Book Proposal

The Architecture of Uncertainty:

Epistemology, Risk, and Decision in the Modern Sciences

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Date:	July 2026
Series:	*Cambridge Studies in Science, Philosophy and Policy*

Overview & Rationale

Modern science operates in the shadow of irreducible uncertainty — from climate modelling and pandemic forecasting to drug approval and autonomous systems. Despite this, the conceptual vocabulary for reasoning about uncertainty remains fragmented across disciplines. Statisticians invoke frequentist confidence intervals; economists frame choices under risk and ambiguity; philosophers debate epistemic versus aleatoric uncertainty; engineers build fault-tolerant systems with little awareness of the philosophical foundations underlying their heuristics.

The Architecture of Uncertainty offers the first unified, book-length treatment of uncertainty for a cross-disciplinary scholarly audience. Drawing on philosophy of science, Bayesian statistics, decision theory, and science and technology studies (STS), the book constructs a coherent taxonomy of uncertainty, examines how scientific communities negotiate its limits, and evaluates the institutional and ethical consequences of misrepresenting or suppressing it. The argument is both descriptive and normative: the book diagnoses current failures and proposes principled remedies grounded in the philosophy of science.

Aims & Scope

The book pursues four interlocking aims:

- **Conceptual clarity.** Distinguish uncertainty from risk, ambiguity, and ignorance; provide a working taxonomy usable across quantitative and qualitative disciplines.
- **Historical grounding.** Trace how the treatment of uncertainty evolved from Laplace's determinism through the probabilistic revolution, the rise of Bayesianism, and contemporary machine learning.
- **Institutional analysis.** Examine how regulatory bodies (FDA, IPCC, EMA) communicate and sometimes conceal uncertainty; propose transparency standards.
- **Ethical appraisal.** Assess the moral obligations of researchers, policy advisors, and journal editors when uncertainty is high and the stakes are public.

The book is explicitly *interdisciplinary*: each chapter pairs philosophical argument with a detailed case study drawn from climate science, clinical trials, financial modelling, or algorithmic decision-making. The intended length is approximately **90,000 words** across eight chapters plus front and back matter.

Market & Competing Titles

Primary Audience

Graduate students and researchers in philosophy of science, science and technology studies, statistics, and policy studies; upper-division undergraduates in honours programmes; and informed general readers working in science journalism or policy.

Comparative Analysis

Title (Author, Year)	Publisher	Relationship to Proposed Book
The Failure of Risk Management **(Hubbard, 2009)**	Wiley	Practitioner focus; limited philosophical analysis; no STS dimension.
Ignorance and Uncertainty **(Smithson, 1989)**	Springer	Now dated; predates Bayesian resurgence and computational science.
Taming Uncertainty **(Hertwig et al., 2019)**	MIT Press	Cognitive psychology focus; does not address institutional or ethical dimensions.
The Precipice **(Ord, 2020)**	Basic Books	Existential-risk frame; popular rather than scholarly; no epistemological grounding.

No current title integrates philosophical, historical, institutional, and ethical dimensions of scientific uncertainty in a single scholarly volume. The proposed book fills this gap.

Table of Contents

Proposes normative standards for uncertainty disclosure in journals, regulatory documents, and public communications.

Chapter 8. Towards an Architecture of Honest Science
Synthesises the book's argument; outlines an epistemic virtue framework for scientists, policy-makers, and science communicators.

Sample Chapter Summary

Chapter 4: Case Study I — Climate Science (~11,000 words)

This chapter opens with a close reading of the IPCC Sixth Assessment Report's calibrated uncertainty language — its five likelihood tiers (*virtually certain* to *exceptionally unlikely*) and four confidence levels — and asks what philosophical work this vocabulary actually performs. Drawing on interviews with IPCC authors and an analysis of lead-author guidance documents, the chapter demonstrates that the official framework conflates two distinct dimensions of uncertainty: *scientific agreement* (how many independent lines of evidence converge) and *evidential quality* (how strong each line is). The conflation is not merely academic: it explains why policy audiences systematically underestimate tipping-point risks that have high agreement but low evidential precision.

The chapter then applies the taxonomy developed in Chapter 1 to proposed reforms, evaluating structured expert elicitation protocols (Cooke's Classical Method, IDEA) as candidate replacements. It concludes that no purely formal method can substitute for cultivated *epistemic humility* among scientists who interact with policy — a theme carried forward into Chapter 7.

Author Biography

Eleanor M. Hartwell is Associate Professor of Philosophy at Stanford University, where she holds the Weinberg Family Chair in Philosophy of Science. She received her B.A. from Oxford University (Keble College) and her Ph.D. from Princeton University (2011). Her first book, *Credence and Commitment* (Cambridge University Press, 2018), received the American Philosophical Association's Book Prize in Epistemology. She has published in *Philosophy of Science*, *The British Journal for the Philosophy of Science*, *Synthese*, and *Risk Analysis*. She has advised the European Commission's Joint Research Centre on uncertainty standards and is a current fellow of the American Academy of Arts and Sciences.

She is represented by Claire Dupont at the Glenmore Agency, London.

Production Details

Word count Approximately 90,000 words (including bibliography and index).

Chapters Eight chapters, introduction, conclusion, and consolidated bibliography.

Figures & tables Approximately 12 figures (line graphs, decision trees) and 6 tables; all author-generated, no third-party rights required.

Manuscript delivery Fifteen months from contract signature (target: October 2027).

Supplementary materials	Companion website with extended case-study data, R analysis scripts, and an uncertainty-language style guide for authors.
Peer review	Author recommends two reviewers with expertise in philosophy of science and in quantitative risk analysis respectively.

Submitted to Cambridge University Press · July 2026 · Correspondence: ehartwell@stanford.edu