A review of technological university academic career paths, contracts and organisation in Ireland

Irish authorities are reshaping the nation's higher education landscape, creating a network of technological universities (TUs) that merge, build on, and extend the mission of the country's institutes of technology (IoTs). Its emerging technological universities are tasked by the Technological Universities Act of 2018 with providing research-informed teaching and learning across all levels of higher education, linking their programmes to the needs of their region's citizens, businesses and professions.

The technological university system cannot fully achieve the expectations set out in the Technological Universities Act with an employment model first developed more than five decades ago for its regional technical colleges, and subsequently elaborated for its successor institutes of technology. The current academic career structure of Ireland's emerging TU institutions, the organisation of academic work, and the management and leadership structures of TUs are impediments to an expanded research profile and research-informed teaching; to deeper engagement with knowledge needs of communities and regions; and to a wider offer of flexible learning to meet the nation's reskilling and upskilling needs.

This paper was commissioned by Ireland's Higher Education Authority and Department for Further and Higher Education, Research and Innovation, who asked the OECD to identify a set of benchmark higher education institutions from other OECD countries that can provide insights for the development of future Irish technological universities through examination of their human resource policies, career paths and organisational structures. Drawing upon this evidence, and analysis of current policies in Ireland's institutes of technology and technological universities, this analysis identifies options for new career and employment contracts and organisation structures.

The brief was prepared in the OECD Secretariat by Thomas Weko, with the assistance of Gillian Golden and Roger Smyth. We are especially grateful for the time and input of the many higher education stakeholders in Ireland who were interviewed in the preparation of this document.

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Introduction

Ireland aims to ensure it continues to transform its economy and society, with the goal of further improving national competitiveness through the delivery of enhanced higher education teaching and learning, research, and engagement activities. This quest led the government to establish an ambitious set of National Strategic Outcomes in its National Development Plan 2018 – 2027[1]. To achieve these outcomes, it aims to deepen the skills of its population, strengthen strategic research and innovation to meet emerging regional challenges, and to build economic clusters that lead to more balanced regional development.

In support of these national ambitions, Irish authorities have begun to reshape the higher education landscape, commencing with a new network of technological universities, established under the Technological Universities Act 2018. Technological universities are to build on and extend the mission of the institutes of technology (IoTs), providing research-informed teaching and learning across all levels of higher education, linking their programmes to the needs of their region's citizens, businesses and professions. Research excellence is to be purpose-driven and internationally engaged, supporting regional entrepreneurship, enterprise development, and innovation in business. Teaching is to be innovative in delivery, open to apprenticeship and work-based learning, accessible to first-generation learners, and sufficiently flexible to meet the needs of working learners seeking to upskill and reskill.

The Irish Higher Education Authority (HEA) and the Department of Further and Higher Education, Research, Innovation and Science (DFHERIS) asked the OECD to identify a set of benchmark higher education institutions from other OECD countries that can provide insights for the development of the profile of the future Irish technological universities, and to describe and analyse their academic human resources policies, career paths and organisational structures. Informed by knowledge of international practice and consultation with Irish higher education stakeholders, the OECD was to identify options for academic contracts, academic careers, and organisation structures that can inform decisions on the further development of Ireland's technological universities. These options should support technological universities to establish conditions that permit talented and dedicated academic staff working in the sector to reach their full potential as scholars, as pedagogical innovators, as partners with professions and enterprises, and as academics fully engaged with the possibilities afforded by the European Higher Education Area and the European University agenda. This deepened European connection offers TU students wider opportunities to engage with European scholars and peers, and can provide the regions they serve with access to enhanced innovation and engagement opportunities, including funding.

The OECD has analysed how academic careers and work are organised in Ireland's emerging technological universities (TUs), and how academic management and organisational leadership is organised in faculty and institutional structures. It has compared these features of TU institutions and existing institutes of technology to those of international benchmark universities. It has consulted widely with stakeholders in the Irish higher education system to take their views of these matters, and it has closely examined government policy documents, reports and studies, and labour agreements.

The OECD team finds that IoTs and emerging TUs play a critical role in Ireland's learning landscape, delivering quality education across levels 6-10 of the Irish qualifications framework, and offering opportunity for first-generation higher education learners. They have built important community and industry links, and increasingly perform research and support innovation that benefits the nation's enterprises and regions. They have travelled a great distance since their inception as regional technical colleges, and have done so based on an employment model principally grounded in teaching activities.

However, the TU system cannot fully achieve the expectations set out in the Technological Universities Act 2018, or the vision of its future articulated by the Technological University Research Network and by social partners, based on the employment model of decades past. The current academic career structure

[1] Since updated to the National Development Plan 2021-2030.

of Ireland's emerging TU institutions, the organisation of academic work, and the management and leadership structures of TUs are impediments to an expanded research profile and research-informed teaching; to deeper engagement with knowledge needs of communities and regions; and to a wider offer of flexible learning to meet the nation's reskilling and upskilling needs.

High-performing institutions in other countries identified as medium-term or aspirational peers for the technological universities of Ireland have established academic contracts, career structures, workload models, academic leadership and organisational structures comprehensively different to those in place in Ireland's emerging TU institutions. While taking note of the distinctive character and mission of TUs, and the need to allow distinctive profiles among these institutions, the OECD team advises that Ireland should substantially revise the career model, academic contract, and capacities of the departments and faculties within which the academic staff of TUs work. This will require, most importantly, a change in the employment contract. We envision all newly hired academics to be employed on the basis of this new contract, as well as TU/IoT staff who volunteer to take it up, seeing in it an opportunity for expanded professional growth and achievement. It will also require a re-examination of the academic management and leadership capabilities of the key organisations that support their work – the TU departments, schools, and faculties.

We recognise that the details of the future TU academic career will be set through public law and collective bargaining. This bargaining should include emerging TU institutions, as they bear responsibility for the implementation of terms agreed. Thus, this document offers a high-level sketch of reform options, linked to principles that should underpin a new vision of employment.

In Part One of this report, we describe the project's terms of reference and methods. We also acknowledge key issues identified by stakeholders that merit attention in future, but lie outside the scope of this review. In Part Two, we provide a peer comparison. Drawing upon a sample of successful technological and technical universities from across the OECD, the OECD team has compared key policies they follow with respect to academic careers, employment contracts, and academic management and leadership structures, comparing these to Irish TU/IoT policies. Part Three outlines a proposed revision of contracts, academic careers, and academic leadership, describing how these might be implemented.

Part One: Terms of reference and methods

Terms of reference

The DFHERIS and the HEA asked the OECD to provide policy advice and an international perspective on the question of how careers paths, contracts and organisation of its emerging technological universities could be redesigned to best support their mission. The international perspective of the OECD is intended to complement prior national research undertaken on the subject, such as the review of lecturing in Irish technological higher education undertaken by Collins et al (2020[1]), and the themes emerging from it. In particular, the DFHERIS and the HEA asked the OECD to:

- undertake consultation with stakeholders to confirm the ambitions set by government for technological universities;
- identify a set of higher education institutions from other OECD countries that have institutional characteristics comparable to the future Irish technological university profile, to be used as a benchmarking sample;
- map key aspects of human resources policies in the higher education institutions identified in the benchmarking sample;
- identify a range of options for the model of the academic career structure and employment contract to inform decisions about Ireland's evolving technological universities;

- re-engage with stakeholders to consider these preliminary options.

Key questions outside the terms of reference

Stakeholders raised two concerns in consultation meetings and written submissions that fall outside the terms of reference for this project, but which raise important questions about the emerging TU system that merit attention, and which may have implications for the design of new terms and conditions for academic staff in TUs.

The first concern centres on how Ireland will ensure that that its technological universities develop as a coherent sector with a distinctive profile, equal in esteem to traditional universities but with a recognisably different profile. In brief, these are concerns of sectoral integration and differentiation.

With respect to sectoral integration, stakeholders noted with concern that not all technological universities have chosen to remain affiliated to the Technological Higher Education Association, the body formed in 2017 to be "the voice of the technological higher education sector." Governments aim to shape the higher education institutional landscape to meet national needs. However, it is equally important that technological universities themselves, in association with one another, collaborate to define this landscape, and their place within it. Opting out of a common associational life impairs the development of technological universities as a distinct sector within Ireland's higher education landscape.

With respect to differentiation, stakeholders observed that a number of Ireland's traditional (or, "legacy") universities, especially its recently established institutions, are strongly committed to professionally-focused education, robust regional engagement, practice-informed research, and the development of brief, flexible and targeted upskilling opportunities for working learners, most of whom will have completed their initial post-secondary education. Thus, some noted, it is difficult for the emerging TU sector to establish and maintain a profile and remit clearly different to that of traditional universities.

Most interlocutors with whom we met cited the breadth of qualifications awarded by TU institutions – from levels 6-10 of the Irish National Qualifications Framework – as a key point of differentiation between traditional and technological universities. Others cited a distinctive pedagogical model characteristic of IoT/TU institutions, marked by small class sizes and close contact between learners and instructors. However, some interlocutors expressed concern that TU institutions may become distinguishable from traditional universities principally by the social profile of their student intake – rather than their institutional profiles or their engagement with enterprises and regions. Whether these patterns emerge within Ireland's higher education system will depend, in important measure, upon decisions taken by public authorities on the system's research and institutional funding policies, among others. In developing recommendations with respect to academic careers, contracts and organisation, the OECD review team is mindful of the distinctive TU vision articulated in law and expressed in our stakeholder consultations. Our recommendations aim to support the further development of a distinct technological sector of higher education, recognising and rewarding academic excellence in its pedagogical, engagement and research missions.

A second concern shared with the OECD review team is how multi-campus institutions will function within the new TU system, and whether there will be sufficient parity among campuses within an institution to ensure that the regional needs they serve are met adequately and equitably. As the Teachers' Union of Ireland (TUI) has stated the matter: "It is important that there is equality and equity of governance, administration and programme delivery across all campuses." In the view of the OECD review team, this is principally a question of setting policies with respect to institutional governance and resource allocation – policies that are outside the scope of a review of academic careers and contracts. Our analysis of academic management and leadership in TU institutions focuses on the role of departmental and school/faculty leaders, and the executive leadership teams that are typical of technological universities. The proposals we offer aim to strengthen the strategic academic leadership capabilities of departments

and schools – and enhance leaders' capacity to manage and co-ordinate the provision of programme delivery across locations.

Study methods

The OECD study team has based its analysis upon three principal sources of information: consultation meetings with stakeholders from the IoT/TU system, including written submissions they provided to the study team; documents and interviews with a set of comparison institutions; and published research from studies of relevant higher education systems and institutions across the OECD. The study methods were designed to provide analysis complementary to other important recent reviews of the sector, including a Review of Lecturing in IoT/TUs conducted in 2020 (Collins, Crowley and Quinlan, 2020[1]) and the 2019 report of the Technological Universities Research Network (TURN, 2019[2]).

Consultation

The team carried out consultation meetings by videoconference between May and December 2021 with a range of stakeholders and actors in the Irish technological higher education sector.

Table 1. Consultations carried out by the OECD team during the review

Organisation consulted (staff roles and responsibilities)
Presidents of Institutes of Technology and Technological Universities – TURN Group
Department of Higher and Further Education, Research, Innovation and Science (Assistant Secretaries, External Staff Relations and human resource managers)
Higher Education Authority staff (CEO, senior management, System Development and Performance Management Committee, budget and statistical staff)
IoT/TU Heads of Department (SL2) and Heads of Faculty/School (SL3)
IoT/TU institution senior management (Heads of Research and Innovation, Registrars, Senior staff responsible for academic affairs and human resource management)
IoT/TU institution staff representatives (Teachers Union of Ireland)
Previous report authors (TURN report and the Review of Lecturing report)
Quality and Qualifications Ireland staff

Benchmarking

To inform the development of options for policy, the study team identified a set of benchmark higher education institutions from OECD countries other than Ireland. We chose these institutions according to the following criteria:

- They meet, or largely meet, the description of and criteria for the term "technological university" (Marginson, 2011[3]), in mission, profile, teaching and research focus, leadership and governance, and international outlook.
- Their performance metrics suggest successful operation as a technological university.
- They represent a range of the higher education traditions across different regions of the OECD, including Continental Europe and Anglophone systems of Scotland (United Kingdom), Ontario (Canada), New Zealand and Australia.

The benchmark institutions have a similar focus as that envisaged for the Irish technological universities: they are higher education institutions deeply connected to industry and to their communities, and produce graduates who are work-ready, whose teaching is both practice-informed and research-led, who produce research that is leading-edge and, in most cases, applied. They resemble the institutions Irish TUs are

becoming – or aim to become in future. The principles and policies they share concerning academic careers and working responsibilities provide a benchmark against which we compare the current policies of Ireland's technological universities, and on which we base, in part, options for reform.

The study team selected institutions by reviewing data contained in the pilot OECD Analytical Database of Higher Education Providers (ADHEP) to find suitable benchmarks. The database encompasses more than 10 000 higher education institutions in 37 OECD countries, and contains information on institutional characteristics and geographical location, and institution-level indicators on enrolment, staff and finance. The institutions selected for comparison include those operating as technological universities for many decades, and universities that have evolved in recent years from the restructuring of technical or further education institutions.

To support the analysis provided in Part Two of this report, the OECD team conducted a review and analysis of key policy documents available on the websites of the benchmark institutions. These included job announcements, official documents describing the institution's academic and career policies, tenure guidelines, mission statements, organisation charts, department and faculty webpages, and annual reports. The project team also created a dataset comprising key indicators of the institutions' resource availability, research productivity, focus on advanced education and science, technology, engineering and mathematics (STEM) intensity. In addition, the team conducted in-depth interviews with senior leaders at seven of the institutions, to achieve a more comprehensive insight into their academic staff policies and the operation of their institutions.

The institutions benchmarked for this study, along with the information sources used, are set out in Table 2. In Part Two of the report, we draw upon these sources of information to lay out an account of the principles underpinning the academic careers, the employment contracts and the organisation of academic leadership in these institutions, and the policies they typically adopt to carry those into practice.

Table 2. Benchmark institutions for the technological universities in Ireland

Institution name and country	Brief name	Year of establishment as a university	Sources of evidence
Queensland University of Technology (Australia)	QUT	1989	Policy documents, interview
Royal Melbourne Institute of Technology (Australia)	RMIT	1992	Policy documents
The University of South Australia (Australia)	UniSA	1991	Policy documents
University of Technology Sydney (Australia)	UTS	1988	Policy documents, interview
TU Wien (previously known as Vienna University of Technology) (Austria)	TU Wien	1975	Policy documents, interview
Ryerson University (Canada)	--	1993	Policy documents, interview
University of Ontario Institute of Technology (Canada)	Ontario Tech	2002	Policy documents, interview
Lappeenranta-Lahti University of Technology (Finland)	LUT	1969	Policy documents
Brandenburg University of Technology Cottbus-Senftenberg (Germany)	BTU	1991	Policy documents, interview
Technical University of Munich (Germany)	TU Munich	1868	Policy documents
Delft University of Technology (The Netherlands)	TU Delft	1905	Policy documents
Eindhoven University of Technology (The Netherlands)	TU/e	1956	Policy documents
Auckland University of Technology (New Zealand)	AUT	2000	Policy documents
Royal Institute of Technology (Sweden)	KTH	1827	Policy documents
Swiss Federal Institute of Technology in Zürich (Switzerland)	ETH	1855	Policy documents
The University of Strathclyde (United Kingdom)	--	1964	Policy documents, interview

Part Two: International benchmarks and TU/IoT institutions

There is wide experience across the OECD in the establishment and management of highly successful technological and technical universities. This experience provides principles and practices that Ireland's emerging TU sector can draw upon – and adapt to its own circumstances – as it sets a course for careers, employment contracts and academic leadership in its newly-formed TU institutions.

We introduce this experience with a brief quantitative profile of the technical and technological universities that we have chosen as benchmark institutions, setting them in comparison to one another, and to Ireland's TU institutions. The strong performance of these benchmark institutions sets an aspirational reference point for the decade ahead, making them a useful source of insight for an emerging higher education sector.

Some of these institutions identify themselves as *technological* universities, while others designate themselves as *technical* universities, either on a legal basis, or in their communications and institutional branding. European universities – especially German, Dutch and Austrian institutions – most often identify themselves as technical universities, reflecting their origins in engineering, a strong, sometimes exclusive, focus on science, technology, engineering and mathematics (STEM) fields (Figure 1 below), and a close link to manufacturing firms. Their counterparts in Australia, New Zealand and Canada principally identify themselves as technological universities, reflecting a wider institutional focus that includes STEM fields, but also professionally-focused education in fields of knowledge central to modern service-led economies, both business and human services. This report uses the names interchangeably, while taking note of differences among the institutions, which we describe below.

Regardless of nomenclature, the performance of these benchmark institutions is grounded in the accomplishments of their academic staff – and, in turn, how the careers of these staff are organised, how their contracts structure and support their academic work, and how academic and institutional leadership is organised. Thus, we examine these three principal features – careers, contracts, and leadership – with the aim of finding principles and policies that the benchmark institutions share with one another, and upon which Ireland's higher education system can draw.

Key quantitative indicators for the benchmark institutions

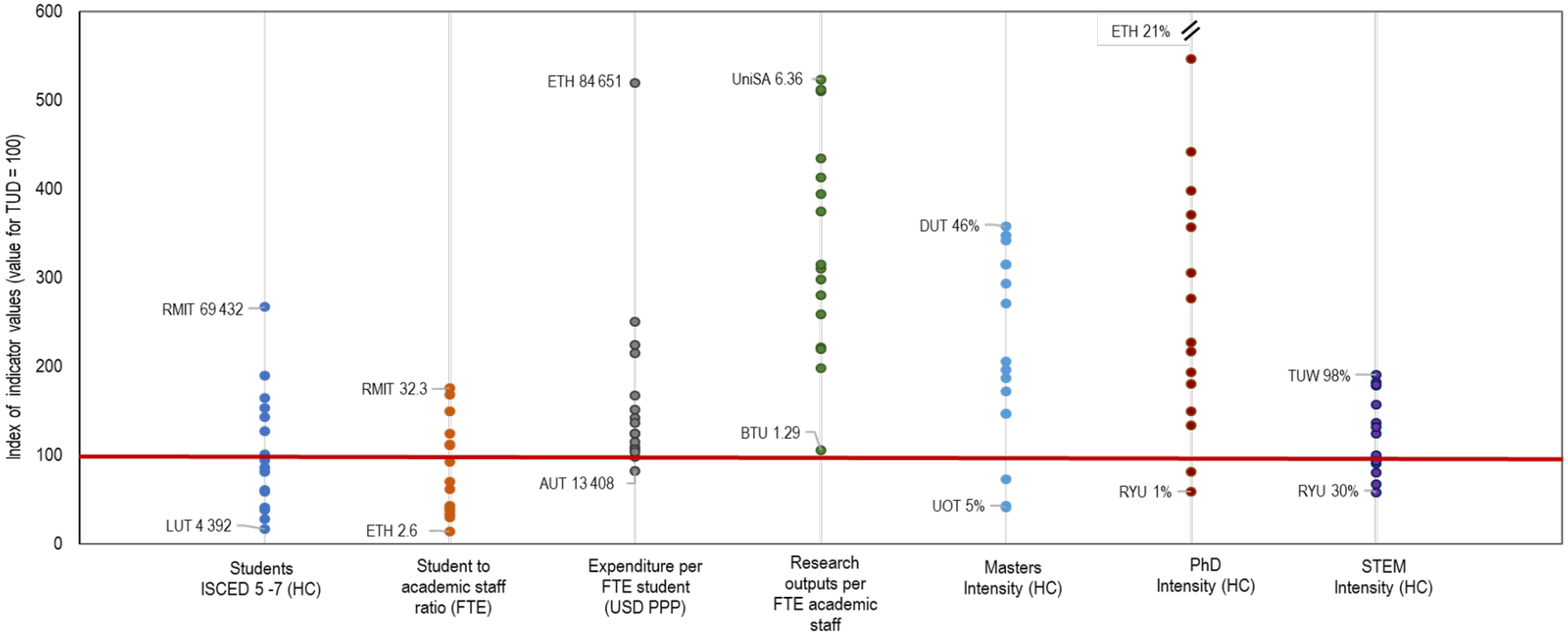
For quantitative indicators, the benchmark institutions are set in comparison to Technological University Dublin (TU Dublin), the largest and first of Ireland's technological universities. The benchmark universities differ from one another and from Ireland's IoT/TU institutions in a range of ways, as the indicators in Figure 1 show. To simplify comparisons, we have created a scale in which the estimated relative value of each member of the benchmarking cohort is compared to Technological University Dublin (TUD = 100).

Among TU/IoT institutions, TU Dublin is closest to the median of the benchmark set of institutions – in terms of size (the number of students enrolled at ISCED levels 5-7) and its level of STEM intensity (the share of its students enrolled in STEM subjects). The intensity of its postgraduate instruction (at the master and especially doctoral level) is lower than the benchmark median, as is its research intensity (measured as research outputs per full-time equivalent (FTE) academic staff). TU Dublin's ratio of students to staff is slightly higher than the median of the benchmark set. However, comparable student to academic staff ratios are especially difficult to estimate. Unlike teaching-led institutions, highly research-intensive institutions often employ relatively large shares of research and scientific staff whose teaching responsibilities are reduced or non-existent (for example, post-doctoral researchers). If one compares benchmark institutions with similar levels of PhD and/or STEM intensity to TU Dublin – those which are likely to have a comparable share of teaching-active staff -- one finds this subset of benchmark universities has higher student-staff ratios than TU Dublin, examples of which include Ryerson University (31.0:1), University of Ontario Institute of Technology (27.5:1) and Queensland University of Technology (22.9:1).

Viewed through the lens of financial resources, research intensity, postgraduate intensity and STEM focus, the benchmark institutions show important differences from one to another. On average, the benchmark institutions demonstrate greater levels of research activity and impact, provision of advanced education and available financial resources than TU Dublin and by extension, the rest of Ireland's IoT/TU institutions. As such, many of them represent a medium-term aspiration for the emerging TU sector.

Figure 1. Estimated resource envelope, instructional profile and research performance of the benchmark institutions

Estimated relative value of each member of the benchmarking cohort compared to Technological University Dublin (TUD = 100)



Notes: HC refers to headcount. FTE refers to full-time equivalent. Full-time equivalent student numbers are estimated for some benchmark institutions using national UOE (UNESCO, OECD, Eurostat data collection) ratios for headcount: full-time equivalent. Data for each indicator refer to the most recent year with complete data available: 2016 for institutions located in Austria, Finland, Germany, Netherlands, Sweden, Switzerland and the United Kingdom, 2018 for institutions located in Canada and New Zealand, and 2019 for TU Dublin and institutions located in Australia. Research outputs are calculated as an average of outputs for 2018-2020 for benchmark institutions, and refer to 2020 only for TU Dublin. RMIT = Royal Melbourne Institute of Technology. LUT = Lappeenranta-Lahti University of Technology. ETH = ETH Zürich. AUT = Auckland University of Technology. BTU = Brandenburg University of Technology Cottbus. UniSA = University of South Australia. DUT = Delft University of Technology. UOT = Ontario University of Technology. RYU = Ryerson University. TUW = Technological University of Vienna.

Source: OECD calculations on data from ETER (n.d.[4]), European Tertiary Education Register (database) https://www.eter-project.com/; CUDO (n.d.[5]) Common University Data Ontario (database) https://ontariosuniversities.ca/resources/data/cudo; DESE (n.d.[6]) Selected Higher Education Statistics (database) https://www.dese.gov.au/higher-education-statistics/student-data/selected-higher-education-statistics-2019-student-data; Education Counts (n.d.[7]) Education Counts (database) https://www.educationcounts.govt.nz/statistics?; Higher Education Authority (n.d.[8]) Statistics (database) https://hea.ie/statistics; Dimensions (n.d.[9]) (database) https://app.dimensions.ai/discover/publication (all accessed on 12 January 2022).

Notwithstanding differences in key indicators of activity and performance, the benchmark institutions share with one another a common orientation to engagement with enterprises and professions, impact through research and teaching in fields of applied knowledge, and a commitment to transferring and applying knowledge for commercial and social benefit. They also share a broadly similar outlook with respect to the structure of academic careers, the allocation of academic work, and the organisation of academic leadership and management.

The following sections provide an analysis of the policies and practices of the benchmark universities and an assessment of the main points of difference between the benchmark institutions and the Irish IoT/TU sector as it currently stands.

Academic careers

The benchmark institutions examined in this project manage their academic careers in varied ways, creating career pathways of varying length and levels of diversification. However, three shared aims underlie the career structures they have established. First, they endeavour to create a career structure that permits the competitive recruitment and retention of highly able academics on a national and international basis. Second, they aim to establish career pathways that recognise and reward professional growth and excellence across the range of institutional missions, and the full length of the academic career. Third, through the design of their career policies, they aim to encourage widely distributed academic leadership among their professors – in the mentoring of junior staff, in the direction of research programmes, in the design and renewal of curriculum in a field of study, and in developing relationships with regions and enterprises.

To that end, these institutions structure the careers of permanent academic staff by a system of ranks, through which staff advance by demonstrations of achievement. These ranks are organised into career ladders that contain professorial ranks – either exclusively, as is common in European technical universities – or in combination with lecturer posts that culminate in one or more professorial ranks, as in Australia, New Zealand and Scotland. The career ladders vary in length, ranging from three ranks (typically Assistant, Associate, and Full Professor) to five ranks: Assistant Lecturer, Lecturer, Senior Lecturer, Associate Professor, and Professor. External candidates may enter at each rank for which they are qualified by experience and achievement, and progress from one rank to another based upon a demonstration of merit. The common denominator among benchmark institutions is a career structure with a sequence of ranks that provide opportunities for advancement through the career, and strong incentives for continuous professional growth, achievement, and progressive responsibility. This common core of ranks and shared nomenclature provides these institutions with a wide basis for the recruitment of entering staff, and facilitates mobility among experienced academics (Table 3).

Table 3. Career structures in the benchmarked institutions

Institution name	Permanent Academic Staff categories
Queensland University of Technology	Associate Lecturer --> Lecturer --> Senior Lecturer --> Associate Professor --> Professor.
University of Technology Sydney	Lecturer--> Senior Lecturer --> Associate Professor --> Professor
University of Ontario Institute of Technology	Assistant Professor --> Associate Professor --> Full Professor
Swiss Federal Institute of Technology in Zürich (ETH Zürich)	Permanent Scientific Staff --> Assistant Professor --> Full Professor
Brandenburg University of Technology Cottbus-Senftenberg	Junior Lecturer --> Senior Lecturer --> Associate Professor -->Professor
Technical University of Munich	Assistant Professor --> Associate Professor --> Full Professor --> Distinguished Professor
Lappeenranta-Lahti University of Technology	Assistant Professor, Associate Professor, Full Professor
Delft University of Technology	Assistant Professor->Associate Professor->Full Professor
Eindhoven University of Technology	Assistant Professor --> Associate Professor --> Professor
Auckland University of Technology	Lecturer --> Senior Lecturer --> Associate Professor --> Professor
KTH Royal Institute of Technology	Assistant Professor --> Associate Professor --> Full Professor
University of Strathclyde	Lecturer --> Senior Lecturer --> Reader -->Professor (Associate, Full)
TU Wien (Vienna)	[Senior Lecturer/Scientist] OR Assistant Professor --> Associate Professor-> University Professor
Ryerson University	Assistant Professor --> Associate Professor --> Full Professor
University of South Australia	Lecturer --> Senior Lecturer --> Associate Professor --> Professor
Royal Melbourne Institute of Technology	Lecturer --> Senior Lecturer --> Associate Professor --> Professor

Note: Includes only career track appointments.
Sources: OECD interviews and review of policy documents (see Table 1 for more details); KTH (n.d.[10]) "Teachers - Tenure Track", https://www.kth.se/en/om/work-at-kth/arbetsomraden/larare/tenure-track-1.507615 (accessed on 9 February 2022); TU Wien (TU Wien, n.d.[11]) "Professorships in Austria", www.tuwien.at/en/tu-wien/organisation/central-divisions/university-development/professorships-at-tu-wien/professorships-in-austria (accessed on 9 February 2022).

The technical universities we examined, in common with most others across the world, embrace three principal institutional missions – teaching, research and engagement (also referred to as "service") – and value synergy among these missions. They recognise that teaching conducted by research-active instructors builds analytical skills valued by employers and that research conducted by academics engaged in close collaboration with firms and communities holds the promise of achieving wide social and economic benefits. They also recognise that their academic staff have different abilities and preferences, and that aligning the abilities and preferences of academics to the diverse missions of the institutions is advantageous, since it permits their staff to flourish, and the institution to make the most efficient use of their talents.

The career structures they establish align institutional missions and the development of academic careers in three different ways.

In some institutions, a single or fully integrated career pathway encompasses teaching and learning, research and knowledge creation, and applying knowledge for social and community good. All who seek to advance must demonstrate achievement in each of these domains, albeit at different levels of accomplishment. At Eindhoven University of Technology (TU/e), for example:

> *Successful academic careers … are built via jobs that combine education, research, valorisation, and organisation & management. [These four domains] are not similar in type but are of the same value. A faculty member makes a commitment to develop in all four domains, although this does not mean that every faculty member has to excel in all four. Excellence in one of the four domains may lead to a professorship, provided the basic qualifications are demonstrable in the other domains (Eindhoven University of Technology (TU/e), 2016[12]).*

In contrast to this unified approach, other benchmark universities follow a second approach, creating weighted pathways for career academic staff within their professorial structure that prioritise or weight one or another of their institutional missions.

- The Technical University of Munich (TUM), for example, has recently introduced the "TUM Teaching Scholar Track", in which "teaching skills and commitment are rewarded the same as research activities". Advancement in rank is assessed, in part, according to research performance, but it is also "assessed in accordance with strict criteria reflecting international best practice [in teaching]. The assessment criteria include the development of new teaching methods, teaching concepts, textbooks and monographs, international conferences (teaching methods, education research)."
- Ontario's Ryerson University has a broadly similar pattern of differentiation, in which "Mode 1" academic staff are principally responsible for teaching, while "Mode 2" are responsible for teaching, research and service – and workloads and evaluation linked to these two career profiles.
- Delft University of Technology, in a similar manner, has established tenure track assistant professorships "*with an emphasis on education*". For these posts, the institution aims to recruit "scientists with a passion for education" who will "primarily focus on education, next to performing scientific research," take responsibility for "providing, renewing and developing high-quality, cutting-edge education" as well as participate in research (TU Delft, n.d.[13]).

Other institutions in the benchmark sample have adopted a third approach, establishing separate career paths that culminate with a professorial rank distinct from the traditional academic path, or a separate path that permits candidates to compete for horizontal entry into the (traditional) tenure-track professorial pathway.

- The University of Strathclyde is an example of the first, in which staff may progress along three distinct pathways in parallel to the traditional "academic" career structure: as Teaching Fellows, Research Fellows, or Knowledge Exchange Fellows. For example, staff may commence as a Knowledge Exchange Fellow, progressing as a Senior Knowledge Exchange Fellow and Principal Knowledge Exchange Fellow. Those in this career pathway may continue with this path through a process of review and internal promotion to the rank of Knowledge Exchange Professor of Practice, or they may seek to move horizontally to the "academic" pathway (University of Strathclyde Glasgow, n.d.[14]).
- At TU Wien (previously known as the Vienna University of Technology), academic staff may obtain indefinite appointments outside the professorial career path as either a senior lecturer (with a principal focus on teaching) or a senior scientist (with a principal focus on research (TU Wien, n.d.[15])) – but have the opportunity to apply for entry to tenure-track professorial posts.

Ireland's Technological Universities have undergone sweeping changes in their educational responsibilities since their establishment as regional technical colleges in 1967. Once responsible for technician and apprentice training (Kintzer, 1981[16]), today they are comprehensive institutions with a remit across levels 6 to 10 of the Irish Qualifications Framework. As they have broadened their teaching to higher levels of the framework, they have also taken on a research role, performing research at basic, applied and pre-commercial stages, often in partnership with enterprises and community organisations (THEA, 2021[17]). Although the remit of IoT/TU institutions has undergone fundamental change, its career model has not, and it is substantially different to benchmark institutions across the world.

Institutes of technology and technological universities in Ireland place each academic staff member in one of three academic ranks: assistant lecturer, lecturer and senior lecturer (at levels SL1, SL2, and SL3) – uniquely among comparators, without professorial ranks. In IoT/TU institutions, each of the ranks has scales that comprise a number of steps, some of which are from below to above the bar. While institutions have devolved responsibility to make decisions on promotion criteria, a policy of non-competitive "progression" between ranks is common for some positions. For example, in Technological University

Dublin, progression from assistant lecturer to lecturer is possible based on years of service (seniority), without a competitive process, and without the need for a specific vacancy to be open (TU Dublin, 2019[18]).

In benchmark institutions advancement in rank requires either public competition (as in Lappeenranta TU), or an institutional review process that is guided by detailed and published criteria that require strong evidence of substantial achievement in research and teaching. TU Munich, for example, provides detailed criteria for advancement from each rank to the next -- encompassing "research and development" responsibilities, "academic teaching" and "academic engagement" in service of the institution, the institution's "young talent" and the local and international global "academic community" (TUM, n.d.[19]).

Where technological universities follow a three-stage professional career model of assistant/associate/full professor, up to one-half of career academic staff may hold an associate or full professor appointment (de Goede, Belder and De Jonge, 2013[20]). In the lecturer/professor career structure typical of many Commonwealth universities, such as the benchmark institutions located in Australia, on average approximately 40% of staff are at senior lecturer level or above and approximately one in every five academic staff holds a professorial rank (Table 4).

Table 4. Rank distribution of academic staff in the Australian benchmark institutions

Institution	Above Senior Lecturer	Senior Lecturer (Level C)	Lecturer (Level B)	Below Lecturer (Level A)	Total academic classifications	Share at Senior Lecturer or above (%)	Share at Associate Professor/Professor level (%)
University of Technology Sydney	509	327	624	519	1 979	42.2	25.7
RMIT University	430	393	1 261	149	2 233	36.9	19.3
Queensland University of Technology	497	380	506	876	2 259	38.8	22.0
University of South Australia	254	284	352	634	1 523	35.3	16.7

Source: OECD calculations based on Department of Education, Skills and Employment (2019[21]), "2019 Staff data", https://www.dese.gov.au/higher-education-statistics/resources/2019-staff-appendix-1-actual-staff-fte.

In Irish IoT/TU institutions, very few staff (3.5% of FTE) hold intermediate Senior Lecturer 1 appointments and opportunities for advancement in rank and compensation centre on advancement to SL2 posts, whose occupants serve indefinitely either as Heads of Department or in other posts of institutional administrative responsibility. Heads of School or Faculty hold SL3 posts, which comprised fewer than 100 (headcount) positions in the system at end of year 2020 (Table 5). The IoT/TU career structure provides many fewer opportunities for advancement into senior roles that is typical in university institutions in other higher education systems. In 2020, for example, there were four promotions made at the level of Senior Lecturer 2 in the entire IoT sector (i.e. not including TU Dublin), and three at the level of Senior Lecturer 3 (Higher Education Authority, 2021[22]).

Table 5. Core-funded academic staff by rank in Irish IoT/TU institutions, 2020

	Headcount	Full-time equivalent (FTE)	Percentage of total staff (FTE)
Assistant Lecturer	1 381.0	1 183.2	23.6
Lecturer	3 463.0	3 343.2	66.7
Senior Lecturer	178.0	176.0	3.5
Senior Lecturer 2	228.0	227.2	4.5
Senior Lecturer 3	86.0	85.6	1.7
Total	5 336.0	5 015.2	100

Note: Data refer to core-funded staff only as at December 2020.
Source: Adapted from data provided by the HEA.

A second anomalous feature of the IoT/TU career model is the extensive segregation of academic responsibilities for administration, teaching, and research among TU academic staff.

Contracts for IoT/TU lecturers specify that they are to engage in "up to 560 hours per annum" of instruction (THEA, 2021[17]; TUI, n.d.[23]; Government of Ireland, 2007[24]), and further indicate that lecturers are to "engage in research, consultancy and development work as appropriate." However, standard lecturer employment contracts contain no defined obligations with respect to engagement and research activities or outputs, and they create neither incentives nor opportunities for research performance. Thus, most lecturers are fully employed in instruction-based roles (TUI, 2021[25]).

Research in IoT/TU institutions is often performed not by lecturers engaged in instruction, but by staff outside of the core funding and staffing plan, employed through project-based contracts in research-only roles and, in many cases, located research in centres separated from teaching departments (TUI, 2021[25]). By 2020, there were 425 non-core-funded specialist research staff in the IoT/TU sector, as compared to 3 855 core-funded academic staff.

Academic administration rests largely with a third set of lecturers, who hold SL2 and SL3 posts, with responsibility for departmental and school or faculty administration, respectively. These SL2 and SL3 posts carry principally (or exclusively) responsibilities for academic management and administration, and are indefinite rather than fixed-duration posts, largely foreclosing close engagement in research, service, or classroom teaching for TU academic administrators.

Consequences of the IoT/TU career structure

Drawing upon prior studies, consultation meetings, written submissions to the review team, and international comparisons, we note ways in which the current career structure of IoT/TU institutions fails to meet fully the needs of lecturers themselves, learners and the wider society that TU institutions are to serve.

The existing career structure separates research from teaching, and both from academic leadership within departmental and faculty bodies. This deprives TU/IoT institutions of the beneficial synergies typical of well-functioning technical universities. The segregation of research, teaching, academic leadership and engagement is detrimental to the professional development of instructors who seek to be research-active professionals and research-informed teachers. It stymies career progression for research staff whose continued employment is dependent on the award of research contracts (THEA, 2021[17]). Learners in TU institutions lack the opportunities for research-informed teaching that is characteristic of technical universities. Ireland's firms and communities have fewer opportunities for engagement with research-active academic staff than regions served by the benchmark institutions we have examined – as performance data reveal. The separation of teaching, engagement and research from academic leadership that results from permanent department and faculty leadership deprives TU/IoT institutions of widely distributed and shared leadership, and weakens collective responsibility.

The limited career-opportunity structure of IoT/TU institutions creates especially weak incentives for continuous professional development and shared responsibility among instructors. There are deeply dedicated academics within IoT/TU institutions, who by virtue of personal commitment and extraordinary efforts, are able to join up teaching, engagement, research and academic leadership. However, the career structure of TU institutions does not produce a sizeable cadre of SL1 staff who are upwardly mobile academic staff, strongly incentivised by their institutions to take responsibility for mentoring junior staff, setting directions for research programmes, designing and renewing curricula, or cultivating new relationships with regions and enterprises. The views of SL2 Heads of Department reflect this concern – many voiced the view that SL1 staff are not incentivised by their institutions to provide "help from below" or share in the responsibilities of academic management and leadership, such as programme review or accreditation, as might be the case in universities where career advancement rewards those commitments.

Employment contracts

Employment contracts implement the vision and plan of the academic career, and guide how instructors deliver their institution's instruction. They do this by establishing a workload allocation model that structures the distribution of staff time among their responsibilities, and by providing developmental opportunities to assist academic staff in meeting their responsibilities.

Workload allocation

Effective workload allocation models in higher education institutions strike a careful balance, achieving an efficient allocation of resources and control of workload to deliver institutional goals, while at the same time ensuring equity, fairness and transparency in the allocation of responsibilities among academic staff. In practical terms, workload allocation models are comprised of two basic parameters: the "total quantum of hours to be allocated over a year" and "on what basis activity is to be distributed over the categories of teaching, research and administration/service" (Collins, Crowley and Quinlan, 2020[1]). Below we examine these two parameters in turn, commencing with the "total quantum of hours."

Quantum of hours

High-performing technical universities, including the benchmark institutions examined in this project, are effectively year-round institutions continuously accessible to the variety of constituencies they serve. Their commitment to continuous engagement permits close collaboration with firms and research partners, adapted to the demands of enterprise and the rhythm of research projects. These institutions sustain wide and flexible access to learners – including postgraduate research students and working adults who seek flexible study opportunities. For academic staff – whose careers combine research, engagement and teaching obligations – a year-round schedule (albeit with clearly defined periods of leave) permits them to mentor postgraduate research students, to conduct their own research, and to establish new links to enterprises and communities.

The "quantum of hours" upon which benchmark institutions operate is embedded in employment contracts, and directly reflects the norm that academics are continuously engaged professionals, whose range of responsibilities are met across the entire year.

Three differences of benchmark and IoT/TU contracts with respect to the "quantum of hours" are apparent. First, benchmark institutions establish a clearly demarcated leave allowance that is set aside or "banked" – and outside of that time, academic staff are to be engaged in performing one or another of their research, engagement, pedagogical or institutional leadership responsibilities. Second, the annual leave allowance is less extensive in benchmark than in IoT/TU institutions. The median annual leave entitlement in the universities represented in the benchmark list is 32.5 days annually (Table 6). Third, benchmark institutions

provide an opportunity for academic staff to take an extended period of leave from instructional responsibilities, a sabbatical leave, and TU/IoT institutions do not.

Table 6. Typical number of days of annual leave for academic staff benchmark universities

Country	Institution	Days
Austria	TU Wien	25
Australia	Queensland University of Technology	30
	RMIT University	33
	University of South Australia	33
	University of Technology, Sydney	32
Canada	Ryerson University	33
	Ontario Tech University	Set by consultation
Scotland	Strathclyde University	31
Sweden	KTH Royal Institute of Technology	35
Netherlands	Eindhoven University of Technology	31
	Delft University of Technology	31
New Zealand	Auckland University of Technology	25
Germany	Brandenburg University of Technology Cottbus-Senftenberg	30
	TU Munich	Not identified

Instructors employed as lecturers in Ireland's technological universities and institutes of technology are contracted to perform 37 weeks of academic work for their institutions, within which they are responsible for providing approximately 24 weeks of instruction. The academic year runs from runs from September 1st to June 20th inclusive. The employment contract states that staff are entitled to "a minimum of six weeks summer vacation each year" and for "such short periods during which the schools may be closed". Collective bargaining agreements provide a minimum of six weeks of summer leave, along with approximately two additional weeks of leave to cover both the Christmas and Easter closures of the institution. However, staff who opt not to perform research or engagement activities outside of the academic calendar have the potential to take a greater amount of annual leave than these agreed minima of eight weeks, with an effective potential leave entitlement of up to 15 weeks (AIT-LIT Consortium (2020[27]). Table 7 below sets out the *effective* leave entitlement and length of the working year for academics on the technological university and institutes of technology lecturer contract.

Table 7. Estimated number of days in the working year and potential leave entitlement for academic staff in Irish institutes of technology

		Days	Comment
1	Number of days in a calendar year (excluding weekend days)	260	Calculated as 52 * 5
2	Minimum number of days of annual leave in the current contract	30	The agreement also allows for an unspecified number of additional days of leave at other times of the year when the institution is closed
3	Number of days notionally available for work (after annual leave)	230	Row 1 - Row 2
4	Taking national agreements into account number of available days for work	185	Calculated as 37 * 5
5	Number of days not accounted for	45	Row 3 - Row 4
6	Effective potential annual leave entitlement	75	Row 5 + Row 2. Effectively, the contract allows 15 weeks of annual leave
7	Effective annual leave as a percentage of the working year	28.85%	Row 6 / Row 1

Source: Authors' calculations based upon AIT-LIT Consortium (2020[28]), "MOU Position Paper 3: Academic Calendar", Athlone Institute of Technology-Limerick Institute of Technology Consortium; Citizens Information Board (n.d.[28]) "Public holidays in Ireland", https://www.citizensinformation.ie/en/employment/employment_rights_and_conditions/leave_and_holidays/public_holidays_in_ireland.html (accessed on 2 September 2021).

A national review of the annual leave of academic staff undertaken by Deloitte Ireland LLP found that in many higher education institutions in Ireland, a common rule is that academic staff are on leave in accordance with the institution's academic calendar, i.e. "when the students are off, the staff are off" (Deloitte, 2019[26]).

Provision for sabbatical leave

Nearly all benchmark universities make provision for sabbatical leave for academics. This policy is based on the principle that excellence in one's field of endeavour requires extended periods during which one has no obligations to teaching or administration – permitting sustained and concentrated attention to deepening and extending regional engagement, working on an industry project, or playing a leading role in curriculum innovation. Research suggests that a sabbatical has positive effects for individual academics (Davidson et al., 2010[29]) and that it remains an important tool for academic staff development, helping faculty members avoid skills obsolescence (Carraher, Crocitto and Sullivan, 2014[30]). Among the benchmark institutions, sabbatical policies include:

- At the University of Technology, Sydney, the purpose of sabbatical leave is to undertake research or to improve and enhance a structured programme to benefit the academic's work for the university. Eligibility to apply for refresher/sabbatical leave is triggered after two years' full-time service. After three years' service, the entitlement is up to 26 weeks. For longer qualifying service, the entitlement increases at 3.6 weeks leave for each six months service over three years – meaning that six years' service generates an entitlement of 48 weeks sabbatical. The entitlement may be exercised only if there is a project proposal of merit and of relevance to the professional activities of the academic (UTS, 2021[31]).
- At Ontario Tech University, an academic is eligible for a 12-month sabbatical after completing six years of full-time service in a tenured academic role (Ontario Tech University, 2019[32]).
- Queensland University of Technology supports the sabbatical by paying full salary and, where applicable, travel expenses and conference registration fees, with an allowance for any accompanying dependents (QUT, 2001[33]).
- At TU Eindhoven, following policies set down in the Collective Labour Agreement for Dutch Universities (VSNU, 2020[34]), (TU/e, n.d.[35]), the sabbatical leave is based upon a long-term saving model, in which employees can save between 56 and 152 hours of holiday leave per year for a continuous period of leave, including sabbatical leave. If the employee chooses this option, the employee can save up for a minimum of three and a maximum of five years (i.e. 760 hours).

In Ireland's TU/IoT sector, there is no system-wide or institution-level policy with respect to sabbatical leave. While a pilot sabbatical scheme was introduced in 2004 for institutes of technology, it did not gain traction within the sector. The previously cited national review of terms and conditions of academic staff carried out during the 2018/19 academic year found that no academic staff availed of sabbatical leave in institutes of technology in the review period (Deloitte, 2019[26]).

Distributing time among responsibilities

Workload models distribute an agreed quantum of time among the missions of a university (Collins, Crowley and Quinlan, 2020[1]). Academic staff holding professorial appointments often operate within a workload model that, as a first step, allocates shares of their times across responsibilities. Perhaps the most widely used standard is an allocation of 40:40:20 for teaching, research, and engagement responsibilities. This reflects the fact that most academics work in universities that balance these three missions, and individual academics hold appointments that combine responsibility for each. For example, across the entire Australian university sector, about six out of ten career academic staff hold appointments with research, teaching and engagement responsibilities (DESE, 2021[36]), and those who do split their time between teaching, research and service/engagement in the ratio 40:40:20 (Miller, 2019[37]; Dekeyser,

Watson and Baré, 2016[38]). The University of South Australia conforms to the 40:40:20 guideline for teaching and research academics, with different splits for academics who are primarily focused on research or teaching (UniSA, 2019[39]; Collins, Crowley and Quinlan, 2020[1]), and likewise the University of Technology Sydney (FWCA, 2018[40]).

However, precise responsibilities for instruction are typically agreed at the faculty, department or individual level, permitting adaption of general policies to local and personal circumstances. For example:

- At the Royal Melbourne Institute of Technology, the overall framework of workload allocation is set at the school and discipline level; however, each employee sets an individual annual work plan that takes account of the workload allocation model, and this forms the basis of the annual performance review (FWCA, 2018[41]).
- At the University of Technology Sydney, workload allocation is framed by an enterprise agreement that establishes principles of allocation (workload allocation will be transparent, broadly equivalent between workers, reflect the stage the person is at in her/his career and the mix of roles between teaching, research and other roles). Implementation of these principles and guidelines rests with Deans (Heads of School) who set faculty-level guidelines, and is finalised through consultation between supervisors and academic staff members.

Where institutions recognise differentiation of roles and responsibilities among those holding academic appointments, workload allocation models reflect this differentiation. Staff with professorial appointments who hold teaching-focused or administrative leadership posts are responsible for more and fewer instructional responsibilities, respectively, than their colleagues.

- At the Technical University of Munich, teaching-oriented assistant professorships initially have a teaching workload of eight hours per semester week, whereas research-oriented professors have five hours lecturing per semester week.
- The TU Wien allocates teaching hour responsibilities by the rank and career profile of staff, with post-doctoral researchers and senior scientists teaching for four hours per semester week, and full professors typically teaching for eight hours per semester week. Following a positive tenure evaluation, the normal teaching workload for teaching-focused professorships is twelve hours per week during term, and nine hours for research-oriented associate and full professors.
- At Ryerson University (Ontario), academic staff who are principally responsible for instruction teach from 9-16 academic course hours per week, with research activities and other special projects off-setting part of the teaching load, while academic staff whose responsibilities include teaching, research and service, teach a maximum of two courses per semester.

In addition to considering academic roles or profiles in setting workloads, benchmark institutions may offer beginning-career instructors reduced instructional responsibilities to permit development of their research programme and external engagements, or other forms of “start-up” assistance. Some institutions provide this as an entitlement; more often, they negotiate it with the instructor at the time of hiring.

In contrast to instructors in benchmark institutions, the work of IoT/TU lecturers at AL, L, and SL1 levels is organised by a workload allocation model in which their defined responsibilities are exclusively instructional, and calibrated in weekly instructional contact hours. Teaching responsibilities are allocated on an input basis, with each lecturer responsible for 16 or 18 hours of teaching contact per week during the instructional period, depending on rank, with beginning lecturers tasked with a larger instruction workload (18 hours) than their more senior colleagues (16 hours). Further, the standard lecturing week “is to extend from Monday to Friday with a timetable running from 09.00-18.00. Lecturing scheduled post 18:00 can only be scheduled with the agreement of the individual academic staff member and must be paid/allocated on a pro-rata basis, currently x 1.25, based on nationally-agreed negotiations” (AIT-LIT Consortium, 2020[27]).

The baseline weekly instruction workload model is a starting point from which classroom instructional obligations are reduced largely to permit the take-up of other pedagogical responsibilities, including the co-ordination of programmes and modules. For example, an Athlone-Limerick TUI Position Paper proposed an Academic Workload agreement in which 17 responsibilities outside of customary hourly classroom instruction and their associated reductions in instructional contact are outlined (Table 8).

Table 8. Workload allowances in Athlone-Limerick TUI Position Paper

Role	Allowance
Programme Coordinator	[Defined in Section B, with base allocation of 2 hours, rising with group intake]
Module coordinator for shared modules	3 hours per semester for modules shared between 3 or more academic staff
Union branch officers (2 branches)	8 hours per branch/main campus per week / Total 16 for the TU
Work placement & Internship co-ordination/supervision/assessment	Work Placement Position Paper to be developed in Phase 2
Field trip coordination	Field Trip allowance to be considered in Phase 2
Active involvement in a national or international professional body	Allowance of one hour per week, up to full secondment in consultation with Head of Department (HoD) in line with TU community engagement/strategic priorities, on the basis this is self-funded from professional body / other external sources.
Level 7 project supervision	15 minutes per student
Level 8 project supervision	Minimum 20 minutes per student. No existing allowance will be reduced in the new TU. Research Community of Practice (CoP) hour for L8 (honours) supervisors. Supervisor with greater than or equal to 6 students will receive 1 hour per week as a CoP hour for the semester of supervision. Objectives: To support the supervisor conduct research to support the student projects. To create a community practice around supervision ensuring commonality of practice and language within an academic discipline area. create synergies and a research culture within a faculty.
Level 9 project supervision (part of taught master's)	Academic staff will be allocated 1 hour per student per week supervised for the semester(s) during which the project module is scheduled
Level 9 Masters by research supervision	Academic staff will be allocated 2 hours per graduate student, when student commences, supervised to a maximum of 6 hours. This will be recorded by the inclusion of 2 hours on the lecturer's timetable for each graduate student project supervised over both semesters. The duration of this allocation is limited to 24 months for a research master's degree
Lecturing groups of 20+ at Level 9	20 – 40 Students: 1 hour per week per module for full time taught programmes delivered face to face. Additional group sizes of up to 20 one additional hour. When there is a small enrolment number over the group e.g. 10%, then the allocation does not increase.
Lecturing on Level 9 taught (Face to face delivery mode) programmes	Academic delivery support mechanism via weighting of 1.5 of approved course schedule contact hours.
PhD supervision The expected duration of a full-time doctoral degree is a 48-month period.	2 hours per week per student or this may be taken on an optional basis in consultation with the HoD. Year 1 – 2 hours per week Year 2 – 1 hours per week Year 3 – 2 hours per week Year 4 – 3 hours per week
Research	See Research position paper (No. 11)
Add skilling for delivery of anomalous assigned module (where module has not been previously taught and module is a significant change from previously taught academic discipline / subject area to be agreed with HoD/ DoF.)	1 hour per week per module for the duration of the first delivery of the module. This applies to Level 6 - 8 programmes.
Voluntary outreach (school visits, open days, etc.)	Travel and subsistence as per travel and subsistence policy
Online delivery and development	See separate position paper (No. 1)

Source: AIT-LIT Consortium (2020[42]) "MOU Position Paper Four: Academic Workload Allocation", Table 4.1 Workload Allowances; Athlone Institute of Technology-Limerick Institute of Technology Consortium.

National agreements, such as Sustaining Progress, have articulated the principle that "the teaching load may be reduced to facilitate work on research projects or other approved projects to meet Institute needs and in consultation with the Lecturer" (Section 24.6). Local agreements recognise that research time release may be provided through "a buy-out of teaching hours by funding agencies." However, they do not allocate a dedicated share of the instructor's time to research and related innovation activities, as is the case in benchmark institutions (Government of Ireland, 2003[43]).

Instruction models, learning support and student-to-instructor ratios

The benchmark institutions in our sample organise and support instruction differently to IoT/TU institutions. They operate with a larger ratio of students to full-time instructors, and organise more extensive instructional support for their instructors than do IoT/TU institutions. They do so because they have larger student numbers, on average, than IoT/TU institutions, a more intensive focus on postgraduate education, and a larger research output than today's TU/IoT institutions (Figure 1). They establish larger student-to-instructor ratios and make wider use of instructional support to allow full-time academic staff to balance their instructional, research and engagement responsibilities. Benchmark institutions can provide an indication of the direction of travel that IoT/TU institutions may follow as they, too, become larger, merged universities with a wider offer of postgraduate education and a more intensive research and innovation focus.

Larger institutions have the capacity to exploit economies of scale that smaller institutions do not. As a result, they have higher student-to-staff ratios than smaller institutions. Among the benchmark universities, there is 0.6 correlation between student numbers and student-to-staff ratios, i.e. the number of full-time equivalent students explains about 36% of the variation in student-to-staff ratios. Further, class size and student-to-instructor ratios vary with research intensity. Analysis of more than 700 US universities shows that universities with high research intensity had an average class size nearly double the size of institutions awarding few postgraduate degrees, and higher student-to-academic staff ratios (Hemelt et al., 2018[44]). Larger average class sizes reduce the number of instructional hours per instructor and make time available with which to take on research, innovation and engagement missions.

Benchmark institutions typically provide instructors with learning support during the teaching semester. This support includes tutors, assignment markers and test markers, demonstrators and, critically, professionals who support learning by providing academic skills training to struggling students (such as training in essay-writing and study skills or digital skills), and experts who may assist with digitally enabled course design and assessment.

Having a learning support team changes the role of a lecturer. While the lecturer retains responsibility for planning and delivering the content of the course, their role is also to lead and manage the learning support team of markers, tutors and demonstrators and to ensure that students know who to turn to for additional help. That has the effect of reducing the amount of time instructors must spend on the most routine instructional tasks (like test and assignment marking) and allowing them to allocate their attention to key tasks, such as innovation in curriculum and pedagogy, as well as their engagement and research responsibilities.

For instance, at University of Technology Sydney and at Queensland University of Technology (QUT), each faculty maintains a pool of people eligible for employment in academic support roles. This includes higher-degree research students and people from industry. QUT is able to offer ongoing part-time, part-year contracts to some in that pool of support staff, provided there is an ongoing need for the work and the person has performed the role to a satisfactory level for three years. At Ryerson University and Ontario Tech University, there are similar arrangements, with teaching assistants doing marking, tutorial work, learning support, demonstrator and lab work, examination invigilation – but who do not deliver "new" content. Ryerson gives its research students preference in appointments to teaching assistant roles, thus providing them with additional income.

In IoT/TU institutions, the normative instructional model has centred on extensive weekly instructional contact with learners, organised, where possible, in small classes and in which the instructor is comprehensively and personally responsible for course design and planning, instruction and assessment. Digital education technologies are to be used to enhance in-person instruction – to support blended instruction – but not welcomed as a substitute for in-person instruction, either partially (as in hybrid provision) or wholly (as in fully online provision). In stakeholder consultations, lecturers suggested that this pedagogical model allows IoT/TU institutions to adapt to the needs of disadvantaged learners and is a characteristic of these institutions that distinguishes them from traditional universities in Ireland. In its written submission to the project team, the TUI identified the IoT/TU education model as "practice-based and informed by industry", and delivered with a focus on "small class sizes and significant supports for our diverse student body."

The student-to-staff ratios of benchmark and IoT/TU institutions reflect these differences in the instructional models of institutions. The calculation of the student-to-staff ratio is complex because of inconsistencies between institutions and jurisdictions in the approach to counting of full-time equivalence of staff, the treatment of casual staff and the definition of full-time equivalence of students. However, in those benchmark universities where we have reasonable equivalence to the counting used in the technological higher education sector in Ireland, the student-to-staff ratio was 24.7:1. Data from the annual accounts of the Irish institutes of technology show the sector to have a student-to-staff ratio of 18.1, or about 73% of the average student-to-staff ratio in benchmark institutions.

Research evidence on the relationship between class size and the effectiveness of higher education delivery is inconclusive (Ake-Little, von der Embse and Dawson, 2020[45]). While some studies have shown poorer outcomes in larger classes, Gilbert (1995[46]) points out that a range of factors affect student performance, stating that "…studies have found that the characteristics of students and their instructors, along with course organisation and management characteristics, are more important than class size in making sure students learn". Stange and Umbricht (2018[47]) find class size reduction appears to be weakly effective, or ineffective, at raising student performance, and observe that reducing class sizes and student-to-instructor ratios is an especially costly policy choice. Other measures aimed at promoting student success, such as "coaching and the combination of peer advising and financial incentives have a cost effectiveness ratio 1.8 to 2.5 times larger than class size reduction" (in raising student grade point averages) (Stange and Umbricht, 2018[47]).

Consequences of the TU workload and instructional model

The annual schedule of TU instructors yields a significantly smaller quantum of hours than is typical for the institutions in our benchmark group. This limits the capacity of TU institutions to meet fully the expectations set by government in the Technological Universities Act (2018), the knowledge needs of regional stakeholders and enterprises, to guide doctoral researchers, and to respond to schedules of adult and working learners.

Specifically, the Technological Universities Act calls upon institutions to:

- have an increased focus on research students, on part-time, mature students who are in work, and on programmes designed and delivered with the participation of local businesses, professions or community organisations (Section 28(1)(a)(b));
- have the capacity to conduct research and innovation of high quality that benefits the region in which the institution will work (Section 28(1)(h));
- have the capacity to create effective links with business and community groups in the region (Section 28(1)(k)(l)).

These responsibilities require institutions that are continuously engaged with the research, engagement and teaching missions, and an academic staff who is not "off when the students are off" (Deloitte, 2019[26])

The capacity of emerging TU institutions to meet their enhanced mission is further limited by how the time of their lecturer workforce is allocated. Lecturers to do not have a clearly demarcated share of their weekly time dedicated to the regional engagement and research missions of TU institutions, as it the case in all benchmark institutions, nor do they have extended opportunities to address these missions through taking sabbatical leave.

The instructional model characteristic of IoT/TU institutions – featuring limited class sizes and modest instructional support – yields comparatively low student-to-instructor ratios. In so doing, the model hampers the ability of IoT/TU institutions to create instructional workloads that permit their lecturers to engage deeply in responsibilities other than instruction, as would be typical in benchmark institutions.

Organising academic and institutional leadership

Well-functioning universities, including the benchmark institutions in this project, distribute responsibility for academic leadership widely among their senior academic staff and Heads of Department, and allocate responsibility for strategic leadership among schools and faculties.

Academic leadership entails leading the design of and management of the curriculum; maintaining oversight of teaching, learning and research performance; leading research programmes; leading knowledge transfer programmes; and mentoring and supporting staff. Universities with well-functioning careers structures build these academic leadership responsibilities into the role profiles and performance criteria of academic staff holding professorial appointments.

Against this background of widely shared academic responsibility, benchmark universities organise institutional leadership into departmental and faculty structures. Departments are typically organised by study fields, and provide academic leadership and management at a disciplinary level. Disciplines are organised into faculties, schools, or institutes that group together related fields, e.g. engineering, business, and health sciences. Faculties (schools) co-ordinate these fields, and are typically responsible for strategic planning, financial management, participation in institutional governance, regional engagement, and the line management of departmental Heads.

Benchmark universities assist their departments and faculties in meeting their responsibilities by distributing management capabilities among them. Departments, for example, are provided senior administrative staff who function as “academic civil servants” and manage each department’s core administrative tasks, such as timetabling. Depending upon their scale, departments will also have specialised professionals responsible for admissions, international outreach, industry engagement, and research and knowledge exchange. Alternatively – or, in combination – benchmark institutions locate management capacities in specialised offices tasked with providing support across the range of departments and faculties. Faculties (schools) are likewise equipped with professionalised administrative staff to support their distinctive financial and strategic responsibilities, as well as senior academic staff to take responsibility for academically focused parts of their portfolios – research, engagement and instruction. Large faculties, central to institutional profiles, may have scores of academic and professional staff; for example, the Engineering Faculty at the University of Strathclyde, which serves eight academic departments and 5 000 students, is supported by more than 60 academic and professional staff at faculty level (University of Strathclyde, n.d.[48]).

Benchmark institutions have chosen to locate wide responsibility for strategic academic leadership and management with departments and faculties, and they have a broad swathe of professorial staff who are expected to share responsibility for academic leadership. Thus, institutions typically organise departmental and faculty leadership, especially the former, on the basis of fixed-term, renewable appointments, with a view to the development of circulating leadership. Where Heads of Department serve fixed terms, their appointments range from three years (e.g. Strathclyde, Ontario Tech) to six years (Brandenburg), and limits of renewal of terms may be set (e.g. Ryerson, Strathclyde).

Benchmark institutions also link fixed-term appointments to step-down provisions. For example, in the two Canadian universities, Deans of Faculties and their Associate and Assistant Deans all retain their underlying academic appointment – so these are reversion roles, allowing the incumbent to retain employment as a regular academic following expiry of the term. At University of Technology Sydney, Head of Department roles are reversion roles, while Head of Faculty roles are full-time specialist management roles. At Queensland University of Technology, those who step down from an academic leadership role may revert to regular academic status, but only if there is a vacancy in the relevant department.

The structure and role of departments and schools (faculties) in IoT/TU institutions are substantially different to those in the benchmark institutions, reflecting the origins of IoT/TU institutions in the schools sector. IoT/TU departments often have a wide span of control, with responsibility for hundreds of students and scores of career and temporary lecturers, often distributed across multiple programmes and sites. Department Heads serve for indefinite terms of appointment rather than on a fixed and rotating basis. IoT/TU Heads of Schools and Faculties, likewise serve on an indefinite appointment, and within the lecturer career structure, as SL3 staff (TUI, 2007[49]; TUI, 2007[50]).

Heads of Department consulted during the project acknowledge that strategic leadership is formally part of the SL2 head of department job profile, as it is in benchmarking institutions. However, they reported that the wide span of control typical of departments, combined with the paucity of senior professional managers to support recurring administrative responsibilities, such as timetabling, result in the "crowding out" of strategic academic leadership. This challenge is reflected in the ratios of full-time equivalent professional administrative staff to full-time equivalent academic staff in IoT/TU institutions (excluding TU Dublin), which is 0.59 to 1.0. This is a lower ratio than the 1.06 to 1.0 in Ireland's traditional universities (also including TU Dublin), and lower than that in the benchmark universities – apart from a trio of research-intensive institutions in Europe with large professorial workforce in research-only roles (Table 9).

Table 9. Non-academic to academic staff ratio for benchmark institutions, Irish institutional sectors and TU Dublin

Based on full-time equivalents of students and staff, for the most recent year available

Institution name	Non-academic staff as a share of academic staff
Technical University of Vienna	0.42
Eindhoven University of Technology	0.51
ETH Zürich	0.52
Irish IoT/TU institutions (excluding TU Dublin)	**0.59**
Lappeenranta-Lahti University of Technology	0.60
Brandenburg University of Technology Cottbus-Senftenberg	0.68
Delft University of Technology	0.70
Technological University Dublin	**0.72**
Technical University of Munich	0.97
Irish universities (including TU Dublin)	**1.06**
Auckland University of Technology	1.06
KTH Royal Institute of Technology	1.21
University of Technology, Sydney	1.34
University of South Australia	1.36
University of Strathclyde	1.37
RMIT University	1.52
Queensland University of Technology	1.58

Source: OECD calculations on benchmark institution data. See Table 2 for more details.

Heads of Department likewise pointed to a career system in which SL1 posts are not designed to share in academic leadership, and whose occupants have few opportunities for advancement, and therefore lack incentives to share voluntarily in those responsibilities. Given these structural constraints, Heads of Department consistently suggest that the heavy administrative demands of their posts make these posts poorly suited to the rotational leadership model followed in benchmark institutions.

SL3 stakeholders, Heads of Schools and Faculties confirmed that routine administrative responsibilities typically deprived the Department Heads with whom they worked of an opportunity to play a strategic role within their institutions, and noted that recruitment to the position of Department Head elicited few candidates or applications from those with profiles unsuited to the responsibilities of the post. SL3 stakeholders suggested that, in principle, TU institutions should have rotating departmental leadership, but volunteered that this would require a reduced span of control and increased management resources available to Heads of Department.

The project team notes that the rotation of departmental and faculty leadership is a principle also endorsed by the Teacher's Union of Ireland, albeit by election, rather than executive appointment.

Institutional leadership: Senior management team structure

Institutional leadership in the technological universities included in the benchmarking set follows two broad patterns. In the first model, the Chief Executive is supported by a team ranging from two to eight Deputy Chief Executives (usually called Vice-Presidents or Deputy Vice-Chancellors), responsible for each of the main functional areas of activity – teaching and learning, research, knowledge exchange and engagement and, possibly also, internationalisation – together with one or more Corporate/Services Managers. In that model, the people holding the teaching and learning portfolio and the research portfolio would effectively be representing all the faculties of the university. On the corporate side, the top table may include a Chief Operating Officer incorporating all corporate roles – including finance, information services, communications, planning, reporting and services for students. Alternatively, the Chief Executive may want the Chief Financial Officer as a direct report, possibly also a Chief Information Officer or another Corporate Service Leader.

A second approach is for a broader top-table group, with each faculty (or, school) head represented at the top table, alongside academic Vice-Presidents and a Chief Operating Officer and, possibly, other lead corporate or service directors (such as information services or academic services). That entire group, ranging from 10 to 14 in number, depending upon the number of faculties, would have the same responsibilities as described for the first model.

Looking at benchmark universities, examples of model one include:

- *Ryerson University*, in which five Vice-Presidents, whose portfolios cover academic affairs; research; operations; equity and community inclusion; and university advancement, support the President.
- *TU Delft,* which is led by a three-person executive board, supported by a Secretary General and Administrative Office, which functions within a system of consultative bodies (TU Delft, n.d.[51]).
- The *Technical University of Munich*, which is led by a Board of Management consisting of a President, a Senior Executive Vice-President, five Senior Vice-Presidents, and three Vice-Presidents (TUM, n.d.[52]).

Institutions employing the second model include:

- At *Queensland University of Technology*, the Vice-Chancellor's executive leadership team comprises herself plus 12 senior executives – the Provost, three Deputy Vice-Chancellors (responsible for education, international and research), five Pro Vice-Chancellors and four Senior Corporate Managers.

- At the *University of Strathclyde*, the Principal/Vice-Chancellor is supported by a Vice-Principal; four Faculty Deans; three Associate Principals (responsible for research, education and entrepreneurship, and social inclusion), and three Senior Corporate Managers.
- At *Auckland University of Technology*, the Vice-Chancellor has two Deputy Vice-Chancellors (one responsible for research and one for teaching and learning) and six Pro-Vice-Chancellors (four of whom are Deans of the university's faculties). Outside the top table, but also in strategic leadership roles, are the twelve Senior Corporate Managers.
- At *Ontario Tech University*, the institutional leadership comprises the President, the Provost, three Vice-Presidents (responsible for research, external relations and administration), four Corporate Managers, the Dean of postgraduate studies, a Deputy Provost, and the Librarian. There are also seven faculty Deans.

In the past, IoT institutions were led by compact executive teams, reflecting their smaller scale and lower complexity than benchmark institutions, and their origin as school sector institutions. In the emerging TU sector, institutional leadership typically rests at present with a President, holding a fixed-term appointment, and an executive management team (or, Executive Board), often comprising a small team responsible for principal functional areas (e.g. Registrar, VP Finance, VP External Affairs), and Faculty Heads. For example, at TU Shannon, an executive management team of three Vice-Presidents (Finance, Academic Affairs, and Strategic Planning), five Deans, and four other executive staff supports the President, while at Waterford IoT the Executive Board consists of the President, Registrar, Secretary/Financial Controller and all Heads of academic schools.

Table 10 provides a brief summary of the key differences in the career, contract and academic and institutional leadership policies of benchmark and IoT/TU institutions.

Table 10. Comparison of key policies in benchmark institutions and Irish TU/IoT institutions

Benchmark institutions	Irish TU/IoT institutions
1. Career path/advancement	
Permanent academic staff advance by demonstration of achievement through a system of ranks organised into long career ladders containing professorial ranks (exclusively or in combination with lecturer posts), providing extensive opportunities for advancement, and strong incentives for continuous professional growth, achievement and progressive responsibility.	The career structure of TU/IoT institutions consists of assistant lecturer (AL), lecturer (L), and senior grades (SL1, SL2, SL3) without professorial rank. Opportunities for advancement are very limited, and incentives for continuous professional development and widely shared responsibility for academic leadership are far weaker than in benchmark institutions.
2. Career differentiation	
Advancement to professorial rank is based upon leadership and recognised excellence in pedagogy, engagement, research and institutional leadership. Academics are evaluated based upon their contribution to the full range of institutional missions, or the institution creates specialised pathways for advancement linked principally (but not exclusively) to one or more of those missions (e.g. research and engagement), ensuring synergies among these missions.	TU/IoT careers are distinguished by the segregation of responsibilities among permanent academic administrators, teaching-focused lecturers, and researchers, many of whom are employed on a project basis. TU/IoT institutions are deprived of the beneficial synergies among teaching, research, engagement and administration typical of well-functioning technical universities.
3. Workload allocation	
Annual workload models allocate academic time across teaching, research and engagement responsibilities, often	The work of TU/IoT lecturers at AL, L, and SL1 levels is organised by a workload allocation model in which their

on a 40:40:20 basis, reflecting the balance of responsibility among these roles. Precise responsibilities for instruction are typically agreed at the faculty, department or individual level, permitting adaption of general policies to local and personal circumstances. If institutions recognise differentiation and specialisation of roles and responsibilities, workload allocation models reflect this differentiation. Benchmark institutions are year-round institutions, continuously accessible to the variety of constituencies they serve. This schedule (with clearly defined periods of leave) permits academics to mentor postgraduate research students, conduct research and establish new links to enterprises and communities. Benchmark universities typically provide sabbatical leave to permit, e.g. sustained and concentrated attention to deepening and extending regional engagement, working on an industry project, or playing a leading role in curriculum innovation.	defined responsibilities are exclusively instructional, and calibrated in weekly instructional contact hours. Lecturers may obtain reductions to their instructional contact hour workload though a collectively-bargained schedule of recognised activities, and "buy-out" of instructional responsibilities. The workload model does not allocate a dedicated share of the instructor's time to research and related innovation activities, as is the case in benchmark institutions. TU/IoT lecturers have an effective potential leave entitlement that is significantly more extensive than that of benchmark institutions, and their annual "quantum of hours" comparatively modest. However, there is no system-wide or institution-level policy supporting sabbatical leave to support extended deepening or refreshing of skills.
4. Instructional model and learning support	
Benchmark institutions organise more extensive instructional support for their academic staff than TU/IoT institutions, permitting them to operate with a larger ratio of students to full-time instructors than IoT/TU institutions and. Academic staff are pedagogical leaders supported by learning support professionals and postgraduate students who assist with advising, course design, assessment, lab supervision and demonstration, and tutoring.	The normative IoT/TU instructional model has centred on extensive weekly instructional contact with learners, organised, where possible, in small classes and in which the instructor is comprehensively and personally responsible for course design and planning, instruction and assessment, with limited assistance from learning support professionals and postgraduates. These choices are reflected in comparatively low student to instructional staff ratios.
5. Academic management and leadership	
Responsibility for academic leadership is widely among Heads of Department and faculties, and complemented by the distribution of responsibilities among senior academic staff at professorial rank. Departments are organised on disciplinary lines, with a responsibility for academic leadership at the disciplinary level and a span of control and professional support aligned to this remit. Faculties provide strategic co-ordination and academic leadership at the level of cognate and co-ordinated fields. Heads of Department serve typically on renewable fixed-term appointments. Some benchmark universities establish Heads of Faculty as rotational positions, while others view these as continuing professional management roles.	Academic units at the department level are multidisciplinary units with a variable, but often very wide, span of control and high associated administrative burden. There is limited professional support at central level, or allocated directly to departments and faculties. Heads of Department and School usually hold indefinite terms of appointment. These structures, combined with a lack of professorial ranks, concentrate academic leadership among a comparatively small and static cadre of leaders.
6. Institutional leadership	
Executive institutional leadership in benchmarking institutions follows two patterns – a Chief Executive is supported by a small executive team of 5-6 Deputy Chief Executives, each of whom is responsible for the main functional areas of institutional activity (research, teaching, external engagement) and key business operations (budget, HR), or a larger executive team of 10-12 comprised of both Faculty Deans and functional and operational officials undertakes institutional leadership.	Institutional leadership in emerging TU institutions now typically rests with a President holding a fixed-term appointment, and an executive management team (or, Executive Board), often comprising a team responsible for principal functional areas (e.g. Registrar, VP Finance, VP External Affairs), and Faculty Heads.

Part Three: New careers, contracts and academic leadership for the emerging technological university system

Ireland's Government has provided a legal and financial commitment to the development of a technological university system through the Technological Universities Act (2018) and the Technological University Transformation Fund. However, it has not addressed the rules governing the employment of the most important resource these institutions have at their disposal: their academic staff. The transformation of IoT institutions into technological universities cannot fully be realised without a new vision of the TU academic career, and concrete contractual and organisational changes needed to underpin this vision.

Below we outline a career model and contract we believe are aligned to the TU system's future profile, and link those to complementary recommendations about academic and institutional leadership. The recommendations draw upon employment practices in benchmark institutions, and evidence obtained from government policy documents, collective bargaining agreements and stakeholder meetings. Our recommendations parallel – and draw upon – suggestions offered by national stakeholders. We, like they, view these reforms as an urgent matter.

In Table 11, below, we briefly point to new supports, conditions of working, and opportunities for advancement, linked to new performance expectations, that can inform a new career vision. We link each recommendation to a guiding principle, since the path to career and organisational reform in emerging TU institutions will begin from agreement about the guiding principles underlying the organisation and recognition of academic work, career paths and organisational structures. The recommended changes are then developed in further detail.

In contrast to past practice, we suggest that consideration and further development of these principles and recommendations take place through a tripartite structure of consultation comprised of trade union representatives of academic staff, DFHERIS, and representatives of the technological university executive management. It is a basic principle of good governance that those who bear responsibility for implementing policy choices – in this case, institutional management – should participate in their development.

Table 7. Guiding principles and recommended changes

Guiding principle	Recommended change
1. Career path	
Career structures should permit the competitive recruitment and retention of highly able academics on a national and international basis, and they should provide opportunity while recognising and rewarding professional growth and excellence across the full length of the academic career. They should facilitate leadership on the part of senior academics in the mentoring of junior staff, the direction of research programmes, the design and renewal of curriculum in a field of study, and in developing relationships with regions and enterprises.	Establish a new career structure with five ranks: Assistant Lecturer, Lecturer, Senior Lecturer, Associate Professor, and Full Professor. Entry to the new career structure and its advancement opportunities should be limited to those employed under a new employment contract. Advancement in rank should be by demonstrated merit, through to the rank of full professor, within a nationally agreed framework specifying the role descriptions and performance standards for all ranks within the new contract. Employ all newly hired academics in the new employment contract, and all current lecturers who volunteer to transfer from the old contract to the new. Evaluate transfer applicants though a rigorous process of review to assess their suitability to the level and profile of the position they seek.

2. Career differentiation	
There should be a common career framework to ensure transparency and academic mobility. However, the framework should permit sufficient differentiation in academic pathways to ensure that academic staff are able to put their talents to their highest use, and that departments, faculties, and institutions are able to align staff roles to their range of missions, permitting them to achieve excellence in each. Care should be taken to ensure that academic roles create sufficient complementarities among the teaching, engagement, and research missions of institutions.	A nationally agreed framework should specify the responsibilities (role descriptions) and performance standards for all ranks within the new contract, and identify the range of pathways for career advancement that TU institutions may establish. Pathways should recognise excellence in research, pedagogy, engagement, and institutional leadership. To ensure sufficient synergies among research, pedagogy, engagement and institutional leadership, role descriptions and workload allocations associated with these new pathways should combine minimum shares of different roles, e.g. pedagogy and engagement.
3. Workload allocation	
Workload models should ensure that the annual quantum of time provided by academic staff is aligned to institutional missions, with a calendar that supports uninterrupted time, e.g. for research, engagement with firms, the delivery of reskilling and upskilling, and guidance for postgraduate research students. A framework should broadly allocate the quantum of time agreed, providing a transparent and widely agreed link between roles and responsibilities. Within this framework, institutions, faculties and departments should be responsible for setting workload allocation policies that are aligned to mission and fairly reflect the needs and capacities of academic staff.	Newly hired staff and current staff who choose to enter a new academic contract would hold an appointment with year-round responsibilities, with a specified period of leave consistent with international standards, and an opportunity for sabbatical leave. The pay scale for those holding new contracts would take account of an extended annual schedule of professional responsibility. The workload of academic staff should be set with a framework that lays out annual time allocations by role. Within that framework, Presidents, Faculty Leaders, and Heads of Department would be authorised to take decisions that reflect faculty and department roles, and individual needs.
4. Instructional model and support	
Learners at all study levels should be offered high-quality instruction that is led and co-ordinated by academic staff. Academic staff should have support for their instructional responsibilities that is sufficient to permit excellence in teaching while meeting research and engagement responsibilities. Support should permit academic staff to focus on instructional leadership and innovation rather than tasks equally well performed by others. Career professionals supporting instruction should be well recognised and rewarded, and doctoral instructional support should be a recognised part of doctoral degree programmes.	Bring instructional support for academic staff to a similar level as that provided in international peer comparison institutions through a combination of expanded career professional support for instruction, and through well-planned and expanded scope of doctoral student engagement in instructional support. Aim for student to staff ratios to reach those typical of appropriate benchmark institutions, with targeted class size expansion focused on subjects and learner cohorts that are well along in the study trajectory, and initiatives that augment institutional capacity to promote student success.
5. Academic management and leadership	
High-performing universities have widely distributed responsibility for academic leadership. Heads of Department and faculty exercise responsibility for strategic leadership at disciplinary and multidisciplinary levels within the university, and among its engagement partners and research communities. Rotation among leadership posts is sought to ensure that leadership and responsibility within the institution are broadly shared, and a cadre of professorial staff across the institution's departments and faculties take on complementary responsibility for mentoring junior colleagues, providing research leadership, or acting as innovators in pedagogy and engagement.	Reduce the span of departmental control and raise the professional and managerial-level support provided to departments, schools/faculties to international standards, permitting Heads of Department to function as strategic leaders at a disciplinary level, and head of faculties/schools to exercise leadership within their portfolio of cognate study fields. This will also permit, in time, the adoption of a system of fixed-term and renewable appointments that enables rotational leadership among a growing cadre of senior academics whose professorial appointments set out responsibility for shared leadership.
6. Institutional leadership	

Public higher education institutions should implement a model of executive institutional leadership adapted to their institutional profile and developmental trajectory, consistent with the broad frame of national policy. As public institutions, they should also be obligated to give an account of this model to stakeholders within the institution and to public funding bodies, with reference to international peer comparison institutions.	The TU system is underpinned by a national vision for the sector and associated legislation, making it advisable to develop an associated national vision for an institutional leadership model informed by the mission objectives of the TU legislation, international best practice and national development strategies. The approach could be to establish a national baseline model for leadership, with some institution-level variations to take into account specific regional requirements of individual TUs. A national baseline may have, e.g. a 10-12 person senior executive team comprised of Heads of School/Faculty and up to five or six Senior Institutional Managers (e.g. Chief Financial Officer, Registrar, and Head of Research).

A new TU academic career and contract

Career structures should permit the competitive recruitment and retention of highly able academics from Ireland and abroad, and should provide opportunity while recognising and rewarding professional growth and excellence across the academic career. They should facilitate leadership in the mentoring of junior staff, the direction of research programmes, the design and renewal of curriculum in a field of study, and in developing relationships with regions and enterprises. Moreover, career structures should establish sufficient differentiation in academic pathways to ensure that academics are able to put their talents to their highest use, and that the institution as a whole is able to align optimally staff abilities to its range of missions. This, in turn, should permit the institution to achieve excellence in each mission, while taking care to promote parity of esteem among pathways. To realise more fully these principles than at present, technological universities should adopt a new career structure and new employment contract, one linked to the other. Specifically, the review team recommends:

i. The creation of a new career structure in technological universities should encompass five ranks: Assistant Lecturer, Lecturer, Senior Lecturer, Associate Professor, and Full Professor.
ii. Advancement in rank should be by demonstrated merit, through to the rank of Full Professor.
iii. Entry to the new career structure should be limited to those employed under a new employment contract.
iv. Lecturers employed in TU/IoT institutions who wish to continue working under existing contractual arrangements have the right to do so.
v. All newly hired academic staff should be employed based upon the new contract.
vi. All lecturers now employed by a TU/IoT institution should have the option of requesting a transfer from the old contract to the new.
vii. Transfer applicants should be subject to a rigorous process of review to assess their suitability to the level and the position profile they seek. An externally moderated evaluation panel should take transfer decisions.
viii. Those holding full-time research appointments should have an opportunity to seek transfer to the new contract, to afford “mobility between research and lecturing as part of the academic career framework” (TUI, 2021[25]).
ix. Lecturers approaching retirement eligibility should have an opportunity to participate in a superannuation scheme that follows the 2009 scheme developed for public servants.
x. A nationally agreed framework should specify the responsibilities (role descriptions) and performance standards for all ranks within the new contract, and identify pathways for career advancement that TU institutions may establish. These pathways should recognise excellence in research, pedagogy, engagement and institutional leadership.

xi. To ensure that there are sufficient synergies among research, pedagogy, engagement and institutional leadership, it is essential that role descriptions and workload allocations associated with these new pathways combine some minimum shares of different missions, e.g. pedagogy and engagement.

Agreeing the responsibilities of those in each rank, and how those vary among pathways, will be a central task in the implementation of a new career model. The project team notes that the Technological University Research Network developed a scheme of academic career pathways in its 2019 document, "Staffing and Grading Norms and Capacity Building, including Research", presenting job profiles (and associated knowledge, skills and experience) for career pathways. Their proposal identified three profiles – "Knowledge Exchange and Engagement", "Teaching and Learning, and Research", and "Teaching and Learning" – and mapped these against five (proposed) ranks (TURN, 2019[2]).

The specification of role descriptions and performance standards will require consultation, and should draw upon models used in other jurisdictions and in benchmark institutions. For example, the Australian Government commissioned the codification of a detailed set of teaching performance standards for its five-rank system that lay out the criteria that appointees at each rank are to meet, covering expectations in seven areas. Suggestions as to what evidence would be suitable to demonstrate performance at each level accompany these standards (Office for Learning and Teaching, 2014[53]). The standards are then adapted and contextualised by universities and put alongside corresponding standards covering research, engagement and leadership to provide a comprehensive set of performance expectations.

Institutions in the benchmark sample likewise have well-developed approaches to performance assessment that link evidence of performance to clearly articulated criteria, which can provide exemplars for adaptation to the TU system. Examples include Eindhoven University of Technology's, *Excellent People Attract Excellent People: Personnel policy for academic staff* (TU/e, 2016[54]). In addition, special consideration should be given to frameworks developed by UK Advance HE (2011[55]) and the Royal Academy of Engineering (2018[56]), both of which describe the criteria for good teaching and suggest how higher education teachers can provide evidence of their performance and their progress.

The new contract will establish new conditions of employment, altering the responsibilities and opportunities of TU academics. Academic staff who are employed under the new contract would have:

i. The opportunity to advance in rank from Assistant Lecturer (or another point of external entry to the career system) through to the rank of Full Professor.
ii. A workload model that reflects the profile of the post they hold, setting out an annual allocation of time across their portfolio of responsibilities.
iii. An employment contract that sets out professional responsibilities across the calendar year, setting aside a clearly demarcated annual leave bank consistent with international norms found in benchmark institutions.
iv. An opportunity for sabbatical leave. This could follow common international practice, as a period of professional development accrued after six years of service, or be organised as a "matched savings scheme" (in which staff save a fraction of annual leave and the employer matching the saved leave, taken either at the end of six years of service, or on a pro-rated basis prior to that.)
v. A salary situated in a salary structure that reflects the wider range of responsibilities they will be asked to take on, and a larger annual quantum of time during which they will perform these responsibilities.

A new career system and contract will require on the part of public authorities:

i. Funding that permits the creation of new Associate Professor and Professor positions in sufficient number to ensure that academic staff employed under the new contract have a viable path for advancement.

ii. Commitment, in the longer run, to creating a share of professorial posts among all academic ranks that is broadly comparable to benchmark patterns.

iii. Funding that recognises the quantum of time associated with the new contract, and the cost of sabbatical leave.

Workload allocation and instruction model

TU lecturers employed under the existing contract, we propose, would continue to work under previously agreed workload models, while academic staff employed under a new contract should work within new workload models.

We advise:

i. The workload allocation model that is developed should set general rules agreed across the system – while leaving scope to recognise distinct institutional and faculty profiles, department needs, and the individual capacities and interests of academic staff.

ii. A national framework containing broad definition by level and role (research, pedagogy, engagement, institutional leadership) should provide a range of time allocations aligned to those levels and roles. Following the practice of benchmark institutions, we envision that all academic staff will also carry responsibilities and time allocations outside their primary role, e.g. that an associate professor of engagement might have 25% of their time allocated to instructional responsibilities, thereby ensuring a link between curriculum and teaching, on the one hand, and regional firms, on the other.[2]

iii. That technological universities – through a process of consultation at the institution, faculty and department levels – take decisions to implement this framework, ensuring a connection between time allocations and measurable annual performance – e.g. research outputs; engagement outputs (e.g. innovation voucher project agreements and consultancy service agreements with industry); or pedagogical leadership (e.g. curriculum review and revision for one's field of study).

iv. Technological universities should formulate annual performance in terms of outputs. This would also include, ideally, instructional activity, which is best measured in outputs – e.g. completed ECTS.

v. A weighted average mark for academic work should specify the time allocated over the course of a year. In academic work, the time allocated to teaching, scholarship, research, administration of academic work, service to the institution or the community, will vary significantly through the year. Teaching, for instance, will be restricted to the teaching semester, while research and scholarship will be more highly concentrated in periods outside the teaching weeks.

As noted in Part Two, instructional workloads within IoT/TU institutions are shaped by the practice of organising instruction in comparatively small classes, and give rise to relatively low student-to-lecturer ratios. While class sizes reflect, in part, the impact of physical spaces and instructional standards set by licensing or professional bodies, they importantly reflect the origins of institutes of technology as school institutions, the focus of the lecturer career on classroom teaching, and the commitment of IoT institutions to the learning needs of disadvantaged students.

Now far removed from their school origins, and with heighted expectations for engagement and research, emerging TU institutions need a new model of the instructional career of its academic staff. With the

[2] This is consistent with the view of the TURN (2019[57]) Report, "Staffing and Grading Norms and Capacity Building, including Research." That document proposed three job profiles in which 20% of time would be allocated to administration, and the remaining 80% to "knowledge exchange and engagement" (40/40); "teaching and learning, and research" (40/40), or "teaching and learning"(with a minimum of 20% of time allocated to "scholarship").

emergence of a much longer pathway for advancement, and more research-informed and regionally engaged teaching, there is a need for a new vision of the instructional career.

i. As academic staff advance in their careers, technological universities should recognise them as instructional leaders who work in concert with collaborators to create, deliver and assess undergraduate learning.
ii. Academic staff who are senior lecturers and professors should engage with larger classes than in past. Student-to-instructor ratios should gradually rise to the average level of benchmark institutions.
iii. Resources need to accompany this instructional vision. Instructional leaders need the support of teaching and learning professionals who are expert in, e.g. course design and assessment. They also need the instructional support of pedagogically trained doctoral students, for whom undergraduate instruction is a recognised part of their doctoral programme.
iv. Student success should remain the instructional priority of technological universities. This means that targeted class size expansion should focus on subjects and learner cohorts that are well along in the study trajectory, and that technological universities should closely engage with initiatives meant to build their capacity to support student success, such as the National Forum for Teaching and Learning's Data-Enabled Student Success Initiative (DESSI).

Academic and institutional leadership

Highly successful technological universities require departments capable of assuming primary responsibility for academic leadership, faculties able to offer strategic guidance and support to their departments and the institution's executive leadership, and an executive team that combines central functions and faculty structures at a scale that meets institutional needs while respecting a common public framework of governance. Emerging technological universities appear, to date, to have prioritised the last of these characteristics. This project advises close attention to the first two characteristics, on the part of government and TU executives.

Support for Department and School Heads

Most benchmark institutions, especially those in Anglophone countries, have adopted the practice of maintaining Departmental Heads as the managers of the academic staff and of the department's academic programme, but with limited financial delegations. They have placed strategic planning and financial management, capital planning and the line management of Departmental Heads in the hands of Faculty Heads or Deans – in the Irish context, Heads of Faculties or Schools. That level of aggregation of the strategic leadership allows for economies of scale and thus, greater sophistication in the planning and financial support available for the strategic manager. At the same time, it keeps academic staff performance management and academic leadership in departments, where there is better understanding of the strengths of the academics working in the department, of problems like scheduling and also of academic issues related to the disciplines covered by the department, such as pedagogical or research questions.

As a new career model and employment contract is implemented and staff begin to transition to a professorial career path, IoT/TU departmental and school leaders will increasingly be called upon to offer academic leadership as well as manage the human, financial and capital resources of their areas of responsibility. If TU academic staff are to operate effectively in a departmental management role while also continuing to offer academic leadership, two things are needed:

i. An appropriate and manageable span of control – so that the time-consuming tasks of staff management, scheduling, and staff performance reviews do not crowd out the important need for broader academic leadership.

ii. An appropriate level of management support – for instance, for budget management, budget tracking, financial reporting, oversight of the research programmes of the department (including postgraduate recruitment), maintenance of plant and equipment, oversight of technical and support staff, so they can see above the details of the running of the operation and continue to offer leadership to the academic staff.

The question of span of control is especially important for Heads of Departments. It is not our role to advise institutions on the precise structure or arrangement of departments, faculties or schools. However, it is important that those in academic leadership roles (who are also responsible for the supervision, mentoring and scheduling of academics) have responsibility for a manageable number of academic staff. To be an effective leader, as well as an effective manager, requires a limited span of control. A wide span risks turning the head of department into a resourcing and scheduling manager, with little scope for the critical roles of research, pedagogical and engagement leadership, and no opportunity to sustain their own scholarship.

The costs of moving to a reasonable span of control need to be met in the transition to the technological universities if the new institutions are to be able to avoid swamping departmental managers with administration at the expense of academic leadership. That may be done either by splitting some existing large departments or, where that is unwise, by creating a departmental management team with a single head supported by a group of senior staff, to create a pool responsible for scheduling, oversight and tasks like performance management.

Likewise, there is a need to ensure that Heads of Schools have a manageable span of control. The need for corporate support is particularly important at the school level, where the head of school also needs support for strategic planning, for capital planning, for overall financial performance and for brokering some of the relationships between the faculty and the regional stakeholders. The head of a school needs to be supported by a small team of professional managers, and, typically, by senior academic staff who can take responsibility for oversight of aspects of the school's work, such as its research and engagement strategies, either on a fixed-term basis, or as part of their long-term career trajectory.

Tenure, reversion and compensation

As technological universities improve departmental spans of control and management support, we advise, as conditions permit, making head of department roles rotational. As is the case for all others employed on lecturer contracts, Heads of Department would take up their post at whatever ranks results from a merit-based process of evaluation, whether Senior Lecturer, Associate Professor, or Full Professor. In the case of Departmental Heads, where there may be a more limited pool of possible candidates, there may be room (or a need) for greater flexibility on the matter of a Department Head's tenure. Once they have served a term as head of department and have given up the associated people management and budgetary tasks, they should have the right to return to an academic role that has significant leadership responsibilities.

The nature of position tenure is likely to differ between a head of department and a head of school or faculty, given the strategic dimension of a head of faculty's role, and the need for clear alignment between a faculty's direction and institutional priorities. A need for alignment implies – as in the case of senior executive roles – that head of faculty should be a fixed-term role, with regular performance reviews and a major review at the half-way point of the term, allowing for refreshing if necessary.

Head of school (or faculty) roles require strategic leadership, in addition to an academic profile, and carry significant responsibilities in planning, people management, a contribution to institutional leadership, capital planning and very significant regional and enterprise engagement. The term of appointment needs to be long enough to reflect the complexity of the role and the time it will take for a new faculty head to get on top of all the challenges of the role. There is also an argument for making a head of school or faculty position a reversion role, reducing the risks where an appointment does not work out well, and international

practice varies: for example, the Canadian benchmark universities see these as reversion roles, while the Australian institutions do not.

Compensation for formal academic leadership roles

Those who hold leadership roles conventionally receive a salary top-up to reflect their extra responsibilities. If those positions are also reversion positions, a decision needs to be taken about what happens when a person reverts from a department or faculty head role to a professorship. Continuation of salary supplements is neither cost-effective nor fair. The loss of a salary supplement may act as a disincentive for a person to stand down, especially if there are implications for a jobholder's superannuation rights. There is no simple way to resolve this, apart from setting clear expectations that leadership roles are for a fixed term, and with limited rights of renewal, enabling senior academics to make informed decisions, taking account of the effects on their superannuation rights. In a well-functioning career system, many senior academics nonetheless find it rewarding to serve as a departmental or faculty academic leader, since it provides an important opportunity to guide one's field or faculty, and to advance one's own career.

Institutional leadership

The leadership models that Ireland's technological universities have implemented to date appear to be broadly comparable to institutional leadership models followed in benchmark institutions. TU institutions are nonetheless different to the benchmark institutions selected for comparison – while each TU has distinctive profile and regional basis, together they form a co-ordinated system of public universities that operate with a shared legal basis, common framework of collective bargaining, and membership association.

Under Irish law, each TU institution enjoys a wide scope of autonomy, and is responsible for implementing a model for executive institutional leadership adapted to its institutional profile and developmental trajectory. However, as co-ordinated public institutions, they function within a broad framework of national policy, and this will set some boundaries for the leadership structures they choose, and the necessity of giving an account of the leadership choices they have made.

To balance these competing priorities, the review team advises establishment of a national baseline model for institutional leadership, while permitting institution-level variations to take into account specific regional requirements of individual TUs. A national baseline might have a 10-12 person senior executive team comprised of Heads of School/Faculty and up to five or six senior institutional managers (e.g. CFO, Registrar, and Head of Research). Institutional governance models outside an agreed baseline would be agreed after consultation with stakeholders within the institution, and with public funding bodies.

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