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The New Innovators' Dilemma: Why we urgently need a Code of Ethics for Innovation Managers

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Abstract

In the past two decades, innovation has become the defining logic of business and policy. Every organisation now claims to innovate responsibly, sustainably, or ethically. Yet, when compared with established professions such as accounting, engineering, or project management, innovation management stands out for what it lacks: any formalised code of ethics. Innovation managers operate in spaces of uncertainty and asymmetrical power, often shaping technologies and systems long before society has understood their implications. The consequences of this ethical vacuum in Innovation Management (IM) are increasingly profound. The question, then, is no longer whether innovation should be ethical, but how ethics can be meaningfully institutionalised within innovation practice. This Letter proposes that innovation management urgently requires a formal code of ethics to guide conduct, clarify values, and legitimise the practice of innovation. It situates this argument within three long-standing ethical traditions that address the uncertainty of technological progress: the Precautionary Principle, which emphasises restraint in the face of risk; Anticipatory Ethics, which seeks to foresee moral challenges before they arise; and Responsible Innovation, which calls for alignment between technological progress and societal values. Together, these frameworks provide a robust theoretical foundation for the development of a hybrid model to provide ethical foresight into the evolving profession of innovation management.

Keywords: anticipatory ethics, responsible innovation, innovation management, Code of Ethics for Innovation.

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1 Introduction

1.1 The Need for an ethical framework

Technology and innovation generally have positive connotations, and yet, one can question whether they really are inherently good (VonSchomberg, 2013). Innovation, in some instances, can have attractive short term advantages but come with uncertainty about future impacts and consequences (Stilgoe et al, 2013). The combustion engine revolutionised transport but is nowadays one of the main sources of CO2 emissions (Lubberink et al, 2017). Technological innovation can produce both benefits and unforeseen, harmful consequences. Examples range from nuclear power and bioengineering to genetically modified foods (Buhmann and Fieseler, 2021). That it is private enterprise often initiating, owning and developing these technological innovations, underlines the need for "extended corporate citizenship" (Matten and Crane, 2005), in which ethical businesses engage with local actors, governments, and civil society to foster responsible processes for innovation (Stafford-Smith et al, 2017).

By its very nature, innovation management is concerned with shaping the future (Spanjol et al, 2024). Accordingly, research in this field is fundamentally an inquiry into how the future is created—by whom (organisations, networks, collaborations), for what purposes (solving global challenges, enhancing customer value, making complex things simple, achieving corporate targets for market performance), and with what wider consequences (social, environmental and beyond). Rapid advances in science and technology hold the potential to address some of society's most persistent and pressing challenges. Additionally, they can also open new opportunities for market creation, and thus stimulate economic growth. Yet these same advances frequently generate complex ethical dilemmas, and their implementation can produce unforeseen negative consequences that organizations are often poorly prepared to anticipate or manage. Bucic and O'Connor (2024) report of a rogue practitioner doing gene editing in China where the consequences of his actions for future generations and human development are unknown. The recent ISO standard (ISO56002), which helps guide commercial innovation practice in organisations, makes no reference to ethics (Tidd, 2021).

Separately, Those who consider ethics in innovation to be discretionary or optional might be persuaded by a statement published, two years ago, on the webpage of the Centre for AI Safety: *"Mitigating the risk of extinction from AI should be a global priority alongside other societal-scale risks such as pandemics and nuclear war"* it reads. This statement was supported by the CEOs of OpenAI (Sam Altman) and Google Deep Mind (Demis Hassabis). Now, two years later, Altman insists he has not changed his mind (FT, 2025). Grace et al (2025) asked 2778 researchers, who have published on AI in top tier journals, for their predictions of the pace, nature and impacts of AI development. 'Between 38% and 51% of respondents gave at least a 10% chance to advanced AI leading to outcomes as bad as human extinction' (p.1). More than half suggested that "substantial" or "extreme" concern is warranted about AI - particularly its role in increasing misinformation, boosting authoritarian control, worsening inequality, and other scenarios.

AI, in particular, represents the forum where the absence of ethical guardrails is both most publicly debated and most acutely felt. A fascinating and profoundly important battle is unfolding between those who want to see unbridled acceleration of AI development and those who would like to see research into AI halted immediately. In October, 2025, the Future of Life Institute (FLI), a non-profit dedicated to 'mitigating existential risks from transformative technologies', coordinated and published a concise, 30-word, open letter: "*We call for a prohibition on the development of superintelligence, not lifted before there is: 1) broad scientific consensus that it will be done safely and controllably, and 2) strong public buy-in*." The letter specifically targets tech giants like Google, Anthropic, OpenAI, and Meta that are engaged in building "superintelligence." FLI, in their original plea in 2023, had demanded a pause for this research but this time chose to call for a complete ban because they believe the technology could arrive in as little as one to two years and presents risks including human economic obsolescence, loss of control and dignity, national security threats, and potential human extinction (Future of Life Institute, 2025).

The FT (Criddle, 2025) reports that this call from FLI is notable for the fact that it is supported by a wide and diverse coalition of policymakers, tech entrepreneurs, celebrities and public intellectuals. Among the 800 people who have publicly put their name to the plea are Yuval Noah Harari, Steve Bannon, Steve Wozniak, Richard Branson, Stephen Fry, Prince Harry and Meghan Markle and former Irish President Mary Robinson. The list also includes AI pioneers Geoffrey Hinton and Yoshua Bengio (two of the so-called "Godfathers of AI" and Turing Award winners). This open letter is a modern version of the Precautionary Principle where the principle is

invoked to argue for a pause or moratorium on untested technologies with potentially catastrophic societal consequences (Majone, 2002).

In the opposing corner, is the *Tech Optimist Manifesto* (Andreessen, 2023) by Marc Andreessen, founding partner of Silicon Valley investment firm Andreessen Horowitz which is a widely read and discussed document published in October 2023. The manifesto celebrates technology as the primary driver of 'human progress, freedom, and moral good.' It was intended as a philosophical declaration defending unrestrained technological innovation and a critique of what Andreessen views as "tech pessimism" and "bureaucratic restraint." Andreessen (2023) sets himself and his philosophy firmly in opposition to any type of anticipatory governance, such as Responsible Innovation - or even the SDGs - which he labels 'the forces of anti-progress.' The techno-optimist stance is not new; these views are common in both industry and in policy (Johnston, 2020; McKeown, 2018), but many academics treat them with deep suspicion (Danaher, 2022). Some suggest (Buchanan, 2024) Andreessen's arguments are taken to the level of absurdity especially when he writes: 'We believe that any deceleration of AI will cost lives. Deaths that were preventable by the AI that was prevented from existing is a form of murder."

But, AI is not the only battleground for ethics in innovation. Recent, high-profile corporate examples—from the fraudulent claims and systemic fraud at Theranos, where a mission of "changing healthcare" collapsed into patient harm and criminal convictions. After raising more than $700 million, Elizabeth Holmes, the founder and chief executive officer of the healthcare startup once valued at $10 billion, was found guilty on four charges of defrauding investors (Das and Drolet, 2022), she was jailed and the company was found to be completely worthless. Theranos was a unicorn company: A unicorn is a privately held business, usually a technology startup, valued at $1 billion or more (Fortune, 2016). It was engaging in a practice called "bitzscaling," which prioritizes speed of growth over operational efficiency and is especially prevalent in markets using disruptive technology (Hoffman, 2018; Kuratko et al, 2020). Holmes became infamous and the highly publicised downfall of Theranos eroded an already frayed relationship between the pharmaceutical industry and public trust (Levinson et al, 2018). The consequences of this breach of trust became apparent in the ensuing Covid 19 pandemic.

In financial services, the opaque, ethically-agnostic, risk-taking at FTX, which led to a catastrophic collapse and the loss of billions—demonstrate that when innovation is uncoupled from a clear ethical compass, the results can be catastrophic for investors, employees, and even for society at large. The FTX fiasco unearthed several fundamental ethical, regulatory, and policy-based flaws, inherently damaging the cryptocurrency industry at large (Conlon et al, 2023). Purdue Pharma, the maker of OxyContin, was accused of misleading doctors and patients about the addictive nature of its painkillers, contributing to the opioid crisis in the United States. The company filed for bankruptcy in 2019 as part of a settlement deal.These are not isolated incidents but symptoms of a deeper systemic issue: innovation professionals are routinely placed in ethically charged, high-uncertainty situations without a guiding professional framework. The challenges posed by new frontiers like artificial intelligence, gene editing, and synthetic biology only underscore the urgency of this issue, raising the stakes from financial ruin to societal-scale risk.

2 Prior Research in the Field

Despite calls for research at the intersection of ethics and innovation, the field remains underdeveloped (Stahl and Coeckelbergh, 2016; Stahl et al., 2017). Creativity literature has largely ignored ethical dimensions (Baucus et al., 2008), leaving organisations with limited frameworks to integrate ethical oversight into innovation processes

(Schumacher & Wasieleskey, 2018). Policy frameworks struggle to keep pace with rapid technological advancement (Pimple, 2014; Nestor and Wilson, 2022). Even relatively contemporary industry standards like ISO 56000 prioritise efficiency over ethical responsibility (Tidd, 2021).

Joseph Schumpeter's concept of "creative destruction" positions innovation as an inherently disruptive force (Schumpeter, 1983; Blok, 2021). While historically beneficial, unchecked disruption is increasingly problematic amid global challenges such as climate change, political instability, and systemic inequality (Spanjol et al., 2024). Organisations such as the United Nations and World Economic Forum highlight innovation's role in achieving Sustainable Development Goals (Directorate-General for Research and Innovation (European Commission) & von Schomberg, 2011), but they assume, sadly, without strong evidence, that corporate innovation naturally aligns with these priorities. Without ethical guardrails, this assumption will always be flawed. Efforts such as Responsible Innovation (RI) and Responsible Research and Innovation (RRI) have attempted to reframe innovation within a societal context (von Schomberg & Hankins, 2019). However, practical implementation remains limited. These frameworks emphasise a critical stance on the interplay between technology, politics, and society (Owen & Pansera, 2019), yet struggle to gain widespread traction or penetrate corporate decision-making processes (van Hove & Wickson, 2017).

2.1 The Precautionary Principle

Originating in Germany during the 1970s under the term Vorsorgeprinzip (literally, the "foresight principle"), the Precautionary Principle (PP) was conceived as a regulatory approach to environmental protection grounded in anticipation and prevention (Majone, 2002). It gained international recognition and legitimacy through the Brundtland Report (1987) and was formally enshrined in Principle 15 of the 1992 Rio Declaration on Environment and Development, which stated that "lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation." The principle was subsequently embedded in European Union law under the Treaty on European Union (1992) and has since served as the normative basis for numerous EU regulations concerning environmental protection, food safety, and public health (Foster et al., 2000).

Conceptually, the PP represents a reversal of the traditional risk assessment paradigm. By stipulating that the lack of full scientific certainty shall not preclude cost-effective preventative measures against threats of serious or irreversible harm, the PP fundamentally shifts the burden of proof onto the proponent of a potentially hazardous activity to demonstrate safety, rather than requiring regulators to prove danger. In this sense, it privileges a "better safe than sorry" logic when facing uncertainty or potential irreversibility of harm. However, interpretations of the principle vary widely—from strict formulations that demand near-absolute proof of safety (as in the World Charter for Nature, 1982) to more pragmatic versions that allow for proportional and cost-effective action (as in the Rio Declaration, 1992). This interpretive elasticity has, as Majone (2002) observed, "engendered endless controversy" (p. 979).

The PP's influence has been particularly strong in the European Union, where it underpins policies on genetically modified organisms (GMOs), chemicals (REACH Regulation), and emerging biotechnologies. In contrast, the United States has tended to rely on risk–cost–benefit analysis, reflecting a more utilitarian and innovation-friendly orientation. Critics argue that while the PP provides a legitimate rationale for restraint in the face of scientific uncertainty, it also suffers from conceptual and practical weaknesses: it can distort regulatory priorities, invite protectionist misuse, and impede international coordination (Majone, 2002). More fundamentally, an overly

rigid application may stifle innovation by demanding levels of certainty that are epistemically unattainable for emerging technologies.

From a management and innovation perspective, the Precautionary Principle embodies a governance dilemma: how to balance the moral duty to avoid harm with the strategic need to experiment and advance. It reflects a risk-averse institutional logic—appropriate where the potential for irreversible harm is high—but ill-suited to domains that depend on rapid experimentation, iteration and entrepreneurial discovery. Consequently, later frameworks such as Responsible Innovation (RI) emerged to retain the ethical foresight of precaution while introducing participatory and adaptive mechanisms better aligned with the dynamics of technological and organizational change.

2.2 Responsible Innovation (RI)

The question of how to encourage radical technological innovation, with its reliance on highly novel technologies, while safeguarding society against its potential harms, lies at the heart of the Responsible Innovation (RI) agenda (Stahl et al., 2017). Since the social and ethical consequences of innovation are often unforeseeable — a limitation acknowledged by science and technology scholars since the 1970s (von Schomberg, 2013), RI emerged in the early 2000s as a normative and governance framework designed to make innovation more anticipatory, inclusive, and ethically reflexive. Building on traditions in Science and Technology Studies (STS), innovation policy, and participatory governance, RI seeks to ensure that technological progress is aligned with societal values, democratic accountability, and sustainability goals (Owen et al., 2013).

A widely adopted conceptualisation defines RI through four foundational dimensions — *anticipation, inclusion, reflexivity,* and *responsiveness* (Stilgoe et al, 2013). *Anticipation* entails exploring plausible futures and foreseeing potential consequences; *inclusion* promotes early and continuous stakeholder engagement; *reflexivity* requires innovators to examine their own assumptions, motivations, and responsibilities; and *responsiveness* emphasises the capacity to adapt innovation trajectories as new insights or public concerns emerge. Together, these principles are intended to transform ethics from an external constraint into a core design feature of innovation systems.

RI gained institutional legitimacy through the European Commission, where it became a cross-cutting principle under *Horizon 2020* and its successor *Horizon Europe* (von Schomberg, 2011). It has since influenced funding criteria of the UK EPSRC, the Dutch Rathenau Institute, and policy discussions within the OECD. While early applications focused on biotechnology and nanoscience, RI now frames debates in artificial intelligence, digital governance, and sustainability innovation (de Saille, 2015).

The rise of artificial intelligence (AI) has underscored both the urgency and the complexity of implementing RI. AI systems' opacity and autonomy challenge the conditions of transparency needed for the type of insightful deliberation that RI presupposes. Buhmann and Fieseler (2021) argue that algorithmic opacity undermines the epistemic basis for public scrutiny, while Fisher et al. (2024) highlight the need for new deliberative mechanisms, including civil-society oversight, investigative journalism, and participatory design, to sustain the normative aims of RI in an algorithmic era.

In summary, Responsible Innovation represents a shift from reactive regulation to proactive governance, embedding ethical reflection and stakeholder participation directly into the innovation process. Its ambition is not merely to prevent harm but to co-create socially desirable futures through anticipatory, reflexive, and inclusive innovation practices.

2.3 Anticipatory Ethics

Anticipatory ethics is defined by its core challenge: undertaking a necessary moral assessment of emerging technologies, determining what is good or bad about devices and right or wrong about their use, at the earliest stages of development, long before their ultimate form; their potential usage patterns, or their social consequences are fully evident (Sollie, 2007). Anticipatory ethics represents a forward-looking approach to technology governance that seeks to integrate ethical reflection into the earliest stages of research and development. Unlike retrospective ethics, which evaluates harms after technologies are deployed, anticipatory ethics addresses uncertainty, complexity, and moral risk before a technology becomes entrenched in society (Brey, 2012). It responds to a persistent gap in both traditional technology ethics and policy frameworks such as the Precautionary Principle, which tend to regulate after harm or uncertainty has become visible.

Emerging in the early 2000s within the field of ethics of technology, the concept was formalised in Brey's (2012) model of Anticipatory Technology Ethics (ATE). Brey argued that existing approaches, including ethical technology assessment (eTA), the techno-ethical scenario method, and the EU-funded ETICA project—were often either too narrow in scope or insufficiently systematic. His ATE framework sought to address these limitations by integrating ethical theory with foresight methodologies drawn from futures studies, such as scenario analysis, Delphi techniques, and structured technology forecasting. The goal was not simply to imagine alternative futures, but to ethically appraise them, using moral reasoning to steer technological trajectories toward more desirable outcomes.

Subsequent scholarship expanded ATE's methodological foundations. Nanayakkara et al. (2020) examined how different kinds of uncertainty, epistemic (knowledge-based), aleatory (probabilistic), and ontological (stemming from novelty)—affect the robustness of ethical foresight. They proposed a model that draws analogies from statistical inference, highlighting the need to involve stakeholders directly in constructing scenarios that capture the social and institutional dynamics of emerging technologies. This participatory element strengthens the validity of ethical foresight and reduces the risk of speculative overreach.

Empirical studies demonstrate the utility of anticipatory ethics in addressing real-world technological challenges. Nestor and Wilson (2022) applied anticipatory ethics to CRISPR genome-editing, examining moral questions of identity and personhood in the context of potential cognitive enhancement. Their work illustrates how anticipatory frameworks can enrich policy discourse by clarifying the ethical stakes of technological futures before they materialise. Similarly, Diakopoulos and Johnson (2020), as discussed by Nanayakkara et al. (2020), used structured scenario-building to explore the democratic vulnerabilities introduced by deepfake technologies. In both cases, anticipatory ethics functions as an early-warning system—mapping moral landscapes before societal adoption locks technologies into path-dependent outcomes.

A key distinction between Anticipatory Ethics and Responsible Innovation (RI) lies in their orientation and locus of practice. Whereas RI emphasises institutional processes—governance, stakeholder inclusion, and organisational reflexivity (Stilgoe et al., 2013)—anticipatory ethics operates more directly at the intersection of moral theory and futures research. It does not depend on formal institutional mandates but instead provides a normative and epistemic toolkit for identifying ethically salient futures. In this sense, anticipatory ethics complements RI: it deepens the "anticipation" component of the AIRR framework by offering methodological guidance on how to think ethically about future technologies before governance structures are in place.

Institutionally, anticipatory ethics has found greater uptake in public-sector R&D and policy environments, notably within programmes funded by the European Commission and DARPA, where long-term public interest justifies extended ethical foresight. In contrast, commercial innovation

settings, often constrained by short-term return expectations, have been slower to adopt such methodologies. However, growing emphasis on Environmental, Social, and Governance (ESG) performance, and increasing scrutiny of AI and biotech sectors, suggest a gradual diffusion of anticipatory ethical thinking into corporate strategy and innovation management.

Anticipatory ethics functions as a meta-ethical framework that bridges the gap between precautionary restraint and responsible innovation. By asking "what futures ought we to pursue?" rather than "what harms should we avoid?", it reorients ethical inquiry from risk avoidance to ethical imagination and design. It offers management scholars and innovation leaders a conceptual and methodological foundation for embedding moral foresight into decision-making, thereby aligning technological development with both societal values and long-term sustainability.

3 Conclusion and Recommendations: A Hybrid Ethical Architecture

Taken together, the Precautionary Principle, Responsible Innovation, and Anticipatory Ethics trace a powerful conceptual evolution—from avoiding harm to envisioning desirable futures. Yet innovation management as a discipline has been slow to internalise these lessons. Unlike established corporate professions such as accounting or project management, innovation lacks a formal ethical framework to guide behaviour, manage dilemmas, and legitimise practice. This absence is increasingly problematic, even untenable in an era when innovation routinely shapes not only markets, but societies, ecosystems, and human futures.

What is now required is the creation of a Code of Ethics for Innovation Management—one that blends the institutional legitimacy of *Responsible Innovation* with the methodological foresight of *Anticipatory Ethics*. Such a hybrid model would allow managers to embed ethical reflection directly into innovation processes rather than treating ethics as an external compliance task. For practitioners, this means operationalising foresight, inclusivity, and reflexivity within day-to-day decision-making. For educators and professional bodies, it means recognising ethics as a foundational competence of the innovation profession. By institutionalising these principles, the field can move from reactive governance to proactive stewardship—ensuring that innovation not only drives growth, but also earns and sustains public trust.

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