Future Directions and Possibilities for the University

Report on Literature Review and Delphi Study

UNIVERSITY OF TURKU

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Report of the project:
Strategic Foresight and Futures Thinking Initiative: Analysis of the International Operating Environment of the University of Turku and Global Situational Picture of University Operations

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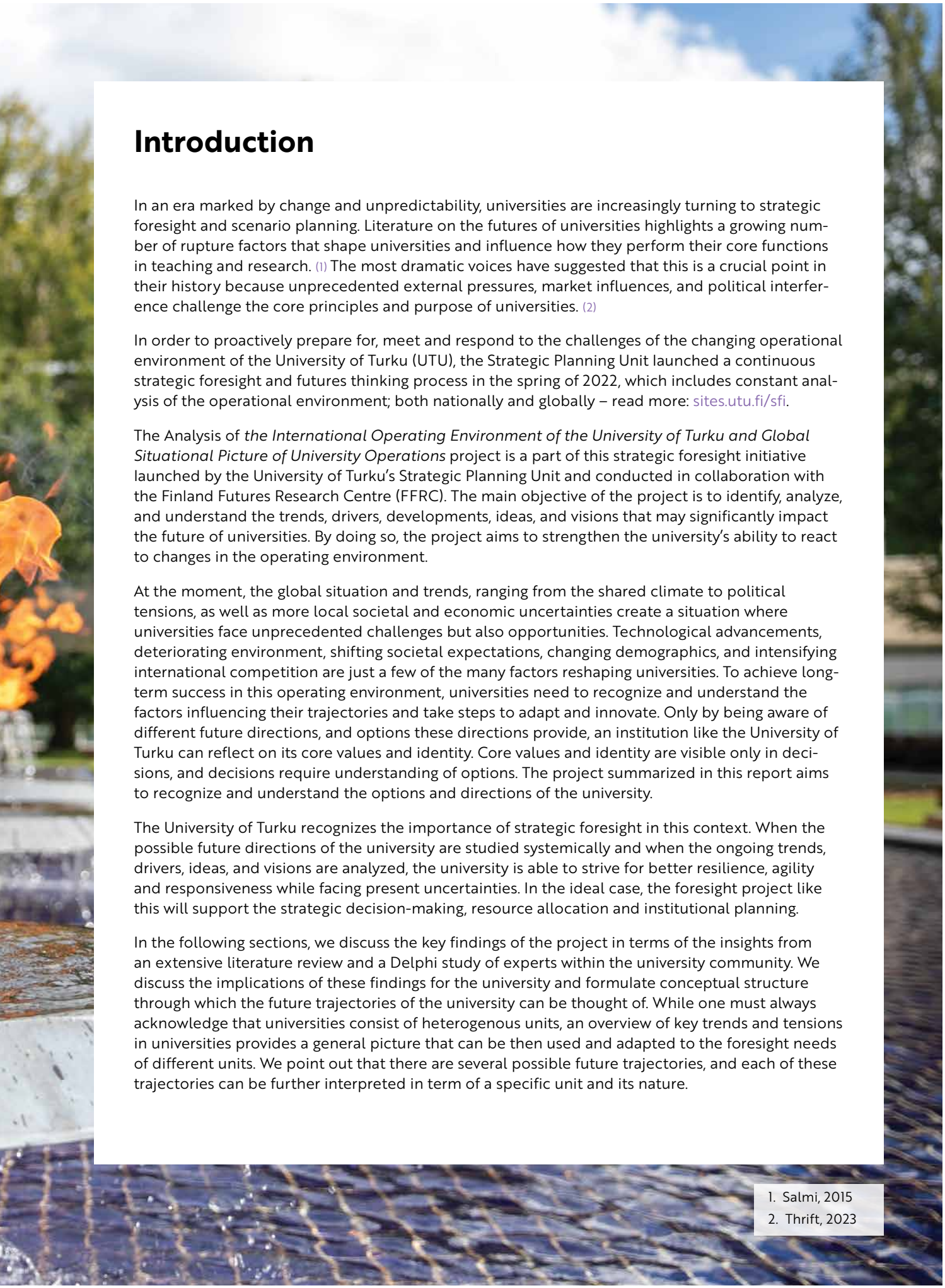


Introduction

In an era marked by change and unpredictability, universities are increasingly turning to strategic foresight and scenario planning. Literature on the futures of universities highlights a growing number of rupture factors that shape universities and influence how they perform their core functions in teaching and research. (1) The most dramatic voices have suggested that this is a crucial point in their history because unprecedented external pressures, market influences, and political interference challenge the core principles and purpose of universities. (2)

In order to proactively prepare for, meet and respond to the challenges of the changing operational environment of the University of Turku (UTU), the Strategic Planning Unit launched a continuous strategic foresight and futures thinking process in the spring of 2022, which includes constant analysis of the operational environment; both nationally and globally – read more: sites.utu.fi/sfi.

The Analysis of *the International Operating Environment of the University of Turku and Global Situational Picture of University Operations* project is a part of this strategic foresight initiative launched by the University of Turku's Strategic Planning Unit and conducted in collaboration with the Finland Futures Research Centre (FFRC). The main objective of the project is to identify, analyze, and understand the trends, drivers, developments, ideas, and visions that may significantly impact the future of universities. By doing so, the project aims to strengthen the university's ability to react to changes in the operating environment.

At the moment, the global situation and trends, ranging from the shared climate to political tensions, as well as more local societal and economic uncertainties create a situation where universities face unprecedented challenges but also opportunities. Technological advancements, deteriorating environment, shifting societal expectations, changing demographics, and intensifying international competition are just a few of the many factors reshaping universities. To achieve long-term success in this operating environment, universities need to recognize and understand the factors influencing their trajectories and take steps to adapt and innovate. Only by being aware of different future directions, and options these directions provide, an institution like the University of Turku can reflect on its core values and identity. Core values and identity are visible only in decisions, and decisions require understanding of options. The project summarized in this report aims to recognize and understand the options and directions of the university.

The University of Turku recognizes the importance of strategic foresight in this context. When the possible future directions of the university are studied systemically and when the ongoing trends, drivers, ideas, and visions are analyzed, the university is able to strive for better resilience, agility and responsiveness while facing present uncertainties. In the ideal case, the foresight project like this will support the strategic decision-making, resource allocation and institutional planning.

In the following sections, we discuss the key findings of the project in terms of the insights from an extensive literature review and a Delphi study of experts within the university community. We discuss the implications of these findings for the university and formulate conceptual structure through which the future trajectories of the university can be thought of. While one must always acknowledge that universities consist of heterogenous units, an overview of key trends and tensions in universities provides a general picture that can be then used and adapted to the foresight needs of different units. We point out that there are several possible future trajectories, and each of these trajectories can be further interpreted in term of a specific unit and its nature.

1. Salmi, 2015
2. Thrift, 2023

The Approach

The project's approach included two key stages: a comprehensive literature review and a Delphi study involving people in the University of Turku who have different roles and work in different units within the university.

The literature review examined well over 200 scientific articles and reports relevant to the topics and cited more than 140 (see references) works on issues relevant to the future of the university. These works covered a broad range of disciplines and perspectives and provide a base from which to understand the current state of knowledge and discussions about the futures of universities.

The Delphi study gathered views from the university community on trends, challenges, and opportunities of the university. The Delphi-study consisted of 22 statements presenting various driving forces impacting futures of universities. The insights in the views of the panel made it possible to enrich the findings of the review and provided a more detailed picture of how the trends and changes might influence the future direction of the university. Considered together, the insights from both the literature review and Delphi study provide a novel angle and knowledge for strategic planning.

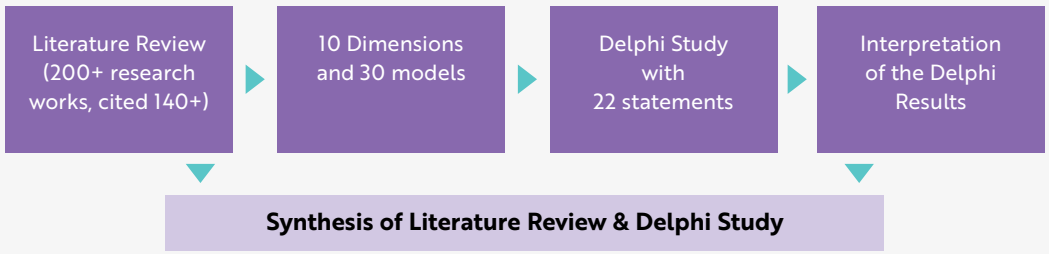


Figure 1. The research process.

The Literature Review

The futures of universities is a vast and heterogenous topic that required a careful and selective review of the relevant literature. The literature consists of scenario-works, explicitly future oriented works, and research that connects with the future-oriented themes. The literature review was conducted in Fall 2023 and mainly consists of publications no older than 10 years, most of them published within 5 years before 2023. Reviewing this literature helped us understand important trends, drivers, visions, challenges, criticisms, and other insights that concern universities around the globe. With this knowledge, we were able to isolate dimensions and build models about the futures of universities. These dimensions and models serve as a conceptual scheme – a tool for thinking – about the vast and heterogenous topic.

We isolated 10 dimensions that are relevant to the future of the university, ranging from the university's purpose and mission to its funding models, global orientation, organizational structure, and technological infrastructure. Each of these ten dimensions, then, contains three idealized models that provide clear and visualizable pathways for the university's future. In this report, we use these models to summarize the discussion in each subsection. The dimensions also served as the source for Delphi study statements (see below). As already indicated, identifying 10 dimensions and models within each dimension serves as conceptual scheme that helps to organize the vast and heterogenous topic of university futures. The dimensions and models are summarized in the table 1.

We should also notice that universities around the globe form a heterogenous group where the functioning of the universities differ – not least because of the different societal contexts where universities are embedded. However, this heterogeneity does not make understanding international discourses irrelevant to our university. Quite the contrary: In strategic foresight we need to understand different institutional models and external contexts. This understanding is crucial for several reasons.

First, we have to be aware of global dynamics and interconnectedness. The university sector is globally interconnected. Changes in one part of the world can have inspire or even force changes elsewhere. Second, this heterogeneity enables learning from different contexts. Third, and most importantly, what now is the context in somewhere else might become our context in the future – societies can change unexpectedly. Therefore, understanding how universities operate in different contexts allows us to future-proof ourselves for many types of changes in university sector.

Table 1. Ten dimensions and their three models relevant to university futures.

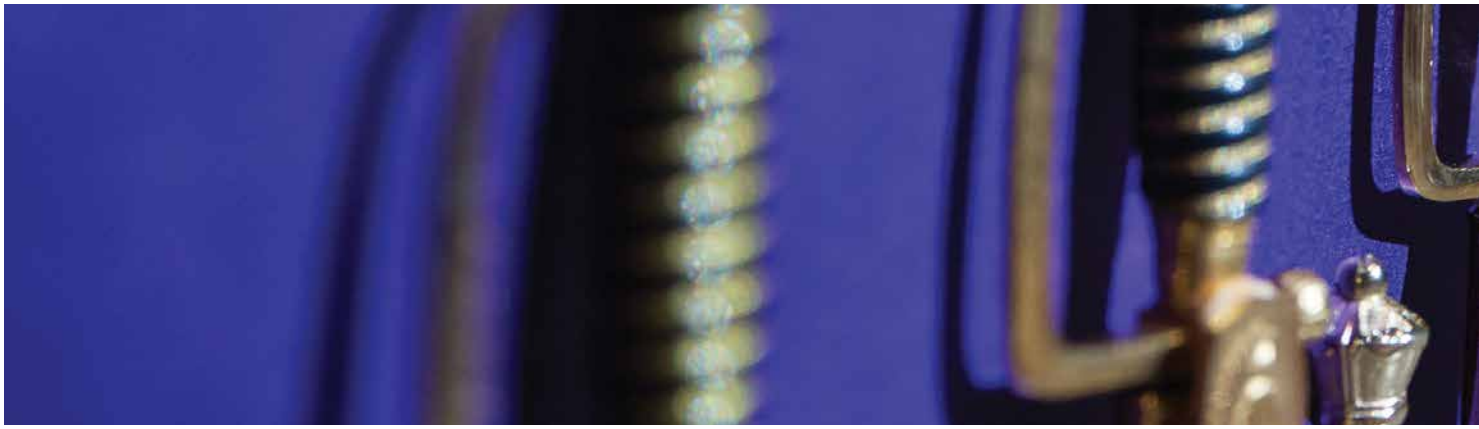
Dimension	Question	Model 1	Model 2	Model 3
Purpose of University	*What objectives could drive universities?*	Market-Oriented, Economic Priorities	Social Mission-Oriented, Public Good Priorities	Curiosity and Tradition-Oriented
Global Orientation	*How could universities position themselves geographically?*	Globally Networked Universities	Locally Focused Universities	Regional Clusters
Organizational Structure	*How could the administrative governance be organized?*	Centralized, Managerial Model	Decentralized, Democratic Model	Shared Governance Model
Funding Models	*What financial sources could support universities?*	Privatized/Corporate Model	Public Block Funding	Mixed Funding Model
Disciplinary Organization	*How should academic disciplines be structured?*	Interdisciplinary, Problem-Focused	Specialized, Discipline-Focused	Pluralistic Model with Core Disciplines
Research Orientation	*What priorities could shape the research agenda at universities?*	Commercially-Driven Research	Mission-Driven Research	Curiosity-Driven Research
Teaching Models	*What approach should be taken to curricula and content delivery?*	Standardized, Scalable Curricula	Personalized, Adaptive Learning	Experiential, Project-Based Learning
Technology Models	*What role could technology play in the learning experience?*	Fully Online, Digital University	Campus-Based, Tech-Limited	Blended Online and In-Person
Student Profile	*What demographic makeup should the student body have?*	Globally Diverse Student Body	Localized Student Demographics	Balanced Mix of Local and Global
Infrastructure Function	*What purpose should the physical campuses serve?*	Innovation Incubator and R&D Hub	Community Anchor and Cultural Center	Distributed Virtual Campuses

The Delphi Study

To deepen the insights from the literature review, the project conducted a Delphi study that collected perspectives and opinions from the members of the University of Turku. The main objective of the Delphi study was to gain a deeper understanding of how the members of the university think about the issues relevant to the future of the university. The study sought to make explicit participants' views on what is likely/unlikely and what is desirable/undesirable when it comes to the futures of university. We aimed to capture different views and arguments to identify key trends, challenges, and opportunities for strategic planning. The insights from the Delphi study make us understand different perspectives on strategic directions that the university should consider. In this way, the Delphi study provides helpful knowledge for addressing future challenges and opportunities.

The study involved an expert panel of 54 respondents from different units and with different roles within the university. The respondents included researchers, teachers, people from administration, people from support services, and students. This representation from different units and groups sought to ensure that the insights gathered would reflect different experiences, expertise, and viewpoints. The university is a heterogenous institution, and the present situation and the future might look different from different places within the university. However, in this report, we do not report differences in the answers between units and groups as this might lead to a situation where the views of an individual researcher can be identified.

The Delphi study was carried out using an eDelphi online platform (eDelphi.org). The Delphi-study consisted of 22 statements, which were based on the findings of the literature review. In addition, three open-ended questions regarding weak signals and wild cards of university futures were presented. The Delphi study had a methodologically novel 'dialectic structure' which means that there were two opposite claims about the future of different aspects of the university. The logic of this dialectic approach was based on the 10 dimensions and 30 models of university futures that were constructed in the literature review (see Table 1). For example, the statements on the "Purpose of University" dimension contrasted curiosity-driven with market-driven visions. Similarly, the statements concerning the "Research Orientation" dimension contrasted mission-oriented with market-oriented research focus.



The dialectic structure was chosen so that

- We were able to encourage people to think about and assess future situations that differ from the current situation. The claims were also quite dramatic and one-eyed to achieve this goal. However, the dialectic structure had also a deeper purpose, as it
- enables us to see when people consider two seemingly opposite future scenarios as contradictory or compatible. This gives us clues about where people think the most serious strategic either-or questions occur and where the university can pick elements from different future options.

It must be noted that we had 22 Delphi statements, whereas there were 30 models in the literature review. This meant that we could not ask directly the views of the participants on each possible future direction brought up in the literature review. However, the 22 statements were chosen so that we cover as many aspects of the 30 models as possible. In this, we leveraged the overlapping aspects of different dimensions of universities. In addition, in this way too long questionnaire was avoided, which ensured the willingness of the panelists to answer the statements.

The insights gathered through the Delphi study served to enrich the findings of the literature review by providing an internal perspective on the challenges and opportunities facing the university. It also enables us to spot insights that were missed in the literature review and provides novel interpretations of the insights already involved. By bringing together these two sources of insight, the project aimed to develop a more robust and contextualized understanding of the future prospects and strategic priorities of the university.

Moreover, by engaging the university community in the foresight process, the Delphi study served to foster a sense of shared ownership and investment in the foresight project. By providing a platform for people within the university to contribute their knowledge, ideas, as well as their hopes and fears, the Delphi study make the internal perspectives on the future an indispensable part of foresight knowledge. We need to make sure that the future direction of the universities is informed by the collective wisdom of its members.

The Four Issues

In the following sections of this report, we present and discuss the main findings of the strategic foresight project in terms of the insights gathered through the literature review and the Delphi study. The report is organized around four main themes that represent central aspects of the future operating environment of the university. The themes of the research project on the futures of universities were given in the summer of 2023 by the Strategic Planning Unit. The four main themes are the following:

1. The University as a Central Institution of Knowledge Production in Society.
2. The University as an Organization Based on Autonomous Disciplines.
3. The University as a Functional Organization: Research, Teaching, and Support Services.
4. The Spatiality of the University in the Future: Material and Immaterial Structures.

For each theme, we begin by summarizing the key insights from the literature review and highlight tensions, trends, and developments identified in the research. We then present the findings of the Delphi study to tell how the insights derived from the literature are perceived by the university community. By bringing together these two sources of insight, we aim to provide an overview of the challenges, opportunities, and potential futures of the university as well as understanding on the meaning and desirability of the insights.

We end each of the four sections with brief introduction of *what-if questions* that stem from less academic literature such as reports and media news, and the open responses of the Delphi study in order to shake the reader to consider variety of alternatives. We wish to point out that some phenomena of the future might be in the blind spots of the type of academic foresight work conducted in this project. We need to remain open for surprises and questioning of our assumptions.

By structuring the report around these four themes and by integrating insights from both the literature review and the Delphi study, we aim to provide as deep an account of the future prospects and strategic challenges of the university as possible. The findings and remarks presented in this report are intended to inform and support the ongoing strategic foresight efforts of the university.

The University as a Central Institution of Knowledge Production in Society

The Literature Review

The literature indicates that the role of universities as institutions for knowledge production in society might be viewed differently in the future. In this section, we draw a general picture of the issue. In latter sections concerning other three topics, the more detailed issues such as the role of the infrastructure in relation to the university's role are discussed.

The research suggests that universities are operating in an environment marked by various competing pressures, priorities, and expectations from diverse stakeholders. (1) In this context, universities need to stay aware of the possible challenges and trends to remain effective. Tools like foresight projects, environmental scanning, data analytics, and horizon scanning can increasingly be used to help universities adapt to uncertainty. (2)

- **Balancing market-oriented, social mission-oriented, and curiosity-driven goals**
- **Navigating global orientation vs. local engagement**
- **New roles and understanding of knowledge**

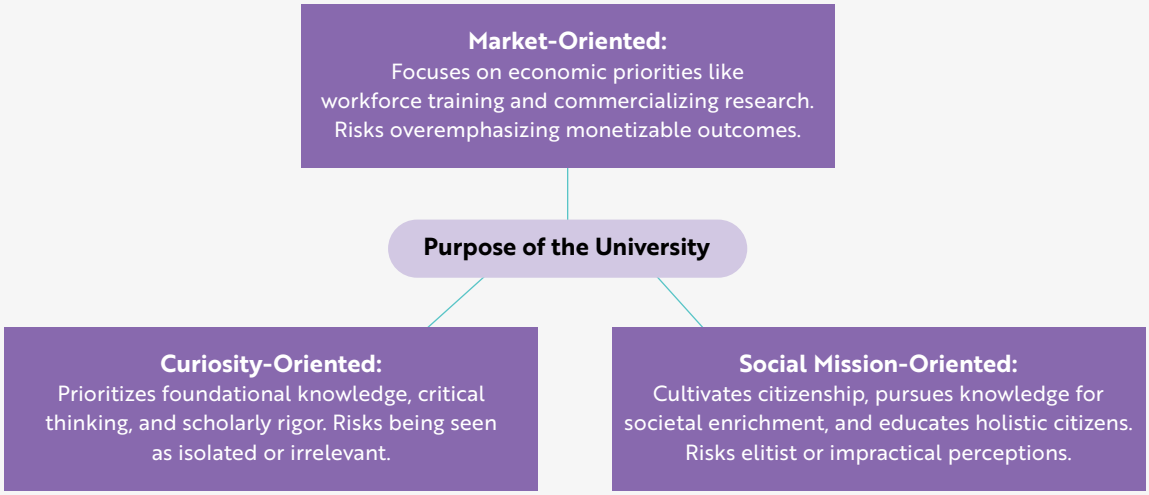


Figure 2. Three models of the purpose of the university.

The literature review indicates the growing diversity of research priorities and stakeholders that universities must engage with when they produce knowledge. Traditionally, universities have been viewed as institutions of curiosity-driven basic research that is mainly shaped by the interests of researchers, research groups, and academic disciplines. (3) However, the literature points to an increasing emphasis on applied, problem-oriented research that is often conducted in collaboration with external partners from industry, government, and civil society. (4) The question does not seem to be whether to collaborate with external stakeholders but with whom to collaborate.

This shift towards more collaborative research where knowledge is transferred to applications is driven by several factors. These include the growing complexity of societal challenges like climate change, inequality, and public health crises which demand interdisciplinary approaches and collaboration with external stakeholders. (5) Moreover, there are increasing pressures and demands from stakeholders for universities to demonstrate societal and economic impacts and relevance. (6)
As a consequence, universities face the challenge of aligning research agendas with the diverse needs of industry, government, community groups, and the public, while simultaneously preserving academic freedom and the ability to pursue knowledge for its own sake. (7)
There might even be a need to develop anticipatory, reflexive, and inclusive forms of governing universities and science in the public interest. (8)

The literature indicates a tension between market-oriented and social mission-oriented goals shaping universities' role in knowledge production. On the one hand, the literature points towards increasing pressures for universities to adopt a market-oriented stance characterized by commercialization, entrepreneurship, and industry partnerships. (9) This market orientation is driven by factors like decreasing public funds, emphasis on innovation for economic competitiveness, and the notion that universities drive growth. (10)

On the other hand, the literature also points towards pressures for universities to increase their social impact by using knowledge production to address societal challenges and public good. (11) This social mission emphasis sees that universities have unique responsibilities in tackling issues like inequality, sustainability, and healthcare. (12) Moreover, the spread of false information and the notion of 'alternative truth' create significant challenges. Universities are recognizing the need to position themselves against this trend and explore effective ways to counteract the spread of misinformation. (13)

As a consequence, universities have a strategic question in balancing economic priorities of commercialization against social impact priorities when they aim to pursue knowledge production activities that create both economic and societal value. (14) Debates persist around the concept of 'third mission' and the tension therein between economic focus and broader public engagement. (15) Moreover, it has been suggested that universities may need to focus on smaller core activities that suit them best in the future, like focus on certain first-class research areas or on excellence in teaching and learning. (16) Still, it has to be remembered that if universities still heavily rely on national or local funding sources, the funding often comes with government agendas attached. (17)

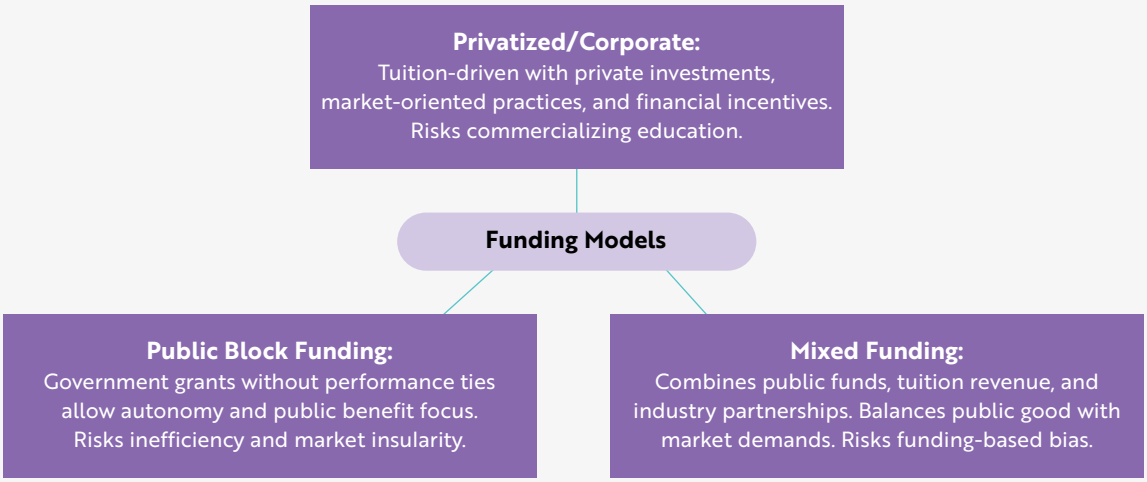


Figure 3. Three models of funding.

Further tensions arise between universities locating themselves into global networks and universities being locally embedded. On one hand, the increasing prevalence of global rankings, international research collaborations, and growing mobility of students and academics, exerts pressure for a more global orientation in universities. (18) This is connected to the notion that knowledge production and dissemination are increasingly global phenomena, (19) and this requires that universities to position themselves as international players for competitiveness and relevance. Research and also teaching are evaluated with global standards and the incentives are set so that the focus is in globally valued works. This global orientation might prefer certain research topics while marginalizing other, globally less recognized, topics. The global orientation might also prefer certain educational programs while marginalizing other more locally tuned programs.

On the other hand, the literature points towards growing pressure for universities to engage with and contribute to local communities and regions. (20) This pressure stems from various sources like funding agencies, policymakers, industry partners, and the public, who increasingly demand universities to demonstrate societal impact and value. (21) In this scenario, universities may collaborate and specialize in ways that are tailored to specific local, regional, or national contexts and needs. This trend is driven by factors like the growing demand for universities to address localized challenges (22), the increasing importance of local innovation and economic development strategies (23), and the geopolitical dynamics shaping the global knowledge economy (24). Additionally, some suggest a potential fragmentation of the European Higher Education Area (EHEA was formally established in 2010 as part of the Bologna Process to ensure more comparable, compatible, and coherent systems of higher education in Europe) which reinforces the need for local strategies and solutions. (25) As a consequence, universities face the challenge of balancing global aspirations with local responsibilities. Universities need global networks while remaining locally relevant and embedded. (26) The two orientations, global and local, might support each other, but this is far from obvious and might set a high-stage strategic dilemma.

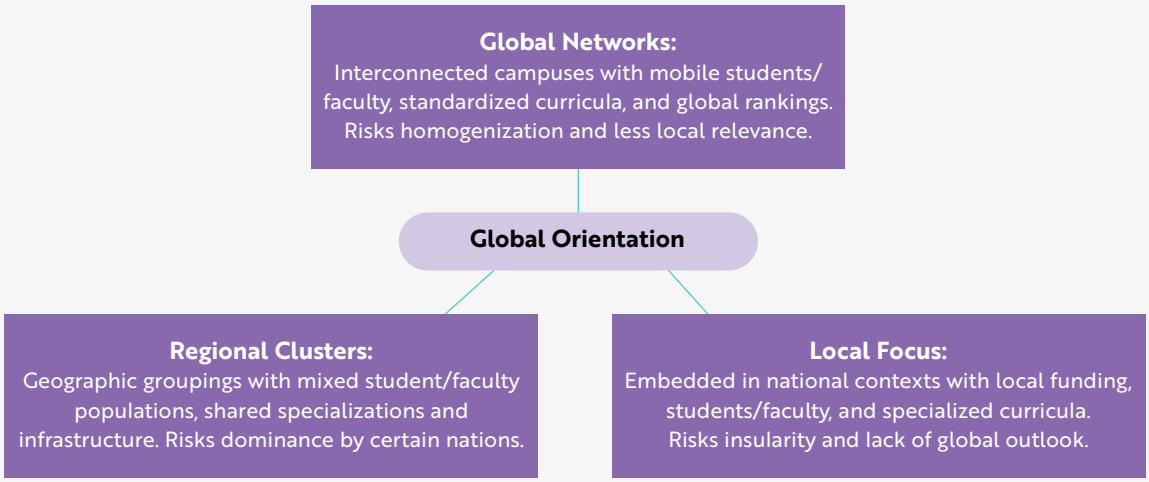


Figure 4. Three models of global orientation.

The tension between the global and local orientation of universities has consequences to their student profiles, i.e., the background of students. On one hand, the increasing influence of global rankings, international research collaborations, and growing mobility of students and academics pushes universities to attract a globally diverse student body. (27) This is further reinforced by the notion of knowledge production and dissemination as global phenomena (28) and it has been suggested that internationalization strategies are driven by neoliberal motives (29). It might also be the case that seeking globally diverse student body could lead to increased relevance of other aspects of global connectedness in universities. On the other hand, universities face growing expectations to engage with local partners and contribute to regional economic and social goals and thus align more closely with local industries and workforce needs. (30) This might lead universities to prefer local student profile. Moreover, financial challenges and tuition fees can create barriers for international students which might be a driver for local demographics. (31) Universities thus face the challenge of balancing the recruitment of international students with the needs of local student populations.

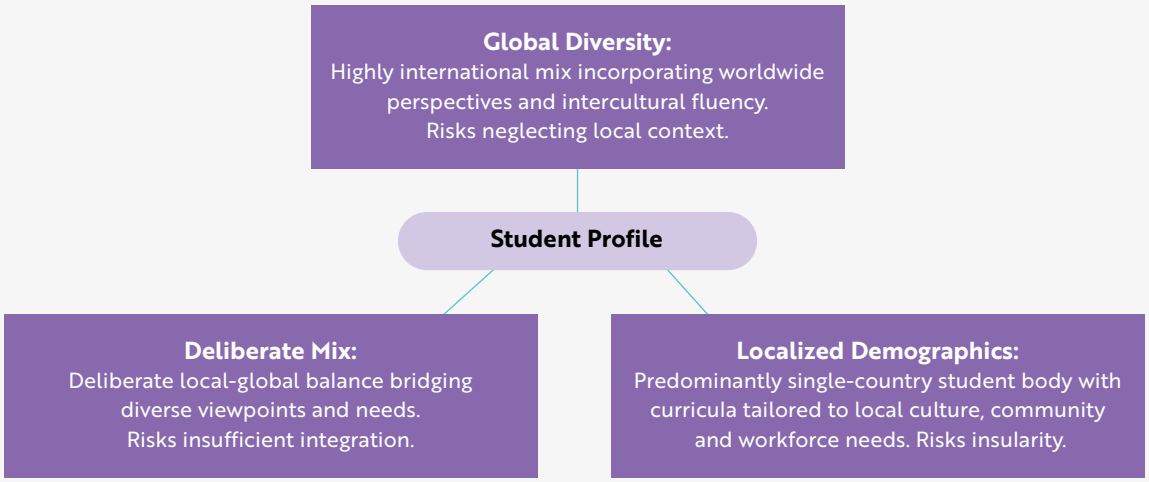


Figure 5. Three models of student profile.

Finally, universities must stay aware of more radical ideas suggesting the possibility of fundamental shifts in how society perceives the value and function of knowledge itself. (32) These perspectives challenge traditional notions of universities as primary knowledge producers and disseminators and raise questions about their role in an era where knowledge is increasingly abundant, accessible, and democratized. (33) Universities may need to transition from knowledge production to curation, validation, and sense-making to remain relevant. Moreover, universities may need to fundamentally re-imagine their mission and purpose to contribute to a more equitable, sustainable society. (34)

These possible trends and radical ideas discussed in this section highlight how complex and especially uncertain the future of universities as central institutions of knowledge production is. While the trends associated with interaction with society and global vs. local orientation are already in themselves setting up shifts in universities, the radical ideas in the literature suggest that universities may need to be prepared for more fundamental shifts in their role and purpose in society. Given this, universities will need to be proactive, adaptive, and innovative in order to make these challenges and opportunities manageable.

The Delphi Study

The Delphi study conducted as part of the strategic foresight project provides valuable insights into how members of the university community view the role of the university as a central producer of knowledge in society.

One of the key tensions identified in the study is the conflict between the expected trajectory of universities towards market-oriented priorities and the desire among many respondents to focus on social mission-oriented goals and curiosity-driven research. The market-oriented model, which emphasizes workforce training, commercialization of research, and economic impact, is seen as increasingly likely due to financial pressures. However, many respondents view this model as undesirable and express concerns about its possible effects on academic freedom, research scope, and the marginalization or even perishing of less commercially relevant disciplines.

Guide to interpretation of the charts:
The x-axis represents desirability, while the y-axis represents probability. The size of a bubble indicates the number of responses at a specific coordinate point, with the exact number displayed above each bubble. Colors are used solely to differentiate between bubbles for easier visual distinction.

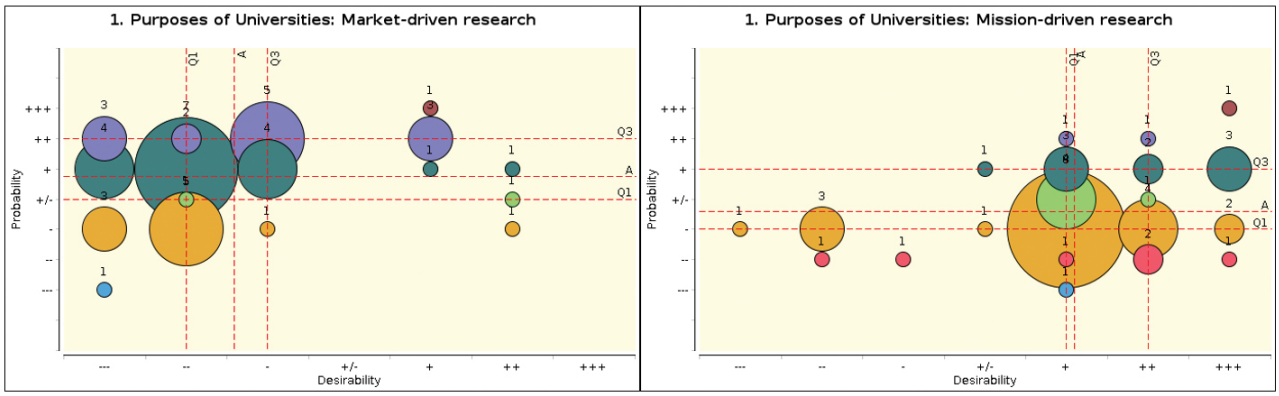


Figure 6. The Answers to the Delphi Statements about the Purpose of University.

In contrast, the social mission-oriented model, which focuses on cultivating citizenship, enriching society and culture, and addressing societal challenges, is considered desirable by many respondents. The study also suggests that respondents value curiosity-driven research that prioritizes the intrinsic value of knowledge creation and academic freedom. Respondents see curiosity-driven research as necessary for achieving broader societal goals. The argument is that the search for knowledge in a curiosity-driven manner is a prerequisite of the other functions of knowledge.

This is, of course, related to funding. In the Delphi survey, the respondents' answers on the probability of Finnish universities adopting a privatized or corporate approach to funding varied. While some respondents see a path towards privatization as likely due to financial pressures and international trends, others view it as improbable given Finland's strong commitment to free education and the challenges of relying on private funding in a small country. Most respondents consider this approach undesirable due to concerns about the commercialization of education, potential conflicts of interest, and risks to academic freedom and integrity.

When it comes to the current system of public block funding for universities, the survey indicates that people have concerns about its viability in light of economic pressures, push towards outcome-oriented funding, and demands for accountability and efficiency. However, most respondents find this approach desirable due to the autonomy it provides for universities to prioritize education and research for the public good.

Another theme that came up in the study is the importance of both global engagement and local relevance for universities. Respondents express a variety of views on the balance between these priorities. Some emphasize the benefits of internationalization and global collaboration, while others emphasize the need for universities to maintain their local identity and address regional needs. It seems that the question concerning global vs. local orientations are dependent on the exact meaning and practical interpretation of the notions such as local, global, and international.

When we focus on student profiles, the study results suggest that a balanced approach between global engagement and local relevance is both expected and preferred. The globally diverse student body is seen as somewhat likely and desirable as it offers benefits such as richer academic experiences and enhanced global reputation. However, concerns include the potential neglect of local needs and cultural and epistemic traditions, as well as challenges in the integration of international students. On the other hand, the localized student demographics profile is generally viewed as unlikely and undesirable. The arguments emphasize the importance of internationalization and the drawbacks of insular perspectives.

In addition to these dimensions, the open section of the Delphi study raises several other important considerations for the role of universities in the future. These include concerns about the sustainability of current university models in the face of changing demographics, the question whether universities could adopt a broad-

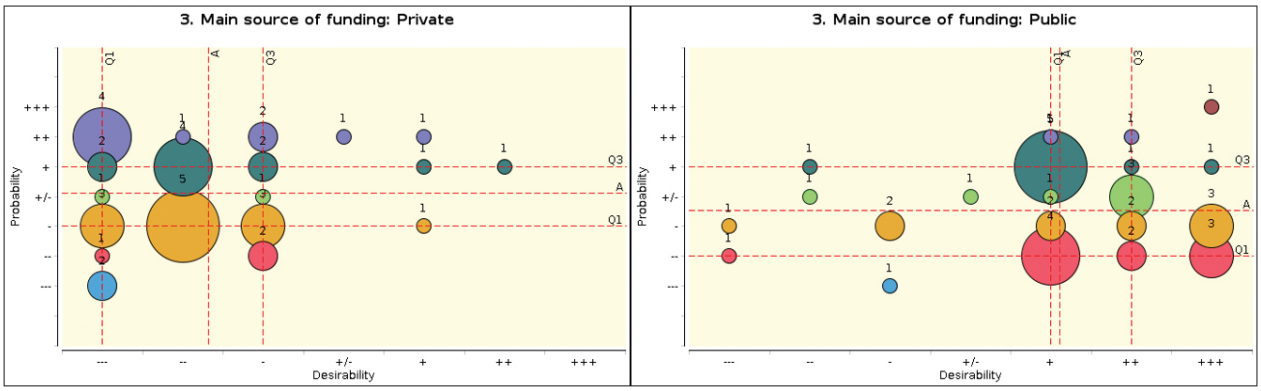


Figure 7. The Answers to the Delphi Statements about Funding Sources.

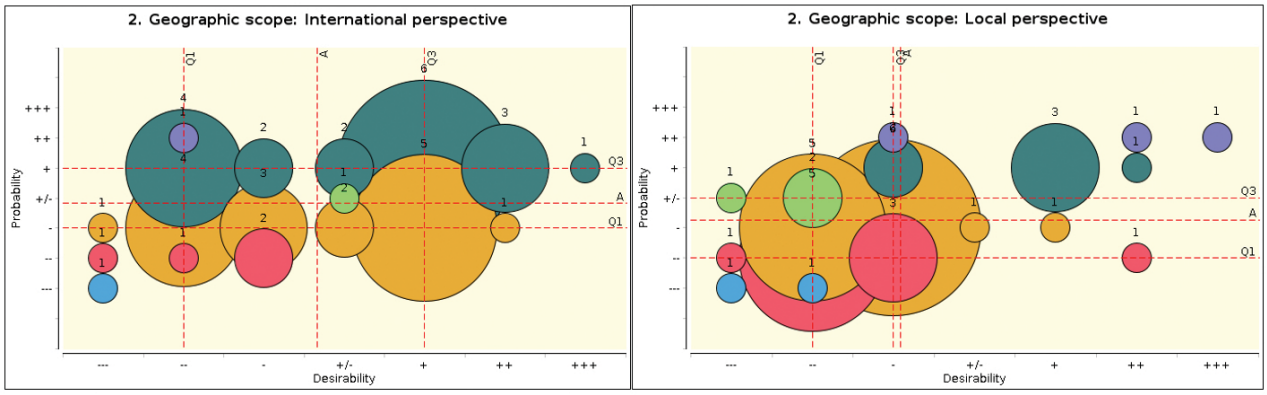


Figure 8. The Answers to the Delphi Statements about Global Orientation.

er societal role that extends beyond education and research, the need for greater emphasis on sustainability and open science practices, the effects of remote work and digitalization on academic communities, the attractiveness of academic careers to younger generations, the quality of life and work at universities, and the role of universities in combating disinformation and ensuring the credibility of knowledge. With regards to these profound issues, one might rely back to the literature reviewed, as many of these issues are discussed there. Certainly, the issues pointed out in the open section hit the core of the university as institution. Without new (and old) generations of researchers, without lively community, or without students, it is difficult to envision any role for the university in the production and dissemination of knowledge.

In conclusion, the Delphi study highlights tensions and competing priorities that universities must negotiate as they define their role as producers of knowledge in society. Central challenges include balancing market-driven demands with social mission-oriented goals, strengthening interdisciplinary and problem-focused approaches while maintaining disciplinary strengths, and negotiating the balance between global engagement and local relevance. Other main challenges include adapting to technological changes while preserving academic integrity and traditions as well as the value of in-person interaction and community engagement, finding the right mix of teaching models and student profiles, and addressing the various concerns raised in the open section of the study. The Delphi study shows that there is a need to consider what to preserve from the tradition and where to adopt new ways of proceeding. In some questions, the answers are relatively consistent across participants, while in others, the responses tend to diverge to a notable degree. Both categories of answers provide clues where the strategic questions lie.

What If?

As we evaluate the challenges and opportunities that can shape how the purpose of university is understood, including global ranking pressures and the need for international engagement, we can extend our analysis through "what if" scenarios. These considerations of somewhat radical alternatives allow us to push beyond conventional thinking and prepare for unexpected futures. We will explore three "what-if" scenarios directly related to our key issues:

What if

To increase the quality of research, universities withdraw from international university rankings

Signal: The University of Zurich is withdrawing from university rankings because they believe the focus on measurable output creates an incentive to prioritize quantity over quality of publications.

Significance: This scenario examines how moving away from rankings-driven metrics could affect our strategic goals and academic standards.

Swissinfo, 13.3.2024: University of Zurich withdraws from international university ranking, www.swissinfo.ch/eng/education/university-of-zurich-quits-international-university-ranking/73693006

What if

Global war cuts out funding and international collaboration of universities

Signal: Global war shifts priorities, affects the members, and cuts off collaboration between countries.

Significance: Considering the current reliance on global networks, this scenario tests the resilience of our strategies against geopolitical disruptions and the role and limits of self-sufficiency in research and funding models.

Expert opinion of the Delphi panel – Strategic Foresight and Futures Thinking at the University of Turku

What if

Universities shift their focus to research and teaching on how to utilize and develop emerging technologies

Signal: Many universities and governments globally are investing in AI and AGI research to study its potential impacts and enhance its capability to serve future needs and ethics.

Significance: This scenario explores how focusing on technologies like AI might change our university, and what ethical decisions, practical changes, and strategic moves would be needed for this new direction.

University of Helsinki, 4.3.2024, New Finnish doctoral education pilot in AI launching in 2024, www.helsinki.fi/en/faculty-science/news/new-finnish-doctoral-education-pilot-ai-launching-2024

1. Forliano et al., 2021; Compagnucci & Spigarelli, 2020; Thrift, 2023; Hartmann, 2019.
2. Munck & McConnell, 2009; Vincent-Lancrin, 2004; Mateo & Casado Da Rocha, 2020; Piirainen et al., 2016; Bonaccorsi et al., 2022.
3. Salmi, 2015; Winter & O'Donohue, 2012; Muller & Young, 2014.
4. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Schull, 2019; Barth et al., 2011; Salmela et al., 2021; Azman et al., 2010; OECD, 2007.
5. Mudrak et al., 2022; Pimental et al., 2023; MacLeod, 2018; Steger, 2019; Fredman, 2023.
6. Forliano et al., 2021; Compagnucci & Spigarelli, 2020; Schüll, 2019; Mcdowell, 2003; Thrift, 2023.
7. Salmi, 2015; Bonaccorsi et al., 2022; Gjefsen & Vie, 2021.
8. Macnaghten & Chilvers, 2014.
9. McKelvey & Zaring, 2018; Zukauskaite, 2012; Sánchez-Barrioluengo and Benneworth, 2019; Santos et al., 2021; Andrade et al., 2022; Ashyrov et al., 2019; Audretsch, 2014; Meissner et al., 2022; Shin et al., 2023; Villani et al., 2017; Klofsten et al., 2019; Etzkowitz et al., 2000; Azman et al., 2010; Blass et al., 2010; OECD, 2007.
10. Orr, 2015; Pruvot et al., 2015; Matei et al., 2015.
11. Compagnucci & Spigarelli, 2020; Sánchez-Barrioluengo & Benneworth, 2019; Winter & O'Donohue, 2012; Whitely, 2011; Estermann & Nokkala, 2009; Geschwind & Broström, 2015; Salmi, 2015; Stilgoe et al., 2014; Lövbrand et al., 2011; Pelacho et al., 2021; Fredman, 2023.
12. Vohland et al., 2021; Macnaghten & Chilvers, 2014; Hartmann, 2019.
13. EUA, 2021; Nørreklit et al., 2019; Corlett, 2023.
14. Salmi, 2015; Mudrak et al., 2022.
15. Compagnucci & Spigarelli, 2020; Sánchez-Barrioluengo & Benneworth, 2019.
16. Bebbington, 2021.
17. Hartmann, 2019; Pruvot et al., 2015; Matei et al., 2015.
18. Sadlak, 2015; Salmi, 2015; Denson & Bowman, 2013; Bleiklie, 2023; de Wit & Deca, 2020; Blanco & Muthanna, 2022.
19. Bebbington, 2021; Munck and McConnell, 2009; Atkinson, 2023; King, 2011.
20. Sánchez-Barrioluengo and Benneworth, 2019; Qiu et al., 2023; Audretsch, 2014; Forliano et al., 2021; Petersen & Kruss, 2021; Bleiklie, 2023.
21. Compagnucci & Spigarelli, 2020; Addie et al., 2015.
22. Addie et al., 2015; Petersen & Kruss, 2021.
23. Sánchez-Barrioluengo & Benneworth, 2019; Qiu et al., 2023.
24. Harmsen, 2015; Klemenčič & Ashwin, 2015.
25. Bergan, 2015; Harmsen, 2015.
26. Stilgoe et al., 2014; León-García, 2023.
27. Sadlak, 2015; Salmi, 2015; Denson & Bowman, 2013; Bleiklie, 2023.
28. Bebbington, 2021; Munck and McConnell, 2009; King, 2011.
29. Blanco & Muthanna, 2022.
30. Sánchez-Barrioluengo and Benneworth 2019; Qiu et al. 2023; Audretsch 2014; Forliano et al. 2021; Petersen & Kruss 2021; Bleiklie 2023; Mairal 2023.
31. Usher, 2015; Kaiser et al., 2015; Orr, 2015; Alexe et al., 2015; Cismaru et al., 2015.
32. Muller & Young, 2014; Mirowski, 2018; Jessop, 2018; Atkinson, 2023; Al-Mahadin, 2023; Christensen, 2023.
33. Mittelman, 2018; Facer, 2022.
34. Barnett, 2023; Steger, 2019.

The University as an Organization Based on Autonomous Disciplines

The Literature Review

Literature indicates the tension between the traditional organization of universities, in both research and teaching, around individual academic disciplines and the demand for interdisciplinary approaches. This tension is related to the more general challenges of universities in a situation where knowledge production is rapidly changing as discussed above. Disciplinary boundaries are blurring and complex societal issues require solutions that go beyond individual fields of research. (1)

Traditionally, university research and teaching have been structured around distinct disciplines, each with its own contents, methodologies, norms, and even social structures. The individual disciplines and their communities have been a main driver in how knowledge has been created through advancing specialized knowledge and training in-depth expertise. (2) However, there are serious indications, or at least arguments for, that this traditional disciplinary model may be inadequate in addressing the complex challenges that a contemporary society faces.(3)

In literature, there is a growing recognition of the need for interdisciplinary and transdisciplinary approaches in research and teaching that are capable of integrating insights and methodologies across different fields to address challenges that cut across disciplinary boundaries. (4) This increasing emphasis on interdisciplinarity is driven by various factors such as the increased complexity of societal issues like climate change and public health crises, (5) the rapid pace of technological advancements, (6) and the growing demand for graduates who are equipped with diverse competencies and knowledge (7).

However, the literature also highlights significant challenges in, and obstacles to, interdisciplinary collaboration within university settings. Traditional disciplinary structure of universities is likely persist in many respects due to a range of historical and structural factors. (8) These barriers include deep-rooted traditions and incentive structures that reward specialization such as funding, tenure, and promotion criteria, the ongoing value placed on curiosity-driven research within many academic fields, the lack of adequate institutional support and resources dedicated to interdisciplinary pursuits, and the challenges in communication and coordination across disciplinary boundaries. (9) Moreover, there may also be a need to bring researchers together in a research institution in order them to support their interactions. (10) It might be the case that the most suitable partners for an interdisciplinary project are not found within one university and, therefore, the interactions may face additional challenges. As a consequence, discipline-centric curiosity-oriented research may remain as influential driver in universities, even when interdisciplinary approaches gain traction. (11)

- **Balancing disciplinary silos vs. interdisciplinary demands**
- **Balancing curiosity-driven research vs. applied, collaborative work**
- **Teaching goals and disciplinarity**

The tension between disciplinary specialization and interdisciplinary approaches is made more complicated by the fact that different disciplines often have very different epistemologies, methodologies, and cultures, and this can make collaboration and communication across fields challenging. (12) Interdisciplinarity is not merely an institutional challenge on how to best support it but also a challenge within research. Moreover, the growing pressure for universities to demonstrate their relevance and impact to society can create incentives for more applied and problem-oriented research that may not always align with the prevalent values and norms of disciplinary communities. (13) As a consequence, uni-

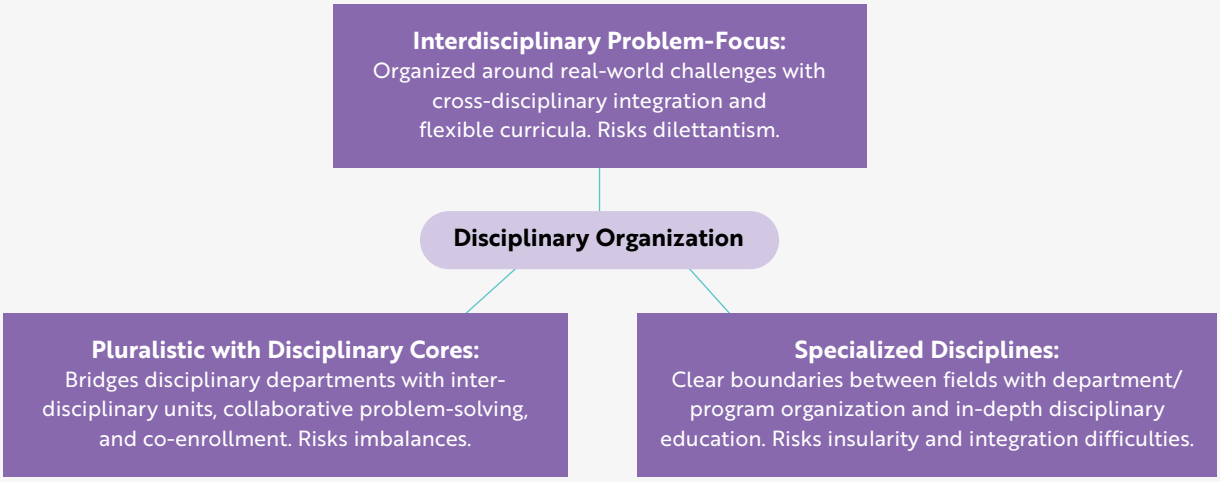


Figure 9. Three models of discipline organization.

versities may face challenges in effectively promoting and sustaining interdisciplinary research and teaching initiatives, despite the growing consensus on their importance. (14) However, AI may enable interdisciplinary research by integrating models developed by different scientific disciplines despite differences in the methods and approaches of the disciplines. (14)

The adoption of participatory research initiatives (15) in universities could impact the disciplines and how they function. By engaging citizens in setting research priorities and evaluating them, these initiatives may challenge traditional disciplinary boundaries and push researchers towards interdisciplinary approaches. However, the deep expertise and methods of individual disciplines may still play a crucial role in ensuring the credibility of participatory research. The impact of participatory research on the balance between disciplinarity and interdisciplinarity will depend on how universities choose to implement and value participatory approaches. However, phenomena like skepticism towards research and growing anti-elitism might drive universities towards participatory approaches. (16) The adoption of participatory research initiatives could reshape the relationship between disciplinary and interdisciplinary research when universities attempt to answer new expectations for societal relevance and public engagement. (18)

Literature also suggests how changes in teaching methodologies could shape the disciplinary organization of universities. For example, the rising emphasis on experiential, skills-focused, and problem-oriented learning may challenge existing disciplinary boundaries. (19) The development of interdisciplinary curricula, project-based courses, and collaborative learning environments could lead to new forms of cross-disciplinary cooperation and coordination. At the same time, the growth of online and digital learning could create space for interdisciplinary knowledge sharing practices. (20) Given the connections between research and teaching – teaching both stems from the current research and affects future expertise – the changes in teaching towards interdisciplinarity may shape interdisciplinarity more widely.

Finally, there might be a need for more radical restructuring of universities to prioritize interdisciplinarity over disciplinary autonomy. (21) The restructuring could involve new interdisciplinary schools or departments designed for cross-disciplinary integration and revised incentive structures that reward interdisciplinary work better. (22) However, such restructuring might face barriers like resistance from disciplinary communities, need for new governance models, and challenges evaluating interdisciplinary outputs. (23)

These possible future trajectories suggest that the development of dynamics between disciplines and their inter- and transdisciplinary connections is likely to be shaped by several partly overlapping and partly interconnected drivers. The drivers identified are for example the strong persistence, such as the persistence of disciplinary traditions and cultures, the impact of changes in teaching and learning, the strengthening of mission-driven and market-oriented research orientations, and the potential for more fundamental restructuring of universities. To cope with these trends, universities need to find ways to balance the values and norms of disciplinary communities with the need for greater interdisciplinary collaboration and integration. This seems to be the way to address the challenges facing society in our times while maintaining the existing inertia of knowledge production in order to be able to address challenges we may not even see yet.

The Delphi Study

The Delphi study conducted as part of the strategic foresight project provides insights into (i) how members of the university community perceive and anticipate the future development of academic disciplines, and (ii) the balance between disciplinary specialization and interdisciplinary collaboration within universities. The insights are in line with the ones in the literature.

One of the key findings of the study is the strong desirability among respondents towards interdisciplinary and problem-focused approaches in research and education. Some respondents pointed out that interdisciplinarity is already a part of their work. Many respondents see interdisciplinarity as a way to address complex societal challenges, support innovation, and prepare students for a rapidly changing world. They believe that universities have a responsibility to promote and facilitate interdisciplinary collaboration.

At the same time, the Delphi study also reveal a deep appreciation for the value of specialized, discipline-focused research and teaching. The argument is that interdisciplinarity requires deep expertise from different fields and, therefore, there is a need for discipline-centered structures that train people in one field of research at a time. Respondents point out the importance of disciplinary depth and expertise in creating novel knowledge, maintaining academic standards, and providing a sense of identity for faculty and students.

When it comes to teaching and interdisciplinarity, some respondents view that experts cannot be created by offering introductory courses from several disciplines without sufficient depth and rigor in any of them. They believe that one has to learn the very basics of their own discipline first. On the other hand, some respondents believe that we will be moving towards ever larger teachable entities over a wide number of collaborating areas. Some respondents consider the idea of faculties to be old-fashioned by in relatively near future, and they believe that the focus is already shifting towards a phenomenon-based approach, particularly in science, and this impacts also teaching.

The Delphi study suggests that finding a balance between the need for interdisciplinary collaboration and the value of disciplinary specialization is a major challenge for universities today and in the future. On the one hand, there are demands that universities take more action to address the issue. Respondents pointed out the potential barriers to interdisciplinary work, such as institutional structures, resource allocation, and disciplinary cultures. However, they also suggested that these can be fixed and, as seen above, the respondents find interdisciplinary stances probable and desirable.

The study highlights that people's desires for the future and their beliefs about what is likely are closely intertwined, particularly when it comes to the balance between disciplinary specialization and interdisciplinary collaboration. Desirability seems to be relevant to the probability. This suggests that in the case of interdisciplinarity, desirability plays a significant role in shaping expectations. This indicates that people see their agency as relevant in the issue at hand. It seems that the future trajectories of the issue are uniquely shaped by researchers' view and motivations towards particular futures.

This brings up a more general point that would require attention. In some Delphi statements, too, participants' arguments for desirability and probability are highly

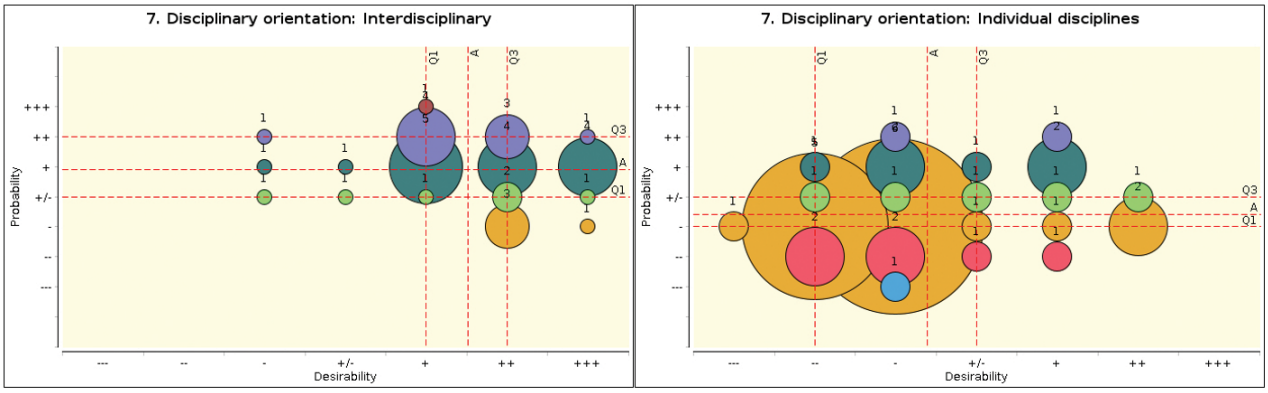


Figure 10. The Answers to the Delphi Statements about the Disciplinary Organization.

entangled. It seems that there are certain issues in the future of the university in which people see more agency than in others. Why this is so would require further research.

In conclusion, the Delphi study highlights the tension between the traditional organization of universities around autonomous disciplines and the growing demand for interdisciplinary approaches in both research and teaching. This tension is created by several drivers such as traditions, incentives, and changes in the society. In order to adapt to these drivers successfully, it seems that universities need to develop strategies and structures that support both disciplinary cores and interdisciplinary projects. Universities also need to consider how they wish to steer the issue of interdisciplinary when issues such as working environments, infrastructure function, governance, and funding are discussed strategically. These issues are all interrelated.

What If?

As we examine the factors influencing the perceived role of disciplines within the university, including the tension between specialization and interdisciplinary collaboration, we can broaden our analysis through "what if" scenarios. These considerations of somewhat radical scenarios enable us to challenge traditional assumptions and anticipate unforeseen developments. Here are three "what-if" scenarios related to our key issues:

What if

Ideologies and politics more strongly guide what can be studied and how. This seriously impacts the livelihood of certain disciplines.

Signal: University of Kent confirms six courses to be axed.

Significance: This scenario investigates the consequences of external influences on the disciplines and their livelihood.

BBC, 22.3.2024: University of Kent confirms six courses to be axed
www.bbc.com/news/articles/cpek98q4l7qo

What if

Remote work and digitalisation weaken the academic community's cohesion.

Signal: Members of the university suggest that the rise of remote work and distance learning could fragment the institution, eroding community and shared values.

Significance: The scenario highlights how increased remote engagement might disrupt the contacts that are necessary to create contacts between disciplines.

Expert opinion of the Delphi panel
– Strategic Foresight and Futures Thinking at the University of Turku

What if

Specific courses offered by companies become more attractive education paths than the traditional degree forms offered by higher education institutions.

Signal: Google is introducing professional courses that provide job-specific skills and certificates.

Significance: This scenario explores how traditional subjects might struggle as company-run courses become more popular and pose a challenge to the university's usual way of teaching and degree programs.

Inc., 19.8.2020: Google Has a Plan to Disrupt the College Degree
www.inc.com/justin-bariso/google-plan-disrupt-college-degree-university-higher-education-certificate-project-management-data-analyst.html

1. MacLeod, 2018; Gjefsen and Vie, 2021; Salmela et al., 2021.
2. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Muller & Young, 2014.
3. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Schull, 2019; Barth et al., 2011; Pimental et al., 2023; MacLeod, 2018; Steger, 2019.
4. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Schull, 2019; Barth et al., 2011; Pimental et al., 2023; MacLeod, 2018; Steger, 2019; Salmela et al., 2021.
5. Pimentel et al., 2023; Thrift, 2023; Berchin et al., 2018; Munck & McConnell, 2009; Schull, 2019.
6. Birtwistle and Wagenaar, 2020; Mohamed Hashim et al., 2022.
7. Williams, 2019; Isaacs, 2015; Parada & Peacock, 2015.
8. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Muller & Young, 2014; Whitely, 2011; MacLeod, 2018.
9. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Muller & Young, 2014; Salmela et al., 2021; Gjefsen and Vie, 2021; Pimentel et al., 2023; MacLeod, 2018; Geschwind & Broström, 2015; Bromham et al., 2016; Winter & O'Donohue, 2012; Mudrak et al., 2022; Salmi, 2015; Henkel, 1997; MacLeod, 2018; Borah and Ellwood, 2022.
10. Duede et al., 2024.
11. Bonaccorsi et al., 2022; Muller & Young, 2014.
12. MacLeod, 2018.
13. Muller & Young, 2014.
14. Bonaccorsi et al., 2022; Schull, 2019; Millar, 2016; Pimentel et al., 2023; Salmela et al., 2021.
15. Gil, 2021.
16. Vohland et al., 2021; Stilgoe et al., 2014; Lövbrand et al., 2011; Pelacho et al., 2021; Macnaghten and Chilvers, 2014.
17. Corlett, 2023.
18. Vohland et al., 2021; Stilgoe et al., 2014; Lövbrand et al., 2011; Pelacho et al., 2021; Macnaghten and Chilvers, 2014.
19. Birtwistle and Wagenaar, 2020; Williams, 2019; Isaacs, 2015; Parada & Peacock, 2015; Muller & Young, 2014; Christensen, 2023; Kennedy et al., 2022.
20. Birtwistle and Wagenaar, 2020; Mohamed Hashim et al., 2022; Grosseck et al., 2020.
21. Alexander and Manolchev, 2020; Bursztyn & Drummond, 2013.
22. Salmela et al., 2021; Bromham et al., 2016; Bursztyn & Drummond 2013; Bonaccorsi et al., 2022.
23. Gjefsen and Vie, 2021; Winter & O'Donohue, 2012; Bonaccorsi et al., 2022; Muller & Young, 2014.

The University a Functional Organization: Research, Teaching and Support Services

The Literature Review

In literature, there are indications of possible and significant changes in the research, teaching, and support services in universities. These changes are driven by variety of factors such as the increasing emphasis on market-oriented and mission-driven research, the adoption of new teaching models and technologies, the growing importance of holistic student support services, and the new and emerging technologies.

With respect to research, the literature points to a trend towards market-oriented and mission-driven approaches that prioritize research with direct economic and societal impacts. (1) This shift is driven by factors such as pressures from governments and industries for universities to demonstrate their relevance and value to society (2), the growing emphasis on innovation and entrepreneurship as means for economic growth (3), and the pressing need to address complex societal challenges such as climate change, inequality, technology, and public health crises (4). Even when universities rely on national/local funding sources, the funding often comes with government agendas attached. (5)

Due these drivers, the research in universities may evolve towards areas where there is potential to generate economic and social benefits, such as technology transfer (i.e., transferring university research to external actors), commercialization, and partnerships with industry and government sectors. (6) The shift towards market-oriented and mission-driven research is also reflected in the growing emphasis on interdisciplinary and collaborative research approaches that bring together researchers and stakeholders from different fields and sectors to tackle complex problems and challenges. (7)

- **Shift towards market-oriented and mission-driven research**
- **Tension between personalized and standardized teaching models**
- **Growing importance of holistic student support services**
- **Debate between centralized and decentralized organizational structures**

However, the literature also indicates that there might be problems when shifting towards market-oriented and mission-driven research approaches. For example, there is discussion on how economic and societal impact may come at the expense of curiosity-driven research that has traditionally been a core function of universities. (8) Others raise concerns about the potential conflicts of interest and ethical dilemmas that may arise in research when universities collaborate with industry or pursue commercial interests. (9) Similar problems are to be expected also when the partners do not have commercial interests but some other interests such as political ones.

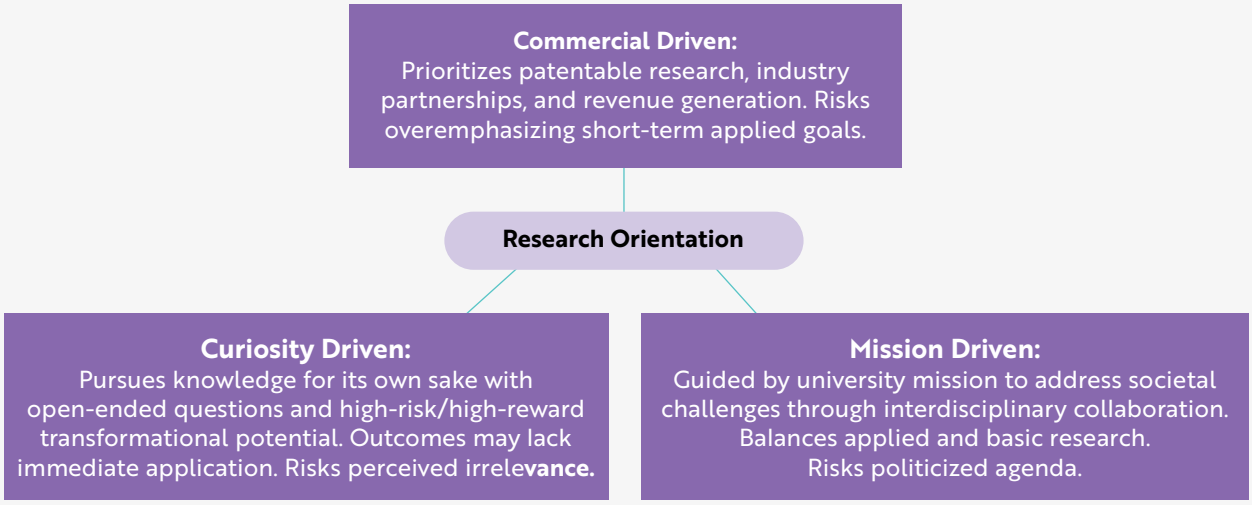


Figure 11. Three models of research orientation.

Moreover, this shift towards market-oriented and mission-driven research may also have implications for the balance between research and teaching within universities. The increasing emphasis on research output and impact could lead to a devaluation of teaching activities and, thereby, to a growing distance between research and teaching. (10) Others suggest that the pressure to secure external research funding might incentivize people to prioritize research over teaching responsibilities, and this could very well lead to a lower quality of teaching. (11)

Despite these challenges, however, the literature also indicates the potential benefits of market-oriented and mission-driven research for universities and society at large. Partnerships with industry and other organization may provide universities with new sources of funding and resources, as well as opportunities for knowledge exchange and technology transfer. (12) Also mission-driven research can play a central role in addressing pressing societal challenges and contribute to the development of more sustainable, equal, and resilient communities. (13)

In this environment, the trend towards collaborative and interdisciplinary research aimed at addressing societal challenges and generating economic impact is likely to gain momentum, as universities strive to demonstrate their relevance and impact. (14) As a consequence, universities may increasingly structure their research activities around interdisciplinary research centers, institutes, and networks that facilitate collaboration among researchers from diverse fields. (15) These collaborative research initiatives could involve partnerships with industry, government, and civil society organizations, as well as international collaborations with other universities and research institutions. (16) However, the literature also highlights potential challenges associated with interdisciplinary research, such as difficulties in securing funding, hierarchical tensions between disciplines, and the need for institutional support and incentive structures that foster interdisciplinary collaboration. (17) Communication between researchers may also benefit from close institutional ties between the researchers. (18)

The adoption of AI tools in university research may have significant effect on how knowledge is produced and understood in the future. AI has become important scientific approaches and discoveries. (19) For example, AI tools can help researchers explore vast hypothesis spaces, generate novel hypotheses, and guide experimentation and simulation in scientific research. (20) However, application of AI tools to enhance research productivity could lead to the creation of scientific monocultures that prioritize certain ways of conducting research while ignoring diverse human perspectives. (21) This shift towards AI-driven research could potentially lead to a situation where traditional research skills are not valued and to illusions of understanding where researchers believe they understand more than they actually do. The question of changes in the nature of scientific understanding comes central in the era of AI research. (22) It is suggested that, in order to mitigate these risks, university researchers should work in diverse teams, expose the next generation to research beyond technical AI education, and focus on developing algorithmic approaches that contribute to scientific understanding. (23)

With respect to teaching, literature indicates possible shifts in teaching models and approaches in universities. One of the trends is the possible trajectory towards adoption of blended, personalized, and experiential learning models that combine traditional classroom-based instruction with online and technology-enhanced learning experiences. These models are designed to provide students with more flexible, adaptive, and engaging learning experiences tailored to their individual needs and preferences. (24)

For example, blended learning integrates face-to-face instruction with online learning activities. This allows students to benefit from the structure and support of traditional classroom settings as well as the flexibility and convenience of online environments. (25) Personalized learning, on the other hand, leverages data analytics and adaptive learning technologies to create tailored learning paths for individual students based on their goals, strengths, weaknesses, and learning styles. (26) Experiential learning emphasizes hands-on, real-world learning experiences such as internships and project-based learning where students to apply their knowledge and skills in authentic contexts. (27)

However, there might be a contrasting trend towards standardized, efficiency-focused teaching models that prioritize scalability, cost-effectiveness, and consistency over personalization and adaptability. (28) These models that rely on large (often online) lecture classes, standardized curricula, and automated assessment tools would be designed to deliver educational content to large numbers of students in a cost-effective manner. While these models could offer certain benefits such as increased access and affordability, they also raise concerns about the quality and effectiveness of learning and stratification in higher education that makes worse existing inequalities. (29)

Both models may be associated with lifelong learning. In the future, universities might play a crucial role in promoting lifelong learning by offering flexible and inclusive education opportunities to learners of all ages. (30) Effective implementation of lifelong learning could require both classes that can be scaled to wide audiences and teaching activities that are tailored to a very specific needs of certain group in workforce.

In all different trajectories concerning teaching in universities, the digitalization trend is present. Universities may use data analytics and AI to personalize student learning experiences to manage different outcomes related issues like student success and retention rates. For example, AI-powered adaptive learning systems and intelligent tutoring platforms could provide real-time feedback and personalized learning pathways tailored to individual student needs and preferences. (31) On a more general level, a likely trend is the increasing use of data analytics and artificial intelligence (AI) across various aspects of university operations such as student recruitment, retention, research efforts, and administrative processes. This trajectory is driven by the grow-

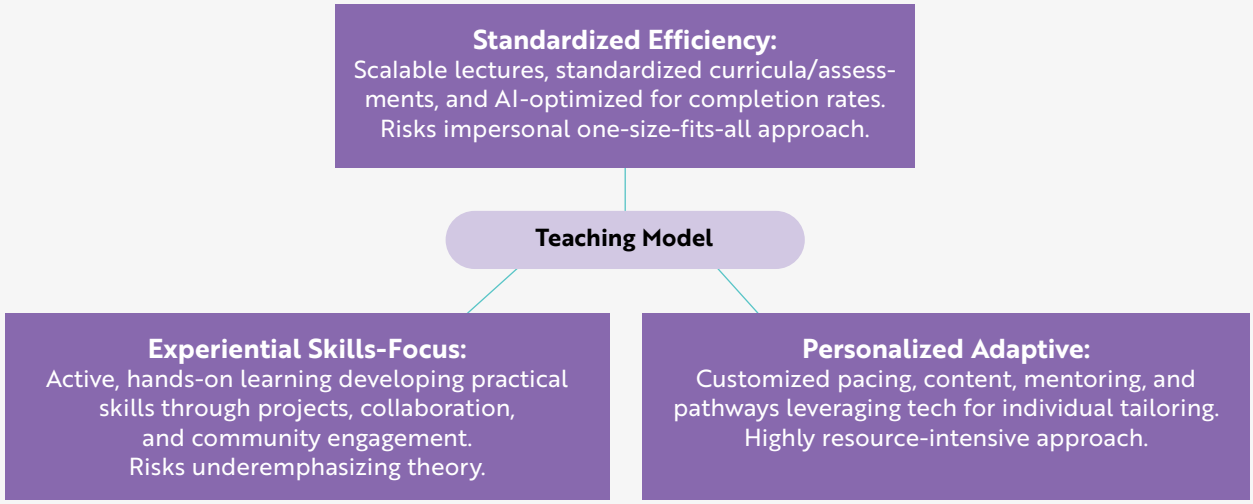


Figure 12. Three models of the main approach in teaching.

ing availability of data and the rapid advancements in AI technologies, which present new opportunities for universities to gain insights, optimize processes, and enhance outcomes. (32) The positive voices suggest that there might be data-driven equity that aims for a more inclusive and equitable higher education system where data is collected and analyzed to ensure fair access, support, and outcomes for all students. (33)

Also, with respect to research, *there is the idea* that we could use science itself to predict the future of science and therefore allocate resources in a meaningful and efficient way (34). In this type of research, AI tools could have a crucial role to play. However, this type of 'science of science' might lead to unintended consequences such as self-fulfilling prophecies and decrease of pluralism in research when the prophecies are uniformly followed.

In general, there is an urgent need for governance frameworks and ethical guidelines to ensure the responsible use of data analytics and AI in university research and teaching. Universities need to develop policies, procedures, and governance structures to address these concerns and ensure the ethical and responsible deployment of data analytics and AI technologies. This could involve significant investments in technology infrastructure, data management systems, and workforce development initiatives to build the necessary capabilities. Moreover, collaborative efforts with industry, government, and other stakeholders may be required to establish shared standards, best practices, and ethical guidelines for the use of these technologies in universities. (35) However, there is a possible tension between university administrations who prioritize efficiency, revenue generation, and modernization, and traditional academic values emphasizing knowledge integrity and research autonomy. (36) These tensions may impact in debates over the adoption of new technologies.

It may be fruitful to consider the issue of technology and AI through the notions of "easy" and "hard" problems of AI governance. The "easy problem" concerns how organizations' design, development, and use of AI systems align with laws, values, and norms stemming from legislation, ethics guidelines, and the surrounding society. The "hard problem" relates to AI as a general-purpose technology that transforms organizations and societies. (37) In the university context, the "easy" problem means that it is ensured that AI tools across research, teaching, administration, and support services are deployed responsibly and ethically. The "hard" problem, in the context of university, stems from AI's potential to fundamentally reshape core university functions like research, teaching, and administration in unforeseen ways that may conflict with traditional academic values. Both "easy" and "hard" problem require strategic discussion, but on somewhat different levels.

In addition to these shifts in teaching models, the literature also shows the growing importance of holistic student support services and robust technological infrastructures in university education. As student populations become increasingly diverse and learning environments become more complex and technology-dependent, universities are recognizing the need to provide comprehensive support services that address the academic, social, cultural, emotional, technological, and personal needs of students. (38) This holistic approach to student support cover a wide range of services, including academic advising, tutoring, mental health counseling, career guidance, financial assistance, as well as programs and initiatives aimed at supporting student engagement, inclusion, and overall success. (39) The literature highlights the need for addressing the diverse needs of students, especially in light of the increasing prevalence of mental health and well-being concerns among student populations. (40)

However, the shift toward greater role of support services in universities would require significant investments in terms of resources, infrastructure, and personnel. It might require new models of funding and governance that prioritize student support and success, and

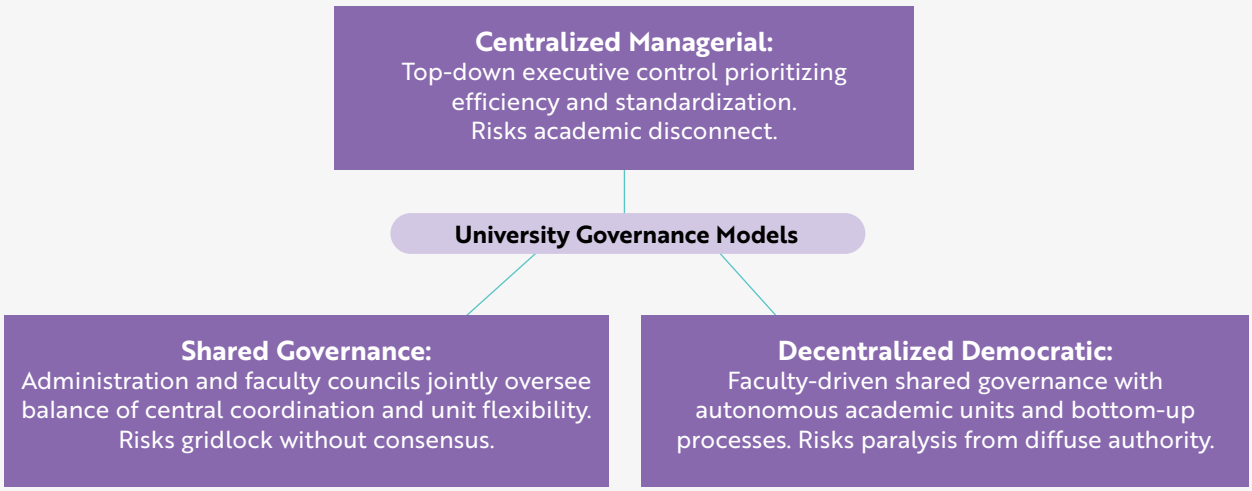


Figure 13. Three models of university governance.

careful consideration of the priorities of the university with respect to its different functions. There could also be potential trade-offs associated with investing heavily in support services, and the support services have to be weighed against other priorities and resource constraints. (41)

Finally, behind all these possible changes in the university as functional organization stands the question of how universities are managed at organizational level. There are contrasting trends and perspectives regarding the organizational structure of universities. The main tension is between centralization and decentralization. One trend points towards the strengthening of university management power and centralization, driven by factors such as increasing accountability demands, competition for resources, and the need for unified authority to ensure competitive performance. (42) This centralized, managerial model is characterized by top-down governance, executive administration, and standardized policies and practices that are applied across all units. (43) However, the literature also highlights significant challenges associated with this model, such as the risk of disconnection from academic needs and the inherent structural inertia of universities. (44)

On the other hand, the literature presents arguments for decentralized and democratic organizational structures that emphasize the importance of shared governance and faculty input in decision making. This model is characterized by high faculty autonomy, bottom-up initiatives, and decision processes tailored to individual units. The literature suggests that universities, being inherently conservative institutions with active interest groups like faculty and students, may be inclined towards democratic decision-making processes to balance the interests of various stakeholders. (45) However, the literature also acknowledges the challenges posed by accountability demands and the need for explicit and univocal authority in certain areas. Solving these challenges may require a balance between centralized decision-making and democratic input. (46)

The Delphi Study

The Delphi study provides insights on the tensions and challenges associated with the changing nature of research, teaching, and technology within universities. One of the key challenges seen in the Delphi study is the need to balance competing research priorities when there are increasing pressures to connect research with market demands and societal needs. While the market-oriented research model is seen as increasingly likely due to financial pressures, many respondents view it as less desirable. The panelists expressed concerns about its potential effects on academic freedom, the scope of research topics, and the neglect of disciplines that are not directly connected to economy. (See discussion in Section 2).

In contrast, respondents expressed a preference to balance mission-driven research that focuses on the challenges societies and nature face and curiosity-driven research that is grounded on the intrinsic value of knowledge creation. The respondents expect a strong trend towards mission-driven research where universities increasingly focus on addressing the central challenges of our time through interdisciplinary collaboration. This path is further grounded in the growing demand for publicly funded universities to demonstrate their relevance. Some concerns were raised about political influences to research in mission-driven research. Also, the crucial question about how the mission (i.e., the central challenges to be solved) is decided was raised in the comments.

While respondents valued curiosity-driven research and recognize its potential for break-through discoveries, they considered it less probable to be the dominant model in the future due to factors such as increased regulation, competitive funding, and the pressure to demonstrate economic relevance.

Despite these probability assessments, the respondents' hopes and desires reveal a preference for a balance

between mission-driven and curiosity-driven research. The ideal future scenario seems to be the one where universities can pursue research that directly addresses societal needs while also engaging in an open-ended inquiry and creation of fundamental knowledge. People do not consider this as being contradictory – rather, they consider fundamental and mission-driven research as complementary.

The study also shows that respondents favor interdisciplinary and problem-focused approaches to research and education. However, they also find strong disciplinary foundations important and recognize the challenges of balancing interdisciplinary and collaborative research within traditional university structures. How to balance curiosity-driven, mission-driven, disciplinary, and interdisciplinary aspects of the research when people expect research to bent towards market-orientation is a challenge set by the Delphi study.

The responses also indicate the tension between different approaches to teaching and consequences of the approaches for the quality and accessibility of education. Teaching based on standardization and efficiency is widely considered undesirable as it fails to recognize different learning needs and decreases educational depth. In contrast, the personalized approach to teaching was seen as highly desirable due to its potential to serve individual learning needs and provide skills needed in the changing world. However, views on the probability of the personalized model varied. Some respondents also regarded that new and emerging technologies could make it more viable option while others see its resource-intensive nature as a major barrier for adoption.

While the Delphi study does not extensively discuss support services and student well-being, it indicates the importance of these aspects for the functionality of the university. Responses suggest that support services and well-being should be considered alongside the core functions of teaching and research. For example, the study indicates that accessible spaces and resources for community building, as well as physical environments that promote interaction and well-being, are seen as important in the university environment. Moreover, the impact of virtual learning on student mental health and well-being is a concern. Responses suggests that there is a need for universities to pay more attention to student support services in the era of technological change.

The study also revealed diverse perspectives on the role of technology in shaping the future of universities. When it comes to teaching, many respondents see the possible benefits of digital technologies and online learning in terms of accessibility and flexibility. However, respondents also emphasize the importance of maintaining

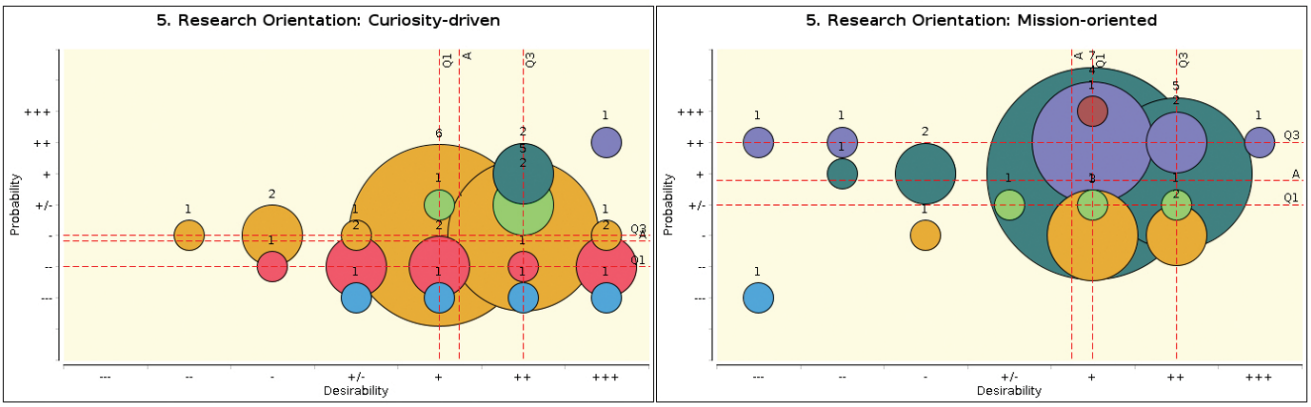


Figure 14. The Answers to the Delphi Statements about Research Orientation.

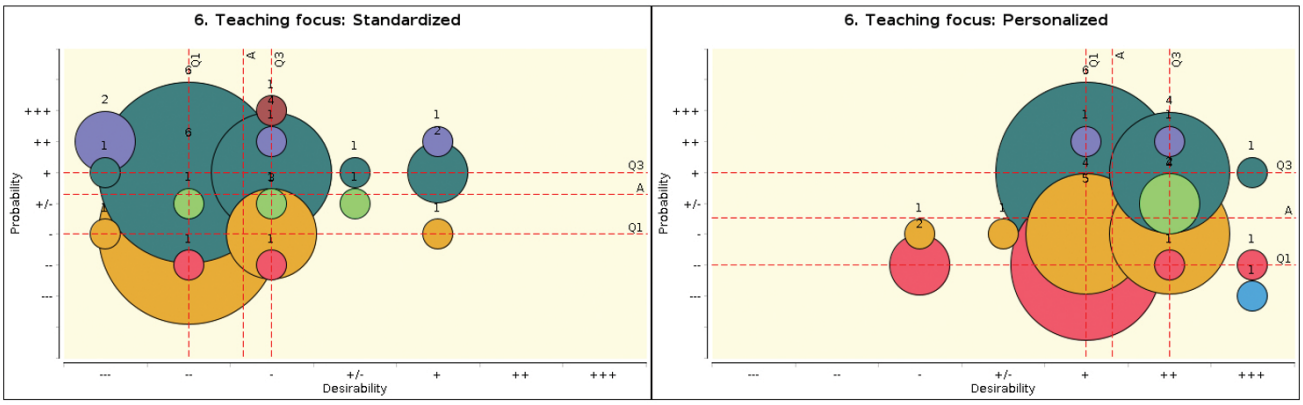


Figure 15. The Answers to the Delphi Statements about Teaching Models.

physical spaces for interaction, community building, and hands-on learning experiences. Similar considerations apply to research. There is a need to develop digital aspects of research but this cannot replace physical presence. In many fields, physical instruments and working-environments set limits to online activities.

Respondents also agreed that a future scenario where AI and ICT in universities become more cost-effective and eco-friendly over time is both likely and desirable. They viewed these technologies as central for innovation and competitiveness. However, some respondents also expressed concerns about the risks and drawbacks of overreliance on AI and ICT. These concerns include cybersecurity and data privacy vulnerabilities, the potential for AI biases and ethical dilemmas, and the risk of losing touch with traditional educational values and methods.

Finally, respondents perceived a trend towards centralized decision-making and management as a likely path for universities. This path is driven by the need for, and idea of, efficiency, financial sustainability, and consistent management of large institutions. However, when it comes to desirability, there is an inclination among respondents towards decentralized and democratic approaches to university governance. They emphasize the importance of autonomy of faculties, bottom-up initiatives, and the ability to adapt to the diverse needs of different fields of research within universities. It needs to be noted that some respondents still argued in favor of more centralized management, given that the management is high-quality. This conflict exemplifies the challenges in balancing institutional efficiency and strategic coherence with the freedom and responsiveness that academic units need and cherish.

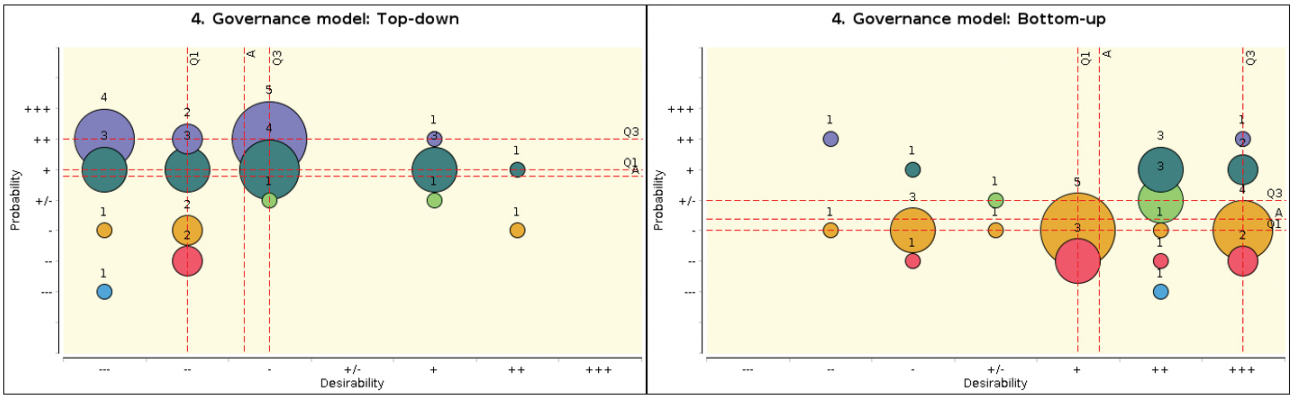


Figure 16. The Answers to the Delphi Statements about the Organizational Structure.

1. Mudrak et al., 2022; Forliano et al., 2021; Compagnucci & Spigarelli, 2020; Schüll, 2019; Mcdowell, 2003; McKelvey and Zaring, 2018; Tjörnbo and McGowan, 2022; Sánchez-Barrioluengo and Benneworth, 2019; Santos et al., 2021; Panizzon and Barcellos, 2020; Petersen and Kruss, 2021; Blass et al., 2010.
2. Compagnucci & Spigarelli, 2020; Addie et al., 2015.
3. Sánchez-Barrioluengo and Benneworth, 2019; Qiu et al., 2023; Audretsch, 2014.
4. Pimentel et al., 2023; Thrift, 2023; Berchin et al., 2018; Munck & McConnell, 2009; Schull, 2019; Birtwistle and Wagenaar, 2020; Mohamed Hashim et al., 2022; Williams, 2019; Isaacs, 2015; Parada & Peacock, 2015.
5. Hartmann, 2019; Pruvot et al., 2015; Matei et al., 2015.
6. McKelvey & Zaring, 2018; Zukauskaite, 2012; Sánchez-Barrioluengo and Benneworth, 2019; Santos et al., 2021; Andrade et al., 2022; Ashyrov et al., 2019; Audretsch, 2014; Meissner et al., 2022; Shin et al., 2023; Villani et al., 2017; Mairal, 2023.
7. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Schull, 2019; Barth et al., 2011; Pimental et al., 2023; MacLeod, 2018; Steger, 2019; Salmela et al., 2021.
8. Salmi, 2015; Winter & O'Donohue, 2012; Whitely, 2011; Estermann & Nokkala, 2009; Geschwind & Broström, 2015; Mudrak et al., 2022; Henkel, 1997; Mirowski, 2018; Blass et al., 2010.
9. Klofsten et al., 2019; Etzkowitz et al., 2000; Petersen and Kruss, 2021; Borah and Ellwood, 2022; Jessop, 2018.
10. Vincent-Lancrin, 2004; Geschwind & Broström, 2015; Millar, 2016.
11. Geschwind & Broström, 2015; Vincent-Lancrin, 2004; Winter & O'Donohue, 2012.
12. Sánchez-Barrioluengo and Benneworth, 2019; Qiu et al., 2023; Audretsch, 2014; Forliano et al., 2021; Petersen & Kruss, 2021; McKelvey & Zaring, 2018.
13. Schull, 2019; Barth et al., 2011; Bleiklie, 2023; Lövbrand et al., 2011; Pelacho et al., 2021.
14. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Schull, 2019; Barth et al., 2011; Pimental et al., 2023; MacLeod, 2018; Steger, 2019; Salmela et al., 2021.
15. Bonaccorsi et al., 2022; Millar, 2016; Bursztyn and Drummond, 2013; Gjefsen and Vie, 2021.
16. Sánchez-Barrioluengo and Benneworth, 2019; Qiu et al., 2023; Audretsch, 2014; Forliano et al., 2021; Petersen & Kruss, 2021; Bleiklie, 2023; McKelvey & Zaring, 2018.
17. Salmela et al., 2021; Gjefsen and Vie, 2021; Bromham et al., 2016.
18. Duede et al., 2024.
19. Gil, 2021.
20. Messeri & Crockett, 2024; Wang et al., 2023.
21. Messeri & Crockett, 2024.
22. Messeri & Crockett, 2024; Wang et al., 2023.
23. Messeri & Crockett, 2024; Wang et al., 2023.

What If?

As we consider the future of the research, teaching, and support services, we can broaden our analysis through "what if" scenarios. These considerations of somewhat radical scenarios enable us to challenge traditional assumptions and anticipate unforeseen developments. Here are three "what-if" scenarios related to university as a functional organization:

What if

An academic path loses all its attraction, and people from young generations to seasoned reseachers leave university

Signal: Some members of the university suggest dissatisfaction with work in the university, particularly compared to international universities or other sectors of society.

Significance: This scenario questions the sustainability of academic careers and its implications for our university's ability to attract and retain expertise necessary to its core functions.

Expert opinion of the Delphi panel – Strategic Foresight and Futures Thinking at the University of Turku

What if

Contact teaching becomes a luxury

Signal: Free higher education students may face limited access to personalized contact teaching, as it could become exclusive to elite universities or fee-paying students.

Significance: This scenario explores what could happen to teaching and its quality if the funding structure and incentives of the university change drastically.

OECD, 2022: Trends Shaping Education 2022. OECD Publishing.

What if

Universities spend significant resources on tackling the effects of an ever-increasing amount of mis- and disinformation.

Signal: Members of the university suggest that universities may play a crucial role in fighting disinformation and ensuring credible, reliable knowledge.

Significance: This scenario looks at how spending increasing resources to fight misinformation might affect other important areas like funding for research and student support services.

Expert opinion of the Delphi panel – Strategic Foresight and Futures Thinking at the University of Turku

24. Valtonen et al., 2021; Orr et al., 2020; Birtwistle and Wagenaar, 2020; Vincent-Lancrin, 2004; Rivera-Vargas et al., 2021; Conrad et al., 2022; Naidu, 2021; Neuwirth et al., 2021; Laufer et al., 2021.
25. Conrad et al., 2022; Salas-Pilco et al., 2022; Erdmann et al., 2021; Neuwirth et al., 2021; Bebbington, 2021; Valtonen et al., 2021.
26. Laufer et al. 2021; Stănescu et al., 2015; Valtonen et al., 2021; Birtwistle and Wagenaar, 2020; Rivera-Vargas et al., 2021; Naidu, 2021; Neuwirth et al., 2021; Cox, 2021; Vincent-Lancrin, 2004.
27. Birtwistle and Wagenaar, 2020; Williams, 2019; Isaacs, 2015; Parada & Peacock, 2015; Muller & Young, 2014; Bleiklie, 2023; Mairal 2023.
28. Dobre et al., 2023; Valtonen et al., 2021; Vincent-Lancrin, 2004; Salmi, 2015; Cox, 2021.
29. Salmi, 2015; Cox, 2021; Dobre et al., 2023; Grosseck et al., 2020; Neuwirth et al., 2021; Erdmann et al., 2021.
30. Council of the European Union, 2018.
31. Dobre et al., 2023; Fernández et al., 2023; Williams, 2019; Cox, 2021.
32. Fernández et al., 2023; Williamson, 2018; Williams, 2019; Minkkinen et al., 2023; Williamson, 2018; Kaiser et al., 2015.
33. Kaiser et al., 2015; Crosier and Haj, 2020.
34. Clauset et al., 2017.
35. Minkkinen et al., 2023; European Commission, 2023; Aithal & Aithal, 2019; Gaebel and Morrisroe, 2023.
36. Salmi, 2015; Winter & O'Donohue, 2012; Whitely, 2011; Orr, 2015; Estermann & Nokkala, 2009; Geschwind & Broström, 2015; Mudrak et al., 2022; Al-Mahadin, 2023; Henkel, 1997; Kupriyanova et al., 2020.
37. Minkkinen & Mäntymäki, 2023.
38. O'Regan, 2020; Alexe et al., 2015; Rutherford and Pickup, 2015; Davis et al., 2023; Humphreys, 2023; Samatar et al., 2021; Cismaru et al., 2015; Gregersen-Hermans, 2015.
39. Rutherford and Pickup, 2015; Davis et al., 2023; Humphreys, 2023; Alexe et al., 2015; Brooks et al., 2020.
40. O'Regan, 2020; Rutherford and Pickup, 2015; Humphreys, 2023; Blanco & Muthanna, 2022; Lieberman, 2023.
41. O'Regan, 2020; Rutherford and Pickup, 2015; Davis et al., 2023; Humphreys, 2023.
42. Estermann and Nokkala, 2009; Whitley, 2011; Martin, 2016; Bolli et al., 2016; Kupriyanova et al., 2020.
43. Bleiklie, 2023.
44. Orr 2015; Winter & O'Donohue, 2012; Whitley, 2011; Estermann & Nokkala, 2009; Geschwind & Broström, 2015; Mudrak et al., 2022; Henkel 1997.
45. Salmi, 2015; Winter & O'Donohue, 2012; Whitley, 2011; Orr, 2015; Estermann & Nokkala, 2009; Geschwind & Broström, 2015; Mudrak et al., 2022; Henkel, 1997; Fredman, 2023; Borah and Ellwood, 2022.
46. Estermann and Nokkala, 2009; Whitley, 2011; Martin, 2016; Thrift, 2023.

The Future of University Spaces: Material and Immaterial Structures

The Literature Review

In literature, we can find several factors that can affect the future trajectories of the material and immaterial infrastructure of university and their function. These include factors such as the need to adapt to changing societal needs and demands, constrains in resource, the increasing importance of interdisciplinary collaboration, and the rapid phase of technological development. (1)

The literature underlines how universities and their surrounding communities are intertwined. Universities are recognizing their wide roles in social, cultural, and economic development. This is driven by factors such as the need to demonstrate societal impact, the possibility of partnerships with several stakeholders to address complex challenges, and the growing emphasis on community engagement and outreach activities. (2)

One of the key trends is that universities might become more connected with their local communities at the level of campus infrastructure. They could be like com-

- **Balancing community engagement and entrepreneurial innovation in campus development**
- **Adapting to the shift towards virtual platforms while recognizing the value of physical spaces**
- **Aligning infrastructure planning with evolving university missions and resource constraints**

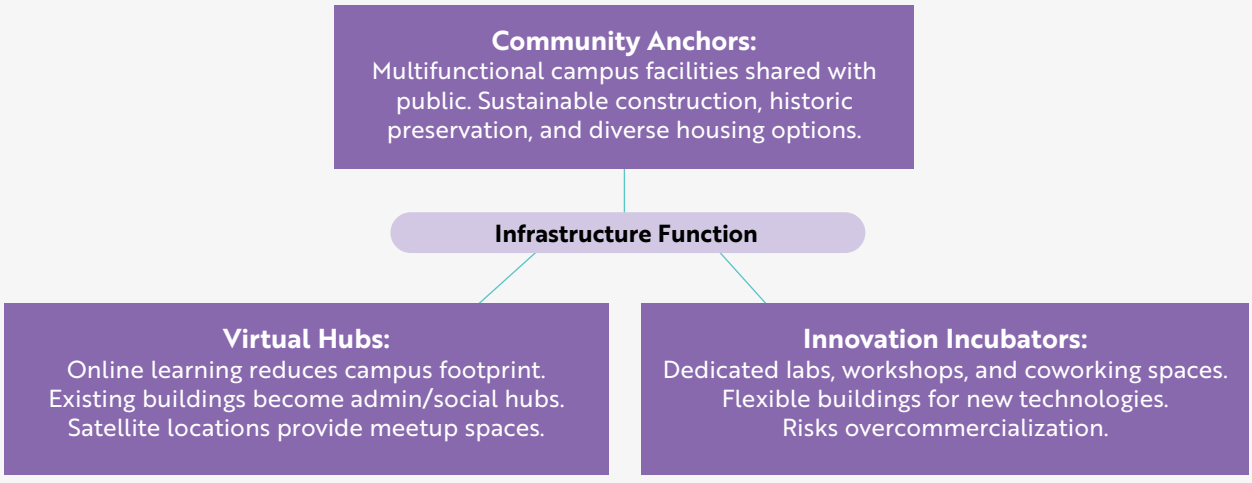


Figure 17. Three models of infrastructure function.

munity anchors that serve as places for social, cultural, and economic interaction and development. (3) This scenario could involve the development of more open and accessible campus spaces, efforts to engage with the community, and encouraging the involvement of community members. These are related to developing relationships and forming partnerships with communities, government agencies, local businesses, and non-profit organizations. (4) These types of activities would require the development of shared facilities and spaces, such as libraries, labs, and community centers, that are open and accessible to the community and stakeholders, as well as the expansion of public engagement with science and outreach activities. (5)

Another possible trend is the transformation of universities into kind of innovation incubators. In this scenario, universities would become centers of entrepreneurship and innovation. There would be a strong emphasis on commercialization, technology transfer, and industry collaboration. (6) This trajectory could include development of spaces and facilities within universities that are dedicated to support innovation and entrepreneurship activities. This could include the creation of incubators, accelerators, innovation hubs, maker spaces, design studios, and other collaborative workspaces designed to support interdisciplinary collaboration, industry partnerships, and an entrepreneurial mindset among students, faculty, and industry partners. (7)

There are various factors that might drive these types of development. These include the emphasis on innovation and entrepreneurship as drivers of economic growth, the demand for universities to demonstrate their relevance and impact to society, and the need to address complex societal challenges through collaboration with industry and other stakeholders. The trend towards dedicated innovation spaces would reflect the same factors: the emphasis on innovation and entrepreneurship, the demand for universities to show their societal relevance, and the need for cross-sector collaboration. (8)

Also, one trajectory is universities evolving towards virtual research and learning platforms that increasingly use digital technologies and platforms to support remote learning and work, research collaboration, and knowledge sharing. (9) This could involve the development of virtual learning environments, the use of artificial intelligence and machine learning to personalize learning and working routines, and the development of global research networks and communities of practice. (10) However, a critical take on this suggests that there is a need to bring researchers concretely together in order to support their interactions. (11) Moreover, online learning might lead to wider skepticism towards education itself. (12) Getting rid of certain buildings might also be quite difficult if these buildings have historical value. (13)

These potential changes in the functions of material and immaterial structures of universities are not necessarily mutually exclusive and may overlap in various ways. However, they all reflect the recognition that universities must adapt to the changing needs and expectations of society while adopting new technologies and modes of operation. (14) Yet, not everything can be achieved, and universities may need to focus on smaller core activities that suit them best in the future. (15) Infrastructure cannot be understood or planned without taking into account all other aspects of universities. The future trajectory of universities is shaped by the interactions between university infrastructure and its social, economic, and cultural context. These interactions suggest that a holistic and strategic approach to planning and decision-making is needed. (16)

There is growing need to develop robust digital infrastructures and platforms that support the core functions of universities, including learning, research, and collaboration. (17) The development of digital infrastructure involves the development of virtual learning environments, online research platforms, digital collaboration tools, digital literacy, and the integration of emerging technologies such as artificial intelligence, virtual reality, and blockchain in to university functions. (18) When the reliance on digital infrastructures increases, universities need to invest in cybersecurity measures and data management systems to ensure the integrity and privacy of digital assets and interactions. (19) These developments and the associated investments affect how the overall infrastructure of the university can be developed due to resource constrains. Path-dependencies and lock-ins are always a concern when decisions and investments are made, but there are also arguments that digital technologies may introduce increased flexibility. (20)

Another possible trend is the need to develop more flexible and adaptable physical spaces within universities that can be easily reconfigured to support different

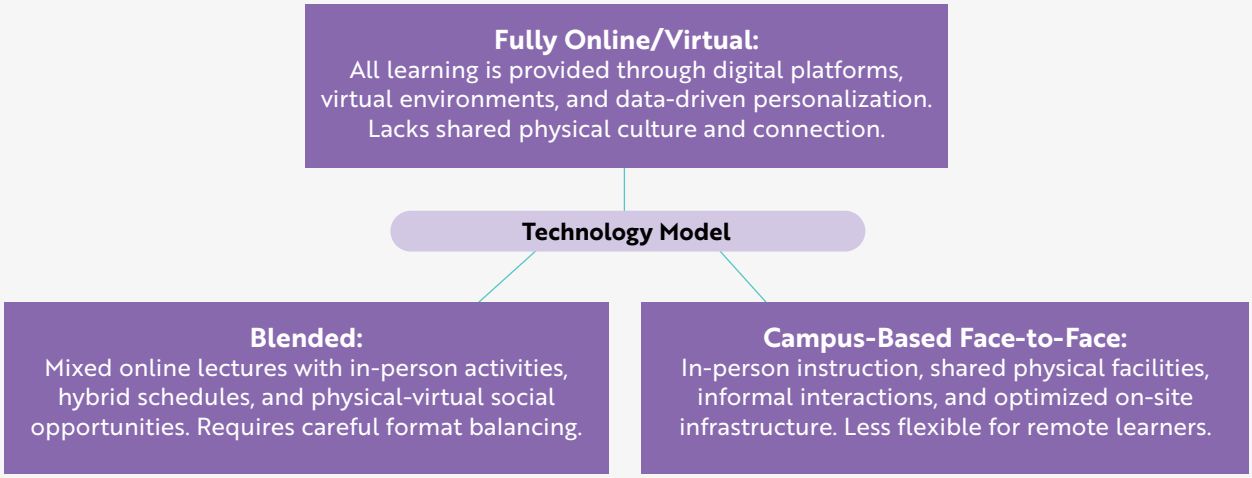


Figure 18. Three models of the role of technology.

activities and different modes of teaching and learning. These spaces could be connected to virtual environments in order to enable hybrid forms of research, learning, and collaboration that blend physical and digital environments. (21) The development of flexible hybrid spaces could be driven by factors such as the increasing emphasis on active, collaborative, and experiential learning approaches, the need to accommodate diverse learning styles and preferences, life-long learning, and the growing integration of online and digital components in education. (22)

Universities may increasingly seek to develop extensive digital networks and partnerships that connect them with other institutions and stakeholders on a global level. This could involve the creation of global research networks, virtual exchange programs, and international collaborative projects that leverage the unique strengths and resources of different institutions. (23) In such scenarios, these extensive digital networks would facilitate knowledge sharing, best practices, and innovations globally. They could also support the development of shared standards and protocols for digital learning and research endeavors. They could enable universities to engage in broader international collaborations support cross-cultural exchange and interdisciplinary problem-solving on a global scale. (24) The trend towards extensive digital networks is driven by factors such as the globalization of university sector, the emphasis on international partnerships and mobility, and the need for institutions to remain competitive and relevant in a rapidly changing global knowledge economy. (25) However, the risk is that strong commitments to this direction could decrease the regional relevance of universities that is often emphasized as a core purpose of universities. (26)

There might also be more radical ideas that challenge traditional notions of the university as a physical entity. There could be scenarios where the majority of learning and research activities could occur in virtual spaces rather than physical classrooms and labs. In this scenario, universities would largely exist as mere digital platforms and networks. In these platform and networks students and research would interact and collaborate through virtual environments and online tools. These environments would lean on technologies like artificial intelligence, virtual reality, and real-time translation to create personalized surfaces for interaction. (27)

However, this radical vision draws attention to questions and challenges such as the potential loss of face-to-face interaction and community-building, novel organization and roles of university stuff and their skills, the need for reliable and equal access to technology and internet connectivity, potential risks of digital surveillance and data privacy violations, and the need for fundamental rethinking of the role and value of the physical campus. (28) The fundamental challenge is that, in the scenario, the purpose and inertia of individual universities might become unclear or non-existent.

A somewhat opposite radical view could suggest that the physical spaces of university could serve more as symbolic and cultural hubs rather than as sites of teaching and research activities. Historically, universities have periodically redefined their roles in response to societal shifts. (29) There might be a possible evolution towards a situation where universities serve broader cultural and symbolic functions in the future. This might be supported by the fact that university buildings can be unsellable deadwood due to state ownership or historical restrictions. (30) In this scenario, the campus would be reimagined as a kind of living museum or cultural center, where the institution's history, achievements, and values are showcased, and where events, exhibitions, and performances that engage the wider community are hosted.

While these radical ideas may seem far-fetched or even dystopian to some, they make visible the growing recognition that the traditional model of the university as a somewhat self-contained and clearly identified entity where research and teaching is performed may no longer be sustainable in the face of rapid technological, social, and economic change. As such, universities may need to be open to more far-reaching changes in the coming years while also keeping an eye on the potential risks and unintended consequences of such changes.

The Delphi Study

One of the key findings of the Delphi study is the desirability of a university model where the campus and facilities are accessible spaces for community engagement. Respondents saw positive value in a university that serves as a resource for the city, promotes inclusivity, and makes research and education more accessible to the public. When it comes to the question of the probability of the model, respondents had mixed views. The pandemic-driven changes in the usage of physical spaces and examples of universities in other countries integrating into communities suggest a path towards this. However, there were concerns about the incompatibility of this model with digitalization, resource scarcity, and maintaining the core focus of university of research and teaching. Security issues raised important worries too.

The study also reveals divided opinions on the probability and desirability of a university model that prioritizes the development of dedicated spaces and facilities for innovation and entrepreneurship activities. Respondents were inclined to think that this model is somewhat probable, while a significant number also doubts its likelihood. Support for "maker spaces" and the perceived importance of university-industry partnerships suggest a trend towards this model. When it comes to desirability, most respondents found this model attractive due to the promotion of innovations and bridging academia with real-world applications. However, there were concerns about commercial interests dominating over core academic priorities.

The Delphi study also revealed interesting insights into the perceived probability and desirability of different technology models in universities.

For a model where universities have adopted fully digital learning, personalized experiences, and virtual campuses, responses were mixed. While many saw the model as probable due to the digitalization trend, some had reservations. Desirability assessments varied greatly but answers tend to incline towards undesirability of this scenario. Concerns about the lack of shared campus culture were raised as a potential risk, although it was also pointed out that virtual communities can have shared cultural experiences.

In contrast, a model where universities commit to in-person instruction, physical campuses, and shared facilities was generally seen as desirable, with only few finding it undesirable. Probability assessments were more varied. The arguments for probability focused on the resilience of traditional models and the importance of in-person interactions for learning and community. Informal interactions were seen as a key part of university life. However, it was pointed out that this model may limit flexibility of, and access to, universities. Arguments against probability cited financial concerns and trends towards digitalization.

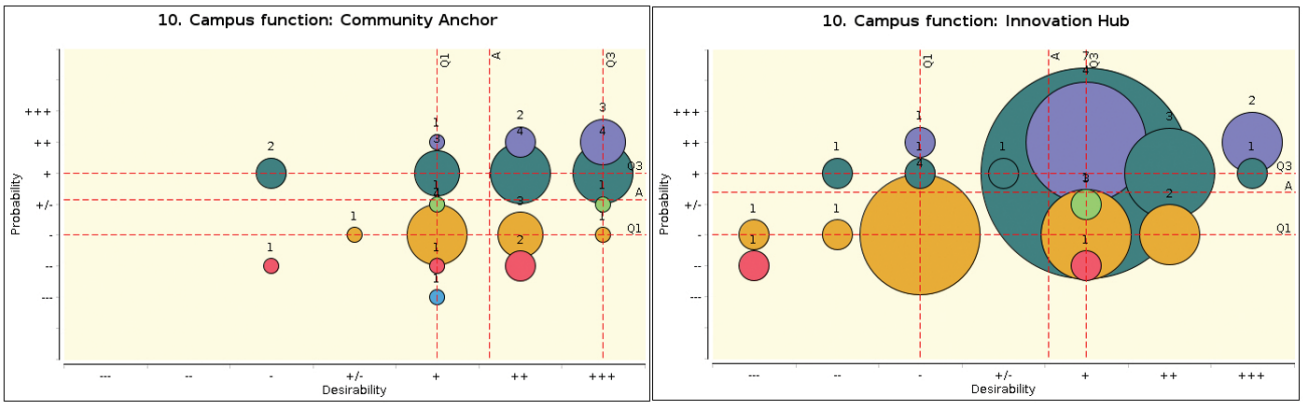


Figure 19. The Answers to the Delphi Statements about Infrastructure Function.

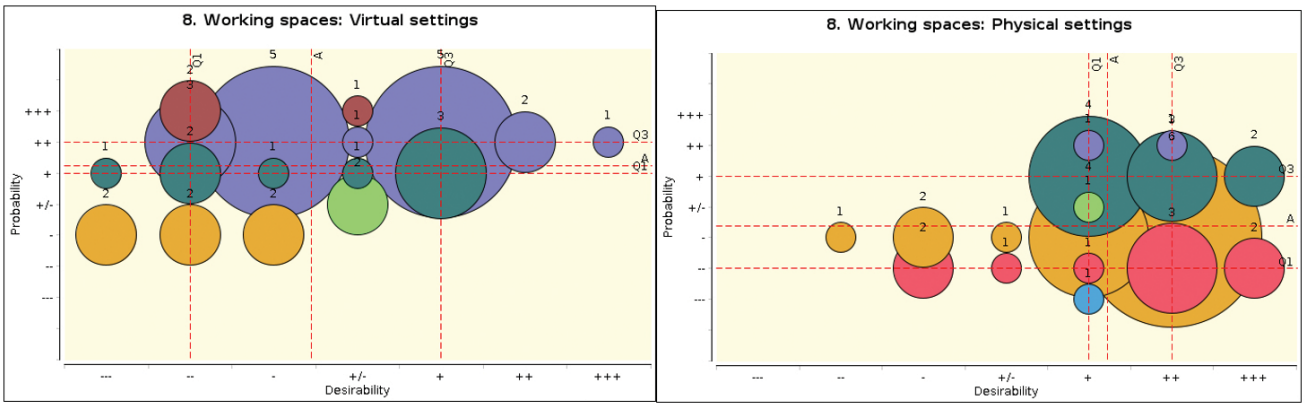


Figure 20. The Answers to the Delphi Statements about Working Spaces.

Finally, we need to notice that issues related to inter-disciplinarity, local vs. global focus, student profile, and funding will all affect the infrastructure solutions in universities. We have seen, in previous sections, that the respondents to the Delphi study think that a balanced approach between global engagement and local relevance is both expected and preferred, and that inter-disciplinary, problem-focused approaches to research and education are becoming increasingly important. At the same time, there are concerns about the financial sustainability of universities. All these issues need to be taken into account when university infrastructure is analyzed and planned. Decisions with regards to other dimensions of the university will also affect infrastructure, but it is equally important to note that infrastructure solutions may limit options in other dimensions of university. Infrastructure solutions may need to enhance flexibility while still supporting the core academic missions of research, teaching, and community engagement.

What If?

As we consider the future function of the university's infrastructure, we can extend our analysis through "what if" scenarios. These "what-if" scenarios encourage us to envision how dramatic changes in how material and immaterial infrastructure could reshape the very foundation of the university by affecting its role and operations. We will explore three such scenarios directly related to our key issues:

? What if

Universities are forced to merge with each other, and, as a consequence, their infrastructure is reconfigured to serve the purpose the larger entity

Signal: There has been notable merger activity in Europe.

Significance: This scenario guides us to think how changes in the identity of the university can shape the infrastructure function dramatically.

European University Association, 2019: University mergers in Europe. EUA.

? What if

Health and wellbeing in the campus is the new normal

Signal: UK universities are adopting the WELL certification, which evaluates buildings across ten categories to ensure they promote occupants' health and wellbeing.

Significance: This scenario guides us to think how the infrastructure might need to be reorganized due to demands related to issues such as health.

Market Intelligence, 4.3.2020: The New Normal in Higher Education: Health and Wellbeing in the Campus Of The Future, marketintel.gardiner.com/health-and-wellbeing-in-the-campus-of-the-future

? What if

University's ICT system is hacked, leading to a complete shutdown and leakage of sensitive information

Signal: In February 2024, Minnesota State University Moorhead reportedly suffered a internet outage due to a cyber attack, disrupting various online services and resources on campus.

Significance: This scenario questions the readiness of our infrastructure to withstand and recover from a major cyberattack and the overall dependence of certain immaterial infrastructure.

InForum, 6.2.2024: MSUM network outage frustrating students both inside and outside the classroom, www.inforum.com/news/moorhead/msum-network-outage-frustrating-students-both-inside-and-outside-the-classroom

1. Hartmann, 2019; Salmi, 2015; Millar, 2016; Bursztyn and Drummond, 2013; Salmela et al., 2021; EUA, 2021; Whitley, 2011; Tjörnbo & McGowan, 2022; Rumler et al., 2017; Valtonen et al., 2021; Williamson, 2018; Fernández et al., 2023; Williams, 2019.
2. Forliano et al., 2021; Compagnucci & Spigarelli, 2020; Schüll, 2019; Mcdowell, 2003; Tjörnbo & McGowan, 2022; Petersen & Kruss, 2021; Santos et al., 2021.
3. Sánchez-Barrioluengo and Benneworth, 2019; Qiu et al., 2023; Audretsch, 2014; Petersen & Kruss, 2021; Bleiklie, 2023; Addie et al., 2015; Gregersen-Hermans, 2015; Birtwistle and Wagenaar 2020.
4. McKelvey & Zaring, 2018; Zukauskaite, 2012; Tjörnbo and McGowan, 2022; Berchin et al., 2018; Rumler et al., 2017; Stilgoe et al., 2014; Lövbrand et al., 2011; Pelacho et al., 2021.
5. McKelvey & Zaring, 2018; Zukauskaite, 2012; Tjörnbo and McGowan, 2022; Berchin et al., 2018; Rumler et al., 2017; Stilgoe et al., 2014; Lövbrand et al., 2011.
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Summary of Key Findings

In what follows, the main findings and especially overreaching themes in the previous sections are summarized.

1. There are possible changes in the overall purpose of the university in our changing world. While the traditional roles in knowledge creation and sharing remain central, the university needs to consider its role as an agent for social change, economic development, and innovation. In each case, the reassessed purpose would require the university to support interdisciplinary collaboration, engage with different types of collaborators, and actively contribute to solving the challenges of our time. However, all collaboration with different stakeholders carries risks that need to be anticipated and managed. Moreover, to fully understand and secure the unique position of universities in the future, it is recommended that subsequent studies and strategic planning efforts look beyond the internal dynamics and identify the distinctive characteristics that set universities apart from other knowledge producers and prosumers.

2. The university may have to make strategic decisions in balancing global orientation and local engagement. On one hand, being a proactive agent in global network of universities, societies, industries, and research institutions is crucial for high-quality research and for preparing students into an interconnected world. On the other hand, the university has a responsibility to serve its local community, address regional needs, and contribute to the development of the area in which it operates. Global and local orientations may support each other, but this is far from obvious and cannot be taken for granted. Also, universities must prepare to work in geopolitical clusters, given the changes we witness now, and be prepared to make difficult and politically loaded decisions that are associated with such clusterings. In the Delphi Study, there were differences between respondents on how important university's global engagement and interconnectivity is in contrast to its local role. This reflects the challenges in defining the relevant meaning, extent, and practices of internalization. There are several nuances at play in the issue, and the international and global dimensions require deep strategic discussion within the university.

3. Research remains a core pillar of the university's functions, and the findings in this report emphasize the importance of collaborative, interdisciplinary research that addresses societal challenges. Supporting partnerships with industry, government, and other institutions can lead to novel advances in research, increased funding opportunities, and the translation of research into real-world applications. The risks in the partnerships, however, concern the integrity and depth of the research in the university. Interdisciplinarity needs institutional support, and the risks involved in different types of collaboration require management on institutional level. It must also be noted that, in the Delphi study, the role of individual disciplines in university generated mixed views. Respondents saw value in both interdisciplinary approaches and maintaining strong specialized disciplinary foundations. The balance between encouraging interdisciplinary collaboration while resourcing in-depth disciplinary expertise was an area that lacked clear resolution.

4. In terms of teaching and learning, there is a need for the university to adapt to drivers that have changed higher education in recent years. This includes regularly assessing and updating curricula to align with workforce demands, investing in online and hybrid learning platforms to accommodate diverse learning needs, and individually tailored paths through higher education. Supporting a student-centered approach in teaching and support services that emphasizes critical thinking, problem-solving, mental health, social interactions, soft skills, and lifelong learning will be important. However, at the same time, universities might adopt scalable and standardize teaching approaches that support a cost-efficient way to provide teaching to wide audiences like non-matriculated students, lifelong learners, and corporate learners.

5. The findings indicate an increasing focus on flexible and adaptable physical spaces. These spaces can be reconfigured easily to support various activities and integrated with virtual activities. Robust digital infrastructures, such as virtual learning environments, online research platforms, and digital collaboration tools, are

needed to support the core functions of universities in the future. The findings also emphasize the enduring value of physical spaces. These spaces support community and sense of belonging, provide the place for hands-on research and learning, and serve as symbolic and cultural hubs. However, given the possible changes in the overall purpose of the university and trends towards online remote work and learning, the campuses might be opened up more to surrounding society. The results suggest that universities need to invest in both physical and digital infrastructures. This investment requires making decisions on the allocation of resources and listening to the perspectives of diverse stakeholders who act in changing technological and societal contexts. Security concerns in both physical and non-physical infrastructure need to be adequately addressed.

6. The Delphi study The Delphi study reveals several key issues where (i) the probable future outcomes are considered undesirable, or (ii) desirable outcomes are considered improbable by the respondents. These issues include (see previous sections): *Market-Oriented Economic Priorities, Curiosity-Driven Research, Centralized, Managerial Organizational Structure, Privatized/ Corporate Funding Model, Campus-Based Face-to-Face Model of Interaction*. In addition to the issues where there was least consensus (*Global Orientation and Disciplinarity Organization*, see above), these issues require deep strategic discussion. There might be a need for novel suggestion on how to achieve the desirable outcomes or how to turn a setback into a comeback – how can we decrease the negative impact of outcomes that are undesirable but probable?

7. Finally, while this report could not cover AI in depth, understanding the possible futures of all the different dimensions of universities is a necessary for analyzing how AI could impact them. Without understanding possible future trajectories of universities themselves – their evolving roles, goals, activities, and structures – we cannot analyze the impact AI may have on them. How AI can be used in a university depends on what the university does and why. While the development of AI is likely to affect universities greatly, there is no single predetermined outcome. The implications of AI will be shaped by the strategic directions universities choose to take in the future. How AI can develop and how these developments may affect universities is a topic so wide that it would require its own project.

Concluding Remarks

In this strategic foresight project, we have mapped insights into the trends, drivers, developments, ideas, and visions in the international operating environment that may significantly impact the future of universities. By combining a literature review and a Delphi study with participants from different units of the University of Turku, the project aimed to strengthen the university's ability to react to changes in the operating environment and make informed strategic decisions.

The analysis of international operating environment used a two-part approach to understand the possible trajectories that might affect the University of Turku. The literature review identified the main issues, trends, signs, and issues in global discourses on universities. This understanding was used to create a broad framework, consisting of dimensions and models, for thinking about the future of universities. The Delphi study then added context-sensitive insights to this framework by drawing on the perspectives and experiences of the University of Turku community. This combination of broad research and local perspectives provided a more complete view of how major trends could impact the University of Turku in particular.

It is important to acknowledge that the findings presented in this report are based on the information available at the time of the research and cannot capture all the nuances and issues related to the university futures. This means that the university need to continue to monitor operating environment, engage with different stakeholders in foresight, and reflect on the strategic opportunities and challenges that arise. The synthesis generated in this project should be regularly updated and re-evaluated to ensure that the framework remains relevant and grounded in the latest research.

Despite these limitations, we dare to say that the project demonstrated the value of engaging in future-oriented thinking and planning in the university. By fostering a culture of foresight, adaptation, and critical takes on the future, the University of Turku can better confront the challenges and opportunities in the international operating environment. The insights gained from this project can serve as a starting point for further discussions and strategic planning efforts.

Ultimately, the success of this strategic foresight project will be measured by its ability to stimulate ongoing dialogue, reflection, and action within the university community. By adopting a proactive approach to shaping its future, the University of Turku can continue to fulfill its mission of creating, sharing, and applying knowledge for the benefit of society – whatever that means in the changing conditions of the future.

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Future Directions and Possibilities for the University

Report on Literature Review and Delphi Study

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