Risk in Research Funding: Implications for Foundation Governance

Research brief from The Danish Centre for Studies in Research and Research Policy

2026

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1.0 Introduction

1.1/ Background

Research funding organisations operate under conditions of considerable uncertainty. Unlike many other forms of investment, research funding concerns future knowledge, whose scientific significance and societal value cannot be determined at the time funding decisions are made. Funding organisations are therefore expected to pursue scientific excellence and strategic objectives while at the same time making responsible decisions about projects whose outcomes are inherently uncertain.

Over the past decades, this uncertainty has increasingly become the subject of research. A growing literature has examined the relationship between uncertainty, risk-taking and scientific breakthroughs, as well as the role of funding organisations in creating conditions that allow more ambitious and potentially transformative research to emerge (Azoulay et al., 2011; Franzoni et al., 2022; OECD, 2021). A central theme in this literature is that breakthrough research is inherently uncertain, and that assessment and funding systems may unintentionally favour more incremental research over projects with greater transformative potential (Alberts et al., 2014; Wang et al., 2017).

These questions also formed the basis of the 2019 DEA report '*What Do We Know About Risk-Taking in Science and Science Funding?'* (Norn, 2019), which reviewed the available literature and discussed how research funders can promote risk-taking through different funding models and organisational approaches. Among the recommendations were longer and more flexible grants, investigator-oriented funding, dedicated high-risk programmes and modifications to peer review and assessment procedures.

Norn (2019) primarily addressed how funding organisations can create conditions that encourage scientific risk-taking. Since then, however, a growing body of empirical research has focused more directly on the assessment process itself. This literature asks how reviewers, panels and funding organisations evaluate uncertainty in grant proposals, how different forms of uncertainty influence funding decisions, and how alternative assessment practices affect the selection of potentially transformative research.

The purpose of the present research brief is to explore this perspective, namely assessment under uncertainty. Rather than revisiting why uncertainty matters for scientific progress, the brief examines how different forms of uncertainty enter assessment and selection processes, how they are managed by research funders, and what empirical evidence exists to support different approaches to assessment and funding design.

1.2/ Structure of the research brief

The research brief is organised into three chapters.

In the following chapter 2, it is discussed how uncertainty has been conceptualised in the literature on research funding. While concepts such as risk, uncertainty and high-risk/high-reward research are often used interchangeably, the literature suggests that research funders encounter several different forms of uncertainty during grant assessment. To provide a common framework for the remainder of the brief, the first section distinguishes between scientific, conceptual, feasibility, implementation, investigator, strategic and portfolio uncertainty.

Chapter 3 examines how these different forms of uncertainty are addressed in assessment and selection processes. Rather than viewing assessment as a single process, the section considers how reviewers, panels, programme managers and foundation boards respond to different uncertainties, which assessment criteria are typically used, and how characteristics such as grant size, duration, career stage and funding instrument influence the level and type of uncertainty that funding organisations are prepared to accept. In this chapter, empirical studies of assessment practices and funding design are presented.

Chapter 4 synthesises the findings from the preceding chapters and discusses their implications for research funders. It introduces a governance perspective on uncertainty, arguing that different forms of uncertainty require different organisational responses rather than a single assessment model. The chapter presents a conceptual framework distinguishing complementary strategies for governing uncertainty, illustrates how different funding instruments accommodate different uncertainty profiles, and summarises examples of organisational tools identified in the literature. Finally, it concludes with a set of questions intended to support strategic discussions among foundation boards and programme managers

The overall ambition of this research brief is to provide an overview of the current literature and an evidence-informed framework that may support funding organisations and foundation boards in reflecting on how uncertainty can most appropriately be assessed and managed when the objective is to promote scientific excellence and breakthrough research.

To achieve this ambition, the brief builds on international literature on research funding, peer review and assessment under uncertainty. The starting point has been the literature synthesised in Norn (2019), complemented with set of key publications, identified through literature searches in major bibliographic databases and existing knowledge of the field. These publications were subsequently used as reference points for backward and forward citation searches (snowballing), whereby reference lists and citing publications were examined to identify additional relevant studies. Emphasis was placed on empirical studies of funding organisations and assessment practices, including programme evaluations, observational studies of peer review, natural experiments and comparative analyses of funding instruments.

2.0 What do we mean by risk in research funding?

2.1/ Risk and uncertainty in research funding

As discussed in the introduction, several studies have highlighted that uncertainty is an inherent feature of scientific discovery and an essential precondition for breakthrough research. At the same time, concepts such as risk, uncertainty, high-risk/high-gain research, transformative research and breakthrough research are often used interchangeably, despite referring to somewhat different phenomena. The first task of this research brief is therefore to clarify how these concepts have been understood in the literature, and in particular what they imply from the perspective of research funders.

An obvious – but also useful – starting point is to distinguish between uncertainty and risk. The distinction has a long tradition within economics and organisation studies. Knight (1921) famously distinguished situations where probabilities can be estimated (risk) from situations where outcomes are fundamentally unknowable (uncertainty). While this distinction has been debated, it remains influential in discussions of scientific research, where uncertainty is generally seen as an inherent feature of knowledge production rather than simply a lack of information. Along similar lines, Whitley (2000) describes research as an activity characterised by a high degree of task uncertainty, reflecting that both the processes and outcomes of scientific work are often difficult to predict.

Several recent authors argue that this distinction is particularly relevant for research funding. Franzoni and Stephan (2023), for example, note that many funding programmes describe themselves as supporting "high-risk, high-reward" research without clearly specifying what kind of risk is meant. Likewise, Gallo et al. (2018), in their study of reviewers participating in the NIH Transformative Research Award programme, find that reviewers interpreted the notion of "risk" in markedly different ways. For some, risk referred primarily to scientific novelty, while others associated it with technical feasibility, implementation challenges or the capabilities of the applicant. The authors conclude that risk is not understood as a single characteristic of research proposals, but rather as a collection of different uncertainties that reviewers weigh differently during assessment.

The literature also increasingly suggests that uncertainty is not only a property of research projects but also of the assessment process itself. Lamont's (2009) ethnographic study of peer review panels demonstrates how reviewers negotiate concepts such as originality, significance and feasibility through discussion rather than by simply applying predefined criteria. Similarly, both Langfeldt (2001) and Pier et al. (2017) shows that reviewers frequently interpret assessment criteria differently and that panel discussions often modify initial judgements. Pier et al. (2018) and Graves et al. (2011) have also demonstrated considerable disagreement between reviewers assessing the same proposals, suggesting that a substantial part of the uncertainty experienced by research funders arises from the assessment process itself rather than from the proposed research alone. From this perspective, funding decisions are made under a double uncertainty: uncertainty regarding future scientific outcomes and uncertainty regarding the evaluation of those outcomes.

Taken together, the literature suggests that "risk" is best understood as a collection of different forms of uncertainty rather than as a single attribute of research proposals. While there is no widely accepted typology, several recurring dimensions can be identified across the literature. Norn et al. (2019) distinguish between conceptual and operational risk, while studies of peer review variously emphasise scientific novelty, technical feasibility, investigator capability, implementation challenges, strategic relevance and portfolio considerations. These dimensions are analytically distinct, and a proposal may, for example, present an exceptionally original scientific idea, while simultaneously involving considerable implementation challenges or being proposed by a relatively inexperienced research team.

Based on the literature described above, the remainder of this research brief distinguishes between seven related dimensions of uncertainty in grant assessment (Table 1). The categories are intended as an analytical framework for synthesising the literature rather than as a new typology. They provide a common language for discussing how uncertainty enters assessment and selection processes and how different funding instruments accommodate different forms of uncertainty.

Table 1:

Type of uncertainty	**Central assessment question**	**Typical evidence reviewers use**	**Typical bias**	**Funding characteristics that accommodate this**
Scientific uncertainty	Could this produce important new knowledge?	Novelty, originality, theoretical contribution	Undervaluation of radical ideas	Long duration, flexible funding, portfolio approach
Conceptual uncertainty	Is the proposed idea intellectually convincing?	Conceptual coherence, interdisciplinarity	Preference for familiar paradigms	Exploratory and/or interdisciplinary grants
Feasibility uncertainty	Can this actually be done?	Methods, pilot data, work plan	Preference for mature projects	Staged funding, smaller initial grants
Investigator uncertainty	Can this team deliver?	CV, publications, previous grants	Matthew effects, prestige bias	Investigator grants, career schemes, mentoring
Implementation uncertainty	Can the project be managed successfully?	Timeline, consortium, governance	Penalizes ambitious projects	Project management requirements, milestones,
Strategic uncertainty	Does the proposal advance programme goals?	Mission fit	Conservative programme interpretation	Targeted/thematic calls, programme portfolios
Portfolio uncertainty	What does this project add to the portfolio?	Existing investments	Rarely assessed explicitly	Differentiated funding instrument, portfolio governance

The following sections use this framework to discuss how each form of uncertainty is addressed in contemporary assessment and selection processes.

3.0 How do assessment systems approach uncertainty in funding decisions?

The previous section argued that "risk" in research funding is better understood as a set of distinct forms of uncertainty than as a single characteristic of research proposals. The challenge for science funders is therefore not simply to identify the best proposals, but to determine how these different uncertainties should be assessed, balanced, and reflected in funding decisions.

Assessment systems provide the mechanisms through which this takes place. Individual reviewers, expert panels, programme managers, and foundation boards each contribute with different perspectives and assume responsibility for different aspects of the decision. Together, they turn uncertainty into funding recommendations and, ultimately, funding decisions. Building on the typology developed in chapter 2, this chapter examines how the different forms of uncertainty are addressed in practice.

3.1/ Scientific and conceptual uncertainty

Scientific and conceptual uncertainty are primarily assessed through judgements of the originality, significance and transformative potential of proposed research. Because these dimensions concern future scientific contributions rather than past achievements, they cannot readily be verified through objective indicators and therefore rely heavily on expert judgement.

The primary responsibility for assessing scientific and conceptual uncertainty is often delegated (at least partially) from research funders to external reviewers and review panels. Individual reviewers evaluate proposals from the perspective of their disciplinary expertise, while panel discussions provide an opportunity to reconcile different interpretations and arrive at a collective judgement. Lamont (2009) demonstrates how assessments of originality emerge through deliberation rather than through the application of fixed criteria, while Langfeldt (2001) similarly shows that reviewers frequently differ in their interpretation of scientific quality. Boudreau et al. (2016) complements this by highlighting how reviewers' disciplinary background and intellectual distance from a proposal influence the assessment of novel ideas. Rather than simply aggregating independent opinions, review panels actively negotiate these differences through discussion and score calibration (Pier et al., 2017).

Empirical studies suggest that reviewer disagreement is not merely a weakness of peer review but may reflect genuine uncertainty regarding the future significance of scientific ideas. Studies consistently find substantial variation in assessments of highly novel proposals (Pier et al., 2018; Langfeldt, 2001), while Boudreau et al. (2016) demonstrate that such variation depends partly on reviewers' disciplinary background and intellectual distance from the proposal. More recently, Oxley and Gulbrandsen (2025) distinguish between *productive variability*, reflecting legitimate differences in expertise and judgement, and *unproductive variability* arising from inconsistent interpretation of assessment criteria or assessment procedures. The challenge for funding organisations is therefore not to eliminate reviewer disagreement, but to ensure that it reflects genuine scientific uncertainty rather than inconsistencies in the assessment process.

The literature also suggests that the assessment of scientific uncertainty varies across funding instruments. Programmes intended to support frontier or breakthrough research generally accept greater scientific uncertainty than ‘conventional’ project grants, often placing greater emphasis on originality than on predefined research trajectories or expected outcomes (Azoulay et al., 2011; Heinze, 2008; OECD, 2021). As we will discuss later, this does not necessarily imply greater tolerance of other forms of uncertainty, such as implementation uncertainty.

In summary, we see that scientific and conceptual uncertainty are often assessed through expert judgement of originality and significance. Because future scientific value cannot be observed directly, assessment depends largely on disciplinary expertise, panel deliberation and the objectives of the funding instrument. Li and Agha (2015), for example, find that, among funded NIH grants, better peer-review scores are consistently associated

with stronger subsequent research outcomes, including highly cited publications, and that this relationship persists when controlling for investigators' publication and grant histories, institutional affiliations, career stage, and other observable characteristics. At the same time, this does not necessarily imply that conventional peer review is particularly well suited to identifying breakthrough research. Other studies suggest that highly novel proposals may receive systematically lower evaluations, indicating that some of the characteristics associated with potentially transformative research can also make proposals more difficult to assess through conventional expert review (Boudreau et al., 2016).

Thus, while there is little robust evidence that alternative approaches, such as partial lotteries, programme-manager discretion or selection mechanisms that allow individual reviewers to champion high-risk proposals, consistently outperform peer review in identifying future breakthroughs, there is equally limited evidence that conventional peer review is uniquely effective at doing so.

3.2/ Feasibility and implementation uncertainty

Feasibility and implementation uncertainty – can it be done and can it be managed – are traditionally assessed through project plans, verified methods and similar evidence. While feasibility concerns the scientific and technical approach, implementation uncertainty relates to project organisation, management and the practical delivery of the proposed work.

These dimensions are typically assessed by reviewers with relevant methodological expertise, often supported by programme managers in larger or more complex funding schemes. Assessment focuses on methodological robustness, preliminary data, project plans, timelines, access to infrastructure and, where relevant, the organisation of research consortia. Gallo et al. (2018) show that reviewers frequently distinguish between scientific originality and technical feasibility when evaluating proposals. Similarly, Stephan (2012) and Alberts et al. (2014) argue that increasing competition for funding has strengthened the emphasis on projects that appear technically feasible and well documented.

Again, we can also point to important differences between funding instruments. Large grants and collaborative programmes generally require more extensive evidence regarding project management and implementation, whereas smaller exploratory grants may tolerate greater uncertainty regarding both feasibility and project management. This is consistent with the argument of Laudel and Gläser (2014) that different research projects are characterised by different epistemic properties and therefore require different funding arrangements. Rather than applying identical assessment criteria across funding schemes, funders may therefore need to match grant design to the types of uncertainty that characterise the research being supported.

Programme evaluations further suggest that staged funding, milestone-based grants and adaptive grant management may provide ways of managing implementation uncertainty while preserving scientific flexibility (OECD, 2021). Similarly, Carnehl et al. (2025) argue that uncertainty need not be fully resolved at the time of award. Distinguishing between grant allocation and grant management, they show how staged funding and adaptive monitoring can enable funders to learn about projects over time and adjust funding decisions as new information becomes available. Smaller exploratory grants and staged funding may thereby provide ways of accommodating greater uncertainty while limiting financial exposure, whereas larger and longer-term funding schemes typically require more extensive evidence regarding implementation and organisational capacity.

Overall, feasibility and implementation uncertainty are primarily addressed through methodological assessment and project planning. Unlike scientific uncertainty, these dimensions can often be influenced through funding design itself. The challenge for funders is thereby not simply to minimise implementation uncertainty, but to determine when it should be reduced through ex ante assessment and when it can be managed through staged funding, adaptive grant management and other mechanisms that preserve flexibility while limiting organisational risk.

3.3/ Investigator uncertainty

One of the most important dimensions of uncertainty, is related to the applicant(s). Investigator uncertainty is often assessed through indicators of the applicant's or research team's ability to conduct the proposed research.

Publication records, previous grant success, scientific leadership and institutional experience are frequently used as indicators of future performance (Hug & Aeschbach, 2020).

Responsibility for assessing investigator uncertainty typically rests with external reviewers and review panels, although programme managers and boards may play a greater role in investigator-centred funding schemes. The literature generally supports the relevance of previous scientific achievements while also pointing to potential biases. Bol et al. (2018), for example, demonstrate that previous funding success substantially increases the probability of future funding, while Merton's (1968) description of the Matthew Effect remains influential in explaining cumulative advantage within science.

This raises one of the most persistent questions in research funding, namely the balance between evaluating research ideas and evaluating the researchers proposing those ideas. Put differently: do we fund projects or people? Track record serves as an important proxy for investigator capability, but strong reliance on previous achievements may also favour established researchers and established research trajectories (Alberts et al., 2014).

Funding teams rather than individual investigators may provide another way of managing investigator uncertainty. From a funder perspective, team-based funding can distribute dependence across several researchers and combine complementary expertise, potentially reducing reliance on the capabilities of any single investigator. Hall et al. (2012), comparing transdisciplinary research centre grants with investigator-initiated grants over a ten-year period, found not only higher overall publication rates for the centre grants after an initial lag, but also considerably more uniform publication rates across grants. While this does not demonstrate that team funding necessarily reduces risk, it suggests that distributing scientific capacity across a team may contribute to more consistent outcomes. At the same time, team-based funding introduces other uncertainties, including those related to coordination, leadership and the integration of different forms of expertise.

Studies of investigator-based funding programmes suggest that greater reliance on researcher capability may increase the likelihood of highly influential discoveries, particularly where scientific uncertainty is high (Azoulay et al., 2011). Evidence regarding alternative approaches remains more limited. Narrative CVs, modified assessment criteria and partial blinding have attracted increasing attention, but we know little about their effects on funding outcomes (Recio-Saucedo et al., 2022).

The weight assigned to investigator uncertainty differs across funding instruments. Early-career schemes generally accept greater uncertainty regarding track record, while large investigator-based funding programmes deliberately place greater emphasis on the researcher's demonstrated scientific capabilities, while potentially being more accepting of greater scientific uncertainty.

Overall, the literature suggests that the appropriate balance between ideas and track record depends on the objectives of the funding instrument. The evidence does not support abandoning track record, but it does suggest that its weight should vary according to the type of research and the level of scientific uncertainty involved. Funders may also manage investigator uncertainty through the design of the grant itself, for example by funding teams with complementary capabilities rather than relying primarily on the track record and capabilities of a single investigator.

3.4/ Strategic and portfolio uncertainty

Strategic and portfolio uncertainty differ from the previous dimensions in that they are assessed primarily from the perspective of the funding organisation, rather than the individual proposal. Strategic uncertainty concerns whether proposals contribute to programme objectives, while portfolio uncertainty concerns how individual funding decisions contribute to the overall balance of the funding portfolio.

These dimensions are thereby typically addressed by programme managers and foundation boards rather than e.g. by external reviewers. Assessment relies less on scientific peer review and more on strategic priorities, programme objectives and considerations regarding the composition of the funding portfolio. Compared with scientific, feasibility and investigator uncertainty, strategic and portfolio uncertainty have received relatively limited attention in

the research literature. Nevertheless, OECD (2021) and evaluations of several high-risk funding programmes suggest that funding organisations increasingly seek to manage uncertainty across portfolios by combining funding instruments with different objectives and uncertainty profiles.

Several policy studies argue that this perspective is particularly relevant for organisations seeking to promote breakthrough research (Council of Canadian Academies, 2021; OECD, 2021). Rather than expecting every funded project to succeed, portfolio approaches recognise that a small number of highly successful projects may justify supporting a broader range of uncertain ideas. This also implies that different funding instruments should play different roles within the overall portfolio, with some programmes emphasising feasibility and accountability and others accepting greater scientific uncertainty.

Funding characteristics play a particularly important role in this context. The balance between investigator grants, project grants, exploratory funding and larger strategic initiatives determines not only how resources are allocated, but also the overall level and type of uncertainty that a funding organisation is prepared to accept.

Although the empirical evidence remains relatively limited, several consistent patterns emerge. Case studies of highly creative scientific environments emphasise the importance of long-term funding, scientific autonomy and organisational flexibility (Heinze et al., 2009). Similarly, evaluations of investigator-centred funding programmes, including the Howard Hughes Medical Institute, suggest that longer funding horizons combined with greater flexibility are associated with a greater likelihood of highly influential scientific contributions, albeit also with greater variation in outcomes (Azoulay et al., 2011). OECD (2021) likewise concludes that funding organisations seeking to support highly uncertain research generally combine scientific freedom with adaptive programme management rather than relying solely on modifications to peer review.

An interesting observation emerging from this literature is that long-term and flexible funding schemes may not simply accommodate greater uncertainty—they also change how uncertainty is managed. Unlike conventional project grants, these funding instruments allow researchers to adapt research questions, redirect activities and pursue unexpected findings as projects evolve. Consequently, individual objectives may not always be realised as originally planned, while the overall investment nevertheless generates substantial scientific value. This is consistent with Laudel and Gläser (2014), who argue that research characterised by high technical uncertainty often requires funding arrangements that permit adaptation as research unfolds, rather than strict adherence to an initial project plan.

Again, we see that funding instruments matter – not because one model consistently outperforms another, but because they provide different organisational responses to uncertainty. Some instruments seek to reduce uncertainty before funding decisions are made, while others accommodate uncertainty by providing researchers with greater flexibility to respond to unforeseen developments. This, in turn, shifts attention from the performance of individual projects towards the management of uncertainty across funding portfolios.

From the perspective of the funding organisation, the relevant question therefore becomes not only whether individual projects succeed, but whether the investment as a whole contributes to the foundation's objectives over time.

The final question concerns the appropriate level at which funding organisations should manage uncertainty. Much of the literature has focused on the assessment of individual proposals. More recently, however, attention has shifted towards portfolio approaches that distribute uncertainty across funding instruments and programmes.

Although direct empirical evidence remains limited, studies of organisations such as DARPA, and the NIH High-Risk, High-Reward Research Program suggest that portfolio approaches provide greater flexibility than attempting to maximise certainty within every individual funding decision (OECD, 2021). Rather than relying on a single assessment model, these organisations combine different funding instruments, time horizons and management approaches to balance scientific ambition with accountability across the funding portfolio.

The portfolio idea could also inform discussions at system level, inspired by the conclusions drawn in Council of Canadian Academies (2021), where it is stated that successful funding systems are characterised less by any single

funding instrument than by a diverse portfolio of complementary programmes designed to support different types of research and different forms of uncertainty.

Viewed from this perspective, portfolio management is not simply a way of spreading financial risk. Rather, it enables funding organisations to pursue multiple scientific objectives simultaneously by matching different funding instruments to different forms of uncertainty.

Overall, strategic and portfolio uncertainty differ from the previous uncertainty dimensions in that they are managed primarily through governance rather than proposal assessment. The literature suggests that funding organisations increasingly address these uncertainties through differentiated funding instruments, adaptive programme management and portfolio thinking, thereby shifting attention from maximising certainty within individual grants towards managing uncertainty across the funding portfolio.

3.5/ Summary

Taken together, the literature suggests that different forms of uncertainty are addressed through different combinations of assessment criteria, evidence and decision-makers. Reviewers, panels, programme managers and foundation boards each contribute to the assessment process, but they do so from different perspectives and with different responsibilities. Similarly, funding instruments differ in the extent to which they accommodate scientific, feasibility, investigator and strategic uncertainty.

4.0 Governing uncertainty in research funding

The preceding chapters have shown that accommodating uncertainty depends not only on how individual proposals are assessed, but also on how funding organisations define their objectives, design funding instruments and govern their funding portfolio. Decisions about risk are therefore embedded in organisational structures and routines rather than confined to individual review panels or funding decisions.

Managing uncertainty is thereby an organisational capability, and the literature identifies several organisational characteristics that support this capability. These include explicit mandates for exploratory research, organisational autonomy, differentiated funding portfolios and a willingness to experiment with assessment and funding practices while evaluating their effects (Council of Canadian Academies, 2021; OECD, 2021).

Organisational autonomy is particularly important in this respect. Funders with sufficient autonomy may be better able to pursue long-term objectives, tolerate uncertainty and occasional failure, and maintain funding strategies that cannot necessarily be justified by the expected return of each individual grant. Autonomy may also create room for programme managers and funding organisations to exercise discretion, adapt instruments over time and balance different forms of risk across a broader portfolio. Conversely, strong demands for short-term accountability, predictability or demonstrable success at the level of individual grants may encourage more conservative funding choices, even where the organisation has an explicit ambition to support high-risk research.

Taken together, these findings suggest that funders rarely become more willing to support uncertainty simply by asking reviewers or boards to select riskier projects. Rather, uncertainty is governed through organisational design: through the mandate of the funding organisation, the degree of discretion it has in pursuing that mandate, the instruments it offers, and the way risks and expected returns are distributed across the funding portfolio.

4.1/ Uncertainty profiles

The analysis in this brief suggests that uncertainty can be governed through three complementary strategies. Some approaches seek to *reduce uncertainty before funding decisions are made* through peer review, feasibility assessment or evidence of previous scientific performance. Others *accommodate uncertainty by providing researchers with the flexibility* to adapt research questions, methods and collaborations as projects evolve. Finally, uncertainty may be *managed strategically across a portfolio of funding instruments*, recognising that different programmes serve different objectives and need not be governed by identical assessment criteria.

Table 2: Three complementary strategies for governing uncertainties

Governance strategy	Typical mechanisms	Examples
Reduce uncertainty before funding	Peer review, pilot data, track record	Conventional project grants
Accommodate uncertainty during funding	Grant duration, flexibility, investigator funding	HHMI, Centres of Excellence
Distribute uncertainty across investments	Portfolio management, differentiated instruments	DARPA, NIH HRHR, ERC

These strategies should not be understood as competing alternatives. Most funding organisations combine elements of all three, although the balance varies according to organisational objectives and the characteristics of different funding instruments. The central governance challenge is therefore not simply whether to accept more uncertainty, but how these different strategies are combined across the funding portfolio.

4.2/ Uncertainty profiles across funding instruments

Funding instruments also differ in the level of organisational commitment required from the funding organisation. Figure 1 brings this observation – and the previously unfolded variation in uncertainty tolerance – together by illustrating how selected funding instruments may be characterised by different uncertainty profiles across the dimensions developed in this brief.

The figure should be understood as a conceptual synthesis of the literature rather than an empirical measurement or ranking of specific funding schemes. The scores have been assigned on the basis of descriptions of the selected funding instruments in the research and policy literature, including their objectives, eligibility and assessment criteria, funding duration and scale, and the degree of discretion and flexibility built into their design. These characteristics have been interpreted through the uncertainty dimensions developed in this brief and translated into stylised scores in order to make differences between instruments analytically visible. The scores should therefore not be read as precise measurements, nor as independently validated assessments of the individual programmes. Actual funding schemes may also vary in their implementation and may change over time.

Figure 1: Uncertainty profiles of selected funding instruments

Importantly, there is no inherently optimal uncertainty profile. A higher score does not indicate that an instrument is better, more innovative or more desirable. Rather, the profiles illustrate that funding instruments make different choices about where uncertainty is accepted and where it is constrained. An instrument designed to accommodate substantial scientific uncertainty may, for example, seek to reduce investigator or implementation uncertainty, while a long-term centre grant may expose the funder to considerable organisational commitment even where other uncertainties are mitigated through extensive assessment. The relevant question is therefore not how much uncertainty an instrument accepts overall, but whether its specific profile is consistent with its objectives.

Used in this way, the framework can support strategic discussions within funding organisations. A funder considering a new funding instrument can use the dimensions to ask which uncertainties the instrument is deliberately intended to accommodate, which it seeks to mitigate, and whether the resulting balance corresponds to the purpose of the scheme. The same framework can be applied when reviewing existing instruments or comparing them across a funding portfolio.

The framework can therefore serve not only as a way of characterising individual funding instruments, but also as a portfolio and design tool. Comparing profiles may help boards consider whether different instruments play sufficiently distinct and complementary roles, whether particular forms of uncertainty are systematically avoided across

the portfolio, and where new instruments or changes to existing schemes could create greater capacity to manage – rather than simply minimise – uncertainty.

4.3/ Organisational tools

The literature described throughout this brief points to a range of organisational and assessment practices that may help funders govern different forms of uncertainty. Table 3 summarises illustrative examples organised according to the types of uncertainty they are primarily intended to address. The examples should be viewed as illustrative rather than prescriptive, and several may be combined within the same funding organisation.

Table 3:

Uncertainty dimension	**Examples of organisational and assessment practices**	**Purpose**	**References**
Scientific uncertainty	Separate assessment of originality and feasibility; explicit novelty criterion; reviewer calibration (SCT); dedicated high-risk programmes; grant duration and flexible adjustment	Makes explicit that originality and feasibility are distinct assessment dimensions and reduces the tendency for novel ideas to be penalised because they are uncertain.	Pier et al. (2017); Franzoni & Stephan (2023); OECD (2021); CCA (2021)
Conceptual uncertainty	Interdisciplinary or mixed review panels; broader reviewer expertise; panel deliberation; discretionary ("golden ticket") nominations	Supports assessment of proposals that challenge existing paradigms or combine knowledge across disciplinary boundaries.	Lamont (2009); Boudreau et al. (2016); CCA (2021); UKRI (2023)
Feasibility / Technical uncertainty	Seed or exploratory grants; staged funding; outline applications; reduced requirements for preliminary data; large grants with room for exploratory subprojects	Allows technically uncertain ideas to be explored before committing larger resources and avoids requiring excessive proof-of-concept.	OECD (2021); Carnehl, Ottaviani & Preusser (2024); Laudel & Gläser (2014); CCA (2021)
Implementation uncertainty	Milestone-based funding; adaptive grant management; mid-term learning reviews; flexible adjustment of work plans	Enables projects to adapt as new knowledge emerges while maintaining appropriate accountability for progress and resources.	OECD (2021); Carnehl, Ottaviani & Preusser (2024); Azoulay et al. (2011)
Investigator uncertainty	Narrative CVs; broader assessment of leadership and research contributions; team-based assessment; mentoring schemes; partial blinding	Broadens the basis for assessing researchers beyond publication metrics and institutional prestige, particularly for early-career applicants.	UKRI (2023); Bol et al. (2018); Li & Agha (2015); CCA (2021)
Strategic uncertainty	Programme-specific assessment criteria; differentiated review criteria across funding instruments; programme manager involvement in funding decisions; thematic or mission-oriented calls	Aligns assessment criteria with programme objectives rather than applying identical criteria across all funding schemes.	OECD (2021); CCA (2021); Franzoni, Stephan & Veugelers (2022)
Portfolio uncertainty	Diverse portfolio of funding instruments; dedicated exploratory programmes; periodic portfolio reviews; experimentation with assessment models; explicit portfolio targets	Manages uncertainty across the overall funding portfolio rather than expecting each individual grant to optimise both certainty and scientific ambition.	OECD (2021); CCA (2021); Franzoni, Stephan & Veugelers (2022)

4.4/ Questions for strategic discussion

The literature suggests that different approaches are appropriate for different organisational objectives and different forms of uncertainty. This brief therefore concludes with a set of questions, that can provide the backdrop for strategic discussions in foundation boards or programme management that wish to develop their strategic profile.

- Strategic objectives
    - Which forms of uncertainty are central to the foundation's mission?
    - Is the ambition to promote breakthrough research reflected explicitly in programme objectives and assessment criteria?
- Assessment and selection
    - Are the current assessment criteria aligned with the objectives of different funding instruments, or are similar criteria applied across programmes with fundamentally different purposes?
    - Should the balance between scientific originality, feasibility and investigator track record differ across funding schemes?
- Funding design
    - Does the current portfolio contain funding instruments that accommodate different forms of uncertainty?
    - Where would greater flexibility in grant duration, grant size or project management create better conditions for ambitious research?
- Portfolio governance
    - Is uncertainty primarily managed within individual funding decisions or across the overall funding portfolio?
    - How should success be evaluated for programmes that explicitly aim to support highly uncertain or potentially transformative research?
- Organisational learning
    - Does the foundation systematically evaluate the effects of changes to assessment procedures or funding instruments?
    - Where is there scope to experiment with new approaches while generating evidence about their effectiveness?

Ultimately, this brief has illustrated that the governance challenge for research funders is not to eliminate uncertainty, but to ensure that different forms of uncertainty are assessed, accommodated and managed in ways that are consistent with the foundation's objectives. As illustrated throughout this final chapter, governing uncertainty is therefore not simply a question of accepting more or less risk. Rather, it involves aligning funding instruments, assessment practices and governance arrangements with the different uncertainty profiles. Making these choices explicit may be at least as important as deciding how much uncertainty a funding organisation is willing to accept.

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