Cardiff University Big Conversation/Y Sgwrs Fawr

Future trends and strategic foresight

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Introduction

Strategic foresight is a structured and systematic way of using ideas about the future to anticipate possible opportunities and challenges and better prepare for change (OECD[1])

The future of Cardiff University will be shaped by a broad range of drivers. The aim of this report is to identify those major external trends around which we have a level of certainty such as climate change, demography, urbanisation, economic growth, energy consumption, connectivity, and geopolitics (ESPAS 2021). Some of these trends are already recognised, but the potential impact on teaching, research and the civic missions of universities has not been adequately addressed. There are other trends that we might expect to shape our future that are less well-recognised. This report forms part of the first, evidence gathering, stage of Cardiff University's Y Sgwrs Fawr/Big Conversation process. [2]

The use of strategic foresight in such exercises is well-established and can help guard against the risk of developing priorities based on outdated evidence or ways of thinking. It has been used to positive effect by governments, businesses, and NGOs as well as universities. 'Foresight is the process of turning facts about the present into plausible, provocative, and logical views of the future. Foresight is a practice that encompasses creative thinking about future possibilities and systematic analysis of patterns that affect change. Foresight tools help us sense change and communicate vision' (Forchheimer 2022). Complex settings, such as those in which universities operate, are particularly suited to futures exercises in which uncertainty pervades, and a range of futures are possible. Indeed, universities have been challenged to become active change agents in shaping their future and their wider region (Piirainen et al. 2016). In considering the future, strategic foresight uses a number of tools including horizon scanning, driver mapping, scenarios, visioning, roadmapping and backcasting. (Government Office for Science 2017). The focus of this report is trends analysis.

The findings highlight a number of global forces that are likely to shape the university landscape, with profound implications for the institution, its staff, and students. Among these forces are immediate challenges, such as the financial intricacies faced by the University, as well as the long-term developments in social, technological, economic, environmental and political dynamics that are set to unfold over the years and decades ahead. This underscores the University's pivotal role in confronting grand challenges and emphasises the urgency for strategic actions to strengthen its position in the evolving future. The findings suggest the importance of not only acknowledging these challenges but also developing the University's anticipatory capacities in shaping the future.

This report provides (1) a brief summary of the situation universities find themselves in today; an overview of long-term megatrends trends that have implications for UK universities (3); followed by analysis of the specific implications for activities, organisational structures and facilities, and the student demographic (4). It concludes by drawing out the main conclusions and discussing the opportunities for building capacities to anticipate the future of universities.

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[1] https://www.oecd.org/strategic-foresight/#:~:text=Strategic%20foresight%20is%20a%20structured,better%20decisions%20and%20act%20now.

[2] https://intranet.cardiff.ac.uk/staff/about-us/strategy-and-improvements/y-sgwrs-fawr-the-big-conversation

The intention is not to be exhaustive, but rather to inform the debate about the University's future strategy.

1. Universities today

Universities make a major contribution to the UK economy (London Economics 2022). They are a significant employer in most cities and regions and they contribute to the development of graduate skills, generation of research and support for entrepreneurship and innovation. These activities contribute towards government policy objectives for productivity and economic growth. They support employment and provide skills for the future, and for social mobility whilst providing research that supports public services and the grand challenges facing the UK. The recent economic impact of Cardiff University (2021/22) report highlights a range of impacts:

- £831 million - research and knowledge exchange activities
- £1,223 million - teaching and learning activities
- £655 million - educational exports
- £970 million operating and capital spending

This corresponds to a benefit ratio of 6.4:1, exceeding the Russell Group average of 5.5:1 (London Economics 2022).

There are signs, however, that the context facing universities is becoming more challenging; indeed the 'golden age' of universities may be passing (KPMG 2020). They face rising operating costs, frozen tuition fees, growing student expectations and uncertain political support for the sector. Questions raised about the value of student learning outcomes and variations in graduate earnings premiums have also come to the fore (IFS 2020). These developments highlight the question of affordability for both students and universities in an era of fixed fees and rising operating costs, as well as fair renumeration for staff (Roth 2023). Indeed, our own Vice Chancellor has noted that we are 'at an existential moment for universities. Our financial situation is, frankly, unsustainable'[3]. In this context, it is perhaps unsurprising that universities face increasing challenges to become leaner and more efficient, while paying closer attention to student and industry needs as well as societal challenges. Solutions to the challenges faced by universities are also likely to require action to develop the sustainability of their funding by both the UK and devolved nations in the UK (Welsh Affairs Select Committee 2023).

Despite these challenges, universities have responded to significant disruptions throughout their history (McCowan 2017), as illustrated most recently by their collective response to the COVID-19 pandemic. This report aims to help Cardiff University understand and respond to these current challenges in an evidence-based, structured, and futures-oriented way.

[3] https://www.walesonline.co.uk/news/education/cardiff-university-faces-cuts-amid-28023417

2. Megatrends

Trends are patterns of change, based on long-term data sets. They are often expressed as increasing, decreasing or continuing. Megatrends are high level driving forces that are slow to form, strongly interconnected and with global impacts. Climate change, population growth and urbanisation are examples of megatrends. (UK Government Foresight)

Large-scale trends and their implications are central to the exploration and understanding of the future. Cardiff University is subject to a broad range of trends with consequent impacts on its activities. This section adopts the Social, Technological, Economic, Environmental and Political (STEEP) framework to make sense of the complex nature of such trends. The STEEP framework is used for scanning developments in the external (contextual) macro environment, providing the basis for the implications to be addressed in later sections.

In a complex world, it can be difficult to place issues into single categories, and it will be important, in the next stages of the strategic foresight work, to interrogate interactions between topics across categories. The trends considered in this report are likely to vary in terms of their temporal horizon. In broad terms the report focuses on trends that are likely to impact our context over the next 10 to 15 years.

Social

The population of the UK is expected to peak at 70 million between now and 2050. Like other Western countries, the UK has been aging for some time and by 2066 there are projected to be a further 8.6 million UK residents aged 65 years and over[4]. In addition, the birth rate has been declining with a slowdown in the growth of the expected population. These trends will have implications for the structure of the population. There is a population bulge coming through with numbers of 18-year-olds in Wales expected to grow until 2030, before steadily declining (Figure 1). More broadly, the aging of the population is likely to see pressure placed on public services from an increasingly elderly population alongside the potential for decline in the number of working-age people (Hill-Dixon et al. 2023). It is expected that more people will be living alone, with consequent impacts on housing demands and loneliness (Hertz 2020).

[4] https://assets.publishing.service.gov.uk/media/60c8818ee90e0743934f6ae8/GO-Science_Trend_Deck_-_Demographics_section_-_Spring_2021.pdf

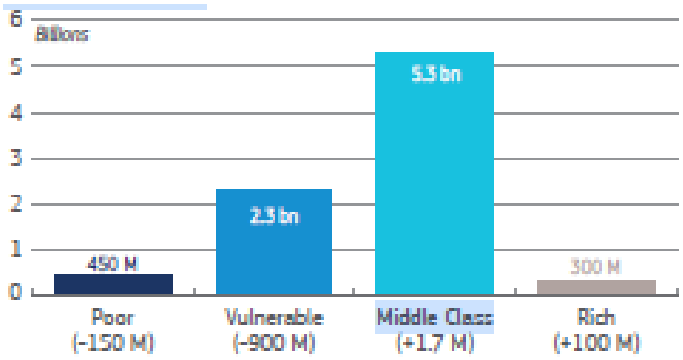
Figure 1 National population projections, Age 18, Wales

Source: Nomis

Such trends present challenges for organisations and services to adapt and improve their focus on the health and wellbeing of the elderly population. It also highlights a future where there may be fewer young people, with consequent impacts on demand for income, spending, and taxation.

Social inequality remains an ongoing challenge. Although income inequality between countries has improved, with a growing middle class (Figure 2) dominated by developments in many emerging countries, inequalities within and between countries are durable (ESPAS 2021). This can also be linked to inequalities in gender, age, origin, ethnicity, disability, sexual orientation, class, and religion. At the heart of such inequalities is the constraint of opportunity and exclusion of groups in society from social, economic, and ecological activities and outcomes. Such inequalities can negatively affect individuals' educational outcomes, employment prospects, home ownership, health, and life expectancy. Income inequality, for example, has grown in recent decades, with low-income households being the worst affected by the economic impacts of COVID-19 lockdowns (Francis-Devine & Orme 2023). This evidence suggests that social inequalities have structural characteristics that persist over time for individuals and groups (Morris et al. 2019), but also for wider regions and countries, where they have been linked to the emergence of other trends such as social polarisation (Dijkstra et al. 2020).

Figure 2 Global middle class dominance in 2030



Note: Figures in parenthesis indicate the increase/decrease in the number of people in each category by 2030.

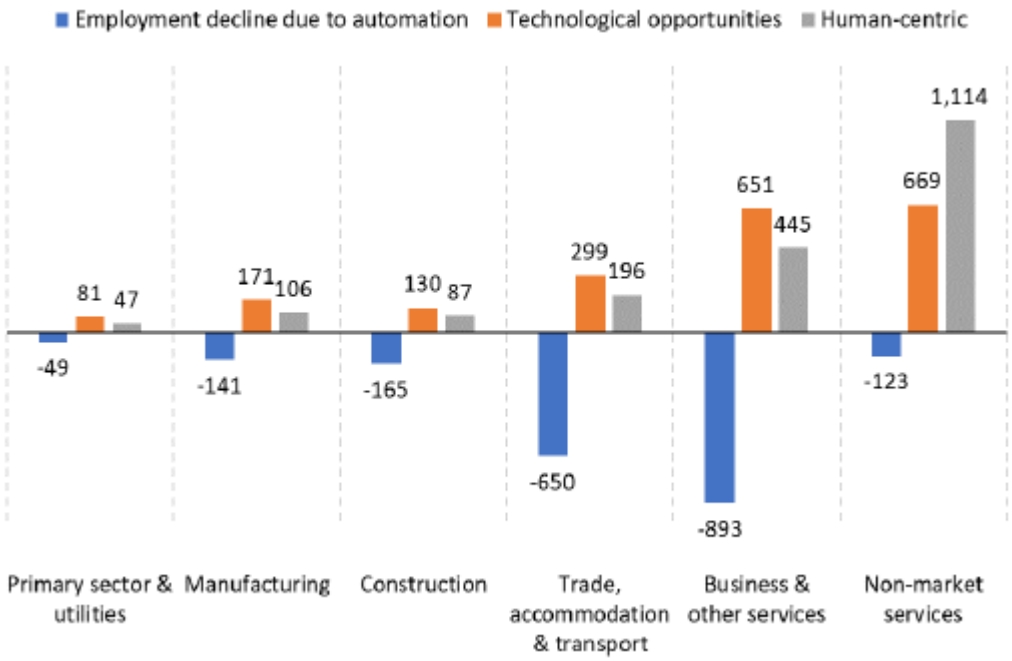
Source: ESPAS (2021)

Technological

The world has become increasingly digitally connected. Successive waves of fixed and mobile telecommunications deployment and the emergence of technologies such as cloud computing, robotics and artificial intelligence have helped shape communication and transform the activities of many sectors, businesses, and individuals (Vial 2019). Such developments are associated with rapidly growing volumes of data and devices, and have been linked to the ability of organisations to generate productivity and innovation benefits.

Digital technologies have also been associated with new business models, the emergence of new competitive actors such as digital platforms and the growing prevalence of personalised services. New technologies are continually emerging and, depending on the speed of adoption, will impact the economy and society. Generative artificial intelligence (for example, ChatGPT) is now reaching the mainstream with the potential for such technologies to transform sectors and reshape labour markets through automation (Figure 3). Calls for greater regulation of 'big tech' are also likely to persist, as the social, economic and environmental impacts of such technologies and business models become clearer.

Figure 3 Forecast automation-driven job declines and increases by sector in 2035 compared to the Baseline projections (000s)



Source: The Warwick Institute for Employment Research (2022)

Although technological transformation represents a significant transition in society, it cannot be solely reduced to digital technology. Indeed, there is a danger that we are 'blinded' by the current emphasis on digital technologies (Stagars 2017). Significant developments in other areas of technology are also emerging with societal and ecological implications. Synthetic biology, for example, is experiencing rapid development in the ability of researchers to harness nature to reengineer organisms and solve problems in areas such as medicine, manufacturing and agriculture. While the potential impacts of such technologies are substantial, concerns also exist regarding their ethical implications and the consequent need for risk management (Voigt 2020). Elsewhere, neuroscience is advancing our understanding of the functioning of the human brain and the potential for cognitive enhancement. Such developments open research avenues to explore the feasibility, utility, risks and impacts of different forms of enhancement (Dresler et al. 2019). Other important areas of technological development are evident in new materials and energy technologies, all of which highlight the importance of developments taking place beyond a pure digital gaze.

Economic

Economic growth in the period to 2030 is expected to be greatest in developing countries, with Europe lagging. These trends are projected to see China becoming the largest economy, overtaking the US (ESPAS 2021). Alongside the shifting nature of global economic power, there is also the potential for the global trading system to become even more fragmented, with higher trade barriers challenging the shift towards globalisation and global integration seen in previous decades. Recent developments in wars, such as Ukraine and political turbulence (e.g., Brexit), have challenged the consensus surrounding globalised supply chains.

The world of work is changing. The job for life is becoming a thing of the past (Future Learn 2022). Employment is becoming more precarious - the number of adults in England and Wales working for gig economy companies grew two-and-a-half times between 2016 and 2021 (Spencer & Huws 2021). There are skills shortages in many areas and a lack of skills readiness in the available workforce for new technologies and new challenges (High Value Manufacturing Catapult 2020).

Critiques of the globalised model of capitalism have called for 'degrowth' to take centre stage in the development of places (Schmelzer 2022). This highlights opportunities for more equitable and sustainable redistribution of economic and technological benefits. Globalisation has also been challenged by the efforts of countries, seeking to reshore economic activities and capabilities 'onshore' (Bailey & De Propris 2014). These developments illustrate the fragile nature of global economic linkages and potential implications for the trade of goods, as well as the movement of people.

The economic context is also informed by the trends in borrowing and national debt. Debt has been growing consistently in most developed economies since the 2007/2008 financial crisis. Borrowing in response to COVID-19, the rapidly aging population, climate change and wars also account for this trend and illustrate to its potential persistence as well as defaults and instability (US National Intelligence Council 2021). Along with China's economic slowdown, declining foreign direct investment and increased debt levels point to the potential for a period of stagnated growth. These findings highlight the potential for weak growth prospects and poor public finances in many countries.

Environmental

Climate change is a significant challenge for all societies worldwide. Here, the impact of human-generated emissions on atmosphere and climate has been scientifically modelled and is increasingly recognised by decision-makers (IPCC 2023). For example, greenhouse gas emissions in the UK have grown by an average 1.3% since 2010. Global temperatures are also increasing, with consequent increases in average temperatures and rising sea levels[5]. Such developments have been linked to extreme weather patterns, flooding, property damage, and their impact on health, food production, and biodiversity. The costs of these climate-related impacts are likely to fall disproportionately on different people and places. This may produce resource shortages and growing competition between countries and regions, leading to further instability and potential for political discord and military intervention.

'On the current path, it is probable that within the next 20 years global warming will surpass 1.5 °C while heading toward 2 °C possibly by mid-century.' (US National Intelligence Council 2021)

Political agreements have sought to address such challenges, not least in the recent UN Paris Agreement to hold 'the increase in the global average temperature to well below

5 https://climateknowledgeportal.worldbank.org/overview#:~:text=Trends%20in%20globally%20averaged%20temperature,evidence%20of%20a%20warming%20planet.

2°C above pre-industrial levels'[6]. Laws have also been passed, such as the UK's Climate Change Act, which commits the UK government to reduce greenhouse gas emissions by at least 100% of 1990 levels (net zero) by 2050. In addition to regulatory activities, rising global temperatures are also spur more research and action on mitigation and adaptation. This is likely to lead to increased efforts to develop and support the adoption of renewable energy technologies, to improve energy efficiency and to phase out fossil fuel usage. Such developments challenge all stakeholders – policy makers, organisations, and individuals–to work towards net zero goals.

As well as the climate crisis, we are also facing a nature crisis (further exacerbated by climate change). Resource extraction, habitat loss, intensive agriculture, overfishing, and pollution mean that nature is deteriorating across the world, and biodiversity is declining faster than at any time in human history (Roy et al. 2023). The ecosystem services on which society depends, and which provide the foundation for every economy, are under pressure. The global economy is already estimated to be operating outside the safe zones for six of the nine planetary boundaries. As pressures intensify, we are likely to see a more concerted response to protect nature and ecosystem services, such as happened with decarbonisation (Taskforce for Nature-Related Financial Disclosures 2023).

Political

Global power dynamics are expected to see US hegemony challenged by an increasingly multipolar world. Key to this trend is the emergence of China as a global power, with a significant influence. While its role and influence in Asia are expected to grow, China is also expected to play a more prominent role in global challenges. Rebalancing of power is becoming more prominent in countries. In the UK, this is reflected by the increasing devolution of powers from the UK stage and an increasingly complex multi-level governance arrangements with cities and regions (Waite & Morgan 2018).

Trust in government and political institutions has declined in the UK, with levels of confidence in political institutions such as parliament halving since the 1990s (The Policy Institute 2023). The decline in political trust is complex, varying according to education, political identity and geography and may undermine liberal democracies worldwide. Societal tensions are reflected in growing polarisation, as illustrated by the rise of populism in many jurisdictions. This has been identified as a troubling prospect for many democracies. Although populism has a long history it has been argued that, in its current form, it has developed a much broader international focus (Cox 2018). These developments highlight potential complexities and turbulence in the context for politics and government.

Conflict and tension have the potential to grow in response to factors such as climate change, population displacement and the changing balance of economic power. Such tensions are likely to be expressed in moves towards protectionism and the erection of borders with implications for trade and movement of people. It may also see conflicting goals and priorities and add to the complexity of governance. Innovative responses to this complexity may see a shift in governance towards actors from outside government,

[6] https://unfccc.int/process-and-meetings/the-paris-agreement#:~:text=Its%20overarching%20goal%20is%20to,above%20pre%2Dindustrial%20levels.%E2%80%9D

as well as the growing importance of the local level, where proximity to the needs of local populations may make local governance actors better placed to address challenges. In the UK, such trends are reflected in the increasing devolution from central government as well as the emergence of multilevel policies (Breach et al. 2023). Funding for such actions at the local level, however, is likely to face financial constraints, relative to the scale of the challenges noted above.

3. University activities, facilities and the student demographic on the horizon

In considering these long-term trends, several potential implications for universities' core missions, operations and facilities have been identified. These potential implications highlight the tensions and uncertainties that pervade future universities and call for debate on what elements of the preferred university should be retained, strengthened, or downgraded. They also highlight the importance of universities developing capacity to anticipate possible future opportunities and challenges (OECD 2021). That is, an ongoing, proactive approach to futures that will best imagine and prepare for the complex and uncertain nature of the future (Kokshagina et al. 2021).

Teaching and learning

Teaching and learning face the prospect of adapting to the changing needs of learners and wider stakeholders. This, as noted, above suggests the need for greater flexibility in the consumption and delivery of teaching and learning. Digital technologies are particularly well-adapted to deliver personalised services, such as teaching and learning (Ahmad 2015). This may reflect demands for learning to be delivered flexibly and to be accessible at a time that suits the learner. It may also provide more accessible learning opportunities and help reach marginalized groups, including those with disabilities and linguistic and minority cultures (UNESCO 2023). Such developments may see greater demand for degree programmes to be restructured to allow students to pick and choose elements of programmes and build credits in a non-linear manner. This may also be enabled by greater integration with tertiary education and improved learning pathways (PA Consulting 2023).

The demand for universities to better adapt their teaching and learning to societal needs, such as climate changes (Välikangas 2022), as well as other pressing concerns such as decolonisation (Joseph Mbembe 2016), as well as the requirements of industry is likely to gain pace. Examples of such teaching practice can be seen in the engagement between teaching and local employers, including social enterprises[7]. Such developments are likely to see universities challenged to reshape their curriculum and provide new skills, such as creativity, teamwork, problem-solving, and interpersonal skills. It also calls for universities to pay attention to the ongoing re-skilling challenges for their own staff that are likely to emerge. Such a role reflects the call for universities to adopt a more user-centric and instrumental approach, geared towards learners and other

[7] https://www.cardiff.ac.uk/news/view/1013773-national-software-academy-awarded-for-teaching-excellence https://intranet.cardiff.ac.uk/staff/documents/2684515-exceptional-enhancement-of-the-student-learning-experience-2022

stakeholders. While such developments are consistent with a greater emphasis on customer services, satisfaction and affordability, there are concerns that this may lead to the 'unbundling' of universities through the redistribution of its tasks to multiple outside providers, the potential for this to overburden staff and downplay of the critical contribution of universities to the societal value in teaching and learning (Schlosser 2016).

Research and impact

Research and its impact have been identified as an important priority for the UK and as part of a strategy to become a science superpower (Department for Science Innovation & Technology 2023). Traditional research quality metrics and processes such as REF are likely to continue to be important for the allocation of research funding. The focus on impact is also likely to continue to grow, alongside the importance of research excellence. This will be supported by the UK Government's commitment to spending 2.4% of its GDP on R&D by 2027 (Rough et al. 2021). Universities, alongside businesses, are well placed to access such funding and engage in this strategic priority for the UK. In Wales, government support for investment in research and innovation is also provided by the Welsh Government. The comparative absence of private-sector R&D activities in the region highlights an important role for universities (Delbridge et al. 2021).

The growing prominence of the aforementioned grand challenges is emerging as a strong focus for university research and practice. Their complexities highlight the importance of interdisciplinary research, as well as the limited rewards available to academic staff to engage in such research (Brown et al. 2019). Tensions, for example, exist in the quest for quality and interdisciplinary research, with recognised difficulties in managing different research approaches into a single 'unified intellectual perspective' (Turner et al. 2015). Notwithstanding these challenges, universities are beginning to develop interdisciplinary responses to grand challenges (Henderson et al. 2023). An example of this can be seen in Cardiff Business School's focus on 'public value' in its teaching, research, and engagement (Kitchener & Delbridge 2020). This approach also calls for growing interaction with outside organisations and their needs (see Civic mission for more details).

Civic mission

Universities are increasingly being asked to engage in and respond to a complex range of public, private, and third-sector actors, as well as civic needs, challenges, and desires for impact (Goddard & Vallance 2011). Universities have traditionally approached this challenge with a strong focus on science and technology, with metrics such as spin-outs, intellectual property, and collaborative R&D at the heart of managing such engagements (Uyarra 2010).

The increasing attention given to grand challenges and wider forms of engagement and innovation highlights the growing cast of local and national interlocutors in university research and engagement. This can be observed in Cardiff University's strong

relationship with the Grangetown community in Cardiff[8]. Likewise, the emerging, inclusive approaches to regional growth and development highlight future opportunities for universities to become 'pivotal change agents' in their surrounding contexts (Giesenbauer & Müller-Christ 2020). This is not to say that large private sector enterprises will decline in importance for the civic mission of universities. Rather, these trends call for universities to better understand their surrounding ecosystems. In doing so, it represents a way for universities to improve their relevance to local areas and place-based challenges and needs, and to demonstrate their impacts. Likewise, this does not suggest that universities should not seek to address impact beyond the civic arena, for example, in addressing global challenges.

Engaging effectively in civic mission is also likely to have implications for universities in terms of their organisational capacity to deliver their activities, as well as tensions with the competing demands on academic staff. Traditionally, this interface has been a challenge for universities, with stakeholders highlighting a 'lack' suitable entry and contact points. However, research and practice highlight the importance of providing an integrated approach to civic engagement that encompasses not only departments/schools, but also support services.

The potential for universities to harness their facilities and spaces in support of engagement and innovation has also been identified (Vallance et al. 2020). Here, sbarc|spark represents one way in which this might be achieved, drawing together interdisciplinary research, collocating SMEs, and providing a convening space for organisations to engage with university research to address challenges (Henderson et al 2023). Indeed, there may be opportunities to further align university research, teaching and engagement around such challenges. The Living Labs concept[9], for example, illustrates how working alongside partners in such labs could be used to mobilise a university's response to societal challenges. This offers the prospect of harnessing and enriching teaching, research and engagement to address such challenges (Goddard 2016).

Organisation and facilities

As they have grown, universities like many other public and private organisations, have increasingly adopted hierarchical organisational principles based on central control, top-down planning and consequent reductions in the autonomy of departments and staff (Martin 2016). Despite these trends, management researchers have highlighted the weaknesses of such arrangements, in terms of communication, adaptation, employee health and collegiality (Sahlin & Eriksson-Zetterquist 2023). This contrasts with many businesses that have begun to adopt organising models based on flatter management structures (McKinsey and Company 2020). Such structures, however, are not without their faults such as confusion and accountability, and had led to greater experimentation in decentralised models of management that seek to harness the principles of subsidiary (Vantrappen & Wirtz 2017). Such principles are at the heart of recent research for

[8] https://www.cardiff.ac.uk/community/our-local-community-projects/community-gateway
[9] https://www.cardiff.ac.uk/architecture/about-us/facilities/living-lab

Advanced HE where universities have expressed the desire to develop distributed leadership to better empower their employees to deliver outcomes (WonkHE 2023).

Alongside challenges to their operating models, university facilities and operations will also face pressures to change. The recognition of the climate crisis, for example, has seen calls for universities to move rapidly to net-zero (UN Environment Programme 2021). While these challenges are recognised, they require substantial investment in areas such as retrofitting facilities and student accommodation, installing renewable energy facilities and facilitating green travel options (e.g. electric vehicle charging). The important position occupied in local housing ecosystems in towns and cities represents a further example of where universities are likely to face challenges, not least in ensuring sufficient housing provision, but also championing standards in the private sector. Such developments highlight the importance of housing in students' academic, financial, social and overall wellbeing (Universities UK 2023). The increase of 18-year-olds (see Figure 1) expected in the coming years call for these challenges to be addressed through joint action by universities and their outside partners.

The transition towards digitalisation has been underway across the University's operations over many years. COVID-19 and the subsequent move towards hybrid working among staff are likely to challenge the University to adapt its facilities. As noted above, students are also likely to expect seamless in-person and digital learning opportunities and services. Technological developments in areas such as augmented reality will also have implications, calling for teaching spaces to be adapted for teaching in the digital age (see Box 1).

Such developments, of course, will require investment over time. The constrained funding environment for universities, however, highlights ongoing tensions and challenges regarding how universities should respond to both current and future challenges, but also the central roles of UK and Welsh Government in the sustainability of university funding arrangements.

The student demographic

The student demographic has traditionally been drawn from UK students. This has grown substantially in recent decades, with the entry rates of UK 18-year-olds rising 'from 24.7% in 2006 to 30.7% in 2015 and peaked at 38.2% in 2021' (Bolton 2023, p. 6). This has been complemented by the increasing number of international students from many countries. Such an approach faces potential challenges associated with globalisation and concerns over an overreliance on China (Adams et al. 2023). While universities are actively seeking to recruit from a broader range of countries, they have limited control over these dynamics with key decisions taken at the UK level, such as immigration policy (Bolton et al. 2023). Such trends may call for universities to develop partnerships with international institutions and consider the support needs of international students.

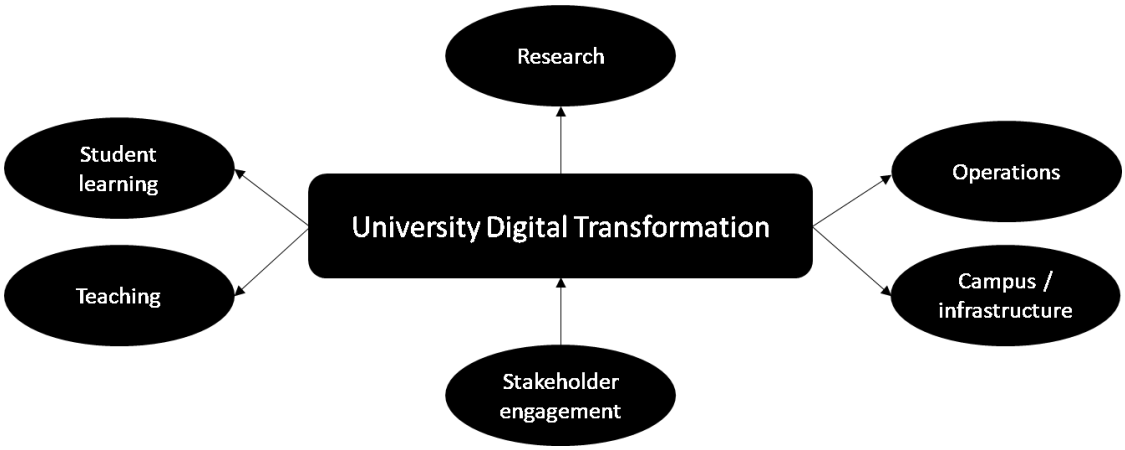
The changing world of work and the aging population represent further drivers that has the potential to shape the structure of the student demographic. Here, student demands for bite-sized personalised learning over time may result in a greater number of older

students on campus. This is likely to require universities to consider the multiple needs of the student body in their planning, facilities and services.

Box 1 Digital transformation and the university

Digital technologies have already had significant impacts on teaching and research, especially since the COVID-19 pandemic. In the future, these technologies are likely to have further transformative effects on teaching and learning, research, and civic engagement. These developments offer new possibilities for organising, delivering, and accessing higher education, as well as the emergence of hybrid provision and the potential for new entrants to enter the higher education 'market.' The broader digitalisation of society also presents challenges to universities, particularly in the disruptive effects of automation and environmental emissions. Harnessing such technologies for the goals of universities while mitigating downsides therefore represents an important future challenge for all such institutions.

Figure 4 Digital transformation and some implications for universities



4. Conclusions

The findings from this review highlight turbulent trends that have the potential to affect universities. While the University is not able to address these challenges on its own, it has the potential to work with partners to better understand this context and take action to mitigate or benefit from such developments.

Although some of the trends and implications identified in this research may represent a threat, painting a negative picture of the future of universities and their staff, more positive perspectives are also highlighted, not least in the potential for universities to address societal and ecological challenges. These multiple interpretations of the future point to not only dystopian and more hopeful futures (Bengtsen & Gildersleeve 2022), but also the agency of universities to develop visions and actions that seek to mitigate negative trends and work towards preferred futures. Interventions to address long-term

challenges, however, will also need to balance the near-term challenges facing universities, such as funding concerns.

'The future is not something that is done to us, but an ongoing process in which we can intervene.' (Facer 2011, p. 6).

This calls for universities to go beyond one-off exercises and seek to build their futures capacity (OECD 2021). Rather than waiting for a crisis to strike, they should recognise that knowledge and understanding of uncertain futures can be generated, but also actions taken to shape them. This involves addressing the emergence of challenges by harnessing a wide range of possible futures to anticipate adaptation strategies, and then monitoring change to guide decision making. While it may not be possible to spot 'black swan' events such as COVID-19, maintaining and developing greater anticipatory capacities and processes may help ensure a more strategic approach to understanding the possibilities of the future.

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