satisfied with the quality of teaching on their courses, and with facilities at the university. The team was told of quite variable practices between different faculties and departments, with hours of attendance and flexibility regarding options differing between subjects. Students reported that they mostly experienced traditional lectures and practical work; students in one faculty commented that all their study materials were available online and could be easily accessed. IT equipment and laboratory resources were generally reported to be good. The team was informed by some students that, as they progressed through their levels of study to more specialisation, there were more problem-based discussions and group projects where they were required to find information and seek solutions, and that they preferred these methods of learning.

Staff reported to the team that research-informed teaching varied between faculties and that in technical subjects it was generally thought essential for students first to acquire the basic subject knowledge. The team found little evidence of consistency in research-based teaching prior to doctoral level in all areas, and suggests that students' horizons and approaches to active citizenship might be widened by promoting enquiry and engagement with research, wherever possible, at an earlier stage in their studies. The team therefore *recommends that BUT strengthen research-based teaching, particularly at Masters level, to widen the horizons of graduates.*

The team heard that, in some faculties, the numbers of academic staff who had worked at the university for many years could limit opportunities to recruit younger prospective teachers and researchers. It was explained that doctoral candidates were expected to teach but that, for those from some other countries, the requirement to teach in the Czech language could prove a major obstacle to this. Doctoral candidates often stayed on or returned later to become members of academic staff, but university salaries were not competitive compared to those in industry. As noted previously, academic managers reported that the national

funding model made it difficult to reward financially those good teachers who undertook less research.

Academic staff in different faculties reported limited experience of training available to teachers at BUT, although some faculties appeared to provide more local support than others. The team was told by some staff that they had received some pedagogic preparation early in their careers, but the picture was inconsistent; the team also heard that teaching staff, including doctoral candidates, had mostly learned how to teach through practice, by shadowing and enacting the approaches of their more experienced colleagues. It was reported to the team that a short course on preparing presentations was available but not mandatory, and that the longer courses leading to teaching qualifications related to schools rather than higher education, so were not relevant. The team therefore concluded that the education and development of academic teachers did not appear currently to be an institutional priority.

Although the SER claimed alignment with the ESG, in discussions with groups of teaching staff the team found little awareness or recognition of the concepts of learning outcomes and student-centred learning. Whilst it appeared from students' comments to the team that some student-centred methods were used in some teaching, the team found no systematic initial teacher training in place, nor any requirement or expectation that more experienced staff update their teaching skills or undertake any regular continuing professional development (CPD). Nor did the team hear of any comprehensive scheme for peer observation of teaching. The team therefore *recommends that BUT establish consistent training of new academic teachers, and CPD for existing teachers, on how to teach and assess with an explicit student-centred approach.*

All external stakeholders whom the team met were satisfied with the knowledge and professional skills of BUT alumni whom they had employed. The team was also told of work undertaken by university staff with students and teachers in some schools, to build up their awareness of science and technology. Some faculties also mentioned their good links with schools, including organising visits and competitions, to promote the awareness and aspiration of pupils to progress to study at BUT. The team heard that, due to both the demographic profile in the Czech Republic and to the high employment rates, there was increasing competition from both public and private universities to recruit students and that applications to some subjects in particular were declining. The ratio of enrolments to applications therefore varied between faculties, and the team found that BUT accepted students with diverse backgrounds and prior educational experience.

However, it was also commented to the team that many undergraduate students required a good deal of support in order to succeed, particularly in their first year. The team was told that many students initially find technical subjects difficult and often did not arrive with the prior technical knowledge needed to enable them to make an easy transition to higher level learning. This also created demands on university teaching staff, who were committed to

maintaining academic standards based on levels of knowledge. Additionally, the team was told that in some subjects there were pressures on retaining students for the full duration of their programmes of study due to the attraction of paid employment, and that many students worked part-time for financial reasons. The team suggests that it will continue to be important for BUT to recruit students from a wide range of backgrounds and with diverse prior learning and therefore *recommends the institution consider appropriate means in a competitive environment to attract applicants with the potential to develop.*

The team heard that a special unit (Alfons) was in place to support students with particular needs or disabilities and was given examples of how students had been assisted by this team. However, not all teaching staff met by the team demonstrated a strong awareness of inclusive approaches, and the team suggests that expertise in this aspect of teaching and learning might be strengthened. The team welcomed the supportive central service, which responded to students' needs, and would encourage more information about accessibility to be published, and active approaches to inclusion to be promoted to all staff, in order to minimise barriers to attracting students who may have disabilities. The team therefore *recommends that BUT encourage students with disabilities to apply for study at BUT through better information to prospective students, and ensure systematic support is widely and equitably available to current students.*

5. Research

The team heard from meetings with senior managers that recent investment had been made in the infrastructure development of research centres, including in the Central European Institute of Technology (CEITEC); this investment attracted staff and also students to undertake doctoral degrees and then became post-doctoral researchers at BUT. The team heard that the whole university aimed to improve further its performance in journal publications and in securing international or EU grants for research. The team was told that other sources of research funding included local industry, and ministries. The team observed that BUT had made sensible investment in specialist centres of research excellence, and found that a healthy amount of research funding was generated from external grants and industry, including successful applications in highly competitive research programmes such as Horizon 2020 and those of the European Research Council.

Research staff had more opportunity to generate higher incomes from grants than those who focused more on teaching. Academics in one faculty reported that, as teaching loads varied in different semesters, this provided some opportunities to balance time for writing or finishing research work. The team was informed that the rectorate implemented a reward system of bonuses when staff published a good paper. It was also suggested to the team that it would be useful to reward staff for facilitating cooperation between successful research teams and those that were less successful. In some faculties, broad collaboration involving all departments was reported to the team; another spoke of projects with other faculties and had attracted some interdisciplinary grants.

Senior managers advised the team that they were promoting top-down schemes and opportunities to stimulate greater interdisciplinary working between faculties, and the team heard from faculty representatives about funding distributed by the rectorate to support doctoral candidate research projects between faculties. Senior staff generally saw research as an institutional strength, with further scope for joint projects and inter-faculty cooperation. Although academic staff were aware of competition between some faculties and departments, the team was also told of examples of internal collaboration on projects.

The team formed the view that there was potential to increase the inter-faculty cooperation and interdisciplinary research essential for research in modern science and engineering and therefore *recommends that BUT foster interdisciplinary research projects through appropriate opportunities and incentives to reward both top-down and bottom-up approaches.*

The team heard that doctoral candidates were of significant importance to BUT, and that responsibility for them rested with the faculties. However, the team heard from several faculties that there were not always enough doctoral candidates to work on their projects, largely due to the high employment rate in the Czech Republic, and also the constrained financial situation of doctoral candidates at Czech universities. Those completing doctoral

degrees were also less likely to stay with the university than in previous years, as scientists could attract higher salaries in industry and must therefore be motivated by intrinsic scientific interest to stay in academia. They could also experience financial instability when projects ended, if they did not have permanent contracts.

Doctoral candidates told the team that they were generally very satisfied with the quality of their research supervision, and thought research work in their departments was of a high standard. They greatly valued the opportunity to work on funded grant projects which expanded knowledge. They felt that they belonged to their research teams and, in some areas, were also guided by post-doctoral researchers or by more senior doctoral candidates. However, academic staff met by the team regarded the position of post-doctoral posts as not well-established. Several doctoral candidates reported to the team that they viewed themselves as both staff and students, although they were mostly not paid for their teaching until the later stages of their studies. Students often worked elsewhere, not necessarily in jobs connected to their fields of study. The team was also told that the closure of dormitories for three months a year was problematic for those who remained at the university over the summer.

Some academic staff told the team that doctoral candidates were seen primarily as students, with primary study commitments such as examinations and defending their thesis, whereas others viewed them as valued colleagues, particularly those who were employed to work on projects. For highly-ranked publications, the team heard, there could be rewards for doctoral candidates through payments transferred from the rectorate to the faculties and departments. The team was told that the basic scholarship for doctoral candidates had historically been very low, although it had been increased by 50% in the current year (2018); some doctoral candidates also received income from research projects in which they were involved, and those affiliated with CEITEC had some additional support from income generated by the institute. The team *recommends that BUT investigate the possibilities to improve funding for doctoral candidates in order to strengthen their links to the university.*

The team heard from academic managers and staff a view that significant bureaucracy was caused by the application and reporting requirements of external funding agencies. The team heard from one area that working with the professional expertise offered by the Knowledge Transfer Office could be made more effective by the university, particularly with regards to reducing bureaucracy for academics and companies relating to contractual issues such as intellectual property rights, and EU funding rules and requirements. The team found that the distribution of responsibilities between the central office and the faculties or institutes, both for technology transfer and preparation of grant applications, was unclear. The team also suggests that the central technology transfer unit might, for example, be able to publish a systematic listing of technology transfer opportunities for industry, including equipment and services. The team therefore *recommends that BUT assist researchers in fuller use of systematic support in the preparation of applications and in technology transfer.*

Several faculties and departments reported strong collaboration with companies, which they would like to improve still further to produce top-class research. The team heard from senior managers that CEITEC had been established in 2011 to foster excellence in science, from a common EU-funded research project. Some special funding currently came from the national sustainability programme, but the institute was primarily dependent on success in obtaining international research grants. The team was told that all research groups in the centre, some involving academic collaborations, had been externally evaluated as internationally comparable, and that publication and citations rates were positive. Industry research was growing but, although some strong collaboration existed, this was not the institute's major focus.

The team heard that until research at BUT became more established and had greater success rates in EU projects, there would continue to be a reliance on collaboration with industry, which typically might involve less focus on generating new knowledge. Senior managers acknowledged that for CEITEC to become a recognised centre of research excellence, within BUT and the Czech Republic, would require efforts to be sufficiently concentrated on advanced research of publishable quality, enabling it to compete with the top universities in Europe. The same applied to other strong research areas in the university. The team therefore *recommends that BUT seek out industry collaborations for research that will lead to publishable knowledge.*

6. Service to society

The team heard from some employers of their long history of collaboration with the university, in which they felt able to influence the development and promotion of new curricula. Some individuals had also undertaken teaching at the university. In one example, catalyst funding had been made available to design a programme to fit with the industry's needs. The team was told of mutual cooperation on faculty scientific boards, with open discussion between external representatives and academics.

Employers informed the team that they ideally wanted graduates who were specialists but also had broader knowledge and skills. They required a solid understanding of technical subject knowledge, and could then offer opportunities to develop soft skills, and even languages, whilst in employment. Some acknowledged that graduates could not be specialists in every field, and might develop their knowledge base through working on a real project. Because of low unemployment, employers were keen to employ students as soon as possible, whilst also encouraging them to finish their studies. They explained that they sought to employ Bachelor degree graduates because, in their view, the former technical schools no longer provided the traditional route to employment. Employers stated that they also needed Masters and doctoral graduates, but in the right proportions, and suggested a national strategy was required. Some were keen to get their employees back into education to undertake Masters degrees, others less so.

The team was told that some employers had commissioned commercial research from BUT, which had sometimes been co-financed, for example through EU funds. Employers were very complimentary about the university's scientists and the capability of the academics they had worked with to deliver within project timescales. The team also heard from BUT staff that companies were able to pay directly to use the equipment in the laboratories of CEITEC, which also provide some targeted financial subsidies for use of their open access laboratories.

The team heard of employer support for national and regional student competitions. The university's co-financing of the South Moravian Innovation Centre was commended as an important contribution to facilitate start-ups and incubation. Employers told the team that they were keen for BUT to attract more entrepreneurs into the university, to share their knowledge and further break down barriers between academia and industry, and proposed the idea of a 'professional professor'. It was also suggested by employers that this might be a useful influence on academic teaching staff, and that more sabbaticals in industry for academics would be beneficial.

The team learned that stakeholders found that BUT provided well-educated graduates for relevant fields and generated ideas for spin-off companies based on research, through which the university provided not only technology but also knowledge transfer. The team also heard of an example of successful technology transfer activity in the field of environmental protection. Although there had been successes, the team heard the view that there was

greater potential for further developments of this type, for example by making better use of doctoral research and encouraging students to interact with industry. The team therefore *recommends that BUT seek ways to foster an entrepreneurial mindset in graduates.*

The team heard of some very positive initiatives with secondary schools to raise awareness of, and aspiration in, technology, and to generate potential applicant students for technical subjects. It was reported to the team that schools found it valuable to keep up-to-date in new developments in science and technology, and to maintain awareness of the knowledge their students would need when progressing to BUT. Furthermore, the team was advised that BUT worked to promote knowledge of science and technology amongst students of other subjects. The team suggests that such activities might also usefully extend to work with younger children in primary schools or kindergarten and *recommends that BUT sustain and expand where possible the cooperation with schools, involving both staff and pupils.* The team also notes that students can be influential in generating interest and motivation towards science and technology, and in doing so can gain skills and experience to enhance their own employment prospects. The team therefore *recommends that BUT raise students' awareness of their societal responsibilities and activate them as ambassadors of their study field.*

The team heard that the University of the Third Age was well-established at BUT and saw evidence that this was a strong and valued initiative. The team also heard that some professors deliver public lectures, and that this was an inexpensive way of extending BUT's public engagement. The team was advised that BUT did not currently consider the development and delivery of open online courses for wider public availability to be a major priority, as development was expensive, but that it might be considered at some future point. The team *recommends that BUT offer more public lectures for the wider society and consider the possibilities for offering open online courses in due course.*

The team saw and heard evidence of the contribution made by BUT to cultural life, particularly to the arts and the architectural development of the city. External stakeholders informed the team that the energy and ideas generated by BUT were influential and valued. The team also heard of provision by the Lifelong Learning Institute (LLI) of CPD courses for professionals, which might be specifically commissioned by an external organisation. The LLI also offered some free courses, for example in management, IT, soft skills and languages, for both students and staff of the university. The team formed the view that there were further opportunities for a more extensive range of provision to be commercially developed and *recommends that BUT consider the scope for expanding the offer of CPD for external professionals more systematically.*

The team heard from external stakeholders of a wide range of examples of the positive influence of BUT's activities on Brno's employers, schools, architectural development and other cultural activities and *recommends that BUT continue to extend and expand upon its current broad impact on society.*

7. Internationalisation

Senior managers explained to the team that there were current limitations to internationalisation at BUT, despite the university having programmes complementary to others in Europe. The team heard from their meetings that staff mobility was limited largely due to the comparatively low incomes and living costs in the Czech Republic relative to elsewhere in Europe. A good number of Erasmus agreements were in place and the team was told that currently about 20% of students go abroad in the course of their studies, with a university target of 40%. BUT offered some support to students, and was hoping to encourage industry partners to also support students to go abroad.

The team was informed that no tuition fees were charged to students taking programmes taught in the Czech language, regardless of nationality. However, one of the main obstacles to attracting more international students was that they found the Czech language difficult to learn, and that BUT was required to charge fees for programmes taught entirely in English. Some foreign doctoral candidates reported difficulty in gaining teaching experience if they were unable to teach in Czech, and the team saw evidence that very few students registered for programmes of study in the English language. The team understood from faculty staff that slightly different arrangements applied to those studying on joint programmes with a UK university. The team heard that for historical reasons and different locations in the city, two faculties each had their own department of foreign languages, one of which also serviced two other faculties. This department also provided study programmes which produced students able both to write in English and to understand the technical background, but such opportunities were not widely available across the university.

The team saw and heard evidence that a high proportion of foreign students at BUT were from Slovakia and the former Soviet Union, and able to study in the Czech language. Senior staff told the team that they would like to improve the recruitment of international students from elsewhere, and that the strategy of the international department was under review. Some employers the team met acknowledged the issues in bringing more international students to Brno, but thought there were further marketing opportunities, although the university was trying to advertise and promote the attractions of the city. The team noted the importance of English in the field of science and technology, and formed the view that the fees charged for programmes taught fully in English were a deterrent both to foreign students applying to BUT, and also to Czech students aiming to study, do research or work abroad. The team therefore *recommends that BUT analyse the possibilities to reduce the deterrent of high fees for English taught study programmes.*

Although they saw evidence that faculties had very few incoming staff from abroad, the team heard of some joint programme links with other European institutions and of some good initiatives for short-term exchange mobility and international research projects. BUT was also exploring external funding schemes offering increased opportunities to attract incoming staff.

The team heard a view that, due to accreditation restrictions, it could be difficult to integrate lectures by visiting professors from abroad into the standard curricula, although single extra lectures were organised with foreign visiting researchers. CEITEC, as a specialist research institute, was better placed than some other academic areas to recruit internationally; however, although about a third of their doctoral intake were foreign, the team heard that employment rules could cause difficulties in appointing foreign staff.

Some academics met by the team had undertaken internships abroad, which they had found valuable in breaking down isolation; these staff had been encouraged by their department heads and stated they were likely in turn to encourage their doctoral candidates to study beyond BUT as part of developing a scientific career. It was reported to the team that more paperwork was involved in applying for central BUT support than in using project income, and that those researchers would use their own funding for travel if possible, to free up university-wide funds for colleagues. Some who had visited another European country under the Erasmus+ programme noted that the bureaucracy associated with this arose from the EU or national agency, not from the university. The team *recommends that BUT investigate how numbers of incoming and outgoing lecturers could be more balanced, using foreign guest teachers as a starting point for more research cooperation, international teachers and students, as well as joint and double degrees.*

The team heard from Czech students whom they met about varying levels of interest in a period of mobility abroad. Reasons cited for undergraduates not doing so included bureaucracy, uncertainty over the relative standards of other universities, local commitments, and not wishing to leave Brno. The team heard from academics that doctoral candidates should spend at least three or four months abroad, although they also heard from doctoral candidates that not all wanted to travel or were able to do so. Although the team found that doctoral candidates they met were more likely to have travelled, particularly those who were associated with projects already collaborating with research institutes abroad, they also saw reports of very low percentages in some subjects of doctoral candidates going abroad.

The team was told that, although all programmes were encouraged to include at least one course (module) taught in English, this was not consistently done in practice. There was also no central unit for teaching foreign languages. The team heard from students they met that in reality only a few of the student population spoke English. The team concluded that there appeared to be no compulsory requirement for Czech students to learn English, and believed this to be limiting for graduate careers in science and technology. The team *recommends that BUT develop some compulsory main programme modules in English for all students.*

Some employers whom the team met commented that BUT could encourage more students to travel beyond the Czech Republic to gain international experience in a more competitive environment, and that their companies would benefit from such intercultural knowledge. The team was told of some small sponsorships available from companies for students or alumni to gain more international experience. Employers informed the team that they wanted

graduates who could speak English and other languages and that, although graduates' standard of English were not currently thought to be good, this was improving. The team *recommends that BUT provide attractive, interactive courses in English communication for students.*

The team was told by some international staff that they had felt the university had not been well-prepared centrally to receive them, and that they had relied on their own contacts for orientation to life in the Czech Republic and Brno. To attract more international staff and students, they thought that BUT needed to adapt. They also reported that had been difficult initially to navigate university administration, since all records and communications were in Czech. It was suggested to the team that the university could display more intranet information in English, and become more outward-looking.

Most international students who met the team told them that it would be beneficial to bring more foreign students into the university and strongly supported BUT's efforts to do so. Students from several countries were very satisfied with the quality of teaching, supervision and facilities at BUT in comparison to those in their own countries. One doctoral candidate, who was also teaching foreign students, thought that there was a difference between the university's stated aim to attract students and how it dealt with this in practice. The team again heard the view that the university was not ready for foreign students who want to study in English, but only those who can study in Czech. Students felt that the university was trying to involve foreign students more, but had not been fully successful so far. The team *recommends that BUT strengthen the central welcome and support services for international students and staff.* The team also *recommends BUT provide all information for students and staff also in English.*

The team concluded that there was a relatively low level of internationalisation in some areas compared to other European institutions of a similar type. It also appeared to the team that the English skills of most students and staff were limiting achievement of better internationalisation. The team suggests that it is important for university teachers not only to remain updated in their teaching skills, but also to have the specialist vocabulary and terminology be able to teach their scientific and technical subjects in English. The team therefore *recommends that BUT offer its teachers specialist courses in how to teach their subject in English.*

8. Conclusion

Brno University of Technology is one of the leading technical universities in the Czech Republic, with a long tradition of technical education and research. The team found it to be an important player in the environment of the technology industry and to have some centres of excellence in research. The team was impressed by the high level of commitment shown by its leadership, its staff and its students.

To sustain its position, the team believes that it will be necessary for BUT to confront the challenges of the present day. BUT is a strong institution, which continues to develop in a positive direction, and has a visionary strategy and committed leadership. However, although its strategic documents articulate a strong vision, constraints in resources and structure make it necessary to prioritise aspects of its implementation.

Summary of the recommendations

Governance and institutional decision-making

- Initiate a review of all support processes to clarify the balance of both responsibility and enactment at faculty and central levels, respectively, and to minimise duplication;
- Establish more consistency of data between faculties and the central level, and the use of a shared, comprehensive tool or information system, for transparent evidence-based decision-making;
- Consider how structures might be used to facilitate more interdisciplinarity in research and education to meet the current needs of the technological sector and of society;
- Consider that planning for longer than five years may be necessary in order to tackle some of the structural and legal constraints.

Quality culture

- Consider how institutional accreditation might be used to reduce bureaucracy through synergies;
- Re-evaluate the appropriacy of the ISO methodology as a tool to establish common understanding of academic quality culture;
- Work towards ownership by staff and students of evaluation processes in order to build quality culture;
- Undertake more consistent collection, and make better use, of evidence to support quality evaluation and enhancement;
- Ensure follow-up from all quality processes to provide feedback on their outcomes to involved members of BUT, both staff and students;
- Make full use of the strong SWOT analysis by taking appropriate follow-up actions.

Teaching and learning

- Strengthen research-based teaching, particularly at Masters level, to widen horizons of graduates;
- Establish consistent training of new academic teachers, and CPD for existing teachers, on how to teach and assess with an explicit student-centred approach;
- Consider appropriate means in a competitive environment to attract applicants with the potential to develop;
- Encourage students with disabilities to apply for study at BUT through better information to prospective students, and ensure systematic support is widely and equitable available to current students.

Research

- Foster interdisciplinary research projects through appropriate opportunities and incentives to reward both top-down and bottom-up approaches;
- Investigate the possibilities to improve funding for doctoral candidates in order to strengthen their links to the university;
- Assist researchers in fuller use of systematic support in the preparation of applications and in technology transfer;
- Seek out industry collaborations for research that will lead to publishable knowledge.

Service to society

- Seek ways to foster an entrepreneurial mindset in more graduates;
- Sustain and expand where possible the cooperation with schools, involving both staff and pupils;
- Raise students' awareness of their societal responsibilities and activate them as ambassadors of their study field;
- Offer more public lectures for the wider society and consider the possibilities for offering open online courses in due course;
- Consider the scope for expanding the offer of CPD for external professionals more systematically;
- Continue to extend and expand upon its current broad impact on society.

Internationalisation

- Analyse possibilities to reduce the deterrent of high fees for English taught study programmes
- Investigate how numbers of incoming and outgoing lecturers could be more balanced, using foreign guest teachers as a starting point for more research cooperations, international teachers and students, joint and double degrees
- Develop some compulsory main programme modules in English for all students
- Provide attractive, interactive courses in English communication for students
- For teachers, offer specialist courses in how to teach their subject in English

- Strengthen the central welcome and support services for international students and staff
- Provide all information for students and staff also in English.