



Navigating complexity

TU Delft Strategic Foresight Approach
for Higher Education Institutions



'Every reduction in uncertainty is more than welcome; ignoring deep uncertainty is attractive. But decisions that ignore deep uncertainty ignore reality. Substituting assumptions for deep uncertainties might simplify choices in the short term but may come at a much higher price in the longer term'.

([Marchau et al., 2019](#))

Executive Summary

Universities today operate in an environment marked by growing complexity and deep uncertainty. Geopolitical tensions, technological change, climate challenges, and shifting societal expectations increasingly disrupt the assumptions on which higher education and research depend. While universities are often perceived as highly resilient, their continuity relies on fragile foundations such as stable funding, international collaboration, inflow of students and talent, and robust infrastructures. These foundations are under pressure, revealing that universities are less autonomous than they may appear.

To strengthen its preparedness, TU Delft has developed the Delft Strategic Foresight Approach (DSFA). Strategic foresight is embedded in TU Delft's Institutional Plan 2024–2030 as part of the priority of strengthening resilience. The DSFA is designed to provide the university with a systematic way to engage with uncertainty. It is both a conceptual framework and a practical method that enables decision-makers to explore plausible alternative futures, to surface hidden assumptions, and to test the robustness of strategies and policies. The purpose is not to predict the future, but to prepare the university for disruption and to support resilient and adaptive decision-making.

The DSFA builds on seven guiding principles that emphasise the reality of deep uncertainty, the external dependencies of universities, the influence of cognitive biases, and the need to explore discontinuities rather than continuity assumptions. It stresses the value of combining analysis with imagination and of applying 'negative empiricism': actively searching for developments that might falsify current assumptions. The approach is operationalised through five levels: diagnosing the strategic environment, constructing scenarios, conducting stress tests, identifying vulnerabilities and options, and linking insights to decision-making.

Early applications of the DSFA within TU Delft have shown its practical relevance. Stress tests on themes such as knowledge security and academic talent revealed hidden assumptions and vulnerabilities. Foresight field labs demonstrated how the approach can broaden perspectives, reduce blind spots, and support both central governance and decentralised strategy processes. Beyond technical insights, the DSFA also contributes to a cultural shift: encouraging open discussion about uncertainty and resilience and helping the university reflect more systematically on its strategic environment.

Looking ahead, TU Delft aims to further strengthen and embed foresight as a core element of its strategic capacity. The next steps include integrating foresight more systematically into governance processes, expanding the portfolio of foresight services, and learning from external partnerships and peer review. By 2030, the ambition is for foresight to be a recognised and firmly embedded function within the university, supporting strategy and policy in an environment of uncertainty. This is not a fixed endpoint but a gradual process of learning, reflection, and adaptation.

Author

Gert Jan Scheurwater, Director Foresight & Strategy Development, TU Delft

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Foresight is not just a technical exercise in plausibly anticipating disruptions, but also a value-driven practice aimed at protecting the normative foundations on which universities rest.

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By continuing to strengthen and embed foresight, TU Delft is working towards a more resilient and adaptive organisational culture. This is not about predicting the future, but about being better prepared for whatever future may unfold.

Preface

Universities nowadays have to operate under conditions of deep uncertainty: circumstances that go far beyond ordinary unpredictability which makes the usual extrapolation from known cases counterproductive. Also, often our knowledge of developments in the environment and the behaviour of actors proves insufficient for reliable linear extrapolation. Yet, decisions still need to be made at various levels of the organisation. This combination of reduced predictability and heightened uncertainty requires a complementary approach to policy development, strategy, and decision-making.

That is why TU Delft has decided to establish a strategic foresight unit within the Strategy Development staff directorate. The goal is to strengthen the university's anticipatory capacity and its resilience over time. Strategic foresight is not new and has a relatively long history as a discipline. Its systematic application within public organisations has grown steadily over the past two decades, though its structural use within universities is a more recent phenomenon.

Too often, it is assumed that universities can absorb almost any shock. They are seen as super-resilient network organisation, and we like to think of them as virtually indestructible and autonomous: too resilient to fail. But is that really the case?

What we observe is that research continues, education is provided, students graduate, partnerships are formed, new buildings are opened. All of this rests on almost invisible foundations, such as stable funding, a stable national political configuration, a steady inflow of students and scientific talent, reliable infrastructures, and an open global scientific system.

Equally fundamental are the principal values that universities embody. They are not just knowledge organisations but crucial societal institutions that represent core values such as freedom of thought, scientific integrity, and openness of debate. These values provide universities with legitimacy and resilience, yet they also make them vulnerable: when they are undermined by political interference, reputational damage, or internal conflicts, the university's role in society itself is at stake.

Foresight is therefore not just a technical exercise in plausible anticipating disruptions, but also a value-driven practice aimed at protecting the normative foundations on which universities rest. What we value is 'design consequential': it shapes how we organise our institutions and how we respond when crises occur.

And it is precisely these kinds of foundations – both structural and normative – that are increasingly under external pressure. Shifts in these conditions can abruptly and profoundly alter the university's strategic environment. It also reveals that universities are far from autonomous – quite the opposite.

The core ideas of foresight are deceptively simple. It comes down to systematically exploring current and plausible future developments that are relevant to the organisation. The potential impact of those developments is then assessed, followed by decision making and implementation.

Summarised in four questions:

- What is happening?
- What does it mean?
- What are our options?
- What do we decide to do?

These questions run through the entire Delft Strategic Foresight Approach: each of the levels and principles described in this paper is designed to help answer them in a structured way.

Foresight as conceived here uses plausible futures as lenses to better see and analyse the present. For instance, on what the university depends for its continuity as an organisation. In that sense, foresight is not like a telescope looking far ahead, and it should be used as a magnifying glass: it helps zoom in on today's realities by viewing them through the lens of plausible tomorrows. It does not offer new certainties. Instead, it raises sharper, more probing questions – questions that may feel uncomfortable, but which can prompt critical reflection and reveal hidden assumptions and vulnerabilities.

This position paper outlines the **TU Delft Strategic Foresight Approach (DSFA)**. It provides an operational translation of the abstract concepts that surround foresight. This approach is based on already extensive practical experience gained from applying foresight in various parts of the organisation and is therefore more or less tailored to TU Delft. The working model as described here represents an empirically proven way foresight can effectively be used within a complex organisation.

For now, the DSFA is tailored to the specific context of a single university. At the same time, it may also be relevant for other academic institutions facing similar challenges. The description of the approach is therefore intended as an open invitation to peer institutions to experiment with and adapt this way of working. Broader application and practical experience will provide valuable feedback, which will help refine and further improve the DSFA over time.

G.J. Scheurwater,
*Director Foresight & Strategy Development TU Delft*¹

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1 Introduction

The strategic environment of TU Delft has, in a short period of time, shifted from being relatively stable and predictable to a context that is (potentially) disruptive to the functioning of the university. Navigating a highly dynamic and largely uncharted environment has become the new normal for many universities. As a recent Nature special report highlights, universities across the globe are confronted with converging pressures on funding, academic autonomy, researcher mobility, and technological disruption (Nature, 2025).

This shift is not unique to higher education. The growing number of trend reports, foresight studies, scenario analyses, and horizon scans – both within and beyond the academic sector – reflects a broader realization: forecasting alone is no longer sufficient. As uncertainty increases, more organisations seek to embed foresight structurally into their decision-making processes. For universities, this marks an important evolution from classical five-year planning toward a more dynamic and adaptive strategic posture.²

For universities this is not merely an organisational adjustment, but a way of safeguarding their distinctive role. As epistemic institutions and public-value driven organisations, they generate, validate, and conserve knowledge, educate talent, and provide an arena for critical debate. These functions depend on conditions beyond their direct control: rule of law, academic freedom, international collaboration, stable funding, and trusted infrastructures. When these conditions shift, universities are affected not only in their operations but also in their ability to fulfil their societal mission.

Rising systemic uncertainty

This turbulent environment is aptly illustrated in the EU report *Safer Together* by former Finnish Prime Minister Sauli Niinistö.³

In the report's first chapter *Decoding the crises of today and anticipating the threats of tomorrow*, it is stated that we are dealing with a multipolar, transactional geopolitical world in which the rule-based international order belongs to the past. Armed conflicts are unfolding at Europe's borders and in the Middle East. According to the report, hybrid warfare is a given, and European defence has fallen into disarray.

These geopolitical developments are accompanied by the escalating consequences of climate disruption across virtually all areas of society, the threat of new pandemic crises, the rise of vocal populism that has entered the (inter)national political mainstream, and the spread of autocratic forms of government. Furthermore, tech companies – according to this analysis – are increasingly taking on an uncontrolled, state-like role, and Artificial Intelligence (AI) is seen as a technology with unpredictable and all-pervasive potential.

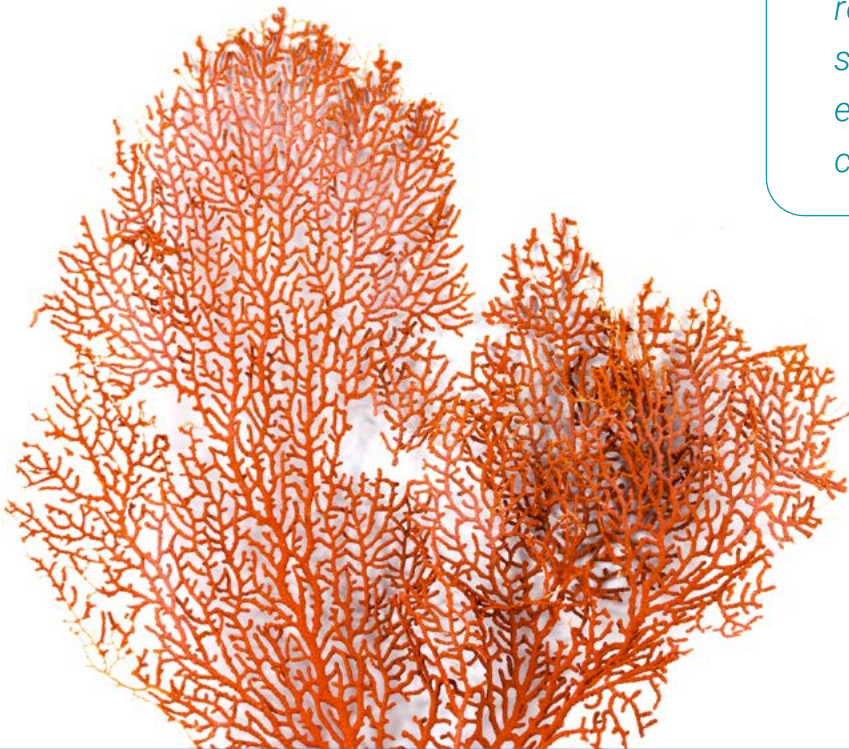
The depiction of a rapidly changing, unpredictable, complex, and ambiguous (geo)political, social, technological, and ecological environment is reinforced and deepened by numerous other publications. The core message is that societies, economies, institutions, and organisations must systematically adapt to a reality in which disruption and uncertainty are not exceptions, but inherent features of the context in which we operate – bringing both challenges and opportunities.⁴

The case for preparedness

Universities are already relatively vulnerable to external disruptions, but the developments described above further increase the pressure. Just as a coral reef has internal resilience, even relatively small events within such an ecosystem can lead to irreversible consequences.

In line with the Niinistö report, this situation calls for a different strategic mindset – for universities in particular. It is necessary to systematically assess whether the university is sufficiently resilient to and prepared for disruptive events and developments that may impact the organisation. Such a mindset challenges many continuity assumptions that are deeply embedded in institutional thinking and behaviour. It is essential to prevent a situation in which ‘the multifaceted changes in our (security) environment have outpaced the speed of our action.’⁵

Just as a coral reef has internal resilience, even relatively small events within such an ecosystem can lead to irreversible consequences.



Introducing the DSFA

TU Delft therefore aims to strengthen its strategic preparedness through the systematic application of strategic foresight. Analysing and understanding the potential impact of external developments on the organisation is fundamental to this effort. It is equally essential to test whether the university can continue to fulfil its societal role under increasing turbulence, and to explore which strategic options are available to ensure that it does. This calls for a more flexible, adaptation-oriented mindset in strategic planning and decision-making.

A focus on (future developments in) the organisation’s environment is not a luxury, but a necessity.

The approach set out in this paper draws partly on the ‘foresight-infused strategy’ model developed by Conway and Voros (Conway, 2016; Voros, 2003), which frames the strategy process as a flow from input through analysis → interpretation → prospection to output. The DSFA mirrors this sequence in its design.^{iv} It also draws on some basic notions developed by Marchau et al. (2019) in the context of the Decision making under deep uncertainty-approach.⁶

A focus on (future developments in) the organisation’s environment is not a luxury, but a necessity. The external lifelines on which the university depends for its functioning are, due to the developments outlined above, under increasing pressure.⁷

Erosion of these foundations poses a threat to the continuity of the university: strategic preparedness is essential. This presupposes ‘to be clear-eyed and avoid wishful thinking and to be able to look at our own vulnerabilities and shortcomings objectively.’

To this end, the TU Delft Strategic Foresight Approach (DSFA) was developed, as also outlined in the TU Delft Strategic Plan – [Strategic Agenda TU Delft 2025–2030](#). DSFA is part of the methodology of Strategic Foresight TU Delft. The approach described here is also a result of experiences gained in various Foresight Field Labs over the past period.⁸

Strategic foresight can be applied through two complementary approaches: explorative and analytical. *Explorative foresight* focuses on scenario development, often involving broad dialogue and extensive reporting to create shared visions of possible futures. *Analytical foresight*, by contrast, emphasises the uncovering and testing of continuity assumptions. It is typically faster, more targeted, and more directly linked to decision-making. The DSFA primarily draws on this analytical mode, while remaining compatible with more explorative exercises when time and purpose allow.

The DSFA is a framework for critically testing the robustness of policy ideas and strategic plans through the lens of plausible and potentially disruptive future scenarios: strategic falsification (see Appendix E for a glossary of relevant terms used in this paper). With its general focus on challenging the durability of policy, the DSFA is designed from the outset to counter systemic cognitive biases such as confirmation bias, normalcy bias, and groupthink phenomena that might impair an institution's strategic capacity and decision-making. Due to this critical-pragmatic perspective, the DSFA is not a non-committal exercise and takes into account the bounded rationality of professional policymakers and decision-makers.

Empirical basis

The development of the DSFA did not start from theory alone. Between 2023 and 2025, TU Delft | Campus Den Haag organised a series of foresight field labs with faculties and professional services. These sessions examined strategies regarding topics such as funding, talent, digitalisation, knowledge security, ICT resilience, and publication infrastructure. They combined environmental analyses, scenario construction, stress testing, and structured dialogue, and generated insights that fed directly into this framework.

Foresight field labs

Foresight Field Labs are the organizational settings in which TU Delft | Campus Den Haag has actively experimented with the application of strategic foresight. They provide a structured yet flexible format that can be deployed in faculties and professional services to stress test policies and strategic assumptions. By working “on location”, the Labs connect foresight directly to the questions and responsibilities of the unit involved, while also linking back to the broader strategic agenda of the university.

What makes these Labs distinctive is their role as bridges between principle and practice. They translate abstract foresight ideas into concrete exercises that make explicit often hidden assumptions, generate alternative perspectives, and feed back into policymaking and governance. Their contribution lies not only in the immediate insights they produce, but also in the way they help embed foresight practices across the organisation.

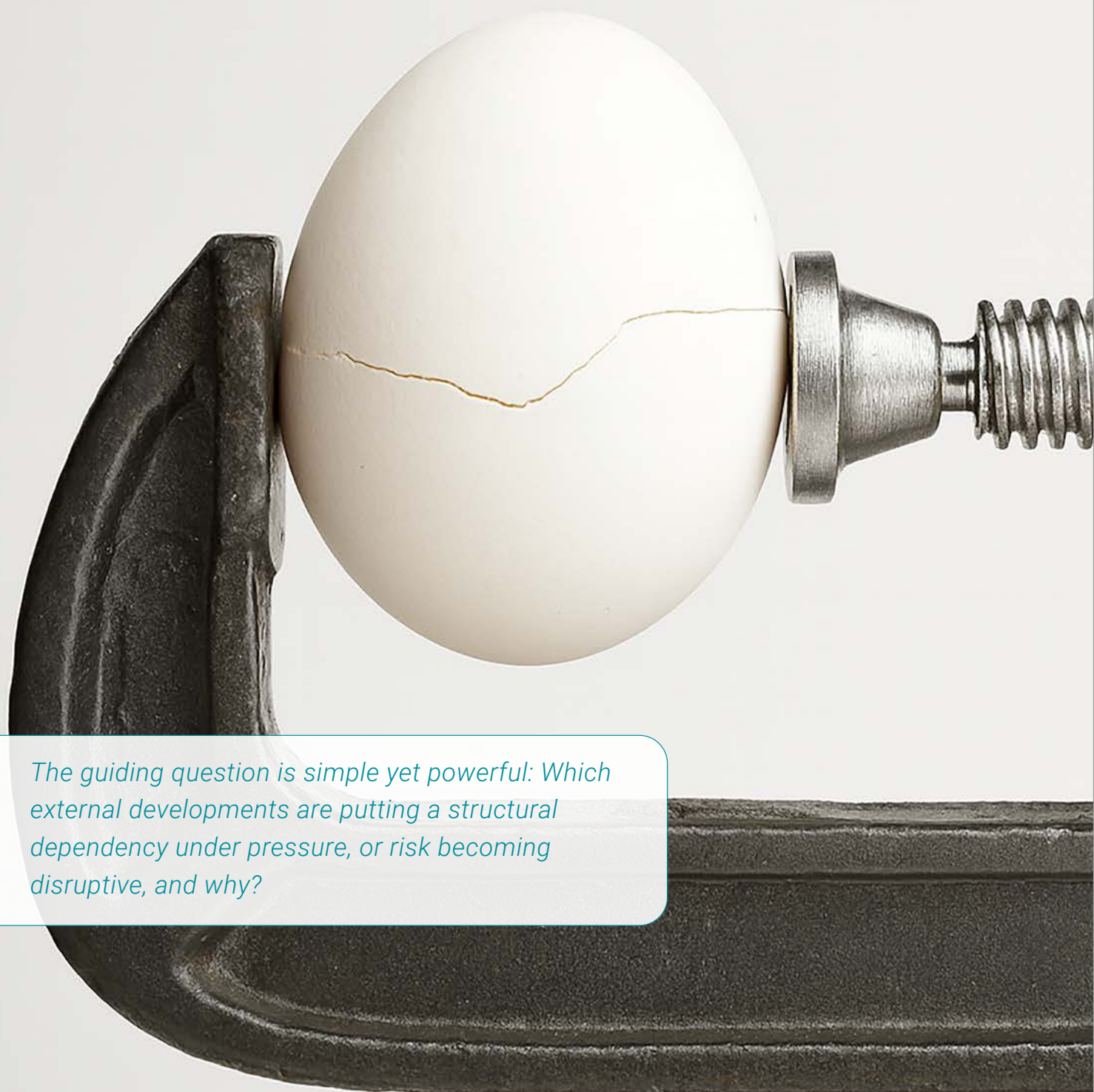
In this sense, the Field Labs have become an essential building block of what can now be dubbed as the Delft Strategic Foresight Approach. They demonstrate that foresight is not an occasional add-on, but can function as part of the everyday repertoire of strategy development in a complex, university setting with multiple decision-making arenas as a reality.



‘We need to be willing to reflect on and think through worst-case scenarios, as a basis for our work on preparedness. This is not only about a sense of urgency, but also a sense of agency.’
(Niinistö, 2024)

Across the different settings, certain patterns returned again and again. Participants tended to rely on continuity assumptions without making them explicit. Disruptive futures often proved difficult to imagine, let alone to connect to current strategy. And when scenarios were made concrete, it became clear how important it is to link foresight directly to decision-making structures rather than treating it as a side activity. These recurring insights have been synthesised into the seven principles and five levels that structure the DSFA.

In this sense, the framework is not only based on academic literature and international foresight practice, but also on TU Delft’s own empirical experience. The labs served as testing grounds where methods were refined, blind spots became visible, and practical relevance was demonstrated. They showed how foresight can help a university act more deliberately under uncertainty, and how strategic resilience is strengthened when faculties and professional services are engaged in joint reflection. For TU Delft, this process has been a way to translate abstract foresight concepts into practical tools, gradually shaping what is now referred to as the Delft approach: a form of theory-inspired practice where ideas from the literature are tested, adapted, and given new meaning in the light of concrete organisational challenges.



The guiding question is simple yet powerful: Which external developments are putting a structural dependency under pressure, or risk becoming disruptive, and why?

2

Seven principles

Structure of this paper

This position paper presents the DSFA as an approach for systematically testing assumptions embedded in strategic planning, policy directions, and organisational structures.

It first outlines the underlying principles of the DSFA, the conditions under which its application is most meaningful, and the structure and functioning of the framework itself. It then discusses the kinds of insights the DSFA can deliver and the way in which strategic foresight is embedded at TU Delft. The appendices provide supporting material, including a work protocol for Foresight Field Labs, guidance for conducting stress tests, an overview of foresight outputs, a glossary of terms, and a list of consulted experts.

The Delft Strategic Foresight Approach was developed as a structural response to the growing need to test policies, organisational structures, and strategic assumptions under conditions of deep uncertainty. For such an approach to be credible and practical, it requires a clear foundation. The DSFA is therefore guided by a number of principles that capture the essence of foresight and set the direction for its application.

These principles reflect the assumptions we start from, the pitfalls we must be aware of, and the purpose we want foresight to serve. They provide the needed orientation: reminding us that uncertainty is the rule rather than the exception, that universities function as complex adaptive systems embedded in wider environments, and that robust strategies must be stress-tested against alternative futures. Together they form the backbone of the DSFA. The principles are informed both by the foresight and planning literature and by recurring patterns observed in TU Delft's field labs.

The seven principles are:

1. **Deep knowledge-uncertainty as a starting point**
2. **The organisation as a complex adaptive system**
3. **External critical dependencies as a perceptual framework**
4. **The status quo as a plausible future**
5. **Falsification as a critical testing principle**
6. **Cognitive biases as a given**
7. **Broadening the scope for strategic action as a goal**

Deep knowledge-uncertainty as a starting point

The application of strategic foresight is based on the acknowledgement that there is structural knowledge uncertainty regarding developments in the environment that impact the functioning of the organisation, both now and in the future. The assumption that the future could be considered as a linear continuation of the past is becoming increasingly untenable. This structural knowledge uncertainty is demonstrated for instance by the limitations of predictive models in the face of disruptive events.

Grouping critical dependencies

Clustering the twelve critical dependencies is not a necessary step, but it can be a helpful option. It offers a way to bring focus and show how different dependencies interact, without losing sight of their individual importance. Instead of treating each dependency as a stand-alone item, clustering makes visible how they jointly shape the conditions under which a university can operate. In this way, the dependencies can also be seen as giving direction and context to the more familiar PESTLE dimensions, but in a form anchored in the specific reality of higher education.

Political & Legal – *Political Stability & Rule of Law, Governance Frameworks, (Inter)national Network Participation, Academic Autonomy.*

This cluster is about the frameworks that set the rules of the game for universities. Political stability, legal systems, and governance arrangements determine how much freedom institutions have, how predictable their environment is, and how easily they can build and maintain external partnerships.

Economic & Social – *Talent, Trust in Knowledge, Funding, Public Health Stability.*

This cluster captures the social and financial base on which universities depend. A steady inflow of students and staff, reliable funding, trust from society, and stable public health together form the conditions that allow education and research to continue over time.

Technological & Environmental – *Publication Infrastructure, Data & Digitalisation, Artificial Intelligence, Climate & Campus.*

This cluster brings together the infrastructures and environments that enable universities to function every day. Secure digital systems, access to publication channels, the rise of AI, and the resilience of the physical campus to climate impacts all shape the long-term continuity of academic work.

For TU Delft, clustering is one of several ways to work with the dependencies. It can make foresight exercises more focused and integrated, but the dependencies can also be used individually depending on the purpose of the exercise.

In *decision making under deep uncertainty*, four levels of knowledge (un)certainty are identified:

Levels 1 and 2 refer to situations where there is sufficient knowledge of causal relationships, and where probabilities can be assigned to future events. The relationships may be complex but are sufficiently understood to support responsible decision-making. A typical example is life expectancy as used in actuarial models: the outcomes vary, but the underlying patterns are stable and predictable.

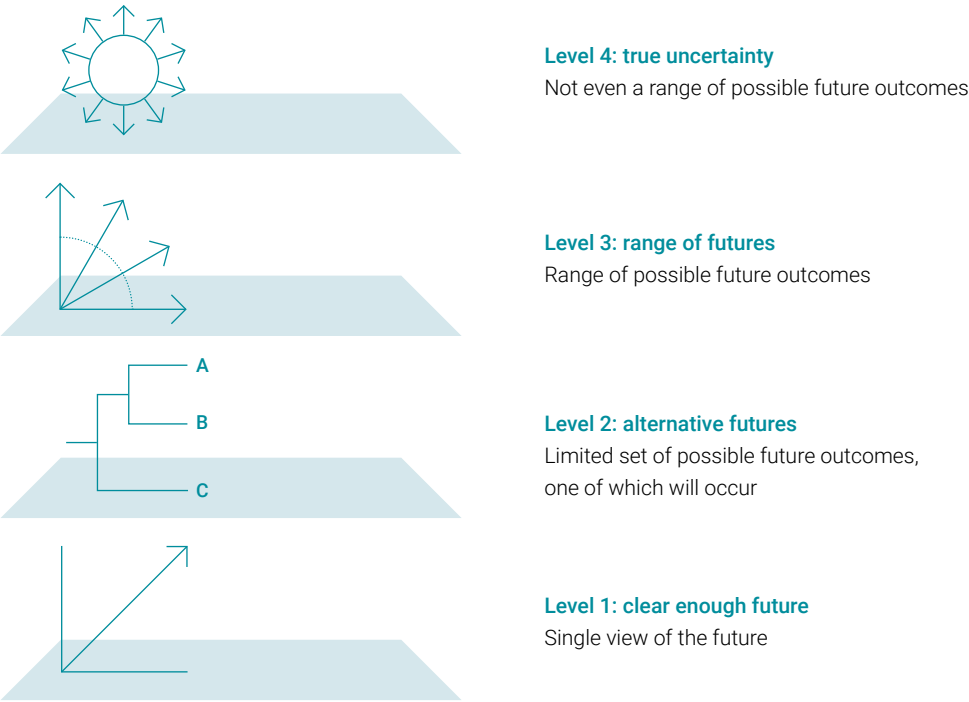


Figure 1. Levels of uncertainty (Courtney et al., 1997)

Level 3 (and higher) concerns deep uncertainty. It applies to events that are suspected to be likely, yet when, how, or with what consequences they will occur remains unclear. At this level, probabilities cannot be reliably estimated, and causal relationships tend to be non-linear, producing unexpected or cascading effects. This level of uncertainty is illustrated by the analysis *Decoding the crises of today and anticipating the threats of tomorrow*, as presented in the Niinistö report. Next to the situations described by Niinisto, examples of level 3 include the outbreak of a new pandemic or a sudden (other) geopolitical shock.

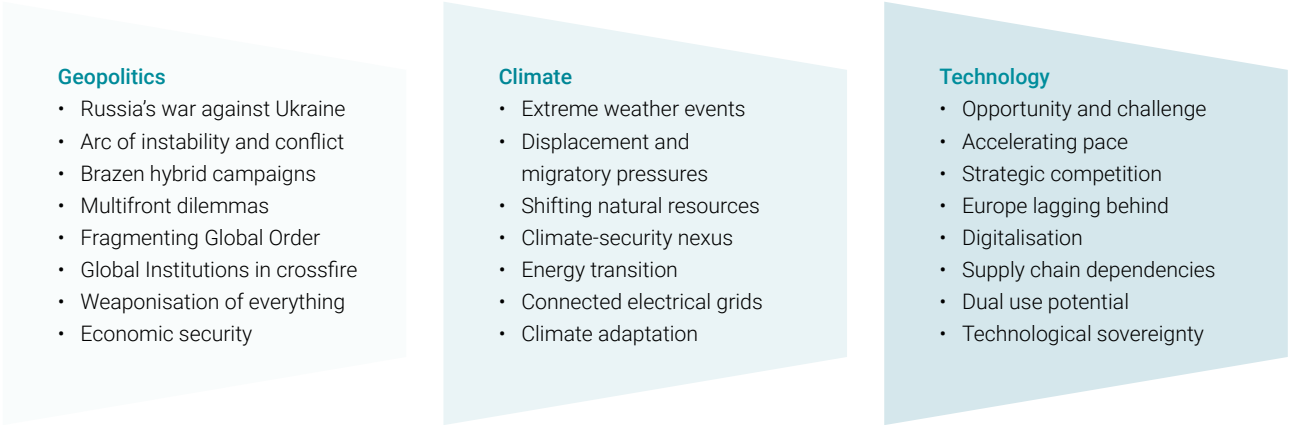


Figure 2. Macro-level shifts transforming the EU's risk environment (Niinistö, 2024)⁹

Level 4 refers to fundamental uncertainty. One may be able to imagine a future situation, but it is impossible to determine if, how, or when it might happen. Its plausibility cannot be assessed, and causal mechanisms are unknown or unknowable. It is domain of the possible.

Strategic foresight is particularly relevant at level 3 (and higher).¹⁰ In such contexts, traditional forecasting is no longer sufficient, and organisations must explore plausible but uncertain developments to prepare for a range of outcomes. Foresight tools – such as scenario development – help to create cognitive grip on ambiguity and complexity, enabling more resilient strategic thinking.

Grey rhinos¹¹

In foresight practice, grey rhinos represent possible and plausible disruptive events that are highly probable and visible yet still neglected on a systems level.

The apparent danger of grey rhinos lies not in their invisibility or our incomplete knowledge, but in the structural tendency of institutions to downplay or postpone responses.

A grey rhino is a threat that, in principle visible, moves slowly but steadily, gaining force over time. Its trajectory is widely recognised, but because the precise timing, location, or impact cannot be known, it is often ignored until it is too late. The institutional inattention towards the possible Grey Rhino-event, makes them strategically dangerous: they are known in principle, but collectively avoided in practice of preparing for those occurrences.

Examples are plentiful. The 2008 financial crisis followed years of warnings about unsustainable credit markets. Brexit was preceded by decades of political signals. The Russian invasion of Ukraine was the culmination of tensions visible well in advance. Even the rise of generative AI fits the pattern: its disruptive potential was evident, yet preparation lagged behind adoption.

For universities, grey rhinos may appear in areas such as demographic shifts in student inflow, climate impacts on campus infrastructure, or changing geopolitical conditions for international collaboration. Foresight helps to treat grey rhinos not as background noise but as critical uncertainties, bringing them into structured dialogue and scenario testing.



2.2

The organisation as a complex adaptive system

The organisational context in which strategic foresight takes place significantly influences how it can be used effectively. In multinational corporations, a centralized, more or less top-down approach is often feasible. The opposite is typically true for universities – environments defined by distributed authority, academic freedom, highly autonomous professionals and faculties.

Viewed as a *complex adaptive system*, the university reveals characteristics such as high actor autonomy, inherent tensions between administrative and academic arenas, and the frequent emergence of unpredictable, bottom-up developments. Strategy development takes place in a polycentric setting, through a loosely coupled network of interactions rather than a single hierarchical chain. Faculties, departments, and professional support units all engage in their own strategy and policy processes, often shaped by their own discipline-specific external environments.¹²

The distributed nature of the organisational environment implies that foresight has to involve multiple systemic anchors: directed both at the university as a whole and at its components, such as faculties, departments and professional support. Faculties and departments in particular – partly because of their broad disciplinary spread – position themselves differently in their strategic environments. In this organisational context, strategic foresight is a function that must relate to both the central organisation and the distributed reality of university strategy development.¹³

2.3

External critical dependencies as a perceptual framework

A third principle on which the DSFA rests is the explicit identification of the necessary and sufficient external conditions that determine the functioning of the organisation as a whole. This approach is derived from *The External Control of Organisations: A Resource Dependence Perspective* (Pfeffer & Salancik, 1978) which argues that organisations have only limited control over their key dependencies – and must continuously adapt to external dynamics in order to maintain access to critical resources, partnerships, and infrastructure. This makes an external focus even more urgent.¹⁴

This perspective plays a guiding role in how TU Delft's strategic foresight approach is structured. The corresponding framework provides an overview of these dependencies and serves as a conceptual tool for mapping developments in TU Delft's strategic environment. It also forms the logical basis for constructing reference scenarios and developing testing frameworks.

By focusing on necessary and sufficient conditions for organisational functioning, foresight trajectories gain direct organisational relevance and become more compelling from a policy perspective. The taxonomy of these conditions also offers a set of selection criteria for identifying external signals and trends in the university's environment that is closely linked to the organisation. The choice to use critical system dependencies as the foundation for foresight is closely aligned with its purpose: to strengthen the university's strategic preparedness.

Without such a reference point, the identification and interpretation of signals would lack direction and clarity. An explicit taxonomy ensures that foresight outcomes are more transparent, as well as more testable and falsifiable.

2.4

The status quo as a plausible future

A fourth principle is that strategy and policy (almost) never start from scratch. There are always existing ideas and assumptions – often implicit – about what is seen as normal, desirable, or feasible. If these assumptions remain unexamined, they can unintentionally shape decisions and narrow the range of considered options. For example, the claim that population ageing will lead to a structural labour shortage in the Netherlands carries several implicit assumptions: it overlooks potential shifts in labour migration, changes in the scale of the economy itself, or the growing role of AI in automating tasks.

In the DSFA, the status quo is therefore explicitly recognised as a reference point – as the baseline from which assumptions are tested and challenged. This helps to prevent a cognitive lock-in and keeps the door open for alternative directions.



Figure 4.7 Principles framework

It is also important to recognise that an existing situation is not necessarily well understood. The foresight approach facilitates a deeper understanding of the status quo. The status quo is treated as one of the possible futures: a plausible scenario. At the same time, this acknowledges the status quo for what it is: a contingent outcome of many interwoven circumstances – one that could easily have turned out differently. In that sense, the status quo becomes a scenario in retrospect.

Approaching the present situation in this way also prevents the assumption that the future must resemble the present. By recognising the status quo as a fundamental starting point, the realism and credibility of applying foresight are strengthened.

2.5

Falsification as a critical testing principle

The fifth DSFA principle is based on the falsification principle developed by Karl Popper. He argued that the value of a scientific theory should be measured by the extent to which a theory can be refuted, not by the extent to which it is confirmed; which implies that a theory that can specify very concretely when a particular event will occur – and thereby rules out a larger number of options – is preferred over a theory that cannot provide this degree of precision: 'the more a theory forbids, the better it is' (Popper, 1959).^{15 16}

By analogy with this idea, 'plans' in the DSFA are treated as hypothetical propositions or theories for solving complex organisational problems. Strategy and policy development serve a broader function of organisational problem solving. These policy theories often contain implicit predictions about the direction in which the organisation aims to move.

This is where DSFA becomes relevant. When testing an organisation's resilience and strategic preparedness, the goal is not to seek confirmation of a strategy or policy direction – that would be of quite limited value. The aim is to understand under what conditions a strategy is likely to fail, which assumptions within the plan lead to that vulnerability, and whether an alternative strategy or policy would be more resilient under those conditions. This is about making continuity assumptions explicit.

In DSFA, scenarios therefore serve the purpose of falsifying or trying to refute key strategy or policy statements: they act as contrast fluid to illuminate the status quo. This aligns with the Seven Provocations Method developed by the Copenhagen Institute for Futures Studies, which formalises provocation as a structured foresight practice to challenge continuity assumptions.¹⁷

The language in which many strategic plans are formulated is often quite abstract and sometimes opaque. Combined with qualitative and normative phrasing, such formulations tend to evade direct falsification, can be interpreted as 'true' under almost any circumstance, and are thus effectively immune to refutation.¹⁸

2.6 Cognitive biases as a factual reality

The sixth DSFA principle holds that cognitive biases are not only a given at the individual level of judgement. They are also embedded in the cultural structure of the organisation, as Mary Douglas outlines in *How Institutions Think* (Douglas, 1986). Collective thinking within organisations therefore is far from neutral. It is shaped by classification systems, habits, and routines developed over time. These often serve as implicit selection mechanisms for what is perceived and what is deemed acceptable to recognise as a relevant signal.¹⁹

Cognitive distortion is therefore a systemic feature. The way signals are processed is influenced by internal cultural patterns. These patterns also shape how an organisation positions itself within its strategic environment, and to what extent it is able to respond in time – or instead cognitively shuts itself off from external developments.²⁰ For instance, the idea that AI could eventually deliver or support university teaching is often dismissed as undesirable, and therefore irrelevant, even though it may represent a relevant strategic signal.

Black buffalos

Metaphors such as black swans and grey rhinos are often used to describe strategic uncertainties that are either unexpected or foreseeable but largely ignored. The black buffalo points to a different type of challenge: problematic issues that are already visible inside an organisation but that remain persistently unaddressed. Unlike grey rhinos, which are external and uncertain in timing, black buffalos are internal, obvious, and ongoing.

The metaphor is deliberate. A buffalo is very large animal, common on the African savannahs, and if encountered impossible to overlook. Strangely enough, people may still avert their eyes out of discomfort or fear. Within organisations, encountered with such issues, this dynamic takes the form of institutional silence: raising certain concerns is seen as futile, too sensitive, or potentially risky. As a result, assumptions remain unchallenged and problems that are well known beneath the surface are left unresolved. Over time, such silences can harden into strategic risks.

For universities, black buffalos may, for example, include unresolved concerns around social safety, possible overdependence on international tuition income, or over-optimistic reliance on digital infrastructures. These issues are not hidden or unexpected; they are widely recognised but are rarely brought into open discussion. Precisely because they seem to be avoided, they can be more dangerous than completely unforeseen events.

Foresight can help to surface black buffalos by creating structured, psychological safe spaces for dialogue. By reframing sensitive issues as part of wider scenarios or dependencies, it becomes easier to discuss them openly and connect them to strategic choices. In this way, foresight does not only look outward to unpredictable futures but also considers the inner dynamics of the organization by – in safe ways – addressing very sensitive issues.



The report series *Omgaan met signalen* by the Netherlands School of Public Administration (NSOB, 2024) explores this in detail, including through an analysis of the Dutch childcare benefits scandal (*Toeslagenaffaire*), in which the distortion of perception and judgement had a systemic nature.²¹

The DSFA model acknowledges that cognitive biases play a significant role in planning and decision-making processes.

The DSFA model acknowledges that cognitive biases play a significant role in planning and decision-making processes. Strategic foresight, as described here, can contribute as a corrective mechanism to counteract unhelpful cognitive dynamics that might unintentionally result in one-sided judgement, such as confirmation bias, overconfidence bias, normalcy bias, or groupthink, all well-documented in the behavioural literature (Kahneman & Tversky, 1979; Kahneman, 2011).²²

In practice, this also means that participants need support to step outside of established ways of thinking. Building futures literacy is part of this. The DSFA therefore separates the introduction of a topic from the exercise itself: first a presentation is given to explain the context and concepts, and only a few weeks later is a stress test session organised. This staged approach gives participants time to reflect and prepare, which makes it easier to move beyond habitual perspectives. By keeping sessions closely tied to concrete university issues such as talent, funding, or digitalisation, discussions remain grounded and relevant. In this way, participants are better able to engage with uncertainty and foresight outcomes are more likely to gain ownership within faculties and professional services.

The DSFA is aimed at broadening the organisation’s strategic scope for action. Applying scenarios to existing situations, making assumptions explicit, and employing the principle of falsification all contribute to this goal.

2.7 Broadening the scope for strategic action as a goal

The seventh principle of the DSFA concerns its pragmatic value. Foresight is not a non-committal thought exercise, but should serve to facilitate and strengthen the organisation’s strategic planning and decision-making.²³

The DSFA is aimed at broadening the organisation’s strategic scope for action. Applying scenarios to existing situations, making assumptions explicit, and employing the principle of falsification all contribute to this goal.

In this way, the DSFA helps to expand strategic thinking. By deliberately putting the status quo under pressure, the approach creates space for identifying alternative courses of action. Applying the principles as outlined here leads to transparent and critically testable outcomes that are translated into actionable outputs – such as foresight white papers – that can be used within decision-making processes.

These seven principles form the foundation of the DSFA. The next section describes its structure and functioning.

Foresight seminars & masterclasses

TU Delft Futures organises seminars and masterclasses to create open spaces for dialogue on topics such as geopolitics, strategic autonomy, or globalisation. These sessions bring together internal and external experts, as well as decision-makers, to exchange perspectives in real time.

Seminars are open and exploratory; masterclasses are more targeted, engaging leadership teams in structured foresight reflection. Both formats help normalise uncertainty as part of strategic conversations at the university.



Futures Seminar Samenleven in de Toekomst

External critical dependencies
Political stability & rule of law. A stable political environment and a reliable rule of law are essential conditions for knowledge development and international attractiveness. This includes predictability in regulations on migration, funding, and academic policies.
Funding. Stable and diverse sources of funding underpin high-quality research and education. This also covers related economic factors such as stable energy prices, construction capacity, and real estate for campus development and maintenance.
Talent. Universities depend on the availability of talented researchers, students, and support staff. This requires reliable frameworks for international mobility, accessible visa and residence procedures, housing, and public transport. Demographic trends at national and international levels directly affect future student intake.
Academic autonomy. Academic freedom and institutional autonomy safeguard independence and innovation in research and education. Protection against political or ideological interference is a necessary condition for academic integrity.
Trust in knowledge & academic institutions. Public trust in science and universities legitimises their role in society. This requires resilience against disinformation, anti-scientific movements, and growing societal polarisation.
Publication infrastructure. Access to internationally recognised publishing channels is vital for academic visibility, reputation, career development, and the ability to attract talent.
(Inter)national network participation. Collaboration in international and national partnerships with universities, industry, and government enables access to funding, exchange of knowledge, and societal impact.
Data & digitalisation. Universities rely on robust and secure digital infrastructures and effective data management. This dependency includes energy security and protection against cyber threats.
Artificial intelligence. Artificial intelligence is (becoming) a key condition for education, research, and operations. Dependence arises from access to expertise, computing capacity, and internal policies and ethical frameworks.
National & sectoral governance frameworks. Universities operate within external frameworks of regulation, quality assurance, and funding. These governance arrangements shape institutional autonomy, sectoral standards, and the state-granted right to award accredited degrees.
Climate & campus. Climate change and extreme weather events, such as floods or enduring heatwaves, directly affect the physical infrastructure and day-to-day operations of universities.
Public health stability. Stable public health is essential to keep education, research, and support functions running. Crises such as pandemics can disrupt these core processes abruptly and extensively.

3

Five levels

The seven principles outlined above provide the foundation of the DSFA. To make them usable in practice, they are translated into five levels that structure how foresight is applied in strategy and governance at the university.

The link between principles and levels is gradual rather than one-to-one. Deep uncertainty and the view of the university as a complex adaptive system guide the diagnostic work at the start of a foresight process. Awareness of cognitive biases, continuity assumptions, and the possibility of treating the status quo as a plausible future shapes the foundational work, where assumptions are made explicit. The futures level reflects the principle of broadening the scope for action, using scenarios to explore alternatives. Falsification becomes most visible in the testing level, where strategies are confronted with disruptive developments. Finally, the strategic options level reflects the overall purpose of foresight: creating a wider set of options for resilient and responsible decision-making.

In this way, the five levels translate the guiding principles into a practical sequence: moving from diagnosis to reflection, from alternative futures to testing, and finally to the generation of options that inform strategy.

The five levels are:

1. Diagnostic level
2. Foundational level
3. Futures level
4. Foresight testing level
5. Strategic options level

Deep uncertainty and the view of the university as a complex adaptive system guide the diagnostic work at the start of a foresight process.



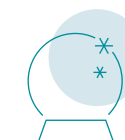
Diagnostic level

Assess the current context



Foundational level

Determine key assumptions



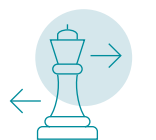
Futures level

Develop multiple scenarios



Foresight testing level

Challenge and refine strategies



Strategic options level

Identify courses of action

Figure 5. 5 Level approach

The framework has a dual structure. The five levels are logically connected, with one level presupposing the other. The levels can also be understood as process steps, with the results of one level being input for the next.

This dual structure draws inspiration from the Conway–Voros model of foresight-infused strategy (Conway, 2016; Voros, 2003). That model organises strategic thinking into four iterative layers: analysis, interpretation, prospection, and strategy. The DSFA builds on this structure but adapts and expands it into five levels specifically designed for the university context. In doing so, it provides both a logical architecture and a process roadmap for applying foresight in complex academic environments.²⁴

Field lab reports

Foresight Field Labs conclude with reports that synthesise outcomes of stress tests and scenario exercises. These reports highlight assumptions, vulnerabilities, and potential agenda points, ensuring that insights become part of institutional learning. In some cases, findings are developed further into a Foresight White Paper: a more elaborate exploration of scenarios and strategic options. These outputs provide a tangible basis for strategy redesign, supporting both decentralised reflection and central governance processes.

3.1 Diagnostic level

Foresight is not always equally relevant to apply; its value depends on the context. To determine under which circumstances it becomes particularly useful, we build on what was outlined under principle one concerning deep uncertainty. This refers to situations where existing knowledge is unreliable, where the behaviour of actors is difficult to anticipate, and where decisions must nevertheless be made. In such cases, conventional planning approaches risk overlooking vulnerabilities or blind spots, while foresight can open up space to question assumptions and explore alternative pathways.²⁵

Complex, not complicated problems

This distinction between suitable and less suitable contexts for foresight is also reflected in the Cynefin framework, which differentiates between complicated and complex situations (Kurtz & Snowden, 2003). In complicated settings, cause-and-effect relationships can be analysed and predicted with some confidence, making conventional tools sufficient. In complex settings, however, causality is unclear, change is non-linear, and multiple actors may interpret the situation differently. These are the kinds of ‘wicked’ problems where foresight provides added value by exploring plausible future dynamics and testing strategic assumptions under uncertainty.²⁶

Whether a topic is suitable for foresight analysis is therefore context dependent. The degree of deep uncertainty in the specific domain provides the basis for this assessment. Conventional risk approaches, such as Enterprise Risk Management, tend to assume stability and calculability, which limits their value in highly uncertain contexts.²⁷ A relevant set of critical dependencies, specific to the policy area, then serves as the observation grid for assessing these uncertainties.

How to assess uncertainty in practice

A number of heuristic questions are used in this process, such as:²⁸

How is the speed of technological development relevant to this policy domain assessed?	For example, if AI tools for education advance faster than expected, how would that affect teaching practices or assessment methods?
How is the robustness of the information and knowledge relevant to this domain evaluated?	Consider climate adaptation: are the available models reliable enough to guide long-term campus investments?
Are there unexpected developments in other countries related to this policy area?	For instance, if a neighbouring country suddenly restricts student visas, what impact might this have on international enrolment at TU Delft?
Are there multiple and strongly conflicting interests at play within this domain?	Think of housing policy, where municipal priorities, student demand, and real estate market dynamics may pull in different directions.
How is the degree of normative and social uncertainty surrounding the issue assessed?	For example, debates about academic freedom or responsible AI can shift quickly depending on societal values and political attention.

3.2 Foundational level

The foundational level aligns with the third principle: structural external dependencies as a foundation. These dependencies represent the necessary and sufficient conditions for the university to function – the baseline under which it can thrive. In an ideal-typical situation, they describe the status quo that enables continuity and performance. The foundational level forms the basis for the other levels of the framework: scenario building, the use of scenarios in foresight testing, the development of strategic action options, and the composition of the Strategic Monitor TU Delft.

Foresight, therefore, operates within a coherent ‘conceptual space’: its logic flows directly from the external conditions that must be met for a university to function and thrive. These foundational assumptions are consistently translated into the other components of the framework, ensuring internal coherence. Importantly, the dependencies identified here are not treated as fixed truths. They are subject to critical examination and can be revised – in line with the principle of falsifiability that underpins the DSFA. This means the framework itself remains open to learning and improvement over time.

Perception of signals

As noted earlier under principle six, many organisations struggle to absorb and make sense of external signals – this applies to universities as well. Their internal dynamics are often so dominant that developments within the organisation obscure awareness of what is happening in the outside world. This carries the risk that the organisation develops a kind of strategic myopia. Foresight, with its strong outside-in orientation, tries to serve as a counterbalance to this tendency.

Conventionally, external scanning is approached through frameworks such as the PESTLE model, which structures attention across Political, Economic, Social, Technological, Legal, and Environmental domains. While useful as a sensitising device, PESTLE has limited explanatory power. The DSFA, by contrast, starts from the critical dependencies that determine the functioning of the university and uses these as a structured filter for assessing external developments. This makes it possible to connect observations directly to the systemic conditions for continuity, rather than producing a neutral inventory of signals.²⁹

Thus, the approach advocated in this paper starts from the recognition that perception is not a neutral activity but is theory- and value-laden. By explicitly working with the external dependencies that largely determine the existence and functioning of the organisation, the framework for organising observations is made as transparent as possible. It is not a static structure: it is open to falsification and subject to revision.

Strategic Monitor TU Delft

The Strategic Monitor TU Delft translates structural external dependencies into a concrete framework for observation and interpretation. It provides a structured lens to identify and interpret external developments that may affect the university's long-term future. These dependencies form the conceptual and empirical foundation of the monitor, ensuring that it operates within a foresight-informed logic and is anchored in the university's actual conditions for continuity.

The guiding question is simple yet powerful: Which external developments are putting a structural dependency under pressure, or risk becoming disruptive, and why?

By treating dependencies as observational lenses, the monitor captures a wide range of signals without becoming arbitrary. This prevents an "anything goes" approach and ensures that signals and observations translate into meaningful strategic insights. When increasing pressure around these dependencies emerges, this functions as an early warning – prompting the organisation to pay closer attention and consider strategic responses.

3.3

Futures level

The Futures Level builds on the third and fourth principles: using structural external dependencies as a foundation and treating the status quo as a plausible future. These dependencies define the critical conditions the university relies on, while the status quo reflects how those conditions currently hold. Together, they form the starting point for exploring a range of 'what if' scenarios: plausible alternative futures in which these conditions may shift. This also supports the seventh principle – broadening the organisation's strategic scope for action through structured imagination.

At the core of the Futures Level is the construction of scenarios that are relevant and useful for the organisation.³⁰ Their relevance is ensured by their direct connection to the structural dependencies. These dependencies are not static: they are exposed to external pressures and marked by uncertainty about how developments will unfold. They represent the critical conditions for the university's ability to function, and can therefore be treated as a collection of critical uncertainties.

Within the conceptual space of the DSFA, structural dependencies are used as structural uncertainties, in line with conventional scenario-building. This makes it possible to develop general yet realistic reference scenarios for the organisation, consistent with the framework's foundations.

Assumptions as foundations

A plan or vision is the visible part of a strategy or policy. It is usually supported by implicit assumptions. There is a visible superstructure and a base that remains largely out of sight – comparable to a city like Venice or Delft built on piles.

Most attention goes to the visible part, while the assumptions on which it rests – and whose continuity determines whether the plan can succeed – are often taken for granted and remain outside the field of vision.

At the foresight testing level, the central task is to identify, analyse, and deliberately put these assumptions under pressure. They are confronted, through what if scenarios with different plausible futures, with the key question: will these foundations remain strong enough even under stressful or adverse conditions?

In this way, basic assumptions are systematically tested, providing not only insight into the relative current and future strength of plans but also the point of departure to develop adaptive strategic options when needed.



Delft built on piles

3.4 Foresight testing level

This level operationalises the falsification principle and the principle of treating the status quo as a plausible future.³¹ Its core task is to critically test existing strategies – or ideas that may evolve into strategy – to determine whether they are sufficiently resilient across a range of possible future scenarios.^{32 33}

At this stage, many of the elements from the earlier levels come together in a systematic way. Scenarios are developed on the basis of the university’s structural dependencies, after which the status quo is exposed to pressure using these structured imaginations of the future. This level therefore represents the operational core of the DSFA, while the preceding levels provide the necessary groundwork.

Scenario Playbook TU Delft

The Scenario Playbook TU Delft is a practical translation of the DSFA- principles. Structural dependencies – defined as the conditions that largely determine the university’s ability to function and flourish – are treated “as if” they are also strategic uncertainties. Therefore, each dependency can be expressed as an axis with opposing poles (for example: stable versus unstable funding).

By combining two such axes, a 2x2 matrix of scenarios emerges. Each quadrant represents a distinct and plausible configuration of the university’s strategic environment since it is anchored in the identified structural dependencies. From here, “what-if” narratives are developed: reasoned and captivating storylines that illustrate how the university might operate if these conditions shift in unexpected or disruptive ways.

These scenarios are surely not forecasts or predictions. Rather, they function as reasoned imaginative stress tests. One of the quadrants often reflects the current situation or status quo, while the other three provide contrasting alternatives. In this sense, these scenarios act as a kind of contrast fluid: they highlight the hidden assumptions underpinning the status quo and expose their potential fragility when tested against alternative futures.

Technically, this approach makes it possible to assemble sets of archetypal scenario examples that are directly useful and applicable within the organisation. Faculties and professional services can draw on these examples to explore vulnerabilities, strategic options, and possible ways forward, always anchored in the systemic conditions that matter most for continuity and flourishing.

To assess the strategic preparedness of a strategy or policy proposal, five resilience criteria are applied: continuity of primary processes, safeguarding academic autonomy, strategic agility, operational robustness, and value alignment and legitimacy. These criteria test how well a current strategy holds up when confronted with the scenarios constructed at the Futures Level. Their further elaboration and operationalisation are provided in Appendix B.

How to build what-if scenarios

- 1. **Select two critical dependencies** – for example funding and talent.
- 2. **Formulate extremes** – express each as two poles, such as stable vs. volatile funding and talent abundance vs. talent scarcity.
- 3. **Cross the axes** – combine them into a 2x2 framework with four possible futures.
- 4. **Write what-if narratives** – for each quadrant, create a short storyline, e.g. “What if funding is stable but talent is scarce?”



Three types of outcomes

Applying the aforementioned resilience criteria can roughly lead to three possible outcomes:

- 1. **Robust:** The tested strategy or policy proves to be (sufficiently) robust under various future conditions.
- 2. **Repair:** The test reveals that certain parts of the strategy or policy require adjustment or repair.
- 3. **Redesign:** The foresight stress test leads to the conclusion that a redesign of the strategy or policy is necessary.

In addition, foresight exercises may also serve an agenda-setting function: they can highlight emerging issues or vulnerabilities that may not yet be addressed by existing strategies, but which require attention in order to prepare for the future. If promising strategic implications emerge from the foresight testing process, this may lead to a follow-up in the form of a Foresight White Paper. The next section outlines how such output is developed within the final level of the DSFA.

Strategic options level

The Strategic Options Level builds on the principle of pragmatic focus: broadening the organisation’s strategic scope for action. When a foresight stress test indicates that a redesign of a particular strategy or policy domain is necessary, this level is used to identify and develop the available options.³⁴

The considerations that led to the conclusion that change is required provide essential input for shaping alternatives. To generate these options, the process draws on the external structural dependencies and the scenarios constructed on their basis. These dependencies and scenarios serve as the starting point for distinguishing alternative directions in which a given strategy or policy area could evolve.

Through this process, the organisation’s governance and policy action space is expanded. The Strategic Options Level therefore acts as a bridge between foresight stress testing and decision-making on how to further develop a specific strategy.

Evaluative aspects

The DSFA is not only a framework for developing strategy under conditions of uncertainty; it also provides a built-in way of evaluating strategy. Rather than producing one-off scenarios or stress tests, the approach embeds continuous reflection and review into the strategic cycle. This makes it possible to assess whether existing policies remain robust as conditions change, and to adapt strategies accordingly.

Foresight white paper

Within the DSFA, the exploration of strategic options can lead to the creation of a Foresight White Paper. Such a paper functions as a quick scan: it does not fully elaborate every possible alternative to act, but it provides essentially a structured overview of assumptions behind different strategic options.

A Foresight White Paper typically identifies the critical dependencies and relevant external developments connected to a specific strategy or policy domain. It presents plausible scenarios, outlines alternative strategic directions, and proposes potential courses of action. At the same time, it highlights boundary conditions, possible challenges, and the implications of different choices.

What makes the White Paper valuable is its role as a decision-support tool. Again, it does not aim to predict or prescribe a single pathway but offers a structured basis for reflection and debate. By synthesising scenarios, assumptions, and options, it helps decision-makers navigate possible redesigns of strategies or policies in a complex and highly uncertain environment.

Developing a White Paper also marks the completion of a full DSFA cycle. From there, the process may continue or restart with new questions or scenarios. Foresight therefore is by nature iterative: once a White Paper has been developed, its findings often trigger new questions, highlight emerging uncertainties, or suggest additional areas for testing.

Organising foresight

This final chapter outlines how strategic foresight has been established and structurally embedded at TU Delft. For peer institutions, this may offer useful insights when considering the development of similar capabilities.³⁵

The approach described in this paper is also the outcome of a decision by the TU Delft Executive Board in 2023, supported by broad consensus within the academic community, to develop a dedicated strategic foresight function within the university. The immediate trigger was a strategic reflection following the COVID-19 crisis (2020–2022), which raised the question: *Are we resilient enough? How can TU Delft strengthen its ability to anticipate, to be better prepared for future systemic disruptions?*

In response, the advisory report *Navigating Complexity: Towards a Strategic Foresight Initiative TU Delft* was published in spring 2023. It addressed the question: *How can universities adopt more flexible and adaptive approaches to strategy development?*

Legitimacy

The advisory report that ultimately led to the decision to establish a strategic foresight capability was grounded in empirical input from a broad series of interviews with (inter)national experts and internal and external stakeholders. This exploratory phase aimed to assess whether foresight would be seen as valuable and relevant. Without such preparatory work, the initiative would likely have been perceived as a top-down intervention. The design also drew on local, ad hoc foresight and scenario experiences already present within the university, as well as academic expertise embedded in the organisation and transmitted through education to future engineers.

Foresight interviews

Foresight Interviews capture expert perspectives from academia, policy, and industry on long-term trends and uncertainties. Published on TU Delft’s innovation platform Pioneering Tech, they offer an accessible format to deepen reflection on geopolitics, research policy, and institutional resilience.

Through structured conversations with experts such as Haroon Sheikh (WRR-Netherlands Scientific Council for Government Policy), Joep Roet (Neth-ER), and Koen Petersen (Dutch Senate), these interviews open windows to external thinking while connecting back to the challenges of higher education and innovation at TU Delft.

The body of literature on setting up foresight capabilities in academic institutions is still limited. A notable exception is the work of Maree Conway, whose publication *Foresight Infused Strategy – A Guide for Using Foresight in Practice* (2016) served as a particularly useful resource. A key insight from Conway is the importance of starting small and avoiding a ‘central rollout’ model. At TU Delft, the Executive Board strongly supported the initiative – an essential precondition – but this alone would not suffice. Universities function as professional organisations with specific features that require a more nuanced approach.

The title of the report – *Navigating Complexity* – encapsulates both the problem and the proposed solution. The proposal to structurally embed strategic foresight is not itself a foresight issue, but rather a question of organisational change. Lasting impact depends on a form of embedding that is both accepted and structurally grounded.

Reference framework

The design of foresight at TU Delft is rooted in the basic organisational characteristics of universities as complex adaptive systems. This implies, for instance, high levels of academic autonomy, a wide diversity of behaviours and goals, and polycentric strategy development.

Complex Adaptive System	Explanation
Non-linear and loosely coupled processes	Processes within universities are non-linear and consist of loosely coupled systems. Actions and outcomes are not always directly predictable or correlated. This creates flexibility, but also leads to complexity in governance and decision-making.
Academic citizens as autonomous actors	Academic professionals act as highly independent and autonomous agents. Their primary affiliation often lies with their academic discipline and international peers, rather than with the university as an organisation.
Variety in goals and behaviours	The autonomy of academic professionals results in a wide range of individual goals and behaviours within the university, which are not always aligned – and may even be in tension with one another.
Professional services	Members of professional services are highly educated and claim their own operational autonomy.
Emergence of ideas and initiatives	Because actors in university systems are intelligent and possess high learning capacity, unexpected and innovative ideas and initiatives frequently emerge. These emergent phenomena increase system complexity.
Polycentric decision-making	There is no single body that has full control over decision-making within the university. Instead, decision-making is polycentric: various autonomous actors take their own decisions daily at micro or meso level, resulting in a decentralised governance structure.

Figure 6. Complex Adaptive Systems³⁶

As a result, strategy within universities does not reside at a single central level. To structurally enhance preparedness, the design of the foresight capability must reflect this distributed nature. Strategic foresight services need to be case-sensitive, attuned to the diverse contexts in which faculties, departments, collaborations, and professional support services operate.

Principles foresight service-model

Effective implementation of foresight hinges on broad engagement within the academic community. Foresight must not become a theoretical or isolated exercise. The foresight function at TU Delft has been built on the following design principles:

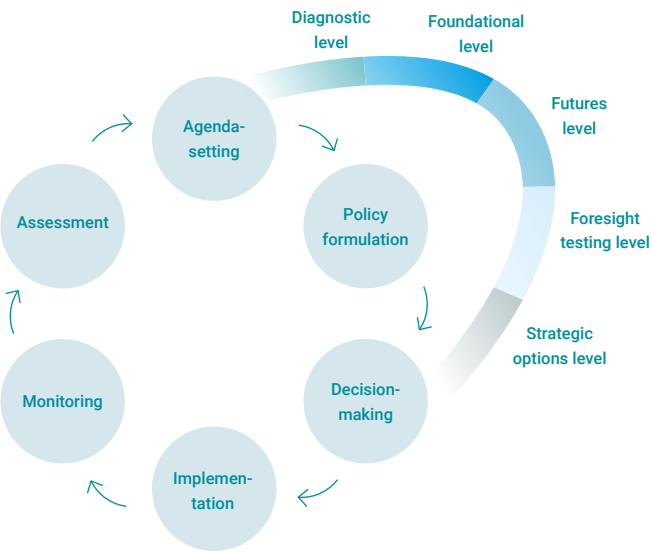
- demand- and need-driven
- user-centric
- connected to relevant academic expertise
- based on internationally proven foresight methods
- focused on building a strategic foresight community
- committed to product and service quality

Enriching the policy cycle with foresight

The classic policy cycle moves from agenda-setting to preparation, decision-making, implementation, monitoring, and evaluation. It provides a structured rhythm for governance, but it assumes that conditions remain relatively stable. In today's environment of deep uncertainty, that assumption no longer holds.

The Delft Strategic Foresight Approach (DSFA) adds an extra loop to this cycle, situated between agenda-setting and decision-making. This loop consists of five foresight levels: diagnostic, foundational, futures, testing, and options. Together, these levels provide a structured way to explore uncertainties, stress test continuity assumptions, and generate alternative strategic directions before decisions are taken.

By embedding foresight in this way, policy development is no longer a linear sequence, but a process enriched by anticipation and reflection. The foresight loop allows strategies to be tested against disruptive futures, making policies more resilient and adaptive. Monitoring and evaluation then feed back not only into the next cycle, but also into foresight activities, ensuring that learning and anticipation are continuously connected.



Classic policy cycle & DSFA levels

Paraphrasing the *School of International Futures* (2021) and *Itonics' Ultimate Guide to Strategic Foresight* (2024), the following elements were identified as essential for a functioning foresight ecosystem at TU Delft:³⁷

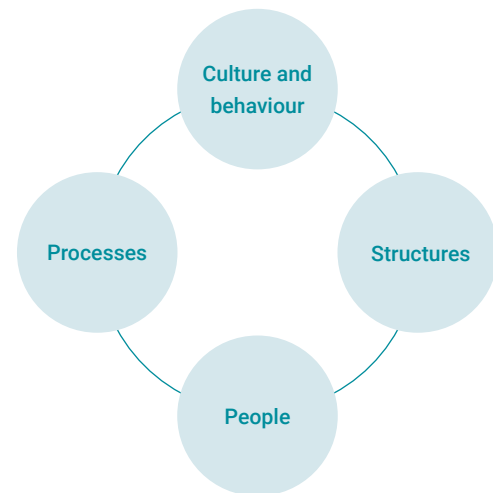


Figure 7. Principles foresight service-model³⁸

People

- Build a strong foresight team and network
- Ensure in-house capacity and skills
- Encourage adaptability and flexibility within the team
- Train new foresight practitioners
- Cultivate visible foresight advocates
- Support and connect foresight practitioners
- Involve internal and external experts
- Actively engage internal stakeholders

Structures

- Identify a central incubator function for foresight
- Build capacity in faculties and services
- Create coordination mechanisms
- Use established tools and frameworks

Culture and behaviour

- Secure leadership commitment
- Focus on fostering buy-in
- Involve decision-makers in foresight processes
- Support near-term priorities with long-term thinking
- Generate shared ownership

Processes

- Work university-wide across domains
- Deliver regular outputs
- Apply diverse methods and perspectives
- Invest in continuous foresight research
- Systematically evaluate impact

Implementation

The Strategic Foresight & Innovation unit was launched within the Strategy Development directory (SD), which acted as an incubator.³⁹ This partly involved reprioritisation within SD, including the reallocation of existing capacity and vacancies. This pragmatic choice enabled the team to reach critical mass quickly, to build on existing institutional knowledge, and to experiment effectively with what works and what doesn't in a complex adaptive system like TU Delft. The set-up was intended as a breeding ground rather than a permanent central unit, while also recognising that a fully decentralised, purely demand-driven model would not be effective.

The team was trained in the use of foresight tools through internal and external sessions, including by leveraging in-house academic expertise. Embedding the unit within SD also enabled immediate access to internal networks and information flows.

Explorative foresight publications

Beyond short updates, TU Delft also develops longer-term explorative studies. These publications address issues too uncertain for conventional planning but too important to ignore, such as the futures of engineering education or the future of academic work and organisation

By articulating possible long-term shifts, they offer horizon perspectives that extend beyond immediate strategy cycles, helping TU Delft (and others) position itself in an evolving academic and societal landscape.

From the start, it became clear that a purely demand-driven approach was insufficient. Many stakeholders do not see 'doing strategy' as part of their core responsibility. This partly shaped the development of the DSFA as a pragmatic method aligned with decentralised needs around strategy and decision-making.



The Changing Futures of Engineering Education 2025

As previously noted, applying strategic foresight to the organisation itself – and making it a structural element of strategic governance – remains relatively new in the academic world. Doing so requires changes in institutional thinking: re-examining dominant assumptions and habitual perspectives. Effective implementation depends on creating broad acceptance and avoiding isolation of the foresight function.

Strategic foresight supports the identification of uncertainties and associated risks as the university’s first line of defence. At institutional level, foresight scans the horizon and advises the Executive Board accordingly. In turn, this expertise is shared with faculties and services that retain their strategic autonomy.

Decision-maker engagement

Experience at TU Delft shows that foresight has the most impact when decision-makers are actively involved throughout the process. This is not an afterthought, but a core design principle of the DSFA and of the Foresight Field Labs. Each lab is initiated and co-owned by the relevant leadership, with decision-makers themselves participating in the dialogue.

Lasting impact, however, requires more than participation alone. Foresight insights contribute most to resilience when decision-makers also take responsibility for translating them into policy choices and follow-up actions. This underlines the importance of connecting foresight to the policy cycle, so that its outputs are not left as isolated reports but feed into agenda-setting, preparation, and decision-making.

The three pillars of strategic foresight

Strategic foresight at TU Delft rests on three pillars:

- TU Delft futures
- Foresight field labs
- Exploration & innovation

TU Delft Futures focuses on activities and outputs at the institutional level. It includes regular foresight seminars and lectures, for example on geopolitical developments and their impact on the university. Foresight masterclasses have also been introduced on more specific topics, such as the Chinese higher education system. Additional formats include foresight briefings – short analyses of publications relevant to the university’s strategic dependencies – and the bi-weekly *Stay Tuned* bulletin.

Foresight briefings

Foresight Briefings are short, analytical notes on key publications or emerging developments that very plausibly affect TU Delft’s strategic agenda. They combine a concise summary with a reflection on strategic relevance, providing decision-makers with timely insights and context.

By capturing developments such as EU policy reports or geopolitical shifts, the briefings function as fast-response tools: they bridge external complexity and internal strategy in a way that is accessible and actionable. Recent examples include reflections on Mario Draghi’s report on European competitiveness and the Dutch Council of State’s annual report on democracy.

Foresight field labs focus on supporting strategic or policy development deeper in the organisation. Several decentralised labs have been organised, initiated by faculties or services. Others were initiated centrally by the Strategy Development Office and co-produced with relevant departments. A defining feature is their focus on real-world challenges that are critical to participants.

Exploration & Innovation includes more long-range and experimental activities. Examples include the *Futures of Engineering Education towards 2050* report and its planned follow-up on *Futures of Academic Work and Organisation*. This domain also translates political developments into institutional foresight, such as work on Open Strategic Autonomy and resilience-related initiatives. Training facilities for foresight and strategy development are also being developed under this pillar.

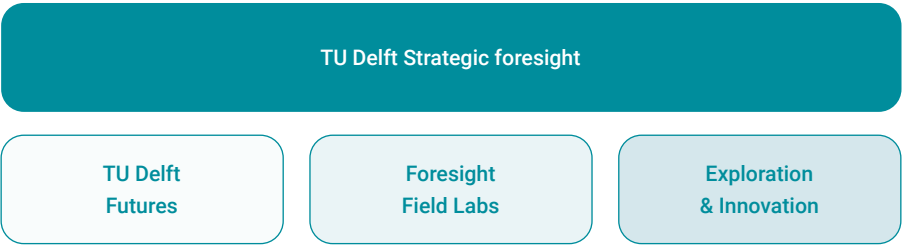


Figure 8. Title

Stay Tuned bulletin

Stay Tuned is a bi-weekly internal newsletter that keeps colleagues informed of foresight products, external signals, and upcoming events. Its concise, regular rhythm makes it a lightweight channel for keeping foresight visible in everyday decision-making.

Each edition includes summaries of new interviews or briefings, links to relevant publications, and invitations to seminars or lectures. By translating scanning highlights into TU Delft’s strategic context, the bulletin helps sustain a shared awareness of uncertainty across governance and policy functions.

Strategic significance

The strategic environment for universities can change rapidly and profoundly, disrupting conventional approaches to strategy, policy, and governance. It also reminds us that universities are far from autonomous: they are deeply entangled with external developments.

In such a world, strategic foresight is not a luxury – it is an essential complement to conventional planning. It helps navigate the uncharted territories that universities increasingly encounter. As the OECD has observed, even small-scale foresight efforts can have disproportionate impact: ‘a little foresight goes a long way,’ especially when embedded structurally in decision-making rather than treated as a one-off exercise.⁴⁰

Open Strategic Autonomy (OSA) program

At the request of all the deans of TU Delft, an expert interview foresight method has been used to translate Dutch and European ambitions regarding Open Strategic Autonomy into actionable recommendations. As an internationally prominent University of Technology, TU Delft is pro-actively contributing to the reduction of virtually all technological dependencies through education, research and innovation.

More information can be found at the thematic webpage (tudelft.nl/osa) that contains, amongst other things, a position paper, and deep dives on AI, Quantum, Robotics, and Critical Raw Materials. You will find many examples of academic excellence that have high strategic relevance for the Netherlands and the EU.



TU Delft QuTech Quantum Laboratory

5

Looking ahead

The Delft Strategic Foresight Approach (DSFA) was developed as both a methodological framework and a practical tool for universities operating under conditions of deep uncertainty. It provides TU Delft with a structured way to explore plausible futures, test the resilience of strategies, and broaden the scope for strategic action. At the same time, the development and early use of the DSFA have generated reflections that extend beyond methodology. They point towards the next steps in building foresight as an organisational capability, and towards the broader role foresight could play in higher education.

Review and reflections

The first applications of the DSFA through foresight field labs have shown its value in practice. They helped make hidden assumptions visible, highlighted vulnerabilities in existing plans, and created space for alternative options. They also demonstrated that foresight could support both central governance and decentralised strategy processes at faculties and professional services. An additional value was that these sessions often played into the agenda-setting phase of strategy processes, helping to surface issues that might otherwise have remained implicit and ensuring they could be addressed at an early stage.

In this way, the DSFA has shown a dual function. On the one hand, it offers a practical method for critically testing strategies under uncertainty. On the other, it contributes to a cultural shift: encouraging the university to think more openly about uncertainty, to question continuity assumptions, and to engage with futures in a more systematic way.

Insights from external consultations

In developing and validating the DSFA, TU Delft also consulted external experts and peer institutions. These conversations brought forward perspectives that enrich the approach and provide additional directions for its use. They underline that foresight is not only about methods and tools, but also about the values, perceptions, and processes that shape how universities deal with uncertainty.⁴¹ These perspectives remind us that foresight is as much about organisational learning and culture as it is about analytical techniques.

Strategic perspective – outlook 2030

The next few years will be about further embedding foresight into the way TU Delft develops and implements strategy. The initial phase has been one of building capacity, piloting methods, and testing added value. The next phase will involve broader integration across faculties and professional services, developing common practices, and ensuring that foresight is linked to decision-making at different levels of the organisation.

This further development will also build on a growing portfolio of outputs and methods. The Strategic Monitor, the Scenario Playbook, and the Foresight Field Labs have already proven their relevance, and their regular use will help to anchor foresight in daily practice. Together with foresight briefings, interviews, and explorations, they form the instruments through which foresight will gradually mature from an emerging practice into an established function.

Looking further ahead, TU Delft aims to extend the use of foresight beyond its own institutional context. The approach developed here has the potential to be applied more broadly, and the university is exploring how it can be offered as a service to other organisations. In the coming period, TU Delft will examine opportunities to set up pilot projects with peer universities and external partners. These pilots can serve both as experiments to adapt the Delft approach to different contexts and as a way to contribute to strengthening collective foresight capacity more widely.

The direction of travel is clear: to move from initiation and consolidation, towards integration and long-term institutionalisation. This is not a fixed endpoint, but an ongoing process of learning and adaptation. The development of foresight within TU Delft is expected to evolve step by step, guided by experience, reflection, and external exchange.

Closing remark

The DSFA is designed as a pragmatic method for testing strategies under conditions of deep uncertainty. Its significance, however, lies in more than methodology alone. It reflects the recognition that universities cannot rely solely on continuity assumptions or linear planning, but should actively prepare for alternative futures.

By continuing to strengthen and embed foresight, TU Delft is working towards a more resilient and adaptive organisational culture. This is not about predicting the future, but about being better prepared for whatever future may unfold. In doing so, TU Delft contributes not only to its own strategic preparedness, but also to the wider conversation on the resilience of universities and the role of foresight in academia.

This position paper is therefore both a description of a method and an invitation. It outlines how foresight is being built step by step at TU Delft, and at the same time it offers ideas and practices that may be of value to peer institutions. The further development of foresight will depend on shared learning, external exchange, and ongoing reflection. TU Delft looks forward to contributing to that dialogue in the years ahead.

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A

Field labs five steps

Level 1: Starting point

Identify whether foresight is the right approach and clarify the context

- **Exploratory conversation:** A short, informal meeting to discuss the potential relevance of foresight in a specific case. Participants are introduced to the concept of strategic foresight and the Delft Strategic Foresight Approach (DSFA). This helps align expectations, clarify the strategic context, and define the main policy or strategy question at hand.
- **Diagnostic assessment:** Using the DSFA (based on levels of deep uncertainty), the SF&I team assesses whether foresight is a suitable method. If uncertainty is high, a stress-test becomes a meaningful next step.
- **Initial research:** The foresight team conducts a light-touch analysis of the unit's existing strategy or policy framework, focusing on how it interacts with TU Delft's 12 critical dependencies (e.g., talent, funding, academic autonomy).
- **Foresight presentation:** If useful, a compact foresight introduction session (60 minutes) is organised for a broader group of participants to explain strategic foresight, DSFA principles, methods, and what to expect from the process.

Level 2: Scoping

Define the test question, identify key dependencies, and prepare tailored scenarios

- **Starting point:** stress testing the current strategy: Unless agreed otherwise, each Field Lab begins with a Policy Stress Test of the current strategy or plan. This helps establish a common reference point and assess whether the existing approach holds up under pressure before considering further steps.
- **Defining the scoping question:** Together with the participants, the precise strategic or policy challenge is identified: What is it we want to test? This often involves surfacing hidden assumptions behind current strategies or priorities.
- **Mapping critical dependencies:** Based on the initial conversations and a review of the current plans, the SF&I team identifies which of the 12 critical dependencies are most relevant at this moment for the specific context. These form the starting point for understanding where potential vulnerabilities may lie.
- **Developing 'what if' scenarios:** The team designs 2–5 plausible yet disruptive 'what if' scenarios based on combinations of stressed dependencies. The scenarios are organisation-specific and built to provoke reflection without being implausibly dystopian.
- **Terms of reference:** Participants receive a short term of reference document ahead of the session. This includes a recap of the 12 critical dependencies, the key question for the Field Lab, and a brief overview of the setup and structure of the stress test workshop.

Foresight is not like a telescope looking far ahead, and it should be used as a magnifying glass: it helps zoom in on today's realities by viewing them through the lens of plausible tomorrows.

Level 3: Application

Examine the robustness of strategic plans under future disruptions

- **Scenario analysis:** During the workshop, participants are divided into groups. Each group works with one of the ‘what if’ scenarios. Using a guided template, they discuss questions such as:
 1. Which dependencies are under pressure, and why?
 2. What are the effects on education, research, staff, collaborations, and resources?
 3. Which implicit assumptions are no longer valid?
 4. At what point would strategic progress truly be at risk?
 5. What can be learned about the unit’s resilience, adaptability, or blind spots?
- **Resilience assessment:** Each group scores their scenario on five resilience criteria:
 1. Continuity of education and research
 2. Safeguarding academic autonomy
 3. Strategic agility
 4. Operational robustness
 5. Value alignment and legitimacyResults are entered into a scoring matrix to identify weak points and compare the resilience of strategies across different scenarios.
- **Plenary debrief & critical reflection:** Each group presents their findings. A facilitator acts as ‘critical friend’ to provoke deeper analysis, challenge blind spots, and surface concrete options.

Level 4: Conclusion

Derive key insights and outline initial pathways forward

- **Strategic reflection report:** SF&I prepares a concise report summarising key vulnerabilities, disrupted assumptions, and degrees of resilience. The report includes visual summaries (e.g., scoring matrices) and recommendations on whether to:
 - **Confirm the current strategy (robust)**
 - **Make minor repairs (moderately robust)**
 - **Redesign (fundamentally not robust)**
- **Internal review & discussion:** The report can be used to support further internal dialogue – within the faculty, support service, or at CvB level – about strategic next steps.

Level 5: Follow-up

Transform insights into concrete options and connect to formal decision-making

- **Follow-up terms of reference:** If the stress test reveals a need for redesign or further exploration, a new foresight track can be initiated. This is first agreed on and recorded in a follow-up term of reference. Such a follow-up process often leads to a Foresight White Paper outlining future-oriented alternatives.
- **White paper:** The white paper explores plausible future directions, outlines strategic risks and conditions, and presents action-oriented recommendations. This helps decision-makers engage with complexity without locking in prematurely.
- **Additional foresight methods (if needed):** If the Policy Stress Test does not provide sufficient insight or resolution, it is possible to apply additional foresight methods, for example, a SWOT-TOWS, backcasting, visioning or preliminary hindsight. These can help broaden the perspective or test new angles before moving to decision-making.
- **Learning loop:** After each Field Lab, SF&I organises an internal evaluation to reflect on what worked well, what could be improved, and how the method can evolve. This supports continuous learning and strengthens foresight as a capability across TU Delft.

B

Foresight stress test process

Goal of the session

With a foresight stress test, we investigate how robust strategic or policy plans are if external circumstances change drastically. Universities function well only if the basis of critical dependencies is stable, such as talent, funding, international cooperation, and digital infrastructure. These dependencies can come under pressure due to geopolitical tensions, new regulations, societal trends, or technological developments. The stress test helps to:

- expose vulnerabilities in the strategy
- make implicit assumptions explicit,
- identify alternative courses of action, and
- assess the adaptive capacity and resilience.

The results can be used to recalibrate the existing strategic course. However, it is also possible that the test shows plans are sufficiently robust and require no adjustment. The outcome can therefore range from a complete change of course to slight fine-tuning, or even confirmation of the existing strategy or policy.

Session setup

1

Introduction (15 min)

A brief introduction to the session's purpose: "You have a strategy or plan (or have an intention to do so). But what if the environment develops differently than expected or hoped? Which dependencies would then be affected, and what does that mean for the feasibility of your course, or for its sustainability?"

A short explanation of the Delft Strategic Foresight Approach (DSFA) is provided with focus on the purpose of foresight stress testing: to explore the resilience of plans by putting the continuity assumptions on which these rest under pressure.

We recommend that, prior to this session, a separate presentation of about one hour be organised to elaborate on the general approach of strategic foresight and the DSFA. During the session itself, this will only be briefly revisited as a refresher.

2

Stress testing steps (60 min)

2.1

Critical dependencies (5 min)

Participants receive an overview of the 12 critical dependencies. Some dependencies relevant to the department, faculty or specific issue at hand are briefly explained: why they are essential, and which developments could impact these dependencies. These dependencies might be used to help identify continuity assumptions later on in the exercise.



The assumption that the future could be considered as a linear continuation of the past is becoming increasingly untenable.

2.2

Stress test case (10 min)

The case at hand will be introduced briefly. Relevant background information on the history and context of the case is shared. The case will be described in a neutral way. Preferably a single central statement that is representing the case in the strongest way possible, is selected.

Example case:
"University X has launched an ambitious Digital Campus Transformation Programme to become a fully digital campus. In the next five years, it aims to move 40% of programmes online, integrate AI platforms for exams and tutoring, replace administration with cloud-based systems, and reduce physical campus space."

2.3

Identifying continuity assumptions (10 min)

A selection of continuity assumptions underlying the selected case are presented. A plenary exercise is intended to expand the selection of assumptions.

For example (relating to 2.2):

- Global cloud and AI platforms remain accessible, affordable, and reliable.
- Students and staff will trust and embrace digital technologies.
- International collaboration remains politically and technically feasible.
- Public funding for digitalisation remains stable.
- Cybersecurity risks can be managed without major disruption.

2.4

Selection for deeper testing (5 min)

A subset from the list of continuity assumptions is selected for deeper testing.

Example (relating to the digital campus transformation case):
From the broader set of assumptions identified, participants may select:

- "Global cloud and AI platforms remain accessible and affordable"
- "Public funding for digitalisation will remain stable"
- "Students and staff will embrace digital technologies"

These examples are discussed plenary to illustrate what is meant by continuity assumptions and why they matter. They also serve to select a small number of assumptions for deeper testing against the what-if scenarios.

2.5

Stress testing with what-if scenarios (30 min)

Confront in small groups the selected assumptions with a set of plausible what-if scenarios. These scenarios are deliberately constructed from combinations of multiple dependencies that support the organisational unit or policy domain. This creates pressure on multiple fronts simultaneously: a more realistic and complex picture than linear future projections.

Explore whether the assumptions hold under stress, or whether they fail. And: assess the organisational impact of assumptions breaking down for different domains (education, research, innovation, operations).

Each group applies one scenario guided by five targeted questions:

- Which dependencies are affected if one applies the what-if scenario?
- Will the selected continuity assumption hold under these conditions? If not, why not? If yes, why?
- What will likely happen if the selected continuity assumption will fail?
- What do you consider the three most vulnerable aspects of the plan?
- What would you recommend doing: stick to the original plan since it is considered resilient enough, repair since with tweaking the original plan is expected to weather storms or, the original plan should be redesigned?

To systematically analyse scenarios, a set of five resilience criteria is used. These are quantitatively assessed per scenario.

Nr	Criterion	Explanation
1	Continuity of education & research	What implications does the disruption have for the quality of core processes?
2	Safeguarding academic autonomy	What effects does the what-if situation have on academic professionals' freedom to express themselves and publish?
3	Strategic agility	To what extent is the university able to adapt timely to the described hypothetical circumstances?
4	Operational robustness	Is it practically possible to keep the university functioning under the described conditions (people, resources, systems)?
5	Value alignment and legitimacy	Is there tension between the values underlying the existing strategy and what is necessary to keep the organisation functioning under disruptive circumstances?

These criteria are scored per scenario on a scale from 1 (very weak) to 5 (very robust). This makes it possible to compare scenarios, identify vulnerabilities, and make targeted recommendations to strengthen the strategy.

Example table

Resilience criterion	Scenario 1	Scenario 2	Scenario 3	Scenario 4
1. Continuity of education & research	3	2	3	4
2. Safeguarding academic autonomy	2	4	1	3
3. Strategic agility	3	2	2	3
4. Operational robustness	2	3	3	3
5. Value alignment and legitimacy	2	3	2	4

'What-if' scenarios are chosen deliberately to retain a degree of realism despite their disruptive nature. Overly abstract or dystopian images provoke unnecessarily defensive reactions. Plausibility is needed to stimulate participants and encourage serious reflection on vulnerabilities and courses of action.

For example (relating to 2.2) Examples of what-if scenarios
The Digital Campus Transformation case was explored through four what-if scenarios.

Each scenario was constructed by crossing two critical dependencies, resulting in a disruptive but plausible storyline:

Scenario A	Political restrictions <i>Axes: Data & Digitalisation (high dependence) × Governance Frameworks (strict EU regulation)</i> Two years into the programme, the European Union imposes strict rules on the use of foreign-hosted cloud and AI platforms. Overnight, University X loses access to the systems that support teaching, research, and administration. Shifting to European alternatives is slow and costly. The university discovers how fragile its operations become when dependence on Big Tech collides with tight regulation.
Scenario B	Cultural resistance <i>Axes: Academic Autonomy (high autonomy) × Trust in Knowledge (low trust in digital systems)</i> Despite major investment, staff and students remain sceptical of digital learning. AI-based assessment raises concerns about fairness and privacy, and many miss face-to-face contact. Adoption of new platforms stays well below expectations; several faculties revert to traditional teaching. Morale declines, and talent retention becomes a problem.
Scenario C	Funding cuts <i>Axes: Funding (unstable public support) × National & Sectoral Governance (shifting political priorities)</i> A new government redirects higher-education budgets toward vocational training and regional development. Public funding for digitalisation is cut in half, but expectations for digital quality remain high. University X cannot deliver on its promises without cutting other activities. The digital transformation slows to a crawl, exposing how fragile ambitious plans are when funding shifts.
Scenario D	Cybersecurity crisis <i>Axes: Data & Digitalisation (vulnerable systems) × Trust in Knowledge (low public trust)</i> In the fourth year, a major cyberattack disables the university's online infrastructure for weeks. Exams are cancelled, classes disrupted, and sensitive student and research data leaked. Public trust collapses as students, parents, and politicians question whether the university can safeguard digital education. The entire transformation strategy comes under scrutiny.

3

Plenary feedback and reflection (45 min)

Each group presents their main findings in 5 minutes. This is followed by a joint reflection guided by a facilitator who acts as a critical friend. The facilitator poses sharp, disruptive questions to identify blind spots, challenge implicit assumptions, and work towards concrete courses of action.

The follow-up consists of compiling a report summarising patterns from the strategic reflection, a preliminary conclusion about the robustness of the existing strategy, and a recommendation from SF&I on the way forward (do nothing, repair, redesign).

C

Foresight white paper writing guide

Purpose of the document

This report is the outcome of a foresight stress test conducted as part of the Delft Strategic Foresight Approach (DSFA). It does not present a detailed strategy, but offers a well-founded exploration of the robustness of existing policies when confronted with plausible future scenarios. The emphasis lies on analysing underlying assumptions, identifying vulnerable dependencies, and mapping relevant external developments.

Depending on the context, the analysis may focus on specific policy objectives, or – when such objectives have not been explicitly formulated – on broader cross-cutting themes that consistently emerge during the sessions. These themes often highlight recurring issues that cut across different scenarios and can therefore serve as guiding anchors for reflection.

By systematically testing either objectives or themes against a set of hypothetical situations, the paper illustrates under what conditions current plans may come under pressure, and where adaptation or reinforcement may be needed. In doing so, it highlights not only risks but also alternative strategic directions and actionable options.

The primary purpose of the document is to support strategic dialogue and to help policymakers prepare for a range of possible futures. It marks the completion of a full DSFA cycle and serves as a foundation for further policy development, decision-making, or strategic reorientation.

Structure and length

Section	Target word count
Executive summary	300–400 words
1. Introduction	400–600 words
2. Method	600–800 words
3. Analysis	1500–1800 words
4. Future agenda	800–1000 words
5. Conclusion	400–500 words
Appendices	Optional

Total: approx. 4,000–5,000 words (excluding appendices)

Executive summary (300–400 words)

Purpose: Provide a concise overview of the rationale, approach, main findings, and policy implications of the foresight stress test.

- Strategic rationale
- Design of the stress test: who, what, how, how many and what type of scenarios
- Key findings
- Policy implications and next steps

1 **Introduction** (400–500 words)

Purpose: Set the stage and outline the central question.

- Strategic context: describe relevant external and internal developments that make this topic timely
- Focus areas: specify the main policy objectives or cross-cutting themes under review (typically 2–4)
- Problem statement: why test the robustness of these focus areas under different conditions?
- Purpose: clarify what the organisation aimed to achieve with this stress test

2 **Method** (600–800 words)

Purpose: Explain the foresight stress test approach and design.

2.1 **Foresight stress testing** (250-350 words)

- What is a foresight stress test? Brief explanation of the methodology.
- Why is this method appropriate for the given policy question?
- How is robustness assessed (e.g. colour coding, 1–5 scoring scale)?

2.2 **Process design** (250-450 words)

Composition of the project team and stakeholder involvement

Process structure (e.g. preparatory session, number and length of workshops)

Scenario selection and validation (typically 3–5 scenarios)

Scoring system and facilitation method (e.g. colour-coded or numerical matrix)

3 **Analysis** (1200–1500 words)

Purpose: Present findings from the stress test in a structured way.

3.1 **Results overview** (200–300 words)

- Summarise main outcomes and recurring patterns
- Highlight strengths and vulnerabilities across objectives or themes

3.2 **Scenario analysis** (600-800 words)

For each scenario:

- Brief description of the scenario and the central tension
- Impact on each policy objective (which objective(s) are challenged and why)
- Explanation of the scores: where does vulnerability or resilience arise?
- Broader implications (e.g. organisational coordination, political legitimacy, implementation feasibility)
- What does this scenario reveal about the organisation's strategic resilience?

3.3 **Policy objectives or cross-cutting themes** (500–600 words)

- For each objective or recurring theme:
- What insights emerge from the different scenarios?
- Which structural vulnerabilities or bottlenecks become visible?
- What appears to function well and why?
- What would be needed to strengthen robustness in this area?

3.4 **Implicit assumptions** (200–300 words)

- Make underlying continuity assumptions explicit
- Reflect on how these shape policy perceptions and vulnerabilities

4 **Future agenda** (800–1000 words)

Purpose: Suggest possible directions and areas for follow-up.

4.1 **Actions and improvements** (500–700 words)

- Define the challenge
- Explore potential responses or improvements
- Note strategic trade-offs or conditions

4.2 **Priorities** (200–300 words)

- Identify 3–5 follow-up questions or actions
- Explain their urgency or significance

5 **Conclusion** (400–500 words)

Purpose: Synthesize findings and propose recommendations.

5.1 **Summary conclusion** (250-300 words)

- What is the overall picture of policy robustness?
- What are the key strengths and weaknesses?
- What does this stress test reveal about the long-term resilience of the current approach?

5.2 **Recommendations** (150-200 words)

- Formulate 3–5 concrete policy recommendations
- Make them action-oriented, consistent with the analysis, and relevant for decision-making

Appendices (optional)

- Appendix A – Full scenario descriptions
- Appendix B – Detailed breakdown of policy or strategic objectives
- Appendix C – Raw results (workshop outputs)



The aim is to understand under what conditions a strategy is likely to fail, which assumptions within the plan lead to that vulnerability, and whether an alternative strategy or policy would be more resilient under those conditions.

D

Glossary of key concepts

Foresight⁴²

A structured and exploratory approach to engaging with uncertainty. Foresight supports organisations in testing strategic assumptions, identifying long-term risks and opportunities, and exploring plausible futures.

Explorative foresight

An approach to strategic foresight that focuses on developing scenarios and shared visions of possible futures. It often involves broad dialogue, participatory methods, and extensive reporting. The purpose is to expand perspectives and create collective awareness of long-term developments, rather than directly testing current strategies.

Analytical foresight

An approach to strategic foresight that emphasises the uncovering and testing of continuity assumptions. It is typically faster, more targeted, and directly linked to decision-making. Rather than producing visions of alternative futures, it focuses on assessing the robustness of strategies under conditions of uncertainty.

Strategic preparedness

The capacity of an organisation to detect change early and act in time. It reduces vulnerability and enables purposeful adaptation under uncertain conditions.

Deep uncertainty

A situation where critical variables, their interactions, or future values are unknown or unknowable. This limits the use of forecasting and requires alternative strategies, such as scenario thinking.

Resilience

The ability of a system or organisation to maintain core functions and adapt effectively in the face of disruption.

Falsification

A principle rooted in the philosophy of science: a meaningful claim should be refutable. In foresight, this translates to testing assumptions by examining how they hold up across a range of plausible futures.

Complex adaptive system

A system composed of interdependent and self-organising actors whose behaviour evolves in response to internal and external change. Universities are a typical example, due to their decentralised and dynamic structure.

Polycentric decision-making

A governance model where multiple centres of decision-making operate autonomously but interactively. It reflects how strategy is shaped in distributed environments such as universities.

Tame vs. Wicked problems

Tame problems have clear definitions, solutions, and goals. Wicked problems are ill-structured, involve conflicting values, and resist definitive solutions. The latter require foresight-informed approaches.

Scenario

A plausible narrative about the future that helps explore uncertainty, challenge assumptions, and stress-test strategies.

Signal

An early or subtle sign of possible change. Signals may point to emerging trends, disruptions, or strategic opportunities.

Black buffalo

A metaphor for unresolved, sensitive issues that persist beneath the surface due to organisational silence or discomfort. If ignored, these may evolve into strategic vulnerabilities.

Grey rhino

A metaphor for highly likely but neglected risks. Unlike “black swans”, grey rhinos are visible and predictable yet often fail to prompt adequate action.

Negative empiricism

An approach that prioritises disproving rather than confirming assumptions. It sharpens strategic thinking and helps expose vulnerabilities in dominant narratives.

E

Consultation

As part of the drafting process, a wide range of colleagues and external experts were consulted. Their feedback confirmed the value of the DSFA as a coherent framework, and the discussions helped to deepen and refine several aspects of the approach. Many of the questions raised in these consultations were not about the solidity of the framework itself, but about its implications and possible extensions. These more reflective and exploratory points are taken up in Chapter 5.

Consulted experts (alphabetical):

- Prof. dr. Arthur C. Petersen** — Professor of Science, Technology & Public Policy, University College London (UCL)
- Prof. dr. ir. Behnam Taebi** — Professor of Energy & Climate Ethics, Delft University of Technology; Member of the Netherlands Scientific Council for Government Policy (WRR)
- Prof. dr. ir. Fred van Keulen** — Dean, Faculty of Mechanical Engineering, Delft University of Technology
- Gül Akcaova, MSc** — Lead Futurist, SURF
- Prof. dr. Jeroen van den Hoven** — University Professor; Professor of Ethics & Technology, Delft University of Technology
- Dr. Maree Conway** — Foresight scholar-practitioner; Founder, Thinking Futures (Melbourne)
- Prof. dr. Martijn Warnier** — Professor of Complex Systems Design; Head, Multi-Actor Systems Department, Delft University of Technology
- Mike Boxall** — Higher education expert at PA Consulting London
- Nadine Burquel, MA** — Director General, HUMANE
- Dr. Patrick van der Duin** — Co-Editor-in-Chief, Futures journal; Managing Director, Foresight & Innovation Management
- Dr. Rafał Kierzenkowski** — Senior Counsellor for Strategic Foresight & Head, Strategic Foresight Unit, OECD
- Prof. dr. ir. Richard Goossens** — Professor of Physical Ergonomics; Scientific Director, Convergence Health & Technology, Delft University of Technology
- Dr. Thomas Ekman Jørgensen** — Director for Policy Coordination and Foresight, European University Association (EUA)
- Prof. dr. ir. Tim van der Hagen** — Rector Magnificus & President, Delft University of Technology
- Prof. dr. ir. Vincent A.W.J. Marchau** — Professor of Uncertainty & Adaptivity of Societal Systems, Radboud University; Managing Director, TRAIL; affiliated with Delft University of Technology

Notes

- 1

Dr. Gert Jan Scheurwater (1963) is Director of Foresight & Strategy Development at TU Delft. With over 30 years of experience in strategy and policy within academia, he holds degrees in History of Philosophy and Epistemology (MA, PhD) and Public Administration (MPA). His expertise includes foresight, institutional strategy, research policy, university governance, and organisational development. From 2013 to 2022, he served as Secretary General of TU Delft, managing central decision-making and advising the Executive and Supervisory Boards. Since 2023, he has led the university's Strategic Foresight & Innovation Unit. <https://www.linkedin.com/in/gertjanscheurwater/>
- 2

Cf. H. Mintzberg (1994). *The Rise and Fall of Strategic Planning*; and the broader trend visible in reports such as OECD (2021), EPRS (2023), and the Niinistö report (2024).
- 3

Niinistö, S. (2024). *Safer together: Strengthening Europe's civilian and military preparedness and readiness*. Report in his capacity as Special Adviser to the President of the European Commission.
- 4

The growing volume of national and international foresight reports illustrates a shared recognition that conventional planning assumptions are under pressure. The production of such reports is itself a signal of decreasing predictability and increasing systemic uncertainty.

Examples include:

- European Commission (2023). *Strategic Foresight Report 2023: Sustainability and Wellbeing at the Heart of Europe's Open Strategic Autonomy*.
- WRR (2023). *Nederland in een fragmenterende wereldorde*.
- Clingendael Institute (2025). *Geopolitiek changement op het wereldtoneel*.
- WKR (Wetenschappelijke Klimaatraad, 2023). *Met iedereen de transities in*.
- SCP (2024). *Samenleven in de toekomst*.
- CPB (2024). *Kiezen voor later: Vier visies voor 2050*.
- Rathenau Instituut (2023). *Kennis van de toekomst*.
- European Commission (2021). *Strategic Foresight towards the EU's Open Strategic Autonomy*.
- U.S. National Intelligence Council (2021). *Global Trends 2040: A More Contested World*.
- UK Ministry of Defence (2024). *Global Strategic Trends: Out to 2055*.
- World Economic Forum (2024). *The Global Risks Report 2024*.
- UNESCO (2021). *Futures of Education: Reimagining our Futures Together*.
- OECD (2023). *Science, Technology and Innovation Outlook 2023*.
- OECD (2023). *Government Foresight Playbook*.
- IPCC (2023). *Climate Change 2023: Synthesis Report (Sixth Assessment Report)*.

Notably, while system-level foresight initiatives are emerging in sectors such as higher education, they are not yet structurally embedded. As a result, foresight remains more ad hoc than systemic in many institutional settings.

- 5

See: Maree Conway, *Foresight Infused Strategy* (2016); and Joseph Voros, 'A Generic Foresight Process Framework,' *Foresight*, 5(3), 2003, pp. 10–21.
- 6

Marchau, V. A. W. J., Walker, W. E., Bloemen, P. J. T. M., & Popper, S. W. (Eds.). (2019). *Decision Making under Deep Uncertainty: From Theory to Practice*. In literature, a distinction is made between four types of futures: projected, probable, plausible, possible. This classification follows the classification of the four levels of knowledge uncertainty as indicated here. As long as projections and extrapolations can still be made, there is sufficient reliable knowledge and information available, and one can also speak in terms of probability. The turning point is in the transition from 'probable' to 'plausible' (and higher). When a situation is characterized as 'plausible', no reliable statements can be made about the 'likelihood' of events occurring. Learning to distinguish between both types of uncertainty is necessary in order not to reduce plausible (or complex) situations to probable (or complicated) situations. When that happens, one tries to fasten a screw with a saw.

The creation of this text involved the use of ChatGPT (OpenAI) and CoPilot as a virtual text editors. The model was employed to edit content provided by the author for grammatical correctness, internal consistency, and textual coherence. The author retains full responsibility for the content of the final text. Parts of the translation were produced using DeepL and ChatGPT.

7 See: [We should have anticipated higher education grey rhinos](#), which argues – albeit in hindsight – that the application of foresight could have been effective. See also: [Foresight Briefing: What is happening to UK universities?](#) for an overview of structural stress factors affecting the UK higher education sector.

8 The operational experience gained through TU Delft’s Foresight Field Labs has been an important foundation for the development of the DSFA as described in this paper. The approach is guided by the principle of being ‘practice inspired, theoretically informed.’ For an analysis of these experiences, see: Girard, G. (2025). Engineering the Future – Experiences with Strategic Foresight at Delft University of Technology, Strategic Foresight & Innovation, TU Delft, May 2025 (publication forthcoming). A substantial number of Foresight Field Labs were realized in the period 2023-2025. The contributions of the many participants in these labs were very valuable for developing and refining the approach as described here.

9 Figure source: *Safer Together: Strengthening Europe’s Civilian and Military Preparedness and Readiness* (Report of the High-Level Group chaired by Sauli Niinistö), European External Action Service, 2024, Figure 2, p. 33.

10 The four levels of uncertainty correlate with two core concepts: *risk* and *deep uncertainty*. In everyday language these terms are sometimes used interchangeably, but in the context of strategic foresight their meaning must be defined more strictly. *Risk* refers to situations in which there is sufficient reliable data, information, knowledge, and models to estimate the probability of a particular outcome. Possible outcomes are more or less known, and the likelihood can be calculated. Risk thus corresponds to level 1 and level 2 uncertainty. *Deep uncertainty* refers to situations in which there is a structural lack of reliable data and information, little or no knowledge of causal relationships, and too many unknown variables to make a trustworthy probability assessment. Deep uncertainty therefore corresponds to level 3 and level 4 uncertainty. Whereas in levels 1 and 2 linear extrapolations may be relevant, at levels 3 and 4 such approaches are counterproductive, requiring the use of strategic foresight instruments such as scenario development, horizon scanning, and policy stress testing.

11 Wucker, M. (2016). *The gray rhino: How to recognize and act on the obvious dangers we ignore*. St. Martin's Press.

12 Rouse, W. B. (2016). *Universities as complex enterprises: How academia works, why it works these ways, and where the university enterprise is headed* (1st ed.). John Wiley & Sons.

13 See TU Delft’s strategy portal: <https://www.tudelft.nl/strategie>

14 Pfeffer, J., & Salancik, G. R. (1978). *The external control of organisations: A resource dependence perspective*. New York: Harper & Row.

15 Popper, K. (1959). *The Logic of Scientific Discovery*. London: Hutchinson.

16 This fifth DSFA principle resonates with the idea of *negative empiricism*, as introduced by Nassim Nicholas Taleb in *The Black Swan* (2007), drawing on Karl Popper’s philosophy of science. Taleb argues that, instead of seeking confirmation, one should actively try to refute expectations about the future. He likens this to the diagnostic logic of medicine, where hypotheses are systematically excluded. This approach reinforces the role of foresight not as a way to predict, but as a way to challenge strategic assumptions by testing them against plausible but divergent futures.

17 The seven provocations are: (1) The Flip: What if an assumption proves opposite to how the future unfolds? (2) The Discontinuity: What if defining features of current reality are rendered obsolete? (3) The Resistant: What if an expected change is stopped by present structures or habits? (4) The Overcorrection: What if a change that appears transformative proves less transformative in the long term? (5) The Undercorrection: What if a marginal change becomes far more transformative than assumed? (6) The Uncomfortable Truth: Which uncomfortable 'truths' are being avoided? (7) The Value Lock-in: what embedded constraints, exclusions, or dependencies might shape a preferred future in limiting ways? See: Østergaard, S.F. (2025). *The Seven Provocations: Introducing a new method for making provocation a structured and standalone foresight practice*. Copenhagen Institute for Futures Studies.

18 Van der Steen (2016), in his inaugural lecture *Tijdig Bestuur. Strategisch omgaan met voorspelbare verrassingen*, explores the performative nature of strategic language in relation to foresight. He argues for the development of a vocabulary that expands and sharpens the meaning of commonly used terms such as uncertainty, anticipation, preparedness, time, and the future. Furthermore, The WRR report *Uit Zicht* describes how foresight can be applied both to confirm policy views (speaking truth to power) and to critically test them (arena perspective). The DSFA explicitly ties in with this latter perspective. The setting of Field Labs offers a concrete social context and psychological space to allow contradiction to take place in an organised and structured manner. DSFA can be used to identify social tricky subjects such as path dependency within established policy trajectories or to make explicit cognitive locked-in effects that hamper policy adjustment.

19 Douglas, M. (1987). *How institutions think* (Revival ed.). Routledge and Kegan Paul.

20 See Sweijjs, T., van Aken, T., Ebrard, J., van Pappelendam, P., & Hoefnagels, A. (2025). *Blinded by Bias: Western Policymakers and Their Perceptions of Russia before 24 February 2022*. The Hague Centre for Strategic Studies. This report demonstrates how cognitive and psychological biases – such as denial, mirror imaging, and groupthink – shaped Western policymakers’ perceptions and contributed to misjudging Russia’s intentions before the full-scale invasion of Ukraine. While written in a geopolitical context, its analysis of how biases distort strategic decision-making offers relevant lessons for universities: awareness of these mechanisms is crucial to prevent foresight processes from becoming trapped in existing assumptions or cultural blind spots.

21 Scherpenisse, J., Chin-A-Fat, N., Van der Steen, M., Frankowski, A., & Schröer, L. (2022). *Omgaan met signalen: Naar een handelingsperspectief voor overheden*. Nederlandse School voor Openbaar Bestuur (NSOB).

22 See: Elna Schirrmeister, Anne-Louise Göhring & Philine Warnke (2019), *Psychological biases and heuristics in the context of foresight and scenario processes*, which identifies specific cognitive biases that frequently arise in foresight contexts. See also: Ministry of Defense (2021), *Red Teaming Handbook*, which elaborates on these phenomena and offers practical mechanisms for mitigating biases.

23 The [Leadership Development Programme](#) of the European University Association states that university leadership benefits from developing the skills needed to navigate an increasingly hyper-complex strategic environment. The ability to apply foresight is identified as a key competency.

24 Niinistö, S. (2024). *Safer together: Strengthening Europe’s civilian and military preparedness and readiness*. Report in his capacity as Special Adviser to the President of the European Commission.

25 In practice, two types of uncertainty can be distinguished: cognitive and behavioural. Cognitive uncertainty refers to limits in our knowledge and models of how systems function, for example uncertainty about causal relationships or dynamics. Behavioural uncertainty concerns the unpredictability of actors’ preferences, values, and responses. For instance, when introducing a new AI tool in education, there may be uncertainty both about how the technology will affect learning outcomes (cognitive) and about how students and lecturers will respond (behavioural). A simple matrix, adapted from the report *Uit Zicht* (WRR 2023) and *Decision Making Under Deep Uncertainty* (Marchau et al. 2019), shows how different combinations of low and high uncertainty point to different planning modes.

	Behavioral uncertainty (low)	Behavioral uncertainty (high)
Cognitive uncertainty (low)	Conventional planning	
Cognitive uncertainty (high)		Foresight

26 This distinction is also addressed in the Cynefin framework, which helps determine whether a situation is complicated – with clear cause-effect relations that require expertise – or complex, where cause-effect relations are unclear and solutions must emerge through exploration. The criteria for identifying ‘wicked’ problems (as characterised by high uncertainty, multiple stakeholders, and no clear solution) largely align with the characteristics of complex situations. See also: van Asselt et al. (2010), *Uit zicht: Toekomstverkennen met beleid*.

27 Enterprise Risk Management (ERM) seems to start from an inside-out perspective: risks are viewed from the internal objectives of the organisation. A second assumption is that it is believed that risks—once identified—can be managed through targeted measures. A third idea is that risks are knowable and calculable (impact × chance). A fourth basic notion is that organisations have sufficient freedom of action to take or avoid risks (risk appetite). The overarching aim is to be ‘in control’ as an organisation, with a strong focus on compliance and accountability. Behind these assumptions an expectation of l stability in the strategic environment can be identified. This results in the use of classification systems such as risk registers, which translate uncertainty into categories that appear manageable and calculable. The inherent risk of this approach itself is that complex situations (level 3) are unintentionally reduced to complicated ones (level 2), leading to a built-in category mistake: using a screwdriver to hammer a nail. FERMA – the European Federation of Enterprise Risk Management Associations – points to that also in a recent publication *Next Exposure to Trends Report 2025* and advocates the systematic use of foresight methods in ERM.

28 These heuristic questions are an adaptation of the questions from: van Asselt, A. Faas, F. van der Molen, S.A. Veenman (2010). *Uit zicht: Toekomstverkennen met beleid*. In practice, distinguishing between ‘complicated’ and ‘complex’ situations requires informed judgment. The diagnostic questions formulated here can be indicative. The overview of characteristics of ‘wicked problems’ (Rittel & Webber, 1973) can be helpful in assessing the degree of complexity of a situation.

29 PESTLE analyses are typically inductive and bottom-up: participants contribute observations from their individual perspectives, resulting in subjective and widely varying lists of trends. While these exercises help ensure that no structural domain is overlooked, they often remain abstract and disconnected from concrete strategic concerns. Because PESTLE is organisation-neutral, its results can be difficult to translate into actionable insights. The DSFA addresses this limitation by adopting a more deductive stance, linking external developments explicitly to the critical dependencies that condition the university's resilience.

30 The Oxford Scenario Planning Approach (OSPA) can be regarded as a form of explorative foresight. Both OSPA and the DSFA treat scenarios as 'plausible fictions' that help to analyse the present. OSPA primarily aims to broaden the horizon of participants through iterative reframing and reperception, whereas the DSFA uses scenarios – constructed on the basis of a fixed taxonomy of critical dependencies and axes of uncertainty – to put continuity assumptions underlying specific plans under pressure. In this way, the DSFA directly facilitates decision-making. Moreover, while the OSPA is a generic method applicable across sectors, the DSFA is institutionally embedded in the governance of universities as complex adaptive systems.

31 In the Foresight Testing Level, the central focus is on subjecting the assumptions that form the load-bearing pillars of a plan or vision to pressure, thereby testing their resilience. The underlying concept is rooted in the Assumption-Based Planning (ABP) approach. ABP, originally developed by RAND for the U.S. Army, offers a structured method for dealing with deep uncertainty by examining the continuity assumptions on which plans and visions rest. In ABP, an assumption is defined as: 'a statement about a feature of the future that underlies current operations or plans of an organisation.'

For the Delft Strategic Foresight Approach (DSFA), this is an important anchor point. In epistemic terms, an assumption can be understood as a theory-laden claim, expressing an (often implicit) expectation about a particular aspect of the future. By analogy with ABP, DSFA examines how a plan or vision 'behaves' if one or more of its fundamental assumptions are put under stress—through the simulation of future conditions in the form of *what if* scenarios—or can be falsified, and whether the plan or vision can withstand this pressure. At this point, ABP and DSFA move in parallel. The key test question formulated in ABP is equally fruitful in the DSFA context: *Which assumptions, if proven false, would lead to significant changes in the organisation's course of action?*

In this sense, ABP aligns with key elements of DSFA: the explicit treatment of continuity assumptions underpinning existing plans or the status quo, and the focus on stress-testing these assumptions. Innovative elements of DSFA include the integration of critical external dependencies, scenario development based on those dependencies, and the systematic generation of strategic options as an operational part of the approach. See: Dewar, J.A. (2002). *Assumption-Based Planning: A Tool for Reducing Avoidable Surprise*. Cambridge University Press.

32 See: OECD (2025), *Strategic Foresight Toolkit for Resilient Public Policy: A Comprehensive Foresight Methodology to Support Sustainable and Future-Ready Public Policy*. This toolkit is, as of writing, the most recent comprehensive foresight guide. It is designed for generic application and is not tied to a specific type of public sector organisation. The OECD's approach to stress-testing policies differs from the DSFA approach in several respects: it does not explicitly include the identification of external critical dependencies; it remains abstract with regard to organisational embedding; and it does not include a dedicated step for formulating strategic options. The research paper Stress-testing EU policies (Andersen, 2021) - part of the report How to stress-test EU policies: building a more resilient Europe for tomorrow - concludes that 'the foresight literature is unanimous that policy stress-testing entails subjecting policies to theoretical future scenarios, which can be based on sudden disruptive events or HILPs'. (p. 12). HILPs refer to high-impact - low probability. It is noted that it is better to speak of high-impact - perceived low probability. The paper also observes that most planning is often not resilient enough to withstand these HILPs. Stress-testing is seen as a simulation exercise in which, given the scarcity of time and resources, diverse groups are used as much as possible with existing scenarios and 'existing foresight knowledge'.

33 See also: UK Ministry of Defense (2021), *Red Teaming Handbook*. This handbook focuses on designing and applying a red team approach within a defence organisation. In contrast to the DSFA approach, red teams are conceptualised as a stand-alone function. As the report itself notes, this positioning may undermine internal acceptance and support: 'A number of disadvantages also exist. Red teams can be resented and mistrusted by the original planning team; insensitive if not managed well; used selectively to do 'hatchet jobs' by an uninformed or unscrupulous end user; seen as not sufficiently expert or well placed to comment if members are not selected carefully; time-consuming to establish; and resource hungry, particularly in overstretched organisation.' At TU Delft, foresight is embedded differently: the approach is demand-driven, with foresight trajectories developed in co-production with stakeholders, rather than as an external evaluative function.

34 In addition to distinguishing between alternative strategic pathways, it is important to already assess the implications of these directions in terms of the organisational change they may require. At this stage, it can be useful to start reflecting on an appropriate *theory of change*.
See also: Paul Woodgates, Change by Design: *How universities should design change initiatives for success*.

35 This section is based on earlier texts published by Gert Jan Scheurwater about strategic foresight, including [the blog post for the European University Association \(EUA\)](#), the transcript of [the EUA podcast episode on strategic foresight](#), and the internal note *Focus on Foresight*. These sources provided the initial structure, language, and key concepts for the present version.

36 Figure source: R. Rouse (2016), *Universities as Complex Enterprises. How Academia Works, Why It Works These Ways and Where the University Enterprise Is Headed*.

37 The elements listed here are adapted from two key resources in the foresight field: Features of Effective Systemic Foresight in Governments Around the World (School of International Futures, for the UK Government Office for Science, 2021) and The Ultimate Guide to Strategic Foresight by Itonics (2024). These publications outline essential organisational conditions for embedding foresight in a systematic and lasting way, including categories such as people, structures, culture and behaviour, and processes. While the terminology and structure used in this section are inspired by these sources, they have been reinterpreted to reflect the specific context and institutional needs of TU Delft.

38 Figure source: School of International Futures (2021), *Features of Effective Systemic Foresight in Governments Around the World*.

39 In accordance with TU Delft's institutional plan the Strategy Development department has established a permanent strategic foresight capability. Its purpose is to identify, analyse and practically address strategic uncertainties for the university. This capability operates as a first line of defense.

The function is organised in two complementary ways:

1. System-level foresight and risk identification – At the institutional (system) level, Strategic Foresight continuously scans for strategic uncertainties and derives potential strategic risks. A direct first-line information and advisory relationship exists with the Executive Board.
2. Horizontal facilitation across first-line units – From its central vantage point, Strategic Foresight shares and transfers foresight expertise to other organisational units operating in the first line. Faculties, departments and professional services can thus draw on centrally developed knowledge and methods while retaining their own strategic autonomy.

40 Polchar, J., & Jonason, D. (2023, March 31). *Foresight: A little goes a long way*. OECD Observatory of Public Sector Innovation (OPSI) Blog. Retrieved from <https://oecd-opsi.org/blog/foresight-a-little-goes-a-long-way/>. The authors argue that even modest foresight efforts can have significant impact when embedded in governance and decision-making processes. Rather than requiring large-scale projects, small and well-placed exercises can already strengthen strategic capacity, which is a lesson highly relevant for universities navigating deep uncertainty.

41 Among the themes raised were: values and responsible foresight (the need to explicitly consider ethical and societal dimensions when exploring futures); individualism and the sociology of perception (how individual experiences and collective frames influence what is noticed, ignored, or judged as relevant); uncertainty and risk perception (recognising that risks are not only objective phenomena but also socially and politically constructed); abductive reasoning (the importance of hypothesis generation and structured imagination as complements to analysis and prediction); poly-think and groupthink (the tension between the benefits of multiple perspectives and the risks of blind spots or institutional silence); process management and foresight (the challenge of embedding foresight in organisational routines while keeping it adaptive and flexible); gamification of foresight (experimenting with interactive and experiential formats to make foresight engaging and accessible); decision-making (ensuring that foresight outputs are connected to governance processes so that insights do not remain isolated from actual choices); and Artificial Intelligence (as both a disruptive force shaping the external environment of universities and a tool within foresight practice).

42 This glossary draws on the foresight glossaries developed by the UN Global Pulse (2024) and GFAR (2014), adapted and reformulated for the context of the Delft Strategic Foresight Approach (DSFA).

More information

strategicforesight-sd@tudelft.nl

tudelft.nl/foresight

