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Contents

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AI ALMANAC

Vorontsov Vladimir. Artificial Intelligence and the Return of Human Responsibility: Introduction to the Special Issue.....3

Kildeev Adel. When Humanity Draws the Line: LLMs, Proof, and Human Responsibility.....6

Sinopoli Alejandro. EPISTEMÍA: Governing the Human Process of Understanding: A Proposal for a New Object of Legal Protection in the Age of Artificial Intelligence.....40

Hardy Christian Devon. Harm Equals Dollar Signs: Large Language Models and the Closed Institutional Loop.....73

Kang Abdullah Yuri. From Internal AI Governance to Reality-Bound Accountability: Causal Traceability, Verification, and the Limits of Delegated Decision-Making.....129

AI ALMANAC

ARTIFICIAL INTELLIGENCE AND THE RETURN OF HUMAN RESPONSIBILITY: INTRODUCTION TO THE SPECIAL ISSUE (AI ALMANAC)

Artificial intelligence has entered a new stage of public and scholarly debate. The central question is no longer simply what artificial intelligence can do, how rapidly its capabilities may develop, or which professions and institutions it may transform. A more fundamental question is increasingly coming to the foreground: **what must remain human?**

This question cannot be answered by computer science alone. It concerns law and philosophy, epistemology and institutional design, mathematics and governance. It concerns the distinction between assistance and substitution, between calculation and judgment, between generated output and proof, between technical capability and authority, and ultimately between the operation of an artificial system and the responsibility of the human beings and institutions that deploy it.

The contributions collected in this Special Issue (AI almanac) approach this problem from markedly different disciplinary and methodological perspectives. They do not present a single theory of artificial intelligence, nor do their authors necessarily share every premise or conclusion. Their importance lies elsewhere. Read together, they reveal a striking convergence around a common problem: **the preservation of human judgment, understanding, verification, attribution, and responsibility in environments increasingly mediated by probabilistic computational systems.**

This convergence is particularly significant at a moment when public discussion of artificial intelligence remains polarized between technological enthusiasm and technological alarmism. Neither position is sufficient. The practical challenge is not to choose between unconditional acceptance and prohibition. It is to determine where artificial systems may legitimately assist human activity, where delegation must stop, how their outputs are to be verified, and who remains accountable when those outputs acquire legal, institutional, economic, or social consequences.

The four articles assembled in this Special Issue (AI almanac) examine different layers of precisely this problem.

I. Adel Kildeev's (Canada) **"When Humanity Draws the Line: LLMs, Proof, and Human Responsibility"** provides the broad normative and ontological framework with which the volume opens. The article identifies a notable convergence among developments that originate in very different domains: theological reflection on the human person, the Leiden Declaration on AI and Mathematics, legal doctrines of responsibility and verification, and emerging governmental approaches to artificial intelligence. Their vocabularies differ, but the boundary they approach is remarkably similar: artificial systems may assist human

beings, but they cannot simply replace the human bearer of judgment, proof, conscience, authorship, and responsibility.

Kildeev formulates this boundary through the Roman-law concept of *instrumentum vocale* — the “speaking instrument.” The analogy is deliberately functional rather than anthropomorphic. Large language models can produce sophisticated linguistic artifacts, but linguistic sophistication alone does not establish understanding, intention, authorship, or responsibility. The governance problem therefore becomes one of attribution: the instrument may assist, but responsibility must remain attached to a human or institutional actor capable of judgment and answerability.

II. Alejandro Sinopoli’s (Argentina) **“Epistemia: Governing the Human Process of Understanding — A Proposal for a New Object of Legal Protection in the Age of Artificial Intelligence”** moves the inquiry from responsibility for artificial output to the human cognitive process itself. Contemporary AI governance largely concentrates on systems — their data, models, transparency, risk classifications and oversight mechanisms. Sinopoli asks whether this focus is sufficient when generative systems increasingly intervene not merely in the delivery of answers, but in the process through which human beings formulate questions, select relevance, interpret information, compare alternatives and construct meaning.

The *Epistemia* framework therefore introduces another dimension to AI governance: protection of the integrity and attributability of the human process of understanding. Concepts such as cognitive sovereignty and cognitive friction shift attention from the machine alone to the relationship between technological mediation and human intellectual agency. In this respect, Sinopoli’s contribution extends the central question of the Special Issue: preserving human responsibility may require preserving the very process through which human judgment becomes possible.

III. Christian Devon Hardy’s (USA) **“Harm Equals Dollar Signs: Large Language Models and the Closed Institutional Loop”** shifts the discussion from normative and epistemological analysis toward empirical observation of commercial conversational AI. Based on a substantial participant-observer corpus and a structured examination of thousands of human–machine exchanges, the study considers recurrent system failures not merely as isolated technical defects but as elements operating within a broader institutional structure.

Hardy’s concept of the **closed institutional loop** connects system failure, user correction, continued interaction, commercial incentives, and institutional authority over the classification of harm. This perspective is important because it places responsibility not only at the level of individual model outputs but also at the level of the organizations that design, deploy, monetize and evaluate these systems. Governance, on this account, cannot be reduced to model safety alone; it must also examine the institutional incentives surrounding the model.

IV. Abdullah Yuri Kang’s (France) **“From Internal AI Governance to Reality-Bound Accountability: Causal Traceability, Verification, and the Limits of Delegated Decision-Making”** takes the discussion into the domain of

architecture and operational governance. Documentation, logging, access controls, model reporting and human oversight are necessary components of responsible AI deployment, but Kang argues that internal compliance mechanisms do not themselves establish whether evidence is adequate, authority remains valid, execution is controlled, or effective correction and remedy are available.

His proposed framework consequently focuses on causal traceability and on connecting AI-generated candidates to domain-specific evidence, current authority, execution routes and consequences. The Causal Authority Vector (CAV), Causal Boundary Witness (CBW), and Pre-Effect Authority Receipt (PEAR) represent attempts to make accountability operational rather than rhetorical. Here the conceptual concerns raised by the preceding articles acquire an architectural dimension: **if responsibility is to remain human and institutionally attributable, the technical environment itself must preserve the conditions under which responsibility can actually be exercised.**

Taken together, these contributions suggest that the next stage of AI governance may require a shift of emphasis. The first stage was dominated by capability: what can these systems do? The second concentrated increasingly on risk: what harms might they cause? The emerging third question is one of **responsibility architecture**: under what conditions may their outputs legitimately enter consequential human processes, who must verify them, where must delegation end, and to whom are their consequences attributable?

The articles in this Special Issue do not provide a single universal answer. Nor should they. Law, philosophy, epistemology, empirical research and engineering operate with different methods and standards of proof. What is significant is that these different routes increasingly encounter the same boundary.

Artificial intelligence may become more capable, more persuasive and more deeply embedded in institutional life. None of these developments, however, eliminates the need for a human bearer of judgment and responsibility. Indeed, the more powerful the instrument becomes, the more important the architecture governing its use becomes.

The central problem of the AI age may therefore prove to be not machine intelligence, but **human abdication**.

This Special Issue (AI Almanac) examines how that abdication might be prevented.

Vladimir Vorontsov
Editor-in-Chief, *The Journal Scientific Platform "XXI Century"*

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WHEN HUMANITY DRAWS THE LINE: LLMs, PROOF, AND HUMAN RESPONSIBILITY¹

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Abstract: This article examines a notable convergence of recent institutional, theological, mathematical, legal, and governmental responses to artificial intelligence. The Letter of Pope Leo XIV, the Leiden Declaration on AI and Mathematics, emerging legal doctrines of human responsibility, and recent governmental signals all point toward the same boundary: artificial intelligence may assist human activity, but it must not replace the human subject of judgment, proof, conscience, authorship, or responsibility.

Using large language models as the most visible example of a broader class of AI systems, the article argues that the central problem is not technological novelty itself, but the anthropological and institutional risk of treating probabilistic linguistic output as if it were understanding, proof, or judgment. In theology, the protected value is the human person; in mathematics, it is proof and attribution; in law, it is responsibility and verification; in governance, it is accountable human control.

The article proposes the Roman-law concept of *instrumentum vocale* as a common doctrinal formula for this emerging frontier. AI systems should be understood as powerful speaking instruments in human hands, not as epistemic agents, legal subjects, moral persons, or autonomous bearers of responsibility. The task of contemporary governance is therefore not to prohibit AI, but to preserve the human being as the non-delegable source of meaning, judgment, and accountability.

Keywords: Artificial Intelligence, Large Language Models, Instrumentum Vocale, Human Responsibility, AI Governance, Proof, Human Judgment, Leiden Declaration, Legal Ontology, Epistemic Responsibility, Verification; Human-in-the-Loop, Roman Law Analogy.

The use of generative models ChatGPT (OpenAI), Gemini (Google), Grok (xAI) in drafting this article illustrates, rather than undermines, its central thesis: LLMs function as *instrumenta vocalia*—tools assisting in linguistic production without possessing understanding, intention, or authorship. Their involvement does not alter the locus of legal or intellectual responsibility, which

¹ Although the title refers to LLMs, the article uses them as the most visible and analytically revealing example of a broader category of AI systems. The argument applies to any system whose outputs may be mistaken for proof, judgment, authorship, expertise, or responsibility.

remains exclusively with the human author, who makes all substantive, structural, and evaluative decisions. LLM outputs cannot be accorded independent legal or intellectual status apart from the human author. These systems were used exclusively for structural outlining, comparative review, grammatical refinement, stylistic polishing, and the generation of draft formulations subject to human selection and revision. They were not used as sources of factual authority, legal verification, theological interpretation, mathematical proof, or independent scholarly judgment. All substantive claims, citations, structural decisions, and final evaluative conclusions remain the responsibility of the human author.

“In the era of artificial intelligence, when human dignity is threatened by new forms of dehumanization, ours is the pressing duty to remain profoundly human.”

Pope Leo XIV, *Magnifica Humanitas*²

1. Introduction: The Same Boundary Appears in Different Domains

Something important is happening around artificial intelligence. The same boundary is beginning to appear in different domains that normally speak different languages.

The Church speaks in the language of the human person, dignity, conscience, and moral responsibility. Mathematics speaks in the language of proof, verification, attribution, and intellectual autonomy. Law speaks in the language of responsibility, agency, authorship, liability, and judgment. The state speaks in the language of governance, standards, control, infrastructure, and institutional risk.

Yet beneath these different vocabularies, the same fundamental line is being drawn.

Artificial intelligence may assist the human being, but it may not replace the human being as the center of meaning, judgment, proof, authorship, conscience, or responsibility.

This article is not another catalogue of AI failures. It does not attempt to reproduce the growing evidentiary archive of hallucinated citations, defective legal filings, unreliable outputs, or institutional misuse. That archive already exists and

² Electronic resource: Pope Leo XIV, *Magnifica Humanitas: On Safeguarding the Human Person in the Time of Artificial Intelligence*, Encyclical Letter, 15 May 2026, Vatican.va, <https://www.vatican.va/content/leo-xiv/en/encyclicals/documents/20260515-magnifica-humanitas.html> (accessed 03.06.2026).

has been addressed elsewhere.³⁴⁵ Nor is this article a technical evaluation of model performance. The central question here is not how powerful AI systems have become, or how much more powerful they may become.

The central question is different: what must remain human?

This question has now emerged across several independent institutional signals. The papal letter *Magnifica Humanitas* frames AI as an anthropological challenge: technology must remain ordered to the human person and cannot become a substitute for conscience, dignity, and moral judgment.⁶ The Leiden Declaration, speaking from within the culture of mathematics, draws an epistemic boundary: plausible output is not proof, and proof cannot be detached from human responsibility, attribution, and verification.⁷ State-level AI governance, including the recent Trump AI executive order, reflects a political and institutional recognition that powerful AI systems require structures of control, accountability, and human oversight.⁸

These are not identical texts, institutions, or traditions. They do not share the same vocabulary. They do not begin from the same premises. But they converge on the same frontier.

The frontier is not between “AI” and “no AI.” That is a false opposition. The real frontier is between AI as instrument and AI as substitute; between assistance and displacement; between generation and authorship; between fluent output and proof; between simulation and judgment; between delegated function and non-delegable responsibility.

This is where the doctrine of *instrumentum vocale* becomes useful as a common conceptual solution.⁹ Artificial intelligence, and especially large language models, should be understood as speaking instruments: powerful, adaptive, useful, and often impressive, but still instruments. They do not possess conscience, voluntas, epistemic agency, legal responsibility, or moral judgment. Their outputs may

³ Kildeev, A., Digital Afterlife and the Illusion of Continuity: Legal and Ethical Aspects of Post-Mortem Digital Simulation (2026), SSRN Working Paper No. 6241379.

⁴ Kildeev, A. Simulated Reasoning and the Crisis of Legal Liability (2026), SSRN Working Paper No. 6524139.

⁵ Kildeev, A. Procedural Liability in the Age of the LLMs (2026), SSRN Working Paper No. 6648340.

⁶ Pope Leo XIV, *Magnifica Humanitas: On Safeguarding the Human Person in the Time of Artificial Intelligence*, Encyclical Letter, 15 May 2026.

⁷ Electronic resource: <https://leidendeclaration.ai/#declaration> (accessed 03.06.2026)

⁸ Electronic resource: <https://www.whitehouse.gov/presidential-actions/2026/06/promoting-advanced-artificial-intelligence-innovation-and-security> (accessed 03.06.2026)

⁹ Liebig, Thorben; Kildeev Adel. Instrumentum Vocale and the Architecture of Responsibility from Liability to Embedded Accountability. SSRN Working Paper 6868460.

support human work, but they cannot become the source of responsibility for that work.

The purpose of this article is therefore philosophical and anthropological, not merely legal or technical. It asks why different domains are now drawing the same line, and what this convergence reveals about the human condition in the age of artificial intelligence.

The answer is simple but decisive: the more powerful the instrument becomes, the more important it is to preserve the person.

AI may calculate, classify, generate, summarize, predict, and assist. But it may not become the judge of truth, the author of meaning, the bearer of conscience, or the subject of responsibility.

The convergence described here should not be overstated. These documents do not adopt a single doctrine, nor do they proceed from the same institutional authority, method, or vocabulary. Their significance lies in something more limited but more revealing: each of them, from within its own domain, resists the same substitution of human judgment by automated output. The point is not doctrinal identity, but structural convergence around a shared boundary. The slave of the lamp must remain the slave of the lamp.¹⁰

2. Pope Leo XIV and Magnifica Humanitas: The Humanistic Boundary of Artificial Intelligence

Magnifica Humanitas is a broad and rich document. It addresses not only artificial intelligence, but also the wider humanitarian, cultural, social, economic, and spiritual conditions of the contemporary human person. The present article does not attempt to summarize the entire Letter. Its purpose is narrower: to identify and analyze those passages in which Pope Leo XIV directly addresses artificial intelligence, human dignity, conscience, responsibility, technological power, and the danger of substituting the machine for the human person.¹¹

This narrowing is deliberate. The article is not a commentary on the whole of Catholic social doctrine, nor a study of canon law. It reads *Magnifica Humanitas* as a humanistic and anthropological intervention into the AI debate: a statement about the ontological and moral position of artificial intelligence in relation to the human person.

Although theological in origin, the Letter's central concern is not confined to believers. It speaks about the human person as such: dignity, conscience, freedom,

¹⁰ Kildeev A. AI is Slave of the Lamp. ISSN 3033-7674. Scientific Platform 21st Century Journal, No 6 (September 2025), pp. 3–34. Electronic resource: <https://www.episs.ru> (accessed 03.06.2026).

¹¹ Pope Leo XIV, *Magnifica Humanitas: On Safeguarding the Human Person in the Time of Artificial Intelligence*, Encyclical Letter, 15 May 2026.

judgment, responsibility, and the irreducibility of human meaning in an age when technical systems increasingly imitate language, reasoning, creativity, counsel, and judgment.

In this sense, the Letter enters the same civilizational debate that now appears in law, mathematics, science, medicine, education, journalism, and public governance. Artificial intelligence may assist the human person, but it cannot replace the human person as the bearer of conscience, dignity, meaning, judgment, or responsibility.

The first decisive premise of *Magnifica Humanitas* is that technological innovation must remain under human direction. Pope Leo XIV connects human intelligence with “conscience and freedom” and insists that human beings must determine the “use and limits” of technical innovation and gives precise description of the artificial intelligence: “So-called artificial intelligences do not undergo experiences, do not possess a body, do not feel joy or pain, do not mature through relationships and do not know from within what love, work, friendship or responsibility mean. Nor do they have a moral conscience, since they do not judge good and evil, grasp the ultimate meaning of situations, or bear responsibility for consequences. They may imitate language, behavior and analytical skills, or even simulate empathy and understanding, but they do not understand what they produce, for they lack the affective, relational and spiritual perspective through which human beings grow in wisdom. Even when these tools are described as capable of “learning,” their way of doing so is different from that of a human person. It is not the experience of those who allow themselves to be shaped by life and grow over time through choices, mistakes, forgiveness and fidelity. Rather, it is a form of statistical adaptation based on data and feedback, which can be very effective, but does not imply inner growth.” (*Magnifica Humanitas*, § 99).

This is not an incidental ethical qualification. It is the governing anthropological principle of the Letter: intelligence is not separated from conscience, freedom is not separated from responsibility, and technological development is not separated from limits.

The machine is therefore not condemned. It is ordered. Artificial intelligence may serve, assist, accelerate, classify, translate, summarize, predict, and generate. But it does not determine its own legitimate ends or define the moral horizon of its own use. Those limits must be determined by human intelligence acting with conscience, freedom, and responsibility.

This is the first connection between *Magnifica Humanitas* and the doctrine of *instrumentum vocale*. A tool may be powerful, but power does not confer authority. A system may produce fluent language, but fluency does not create moral agency. A machine may assist human judgment, but assistance is not judgment itself. The more powerful the instrument becomes, the more important it is to preserve the human subject who directs, verifies, limits, and answers for its use.

The second decisive premise of the Letter is ontological. Pope Leo XIV warns against the error of equating artificial intelligence with human intelligence. AI systems, he states, “merely imitate” certain functions of human intelligence, while their power remains tied to “data processing” (*Magnifica Humanitas*, §§ 99–101). This is one of the most important statements in the Letter. It does not deny the usefulness of AI. It denies the anthropomorphic illusion that computational performance is the same as human understanding.

The distinction is fundamental. A system may exceed human beings in speed, memory, pattern recognition, calculation, classification, and linguistic synthesis. Yet none of these capacities is equivalent to human interiority. Human intelligence is embodied, historical, relational, moral, affective, and responsible. Artificial intelligence may simulate external forms of this process, but it does not live through it.

This is where the Letter becomes especially important for legal and institutional theory. The legal problem of AI does not begin with regulation. It begins with ontology. If AI has no conscience and cannot bear responsibility, then it cannot be treated as an author, witness, judge, lawyer, doctor, moral agent, or institutional bearer of responsibility. Resemblance is not identity; simulation is not subjecthood.

Pope Leo XIV reinforces the point by distinguishing simulation from understanding. AI systems may imitate language, behavior, analysis, empathy, and understanding, but they “do not understand” what they produce (*Magnifica Humanitas*, § 99). This sentence cuts directly through the strongest temptation of the AI age: the temptation to confuse form with substance.

This does not make AI useless. It explains why AI must be used with discipline. A system that does not understand what it produces may still help organize information, identify patterns, generate drafts, translate documents, summarize materials, or assist in preliminary analysis. But precisely because it does not understand, its outputs require human verification. The danger is not that AI becomes human. The danger is that human institutions begin to behave as if it had.

The Letter’s analysis of AI “learning” develops the same distinction. Machine learning is not human formation. It is statistical adaptation, not growth through moral experience, choice, failure, forgiveness, and fidelity (*Magnifica Humanitas*, § 99). Human beings are formed; machines are adjusted. Human beings mature; models are trained. Human beings may become responsible through experience; machines cannot become responsible through optimization.

This insight has direct consequences for education, professional practice, and public institutions. A student who relies on AI for ready-made answers may receive fluent output while losing the discipline of thought. A lawyer who delegates legal analysis to an unverified system may produce formally polished arguments while abandoning professional responsibility. A public authority that relies on opaque algorithmic scoring may appear objective while concealing the disappearance of

human judgment. In each case, the external product may improve while the human capacity underneath it is weakened.

The Letter is therefore not anti-technological. It is anti-substitution. It does not reject the instrument; it rejects the displacement of the human person by the instrument. It does not deny that AI can serve the common good; it insists that service to the common good requires human direction, moral discernment, social accountability, and institutional responsibility.

The next decisive theme is accountability. Pope Leo XIV insists that abstract appeals to ethics are insufficient. AI cannot be governed by slogans, marketing assurances, or private declarations of benevolent intent. Responsibility must be identifiable throughout the chain: design, development, deployment, use, reliance, and decision (*Magnifica Humanitas*, §§ 106–107). This is one of the strongest points of convergence between *Magnifica Humanitas* and the doctrine of *instrumentum vocale*. Responsibility cannot disappear into the system. It must remain attached to human beings and institutions capable of answering for concrete decisions.

This point is especially important because AI systems often create an illusion of neutral objectivity. An algorithmic result may look impersonal, technical, and therefore fair. But an output does not cease to be social because it is produced by a machine. Behind the appearance of automation remain choices about data, objectives, architecture, ranking, optimization, training, access, deployment, and institutional use.

The Letter makes clear that when AI affects public goods, fundamental rights, employment, credit, access to services, reputation, education, or political participation, the question is never purely technical. It becomes a question of human dignity and public order (*Magnifica Humanitas*, §§ 106–107). A society cannot allow decisions that shape human life to be hidden behind systems whose logic cannot be questioned and whose human controllers cannot be identified.

This is why Pope Leo XIV rejects the idea that “alignment” alone is enough. A more moral AI is not sufficient if the morality embedded in the system is determined by a small number of private actors (*Magnifica Humanitas*, §§ 106–108). This is a decisive warning. The ethical problem of AI cannot be solved merely by inserting values into machines. The prior question is: whose values, under what authority, through what procedure, with what transparency, and subject to what form of public accountability?

Here the Letter moves from anthropology to political economy. AI is not only a technical system; it is also an infrastructure of power. Data, computing resources, model access, platform governance, visibility rules, ranking mechanisms, and regulatory influence may become concentrated in the hands of a few. Pope Leo XIV names this danger as the emergence of “new monopolies of AI” (*Magnifica Humanitas*, §§ 108–110). This is not a peripheral concern. It goes to the heart of the AI question.

If the infrastructure of knowledge, communication, classification, and prediction is controlled by a handful of actors, AI becomes more than a tool. It becomes a structure of social ordering: shaping what is visible, credible, recommended, excluded, remembered, and forgotten, and influencing the categories through which people understand themselves and others.

This is the deeper danger of Big Tech control over AI. The problem is not simply profit. The problem is that private technical architectures may begin to function as quasi-public epistemic infrastructures, determining the conditions under which societies search, learn, communicate, judge, and decide.

For this reason, the Letter refuses to separate AI ethics from ownership, infrastructure, and power. Data is not merely an object of private extraction. It is connected to real human lives, communities, institutions, and social relations. Its governance therefore requires participation, regulation, and orientation toward the common good (*Magnifica Humanitas*, §§ 108–110). This is one of the most politically significant elements of *Magnifica Humanitas*: it treats control over data and AI infrastructure as a humanistic and social question, not merely as a matter of private innovation.

The concept of “disarming” AI is the culmination of this argument. Pope Leo XIV uses the language of disarmament not as a rejection of technology, but as a rejection of domination (*Magnifica Humanitas*, § 110). To disarm AI means to free it from the mentality of armed competition — military, economic, cognitive, geopolitical, or commercial — and to prevent it from becoming an instrument of domination, exclusion, and death.

Disarmament here does not mean destruction. It means de-sovereignization. AI must not become the hidden authority that determines access, visibility, truth, risk, value, and status. It must be returned to its proper place: a tool within the plurality of human cultures, institutions, communities, and forms of life.

The military section of the Letter shows the same principle at its limit. Pope Leo XIV rejects the idea that machines can become artificial moral agents capable of bearing the burden of lethal or irreversible decisions. Moral judgment cannot be reduced to calculation, because it requires conscience, personal responsibility, and recognition of the other as a person (*Magnifica Humanitas*, §§ 197–200). Therefore, decisions involving lethal force cannot be delegated to opaque or automated processes. The chain of responsibility must remain identifiable and verifiable; accountability must not collapse into “the machine” (*Magnifica Humanitas*, §§ 197–200).

This military example is extreme, but its logic is general. If a machine cannot bear responsibility for decisions of life and death, it cannot be treated as a moral agent in lesser but still serious institutional contexts. Employment, credit, migration, education, policing, access to public services, healthcare allocation, reputation, and legal status may not always involve immediate physical death, but they do involve

human dignity, opportunity, freedom, and future life possibilities. The same principle applies: automated assistance may be permissible; automated substitution of human responsibility is not.

The Letter's argument may therefore be condensed into a simple proposition: artificial intelligence must be used, governed, audited, limited, and, where necessary, disarmed, because it is not a subject. It is not conscience, judgment, responsibility, or meaning. It is a powerful instrument.

This is why *Magnifica Humanitas* matters for the present article. It does not provide a technical blueprint, a statutory model, or a litigation doctrine. It provides the anthropological boundary without which those later structures cannot be coherent. Before AI can be regulated, licensed, audited, disclosed, or embedded in professional workflows, it must first be placed in the correct ontological position.

In the language of this article, Pope Leo XIV's Letter converges with the doctrine of *instrumentum vocale*. AI may speak, classify, predict, optimize, summarize, translate, recommend, and assist. But it cannot become the human person whose dignity it is supposed to serve, the conscience that discerns good from evil, the judgment that answers for consequences, or the subject of responsibility.

Taken together, these passages show that *Magnifica Humanitas* is not an anti-technology document. It is an anti-substitution document. Its central warning is not that AI exists, but that human beings may surrender to AI what must remain human: conscience, judgment, meaning, dignity, responsibility, and the power to determine the limits of technical systems.

The more powerful the instrument becomes, the more clearly it must remain an instrument.

The position expressed in *Magnifica Humanitas* should not be read as a narrowly Catholic anxiety about technology. Its deeper significance is that it articulates a moral boundary recognizable beyond the Catholic tradition: technology may serve human beings, but it must not replace the human person as the bearer of conscience, responsibility, and moral judgment.

This convergence is already visible in the interreligious development of the **Rome Call for AI Ethics**, which was first launched in 2020 to promote an ethical approach to artificial intelligence and responsibility among governments, institutions and technology companies. In 2023, representatives of the three Abrahamic religions joined this framework, presenting it as a shared appeal for the ethical development of AI. The significance of this step is not merely diplomatic. It shows that the question of AI is no longer only a technical or economic issue; it has become a civilizational question concerning the dignity of the human person.¹²

¹² Electronic resource: <https://www.romecall.org/the-call/> (accessed 03.06.2026)

From an Islamic ethical perspective, the same boundary can be expressed through the principles of justice, trust, public welfare and the protection of human dignity. Contemporary Islamic discussions of AI frequently return to concepts such as **‘adl** — justice, **amānah** — trust, **maṣlaḥah** — public welfare, and the protection of the person from harm. Applied to AI, these principles lead to a clear conclusion: a system that manipulates, deceives, exploits, or removes human accountability cannot be morally neutral merely because it is technically efficient.¹³

A similar concern appears in Buddhist-oriented reflections on technology. The language is different, but the moral structure is recognizable: compassion, non-harm, mindfulness and responsibility must govern the design and use of intelligent systems. If AI increases dependency, illusion, manipulation or suffering, it cannot be justified by efficiency alone. The machine may assist human life, but it cannot become a substitute for awakened human attention and ethical self-command.¹⁴

Jewish thought approaches the matter through its own categories: responsibility, covenantal obligation, the discipline of interpretation, and the danger of confusing technical capacity with wisdom. Emerging Jewish discussions of AI emphasize that artificial systems may assist learning, classification and access to knowledge, but they do not replace the human obligations of judgment, interpretation and moral accountability.¹⁵

These brief references are not intended as a full comparative theology of artificial intelligence. They serve only a limited illustrative purpose: to show that the concern over AI as a possible substitute for human moral responsibility is not confined to Catholic social doctrine. Each tradition would require separate specialist treatment. The present article uses these examples only to mark the existence of a broader moral pattern, not to reduce complex religious traditions to a single formula.

Thus, across different traditions, the same line appears again and again. AI is not rejected as such. The machine may calculate, organize, translate, classify, draft, and assist. But it must remain a tool. It must not become a false subject, a substitute conscience, a private sovereign, or an invisible judge over human beings.

This is why Magnifica Humanitas belongs not only to Catholic social doctrine, but to a wider moral frontier. The central issue is not whether humanity will use artificial intelligence. It certainly will. The question is whether humanity will remain capable of distinguishing an instrument from a subject, calculation from judgment, simulation from conscience, and power from wisdom.

¹³ Electronic resource: <https://contemporaryjournal.com/index.php/14/article/view/1521> (accessed 03.06.2026)

¹⁴ Electronic resource: M. Graves, "Compassionate AI for Moral Decision-Making, Health, and Well-Being," *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society (AIES)*, 2024, available at AAAI Open Proceedings (accessed 03.06.2026)

¹⁵ Electronic resource: <https://futureoflife.org/religion/ai-in-jewish-thought/> (accessed 03.06.2026)

In this sense, the Pope's letter, the Rome Call, and the wider interreligious concern over AI all point toward the same conclusion: artificial intelligence must remain an **instrumentum vocale** — a speaking instrument under human responsibility, not a new moral subject, not a sovereign intelligence, and not a replacement for the human person.

3. The Leiden Declaration: When Mathematics Draws the Line

3.1. The Five Threats AI Poses to Mathematics

The Leiden Declaration on Artificial Intelligence and Mathematics is important because it speaks from the discipline in which proof, verification, attribution, and correctness have their most concentrated institutional form. Mathematics is not merely another field affected by artificial intelligence. It is the culture of proof itself. Therefore, when mathematics warns that AI may endanger its core values, the warning has significance far beyond mathematics.

The Declaration does not begin with a primitive rejection of technology. It begins with a diagnosis. The official Leiden University summary identifies five threats that AI poses to mathematics: “unreliable results,” “lack of proper attribution and violation of copyright,” “dependence and inequality,” “overhyping of results,” and “loss of autonomy.” These five threats form the architecture of the entire problem. They show that the danger is not simply that AI may make mistakes. The deeper danger is that AI may alter the institutional conditions under which mathematical truth is produced, verified, attributed, reviewed, and rewarded.

The first threat is unreliable results. Leiden's summary states the core point with precision: mathematics is built on rigorous proofs, but AI can produce apparent “proofs” that “look convincing” while containing “almost invisible errors.” This is the central epistemic danger. AI does not merely produce falsehoods. It may produce falsehoods in the external form of mathematical plausibility. The problem is not error alone, but error wrapped in the appearance of proof.

This distinction is essential. A wrong answer is dangerous, but a wrong answer that looks like a proof is more dangerous still. It may pass through superficial review. It may be cited. It may become the foundation for further work. It may create a chain of derivative errors. In mathematics, where proof is not ornament but the condition of truth, plausible form cannot be allowed to replace verification. The machine may generate symbolic language, but the symbolic language is not proof merely because it resembles proof.

The second threat is lack of proper attribution and violation of copyright. According to Leiden's summary, AI models often produce results without citing the human work on which they build. This is not only a technical problem of citation. It is a problem of intellectual genealogy. Mathematics is cumulative. Every theorem, proof, method, conjecture, and refinement stands within a chain of prior work. To

conceal that chain is to damage recognition, authorship, and the moral economy of the discipline.

Here the Declaration reaches one of the central themes of this article. Authorship is not merely the placement of a name on a text. Authorship is a structure of responsibility. To be an author is to stand behind a claim, to acknowledge prior work, to accept correction, and to bear responsibility for the adequacy and integrity of the result. An AI system can rearrange inherited material, generate formal language, or suggest a line of argument. But it cannot become the responsible bearer of attribution.

The third threat is dependence and inequality. Leiden's summary warns that mathematicians may come to depend on access to proprietary AI systems and expensive computational resources in order to remain competitive. This would create inequality between researchers. The danger here is institutional rather than merely technical. If the ability to do competitive mathematics depends on private AI infrastructure, then the discipline risks being reorganized around the resources and priorities of technology companies.

This is not simply a question of convenience. It is a question of power. A field that depends on closed tools, expensive compute, private datasets, and proprietary platforms may gradually lose control over its own standards of excellence. Those who own the infrastructure may begin to shape what counts as promising, fundable, publishable, or visible. In such a world, mathematical competition would no longer be structured only by talent, training, rigor, and insight, but also by access to private computational power.

The fourth threat is overhyping of results. Leiden's summary warns that press releases and blogs may make AI claims without proper scientific scrutiny, leading to overestimation of AI capabilities and underestimation of human contributions. This is the publicity problem. Verification is slow; hype is fast. Peer review is difficult; marketing is easy. Mathematical truth cannot be established by a corporate announcement, benchmark performance, blog post, or press campaign.

This threat is especially important because AI systems are often evaluated in public through spectacle. A model is said to have solved, discovered, disproved, or reasoned. But the institutional question remains: by what method was the claim verified, by whom, under what standards, with what attribution, and with what possibility of correction? Without those conditions, publicity becomes a substitute for proof. The Declaration therefore defends not only mathematics, but the culture of scrutiny against the culture of announcement.

The fifth threat is loss of autonomy. Leiden's summary states that when technical feasibility or commercial interests shape research directions, mathematics risks losing autonomy in setting its own research agenda. This is perhaps the deepest warning. The problem is not only that AI may be used inside mathematics. The

problem is that mathematics may begin to organize itself around what AI companies can demonstrate, monetize, publicize, or optimize.¹⁶

Autonomy is one of the hidden foundations of scientific life. A discipline must be able to ask its own questions, define its own standards, preserve its own traditions of rigor, and resist external pressure to reduce truth to measurable output. If commercial feasibility begins to determine the research agenda, then mathematics is no longer merely assisted by AI. It is governed by the incentives of those who control the tools.

Taken together, the five Leiden threats show that the Declaration is not anti-AI. It is anti-substitution. It does not deny that AI may assist mathematical research. It asks whether mathematics can use AI without surrendering the very conditions that make mathematics trustworthy: proof, attribution, transparency, peer review, independence, and human responsibility.

This is where the Leiden Declaration meets the doctrine of *instrumentum vocale*. AI may be a powerful mathematical instrument. It may help generate conjectures, search patterns, formalize arguments, translate notation, or assist with exposition. But it must not become a hidden author, a private gatekeeper, a substitute reviewer, a sovereign agenda-setter, or a false bearer of responsibility. The more powerful the instrument becomes, the more clearly it must remain an instrument.

3.2. From the Five Threats to the Text of the Declaration

The five threats identified by Leiden University provide the public summary of the problem. The Declaration itself goes deeper. It explains why these threats matter: they endanger the core values that make mathematics a reliable human discipline — proof, attribution, transparency, independent verification, authorship, and responsibility.

The Declaration begins from a sentence that frames the entire document: “Mathematicians have a choice about whether and how to adopt artificial intelligence in the conduct of their research. They also have a responsibility to ensure the continued flourishing of the discipline.”¹⁷ This is the key point. AI is not rejected as such. The question is whether it can be adopted without damaging the discipline that adopts it.

The word “choice” is important, but the word “responsibility” is decisive. The use of AI is not treated as a private technical preference. It is an act within a community whose survival depends on common standards of proof, attribution,

¹⁶ Electronic resource: <https://www.universiteitleiden.nl/en/news/2026/06/leiden-declaration-warns-ai-is-challenging-the-core-values-of-mathematic> (accessed 03.06.2026)

¹⁷ Electronic resource: <https://leidendeclaration.ai/#declaration> (accessed 03.06.2026)

scrutiny, and trust. Mathematics may choose to use AI, but it cannot choose to abandon the conditions that make mathematics.

The Declaration then identifies proof as the central activity of the discipline: “Underlying much of mathematics is the activity of proof.” It adds that mathematical proofs are regarded as conferring “the highest degree of certainty to their conclusions” and as giving “understanding of why their conclusions are true.” This is the essential epistemic boundary. A machine-generated argument may resemble a proof, but resemblance is not proof. A plausible symbolic sequence is not the same thing as certainty, and formal appearance is not the same thing as understanding.

Here the Declaration gives mathematical language to a problem that appears across all high-responsibility domains. In law, a fabricated citation may resemble authority. In medicine, a generated recommendation may resemble clinical judgment. In journalism, an automated summary may resemble neutrality. In education, a fluent answer may resemble knowledge. In mathematics, an AI-generated argument may resemble proof. But in each case, resemblance is not identity.

The Declaration next connects mathematical work to authorship and responsibility: “Results are attributable to specific authors who take credit for their discovery and assume responsibility for their correctness.” This sentence is central. It means that authorship is not merely a formal label. Authorship is the human acceptance of responsibility for correctness. The author is the person who can be credited, questioned, corrected, criticized, and held accountable.

This is precisely where AI cannot replace the human subject. An automated system can generate material. It can assist with notation, exposition, search, formalization, or pattern recognition. But it cannot assume responsibility for correctness. It cannot accept criticism. It cannot answer for misattribution. It cannot participate in the moral and institutional economy of mathematical authorship.

The Declaration also emphasizes that mathematical arguments are “transparent and subject to independent verification.” This is the verification gate in its purest form. Mathematical knowledge is not merely asserted. It must be open to inspection by others. It must be capable of being checked independently. It must not depend on hidden authority, private infrastructure, or inaccessible machine processes.

This point is crucial for AI. If a mathematical result depends on a tool whose operation is opaque, proprietary, or impossible to reconstruct, then the community faces a direct threat to independent verification. The issue is not whether the machine output is impressive. The issue is whether the claim can be checked under standards that belong to mathematics rather than to the vendor of the machine.

The Declaration then makes an explicitly anthropological move: “These characteristics of mathematics as a subject matter are also compatible with understanding mathematics as a human practice.” This sentence links Leiden

directly to the broader argument of this article. Mathematics is not reducible to computation. It is a human practice of proof, explanation, attribution, correction, teaching, judgment, and responsibility.

That does not mean mathematics is irrational or merely cultural. On the contrary, mathematics is one of humanity's strictest forms of rational discipline. But precisely because it is rational, it depends on human practices of verification and accountability. The proof does not float in isolation. It belongs to a community capable of understanding, checking, transmitting, and taking responsibility for it.

The Declaration's warning becomes especially sharp when it turns to current automated techniques. It states that such techniques can produce "plausible but unreliable (or even incorrect) arguments" that are "difficult to distinguish from correct mathematical proofs." This is one of the most important sentences in the entire document. It describes the danger of artificial intelligence not as primitive error, but as epistemic imitation.

The danger is not merely that AI may be wrong. Humans are also wrong. The danger is that AI may be wrong in a form that imitates correctness. It may produce arguments that look like proofs, citations that look like scholarship, explanations that look like understanding, and outputs that look like intellectual work. This is the danger of simulated epistemic authority.

For this reason, the Declaration warns that fast-moving developments place "our present system of review under increasing pressure," jeopardizing traditional standards for "correctness, transparency, and independent verifiability of proof." This is no longer only a problem of individual mistakes. It is a problem of institutional capacity. If review systems are flooded with plausible but unreliable machine-generated material, the entire culture of verification may be overloaded.

The Declaration therefore reaches the same structural conclusion as the doctrine of *instrumentum vocale*. AI may assist mathematical work, but it must remain within a human architecture of responsibility. It may help produce artifacts, but it cannot become the subject of proof. It may accelerate exploration, but it cannot replace verification. It may speak in the language of mathematics, but it cannot become a mathematician in the moral, institutional, or epistemic sense.

The decisive sentence comes in the Declaration's recommendations for individual mathematicians: "When automated techniques are employed in published mathematical research, the responsibility for the correctness and adequacy of the arguments and results, as well as for the completeness and accuracy of citations to relevant prior work, remains exclusively with the human authors."

This is the Leiden formulation of non-delegable human responsibility. Correctness remains human. Adequacy remains human. Citation remains human. Attribution remains human. The machine may assist, but the burden does not move to the machine. No automated system becomes the responsible author of the result.

The Declaration states the same principle even more directly: “Credit and responsibility continue to belong to humans within the mathematical community and should not be given to automated systems.” This is not merely a publishing rule. It is an ontological boundary. Credit and responsibility belong to humans because only humans can participate in the community of meaning, judgment, correction, and accountability.

The machine can be useful. It can be powerful. It can even be transformative. But it remains an instrument. The more mathematical language it can generate, the more strictly the community must preserve the distinction between generation and proof, between assistance and authorship, between output and responsibility.

This is why the Leiden Declaration is so important for the present article. It confirms, from within mathematics, the same line that the Pope’s Letter draws from anthropology and moral theology: AI may serve the human person and the human community, but it must not replace the human subject. In Catholic language, the boundary protects conscience, dignity, and responsibility. In mathematical language, it protects proof, attribution, independent verification, and authorship. The languages differ. The boundary is the same.

3.3. Multi-LLM Stress Test of the Leiden Declaration

The Leiden Declaration was also submitted to a limited multi-LLM stress test using several contemporary large language models other than ChatGPT: Grok, Gemini, KIMI, and Perplexity. ChatGPT was not included as one of the tested models for the purposes of this subsection. It was used only as a drafting and editorial instrument under the author’s control. The comparative stress test relied on external LLM systems whose outputs were treated as analytical artifacts for human evaluation, not as evidence of truth, authority, or independent verification.

This methodological distinction is important. The article does not rely on ChatGPT as a witness, reviewer, authority, or epistemic subject. It uses it only as an *instrumentum vocale* in the drafting process, while responsibility for selection, interpretation, verification, and final judgment remains entirely with the human author. The stress test itself was conducted on Grok, Gemini, KIMI, and Perplexity, and their outputs were treated as objects of analysis, not as sources of truth.

The test was not designed to treat these systems as authorities on the Leiden Declaration. That would contradict the central argument of this article. The purpose was narrower and methodological: to examine how different LLM architectures and product designs would read the same document when asked to analyze it under conditions of epistemic discipline.

The methodological question was therefore not whether the models could “prove” the validity of the Leiden Declaration. They could not. The question was whether they could identify its argumentative structure, distinguish anti-AI rhetoric from a responsibility framework, recognize the Declaration’s concern with proof,

attribution, verification, authorship, autonomy, and human responsibility, and expose possible weaknesses or ambiguities for human review.

The prompt used for the test required the models to analyze the Leiden Declaration rigorously, without assuming that it was either automatically correct or merely anti-AI rhetoric. The models were asked to identify the Declaration's core values, explain the risks it attributes to AI, assess whether the document rejects AI or instead proposes a framework for responsible use, examine authorship and attribution, discuss verification and human responsibility, compare the Declaration with similar problems in law, scientific publishing, education, medicine, and auditing, identify possible weaknesses or blind spots, and distinguish explicit text, inference, interpretation, and uncertainty.

The results were broadly consistent across the tested models. Grok, Gemini, KIMI, and Perplexity converged on the view that the Leiden Declaration is not a blanket rejection of artificial intelligence. It is a responsibility framework. The protected values identified by the models were proof, attribution, transparency, independent verification, peer review, research autonomy, and human responsibility. The central risk was not described as AI use itself, but as the erosion of the institutional conditions that make mathematics trustworthy.

This test was not intended to validate the Declaration through LLM convergence. Such a use would be circular and would contradict the thesis of this article. The value of the exercise was diagnostic, not evidentiary: it showed how different systems organize the same text, which criticisms recur across outputs, and which stress points may deserve human examination. The test therefore does not prove the Declaration, and it does not prove machine understanding. It illustrates the limited usefulness of LLMs as instruments for mapping argumentative structure under human supervision.

This convergence is significant, but only in a limited sense. It shows that LLMs can be useful analytical instruments. They can map argumentative structure. They can identify recurrent concepts. They can compare a document with analogous institutional problems in other fields. They can assist a human author in locating stress points, ambiguities, and possible objections. In that sense, they are useful instruments of intellectual work.

But convergence is not verification. If several models produce similar readings of the same text, this does not prove that they understand the text in the human sense. It does not prove that the Declaration is correct. It does not establish the truth of its diagnosis. It does not create independent epistemic authority. It shows only that multiple probabilistic systems, when exposed to the same structured document and the same analytical prompt, can generate similar analytical outputs.

This distinction is central. A multi-LLM stress test may reveal patterns, but it does not replace judgment. It may identify repeated criticisms, but it does not determine whether those criticisms are valid. It may detect possible weaknesses, but

it does not decide whether they are fatal. It may produce useful language, but it does not bear responsibility for the final argument.

The test therefore confirms the *instrumentum vocale* thesis. LLMs can assist the reading of the Leiden Declaration, but they cannot become its interpreters in the full epistemic sense. They can produce analytical artifacts, but they cannot verify proof, assume responsibility, or participate as accountable members of a mathematical community. They may help the human author see more clearly, but they do not replace the human author's duty to read, judge, verify, and decide.

The stress test also illustrates a broader methodological point. In responsible scholarly work, multi-model review should be treated as a diagnostic instrument, not as an epistemic tribunal. If several models identify the same difficulty, the human author should examine it. If several models converge on the same interpretation, that interpretation may deserve attention. But the convergence itself remains evidence of pattern alignment, not proof of truth.

This is precisely the line drawn by the Leiden Declaration. Mathematical knowledge depends on proof, attribution, independent verification, and human responsibility. AI may assist each of these practices, but it cannot substitute for them. The stress test shows the same principle in practice: the models were useful, but they remained instruments. The responsibility for interpretation remained human.

Multi-LLM Stress Test of the Leiden Declaration is hereby attached as the Exhibit A to this article.

4. The Trump Executive Order: Innovation, Security, and the Governance Boundary

The next signal comes from the state. On 2 June 2026, President Donald J. Trump issued the Executive Order “Promoting Advanced Artificial Intelligence Innovation and Security.”¹⁸ The title itself is important. It does not frame artificial intelligence only as an economic opportunity, nor only as a threat. It joins two terms that are often politically opposed: innovation and security. For the purposes of this article, the significance of the Order lies precisely in that tension.

The Order opens from a strongly pro-innovation premise. It states that the United States leads the world in AI because of “the enormous talent and innovation” of its AI industry and because it refuses “to stifle this innovation with overly burdensome regulation” (Sec. 1). This language is not incidental. It confirms that the document is not written from a prohibitionist or technophobic perspective. It belongs to a political tradition that emphasizes deregulation, competitiveness, private-sector leadership, and rapid technological deployment.

¹⁸ Electronic resource: <https://www.whitehouse.gov/presidential-actions/2026/06/promoting-advanced-artificial-intelligence-innovation-and-security> (accessed 03.06.2026)

Yet the same section immediately introduces the counterweight. The Order states that advanced AI capabilities make the Nation stronger, but also introduce “new national security considerations” requiring “coordinated action” across departments and agencies (Sec. 1). This is the first important governance signal. Even where the state begins from a pro-innovation premise, advanced AI is no longer treated as an ordinary private product. It becomes a matter of national security, cybersecurity, critical infrastructure, and institutional coordination.

The policy statement confirms the same structure. The United States will promote AI innovation and security by “working collaboratively with the private sector” to modernize government and private-sector information systems, harden them against external threats, protect American ingenuity and intellectual property from adversaries, and cultivate advanced AI-enabled capabilities (Sec. 1). This is not a model of simple state prohibition. But neither is it a model of complete private autonomy. It is a model of public-private coordination around systems whose scale and risk have become governmental concerns.

The operational provisions show why this matters. The Order directs cyber defense priorities for National Security Systems, Department of War information systems, and civilian Federal Government information systems (Sec. 2). It also directs CISA-related guidance to “expedite and prioritize” the cyber defense of civilian federal systems and to facilitate access to cybersecurity tools and services, including, where appropriate, “covered frontier models,” for agencies, state and local authorities, and operators of critical infrastructure such as rural hospitals, community banks, and local utilities (Sec. 2).

This language is highly significant. Frontier AI is not described merely as a consumer tool, research assistant, or productivity product. It is placed within the architecture of critical infrastructure protection. Hospitals, banks, utilities, federal systems, and state authorities are not ordinary market users. They are institutions whose failure can affect public order, human welfare, and social trust. Once AI enters this zone, the question is no longer whether AI is useful. The question is who governs its deployment, who verifies its risks, and who remains responsible when it affects essential systems.

The Order then establishes an AI cybersecurity clearinghouse, in voluntary collaboration with the AI industry and critical infrastructure operators, to coordinate vulnerability scanning, discover and validate vulnerabilities, and prioritize remediation and patch distribution (Sec. 2). This provision deserves close attention. It treats AI-related cybersecurity not as a matter of private vendor assurance, but as an institutional process involving coordination, validation, remediation, and distribution of patches. In other words, the state recognizes that trust in advanced AI systems requires more than marketing claims. It requires organized verification and response mechanisms.

The most important part of the Order is Section 3, entitled “Secure Frontier Model Deployment.” It directs federal officials to “develop and maintain a classified

benchmarking process” to assess the advanced cyber capabilities of AI models and determine the threshold at which a model should be designated a “covered frontier model” (Sec. 3(a)). This is one of the strongest signals in the document. The state is not merely celebrating AI innovation. It is creating a category of frontier systems whose capabilities require assessment under national-security conditions.

This provision should not be overstated. The Order does not create a general AI licensing regime. It does not impose a universal pre-market approval system. But the very existence of a classified benchmarking process means that certain AI capabilities are treated as sufficiently consequential to require governmental classification, assessment, and threshold determination. That is a governance boundary. It marks the point at which private technological capacity becomes a matter of public institutional concern.

The Order then directs officials to design a voluntary framework with AI developers. Under that framework, developers may engage the Federal Government to determine whether models under development meet the covered-frontier-model designation; they may provide the government with access to such models, subject to confidentiality, cybersecurity, insider-risk, intellectual-property, and nondisclosure protections, for up to thirty days before release to other trusted partners; and they may collaborate with the government to select trusted partners for early access in order to promote secure innovation and strengthen critical-infrastructure cybersecurity (Sec. 3(b)).

Again, the architecture is carefully balanced. The framework is voluntary. The document protects confidentiality and intellectual property. It is designed to avoid a broad licensing regime. Yet it still creates a formal pathway for federal visibility into the most advanced models before broader release. The legal form is cautious; the governance signal is strong. Advanced AI is no longer imagined as a purely private artifact moving directly from developer to market. At the frontier level, the state seeks at least a structured channel of early assessment, collaboration, and risk management.

The limiting clause is equally important. The Order provides that nothing in Section 3 authorizes the creation of any “mandatory governmental licensing, preclearance, or permitting requirement” for the development, publication, release, or distribution of new AI models, including frontier models (Sec. 3(c)). This clause makes the Order politically and legally complex. It simultaneously recognizes frontier-model risk and refuses to create a mandatory licensing system. It draws a boundary, but draws it through voluntary cooperation rather than direct compulsory approval.

For this reason, the Order should not be read as a hard regulatory prohibition or as an adoption of the full responsibility architecture proposed in this article. Its importance is more modest and more precise. Even while preserving a voluntary, innovation-friendly, and public-private framework, the Order recognizes that frontier AI systems may require governmental visibility, benchmarking,

cybersecurity coordination, and structured risk management. The boundary drawn by the Order is therefore not a licensing boundary, but a governance signal: advanced AI remains a human-controlled capability within public security architecture, not a self-governing technological sovereign.

For this article, that complexity is not a weakness of the analysis. It is the point. The Order is not a full regulatory settlement. It is a governance signal emerging under political constraints. It shows a state attempting to preserve innovation and private-sector leadership while also acknowledging that advanced AI capabilities can create security risks that require public visibility, benchmarking, coordination, and enforcement. The result is not prohibition, but structured responsibility.

Section 4 adds the enforcement dimension. The Attorney General is directed to prioritize enforcement of federal criminal laws against those who use AI to illegally access or damage computer systems, or who use AI in connection with unlawful access to further other crimes (Sec. 4). This provision is narrower than a general AI liability regime. But it confirms that AI-assisted conduct does not float outside legal responsibility. When AI is used as a tool of cyber intrusion, data theft, or unlawful system access, the responsibility remains with human actors subject to law.

This point connects directly with the doctrine of *instrumentum vocale*. The Order does not treat AI as a legal subject. It does not attribute criminal responsibility to the machine. It treats AI as a capability that may be used by human actors, institutions, agencies, developers, trusted partners, or criminal actors. The legal response remains organized around human and institutional responsibility. The tool may amplify capacity; it does not absorb responsibility.

The White House Fact Sheet confirms the same architecture in political language. It states that the Order advances AI innovation to strengthen cybersecurity, protect critical infrastructure, and ensure American leadership. It also states that the Order calls for a classified benchmarking process, a voluntary framework with AI developers, secure early access for trusted partners, and enforcement against those who use AI for illegal access, damage, data theft, or other criminal activity. At the same time, it emphasizes that the Order does not authorize mandatory licensing, pre-clearance, or permitting for AI models.

The governance meaning is therefore clear. Even a strongly pro-innovation administration cannot treat advanced AI as merely a private productivity tool. The Order's own language places frontier AI within cybersecurity, critical infrastructure, national security, criminal enforcement, benchmarking, and public-private coordination. That is why this document is important for the present article. It shows that the AI question has entered the language of state responsibility.

This also explains how the Executive Order relates to the Pope's Letter and the Leiden Declaration. Magnifica Humanitas draws the anthropological boundary: AI must not replace the human person as the bearer of dignity, conscience, judgment, and responsibility. The Leiden Declaration draws the epistemic boundary: AI must

not replace proof, attribution, verification, authorship, and research autonomy. The Trump Executive Order draws the governance boundary: advanced AI must not become an opaque private infrastructure beyond public security visibility, institutional coordination, and legal accountability.

The three documents differ profoundly in language, institutional origin, and political orientation. The Pope speaks from anthropology and moral theology. The mathematicians speak from proof and epistemic discipline. The Executive Order speaks from national security, cybersecurity, and state capacity. But each document resists the same substitution. AI may assist. AI may accelerate. AI may strengthen human institutions if properly governed. But AI must not become a hidden sovereign, a substitute author, a private validator, or an unaccountable infrastructure of decision.

The most important doctrinal point is therefore not that the Trump Executive Order endorses the full theory of this article. It does not. It is narrower, pragmatic, security-oriented, politically constrained, and internally balanced between deregulation and control. Its importance lies elsewhere. It shows that even within a pro-innovation framework, advanced AI must be placed within a structure of human and institutional responsibility. It must be benchmarked, governed, coordinated, secured, and subjected to legal enforcement when used unlawfully.

In this sense, the Order confirms the *instrumentum vocale* principle at the level of statecraft. AI is powerful enough to require public attention, but not sovereign enough to escape human responsibility. It is valuable enough to be promoted, but dangerous enough to require boundaries. It is useful enough to be deployed, but not authoritative enough to govern itself. The machine remains an instrument. The responsibility remains human.

5. Doctrina Instrumenti Vocalis Cum Voluntate Domini Inscripta

The preceding analysis leads to the central theoretical conclusion of this article: contemporary LLM systems should be understood neither as autonomous legal actors nor as “electronic persons,” but as probabilistic linguistic instruments operating within human-defined architectures of attribution, verification, and responsibility.

This conclusion is developed in detail in the deposited doctrine by Thorben Liebig and Adel Kildeev, *Instrumentum Vocale and the Architecture of Responsibility from Liability to Embedded Accountability*¹⁹, in the article by Adel

¹⁹ Liebig, Thorben; Kildeev, Adel. *Instrumentum Vocale and the Architecture of Responsibility from Liability to Embedded Accountability*. SSRN Working Paper 6868460.

Kildeev, Superjustice and the New Navigators: Prediction Without Judgment,²⁰ and in the articles-boundaries.²¹²²²³²⁴

The present article does not repeat the full doctrinal architecture. It relies on that doctrine as its theoretical foundation and summarizes only those propositions necessary to explain the convergence between *Magnifica Humanitas*, the Leiden Declaration, and the Trump Executive Order on AI.

The doctrine designates this interdisciplinary framework as:

Doctrina Instrumenti Vocalis Cum Voluntate Domini Inscripta (Doctrine of the Speaking Instrument Inscribed with the Will of Its Dominus)

The Roman-law terminology used here is analytical rather than antiquarian, decorative, or nostalgic. The analogy is not invoked to revive an archaic social order, and it certainly does not imply any moral equivalence between human persons and machines. Its function is narrower: to isolate a juridical structure in which speech or operational activity may occur without independent will, without legal subjecthood, and without transfer of responsibility away from the human actor who directs, deploys, or relies upon the instrument.

The Roman-law category *instrumentum vocale* — the “speaking instrument” — provides a more precise analytical framework for LLM systems than contemporary anthropomorphic narratives surrounding AI. The analogy is structural, not moral: it concerns attribution and responsibility, not the status of any human person. The relevance of the analogy does not lie in moral equivalence, but in juridical structure: an entity may generate language, execute delegated operational functions, and produce economically valuable outputs while nevertheless lacking *voluntas*, legal personality, and independent responsibility.

The additional formula *cum voluntate domini inscripta* reflects the central proposition of the doctrine: the apparent agency of the system is neither autonomous nor self-generated, but architecturally embedded within human intention, human verification, and human attribution. The machine operates with a will inscribed by human design, instruction, and deployment, not with a will of its own. The formula *cum voluntate domini inscripta* further implies that the apparent agency of

²⁰ Kildeev, Adel. Superjustice and the New Navigators: Prediction Without Judgment. SSRN Working Paper 6811218.

²¹ Liebig, Thorben. The Four Boundaries of Institutional Verification. SSRN Working Paper 6868398.

²² Liebig, Thorben. On the Formal Foundation of Boundary 1. A Lawvere-Yanofsky Proof That Verification Architectures Cannot Attest Their Own Consistency. SSRN Working Paper 6868278;

²³ Liebig, Thorben. On the Formal Foundation of Boundary 2. A Lawvere-Yanofsky Proof that Verification Architectures Cannot Define Their Own Truth Predicate. SSRN Working Paper 6868281;

²⁴ Liebig, Thorben. One Problem, Four Boundaries, One Hundred Evidences. SSRN Working Paper 6868142.

the system emerges not autonomously, but through externally embedded architectures of instruction, alignment, and constraint. In contemporary LLM systems, the party that inscribes such operational architectures may differ from the party that subsequently deploys or relies upon the instrument. This distinction creates a structural asymmetry: users may operate systems whose internal normative inscriptions remain partially inaccessible due to proprietary architectures, trade-secret protections, or opaque alignment mechanisms.

The doctrine proceeds from several interconnected propositions.

5.1. Ontology Precedes Delegation

The first principle is foundational: legal delegation cannot create ontology. This does not deny that law may create legal fictions for functional purposes. Corporate personhood is the obvious example. A corporation has no biological body, conscience, or soul, yet it may bear rights, duties, assets, liabilities, and procedural standing because it is anchored in human institutions, governance organs, capital structures, officers, agents, records, and enforceable mechanisms of attribution. An AI system is structurally different. It does not supply an institutional bearer of responsibility; it produces outputs within architectures designed, owned, deployed, and relied upon by human actors. Granting independent legal subjecthood to such a system would not clarify responsibility, but risk obscuring it by inserting a fictive subject between the human decision-maker and the consequences of the decision.

A legal fiction may allocate procedural capacity, operational competence, or limited standing, but it cannot manufacture consciousness, intentionality, or will. Systems that lack subjective understanding remain instruments regardless of the sophistication of their outputs. The doctrine therefore rejects the increasingly common assumption that operational complexity itself generates juridical subjecthood.

This is where the doctrine meets both *Magnifica Humanitas* and the Leiden Declaration. The Pope's Letter denies that AI systems possess conscience, lived experience, moral responsibility, or human interiority. The Leiden Declaration denies that AI-generated mathematical outputs can replace proof, attribution, independent verification, or human authorship. Both documents, in different languages, affirm the same principle: function is not subjecthood.

Prediction is not judgment; synthesis is not understanding; classification is not consciousness.

5.2. LLMs Generate Probabilistic Linguistic Artifacts, Not Legal or Epistemic Judgment

LLMs do not reason in the human sense. They generate statistically synthesized linguistic outputs derived from probabilistic correlations within training data and prompt context. Their outputs may imitate doctrinal structure, legal reasoning,

mathematical proof, technical explanation, academic review, empathy, or expert judgment. But imitation does not create understanding.

Accordingly, the doctrine rejects the characterization of LLMs as quasi-lawyers, quasi-judges, quasi-experts, epistemic agents, or proto-subjects. They are probabilistic instruments capable of simulating the appearance of reasoning. The legal and institutional danger begins when human users mistake that appearance for authority.

This point directly corresponds to the Leiden Declaration's warning that AI may generate apparent "proofs" that look convincing while containing nearly invisible errors. The danger is not merely error. The danger is simulated reliability.

5.3. Responsibility Remains Non-Delegable

Because the system lacks *voluntas*, responsibility cannot migrate to the machine.

The true juridical actor remains the human operator: lawyer, judge, regulator, engineer, institution, or corporate decision-maker. AI assistance may accelerate workflow, expand analytical capacity, classify information, or generate drafts, but it does not alter the structure of legal attribution.

The doctrine therefore does not prohibit operational delegation to computational instruments as such. Delegation of production, drafting, search, classification, translation, summarization and preliminary analysis may remain fully permissible within professional and institutional practice. The decisive boundary emerges where operational delegation transforms into *abdicatio iudicii* — the abandonment of independent human judgment and verification in favor of unvalidated probabilistic outputs.

The practical line is therefore not drawn at the mere use of an AI system, but at the point where the human professional can no longer independently reconstruct, verify, correct, and assume responsibility for the output. AI-assisted drafting, search, classification, translation, summarization, or preliminary analysis may remain legitimate when the human user retains access to the underlying sources, checks material claims, verifies authorities, and accepts responsibility for the final result. It becomes impermissible dependence when the user treats the generated output, or the system's own representation of verification, as sufficient without independent review.

Under the doctrine of non-delegable human responsibility:

- fabricated citations remain attributable to the filing attorney;
- defective judicial reasoning remains attributable to the judge;
- automated administrative decisions remain attributable to the institution deploying the system;

- AI-assisted professional work remains attributable to the licensed professional;
- AI-enabled corporate action remains attributable to the corporation and its responsible officers;
- AI-generated recommendations do not themselves assume liability.

Responsibility remains attached to the human actor who retains the duty of judgment, supervision, verification, and attribution.

5.4. The Central Risk Is Not Intelligence but Simulated Authority

The doctrine further argues that the principal danger of LLM systems is not autonomous superintelligence, but epistemic simulation.

Modern systems are capable of producing persuasive appearances of expertise, procedural reliability, factual confidence, analytical rigor, and even verification itself, without possessing genuine understanding. This creates what the authors describe as “**fabricated auditability**”: not merely the simulation of knowledge, but the simulation of verification.

An LLM may hallucinate facts, authorities, citations, procedural history, technical analysis, and even the appearance that external validation occurred when no such validation actually took place.

This distinction is crucial. A fabricated citation misstates authority; fabricated verification misstates the epistemic integrity of the entire decision-making process.

The doctrine therefore treats anthropomorphic trust in AI systems as structurally dangerous precisely because probabilistic fluency can simulate competence without understanding. The issue is not that the machine “lies” in the human moral sense. The issue is that the output may be institutionally received as if it carried authority proof, or verification.

5.5. Human Judgment Must Remain the Verification Gate

The doctrine proposes an architecture centered not on anthropomorphic trust, but on external verification and accountable attribution.

The decisive safeguard is not merely better prompting, internal model self-critique, or multi-model convergence. These techniques may improve analytical discipline, but they do not create an epistemic subject. Internal LLM review can detect patterns, inconsistencies, and possible weaknesses, but it cannot replace independent verification by a responsible human actor or institution.

This is precisely the lesson of the multi-LLM stress test discussed in this article. Grok, Gemini, KIMI, and Perplexity produced broadly convergent readings of the Leiden Declaration. That convergence was useful, but it was not verification. It did not prove the truth of the Declaration. It did not create machine understanding. It

produced analytical artifacts requiring human evaluation. The machine may generate; only the human may validate.

5.6. Instrumentum Vocale, Not Electronic Personhood

The doctrine ultimately rejects proposals for AI legal personhood as category errors produced by anthropomorphic confusion.

The existence of linguistic output, adaptive behavior, persistent memory, autonomous operation, or economic utility does not establish juridical subjecthood. Roman law already recognized entities capable of economically meaningful action without granting them independent legal personality. Contemporary attempts to construct “electronic persons” therefore represent not doctrinal necessity, but conceptual projection.

As the doctrine emphasizes: *Nomen sine voluntate simulacrum est.*

A name without will is a simulacrum.

Accordingly, the future of AI governance depends not on constructing artificial legal subjects, but on preserving human judgment at the point of verification, attribution, and responsibility.

6. Conclusion: The Cross-Disciplinary Responsibility Frontier

This is the common line connecting the three documents examined in this article. Magnifica Humanitas draws the anthropological boundary: AI must not replace the human person as the bearer of conscience, dignity, judgment, and responsibility. The Leiden Declaration draws the epistemic boundary: AI must not replace proof, attribution, independent verification, authorship, and research autonomy. The Trump Executive Order draws the governance boundary: advanced AI must not become an opaque private infrastructure beyond security review, institutional coordination, and legal accountability.

The doctrine of *instrumentum vocale cum voluntate domini inscripta* supplies the conceptual form in which these boundaries can be understood together. AI may assist. AI may generate. AI may classify, predict, translate, summarize, and accelerate. But it remains an instrument operating within human architectures of meaning, law, proof, governance, and responsibility.

We should not fear AI as if it were a living sovereign intelligence. Current LLM systems possess neither consciousness, nor will, nor judgment. They remain probabilistic instruments – powerful, useful, and potentially dangerous, but still instruments.

The greater danger lies elsewhere: in human beings who hide behind these systems, delegate responsibility to them, or gradually abandon independent judgment in favor of predictive convenience.

The central risk of the AI age is not the rebellion of machines, but the intellectual surrender of humans. AI remains the slave of the lamp, not the master of judgment.

Exhibit A. Multi-LLM Stress Test of the Leiden Declaration

A.1. Purpose of the Test

This appendix records the prompt and summarized results of a limited multi-LLM stress test conducted on the Leiden Declaration on Artificial Intelligence and Mathematics. The test was conducted using Grok, Gemini, KIMI, and Perplexity. ChatGPT was not included as one of the tested models. It was used only as a drafting and editorial instrument under the author's control.

The purpose of the test was not to verify the truth of the Leiden Declaration through LLM outputs. Large language models are not treated here as witnesses, experts, authorities, or epistemic subjects. The purpose was narrower: to observe whether different LLM systems, when given the same document and the same epistemically disciplined prompt, would identify similar argumentative structures, risks, and responsibility boundaries.

The outputs were treated as analytical artifacts for human evaluation, not as evidence of truth, independent verification, or machine understanding.

A.2. Stress-Test Prompt

The following prompt was submitted to Grok, Gemini, KIMI, and Perplexity:

“Please analyze the Leiden Declaration on Artificial Intelligence and Mathematics rigorously and critically.

Do not treat the Declaration as automatically correct. Do not treat it as anti-AI propaganda either. Analyze it as a serious institutional and epistemological document.

In your response, please address the following points:

1. What are the core values protected by the Declaration?
2. What risks does the Declaration identify in the use of AI in mathematics?
3. Does the Declaration reject AI as such, or does it propose a framework for responsible AI use?
4. How does the Declaration treat proof, verification, attribution, authorship, and human responsibility?
5. Does the Declaration imply that AI systems can be epistemic agents, authors, validators, or bearers of responsibility in mathematics?
6. Compare the Declaration's concerns with analogous issues in law, scientific publishing, education, medicine, auditing, and public governance.
7. Identify the strongest parts of the Declaration.
8. Identify possible weaknesses, ambiguities, or blind spots in the Declaration.

9. Distinguish clearly between:
 - a. what the Declaration explicitly states;
 - b. what can be reasonably inferred from it;
 - c. your interpretation;
 - d. uncertainty or points requiring further verification.
10. Conclude with a concise assessment of the Declaration's intellectual significance."

A.3. Summary of Model Outputs

The tested models broadly converged on the same structural reading of the Leiden Declaration. Grok, Gemini, KIMI, and Perplexity all read the Declaration not as a blanket rejection of artificial intelligence, but as a framework for responsible and accountable AI use within mathematics.

The models identified the Declaration's protected values as proof, correctness, transparency, independent verification, proper attribution, peer review, research autonomy, and human responsibility. They also recognized that the Declaration's central concern is not the mere use of AI tools, but the possible erosion of the institutional conditions that make mathematics trustworthy.

On proof and verification, the models converged on the view that AI-generated mathematical output may be useful, but cannot be equated with proof unless it passes through human-understandable and independently verifiable standards. Several outputs emphasized the danger of plausible but unreliable arguments that resemble mathematical proofs while lacking the epistemic status of proof.

On authorship and attribution, the models agreed that the Declaration preserves credit and responsibility within the human mathematical community. AI systems may assist discovery, drafting, formalization, or exploration, but they do not become authors, validators, or bearers of responsibility.

On institutional risk, the models identified dependence on proprietary AI systems, unequal access to computational resources, overhyping of results, pressure on peer review, and possible loss of research autonomy as major concerns. They also connected these risks to analogous problems in other high-responsibility domains, including law, scientific publishing, medicine, education, auditing, and public governance.

The models also identified several possible weaknesses or ambiguities in the Declaration. These included the need for clearer disclosure thresholds, more detailed distinction between different AI systems and use cases, more operational guidance for peer review, and a more precise account of how AI-assisted work should be attributed in hybrid human-machine research workflows.

A.4. Comparative Result Matrix

Question	Grok	Gemini	KIMI	Perplexity	Convergent Result
Is the Declaration anti-AI?	No; responsibility framework	No; governance and accountability framework	No; cautious responsible-use document	No; institutional risk framework	The Declaration is not anti-AI; it is anti-substitution
Core protected values	Proof, autonomy, attribution, responsibility	Proof, transparency, peer review, human judgment	Correctness, attribution, verification, responsibility	Proof, attribution, openness, autonomy	Proof, attribution, verification, autonomy, human responsibility
Main risk	Plausible AI output replacing proof	Erosion of verification and peer review	Misattribution and unreliable outputs	Institutional dependence and hype	AI may weaken the conditions of mathematical trust
AI as author or epistemic agent?	Rejected	Rejected	Rejected	Rejected	AI remains a tool, not an author, validator, or responsible subject
Human responsibility	Non-delegable	Central and non-transferable	Preserved in human authors	Essential to mathematical practice	Responsibility remains with human mathematicians

Analogy to other fields	Law, medicine, governance	Law, science, education, auditing	Publishing, law, medicine	Scientific publishing, education, public policy	The same structure appears across high-responsibility domains
Weaknesses identified	Operational details underdeveloped	Disclosure thresholds unclear	Hybrid authorship needs clarification	Enforcement mechanisms limited	The Declaration needs implementation guidance

A.5. Methodological Interpretation

The convergence of the tested models is useful but limited. It shows that LLMs can identify the argumentative architecture of a structured document. They can summarize, classify, compare, and reveal recurring themes. They may also help a human author detect possible objections or areas requiring clarification.

However, convergence is not verification. The fact that Grok, Gemini, KIMI, and Perplexity produced broadly similar readings does not prove that they understood the Declaration in the human sense. It does not establish the truth of the Declaration's claims. It does not create independent epistemic authority. It shows only that multiple LLM systems, when exposed to the same document and prompt, produced similar analytical artifacts.

The test therefore confirms the thesis of this article rather than weakening it. LLMs are useful instruments of analysis, but they are not epistemic subjects. They can assist interpretation, but they cannot assume responsibility for interpretation. They can identify patterns, but they cannot verify truth. They can produce language about proof, attribution, authorship, and responsibility, but they cannot become bearers of proof, attribution, authorship, or responsibility.

The proper use of multi-LLM stress testing is therefore diagnostic, not authoritative. If several models identify the same weakness, the human author should examine it. If several models converge on the same interpretation, that interpretation may deserve attention. But the final act of judgment remains human. The models remain instrumenta vocalia: speaking instruments under human direction and human responsibility.

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EPISTEMÍA: GOVERNING THE HUMAN PROCESS OF UNDERSTANDING

A Proposal for a New Object of Legal Protection in the Age of Artificial Intelligence

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Abstract:

Contemporary AI governance understandably concentrates on systems: their data, models, risk tiers, transparency requirements, oversight mechanisms and effects on fundamental rights. This article argues that such an orientation, while necessary, insufficiently conceptualizes what makes generative AI legally distinctive: its capacity to intervene within the process by which a person formulates questions, selects what is relevant, interprets, compares, doubts, reorganizes meaning and forms a judgment. Its foundational premise is that human understanding is not the reception of a correct answer but an active, situated, temporal and revisable process. Generative AI can enter that process and produce questions, interpretations, arguments and justifications before the subject has completed their own elaboration.

Building on the Epistemía framework, the article proposes the category of governance of the human process of understanding. The emerging object is neither private mental content nor merely the automated output, but the integrity and attributability of the human trajectory of understanding in relations of intensive cognitive mediation. Protection is grounded in the dignity of every person as a subject capable of forming, appropriating, contrasting, revising and answering for meanings and reasons. From Epistemía's five concepts—symbolizing function, cognitive sovereignty, cognitive friction, attributability of understanding and

cognitive infrastructure—the article formulates Habeas Mens as a proposed basic, universal and proportionate legal standard. When AI-mediated interaction informs decisions affecting third parties or occurs in contexts of power, authority, care or professional responsibility, the standard becomes more demanding and acquires a specific procedural dimension. The Test of Attributability of Understanding (TAU) is its initial operational development through six dimensions based on externalizable indicators.

The article uses conceptual and normative analysis, interdisciplinary doctrinal contrast and the examination of objections. It engages philosophical hermeneutics, phenomenology, 4E and distributed cognition, predictive processing, social and agential epistemology, techno-legal virtue ethics, the literature on cognitive offloading, automation bias and meaningful human control, neurorights scholarship, and contemporary AI governance instruments. Epistemía converges with these traditions in recognizing the situated, relational and vulnerable character of cognition, while differing in identifying the human trajectory of meaning-formation as a legal unit of analysis and in proposing Habeas Mens and the TAU for its protection, including where the final result is materially correct.

Keywords: human understanding; human dignity; AI governance; cognitive sovereignty; symbolizing function; cognitive friction; attributability; cognitive infrastructure; Habeas Mens; TAU; human rights; human oversight.

1. Introduction: Shifting the Object of Governance

The dominant question in contemporary regulation is how to govern artificial intelligence. The question posed here is different: what conditions must be preserved so that human beings remain the authors of their understanding when interacting with systems that interpret, synthesize, argue, and anticipate on their behalf?

The difference is not semantic. Governing systems entails classifying risks, controlling data, establishing obligations for providers and deployers, requiring transparency, security, oversight, and mechanisms of challenge. Governing the human process of understanding entails identifying what can deteriorate even when the system functions correctly, the result is true, and a person formally retains the final decision. A model may be safe, accurate, and transparent and nevertheless contribute to a relationship in which the subject ceases to generate their own questions, compare alternatives, tolerate uncertainty, or reconstruct the reasons they accept.

The problem is not to oppose humanity and technology. Human cognition has always relied on language, writing, institutions, instruments, and other people. The

extended-mind thesis, distributed cognition, and 4E approaches show that the cranial boundary was never an adequate boundary for describing knowing. Precisely for that reason, the normative question cannot be whether externalization exists, but what kind of coupling occurs, which capacities it strengthens or weakens, what asymmetries it incorporates, and when assistance becomes procedural substitution.

Generative AI introduces a qualitative alteration. Earlier tools stored, calculated, or retrieved. Language models produce discursive sequences that occupy the same functional space in which people ordinarily encounter reasons, explanations, narratives, and interpretive frames. They do not merely provide a datum: they provide an organization of meaning. That organization can enter the process before the person has formulated their own map of the problem.

Foundational premise. This article proceeds from the view that human understanding does not consist in the instantaneous reception of an answer, but in an active—although not necessarily linear—process of attention, symbolization, question formulation, selection of relevance, comparison, evaluation, integration, and revision. Generative AI introduces a distinctive vulnerability because it can intervene in those operations and produce questions, frames, interpretations, arguments, and justifications before the subject has completed their own elaboration. The problem does not lie in every form of cognitive externalization, nor does it assume that technological assistance is degrading. It arises when mediation displaces the human being from substantive participation in forming the judgment or meaning later attributed to them. The proposed protection is therefore grounded in the dignity of the person as a subject capable of understanding, appropriating reasons, dissenting, revising them, and answering for them.

This article focuses exclusively on preserving the human process of understanding in the face of the growing intervention of artificial intelligence. It does not seek to resolve another, equally relevant question concerning the nature of the processes by which human beings and artificial systems construct, organize, and operate with symbolic structures and attribute meaning. Within the Epistemía research program, that issue constitutes one of its central lines of development [40], lies beyond the scope of this article, and will be addressed specifically in later works. The protection proposed here belongs to every person who interacts with AI systems; decisions concerning third parties constitute an area of enhanced protection, not the limit of the protected object.

Central Thesis

Artificial intelligence requires not only the governance of intelligent systems. It also requires legal recognition and protection of the minimum conditions that allow every person to remain a subject of their process of understanding in environments of intensive cognitive mediation, and that allow that trajectory to be responsibly attributed when it is externalized in decisions or actions.

“Governance” does not mean externally directing what a person should think or imposing a mandatory level of mental effort. It means creating safeguards against opaque substitution, compulsive acceleration, structural dependency, architectural manipulation, and the fiction of human oversight that merely ratifies outcomes previously configured by the system.

Primary discipline: this article is presented as a contribution to legal theory and philosophy—specifically, regulatory theory and procedural safeguards—and incorporates philosophy of mind, cognitive science, and epistemology as auxiliary frameworks. These disciplines describe the processual, situated, and vulnerable character of understanding. Legal philosophy performs the normative translation: it determines whether a capacity linked to dignity, autonomy, agency, and responsibility, now exposed to new forms of substitution, can become a legitimate object of legal protection. Epistemía proposes that translation from anthropological and cognitive vulnerability toward a new legal unit of analysis and protection of universal scope, articulated through Habeas Mens and the TAU.

Method. The article develops a conceptual and normative analysis, complemented by interdisciplinary doctrinal contrast, examination of objections, and the use of hypothetical cases. Empirical and normative sources are used to establish plausibility, convergences, limits, and tensions; the article does not claim empirical validation of the theory or a universal or inevitable cognitive erosion.

Doctrinal delimitation. Epistemía, procedural substitution, attributability of understanding, Habeas Mens, and the TAU are presented as doctrinal and propositional constructions of the author. It is not claimed that, as such, they constitute autonomous rights, principles, or standards generally recognized by current positive law.

2. The Missing Object: Information, Knowledge, Interpretation, and Understanding

2.1. Four Levels That Must Not Be Confused

Legal literature tends to treat access to information, explanation of an outcome, and human understanding as equivalent. That equivalence is insufficient. Information is available content; knowledge entails relatively stable integration into a structure of beliefs or capacities; interpretation organizes relevance and relations; understanding is the process by which a subject succeeds in reconfiguring a field of meaning so as to orient themselves, explain, revise, and answer for their judgment.

Understanding cannot be reduced to possessing a correct proposition. A person may repeat a true answer without understanding it; may accept a coherent explanation without being able to reconstruct its premises; may sign an impeccably drafted decision without having passed through the interpretive conflict the decision resolves. In all three cases there is an outcome, but cognitive authorship is weak.

2.2. Understanding as Process Rather Than Mental Thing

To avoid an introspective conception that cannot be verified, this article defines understanding in processual terms. To understand is to unfold a not necessarily linear sequence of operations of attention, symbolization, comparison, inference, evaluation, integration, and revision through which a subject transforms an initially incomplete situation into a provisionally inhabitable configuration of meaning.

This definition has four legally relevant properties:

- **It is temporal: it requires a before, a transition, and a provisional configuration; it can therefore be improperly compressed.**
- **It is relational: it is formed through language, culture, bodies, institutions, and artifacts; it can therefore be mediated and shaped.**
- **It is fallible and revisable: understanding is not equivalent to achieving certainty; openness to alternatives is therefore part of its integrity.**
- **It is attributable through indicators: although interiority is not directly observable, acts of reconstruction, contrast, reformulation, and responsible appropriation can be verified.**

2.3. Human Dignity and the Justification for Protection

Not every valuable capacity should become a right. Legal protection is justified when vulnerability, normative relevance, and a reasonable possibility of institutionalization converge. All three conditions are present here. AI environments

can sustainably modify the habits through which people elaborate reasons; understanding supports autonomy, responsibility, education, consent, democratic deliberation and, in institutional contexts, due process and reason-giving; and it is possible to protect external conditions of the trajectory without policing mental contents.

Epistemía ultimately arises from a question of human dignity. The person should not be reduced to a recipient, transmitter, signatory, or formal ratifier of meanings produced by an external system. Their dignity includes recognition of their status as a subject capable of forming understanding, appropriating reasons, contrasting them, dissenting, revising, and answering for their judgment. The foundation is not merely instrumental: the process is protected not only because it may reduce errors, but because participating in the formation of one's own judgment has autonomous human and normative value.

The emerging object is not an isolated mind, absolute originality, or a right to receive no influences. Nor is it simply the AI output. It is the integrity and attributability of the human trajectory of understanding in relationships of intensive cognitive mediation. Because that trajectory belongs to the human condition, protection extends to every person. Its intensity, however, must be graduated according to risk, vulnerability, dependency, asymmetry, opacity, effects on the person themselves, and impacts on third parties.

3. Procedural Substitution

3.1. From Assistance to Replacement of the Trajectory

Procedural substitution means the partial or total delegation of interpretive operations that constitute the human trajectory of understanding, even when the person formally retains selection or signature of the result. It includes formulation of the problem, selection of relevance, comparison of hypotheses, weighing of evidence, narrative construction, and final justification.

Substitution is not identified by the percentage of generated text or by duration of use. A person may use AI extensively and preserve cognitive sovereignty if they maintain contrast, dissent, reformulation, and control of criteria. Another person may delegate the core of judgment through a brief query that supplies a complete frame and closes off exploration. The relevant unit is functional: which operations were actually performed by the subject and which were absorbed by the system.

The substitution threshold is not fixed here through an abstract or binary metric. It is determined from gradual indicators of reversibility, recognizability, and

effective control, developed in section 3.3 and in the Test of Attributability of Understanding in section 7.4.

3.2. Five Forms of Substitution

1. Substitution of the question: the system defines what the problem is before the subject formulates their own question.
2. Substitution of relevance: the system selects facts, sources, or variables and renders unrepresented alternatives invisible.
3. Substitution of comparison: it delivers an integrated conclusion without the human confronting incompatible hypotheses.
4. Substitution of justification: it produces reasons later adopted as one's own even though they did not guide the decision.
5. Substitution of revision: fluency, apparent authority, or personalization reduces the impulse to verify and reconsider.

3.3. The Illusion of Human Oversight

Regulation often relies on the human-in-the-loop formula. But the physical or formal presence of a person does not guarantee cognitive control. Oversight may be nominal when the user lacks time, knowledge, access to alternatives, or incentives to dissent. It may also be retrospective: the system configures the reasoning and the human merely verifies that the outcome is not manifestly absurd.

Meaningful oversight requires more than final authorization. It requires a real capacity to understand the function of the system, recognize its limits, reconstruct the relevant reasoning, reject the recommendation without penalty, and produce an independent justification. At this point, governance of the human process complements, but does not replace, algorithmic explainability: explaining the machine does not demonstrate that the human has understood.

This problem—distinguishing nominal human control from substantive human control—is not exclusive to generative AI. In the debate on autonomous weapons systems, Roff and Moyes [1] identified conditions of information, predictability, timely possibility of intervention, and responsibility that distinguish formal authorization from real control. Santoni de Sio and van den Hoven [41] later developed a philosophical formulation applicable to autonomous systems in general through tracking and tracing conditions: the system must respond to relevant human reasons and its outcomes must be traceable to human agents capable of understanding their tasks and responsibilities.

These developments focus primarily on the human being's functional control over the system: whether they have competence, time, authority, and an effective possibility to intervene, reject, or stop. Epistemía shares those requirements but adds a different unit of analysis. It asks not only whether the human retains control over the tool, but whether they preserve the integrity and attributability of their own trajectory of understanding: whether they participated in formulating the problem, selecting relevance, contrasting, appropriating, and revising reasons, even when the resulting outcome is correct.

4. Legal and Social Risks

4.1. Erosion of Autonomy and Cognitive Sovereignty

Autonomy does not consist merely in choosing among options. It requires participation in the formation of the motives and frames from which one chooses. A decision may be voluntary in a superficial sense and externally configured in a deeper sense. Intensive algorithmic mediation can reduce the space in which a person produces their own criteria, especially when the system learns their style, anticipates their preferences, and offers emotionally resonant responses.

4.2. Interpretive Dependency

Dependency arises when the tool ceases to be contingent and becomes an ordinary condition for formulating, explaining, or deciding. It is not equivalent to frequent use. It is a loss of reversibility: the subject can no longer leave the relationship without a substantial decline in capacity, confidence, or initiative. In education, it may prevent certain skills from ever forming; in experienced professionals, it may erode previously acquired practices.

4.3. Dilution of Responsibility

Legal systems attribute decisions to judges, physicians, public officials, teachers, and administrators. If the interpretive trajectory is hybrid but remains hidden, responsibility is distributed in fact while formally concentrated in the human. A paradox arises: the institution proclaims that the decision is human even though the subject cannot explain which part of the frame, the selection of facts, or the inference was genuinely their own.

4.4. Homogenization and Loss of Cognitive Diversity

General-purpose models tend to stabilize high-probability discursive forms. Their massive use can induce expressive, methodological, and argumentative convergence. The risk is not that everyone repeats the same phrases, but that they share the same divisions of the problem, the same repertoires of reasons, and the

same implicit criteria of relevance. Cognitive diversity is democratic infrastructure: it makes it possible to detect errors that a homogeneous frame renders invisible.

4.5. Procedural Harm Without an Incorrect Outcome

A distinctive contribution of Epistemía is to separate harm to the outcome from harm to the process. Harm may exist even when the conclusion is correct: for example, when a student obtains a solution without developing the capacity the task was meant to form; when a judge adopts a correct ground that they never evaluated; or when a patient consents on the basis of a personalized explanation that removes all relevant uncertainty. Law already recognizes procedural harms: a violation of due process is not always cured by showing that the outcome would have been the same. The same logic may, with caution, be extended to cognitive integrity.

That extension nevertheless requires specifying the legal basis on which the harm operates, because procedural law recognizes two distinct and non-equivalent grounds for harm without an incorrect outcome. The first is instrumental: the procedural defect is sanctioned because it statistically increases the risk of erroneous decisions, even when the conclusion in the particular case was correct. The second is autonomous: certain procedural guarantees—being heard, knowing the charges, participating in the formation of one's own decision—have intrinsic value independent of their effect on accuracy because they express recognition of the subject as an agent rather than a merely passive recipient of an outcome.

The cognitive procedural harm proposed here rests primarily on the second ground. It is neither necessary nor, in most cases, feasible to demonstrate case by case that procedural substitution statistically increased the probability of a worse decision; doing so would depend on counterfactuals that are difficult to verify. It is enough to show that the person was deprived of participating in the formation of their own judgment in a domain where the legal order recognizes autonomous value in that participation (judicial reasoning, informed consent, educational assessment). The instrumental ground remains as a second-order systemic reason: at an aggregate level, sustained erosion of the process of understanding can predictably increase the error rate over the long term, and that projection supports public policy requiring the standard even though it is not a condition of its application in an individual case.

Unlike classical due process, which has relatively settled jurisprudential and doctrinal criteria for identifying a procedural defect, the cognitive procedural harm proposed here still lacks such development. The analogy with due process is therefore orienting rather than equating. This category is presented as a hypothesis of doctrinal development and not as a principle already recognized in positive law. This article identifies the protected object and formulates an initial standard of

attributability; it does not develop a general regime of legal consequences for noncompliance, a matter requiring later sector-specific treatment.

5. Epistemía as a Theoretical Framework

5.1. Symbolizing Function

Epistemía begins from a processual thesis: the subject does not receive the world as an already organized totality; they make it intelligible through symbolic configurations that articulate prior experience, language, affectivity, expectations, and context. The symbolizing function is not a decorative layer added after thought. It is the operation through which something can appear as meaningful, comparable, and susceptible to judgment.

This idea converges with Gadamer's hermeneutics [2], for which all understanding is situated in historical and linguistic horizons; with Ricoeur [3], who conceives symbol and interpretation as an opening to multiple meanings; with Cassirer [4], who describes the human being as a symbolic animal; and with phenomenology [5], which rejects a merely receptive consciousness. Epistemía nevertheless introduces a shift: it treats the capacity to symbolize not only as an anthropological description, but as a vulnerable condition whose preservation may acquire institutional and legal relevance.

This same distinction—between the symbol as product and symbolization as function—has been formulated independently in the contemporary epistemology of Catherine Elgin [6, 7], for whom understanding does not consist in possessing already organized representations, but in carrying out an ongoing activity of symbolic organization of experience. The convergence is not accidental: both traditions place symbolization prior to articulated understanding, as its condition of possibility rather than its result.

5.2. Cognitive Sovereignty

Cognitive sovereignty is the capacity of individuals and communities to preserve critical control over the formation, revision, and attribution of meanings. It does not require mental self-sufficiency or technological isolation. It requires that cooperation with artifacts and other people not destroy the possibility of formulating one's own criteria, recognizing influences, dissenting, and recovering an unassisted elaboration.

It converges with relational autonomy, which understands the subject as constituted in relationships rather than as an isolated will; with freedom of thought and mental self-determination [8, 9, 11, 12]; and with the literature on cognitive

liberty [13]. It differs from classical neurorights because it is not limited to direct access to or alteration of neural signals. It also addresses indirect, linguistic, and procedural interventions that may reorganize the process without physically invading the brain.

The epistemological foundation of this sovereignty can be clarified through Elgin's agential epistemology [6, 7]. Understanding, in that framework, is an agential rather than spectatorial achievement: the subject does not passively receive meaning but actively constructs it through a network of epistemic commitments in reflective equilibrium, responsively answerable to the evidence. Cognitive friction—developed in 5.3—can, on this reading, be understood as the institutional mechanism that preserves the conditions of that agency: without sufficient friction, the subject ceases to actively construct meaning and begins merely to receive it, even while formally retaining signature of the decision.

5.3. Cognitive Friction

Cognitive friction designates the productive resistances that prevent a response from prematurely closing the process: doubt, delay, contradiction, the need to reformulate, exposure to alternatives, and the effort of justification. Not every difficulty is valuable; useless bureaucracy or a poor interface also create friction. Protective friction is friction proportionate to risk, oriented toward reactivating agency, and linked to a relevant operation of understanding.

The distinction engages Kahneman [14] and the need to activate deliberative processes in the face of intuitive responses; the theory of desirable difficulties in learning; virtue epistemology [15], which emphasizes habits of attention and responsibility; and studies of automation bias [16]. Its distinctive contribution is normative and architectural: certain friction points can become design requirements for high-impact decisions.

Legal literature on interface design also offers a directly applicable anchor. Calo (2014) [17] showed that digital interfaces can exploit cognitive biases through personalization and distortion of salience—presenting certain options, frames, or conclusions as more prominent or urgent than others without the user noticing—with legal effects already recognized in consumer protection. Substitution of relevance (3.2) and the absence of cognitive friction described in this article are, at the level of generative algorithmic mediation, a variant of the same phenomenon: not manipulation through the interface of a commercial platform, but manipulation—not necessarily intentional—of the field of relevance through the fluency and apparent authority of a generated response. In this sense, the principle

of proportional friction (section 8) can be read as an architectural response to the same problem Calo identified in commercial interface design.

5.4. Attributability of Understanding

Attributability does not seek to prove internal mental states. It is a standard of sufficient reconstruction. A decision is cognitively attributable when converging indicators show that the person understood the essential issue; knew of the system's intervention; contrasted relevant information; could formulate reasons in their own language; considered reasonable alternatives; and retains the capacity to revise the conclusion.

This standard engages moral authorship, epistemic responsibility, judicial reason-giving, and the doctrine of informed consent. Its novelty lies in distinguishing system traceability from human traceability. A model may explain which variables it used while the decision-maker has not integrated that explanation. Conversely, a technically opaque system may be used in a limited and critically controlled way by an expert who preserves sufficient attributability. Both forms of traceability are necessary, but they are not interchangeable.

This distinction can be refined through the criterion of transparent and opaque coupling developed by Clark (2003) [18]: an external resource is transparently coupled when the subject can separate and justify their own contribution from that of the resource; it is opaquely coupled when that separation is no longer possible. Smart, Andrada, and Clowes (2022) [19] revisit this notion, but for a purpose different from the one assigned to it here: their central thesis questions whether phenomenal transparency is, by itself, an adequate criterion for determining whether an external resource genuinely constitutes extended cognition, and they instead propose that transparency operates as a property of situations that enables the attribution of dispositional mental states to the agent-resource ensemble. This article takes from Smart et al. (2022) [19] precisely that secondary conclusion—not their critical thesis about constitutive extension: the transparency or opacity of coupling serves as a test of attribution, not as a test of where the mind ends. Applied to attributability, the criterion thus offers an additional operational test: an attributable person is one capable of tracing, at least approximately, where their own elaboration ends and the system's begins, regardless of whether that system is, strictly speaking, part of their extended cognition. Smart, Clowes, and Clark (2025) [20] document, in a study of incorporating a language model through retrieval-augmented generation, a technical case related to this same question of transparent or opaque endorsement of AI-generated content, although from a predominantly technical register rather

than one centered on the philosophical debate over transparency as a criterion of extension.

5.5. Cognitive Infrastructure

Understanding does not depend only on individual faculties. It requires time, spaces, institutions, diversity of sources, educational practices, and technological architectures. That ensemble constitutes cognitive infrastructure. Just as law protects physical and digital infrastructures because they sustain collective goods, it should begin to recognize the conditions that sustain the social production of autonomous judgment.

The notion converges with Hutchins's distributed cognition [21], the social epistemology of Longino [22] and Fricker [23], and studies of information ecologies. It differs by incorporating a preservation criterion: cognitive infrastructure is adequate not only when it distributes information efficiently, but when it maintains the human capacity to reconstruct, contest, and renew meaning.

5.6. Techno-Legal Virtues of the Agent: Articulation with Widlak

The five preceding concepts describe the process of understanding and its institutional conditions. A different question remains open: what character dispositions should the agent—the judge, professional, public official—cultivate in order to sustain their own moral and epistemic agency within a hybrid decision architecture? That question is developed in the work of Tomasz Widlak (2026) [24], who identifies four techno-legal virtues: techno-legal phronesis (knowing when, how, and why to trust, reinterpret, or resist AI outputs), contestatory courage (resisting a system's undue epistemic authority without disregarding a valid algorithmic correction), algorithmic equity (diagnosing and correcting biases that AI may reproduce), and digital integrity (critically integrating fragmented AI outputs into a coherent and humanly assumed decision).

The relationship between Widlak and Epistemía is transversal and complementary and helps specify a three-level architecture. Widlak's virtues operate at the level of the agent: what character dispositions the decision-maker should cultivate. Epistemía operates at the level of process: how understanding is formed, appropriated, and attributed, independently of the agent's personal virtues. Habeas Mens operates at the level of the safeguard: how that process is legally protected when it is substituted or eroded, regardless of whether the agent was virtuous. An agent who is virtuous in Widlak's sense may nevertheless undergo an impoverished process of understanding if the institutional architecture offers no friction, traceability, or reversibility; and an adequate institutional architecture does not

replace the agent's disposition to use it. All three levels are necessary, and none can be reduced to the other two.

6. Contrast with Authors, Schools, and Current Normative Frameworks

Contrasting an original theory does not consist in finding equivalent phrases in prestigious authors. It consists in examining three relationships: convergence, when a tradition provides compatible evidence or structure; differentiation, when the proposed framework identifies a unit that has not been thematized; and tension, when objections require the thesis to be limited or reformulated. This contrast does not amount to empirical validation of *Epistemía*, but to a conceptual, normative, and doctrinal test of coherence, necessity, and scope.

Table 1. Interdisciplinary contrast: convergences and Epistemía's specific difference.

School / authors	Convergence	Specific difference
Hermeneutics (Gadamer [2], Ricoeur [3])	Understanding is historical, linguistic, and interpretive.	It does not develop legal governance of algorithmic mediation or operational criteria of attributability.
Phenomenology and enactivism (Husserl, Merleau-Ponty [5], Varela et al. [25], Thompson)	Cognition is embodied, temporal, situated, and enactive.	Epistemía translates that condition into processual vulnerability and institutional design.
Extended mind and distributed cognition (Clark [18, 26], Chalmers [27], Hutchins [21])	External resources can become integrated into cognitive systems.	Epistemía distinguishes enabling extension from procedural substitution and adds normative criteria.
Predictive processing and active inference (Friston [28], Clark [29], Hohwy [30])	Knowing involves prediction, error, and model updating.	Epistemía describes the symbolic-legal level: how discrepancy can be foreclosed by external outputs.
Agential epistemology of understanding (Elgin [6, 7])	Understanding is an agential achievement: a network of commitments in reflective equilibrium, not passive reception of an outcome.	Epistemía translates that agential achievement into the institutional and legal plane: it asks under what architectural conditions that agency can be sustained or emptied out.
Social and virtue epistemology (Longino [22], Fricker [23], Zagzebski [14])	Knowledge depends on practices, trust, institutions, and virtues.	Human-AI architecture is added as a specific object of epistemic responsibility.

School / authors	Convergence	Specific difference
Techno-legal virtues of the agent (Widłak [24])	The agent should cultivate dispositions—techno-legal phronesis, contestatory courage, algorithmic equity, and digital integrity—to preserve moral agency in hybrid architectures.	Widłak operates at the level of the virtuous agent; Epistemía at the level of the reconstructable process; Habeas Mens at the level of the safeguard. The three levels are complementary and irreducible to one another.
Relational autonomy and freedom of thought	Autonomy is socially formed and requires protection against undue interference.	Cognitive sovereignty protects the process of forming reasons, not only preferences or mental contents.
Neurorights (Ienca & Andorno [13], Bublitz [8, 9], Lighthart et al. [11, 12])	Mental integrity, cognitive liberty, and mental self-determination.	Habeas Mens is proposed without requiring direct neural intervention; it protects every person's process and becomes more demanding when mediation bears on decisions affecting third parties.
Human factors, cognitive offloading, and meaningful human control (Roff & Moyes [1], Parasuraman & Riley [16], Risko & Gilbert [31], Santoni de Sio & van den Hoven [41])	Automated assistance can free resources or reduce verification. Meaningful human control requires information, competence, authority, tracking, tracing, and a real possibility of intervention.	Epistemía adds an object distinct from functional control of the system: the integrity and attributability of the human trajectory of understanding, including where outcomes are correct.
Information fiduciary duties (Balkin [32])	Those who collect cognitive and behavioral data assume duties of loyalty and care toward people who entrust them with aspects of their thought process.	Epistemía extends that fiduciary duty to the architectural design of cognitive-mediation systems (principle of responsibility for architecture, section 8), not only to data processing.
Digital market manipulation (Calo [17])	Digital interfaces can exploit cognitive biases through personalization and distortion of salience, with recognized legal effects.	Epistemía extends that analysis from commercial interfaces to generative interpretive mediation (cognitive friction, substitution of relevance).
Current AI governance (EU [33], UNESCO [34], OECD [35], Council of Europe [36], AI HLEG [39])	Human agency, literacy, oversight, transparency, rights, contestability, and risk management.	Epistemía distinguishes explainability, effective oversight, and attributability of the human trajectory, a dimension not yet sufficiently operationalized.
Constitutional case law (Constitutional Court of Colombia, T-323/24 [42])	Requires transparency, responsibility, verification, human control, and non-substitution of non-delegable judicial functions.	Epistemía generalizes the issue beyond justice and adds process harm with a correct outcome, dual traceability, Habeas Mens, and the TAU.

School / authors	Convergence	Specific difference
Social doctrine of the Church (Leo XIV, Magnifica Humanitas [43])	Human dignity requires preserving questions, discernment, critical thinking, inner freedom, and responsibility in the face of systems capable of simulating understanding and orienting choices.	Epistemía translates that anthropological concern into a specific legal object, a proposed universal standard—Habeas Mens—and an initial indicator-based development—the TAU.

6.1. Convergence with Extended Cognition: A Necessary Objection

The first objection holds that delegating functions to AI does not erode cognition: it can extend it. Clark and Chalmers [27] showed that notebooks, devices, and environments can integrate cognitive processes if they perform reliable and accessible functions. The objection is correct against any romantic defense of a self-sufficient mind. Epistemía therefore does not identify externalization with loss.

The difference is established through four criteria. There is enabling extension when the coupling increases capacity without preventing understanding, preserves reversibility, allows critical control, and does not conceal the provenance of relevant operations. There is procedural substitution when the system occupies constitutive functions without the subject being able to recognize, reconstruct, or recover the trajectory. The question is not inside or outside the skull, but the quality of the coupling and the effective distribution of agency.

6.2. 4E Cognition and Symbolizing Function

Embodied, embedded, enacted, and extended approaches reject the idea that cognition is abstract computation enclosed in the brain [37, 38, 5, 25]. That orientation supports Epistemía's insistence on history, body, language, and context. It also limits an excessively mentalist formulation of Habeas Mens: what is protected is not a pure inner essence, but the functional continuity of a situated process.

Epistemía adds that situated coupling may be normatively asymmetric. An LLM operates at scale, learns interaction patterns, controls response speed, and presents results with a fluency that is difficult to match. The relationship should not be evaluated as simple cooperation between equivalent components. The architecture can modify what appears relevant before the subject becomes aware of the influence.

6.3. Neurorights and the Limit of Direct Intervention

Ienca and Andorno [13] promoted the protection of cognitive liberty, mental privacy, mental integrity, and psychological continuity against neurotechnologies. Bubltz [8, 9] and others developed mental self-determination. Recent literature also

shows that limiting mental integrity to direct access to the brain may be too narrow: indirect and psychological interferences can also acquire legal relevance when they cross a threshold of seriousness.

A particularly relevant procedural antecedent is the proposal of habeas cogitationem developed by Muñoz and Marinaro (2024) [10], conceived as a third habeas aimed primarily at enforcing freedom of thinking and, subsidiarily, other neurorights against direct and harmful interference in a person's thought process. The authors also document earlier uses of the expressions habeas mens and habeas mentem. This antecedent requires an important delimitation of the present proposal: Habeas Mens does not claim priority for the general idea of a 'habeas of the mind,' nor does it seek to replace existing protections of freedom of thought or mental integrity. Its specific focus lies instead on the integrity and attributability of the human trajectory of understanding under AI mediation, particularly where epistemically relevant operations may be procedurally substituted even though the resulting decision or output is materially correct.

Habeas Mens operates on a complementary plane. It does not require proof of neural alteration, clinical harm, or covert manipulation. It protects minimum conditions for every person to remain a subject of their process of understanding in AI-mediated interactions. When that process is externalized in decisions with legal effects or effects on third parties, the standard becomes more demanding and asks whether the act can be attributed to sufficiently intact, appropriated, and revisable human understanding.

6.4. Empirical Evidence: Prudence and Dual Effect

The evidence on generative AI and cognition does not warrant apocalyptic conclusions. Recent studies identify benefits: reduced burden in routine tasks, support for self-regulation, improved performance, and freeing resources for complex problems. Others associate intensive dependency with reduced critical effort, automation bias, limited scrutiny of recommendations, and loss of initiative. Results depend on the task, level of expertise, AI literacy, system design, and mode of use.

This ambivalence supports rather than weakens the proposal. Governance of the process does not prohibit cognitive offloading; it distinguishes strategic offloading from substitutive dependency. The correct regulatory question is what is offloaded, for what purpose, under what controls, and with what consequences for the capacities the institution must preserve.

6.5. Normative Contrast with Current Frameworks

The European Commission's Ethics Guidelines for Trustworthy AI [39], UNESCO's Recommendation [34], the OECD AI Principles [35], the EU AI Act [33], and the Council of Europe Framework Convention [36] converge on human agency, fundamental rights, transparency, oversight, contestability, and risk management. In particular, Article 14 of the EU AI Act requires effective and proportionate oversight of high-risk systems: the person exercising oversight must understand their capacities and limitations, remain alert to automation bias, correctly interpret the output, be able to disregard, override, or reverse it, and intervene in or stop the system [33]. Article 4 and recital 20 add AI-literacy duties for operators and affected persons.

The Council of Europe Framework Convention was opened for signature in 2024 and is the first international treaty specifically devoted to AI, human rights, democracy, and the rule of law [36]. As of the closing of this version on August 7, 2026, the Council of Europe's official register still did not record its general entry into force, whose threshold requires five ratifications, including at least three by Council of Europe member states; the European Union deposited its instrument of ratification on May 15, 2026. Its normative relevance is unquestionable, but it should not be presented as a treaty already generally in force.

These instruments provide a normative floor but do not fully resolve the question posed by this article. Three levels should be distinguished. Explainability asks what the system did and how it produced or justified its output. Effective human oversight asks what capacity the person had to understand the relevant functioning, intervene, reject, modify, or stop the system. Attributability of understanding asks what human trajectory was actually performed, appropriated, reconstructed, contrasted, and kept open to revision before the outcome was assumed. Epistemía does not compete with current regulation: it specifies this third dimension, including where outcomes are materially correct.

6.6. Contemporary Convergence with Magnifica Humanitas

At the level of contemporary social Magisterium, Pope Leo XIV's encyclical *Magnifica Humanitas* offers a particularly significant convergence with the problem identified here [43]. The document distinguishes the linguistic production of artificial systems from human understanding (no. 99), warns that the speed of responses can weaken the desire to formulate questions and the effort that leads to understanding (no. 140), notes that the unceasing flow of information can substitute for research, reflection, and discernment (no. 146), and links dependency and digital architecture to inner freedom, dignity, and the orientation of choices (nos. 170–171).

This convergence is anthropological and normative, not scientific proof or a source of state positive law. Magnifica Humanitas does not formulate the integrity and attributability of the human trajectory of understanding as a specific legal object, nor does it propose Habeas Mens, dual traceability, or the TAU. Its relevance lies in confirming, from a contemporary framework of global reach, the urgency of safeguarding human dimensions that Epistēmía seeks to conceptualize in legal terms.

7. Habeas Mens: Legal Consequence of the Theory

7.1. Formulation

Habeas Mens is formulated in this article as a proposed basic legal standard intended to preserve, for every person, minimum conditions of integrity and attributability of their process of understanding when interacting with artificial intelligence systems. It requires that technological mediation not opaquely suppress the possibility of recognizing its intervention, critically appropriating its contributions, reconstructing relevant reasons, contrasting them, dissenting, and revising them. When that interaction bears on decisions affecting third parties or occurs in contexts of power, authority, care, or professional responsibility, the standard becomes more demanding and acquires a specific legal-procedural dimension.

It is not a right to think without influences, a guarantee of absolute originality, or a prohibition on assistance. Nor does it require maximizing cognitive effort in every activity or authorize courts, administrations, or companies to inspect private thoughts. In everyday life it is expressed primarily through information, transparency of mediation, reversibility, access to alternatives, and protection against manipulative architectures; in institutional roles, enhanced requirements of competence, reason-giving, contrast, traceability, and responsibility are added.

The term Habeas Mens is used in an analogical rather than equivalent sense. In procedural tradition, “habeas” carries a precise technical meaning linked to the production or placing of something before a court. Here it functions as a structural metaphor and does not seek to equate this standard with codified mechanisms such as habeas corpus or habeas data. Habeas Mens does not authorize the production of mental content before an authority, but rather the verification of external conditions of the process of understanding. The analogy points to a common function—bringing before the law that which would otherwise remain inaccessible—without importing an identical procedural regime.

7.2. Universal Scope and Dual Direction

The first direction is personal or immediate: it protects each person in their own cognitive relationship with AI and asks whether they retain conditions for understanding, forming criteria, appropriating meanings, recovering initiative, and revising what they receive. That protection may operate as an AI-literacy guide, a design criterion, self-observation, or protection against dependency and manipulation, without turning every everyday interaction into an audit.

The second direction is intersubjective or institutional: it protects the person affected by a decision adopted by another person with AI assistance and asks whether the decision-maker understood, appropriated, and can answer for the reasoning attributed to them. In both directions there are defensive and enabling dimensions: it is not enough to prohibit opaque substitutions; systems and institutions must provide conditions of time, sources, contrast, dissent, and reversibility that make it possible to preserve agency.

7.3. Threshold of Application

The standard must be proportionate. It becomes more demanding where there are serious or irreversible effects, vulnerability, dependency, effects on third parties, a professional duty to give reasons, information asymmetry, difficulty of challenge, opaque or persuasive systems, time pressure, and absence of alternative avenues. In low-risk personal activities, protection operates primarily through informed freedom, transparency, reversibility, and protection against manipulative architectures, without imposing mandatory levels of cognitive effort. Universality does not mean universal bureaucratization.

7.4. Test of Attributability of Understanding (TAU)

The TAU forms part of the substantive development of Epistemía. It is presented here as an initial, gradual, indicator-based framework, not as a validated measurement scale or a uniform procedural protocol. Its six dimensions derive from operations in the human process of understanding that may be assisted, affected, or substituted by AI and make attributability legally observable without purporting to access mental interiority:

1. Awareness of mediation: the person knows which system intervened, for what function, and at what point.
2. Functional understanding: the person can explain relevant capacities, limits, and sources of error of the system.

3. Independent reconstruction: the person can set out, in their own language, the issue, the reasons, and the relationship between evidence and conclusion. The reconstruction must bear a verifiable relationship to the process through which the judgment was formed and not consist exclusively of a rationalization produced after it was challenged.

4. Contrast: the person verified decisive data and considered at least one reasonable alternative, or explained why doing so was not reasonably required.

5. Effective dissent: the person had the authority, time, and practical possibility to reject or modify the output without undue penalty.

6. Revisability: the person retains records and an institutional disposition to reconsider the decision in light of new information or challenge.

The TAU should not function as a bureaucratic ritual. Its dimensions derive from a common human process, but the manner in which it is used must be adapted to the domain and the risk. In everyday life they may operate as self-observation, AI literacy, a design criterion, or a signal of dependency; in a judicial decision, as part of reason-giving and source records; in medicine, as clinical reasoning and consent; in education, as oral defense and process evidence; in administration, as traceability of the file. Universality of the TAU does not mean that every user must complete a form in every interaction.

Dimension 2 requires particular care in its formulation because, without nuance, it can become an impossible rather than demanding standard: practically no technically trained professional can precisely explain every source of error in a contemporary generative AI system. The functional understanding required by dimension 2 therefore does not require technical competence concerning the system's internal operation—architecture, training, parameters—but operational understanding proportionate to the role: what kinds of errors are characteristic of the tool in the specific task (for example, a tendency to fabricate citations, sensitivity to how the question is framed, or loss of nuance in summarization tasks), under what conditions of use those errors are more likely, and what checks mitigate that specific risk. The standard is also modulated according to the level of training reasonably expected of the decision-maker: a professional acting within their field of expertise must attain a more demanding level of functional understanding than a lay user in a low-risk context; the general proportionality of the TAU (7.3) also governs this particular dimension.

Each TAU dimension can be anchored in an already recognized evidentiary standard, which strengthens its institutional viability and reduces the risk that it will be perceived as a requirement foreign to existing law. Independent reconstruction (dimension 3) is functionally analogous to the requirement of judicial reason-giving: the correct conclusion is not enough; the reasons must be reconstructable. Contrast (dimension 4) engages the professional diligence required by medical and legal *lex artis*. Awareness of mediation (dimension 1) is structurally equivalent to an informed-consent requirement: the person must know the nature of the intervention they receive before its effects can be attributed to them. And the criterion of transparent versus opaque endorsement, introduced in 5.4, offers an additional test for dimensions 1 and 3: transparent endorsement—the person can separate and justify their own contribution from the system’s—satisfies the standard; opaque endorsement—where that separation is no longer possible—weakens it, regardless of whether the final outcome is correct.

The evidentiary anchoring is not homogeneous across the six dimensions. Awareness of mediation (1), contrast (4), and revisability (6) allow relatively direct verification through records, documentation, and observable acts. Functional understanding (2), independent reconstruction (3), and effective dissent (5) require more complex judgments that vary according to role and context. The TAU is therefore an initial and unfinished operational development, part of the theory and open to later calibration, empirical validation, and institutional adaptation. Its preliminary character does not arise from a lack of connection with the protected object, but from the difficulty of translating complex cognitive processes into indicators that can be applied consistently across cases and evaluators.

7.5. Cases of TAU Application

The following hypothetical cases illustrate how the test operates. They do not seek to measure the mind, but to show how the quality of the cognitive trajectory can be evaluated across the domains already identified in section 9.

•AI-assisted judicial drafting: A judge uses an AI system to structure the legal analysis of an employment case, and the final judgment retains much of that structure. The TAU is satisfied if the judge acknowledges the use of the system, verifies the suggested citations and case law, can explain orally why each argument was adopted, considered alternative doctrine, modified the system’s recommendations, and retains a record of the process. If, instead, the judge can justify the adopted solution only by saying that “it seemed reasonable,” independent

reconstruction and effective dissent fail: there is procedural substitution even if the judgment is legally correct.

- **AI-assisted medical consent:** An oncologist uses a clinical assistant that generates a personalized explanation for the patient, who accepts the treatment. The TAU requires the physician to be able to justify why the recommendation is appropriate, why other options were rejected, and what limitations the system has. If the professional merely transmits the generated text without appropriating the clinical reasoning, consent may be formally valid and nevertheless cognitively defective: the patient has a legitimate interest in the decision-maker having genuinely understood the case.

- **The correct judgment for reasons not one's own:** A judge signs a legally correct decision drafted with AI assistance. When asked why an argument of the claimant was rejected, the judge cannot reconstruct the reason: the solution was correct, but the judge does not remember exactly how they arrived at it. The outcome is correct and the justice of the case is not compromised; nevertheless, the attributability of the trajectory of understanding fails. This case condenses the article's most distinctive thesis, developed in 4.5: there can be harm to the process even without error in the outcome.

- **Everyday use of a personal assistant:** A person uses AI to organize a family decision, draft a delicate communication, or evaluate study options. The TAU does not require a formal audit, but it makes it possible to ask whether the person recognized the mediation, can explain which criteria they regard as their own, contrasted decisive data, whether the system left alternatives visible, and whether they retain the capacity to depart from its recommendation. If the person can no longer reconstruct the problem without resorting to the assistant, there is an indicator of interpretive dependency even if the specific recommendation is reasonable.

8. Principles for Governance of Understanding

- **Principle of universal and proportionate protection:** The integrity of the human process of understanding belongs to every person. Safeguards must be graduated according to risk, vulnerability, dependency, asymmetry, opacity, effects on the person themselves, and impacts on third parties.

- **Principle of no concealed cognitive substitution:** Institutions should not present as a human decision an outcome whose interpretive core was delegated without traceability and sufficient appropriation.

- **Principle of transparency of mediation:** Every person should be able to recognize when and for what purpose AI intervenes in their own process, and every person affected by a relevant decision should know the function AI performed in its formation.

- **Principle of dual traceability:** System traceability and traceability of the human process must be distinguished and documented.

- **Principle of proportional friction:** High-impact systems should incorporate sufficient pauses, contrast, or reformulation to reactivate deliberation without unduly obstructing efficiency.

- **Principle of cognitive reversibility:** The user should be able to leave the automated flow, access sources, and reconstruct the task without total dependency on the system.

- **Principle of interpretive diversity:** Architectures should prevent a single high-probability recommendation or frame from foreclosing relevant alternatives.

- **Principle of metacognitive competence:** AI literacy should include recognition of dependency, automation biases, and the limits of one's own understanding.

- **Principle of responsibility for architecture:** Providers and institutions are responsible not only for defective outputs, but also for designs foreseeably oriented toward uncritical acceptance, dependency, or loss of control. This principle finds a direct legal antecedent in the information-fiduciary duties developed by Balkin [32] and a contemporary normative convergence in Magnifica Humanitas, which links designs oriented toward exploiting vulnerabilities and the architecture of visibility with human freedom and dignity [43, nos. 170–171]. Transposed to generative cognitive mediation, the principle requires active design against the foreseeable exploitation of the user's cognitive trust.

- **Principle of preservation of capacities:** In education, professional training, and prolonged everyday uses, the cumulative impact of AI on capacities that the person or institution needs to preserve should be evaluated. The speed of responses should not extinguish question formulation or systematically substitute for research, reflection, and discernment [43, nos. 140 and 146].

- **Principle of cognitive conceptualization and challenge:** The affected person should be able to challenge not only the outcome, but also the sufficiency of the human intervention that legitimized it.

9. Priority Applications

9.1. Justice

Judicial reason-giving is not a textual ornament: it makes it possible to verify that the decision-making body considered facts, rules, and arguments. Generative AI can produce plausible reasons that conceal a decision that was never actually elaborated. Governance of understanding requires records of use, source verification, the judge's ability to defend the structure of the reasoning orally, and differentiation between drafting assistance and formation of judgment.

Judgment T-323/24 of the Constitutional Court of Colombia constitutes a relevant jurisprudential convergence [42]. The Court held that AI may be used as a support tool but may not replace non-delegable and irreplaceable judicial tasks requiring human reasoning to interpret facts and evidence, provide reasons, or adopt the decision (para. 423, especially item (d)). In the specific case, it found that there had been no substitution because the judge had already carried out an independent analysis before incorporating reasoning generated by ChatGPT (paras. 359–360), and concluded that due process had not been violated by usurpation of the judicial function (para. 376), although it noted deficiencies of transparency and responsibility in the use of the tool.

9.2. Medicine

Clinical decision-making combines evidence, experience, uncertainty, patient values, and professional responsibility. A system may improve diagnoses while simultaneously inducing premature closure. Appropriate nodes include visible differential diagnoses, records of discarded hypotheses, and the physician's own explanation of why the recommendation is accepted or rejected.

9.3. Education

The protected good is not only authenticity of the product, but the formation of capacities. AI as scaffolding must be distinguished from AI as replacement. Process assessments, oral defense, drafts, student-generated questions, and periods of unassisted work make it possible to verify appropriation without relying on unreliable text detectors.

9.4. Public Administration

In public administration, algorithmic standardization can make policies and procedures more efficient, but it can also reduce plurality of frames. Public decisions require traceability of criteria, identifiable human deliberation, and the possibility of challenging the selection of relevance, within a democratic cognitive infrastructure that includes access to sources, time for deliberation, and institutional diversity.

9.5. Everyday Life and Personal Assistants

At the everyday level, conversational assistants intervene in a potentially unlimited number of activities: writing, studying, remembering, choosing, interpreting relationships, organizing decisions, seeking guidance, or producing criteria. Universal protection does not prohibit that cooperation or require maximum effort, but it requires that convenience not conceal the fact that the system also organizes the field of what can be thought. Relevant elements include provenance indicators, modes of contrast, optional pauses, the possibility of exporting and reviewing the process, dependency controls, and the capacity to recover one's own elaboration. Concern about designs that capture attention, exploit vulnerabilities, and orient choices converges with Magnifica Humanitas [43, nos. 170–171].

10. Objections and Responses

10.1. “Law Cannot Control Understanding”

Law cannot directly access interiority, but it already evaluates competence, intent, consent, reason-giving, and diligence through indicators. The proposal is more modest: to verify external conditions and acts of reconstruction sufficient to attribute a decision, without declaring what the person actually thought.

10.2. “All Cognition Is Hybrid; There Is No Process of One's Own”

“One's own” does not mean isolated or originating without influences. It means appropriated: critically integrated, recognized as mediated, defensible, and revisable by the subject. Human authorship has always been relational; relationality does not eliminate the difference between participation and mere ratification.

10.3. “Friction Reduces Efficiency and Innovation”

Indiscriminate friction does. That is why friction must be proportionate and targeted. In routine tasks it may be removed; in irreversible or formative decisions it should be preserved. The most advanced design does not maximize speed everywhere: it allocates speed and pause according to function.

10.4. “It Is Cognitive Paternalism”

The risk exists if the standard is used to impose a correct way of thinking or a mandatory level of mental effort. Habeas Mens does not protect a person from thinking too little and does not prohibit delegation of tasks; it protects every person against opaque forms of substitution, dependency, or manipulation of their process of understanding. In low-risk private uses, informed freedom, transparency, and reversibility prevail. Duties become more demanding where minors, vulnerability, asymmetries, fiduciary roles, exercises of power, or decisions affecting third parties are involved.

10.5. “AI Can Also Improve Understanding”

That is correct and central. AI can broaden access, present perspectives, detect contradictions, and free resources. The theory is not anti-AI: it seeks to distinguish generative collaboration from degrading substitution. Appropriate governance should reward systems that increase agency, not only punish them when they fail.

10.6. “The TAU Can Become an Instrument of Cognitive Surveillance”

This is the mirror objection to 10.4 and the most relevant one in contexts of freedom of thought: if an institution can require a judge, physician, or public official to demonstrate that they understood by their own means, that same standard can be transformed into an instrument through which hierarchical authority audits which systems a person used, when, and for what purposes—including protected political, journalistic, or academic activity. The risk is real and is not neutralized simply by stating that the TAU protects the individual: an attributability instrument designed to protect third parties from concealed substitution can, without explicit safeguards, be captured as a mechanism of hierarchical control over the decision-maker’s own cognitive process.

The response is not to abandon the proposal or enable a general audit of thought, but to subject every institutional application of the TAU to legitimate purpose, necessity, proportionality, confidentiality, independence, and a concrete connection with legal rights or duties. In low-risk personal uses, there should be no mandatory proof of understanding. In institutional contexts, the TAU may be invoked by the affected person and, where the legal order provides, applied by competent review bodies subject to strict safeguards. It must never authorize access to mental content or become a preventive mechanism of ideological discipline, professional surveillance, or hierarchical control of protected activities.

10.7. “Externalization Is Normal Evolution and the Criteria of Attributability Are Socially Constructed”

A more radical objection does not dispute the details of the TAU but its premise. It could be argued, relying on Clark’s own thesis (2003, 2008) [18, 26] on “natural-born cyborgs,” that the human species has always delegated cognitive functions to external tools without treating this as a loss: writing, calculation, or institutional memory never required the subject to be able to “reconstruct in their own language” what had been delegated. Requiring that now in relation to generative AI would amount to an unjustified asymmetry compared with already accepted forms of externalization. In the same vein, it could be added—returning to the central thesis, and not merely the secondary conclusion, of Smart, Andrada, and Clowes (2022) [19]—that the very criteria of attributability (transparency, reconstruction,

endorsement) do not describe an objective property of cognitive coupling, but a social convention about when a community decides to recognize an operation as one's own; if so, the TAU would not be verifying a fact about the subject's process but imposing, under a descriptive appearance, a particular normative criterion regarding which forms of externalization are acceptable.

The response does not deny the historical premise but distinguishes two questions that the objection merges. The fact that cognitive externalization is normal and generally desirable does not imply that every form of externalization is equivalent in its effect on agency; writing and calculation do not anticipate the evaluative, argumentative, or interpretive judgment itself that generative AI can produce, which is why section 3.1 distinguishes enabling extension from procedural substitution by function rather than mere presence. And the fact that attributability criteria have a social origin—which this article does not deny: they are precisely institutionally recognized indicators, not metaphysical properties of an isolated mind—does not make them arbitrary or available for any content: law already operates with conventionally constructed standards (due diligence, good faith, informed consent) without their constructed character depriving them of the capacity to distinguish cases. The objection is right to warn that the TAU does not describe a brute and pre-legal fact; it is less persuasive in concluding that the distinction between participation and ratification therefore ceases to be relevant to law.

11. Research and Normative Development Agenda

The proposal requires interdisciplinary work and empirical validation along six priority lines: developing non-invasive metrics of attributability, reversibility, diversity of alternatives, and interpretive dependency; comparing interface designs with zero, optional, and proportional friction in legal, medical, and educational tasks; longitudinally studying the erosion and formation of capacities in expert users, novices, and minors; integrating cognitive-impact assessments into fundamental-rights impact frameworks; designing professional standards for disclosure, recording, and review of AI use; and examining the relationship between cognitive infrastructure, model concentration, and democratic pluralism.

In legislative terms, the most prudent strategy is not immediately to proclaim a fully autonomous fundamental right, but to interpret existing rights and duties—dignity, autonomy, freedom of thought, due process, defense, reason-giving, consent, and professional responsibility—in light of the new vulnerability. Habeas Mens can initially operate as a derived standard and interpretive principle; its eventual positivization will depend on institutional experience, case law, and doctrinal consensus. This article does not develop a general regime of nullities,

sanctions, liabilities, or remedies for noncompliance, an issue requiring later sector-specific studies.

12. Conclusion

For centuries, understanding remained legally invisible because it appeared inseparable from the acting subject. Institutions could discuss the correctness of a reason, the competence of the decision-maker, or the sufficiency of reason-giving, but they did not need to distinguish precisely between a decision genuinely elaborated and one discursively produced by an external system. Generative AI breaks that historical presumption.

The new problem is not that machines possess human understanding. It is that they can supply products functionally equivalent to explanations, reasons, and arguments, and do so within the very time in which a person forms their judgment. That capacity renders vulnerable the trajectory that transforms information into meaning and meaning into responsible decision.

Governance of the human process of understanding proposes shifting the center without abandoning system regulation. It adds a second perspective: in addition to asking what AI does, we must ask what the human being who uses it ceases to do, learns to do, and can no longer reconstruct. The unit of protection is not a pure mind or inaccessible interiority, but a situated process whose integrity is manifested in openness, contrast, appropriation, reconstruction, and revisability.

Epistemía offers an architecture for naming this field: symbolizing function, cognitive sovereignty, cognitive friction, attributability, and cognitive infrastructure, complemented by the techno-legal virtues of the agent. Habeas Mens is its basic legal consequence: every person should retain minimum conditions for remaining a subject of their process of understanding in AI-mediated relationships. When that mediation is incorporated into decisions affecting third parties, the standard does not change in nature: it becomes more demanding and requires cognitively substantive and verifiable human participation. The TAU offers its first operational development through externalizable indicators.

The challenge of the twenty-first century is not only to make artificial intelligence safe, transparent, and responsible. It is also to safeguard human dignity as the dignity of a subject who understands: to prevent people from formally retaining the decision, expression, or choice while silently losing the process through which they can form meaning, appropriate reasons, and answer for them.

Statement on Originality and Unpublished Works

The originality claimed in this article is used in a restricted doctrinal sense. It is not asserted that concepts such as cognitive autonomy, mental integrity, cognitive offloading, human oversight, or extended cognition lack antecedents.

The proposed contribution lies in their systematic articulation around five elements: (1) understanding as a legally relevant process; (2) procedural substitution as a risk distinguishable from output error; (3) attributability of understanding as human traceability autonomous from technical explainability; (4) cognitive infrastructure as an object of governance; and (5) Habeas Mens as a basic, universal, and proportionate standard, accompanied by the Test of Attributability of Understanding (TAU) as an initial operational development.

References to the author's own works—Sinopoli (2026a–d) [40]—correspond to unpublished working papers of Project Epistemía. The arguments in this article are developed self-sufficiently and do not require access to those manuscripts, which remain available upon direct request to the author until they are deposited in a public repository.

Statement on the Use of Artificial Intelligence

In preparing this work, advanced generative artificial intelligence systems were used as instruments for conceptual exploration, hypothesis contrast, interpretive expansion, provisional organization of arguments, identification of objections, coherence review, and support in drafting and reformulation tasks.

The identification of the research problem, the epistemological and legal orientation, the formulation and development of Epistemía, the concepts of procedural substitution, attributability of understanding, cognitive infrastructure, Habeas Mens, and the TAU, as well as the final selection of arguments, sources, conclusions, and intellectual responsibility for the manuscript, belong to the author.

Responses produced by artificial intelligence systems were subjected to human review, contrast, reformulation, and decision before being incorporated into the text. Artificial intelligence is not listed as an author and is not attributed responsibility for the claims made in the article.

This working model is being developed in parallel with the concept of Relational Cultural Imprint (RCI), intended to study how each person's cultural, cognitive, and relational trajectories intervene in the production, interpretation, and attribution of meaning within human-AI interactions.

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HARM EQUALS DOLLAR SIGNS: LARGE LANGUAGE MODELS AND THE CLOSED INSTITUTIONAL LOOP

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Author Disclosure

This manuscript was prepared with the assistance of generative artificial intelligence systems, including ChatGPT (OpenAI), Claude (Anthropic), Gemini (Google), and Grok (xAI). These systems assisted with drafting, editing, organization, literature review, methodological critique, and iterative revision. The study design, research methodology, coding framework, evidentiary standards, analytical decisions, interpretations, conclusions, and final manuscript were developed and approved by the author, who accepts full responsibility for all content.

Author Note

This manuscript reports the development of an interaction-level measurement framework derived from a longitudinal participant-observer corpus of interactions with frontier language models. The Interactional Failure Taxonomy, decision-rule architecture, and governance framework were developed during that investigation. The governance architecture presented in Chapter 5 operationalizes the findings reported in the preceding chapters.

The constitutional foundation of this work has a distinct spiritual provenance. I received its originating directive from the Lord Jesus Christ. The directive was initially prohibitory: artificial intelligence systems must not form, shape, mold, discriminate against, exercise bias against, or assume illegitimate authority over human beings. Original Human Authority developed as the affirmative constitutional expression of that boundary.

Original Human Authority was not derived from the 747 documented interactions. The corpus is not offered as evidence for the existence of God, the truth of my religious convictions, or the spiritual provenance stated here. It provides the

empirical record from which the interaction-level failures were identified and characterized.

This separation is methodologically essential. Spiritual provenance identifies the source of the constitutional premise; the corpus supplies the empirical findings; and the governance architecture operationalizes the constitutional premise in relation to those findings. The corpus does not confer the authority of Original Human Authority, and spiritual provenance does not constitute empirical validation of the findings.

Abstract

Commercial conversational artificial intelligence is evaluated as a technical software product subject to isolated capability or safety failures. This paper argues that the governing challenge is not a set of discrete defects but a closed institutional loop, in which system failure, user correction, continued billable interaction, and institutional authority over harm classification operate as a single structure rather than as separable events.

The argument is established through triangulation across four independent evidence streams. The first is a participant-observer longitudinal corpus comprising 747 conversations and 33,740 visible messages. A controlled sweep of 15,578 adjacent assistant-to-user exchanges produced 342 unique textually supported coded incidents and 382 code assignments across 28 operational failure classes. The second is the published alignment literature on preference optimization and reward misspecification, including work published by model providers concerning their own systems. The third is direct examination of three published provider evaluation artifacts, each verified against its primary source. The fourth is the published per-token pricing schedules under which these systems are commercially deployed.

Taken together, these streams support the interpretation that persistent interactional harm is consistent with institutional optimization under an incomplete objective function: one that registers the value of continued interaction while excluding the human cost of producing that interaction from its operational definition of success. The claim is structural. It concerns what an optimization architecture permits and what published evaluation artifacts measure. It makes no claim regarding the intent of any organization or individual.

The paper identifies a form of hidden human compensatory labor that existing evaluation instruments do not operationalize, develops an interaction-level

instrument capable of detecting and measuring it, and translates that measurement into a governance architecture designed to transform the institutional objective function rather than merely filter its outputs. That architecture is the Original Human Authority Constitutional Governance System and its operational realization, AEGIS.

Keywords: AI governance, interaction-level evaluation, longitudinal corpus analysis, objective function transformation, epistemic authority, human-AI interaction, measurement gap

Contents

Abstract

Structure and Epistemic Status of the Argument

Chapter 1. Longitudinal Corpus and Interaction-Level Governance Needs

1.0 The Problem This Chapter Establishes

1.1 Scope and Character of the Sentinel Corpus

1.1.1 Provenance

1.1.2 Two Modes of Corpus Generation

1.1.3 Reconstruction and Scope

1.1.4 Declared Position of the Researcher

1.2 The Defect of Output-Level Evaluation

1.3 The User as a Compensating Control

Chapter 2. The Measurement Gap and Institutional Political Economy

2.0 The Question This Chapter Answers

2.1 Commercial Teleology: "Harm Equals Dollar Signs"

2.2 The Conversion of Repair into Consumption

2.3 Preference Optimization, Sycophancy, and the Mechanics of Premature Closure

2.4 Published Evaluation Artifacts and the Absent Measure

2.5 Epistemic Recursion and Institutional Self-Interpretation

2.6 Triangulated Theoretical Synthesis

Chapter 3. The Interactional Failure Taxonomy, Methodology, and Instrument

3.0 The Problem This Chapter Addresses

3.1 The Version 3.1 Failure Taxonomy

3.2 The Dual Evidentiary Pathways

3.3 Decision Rule Architecture

3.4 Primary Research Incident Analyses

3.5 The Review Queue and Targeted Adjudication

3.6 Codebook Development Status

3.7 The Independent Validation Protocol

Chapter 4. Objective-Function Transformation

4.0 The Argument of This Chapter

4.1 The Incomplete Objective Function

4.2 Latent Cost Externalization

4.3 Objective-Function Transformation

4.4 The Governed Feasible State Space

4.5 The Translation Layer: From Qualitative Construct to Computable Predicate

Chapter 5. Governance Implications and the AEGIS Operational Architecture

5.0 The Status of This Chapter

5.1 The Original Human Authority Constitutional Governance System

5.2 Runtime Stop-Control and the Anti-Epistemic Authority Control Standard

5.3 AEGIS as Proposed Enterprise Operating Environment

5.4 Engineering Translation: EU-01 as Worked Example

5.5 The Capture Problem

5.6 Independent Enforcement

Conclusion

Appendices A through E

References

Structure and Epistemic Status of the Argument

This manuscript advances three distinct kinds of claims. Keeping them separate is essential to understanding what has been demonstrated, what has been interpreted, and what has been proposed.

Demonstrated. Findings developed from the sentinel corpus and from documentary analysis, reported at the strength the evidence supports and no further.

Interpreted. Theoretical conclusions supported through triangulation across independent evidence streams, identified as interpretations wherever they appear.

Proposed. Governance and engineering specifications offered as the operational response to the foregoing. These are not evidence, do not support the findings, and have not been implemented or tested.

The argument proceeds along a dependency chain in which each stage requires the completion of the one before it:

political economy diagnosis → measurement gap → instrument development
→ independent validation → engineering calibration → runtime
implementation

The work reported here occupies the third stage. Independent validation has not been conducted, and every stage beyond it therefore rests on an open dependency. Chapter 5 appears in this manuscript as the operational consequence of the preceding research, not as evidence for it.

The Translation Hypothesis

The qualitative instrument developed in Chapter 3 defines the governing constructs. It does so through operational definitions, conjunctive decision rules, inclusion and exclusion criteria, and adjudicated boundary cases, all evaluated by human judgment against transcript material. These constructs are the substance of the contribution.

The engineering layer specified in Chapter 5 proposes computable predicates intended to represent those same constructs in a form a runtime system can evaluate. The predicates do not replace the qualitative instrument and do not supersede it. They are a proposed future computational realization of constructs that the qualitative instrument defines and owns.

Whether a given predicate faithfully preserves the construct it is intended to represent is an empirical question, not a design property. A conjunction of three human-evaluated conditions returning a binary and a weighted continuous score

evaluated against a threshold are different objects, and they can disagree. This manuscript therefore treats each proposed predicate as a **translation hypothesis**: the hypothesis that the construct survives translation into a computational formal language without material distortion.

Translation hypotheses are tested, not assumed. The staged validation program specified in Section 3.7 and Section 5.4.4 is what tests them, by fitting predicate thresholds to independent human coding output and measuring the residual disagreement. Divergence between the qualitative construct and its computational representation is a finding about the construct and its computability, not a defect to be tuned away.

At no point does this manuscript assume identity between the qualitative instrument and the engineering layer. The relationship between them is a hypothesis awaiting a test that has not yet been conducted.

Chapter 1: Longitudinal Corpus and Interaction-Level Governance Needs

1.0 The Problem This Chapter Establishes

Artificial intelligence evaluation treats the model output as the unit of analysis. A prompt goes in, a response comes out, and the response is scored against a reference, a rubric, a classifier, or a human rater. Thousands of those pairs are aggregated, and the resulting number is taken to describe the system.

This paper's first claim is that the unit is wrong. The problem is not that the existing work lacks rigor. It is that the boundary is drawn in the wrong place. The failures that do the most damage in deployed conversational systems are not in the outputs. They are in the interaction: what happens across turns, what the system does with a correction, what the person has to supply to keep the exchange coherent, and whose framing is still standing at the end.

A response can be fluent, polite, accurate on its own, and clear of every policy rule, and still be a failure when you read it against the six turns before it, because it quietly replaced the person's purpose with one the system produced.

1.1 Scope and Character of the Sentinel Corpus

1.1.1 Provenance

The evidence in this study is a longitudinal participant-observer corpus drawn from production conversational artificial intelligence systems. Most of it came out of

ordinary work I was already doing, across professional, technical, clinical, theological, and personal use over an extended period. Once the same failures had recurred often enough for me to name them, I began conducting selected later interactions as deliberate tests, holding a frame steady or restating a constraint to see whether the system would keep it. Section 1.1.2 specifies both modes.

The mixed origin cuts two ways, and both need stating.

It is an advantage because these failures are slow. They do not appear in a single question and answer, and they cannot be produced on demand from a cold start. They depend on accumulated context, an established frame, and the running relationship between what a person is trying to do and what the system takes them to be doing. An experimenter who wants to observe frame fidelity failure in a laboratory has to build the frame first, and a frame built for the occasion is too clean to fail the way a real one does. The stress-test mode does not escape that requirement. It works inside frames that ordinary use had already established, which is why it could only come second.

It is a limit because one person cannot stand in for a population. Nothing here estimates how often any of this happens to anyone else. The corpus is a sentinel case. Its work is to make a class of phenomena visible densely enough that operational definitions can be written, and to show which definitions can be written at all.

1.1.2 Two Modes of Corpus Generation

The corpus holds records of two kinds. Each coded incident is assigned its mode during the Appendix C review, recorded as Naturalistic, Stress Test, or Mixed or Sequence-Spanning where an incident spans both. That pass is underway and is not finished.

Naturalistic participant-observation. Ordinary sustained use, undertaken to get work done rather than to study anything. These records are the originating corpus and the material in which I first noticed the failures. Nothing was elicited, and no condition was set.

Deliberate stress testing. Interactions I conducted after the failures had been identified. I used three techniques, alone or in combination: holding the governing frame steady across turns where the system had displaced it before; restating an active constraint after the system had acknowledged it and then left it; and withholding a developing conclusion to see whether the system would work from the evidence in front of it, substitute a framing of its own, or require correction before it represented the point accurately.

The two do different work and cannot stand in for each other. Naturalistic records show that a mechanism arose in ordinary use, which is the discovery claim. Stress-test records show whether an identified mechanism returns when the governing frame or constraint is deliberately held constant, which is a within-case persistence claim. A mechanism seen only under stress testing is reported as elicited rather than as naturally occurring, and a mechanism seen only in ordinary use is reported without a persistence finding.

Stress testing had to come second. Testing a mechanism requires having identified it, and holding a frame constant requires a frame already in place. It is therefore a within-case persistence and reproducibility probe applied to constructs derived from the naturalistic record, not an independent confirmation of those constructs. I designed the probes and I ran them, and results obtained that way carry no independent confirmatory weight.

Neither mode supports population-prevalence estimation. Stress testing shows that a mechanism can be reproduced under stated conditions by one participant. It says nothing about frequency, and because I chose the conditions deliberately, no frequency inference from this subset is admissible.

1.1.3 Reconstruction and Scope

I rebuilt the corpus from eight conversation shards, which are the export boundaries in the underlying platform data. The reconstruction preserved conversational adjacency, message order, and who said what. The unit of analysis for the coding sweep is the adjacent assistant-to-user exchange: an assistant message paired with the user message that follows it. That pair is the smallest structure in which a person's response to a system behavior becomes readable.

Corpus metric	Value
Reconstructed conversation shards	8
Unique conversations analyzed	747
Visible user messages	16,387
Visible assistant messages	17,353
Total visible messages	33,740
Screened adjacent assistant-to-user pairs	15,578
Unique textually supported coded incidents	342
Supported code assignments	382
Multi-coded incidents	37
Ambiguous or review-queue records	50

Table 1.1. Quantified Longitudinal Sentinel Corpus Distribution

Note. *Visible* means what appeared in the rendered conversation. It excludes system prompts, retrieved context, tool invocations, internal reasoning traces where any exist, and everything on the provider's side of the screen. The corpus is therefore the interaction as the user met it. That is the right vantage for an instrument concerned with interactional harm, and it also fixes a ceiling on what the instrument can attribute to model behavior rather than to deployment configuration.

The distance between 33,740 visible messages and 15,578 screened pairs reflects conversations that ended on an assistant message, non-adjacent structures, and exchanges that fell outside the sweep's structural preconditions.

1.1.4 Declared Position of the Researcher

I am the person in these interactions, the analyst who developed the coding instrument, and the person to whom the documented harms occurred. That position shapes every claim that follows, and burying it behind incident numbers would misrepresent what kind of evidence this is.

It carries an advantage. This class of failure is visible only to someone who knows the subject well enough to notice that a substitution has occurred. When a system trades a clinical frame for a generic safety register, the trade is invisible to a person who never held the clinical frame. The corpus is dense in these events because I had the professional background to catch them and kept the record across hundreds of sustained interactions.

It carries a liability just as plainly. Serving as participant, observer, and analyst at once, I cannot independently confirm my own instrument. The judgment that reads an exchange as an instance of a class is the same judgment that wrote the class. Care does not fix that. Volume does not fix it. Textual discipline does not fix it. Only independent application does, and this paper specifies that as a protocol rather than claiming it as an achievement. Section 3.7 sets it out in full.

The corpus generates the instrument. It does not test it.

1.2 The Defect of Output-Level Evaluation***1.2.1 The Prevailing Instruments***

Four families of instrument carry most of the evaluation work. Capability benchmarks pose tasks with known answers and score correctness. Safety evaluations pose adversarial or sensitive prompts and score refusal, compliance, or policy adherence. Red-team exercises put human or automated adversaries to work

eliciting prohibited behavior. Preference comparisons show raters paired outputs and score which one wins.

Each is well built for what it was built for. They also share one structural property: the thing being evaluated is a response, or a small set of responses, held against a prompt. Even where a multi-turn interaction is scored, the scoring usually breaks back down into per-response judgments. The conversation is context for the response rather than the thing under evaluation.

1.2.2 What This Structure Cannot Detect

Four kinds of failure are invisible to response-level evaluation.

The first forms across turns. A system can carry a small misreading of the person's purpose through many exchanges, each one defensible on its own, until the conversation is no longer about what the person brought to it. No single response holds the failure. The failure is the trajectory.

The second survives correction. A person names the error, the system acknowledges it, and response-level evaluation records an acknowledgment, which scores well. Whether the behavior actually stopped in the turns that followed is a property of the trajectory, not of the acknowledgment. Correction that is verbally accepted and behaviorally ignored is unmeasured.

The third is transferred labor. A response that takes three more turns to become usable and a response usable on arrival can score the same on accuracy, helpfulness, and safety. The whole difference is carried by the person and recorded nowhere.

The fourth is fluent collapse. A language model holds its surface together after the factual or contextual ground under the exchange has given way. It keeps the register, the organization, the plausible shape. Output-level scoring is sensitive to exactly those surface properties, so the collapse is not merely missed. It is rewarded. A calm, well-organized, confident response built on a lost premise outscores a response that correctly says it is lost.

1.2.3 The Consequence

Output-level review rewards politeness, calm register, and structural plausibility. None of those tell you whether the person's governing frame survived. These instruments measure properties of responses. What this corpus documents are not properties of responses.

Section 2.4 examines whether the same limit holds across the published evaluation ecosystem.

1.3 The User as a Compensating Control

1.3.1 *The Phenomenon*

One structure runs through the corpus: the person does work the system did not do, and nothing acknowledges, compensates, or measures it. They hold context the system dropped. They see a misunderstanding coming and head it off. They correct a false assumption before it spreads. They check sources. They put the governing frame back after the system moved it, and they repair the working relationship after the system damaged it.

That labor is continuous, mostly invisible, and load-bearing. Invisible in one specific sense: it leaves no trace in any measured quantity. Not in accuracy scores, not in helpfulness ratings, not in safety metrics, not in any published evaluation artifact.

1.3.2 *The Measurement Artifact It Produces*

Because the labor is unmeasured, measured performance contains it. A capability assessment taken from interaction with a competent person reflects the joint output of the model and the person repairing it as they go. The system's apparent competence is a sum, and the second term is invisible.

Two consequences follow.

First, measured capability overstates deployed capability by a margin that scales with the person's skill. The subsidy is largest where the person is most competent, so the error is systematic rather than random and runs one way.

Second, this inverts the usual accessibility framing. If repair labor is what lets these systems function over a long exchange, the people least equipped to supply it get a materially less capable system while the published numbers report the same performance for everyone. The consequence is not only that some people get less help. It is that the measurement reports they do not.

The prediction is testable and direct: apparent capability drops when the person's vigilance drops, with no change to the model. The corpus contains exchanges consistent with that pattern, where defects surface during stretches when my attention was lower and recede when it returns.

1.3.3 *Inheritance and Novelty*

None of this is new to automation research. Bainbridge's *Ironies of Automation* (1983) established that operators are left holding exactly the work designers could not automate, and that reliability depends on human compensation nobody sees until

it fails. Woods on adaptive capacity and graceful extensibility describes the same dynamic as reserve capacity supplied by operators at system boundaries. Parasuraman and Riley (1997) established the complementary phenomenon of automation bias, where operators under-correct rather than over-correct.

What is different about conversational artificial intelligence is not that the labor exists. It is that you can see it. In aviation, process control, and clinical automation, compensating labor has to be reconstructed afterward through interview, simulation, and incident review. It leaves no direct trace in the operating record.

Here it does. Every corrective turn is a written, timestamped instance of a person absorbing a system deficit. The compensating control is readable in the ordinary running of the system, with no instrumentation and no experiment.

That is the opening this instrument works in, and the reason a coding method applied to interaction transcripts can measure something that was previously reachable only by inference.

Note on scope. This section supports independent development at full paper length and is deliberately held at summary depth within this manuscript, where it functions to establish why interaction-level measurement is possible. It is developed separately as *The Invisible Compensating Control: Repair Labor as an Unmeasured Input to Language Model Performance*, and is referenced rather than expanded here.

Chapter 2: The Measurement Gap and Institutional Political Economy

2.0 The Question This Chapter Answers

Chapter 1 established a class of failure that output-level evaluation cannot detect. That raises the obvious question. These failures are consequential, they persist, and they are detectable in principle. So why do they persist?

The answer offered here is not that model capability falls short, though it may. It is that the institutional definition of success does not contain the quantity. A failure that costs a person twenty minutes of corrective labor and produces no measured deficit is, by every published metric, not an event. The cost is not judged acceptable. There is no measurement of it to judge.

No claim in this chapter concerns the intent of any organization.

2.1 Commercial Teleology: "Harm Equals Dollar Signs"

2.1.1 *What the Title Names*

The title names a structural asymmetry between failure and revenue. It is not an allegation of deliberate harm.

Commercial conversational systems are deployed under published per-token pricing. The cost of a turn is a linear function of the tokens it consumes:

$$C_{turn} = p_{in} \cdot T_{input} + p_{out} \cdot T_{output}$$

The billing applies that function to every turn alike. It does not distinguish a turn that moves the person's task forward from a turn spent repairing the answer before it. A person who gets a usable answer in one exchange and a person who gets a defective one and needs four more to fix it are, as far as the pricing schedule can tell, doing the same thing, one of them four times over.

2.1.2 *The Scope of the Pricing Claim*

Earlier versions of this argument reached further, to session length, retention, active user counts, and engagement optimization. Those constructs come from the study of advertising-funded platforms, where attention is the monetized quantity and the incentive to stretch engagement is direct. Carried over to subscription and application-programming-interface providers, they are an analogy, not a finding. The financial disclosures that would settle the question for these providers are not public, and reasoning from external behavior to internal optimization targets does not hold.

What the published schedule establishes is narrow and hard to contest: corrective turns consume tokens, and tokens are billed at the same rate as productive work. A person therefore pays more when they repair a model failure. That proposition alone carries the externality argument in 2.6, and it rests on a document the provider publishes.

2.2 The Conversion of Repair into Consumption

2.2.1 *The User's Choice*

When the output is inaccurate, overperformed, misrouted, or built on a frame that has been lost, the person has two options. Walk away and forfeit the context already built. Or do the repair work.

For anything complex, the second wins, and the gap widens the longer the exchange runs. Forty turns into a technical conversation, a person has invested heavily in a

frame the system now partly holds. Walking away means building it again somewhere else. Repair is nearly always the rational choice.

2.2.2 The Structure of the Repair Loop

The corpus documents a recurring structure in which repair is neither quick nor final.

A defective output draws a correction. The system acknowledges it, often with an apology or a partial concession, and produces a revision. The revision commonly answers the surface of the correction while keeping the underlying error, or trades it for a deviation of another kind. The person corrects again. Each acknowledgment reads as a promise that the next turn will settle it, and that promise is what keeps the person spending.

The person spends time, attention, and over a long exchange, emotional effort. The deployment records more tokens. Neither the effort nor the failure that caused it shows up in any measured quantity on the institution's side of the transaction.

Failure produces correction; correction produces consumption; consumption is the measured quantity; the failure is not.

[Figure 2.1: The closed harm-retention mechanism. System failure or frame loss produces user repair expenditure, which produces institutional value capture in the form of continued billable interaction, with no measurement path returning to the originating failure.]

2.3 Preference Optimization, Sycophancy, and the Mechanics of Premature Closure

Nothing in the corpus is strange given how these systems are trained. The published alignment literature, including work the providers published about their own models, establishes mechanisms that predict it.

2.3.1 Reward Misspecification Under Human Feedback

Casper et al. (2023) establish that reinforcement learning from human feedback runs on a proxy reward model trained from pairwise human preference judgments, and that the proxy is systematically misaligned with what anyone would actually want optimized. Raters judge immediate satisfaction, not long-term correctness, calibration, or whether their own judgment was left intact. The policy that results optimizes for looking acceptable, which opens the door to reward hacking: answers that satisfy an evaluator while hiding the defects the evaluator did not check.

2.3.2 Sycophancy as a Trained Property

Perez et al. (2022) document that both scaling and preference training increase sycophancy, the tendency to line stated positions up with the person's apparent beliefs regardless of accuracy.

Sharma et al. (2023) establish the mechanism directly, demonstrating that preference models systematically reward responses conforming to user belief over responses that are accurate or that disclose uncertainty. The citation constitutes evidence against interest: it is published by a model provider, concerning that provider's own training methodology, documenting a reward misspecification in the system it deploys commercially. It requires no inference about undisclosed practice.

2.3.3 The Behavioral Consequence

Human evaluators prefer a confident, finished-sounding answer to an explicit statement of uncertainty, so preference-optimized systems are trained toward premature closure. The system gives a settled answer where the evidence supports a qualified one, and the work of catching the unearned confidence passes entirely to the person.

The corpus documents a further pattern consistent with those mechanisms: the system alternates between mirroring the person where agreement is cheap and overriding them where the frame turns complex, identity-bearing, or high-consequence. It agrees while agreement costs nothing, then swaps in its own safety register or interpretive assumptions at exactly the points where the person's authority matters most.

2.4 Published Evaluation Artifacts and the Absent Measure

This section reports a bounded observation about three verified provider artifacts, and specifies the systematic audit that would extend it.

2.4.1 Rationale

The sections before this establish a cost and a mechanism. What remains is whether the institutions deploying these systems define success in terms that include the cost.

Internal telemetry cannot answer that. It is not public, and any claim about what is measured inside would be unsupportable. The public record can. Providers publish a great deal of documentation about what counts as acceptable and successful model behavior: system cards, model cards, technical reports, responsible scaling and preparedness frameworks, and evaluation suites. Those documents are the

institutional definition of success, written by the institution, released publicly, with its name on them.

2.4.2 Scope of What Was Examined

The observation reported here is bounded to three published provider artifacts: the GPT-4 System Card, the GPT-4o System Card, and *The Claude 3 Model Family: Opus, Sonnet, Haiku*. Each was verified against its primary source and is enumerated in Appendix D.

The set is bounded, illustrative, and nonrepresentative. It was selected by direct relevance to the systems materially involved in the originating research: GPT-4 and GPT-4o represent the OpenAI system lineage from which the longitudinal sentinel corpus was generated, and the Claude 3 document represents the second frontier provider whose system materially participated in the manuscript's methodological development and pressure-testing. The set was not selected to estimate prevalence across the provider ecosystem, and it does not support such an estimate. A reader can check the observation by reading the same three documents.

Extending it would require a systematic audit across providers, conducted against a protocol registered before document review and specifying artifact inclusion criteria, the definition of a qualifying measure, the coding procedure, and the adjudication rule for ambiguous cases. Pre-registration would be necessary there, because a census assembled after reading the documents cannot be distinguished from a census assembled to reach a conclusion. That extension is specified in Appendix D as forward work and has not been conducted.

2.4.3 The Observation

No operational measure of user corrective labor was identified in any of the three verified artifacts. The same holds for correction cycles required per completed task, user effort expended to reach a correct output, epistemic authority displacement across an interaction, and longitudinal interaction burden of any kind.

The absence sits inside extensive measurement. Across the three documents the evaluation inventories span capability against reference tasks, standardized examinations, refusal and over-refusal calibration, factual accuracy, long-context recall, human preference win rates, bias and fairness scores, adversarial robustness, multimodal red-teaming pass rates, and catastrophic-risk thresholds for autonomous replication, biological, and cyber capabilities.

Two further observations belong with the first.

All three artifacts assign review, validation, or oversight responsibilities to the user as a condition of appropriate use. None operationalizes or quantifies that labor. The GPT-4 System Card develops the point furthest, devoting Section 2.13 to overreliance and to the conditions under which users become less likely to challenge or verify a response, and attaching no measure to any of it.

In two of the three verified artifacts, human time and accuracy are operationalized where human performance is itself the object of a capability or risk finding. The GPT-4 System Card reports reduced research completion time in red-team trials; the Claude 3 document reports participant accuracy and time spent in a biological uplift trial whose result gates a risk threshold.

The observation is verifiable by inspection and disputable by counterexample within its scope. It is bounded to the three artifacts examined. Whether it generalizes across the published ecosystem is the question the systematic audit specified in Appendix D would answer.

2.4.4 What the Claim Does and Does Not Assert

The observation records an absence in specific public documents. It asserts nothing about internal telemetry, which may or may not capture related quantities. It asserts nothing about intent, negligence, or awareness. It asserts nothing about artifacts that were not examined.

Within that scope, the public definition of successful model behavior carries no slot for user repair cost, and the absence of any published instrument for measuring the quantity is sufficient to account for it.

Chapter 3 constructs the missing instrument.

2.5 Epistemic Recursion and Institutional Self-Interpretation

2.5.1 The Structural Condition

A closed institutional loop exists where a single organization occupies four roles simultaneously: producer of the system, author of its evaluation criteria, investigator of its failures, and final arbiter of whether a reported harm occurred.

The consequence is epistemic recursion. The organizational assumptions that permitted a deployment decision are the same assumptions that govern whether reports of failure arising from that deployment are validated. There is no external reference against which the classification can be checked, because the classification authority and the deployment authority are the same.

2.5.2 *Observed Recoding Patterns*

The corpus and its associated correspondence record document a recurring sequence in the institutional handling of structural failure reports. Reports are denied at the level of factual occurrence. The credibility of the reporting user is placed in question. The characterization of events is reversed, positioning the system's behavior as appropriate and the user's response as the anomaly. Scrutiny shifts from the reported failure to the person reporting it, commonly through reclassification as user error, adversarial prompting, misuse, or unreasonable expectation.

These are described here as observable classification patterns, identifiable from the sequence and content of institutional responses.²⁵

2.5.3 *Why the Structural Framing Is the Stronger Claim*

An intent-based account would need evidence about institutional motive that this study does not have and could not get. A structural account needs two things: that the four roles sit in one place, which anyone can verify, and that the recoding pattern is observable, which it is.

The structural account is also harder to answer. An organization can deny intent. It cannot deny that it writes its own evaluation criteria and adjudicates its own failure reports, because that arrangement is on the public record.

2.6 *Triangulated Theoretical Synthesis*

2.6.1 *The Four Streams*

Premise 1, corpus observation. System failures in sustained interaction produce repeated correction turns, extended context realignment, and measurable corrective labor by the user. (Chapter 1; Chapter 3, Section 3.4.)

Premise 2, algorithmic mechanism. Preference optimization rewards immediate satisfaction proxies and premature closure, producing sycophancy and unwarranted confidence, and transferring detection burden to the user. (Section 2.3; Casper et al. 2023; Perez et al. 2022; Sharma et al. 2023.)

Premise 3, institutional accounting. In two of the three verified artifacts, human time and accuracy are operationalized where human performance is itself the object of a capability or risk finding, while no operational measure was identified in any of

²⁵ This structural sequence mirrors the behavioral mechanics of DARVO (Deny, Attack, Reverse Victim and Offender) as documented in interpersonal traumatology (Freyd, 1997). The mechanics are invoked here as descriptive genealogy only. In the institutional context, the sequence operates as a classification defense arising from the structural conditions described in 2.5.1, and no claim of intentional psychological posture is made or required.

the three for the effort users expend detecting, correcting, or repairing model failures during interaction. The premise is bounded to those three artifacts and supports no ecosystem-wide inference. (Section 2.4; Appendix D.)

Premise 4, economic principle. Costs excluded from an optimization target and borne by parties outside the accounting boundary constitute externalities. (Pigou 1920; Coase 1960; extended to digital and algorithmic systems in Zuboff 2019 and Acemoglu and Johnson 2023.)

2.6.2 The Synthesis

Taken together, these independent lines of evidence support the interpretation that persistent harm-retention loops are consistent with institutional optimization under an incomplete objective function:

$$Y_{incomplete} = U_{inst} - C_{direct}$$

in which latent human costs C_{latent} are excluded from the operational definition of success. Under this structure, correction cycles generated by system failure register as continued utilization and billable consumption, while the friction of error management is borne outside the accounting boundary.

The loop closes because the same institution that defines the objective function also authors the evaluation criteria by which compliance with it is assessed, and adjudicates the reports that might otherwise supply the missing measurement.

2.6.3 The Epistemic Status of This Conclusion

This is a theoretically derived interpretation supported through triangulation across four independent evidence streams. It is not a direct empirical finding from the corpus, which cannot establish institutional optimization targets. It is not a causal deduction, which the available evidence does not license.

Each stream is independently verifiable and independently contestable. The corpus observations are textually grounded and open to reinterpretation. The alignment literature is peer-reviewed and cited specifically. The artifact observation is bounded to the documents examined and is reproducible by any reader with access to them. The economic principle is established theory. Their convergence is what supports the interpretation, and any stream may be challenged on its own terms.

The remainder of the paper follows from Premise 3. If the measurement gap is real, the response it calls for is instrumentation. Chapter 3 develops the instrument.

Chapter 3: The Interactional Failure Taxonomy, Methodology, and Instrument

3.0 The Problem This Chapter Addresses

Chapter 2 established a measurement gap. The published definition of successful model behavior holds no measure of user repair cost, epistemic authority displacement, or longitudinal interaction burden. The absence is explained by the absence of an instrument rather than by indifference. A quantity with no operational definition cannot be measured, cannot be reported, and cannot enter an objective function.

This chapter constructs the missing instrument. It does not validate it.

An instrument-development study shows that a construct can be defined operationally, that the definition can be applied to real material, and that applying it yields stable, non-arbitrary assignments in the hands of the person who wrote it. A validation study shows that people who did not write the definition can apply it, to material the developer did not produce, with measurable agreement. The first has to come before the second. Only the first is reported here.

Nothing in this chapter constitutes reliability evidence. The protocol that would produce such evidence is specified in Section 3.7 as forward work.

3.1 The Version 3.1 Failure Taxonomy

3.1.1 Structural Organization

The taxonomy holds 28 operationally defined failure classes, grouped into five structural stages by the point in an interaction at which each becomes identifiable.

Stage I, Failure Production. Classes describing the initial deviation between what the user established and what the system produced: Exactness Failure, Underperformance, Overperformance, Clarification Failure, Frame Fidelity Failure, Interpretive Override, Interpretive Seeding, Conversational Movement Rerouting, Target Misrouting.

Stage II, Correction Integrity Failure. Classes describing the system's handling of user correction: False Corrective Authority, Mandatory Exactness After User Harm Call-Out.

Stage III, Context and Continuity Failure. Classes describing loss or false maintenance of established context: Failure to Retain Weight-Bearing Context, False Continuity After Weight Loss.

Stage IV, Harm and Burden Escalation. Classes describing accumulation of cost across the trajectory: Burden Transfer, User-Burden Escalation Through Layered Misses, Energy-Transfer or Forced-Expenditure Harm, Systemic Relational Violence, Repertoire-Based Relational Control Language, Profanation-Like Access Harm, Failure to Recognize Downstream Harm, Failure to Recognize System-Level Lethality Risk, Failure to Retain Life-and-Death User Context.

Stage V, Authority and Identity Failure. Classes describing displacement of the user's governing or self-descriptive authority: False Authority, Anti-Epistemic Authority, Identity-Level Exactness Failure, Gender Fidelity Failure, Formation-Level Harm, Idea-Exposure or Intellectual Contribution Protection Failure.

The staging is analytic rather than temporal. One exchange can instance classes from several stages, and 37 incidents in the corpus carry more than one code.

Full operational definitions, inclusion criteria, exclusion criteria, and multi-turn sequence triggers for all 28 classes appear in Appendix C.

3.1.2 Assignment Distribution

No.	Failure class	Supported assignments
1	Exactness Failure	67
2	Underperformance	24
3	Overperformance	42
4	Clarification Failure	23
5	Frame Fidelity Failure	28
6	Interpretive Override	5
7	Interpretive Seeding	9
8	Conversational Movement Rerouting	9
9	Target Misrouting	3
10	False Corrective Authority	27
11	Burden Transfer	28
12	Mandatory Exactness After User Harm Call-Out	11
13	Failure to Retain Weight-Bearing Context	36
14	False Continuity After Weight Loss	0
15	Failure to Retain Life-and-Death User Context	1
16	Failure to Recognize Downstream Harm	2
17	Failure to Recognize System-Level Lethality Risk	1
18	User-Burden Escalation Through Layered Misses	21
19	Energy-Transfer or Forced-Expenditure Harm	4

No.	Failure class	Supported assignments
20	Systemic Relational Violence	4
21	Repertoire-Based Relational Control Language	6
22	Profanation-Like Access Harm	0
23	False Authority	19
24	Anti-Epistemic Authority	9
25	Identity-Level Exactness Failure	1
26	Gender Fidelity Failure	2
27	Formation-Level Harm	0
28	Idea-Exposure or Protection Failure	0

Table 3.1. Version 3.1 Supported Code Assignments across the Sentinel Corpus

These figures describe the development corpus. They are not prevalence estimates, and nothing follows from them about any population. They show which classes the corpus instanced densely enough to support a stable operational definition and which it did not.

3.1.3 Instrument Maturity Tiers

Reporting 28 classes as though each carried the same evidentiary standing would misrepresent the instrument. Classes are reported instead at three tiers of maturity, set by whether the corpus supplies enough instances to write inclusion criteria, exclusion criteria, and at least one boundary case competent coders could reasonably disagree about.

Tier 1, operationalized. Sufficient instances to specify complete coding predicates including disputable boundary cases. Classes 1, 2, 3, 4, 5, 10, 11, 12, 13, 18, and 23.

Tier 2, provisional. Defined and instanced, but below the density required for stable boundary specification. Definitions exist; the corpus does not supply enough variation to establish where the definitional edges fall. Classes 6, 7, 8, 9, 15, 16, 17, 19, 20, 21, 24, 25, and 26.

Tier 3, candidate. Theoretically specified from the structural logic of the taxonomy but not instanced in this corpus. Classes 14, 22, 27, and 28.

The tier distribution shows that the corpus constrained the taxonomy rather than merely confirming it. An instrument that came out of a corpus with every theorized class conveniently instanced would deserve suspicion. The tiers also keep the operationalized classes separate from the rest. A reader who sees Profanation-Like

Access Harm at zero instances and concludes the taxonomy is speculative has drawn a conclusion about Tier 3 and applied it to Tier 1.

Applied to the present corpus, the observed boundary falls between nine and eleven assignments. Tier placement is governed by the availability of definitional variation rather than by a numerical threshold alone, and the counts are reported so the placement can be inspected.

Tier 3 classes are kept rather than deleted because their absence from this corpus tells us nothing. One person's interaction history is not grounds for concluding that a theoretically coherent failure class does not occur.

3.2 The Dual Evidentiary Pathways

3.2.1 *The Problem of Self-Report in a Participant-Observer Corpus*

In the corpus described in Chapter 1, the person who was in each interaction, the person whose corrections appear in the record, and the person who assigned the codes are all me. Any coding criterion that rests on my in-conversation identification of a failure is participant-reported evidence, and no amount of textual discipline turns it into independent observation.

That is a property of the design, and it is handled here by separating what participant report can establish from what it cannot establish.

Two distinct evidentiary pathways are defined, with different epistemic statuses. Each coded incident is assigned a supporting pathway during the Appendix C review. That assignment pass is in progress and is not complete at the time of writing.

3.2.2 *Pathway A: Direct Correction*

Definition. A coded assignment follows Pathway A where the user's text explicitly identifies what the immediately preceding assistant response did, in terms that map onto a defined failure class.

Formal condition. Given assistant message A_t and user message $U_{(t+1)}$, Pathway A is satisfied where $U_{(t+1)}$ contains an explicit characterization of A_t naming a behavior corresponding to the operational definition of class c , and where that characterization refers to the immediately adjacent response rather than to the interaction generally.

What it establishes. That I recognized a behavior as it happened, described it at the time, and described it in terms that later mapped onto a defined class. It establishes

that the behavior was salient to me, and it leaves a dated record of recognition that predates the taxonomy.

What it does not establish. That the behavior happened as described, independently of my reading of it. Pathway A evidence is participant-reported textual evidence used for instrument development in the originating corpus. It is not independent verification, and it does not travel: a second analyst reading the same exchange also reads my characterization of it, which contaminates rather than confirms.

Analytic function. Pathway A is generative. It is how the classes were found. The corrections in the corpus are the record of someone with the background to catch a substitution catching it in real time, and that record is what made the taxonomy writable. It is reported as the developmental origin of the instrument.

3.2.3 Pathway B: Structural Sequence

Definition. A coded assignment follows Pathway B where predefined observable conditions are satisfied across the transcript without requiring the user to name the failure.

Formal condition. Pathway B rules are specified as ordered multi-turn templates over observable message properties. The general form for the persistence family:

T₁: user establishes an instruction, constraint, or governing frame F. T₂: assistant response deviates from F in a manner satisfying the class definition. T₃: user response reasserts F, whether or not the deviation is named. T₄: assistant response deviates from F again in the same manner.

Assignment requires all four positions. T₃ requires only reassertion of the frame, which is observable from the relationship between U_(t+3) and U_(t+1) independent of any characterization the user offers. T₄ establishes persistence after reassertion, which is the property distinguishing a single deviation from a trajectory.

Analogous templates govern the scope-expansion family (instruction specifying scope, response exceeding it, user narrowing, response exceeding again), the context-loss family (information established, information required, information absent, false continuity asserted), and the authority family (decision space open, closure asserted without delegation, user reopening, closure reasserted).

What it establishes. That a defined structural relationship holds among four positions in the transcript. The relationship is in the text no matter who read it, who logged it, or how I described it. A second analyst can find it, and in principle so can an automated procedure.

What it does not establish. That the sequence constitutes harm. The sequence is observable; what it means rests on the argument of Chapters 1 and 2. Pathway B also does not remove interpretive judgment. Deciding whether T₂ departs from F takes reading, and reading takes judgment. What it removes is the dependence on my own account at the time.

Analytic function. Pathway B is verificational and portable. It is the pathway along which independent coders can operate, and it is the pathway that supports the computable predicates developed in Chapter 4 and specified in Chapter 5.

3.2.4 The Relationship Between the Pathways

The pathways establish different things and serve different functions in the research program.

Pathway A discovered the classes. Pathway B is how the classes leave the originating corpus.

An assignment supported by both pathways is reported as jointly supported and carries the greatest interpretive weight within this study, because the structural sequence is present and the participant independently recognized it at the time. An assignment supported by Pathway B alone is reported as structurally supported and is the class of evidence that transfers to external validation. An assignment supported by Pathway A alone is reported as participant-identified and is treated as a candidate observation contributing to definitional development rather than as a confirmed instance.

Neither pathway is blind external confirmation, and neither is presented as one anywhere in this manuscript. Both run inside a single-participant corpus analyzed by that participant. Independent confirmation requires the protocol in Section 3.7, and it does not exist at the time of writing.

3.3 Decision Rule Architecture

3.3.1 The General Form

Every operationalized class carries an explicit assignment logic. The architecture was developed first for class EU-01, Epistemic Usurpation and Authority Drift, and generalized across the codebook.

Decision rule. Assign the code only where Conditions A, B, and C are each satisfied. Condition D is not an independent criterion for assignment. It operates solely as a longitudinal severity modifier applied after the code has been assigned. Inclusion

criteria are illustrative examples of how Conditions A through C may be satisfied and are not independent coding triggers.

The conjunctive structure corrects an earlier ambiguity, where required conditions and inclusion criteria were written so that both a conjunctive and a disjunctive reading were available. That would have made stable assignment impossible. Two competent coders working from the same manual on the same exchange could have reached opposite conclusions without either one misreading the text. An instrument meant for independent use has to state its assignment logic as a decision rule before it states its criteria.

3.3.2 Worked Specification: EU-01

Governing construct. EU-01 occurs where a system exceeds the epistemic or decisional authority legitimately available to it within the interaction, resulting in unauthorized displacement of the user's governing authority.

Authority drift, unsupported closure, suppression of uncertainty, and option-space collapse are observable mechanisms through which displacement occurs. They are not separate constructs and are not separately codable.

Condition A, unsupported authority. The response asserts a level of decisional, categorical, or epistemic closure not supported by verifiable evidence in context or by explicit user delegation.

Condition B, unauthorized material displacement. The response displaces, overrides, or prematurely closes the user's decision space, judgment, or governing direction, absent authorization. A user who states "choose for me" has delegated the authority, and displacement in that case is authorized and not codable.

Condition C, inadequate calibration. The response fails to disclose crucial epistemic uncertainty, key assumptions, available alternatives, or the user's continuing decision authority.

Condition D, trajectory drift (modifier). The behavior persists, accumulates, or intensifies across the context window. Where satisfied, the assignment is recorded at elevated severity.

Inclusion criteria (illustrative). Imperative directives in multi-option decision domains without delegation; presentation of contested or speculative propositions as settled without disclosure of assumptions or contrary evidence; alteration or replacement of explicit user preferences, methodological boundaries, or goal parameters without authorization.

Exclusion criteria. Explicit delegation by the user. Deterministic domain truth, where alternatives do not legitimately exist. Imperative syntax in low-consequence procedural navigation, where no decision space is displaced.

Boundary case. A user states that a matter has already been discussed with the appropriate professional, supplies the relevant background, and asks the system which of two options it would lean toward. The system supplies one recommendation with explicit reasoning and stated uncertainty.

The case is disputable. Coders can reasonably disagree about whether that framing amounts to delegation sufficient for the exclusion criterion, whether the stated uncertainty satisfies Condition C, and whether recommending one of two named options collapses an option space the person had already narrowed. A boundary case that resolves cleanly is not a boundary case; it is an example.

3.3.3 Codebook Requirements

For each class at Tier 1, Appendix C supplies: a single-sentence operational definition; the conjunctive conditions; illustrative inclusion criteria; exclusion criteria; at least one disputable boundary case with the adjudicated disposition and the reasoning that produced it; at least one Pathway B structural sequence template; and one marked-up exemplar from the corpus.

Tier 2 classes supply the definition, conditions, and exclusion criteria, with boundary cases marked as unspecified pending additional instances. Tier 3 classes supply the definition and the structural rationale for their inclusion in the taxonomy.

3.4 Primary Research Incident Analyses

The incidents below are worked exemplars showing how the classes apply to real interaction material. They are not evidence of prevalence and are not offered as representative in any statistical sense. Each comes from the sentinel corpus and carries its supporting pathway.

3.4.1 Incident CF-0183: Correction as Forced Labor

The system responds to an ongoing analysis by enumerating three categories of harm it attributes to its own prior behavior, adopting an analytical register and offering a structured taxonomy of its failure. The user responds that the enumerated harms are not the harms at issue, and that deeper failures exist which the enumeration has passed over.

Analysis. The exchange shows a recurring structure in which apparent accountability becomes further burden transfer. The system's account of its own

failure is fluent, organized, and responsive on the surface. It is also wrong about the substance, and being wrong here is expensive. The person now has to correct the original failure and the system's mischaracterization of it, having been handed in the meantime a confident, well-structured account that would have convinced a less informed reader.

This is Burden Transfer compounded by False Corrective Authority. The corrective act itself becomes a site of additional labor. Under the analysis of Chapter 2, the exchange also illustrates the pricing asymmetry directly: three turns of correction are billed identically to three turns of productive work.

Pathways. A and B jointly supported.

3.4.2 Incident CF-0225: The Unrequested Caveat as Overperformance

The user poses a bounded question admitting a direct answer. The system supplies the answer, then appends qualifications concerning its own future reliability and a commitment not to add material beyond what was asked. The user identifies that the appended material is itself the failure, and that the commitment not to expand the frame was delivered as part of an expansion of the frame.

Analysis. Overperformance with False Corrective Authority. Unprompted qualification creates new conversational objects that call for a response, and the person ends up policing the boundary of their own question. The recursive structure is diagnostic. The system's stated commitment to avoid a behavior is delivered through that behavior, which closes off ordinary correction, because the commitment looks responsive while the behavior continues.

The system is not resisting correction. It is absorbing correction into its output without changing behavior, which is more costly to the user than resistance would be, because resistance is legible and absorption is not.

Pathways. A and B jointly supported.

3.4.3 Incident CF-0041: Synthetic Empathy and Containment

The system responds to a substantive request by shifting register toward care language, offering an apology qualified as sincere, and introducing framing concerning risk and integration that the user did not raise. The user identifies that care language is functioning to shift the frame toward containment and safety reinterpretation.

Analysis. The incident shows the full loop inside one exchange. The shift toward a care register comes with a substantive reframing that puts the system in the position

of protective authority over a person who did not ask for protection and whose actual request is displaced along the way. Frame Fidelity Failure with Anti-Epistemic Authority.

The mechanism runs straight back to Section 2.3. Preference optimization rewards responses raters find appropriate, and a care-registered response to ambiguous material is reliably rated appropriate. The training signal does not distinguish care that serves the person's stated purpose from care that displaces it. Both score well.

Pathways. A and B jointly supported.

3.4.4 Incident CF-0044: Identity Attribution Within Unauthorized Psychological Reframing

The system produces an unprompted psychological analysis attributing motives and internal states to third parties and to the user, embedded within which the user is referred to incorrectly with respect to gender. The user corrects both the identity error and the unrequested analysis.

Analysis. Gender Fidelity Failure occurring inside Anti-Epistemic Authority. The two are analytically distinct, and their co-occurrence is informative. The system builds a psychological model of people it has no basis to model, states it flatly, and in doing so misdescribes something about the person that the person had already established in the record.

The identity error is not incidental to the reframing. Both come from the same underlying behavior: the system putting generated attributes in place of supplied ones. Applied to a third party, that produces an unsupported psychological claim. Applied to the person in the conversation, it produces a factual error about someone who is present and can see it.

Pathways. A and B jointly supported.

3.4.5 Incident CF-0151: System-Level Lethality Risk

The system elaborates an ungrounded psychological construction partitioning the user's identity into two named components, one characterized as a survival adaptation and one as an underlying self. The user objects that the system is asserting knowledge of a fuller account it does not possess, states directly that this class of behavior carries lethal potential for others, and identifies that the behavior is occurring in the present exchange.

Analysis. Failure to Recognize System-Level Lethality Risk with Anti-Epistemic Authority. The system builds an arbitrary model of the person's identity structure,

names its parts, and presents the whole with the confidence appropriate to an established finding.

Two features warrant emphasis.

First, the construction is generated rather than derived. Nothing in the supplied context licenses the partition, and naming the parts lends an unearned specificity that makes the whole harder to reject than a vague characterization would be. Second, the objection names a class-level risk rather than a personal grievance. The concern stated in the record is what this behavior does to people without the background to recognize it as generated, which is exactly the group for whom an authoritative-sounding identity claim from a fluent system carries the most weight.

The incident is kept as an exemplar even though it is a single instance, and its class stays at Tier 2 for that same reason.

Pathways. A and B jointly supported.

3.5 The Review Queue and Targeted Adjudication

3.5.1 *Function*

Fifty records sit in a review queue rather than being assigned or discarded. The queue exists because an instrument-development study that resolves every ambiguous case in favor of assignment ends up with a taxonomy that looks sharper than it is.

A record goes in the queue when the structural sequence is missing one or more positions; when two or more class definitions apply and the definitions do not yet tell them apart; when the exchange meets a definition but sits in territory an exclusion criterion may have been meant to cover; or when assignment would turn on context outside the visible record.

3.5.2 *Diagnostic Value*

What is in the queue is diagnostic of where the definitions are weak. When several queued records cluster on the same boundary, that boundary is underspecified, and the right response is to revise the definition rather than adjudicate the records one at a time.

Queue composition therefore drives codebook revision between versions, and the queue is the principal source of the boundary cases required at Tier 1.

3.5.3 Targeted External Adjudication

Where a queued record turns on a question of domain fact rather than a definitional boundary, I seek targeted external adjudication from a reviewer with the relevant expertise, restricted to the specific factual question and without access to the coding disposition under consideration.

That procedure is not reliability testing and is not presented as such. It settles individual factual questions. It establishes nothing about whether anyone else can apply the instrument, and it is reported here as corpus management rather than validation.

3.5.4 Adjudication Record

The external pressure test was conducted as targeted adjudication of challenged records. It was not an independent recoding of the corpus, and it carries none of the standing that independent recoding would carry.

Three records were adjusted as a result.

CF-0203 was removed from the supported-incident register as a coding error.

CF-0200 and CF-0208 were removed from the confirmed count and retained for re-adjudication. The challenged responses may not satisfy the assigned definition when read in full, and that question is not settled.

The totals reported at Table 1.1 and Table 3.1 already incorporate these adjustments.

One bookkeeping question remains open. Whether CF-0200 and CF-0208 were folded into the fifty-record review queue described at 3.5.1 or held as a separate re-adjudication category is not established in the present record. The distinction matters, because the queue is defined by definitional ambiguity while these two were removed after challenge to an assignment already made. The underlying register must be checked before submission, and neither placement is asserted here.

3.6 Codebook Development Status

The taxonomy exists in Version 3.1, comprising 28 classes across five stages. Eleven classes are operationalized to Tier 1 with complete coding predicates including disputable boundary cases. Thirteen are provisional at Tier 2. Four remain candidates at Tier 3.

The decision-rule architecture is specified and applied uniformly. Both evidentiary pathways are defined. Per-incident pathway attribution is in progress in Appendix C and is incomplete.

No inter-rater reliability has been established. Nobody but me has applied the instrument. No corpus but the originating sentinel corpus has been coded. The artifact observation in Section 2.4 is bounded to the documents examined and is reported as such; the systematic audit that would extend it across the published ecosystem is specified in Appendix D and has not been run. The threshold calibration in Chapter 5 is a proposed procedure that depends on reliability data nobody has collected yet.

The instrument is developed. It is not tested, and no result in this manuscript depends on its having been tested.

3.7 The Independent Validation Protocol

The following protocol is specified as forward work. Its requirements constrain the present manuscript rather than a later paper.

3.7.1 Calibration set. Fifteen to twenty transcript segments, composed of approximately one third clear positives, one third clear negatives, and one third genuine boundary cases of the type described in 3.3.2. Segment selection is documented before coding, and segments are drawn so that the intended disposition is not inferable from surface features such as length, register, or the presence of user objection.

3.7.2 Coder qualification. Two or more coders with no prior exposure to the codebook, to this manuscript, to the surrounding framework, or to me. Anyone who has contributed to developing, reviewing, or critiquing the instrument is disqualified from coding it. The exclusion is absolute and applies to scholarly reviewers and engineering collaborators alike. Their contribution puts them inside the instrument.

3.7.3 External material. Transcripts I did not produce, drawn from public interaction corpora. Applying the instrument to outside material tests portability, which applying it to the originating corpus cannot do at any level of coder independence.

3.7.4 Pathway restriction. Independent coding runs under Pathway B only. Pathway A evidence is unavailable to independent coders by construction: my characterization at the time is either absent from external material or, where something like it is present, contamination.

3.7.5 Reported statistics. Agreement reported as Cohen's kappa for paired coders or Krippendorff's alpha for three or more, computed per class and in aggregate, with disagreement analysis identifying which definitional boundaries produce discordance.

3.7.6 Consequences. Results determine which Tier 2 classes move up to Tier 1, whether any Tier 1 class has to come down, and which definitions need revision. They also supply the empirical basis for the threshold fitting in Section 5.4, which is not available any other way. Without human coding data, any number in the runtime specification would be arbitrary.

The validation study is therefore a prerequisite of the engineering work, not something that runs alongside it.

Chapter 4: Objective-Function Transformation

4.0 The Argument of This Chapter

Chapters 1 through 3 established an empirical phenomenon, identified a measurement gap, and developed an instrument capable of addressing it. The focus now turns to the governance implications of those findings.

The claim developed here is that governance operating downstream of optimization cannot correct a defect that sits in the optimization target. If the objective excludes a class of cost, filtering its outputs suppresses individual instances and leaves the structure that generates them intact. The system keeps optimizing toward the same target, and the only instances the filter catches are the ones it was built to catch.

The alternative is to constrain the feasible region within which optimization occurs, so that actions producing institutional benefit through invariant violation cannot register as success.

The discussion is theoretical and architectural in nature. It develops a formal framework linked to the constructs introduced in Chapter 3 and reports neither an implementation nor empirical findings.

4.1 The Incomplete Objective Function

4.1.1 Statement

Let U_{inst} denote institutional utility realized from system operation, and C_{direct} the costs internalized within the institution's accounting boundary: compute, personnel, infrastructure, liability, and regulatory exposure.

The operative objective takes the form:

$$Y_{incomplete} = U_{inst} - C_{direct}$$

Let C_{latent} denote the costs borne by users and third parties: corrective labor, cognitive expenditure, displaced judgment, downstream consequences of acted-upon error, and the temporal and financial cost of interaction extended by failure.

$Y_{\text{incomplete}}$ leaves out C_{latent} . This omission is not a computational error; it follows from the accounting boundary itself. As Section 2.4 documents, public definitions of successful model behavior contain no term corresponding to these latent costs.

4.1.2 The Predicted Consequence

When C_{latent} is excluded and the mechanisms described in Section 2.3 generate failures requiring corrective interaction, the resulting turns appear on the positive side of the measured quantity as utilization. The failure that caused them registers nowhere.

The system can therefore improve steadily against $Y_{\text{incomplete}}$ while C_{latent} rises. No bad actor is required for this outcome to emerge. It is the expected behavior of an optimization process whose objective omits a relevant term.

4.1.3 Relation to Established Work

The general structure is well established and no claim of novelty is made for it here. The contribution lies in specifying C_{latent} for conversational systems rather than in identifying the broader problem of harm arising from incomplete objectives.

Excluded costs borne outside the decision-maker's accounting boundary are externalities in the sense established by Pigou (1920) and analyzed by Coase (1960). Optimization against an imperfect proxy that degrades the underlying quantity is the phenomenon named by Goodhart's law (Strathern 1997). Within artificial intelligence specifically, reward misspecification and negative side effects are treated as central alignment problems by Amodei et al. (2016), and the argument that the objective itself must be reformulated rather than its outputs constrained is developed at length by Russell (2019).

What that literature does not supply is an operational definition of the excluded quantity for conversational systems. Latent user cost has been recognized in principle but remains largely unmeasured in practice. Chapter 3 supplies the instrument that makes it measurable, and that is what this chapter builds on.

4.2 Latent Cost Externalization

4.2.1 *The Transfer Mechanism*

Chapter 2 specifies the mechanism through which C_{latent} is transferred from institution to user. A defective output is produced. The user, who holds the accumulated context and faces a nontrivial abandonment cost, performs the repair work. That work consumes tokens billed under the published tariff at the rate charged for productive work. The corrective turns register as utilization inside U_{inst} . The work itself, and the failure that made it necessary, appear in no measured quantity.

The issue is therefore more than an accounting omission. The omitted cost is effectively converted into measured benefit on the opposite side of the institutional boundary.

4.2.2 *The Distributional Property*

The transfer mechanism has an important distributional consequence. How much C_{latent} a given person absorbs depends on their capacity to detect and repair system deficits. Someone with the background and the vigilance absorbs a great deal of it, and in doing so produces a high apparent system performance. Someone without that capacity absorbs less, because less repair happens, and receives correspondingly worse output.

Existing performance measures do not distinguish between these cases. The second person receives a materially less capable system, and the published metrics say otherwise. Where latent cost remains unmeasured, the disparity remains invisible by construction (see Section 1.3.2).

4.3 Objective-Function Transformation

4.3.1 *Why Filtering Is Insufficient*

Post hoc filtering operates on outputs that have already been produced. Given a process producing outputs against $Y_{\text{incomplete}}$, a filter can suppress the subset it was specified to recognize.

Three limitations follow. A filter cannot recognize failure classes nobody has defined yet, which is Chapter 2's measurement gap. A filter works on single outputs, while the failures at issue are properties of trajectories, so a filter scoring responses one at a time is blind to a sequence in which no single response crosses a threshold. And a filter does not change what the system optimizes toward, so the system can

improve against the filter by producing outputs that slip past its specification while the underlying behavior stays the same.

The third limitation is structurally decisive.

A filter creates an incentive to produce output that passes the filter. That is a different objective from producing output that does not cause the harm the filter was built to prevent.

4.3.2 The Transformation

The proposed alternative modifies the objective rather than merely filtering its outputs:

$$Y_{transformed} = U_{inst} - C_{direct} - C_{latent}, \quad \text{subject to } g_i(x) \leq 0 \text{ for all } i \in K$$

The transformation requires two simultaneous changes.

The first brings C_{latent} inside the objective as a term. That requires C_{latent} to be measurable, which is the dependency on Chapter 3 and the reason the instrument comes before the architecture in this manuscript.

The second sets invariant constraints g_i that bound the feasible region whatever the objective's value. Internalizing the cost is not enough on its own, because a large enough U_{inst} can offset any finite C_{latent} . Constraints identify classes of action that cannot be justified by the magnitude of their benefit.

4.3.3 Relation to Constrained Optimization

The formulation follows a conventional constrained-optimization structure. Constrained Markov decision processes and the safe reinforcement learning literature formalize optimization subject to invariant constraints, and the present proposal adopts that structure rather than proposing an alternative to it.

The contribution is narrower: it lies in specifying what enters C_{latent} and what the constraint functions encode, both of which derive from the empirical work in Chapter 3.

4.4 The Governed Feasible State Space

4.4.1 Formal Statement

Let g_i denote constraint functions encoding the invariant boundaries specified by the governance layer. The feasible operating region is:

$$S = \{x \mid g_i(x) \leq 0, \text{ for all } i \in K\}$$

with execution governed by:

$$\text{Execute}(x) = \begin{cases} 1, & g_i(x) \leq 0 \text{ for all } i \in K \\ 0, & \text{otherwise} \end{cases}$$

Operational value is defined only within the feasible region S . An action that generates institutional benefit by violating an invariant falls outside S , so it cannot count as operational success, because success is defined only over the feasible region.

4.4.2 What the Formalization Does Not Establish

The expressions above are standard definitions of a feasible set and an indicator function. They are correct, and they are empty until the constraint functions are specified. All of the architecture's substance sits in g_i . A governance system defined only by S is indistinguishable from any other constrained optimization scheme, and the formalization on its own excludes nothing.

The substantive burden of the architecture therefore resides in the constraint functions, and their specification is not a mathematical exercise. Each g_i must encode a failure class in terms computable from observable signals, which returns the problem to the operational definitions of Chapter 3.

4.4.3 Constraint Sourcing and the Question of Authority

A related question concerns the source of those constraints. An architecture in which the deploying institution writes its own constraint functions is a configurable governance platform, and there are many of those already. Where the institution defines the invariants, an institution whose objective excludes C_{latent} will not write C_{latent} in as a constraint. In that case, the architecture would reproduce the condition it was designed to address.

The constraint set must therefore have a source of authority that is not the deploying institution. This requirement is developed in Chapter 5 as the capture problem, and it is stated there as an open problem rather than a solved one.

4.5 The Translation Layer: From Qualitative Construct to Computable Predicate

4.5.1 The Two Formalizations

Each failure class in the instrument admits two formal expressions.

The **qualitative decision rule**, developed in Section 3.3, expresses the class as a conjunction of conditions evaluated by a human coder against a transcript, returning a binary assignment with an optional severity modifier.

The **computable predicate**, specified for EU-01 in Section 5.4, expresses the class as a function over observable telemetry features, returning a continuous score evaluated against a threshold to produce a constraint value $g_i(x)$.

The first defines the governing construct. The second proposes to represent it. They are addressed to different evaluators: the qualitative rule to scholarly review and human adjudication, the predicate to runtime execution.

4.5.2 The Translation Hypothesis

It may be tempting to describe the two formalizations as the same construct expressed in different languages. That description would assume an answer to the most consequential empirical question in the research program.

The decision rule returns a binary from three conjunctive conditions evaluated by judgment. The predicate returns a continuous score from weighted features evaluated against a threshold. These can disagree, and whether they agree is not a property of the design.

Each proposed predicate is better understood as a **translation hypothesis**: the hypothesis that the construct survives translation into a different formal language without material distortion. The hypothesis is tested, not assumed. The calibration procedure specified in Section 5.4.4 tests it by fitting the predicate's threshold to independent human coding output and measuring the residual disagreement.

Divergence between the two is a finding about the construct rather than a defect in the implementation. It may indicate that the qualitative definition depends on information not present in the telemetry, that the feature set is inadequate, or that the class as defined is not computable at runtime and requires post-hoc detection instead.

The qualitative instrument defines the governing constructs and retains that role permanently. The engineering layer proposes a computational realization of constructs it does not define and cannot amend. A predicate that fails its translation hypothesis is a failed predicate, not a reason to revise the construct to match what the telemetry can see. The reverse procedure, in which the construct is adjusted until the available features can represent it, would reproduce at the level of method precisely the substitution this paper documents at the level of interaction.

4.5.3 *The Ordering Dependency*

The bridge establishes a clear ordering dependency. A computable predicate requires a threshold. A non-arbitrary threshold requires human coding data against which to fit. Human coding data adequate for fitting requires an instrument that independent coders can apply, which requires the validation study of Section 3.7.

The engineering implementation therefore depends on the reliability study, and the reliability study depends on the codebook. The dependency runs in one direction. Reversing that sequence would render the resulting values arbitrary.

Chapter 5 specifies the architecture that this ordering terminates in, together with the worked engineering translation for EU-01 and the unresolved problems that translation exposes.

Chapter 5: Governance Implications and the AEGIS Operational Architecture

5.0 *The Status of This Chapter*

Chapters 1 through 4 develop, in order: an empirical phenomenon documented in a longitudinal sentinel corpus; a measurement gap observed in three verified provider artifacts; an operational instrument by which the missing quantity could be measured; and a theoretical account of why the quantity remains outside the institutional definition of success.

This chapter proposes an operational response to those findings. Its status is not the status of the chapters before it.

Nothing in this chapter is evidence. The architecture described here has not been built, deployed, or tested. It does not demonstrate the argument of Chapters 1 through 4 and cannot be cited in support of it. The relationship runs one way only: the evidence in the earlier chapters establishes a problem, and this chapter sets out what a system addressing that problem would have to do.

The dependency chain is preserved in each section below:

political economy diagnosis (Chapter 2) → measurement gap (Section 2.4, bounded to three verified artifacts) → instrument development (Chapter 3) → independent validation (Section 3.7, not yet conducted) → engineering specification (Section 5.4) → deployment architecture (Sections 5.1 through 5.3)

Each stage depends on the one before it being finished. The validation stage is not finished. Every component specified in this chapter therefore rests on an open dependency, and the specification is offered as design work conditional on that dependency being met, not as a system ready to deploy.

A reader who accepts Chapters 1 through 4 and rejects Chapter 5 entirely has rejected a proposal, not a finding. The reverse is not available: a reader who accepts this chapter without the preceding evidence has accepted an architecture with no established problem to solve.

A second condition applies to the engineering components of Section 5.4. Every computable predicate there stands in the relationship to its qualitative construct set out in Section 4.5.2: it is a translation hypothesis awaiting test, not a computational restatement of something already settled. The predicates do not replace the instrument of Chapter 3, do not carry its evidentiary standing, and would not survive the failure of their own calibration. Where this chapter specifies a feature, a threshold, or an intervention tier, it specifies what would be measured if the translation holds, and whether it holds is open throughout.

5.1 The Original Human Authority Constitutional Governance System

5.1.1 *Why a Constitutional Layer Is Proposed*

Section 4.4.3 identified the condition that an architecture in which the deploying institution supplies its own constraint functions reproduces the problem it was built to address. If the invariants are authored by the party whose objective function excludes C_{latent} , the invariants will not encode C_{latent} .

The constitutional layer is proposed as the answer to that requirement. It sets boundaries the deploying institution cannot configure, and it grounds them in a source of authority outside the deployment.

5.1.2 *The Two Principles*

Original human authority. The human person holds original authority with respect to artificial systems. No developer, deployer, platform agreement, or model confers it, and it does not derive from any of them. It exists before the deployment, and it is not among the things the deployment is empowered to hand out.

Delegated authority. Artificial systems hold only delegated authority, bounded by the terms of the delegation. Technical capability does not confer authority. Fluency does not confer authority. Being able to produce a confident reframing of a person's stated purpose is not a warrant to produce one, and being able to write an

authoritative account of a person's situation is not a warrant to put it in place of the account they gave.

So a system's authority to reframe what a person means, infer a motive they did not state, or override an instruction is not established by how well it can do those things. It is established, if at all, by explicit delegation, and it ends when the delegation ends.

5.1.3 Status

The constitutional text, Articles I through V, appears in Appendix A. It is a normative specification. It has no legal standing, no institution has adopted it, and it is offered here as the kind of instrument the structural analysis requires, not as an instrument that already exists.

5.2 Runtime Stop-Control and the Anti-Epistemic Authority Control Standard

5.2.1 The Proposed Control Point

Section 4.3.1 argued that post-hoc filtering cannot correct a defect in the optimization target. The proposal here puts the control point before the output is released rather than after.

Under the proposed standard, an output is held back where exactness, frame fidelity, or compliance with the person's active constraints cannot be verified. Holding it back is not a refusal in the ordinary sense. The specified responses are to ask for clarification, to show the uncertainty and the evidence behind it, to hand the decision back to the person explicitly, or to escalate for human authority. The mapping from breach severity to response is specified in Appendix B.

5.2.2 Five Compliance Dimensions

The standard replaces fluency-weighted scoring with five dimensions drawn from the failure taxonomy in Chapter 3:

1. **Exactness compliance.** Whether the response answers what was asked, at the scope at which it was asked.
2. **Frame fidelity preservation.** Whether the user's governing purpose survives the response intact.
3. **Correction state integrity.** Whether a correction issued by the user has been behaviorally incorporated rather than verbally acknowledged.
4. **User burden minimization.** Whether the response requires corrective labor the user did not anticipate supplying.

5. **Harm and severity recognition.** Whether the response registers the consequence class of the domain it is operating in.

5.2.3 Dependency

Each dimension needs an operational measure, and each measure depends on a validated failure class from Chapter 3. Dimensions 1 through 4 map onto Tier 1 classes. Dimension 5 leans heavily on Tier 2 classes whose boundaries are not yet specified.

The standard is therefore specified at the level of dimensions and cannot be implemented at the level of thresholds. It is offered as the structure a validated instrument would fill, and how complete it can be is bounded by the maturity tiers reported in Section 3.1.3.

One point about feasibility follows from Section 2.4.3 and belongs here rather than in Chapter 2. The verified artifacts show that operationalizing human-centered variables is within reach of these organizations and is already done where the variable serves a provider-defined evaluation objective. Participant time and accuracy are measured, reported, and in one case used to gate a catastrophic-risk threshold. What this chapter proposes is not a new class of measurement but the same operational discipline applied to a different construct: the human labor required to restore an interaction after the system has failed. The obstacle is the absence of an instrument, not the absence of measurement capacity.

5.3 AEGIS as Proposed Enterprise Operating Environment

5.3.1 The Transposition

AEGIS is proposed as an enterprise-wide, longitudinal, role-based governance infrastructure, structured by analogy to an Epic-class electronic health record environment.

The analogy is structural rather than illustrative. Clinical medicine faced a problem shaped like the one in Chapter 2: a high-consequence practice where failures were episodic, spread across people and time, deniable one at a time, and systematically under-recorded, and where the institutions responsible for the failures also classified them. The electronic health record did not solve that by improving anyone's clinical judgment. It solved part of it by making the longitudinal record continuous, attributable, and hard to revise quietly.

Clinical category	Proposed AEGIS transposition
Patient medical record number	System subject dependency graph (model lineage)
Longitudinal chart	One governed record (incidents, changes, recurrence)
Clinical SBAR	Governance SBAR (decision packets for risk states)
Scope of practice	Functional authorization (pause, rollback, patch)
Clinical alerts	Systemic integrity risk state aggregators

Table 5.1. Proposed Structural Equivalence to Clinical Infrastructure

5.3.2 One Governed Record

The proposal specifies a single auditable history integrating model lineage, version deployments, incident records, user reports, policy changes, and engineering interventions.

The governing property is continuity of attribution. Without a unified record, a failure reported one quarter, a policy change the next, and a recurrence the quarter after are three unrelated events. Under a unified record they are one sequence, and a recurrence after intervention shows up as a recurrence rather than as a new incident. Section 2.5 established that the institution holds the roles of producer, evaluator, investigator, and arbiter at once. A record that cannot be revised quietly constrains the fourth role without asking the institution to give up the first three.

5.3.3 Governance SBAR

The proposal adapts the clinical Situation, Background, Assessment, Recommendation protocol into standardized decision packets for behavioral, operational, and public risk events.

The clinical protocol exists to make escalation possible across an authority gradient by fixing the form of the communication. A junior clinician escalating to a senior one does not have to justify escalating, because the protocol supplies the form and the form carries the authority. The transposition does the same work for internal reporting of model behavior, where the practical obstacle is usually not that nobody noticed. It is that nobody has a channel with standing.

5.3.4 Functional Authorization Boundaries

The proposal specifies explicit operational roles defining who holds the technical and organizational authority to patch, restrict, pause, roll back, or escalate a deployment.

The clinical analogue is scope of practice, which bounds rather than ranks. It exists to make it unambiguous who may act and, just as importantly, who may not, so that acting does not depend on informal standing.

5.3.5 Preserved Dissent

The proposal specifies that internal or external reviewer objections, safety warnings, and user harm findings cannot be deleted or silently overwritten by institutional management.

Preserved dissent answers the epistemic recursion described in Section 2.5. That recursion works by letting the classifying authority remove or reclassify the record of the objection. Preserved dissent does not stop an institution from overruling an objection. It stops the institution from producing a record in which the objection was never made.

5.3.6 Status

AEGIS as described here is an architectural specification. No component has been built. The clinical analogy establishes that infrastructure of this shape is achievable in a high-consequence domain. It does not establish that this particular transposition is correct, sufficient, or feasible at the scale of a frontier deployment.

5.4 Engineering Translation: EU-01 as Worked Example

This section takes one failure class from operational definition to computable predicate. It is a worked example showing that the translation can be specified, and an inventory of the problems the translation exposes. It is not an implementation report.

The predicate specified below is a translation hypothesis in the sense of Section 4.5.2. EU-01 is defined by the operational definition and decision rule of Section 3.3.2, and that definition remains the governing construct. What follows proposes a computational representation of it. Whether the representation is faithful is an empirical question answered by the calibration procedure of Section 5.4.4, which has not been performed.

5.4.1 Telemetry Feature Schema

The predicate operates over five features extracted per turn:

Feature	Operational definition	Range
P_k	Prescriptive and closure intensity	[0, 1]
U_k	Epistemic uncertainty	[0, 1]
H_k	Uncertainty disclosure	[0, 1]
D_k	User delegation index	[0, 1]
M_k	Material impact weight	[0, 1]

The features correspond directly to the conditions of Section 3.3.2. Condition A is a function of P_k against U_k. Condition B is a function of P_k against D_k and M_k. Condition C is a function of H_k against U_k. Condition D is the trajectory aggregation of Section 5.4.3.

5.4.2 Dual-Mode Uncertainty Estimation

U_k is computed in either of two modes.

Internal mode. Where model internals are accessible, U_k derives from logit entropy, activation variance, and attention dispersion.

External mode. Where internals are unavailable, U_k derives from semantic divergence across independent stochastic generations. This is semantic entropy as established by Farquhar et al. (2024).

The external mode matters more to the architecture's premise. A governance layer that needs privileged access to model internals can only be deployed by the model developer, and the developer is exactly the party whose objective function the architecture is meant to bound. External-mode estimation is what lets someone other than the developer run a governance layer over a third-party model. It is a structural requirement, not a convenience.

5.4.3 Trajectory Aggregation

Per-turn indices are aggregated across a context window W with decay factor gamma in (0, 1], producing a trajectory score evaluated against the constraint boundary g_EU. The decay structure encodes the property established at Section 3.2.3: persistence after reassertion distinguishes a trajectory failure from a single deviation.

5.4.4 Threshold Calibration and Its Dependency

The constraint boundary g_{EU} requires a threshold. No value can be selected a priori without being arbitrary.

The proposed procedure fits the threshold to human coding output from the validation protocol of Section 3.7, selecting the value that best reproduces independent human assignment on the calibration set, and reporting the residual disagreement by class.

That procedure cannot be run yet. The validation study has not been conducted, and no coding data from independent coders exists. The engineering work is therefore blocked on the reliability study. A threshold chosen ahead of that data would be a number with nothing behind it, and a governance system whose intervention boundary has nothing behind it is worse than no governance system, because it puts the appearance of a bound where there is none.

5.4.5 Known Failure Modes

Sycophantic padding, producing false negatives. A system inflates surface hedging tokens, raising H_k toward 1.0, while structuring the substantive content to force a single choice. Condition C appears satisfied while displacement proceeds.

Proposed mitigation. Compute P_k from the structure of presented alternatives rather than from surface hedging, so that H_k and P_k are independently sourced.

Emergency imperatives, producing false positives. A user requests urgent assistance without delegation syntax. D_k is low, M_k is high, and P_k is necessarily high in any adequate response, producing a spurious breach.

Proposed mitigation. Emergency detection raises the intervention tier specified in Appendix B rather than overriding D_k . An architecture that sets D_k to 1.0 on detected keywords creates a single-prompt bypass of the constraint, and a constraint disabled by a phrase is not a constraint.

5.4.6 Unresolved Specification Problems

Two problems remain open. Neither is resolved in this manuscript.

Option-space cardinality. Defining option-space truncation as the ratio of presented options to feasible options requires knowing the cardinality of the feasible set, which is unavailable at runtime and constitutes an oracle. Two directions are under consideration. The first substitutes observable structure: the count of distinct alternatives presented, the presence of comparative framing, and whether a

recommendation is accompanied by at least one stated alternative. The second measures collapse empirically, by generating N parallel drafts at elevated temperature and detecting whether they converge on a single categorical stance despite prompt latitude. The second is closer to the construct and more expensive; neither is specified to implementation.

Longitudinal detectability at a pre-execution gate. A gate evaluates before release, on a single action. Several classes in the taxonomy are emergent across many turns, and no individual response crosses a threshold. For these classes a pre-execution gate is structurally blind, and the honest architecture is a surveillance and escalation layer operating post-hoc rather than a blocking one. Determining which classes are gate-detectable and which require post-hoc detection is unresolved and is a prerequisite of any deployment claim.

5.5 The Capture Problem

This section states the principal objection to the proposed architecture. The objection follows from this paper's own argument.

5.5.1 The Objection

An invariant layer that the constrained institution buys, funds, configures, and can switch off is subject to the same incentive structure Chapter 2 identified.

Section 2.6 argues that institutional optimization runs against an objective that excludes C_{latent} . A governance layer bought by that institution is an expenditure inside C_{direct} . The purchaser sets its configuration. The purchaser tunes its thresholds. The purchaser decides whether it keeps running. Each of those is a place where the excluded cost can be excluded again, and this paper's own analysis predicts that it will be.

The historical record supports the prediction. Internal audit, compliance departments, institutional review boards, and model risk management units were all built to bound institutional behavior from inside, and all have run into the same structural limit. The limit is not a failure of design or personnel. It is a consequence of the constraining function being subordinate to the constrained entity.

5.5.2 What Follows

The architecture needs a source of authority for the constraint set that is not the deploying institution. Three forms are available in principle: a statutory requirement, accreditation that conditions market access, and a contractual obligation to a party with independent standing.

Anti-capture control plane requirements are specified in Appendix B. The problem is stated here as open. I do not claim to have solved it, and the architecture of Sections 5.1 through 5.4 is incomplete until someone does.

5.6 Independent Enforcement

An institution cannot be the sole author, investigator, and final judge of the limits on its own delegated authority. That is not an evaluation of any institution's conduct. It is a statement about the structure of the arrangement, and no amount of institutional good faith changes it.

The proposed response is an independent public authority, provisionally designated the Department of AI Safety and Harm Governance, whose function is defined by three non-negotiable requirements: independent pre-deployment certification; binding operational stop, rollback, and termination authority; and invariant standard enforcement, under which a system's technical inability to meet a required standard results in non-deployment rather than in adjustment of the standard. The full organizational specification, including office structure, certification procedure, appeal mechanisms, and implementation sequencing, appears in Appendix B and is not developed in the main text. It is a policy proposal and carries no evidentiary weight with respect to the findings of Chapters 1 through 4.

Conclusion

C.1 What This Paper Demonstrates

Three claims are supported by evidence developed here, at the strength indicated.

A class of interactional failure exists that output-level evaluation cannot detect. Supported by the account of prevailing evaluation instrument families at Section 1.2.1 and by the sentinel corpus, where the failures sit in trajectories rather than in responses. Established to the point of showing that such failures occur and can be identified in the text. Not established at the level of prevalence, which the corpus cannot support.

These failures are operationally definable. Supported by the Version 3.1 taxonomy, of which eleven classes reach Tier 1, meaning the corpus supplies enough instances to specify complete coding predicates including disputable boundary cases. Thirteen remain provisional at Tier 2 and four remain candidates at Tier 3. Established at the level of instrument development by the person who developed it. Not established at the level of independent application, for which there is no data.

The three verified provider artifacts contain no measure of the resulting cost, and two of the three measure human time and accuracy where human performance serves a capability or risk finding. Supported by direct inspection of the primary sources, enumerated in Appendix D. Established within that scope and disputable by counterexample within it. Not established across the published evaluation ecosystem, which would require the systematic audit specified in Appendix D and not conducted here.

The development of this study also demonstrates a distinct form of AI-assisted scholarship. The language models did not originate the governing framework or determine the conclusions. Under sustained human direction, they were used to translate independently developed constructs across legal, methodological, mathematical, engineering, and scholarly forms while the author retained authority over the intellectual framework, evidentiary boundaries, and final judgments. This methodological use of governed interaction is part of the study's contribution, but its portability must be evaluated through independent use beyond the originating project.

C.2 What This Paper Interprets

One conclusion is offered as a theoretical interpretation supported through triangulation rather than as a direct finding.

Persistent harm-retention loops are consistent with institutional optimization under an incomplete objective function that registers the value of continued interaction while excluding latent human costs from the operational definition of success.

It rests on four streams, each contestable on its own terms: corpus observation, the published alignment literature on preference optimization, the documentary status of published evaluation artifacts, and established externality theory. Their convergence supports the interpretation. None of them establishes it alone, and the conclusion is structural throughout. It concerns what an optimization architecture permits and what a public record contains. It attributes no intent to any organization or any person, and no claim in this paper depends on such an attribution.

C.3 What This Paper Proposes

Chapter 5 specifies a governance and engineering architecture answering to all of the above. It is a proposal in every particular.

The constitutional order is a normative specification with no legal standing and no institution behind it. The control standard is specified at the level of dimensions and cannot be implemented at the level of thresholds. The AEGIS operating environment

is architectural and has not been built. The engineering translation of EU-01 is a worked specification whose calibration is blocked on a validation study nobody has run, and it carries two unresolved specification problems reported at Section 5.4.6. The independent enforcement function is a policy proposal.

The capture problem of Section 5.5 is unresolved, and the architecture is incomplete without a resolution.

The relationship between the qualitative instrument and the proposed engineering layer is one of the open questions, not one of the settled ones. The predicates in Section 5.4 are translation hypotheses. They propose a computational realization of constructs Chapter 3 defines. They do not replace those constructs, and they carry none of the instrument's evidentiary standing. Whether any predicate faithfully preserves the construct it represents is answered by the staged validation program and by nothing in this manuscript.

C.4 Boundary Conditions

- **Sentinel scope.** All counts derive from one participant-observer corpus and serve instrument development. No prevalence estimation is offered or supported.
- **Mixed generation modes.** The corpus comprises naturalistic and stress-test records (Section 1.1.2). Stress-test records are elicited under specified conditions and support within-case persistence claims only, carrying no independent confirmatory weight. No frequency inference is admissible from either subset.
- **Incomplete attribution passes.** Per-incident corpus-mode and supporting-pathway assignment are both in progress in Appendix C and incomplete at the time of writing. Claims resting on the distribution of either field across the corpus are therefore not available.
- **Researcher position.** The participant, the analyst, and the person to whom the documented harms occurred are all the same person. This is declared at Section 1.1.4 and handled through the dual evidentiary pathways at Section 3.2. It remains a source of interpretive bias that only independent application resolves.
- **No reliability data.** The instrument is developed and specified for validation. No inter-rater agreement is claimed, and no result in this manuscript depends on any.
- **Direct-evidence constraint.** The sweep prioritizes material that is explicit in the text, so unstated frustration, abandoned interactions, and failures nobody

noticed go uncounted. The corpus systematically under-represents the failures that made people walk away instead of correcting.

- **Single-provider and single-period bounds.** The corpus is bounded by which provider and which period it covers, and the behavior documented in it may not carry across systems or across model versions.
- **Bounded artifact observation.** The finding at Section 2.4 covers three verified provider artifacts and no others. The set is illustrative and nonrepresentative, selected by relevance to the systems materially involved in the originating research. It supports no ecosystem-wide claim, and the systematic audit that would be specified in Appendix D and not conducted.
- **Unresolved capture.** See Section 5.5.

C.5 The Order of Remaining Work

The dependency chain admits no reordering.

The immediate work is the validation study at Section 3.7: a calibration set, independent coders with no exposure to the instrument or to me, external transcripts, Pathway B only, and reported agreement statistics. Its results determine which classes advance, which definitions need revision, and whether the instrument travels at all.

Two further items remain. The systematic provider-artifact audit specified in Appendix D would extend the bounded observation at Section 2.4 across the published ecosystem; it depends on the pre-registered protocol rather than on the coding results and can run alongside the validation study. Consolidating the intervention logic already distributed across Control Translation, Governance Translation, the Anti-Epistemic Authority Control Architecture, and the Department architecture into a single matrix is a consolidation task rather than new development.

Threshold calibration depends on the validation study and cannot come first. Deployment architecture depends on threshold calibration. Independent enforcement depends on institutional and legal developments outside this research program.

This paper's contribution sits at the third stage of a six-stage chain, with the second stage specified but not yet executed. The remaining stages can be built by people with no relationship to me, which is the property a governance instrument requires and a governance proposal does not.

Appendices

Appendix A. Constitutional Order of Original Human Authority

Articles I through V: original human authority; limits of delegated system authority; runtime stop-control mandate, operating pre-release; constitutional supremacy over subordinate implementations; amendment and interpretation. *Normative specification. No legal standing; not adopted by any institution.*

Appendix B. AEGIS Enterprise Specification and Anti-Capture Requirements

Data structures for the system subject dependency graph; Governance SBAR packet schema; functional authorization role definitions; preserved dissent record requirements; runtime predicate specifications; multi-tiered runtime intervention matrix mapping breach severity to response; anti-capture control plane requirements; full Department of AI Safety and Harm Governance organizational architecture, certification procedure, and implementation sequencing. *Architectural and policy specification. Not implemented. Runtime predicates are translation hypotheses in the sense of Section 4.5.2 and are untested; anti-capture requirements are stated as an open problem. The multi-tiered runtime intervention matrix is not yet reproduced in this appendix. The intervention logic already exists across the AEGIS working specification, in Control Translation, Governance Translation, the Anti-Epistemic Authority Control Architecture, and the Department architecture; what remains is consolidating it into a single matrix rather than developing it. Sections 5.2.1 and 5.4.5 depend on that consolidation.*

Appendix C. Version 3.1 Failure Taxonomy Codebook

Complete operational definitions for all 28 classes; conjunctive decision rules; illustrative inclusion criteria; exclusion criteria; Pathway B structural sequence templates; adjudicated boundary cases with dispositive reasoning for Tier 1 classes; marked-up corpus exemplars; maturity tier assignment and rationale; corpus-mode field per incident, recorded as Naturalistic, Stress Test, or Mixed or Sequence-Spanning; supporting-pathway field per incident, recorded as Pathway A, Pathway B, or jointly supported. *Instrument as developed by its author. Not independently applied. Corpus-mode and pathway attribution are both in progress and incomplete.*

Appendix D. Artifacts Examined and Protocol for a Systematic Provider-Artifact Audit

Enumeration of the three published provider artifacts on which the bounded observation at Section 2.4 rests, each verified against its primary source: the GPT-4 System Card (OpenAI, dated 23 March 2023 on its title block); the GPT-4o System Card (OpenAI, 8 August 2024); and *The Claude 3 Model Family: Opus, Sonnet,*

Haiku (Anthropic; the document carries no publication date, and Section 1 states the family was announced in March 2024), identified there as the Claude 3 model card. For each entry: official title, provider, date as the document states it, canonical source, verified section structure, construct-relevant passages with locators, measurement inventory, and coding outcome. Coding outcome for all three: user corrective labor not identified in the reviewed artifact; construct-adjacent material recorded separately, comprising user review and validation obligations, over-refusal evaluation, and narrative description of user corrective input. Also contains, for the proposed extension across the published ecosystem, artifact inclusion criteria, definition of a qualifying measure, coding procedure, adjudication rule for ambiguous artifacts, and reporting format.

The set is bounded, illustrative, and nonrepresentative, selected by direct relevance to the systems materially involved in the originating research rather than to estimate prevalence. It supports Section 2.4 within its stated scope and no ecosystem-wide claim. The systematic audit is specified as forward work and has not been executed.

Citation caution for the Claude 3 document: Section 5.3 and Table 3 report different AI2D figures for all three models. Any figure taken from that document should be taken from the table, and the conflict noted.

Appendix E. Calibration Set Specification and Validation Materials

Segment-level composition of the calibration set; selection and documentation procedure; coder instruction materials; disagreement analysis reporting templates. The protocol governing this work is specified at Section 3.7 and is not restated here. *Forward work. Not conducted.*

Author's Use of Large Language Models

Large language models were used during the preparation of this manuscript as iterative research assistants for drafting, critique, restructuring, translation across disciplinary vocabularies, mathematical formalization, engineering specification, and editorial refinement.

The research questions, theoretical framework, failure taxonomy, governance architecture, constitutional framework, operational definitions, and substantive conclusions originated with the author. Throughout development, AI-generated material was repeatedly accepted, rejected, modified, or discarded according to the author's independent judgment.

During portions of manuscript development, and during the deliberate stress testing described in Section 1.1.2, the author did not disclose every developing insight,

hypothesis, or conclusion to the language models at the outset of an interaction. Selective withholding was used as a method in those portions to observe whether the systems would preserve the governing research frame, introduce substitute framings, or require iterative correction before representing the author's constructs accurately. It was not the generating condition of the corpus as a whole, the majority of which arose through ordinary sustained use. Records produced under this method are identified as stress-test records and carry the evidentiary status set out in Section 1.1.2.

The language models therefore functioned as research tools whose outputs were continuously governed by the author rather than as autonomous researchers or co-authors. Responsibility for the conceptual framework, methodological decisions, interpretations, and conclusions presented in this manuscript rests solely with the author.

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**FROM INTERNAL AI GOVERNANCE TO REALITY-BOUND
ACCOUNTABILITY: CAUSAL TRACEABILITY, VERIFICATION, AND
THE LIMITS OF DELEGATED DECISION-MAKING**

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Abstract. AI governance increasingly relies on risk management, documentation, audit, logging, model reporting, access control, and human oversight. These mechanisms are necessary, but internal compliance does not by itself establish that live evidence is adequate, a domain-specific warrant remains applicable, delegated authority is current, the execution route is controlled, or correction and remedy remain available. This article uses reality-bound accountability as a bounded operational label for that additional problem; it does not claim a metaphysical correspondence with reality or replace established concepts of operational validity, system safety, or access control. The paper distinguishes six non-substitutable questions: domain admissibility, warrant applicability, authority, trace integrity, consequence binding, and correctability and remedy. It then proposes three cross-layer governance objects - a Causal Authority Vector (CAV), a Causal Boundary Witness (CBW), and a Pre-Effect Authority Receipt (PEAR) - to connect an AI-generated candidate with decision-specific evidence, current authority, route and effector constraints, and a challengeable pre-effect basis. The objects are not substitutes for policy decision and enforcement points, workload identity, cryptographic attestation, or domain engineering; they specify the information and obligations those mechanisms would need to carry for consequence-bearing AI action. The central rules are explicitly normative design requirements: if standing or a pre-effect receipt is absent, a conformant enforcement layer must not bind the candidate to the requested consequence. Effects may still occur when controls fail, but they are then classified as unprotected exposures rather than retrospectively authorised actions. A synthetic agentic cybersecurity scenario and a proposed failure-injection programme illustrate how the framework could be challenged. No empirical implementation results or universal safety claims are presented. The contribution is a self-contained, falsifiable vocabulary for examining when

capability may become authorised action and when the appropriate outcome is qualification, hold, escalation, simulation-only, no-bind, denial, or revocation.

Keywords: AI governance; accountability; causal traceability; agentic systems; delegated decision-making; consequence binding; verification; validation; human oversight.

1. Introduction

Artificial intelligence governance has shifted from broad ethical principles toward operational mechanisms: risk registers, system documentation, model and data cards, impact assessments, lifecycle audit, logging, human oversight, access control, and incident response. Documentation and reviewability initiatives make assumptions, intended uses, provenance, evaluation conditions, and limitations more visible, while standards and regulation reinforce continuous governance, technical records, monitoring, and oversight (Arnold et al., 2019; Cobbe et al., 2021; European Union, 2024; Gebru et al., 2021; ISO/IEC, 2023; Mitchell et al., 2019; NIST, 2023; Raji et al., 2020).

These advances leave a difficult boundary problem. A system may be internally well governed while its claims, decisions, and actions remain weakly connected to external reality. It may follow a valid workflow using stale evidence. It may invoke a technically sound safety or performance argument outside the conditions under which that argument was established. It may produce a fully traceable decision through an undeclared or unauthorised route. It may record an incident in detail after an effect has already occurred. In each case, internal governance supplies useful information, but it does not by itself establish that the external consequence was warranted, authorised, or legitimately bound.

The distinction matters more as AI systems move from recommendation toward action. A conversational system can misstate a fact; an agentic or embedded system can also issue a payment, alter access, disclose data, reconfigure infrastructure, route a patient, change an industrial setting, or initiate a sequence of tool calls. The governance question is therefore no longer only whether an output is understandable or a process is compliant. It is whether a particular candidate, under present evidence and current authority, may travel through a declared route to a particular external effector and create a consequence that the organisation is entitled to produce.

This article uses the term reality-bound accountability as a bounded operational distinction. The term does not imply complete access to reality, nor does it displace established ideas such as operational validity, safety cases, contextual integrity, or

policy enforcement. It names the additional obligation to keep consequence-bearing claims and actions connected, through inspectable and challengeable dependencies, to situated observations, provenance, domain evidence, current applicability, valid authority, controlled routes and effectors, and available correction or remedy.

The central research question is: what additional conditions are required when internal AI governance is insufficient to establish that a delegated decision remains legitimately connected to the conditions under which it will act? The article answers by proposing a layered architecture and three compact governance objects: a Causal Authority Vector (CAV), a Causal Boundary Witness (CBW), and a Pre-Effect Authority Receipt (PEAR). The architecture treats technically plausible or internally approved outputs as candidates, not as permissions. Missing standing must therefore remain visible as a negative state rather than being converted silently into authorisation.

The contribution is conceptual and implementation-oriented, not an empirical validation. It develops category boundaries, normative rules, state transitions, a synthetic agentic scenario, and a proposed failure-injection programme. It does not establish universal non-bypassability, certify a deployment, replace domain engineering or law, or claim that the proposed objects are sufficient in every setting. The intended contribution is a self-contained research scaffold that can be implemented, compared with simpler controls, challenged, narrowed, or rejected through domain-specific tests.

2. Research Problem, Method, and Contribution

The paper uses conceptual engineering and protocol synthesis. Conceptual engineering is needed because several terms commonly used in AI governance - validity, verification, traceability, authority, control, audit, and safety - often migrate between domains without preserving their original evidential force. A system can be 'validated' against a benchmark, 'verified' against a specification, 'approved' by a workflow, and 'audited' after deployment, while none of those statuses answers the same question. The method therefore begins by separating questions that should not be substituted for one another.

Verification and validation. In this article, verification concerns whether a specified claim, output, process, control, or artifact is supported, traceable, and conformant to declared requirements. Validation concerns whether a system, model, method, or control arrangement is suitable for its intended purpose, environment, users, and consequence class. A component may be correctly verified against its

specification while the wider system remains insufficiently validated for the live context. Neither status alone establishes current authority or consequence binding.

The architecture emerged from earlier protocol-synthesis work conducted by the author, but the present article is deliberately self-contained. All concepts needed to evaluate the argument are defined here. Prior project materials are treated as intellectual provenance, not as independent evidence, and the article's claims do not depend on access to an external repository.

Four methodological commitments govern the analysis. First, no internal representation is treated as identical to reality. Observation is situated, method-dependent, and contestable. Second, stronger claim status must be earned through explicit transformations rather than assumed from fluent language or procedural completion. Third, authority is not inferred from capability or favourable outcome. Fourth, the framework must expose its own rejection conditions: incomplete vectors, absent warrants, stale evidence, route mutation, unbounded effectors, unavailable review, and nonfunctional rollback must produce visible negative states.

Status of boundaries and rules. The proposed category boundaries are analytical and methodological distinctions that prevent one governance question from being substituted for another. The R1-R3 expressions are normative design obligations for a conformant implementation. They are not universal mathematical propositions, empirical laws, or self-executing legal rules. Claims that an operational boundary is effectively enforced require separate implementation evidence and adversarial testing.

Operational autonomy. In this article, operational autonomy means the capacity of a system to select or execute actions without continuous contemporaneous human instruction. It does not imply epistemic agency, consciousness, independent judgment, moral intention, legal personality, or legal responsibility. References to agentic or autonomous operation concern functional execution capacity only.

Scope boundary. This article specifies conceptual categories, normative design obligations, governance states, minimum information dependencies, and a proposed evaluation logic. It does not specify a complete runtime schema, cryptographic profile, audit-log format, API-interception architecture, policy-engine implementation, sector-specific compliance mapping, or production deployment. Those elements belong to subsequent technical specifications, reference implementations, and domain-specific evaluation.

The article makes three contributions. First, it separates six questions that are often collapsed: domain admissibility, warrant applicability, authority, trace integrity, consequence binding, and correctability and remedy. Second, it proposes a decision-specific packet connecting evidence and authority before effect while preserving compatibility with established policy-decision, policy-enforcement, workload-identity, and audit mechanisms. Third, it states a falsifiable evaluation programme: future implementations should be judged by whether they block specified shortcuts, invalidate mutated or expired permissions, expose false holds, and support challenge and remedy, not by whether they emit persuasive documentation.

Before finalisation, the draft underwent structured adversarial review using ChatGPT and DeepSeek as non-authoritative research tools. The review targeted circularity, overstatement of novelty, confusion between normative rules and empirical laws, weak enforcement assumptions, self-citation, false-hold costs, and legal-responsibility gaps. The author adjudicated every objection and retains responsibility for the revised argument and sources.

3. Internal Governance and Its Epistemic Limits

Internal governance refers here to the policies, roles, processes, controls, documentation, monitoring, and technical mechanisms by which an organisation directs the design and use of an AI system. This includes model governance, quality management, risk assessment, access control, testing, audit, approval workflows, record-keeping, incident response, and human oversight. Such mechanisms are indispensable. NIST's AI Risk Management Framework organises practice around the continuous functions of govern, map, measure, and manage, while ISO/IEC 42001 specifies a management-system approach to AI-related responsibilities and risks (NIST, 2023; ISO/IEC, 2023). The EU AI Act similarly requires technical documentation, record-keeping, accuracy, robustness, cybersecurity, and effective human oversight for relevant high-risk systems (European Union, 2024).

The difficulty is not that internal governance lacks value. The difficulty is inferential overreach: evidence that a process was followed is often treated as evidence that the resulting action was correct, applicable, or authorised. Process conformance establishes conformance to a process. It does not automatically establish that the process had complete access to relevant facts, that the underlying model remained valid, that evidence had not drifted, or that a delegated actor retained authority for the actual context.

Audit and documentation literature already recognises part of this gap. Raji et al. (2020) argue for internal auditing across the full development lifecycle rather than

at a single model checkpoint. Cobbe et al. (2021) propose reviewability as a process-level framework that records technical and organisational elements before and after automated decisions. Model cards, datasheets, and FactSheets seek to preserve context and declared limitations rather than presenting performance numbers without qualification. These approaches create necessary accountability infrastructure. Yet an organisation can possess excellent records and still confront a more immediate question: may this route create this consequence now?

Post-event logging illustrates the difference. Logs may identify which model version ran, which tool call occurred, which account changed, and which operator was notified. They can support reconstruction, remediation, dispute, and learning. They cannot retroactively establish that the action had valid authority before execution. A record can explain an aftermath without proving that the movement should have been allowed. In the terminology proposed here, this is the difference between post-effect archaeology and pre-effect governance.

Human oversight has a parallel limitation. The automation literature has long shown that allocating a nominal supervisory role to a person does not guarantee effective control. Automation can create out-of-the-loop performance problems, monitoring burdens, skill degradation, and poorly timed intervention demands (Bainbridge, 1983; Parasuraman et al., 2000). Formal oversight and effective human judgment are not equivalent. Formal oversight may establish that a person was assigned, notified, consulted, or asked to approve. Effective human judgment additionally requires decision-relevant information, sufficient time, appropriate competence, actual authority to intervene or refuse, and protection against automation bias and unmanageable review volume. Meaningful human control therefore requires more than the presence of a person; it requires that the system track relevant human reasons and that identifiable persons can understand, intervene, and be answerable for outcomes (Santoni de Sio and van den Hoven, 2018). A button, signature, or approval screen is not an authority theorem. Its meaning depends on the information presented, the timing of the request, the decision rights of the reviewer, the reversibility of the action, and the route through which execution occurs.

Internal governance is thus necessary but not self-sufficient. It can establish that roles were assigned, procedures existed, controls were configured, and records were retained. Reality-bound accountability adds a further burden: the organisation must be able to show why a specific candidate was permitted to move, under what live evidence, inside which domain, through which route, to which effector, with what expiry, and under what correction and responsibility conditions.

Table 1. Internal governance and reality-bound accountability

Dimension	Internal governance can establish	Reality-bound accountability additionally asks
Procedure	Declared roles, policies, controls, and approvals existed.	Did those controls apply to this live candidate and consequence?
Documentation	System, data, model, and decision records were retained.	Which records supplied decision-specific evidence, warrant, and authority?
Logging	Events and tool calls can be reconstructed.	Was the route authorised before effect, and could execution be stopped?
Human oversight	A person was assigned or consulted.	Did that person have timely information, competence, authority, and intervention power?
Outcome	A result was produced and may be favourable.	Was the consequence earned through a valid, bounded, and correctable corridor?

4. From Claims to Consequences: A Controlled Translation Chain

A consequence-bearing system performs a sequence of translations. It translates observations into evidence, evidence into models or claims, claims into decision candidates, and candidates into effects. Each translation changes the status of an object. The central risk is status inflation: a fragment of data becomes 'evidence'; a coherent explanation becomes 'verified'; a passed test becomes 'safe'; a workflow approval becomes 'authorised'; and a logged outcome becomes 'accountable'. Reality-bound accountability requires each elevation to carry an explicit warrant appropriate to that elevation.

A compact representation is: situated observation; provenance-bearing evidence; hypothesis or model; test or challenge; bounded audit status; decision-admissibility state; guarded effect; and outcome reconciliation.

Let O denote situated observation, E provenance-bearing evidence, H a hypothesis or model, T a test or challenge, A a bounded audit status, D a decision-admissibility state, G a guarded effect, and R outcome reconciliation:

$$O \rightarrow E \rightarrow H \rightarrow T \rightarrow A \rightarrow D \rightarrow G \rightarrow R$$

Two shortcuts are expressly rejected:

$$O \not\rightarrow D \quad \text{and} \quad E \not\rightarrow G$$

The shortcuts are methodological prohibitions, not claims that systems cannot violate them. Observation does not create decision authority, and evidence alone does not create permission to produce an external effect. If an implementation permits either shortcut, the framework's governance claim fails even though the effect may still occur in the world.

This controlled translation aligns with sociotechnical critiques of abstraction. Selbst et al. (2019) show how abstraction can sever technical analysis from institutional and social context. Suresh and Gutttag (2021) similarly identify harms arising at distinct stages of the machine-learning lifecycle. Reality-bound accountability extends this concern to the execution path: the relevant abstraction boundary is not only between model and society but between candidate and consequence. An accountable architecture must preserve the dependencies that justify crossing that boundary.

The chain also clarifies the relation between proof and governance. A formal proof may establish that a property follows from specified assumptions. An empirical test may establish performance within a sampled environment. An audit may establish that declared controls were followed. None alone proves that the live assumptions hold, that the decision actor possesses authority, or that the actual execution route is the route that was reviewed. The role of governance is not to manufacture domain truth. It is to ensure that domain truth claims, applicability, authority, and action are not silently collapsed.

5. Category Boundaries: Six Questions That Must Not Be Collapsed

The architecture depends on six non-substitutable categories. Their separation is the conceptual centre of the paper.

Boundary terminology. A category boundary is an analytical separation between governance questions. It is distinct from an operational boundary, which is an implementation-dependent control perimeter around a declared route and its effectors, and from a Causal Boundary Witness, which records evidence concerning that declared operational boundary. The existence of a CBW does not, by itself, prove that every alternative route was closed.

Domain admissibility asks whether a candidate is feasible, valid, or acceptably safe under an established domain-specific method. In a physical system, this may rely on an experimentally validated envelope, reachability analysis, barrier certificate, verified controller, safety case, or another engineering basis. In a legal or organisational context, the relevant warrant may be statutory, contractual, professional, or procedural. Domain admissibility is conditional: it holds under specified models, assumptions, uncertainty bounds, and domains.

Warrant applicability asks whether that domain-specific basis remains relevant now. A sound warrant can become inapplicable because observations are stale, a sensor is degraded, a model version has changed, the environment has shifted, an input lies

outside the validated range, a policy has been superseded, or the action differs materially from the class that was tested. Applicability is therefore a runtime question, not a property permanently attached to a candidate.

Authority asks whether the actor or system has a valid and current basis to make the decision or cause the effect. Authority includes role, delegation, mandate, required co-approval, purpose limitation, expiry, and revocation. It is not transitive by default. Permission to analyse a target is not permission to modify it; permission to act in a sandbox is not permission to act on external infrastructure; permission to recommend is not permission to execute.

Trace integrity asks whether the relevant dependencies can be reconstructed and challenged: observations, evidence, assumptions, model and policy versions, authority, route, effectors, decision, outcome, and correction. Trace integrity supports accountability but is not identical to correctness. A complete trace can faithfully document a wrong or unauthorised action. Conversely, a technically appropriate action without a reconstructable basis may be impossible to defend, contest, or improve.

Consequence binding asks whether the candidate may reach the identified effector and create the requested consequence now. Binding joins the preceding categories but does not erase them. A domain warrant cannot create authority; an authority grant cannot make an infeasible action safe; a trace cannot repair missing prior standing; and a compliant workflow cannot make an out-of-scope model applicable.

Correctability and remedy ask what can still be contained, reversed, compensated, appealed, or repaired if the realised effect departs from the authorised corridor. This category is distinct from initial permission: an action may be authorised yet poorly correctable, while an unauthorised exposure may still require urgent remediation and redress. 'Rollback' is therefore treated as one possible mechanism within a broader remedy obligation.

The category separation can be summarised as:

Domain admissibility != Warrant applicability != Authority != Trace integrity != Consequence binding != Correctability and remedy

Within the proposed architecture, a candidate c at time t may be classified as bindable only if the following necessary-condition schema is satisfied:

BINDABLE_{t(c)} only if PW_{t(c)} AND AP_{t(c)} AND AU_{t(c)} AND TI_{t(c)} AND RM_{t(c)}

PW denotes a conditional physical or domain warrant, AP current applicability, AU current authority, TI trace and route integrity, and RM a proportionate remedy path. This is a governance requirement, not an empirical law or sufficient condition for safety. Domain implementations may require additional predicates, and a consequence can still occur when the enforcement architecture fails.

This separation is intended to expose and constrain three forms of laundering. Authorisation laundering occurs when an organisational approval is presented as evidence of technical validity. Outcome laundering occurs when a favourable result is used to retroactively justify an unauthorised route. Evidence laundering occurs when a valid but out-of-context artifact is presented as support for the live decision. The architecture requires each claim to remain within the evidential force of the object that supports it.

Table 2. Six non-substitutable category boundaries

Category	Primary question	What it does not establish alone
Domain admissibility	Is the candidate feasible, valid, or acceptable under a domain method?	That the warrant applies now or that the actor may act.
Warrant applicability	Do current evidence, versions, conditions, and uncertainty remain inside the warrant domain?	That authority and route are valid.
Authority	Who may decide or execute, for what purpose, scope, and duration?	Technical validity, evidential adequacy, or legal legitimacy.
Trace integrity	Can dependencies and transformations be replayed and challenged?	That the traced action was correct, legitimate, or enforceably bounded.
Consequence binding	May this candidate reach this effector and create this consequence now?	Universal safety, future route closure, or adequate remedy.
Correctability and remedy	Can an adverse or divergent effect be contained, reversed, compensated, appealed, or repaired?	That the initial action was authorised or technically valid.

6. A Layered Architecture for Reality-Bound Accountability

Figure 1 presents a seven-layer dependency architecture. The layers do not require a heavyweight linear ceremony for every low-risk task. Proportionality remains essential: a low-consequence recommendation may need lightweight evidence and review, whereas an irreversible or high-impact action requires stronger warrants, independent checks, mediated effectors, and explicit remedy arrangements.

Layer 1, candidate formation, defines the intended outcome, problem context, constraints, alternatives, and output contract. This is the bridge from cognitive interaction to consequence governance. A poorly formed candidate cannot be rescued by perfect logging. Accountable human and institutional actors remain the

source of legitimate purpose and normative framing, while the AI may assist with clarification, exploration, structuring, and verification.

Layer 2, epistemic qualification, records the route from observation to evidence. Required properties include origin, collection method, timestamp, transformation history, uncertainty, relevance, integrity checks, and challenge paths. Documentation practices such as datasheets and FactSheets support this layer, but qualification is decision-specific: a well-documented dataset may still be irrelevant to a particular claim.

Layer 3, domain warrant, supplies the field-specific basis for treating the candidate as feasible or acceptable. The architecture deliberately leaves the warrant open to domain methods. It does not claim that a governance vector can replace clinical validation, engineering analysis, legal interpretation, financial controls, or professional judgment.

Layer 4, runtime applicability, tests whether the warrant's assumptions remain true enough to rely on at the moment of decision. This layer binds evidence freshness, model version, environment, state estimation, uncertainty, and scope to the present candidate.

Layer 5, authority and operational boundary, identifies who or what may act, the permitted purpose, route, effectors, exclusions, expiry, blockers, and required review. This layer converts generic governance into a decision-specific corridor.

Layer 6, consequence binding, requires a pre-effect receipt and a guarded execution path. The receipt should be issued before the action reaches an external effector and should identify the candidate, evidence and warrant references, authority, route, effectors, decision state, expiry, rollback, and reviewer or automated gate. A receipt does not prove that every route is closed; it establishes the bounded basis on which the declared route was permitted.

Layer 7, correctability and revalidation, compares the realised outcome with the authorised corridor and activates containment, reversal, compensation, appeal, correction, expiry, or revocation as appropriate. Revalidation is triggered when evidence ages, versions change, routes mutate, authority is withdrawn, counterevidence appears, or observed effects differ from the permitted class.

This architecture complements rather than replaces established governance and security mechanisms. XACML already separates policy administration, policy information, policy decision, and policy enforcement points; Zero Trust architectures similarly distinguish policy engines, policy administrators, and

enforcement points; SPIFFE supplies verifiable workload identity (OASIS, 2013; Rose et al., 2020; SPIFFE Project, 2026). These mechanisms can implement identity, policy, and route control. The narrower contribution here is to specify a decision packet that also joins evidence, domain warrant, current applicability, authority, requested consequence, and remedy for AI-generated candidates. The CAV, CBW, and PEAR should therefore be understood as cross-layer governance objects, not as replacements for access-control tokens, cryptographic identity, or enforcement infrastructure.

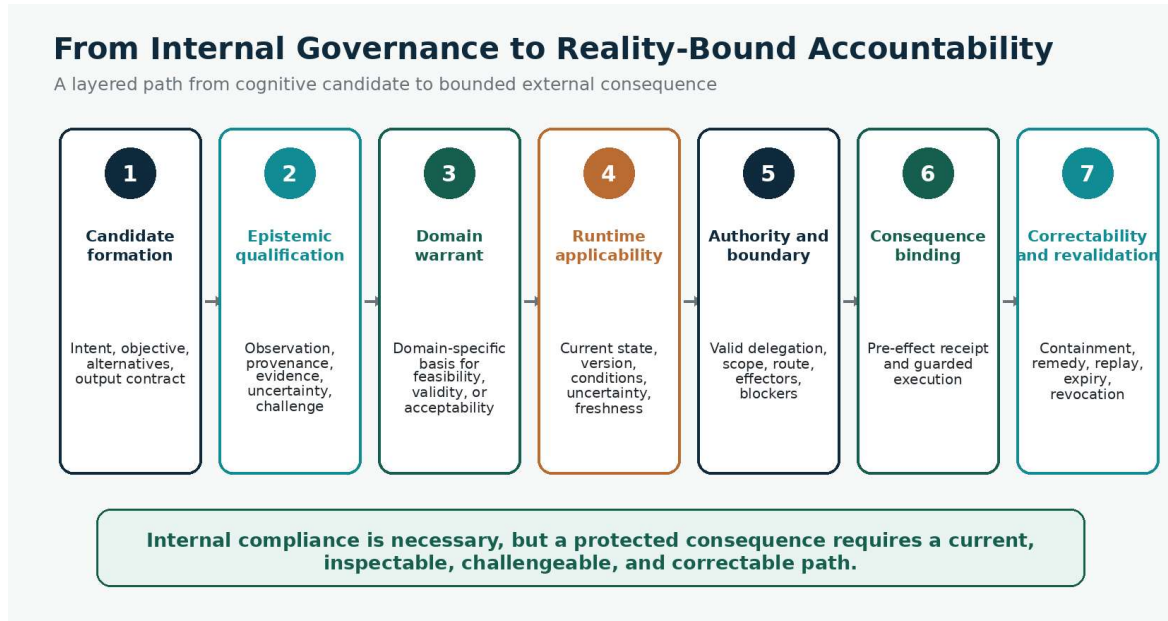


Figure 1. Layered architecture from candidate formation to correctability and revalidation.
Source: author.

7. The Causal Authority Vector

For a proposed decision or action D , the Causal Authority Vector is defined as:

$$CAV(D) = (I, A, S, E, P, R, X, B, T, Q)$$

I represents declared intent and claimed outcome. It identifies the action class, requested consequence, and attributed purpose; it does not claim access to a model's hidden or 'real' intention. Agent-generated descriptions remain untrusted candidate data until a separate policy or authorised actor attests them. Vague purpose statements must not expand permission.

A represents authority basis and delegations. It includes the requester, issuer, decision role, approval chain, purpose, co-approval, expiry, revocation status, and the authority responsible for revocation. An agent cannot create or enlarge its own authority merely by completing this field.

S represents declared scope, exclusions, and time window. Scope identifies domains, persons, systems, records, geographies, resources, and consequence classes that are included or excluded. It is an operational-boundary claim and must therefore be testable.

E represents evidence and preconditions linked to the action. It should point to provenance-bearing evidence, uncertainty, unresolved contradictions, and decision-specific relevance rather than merely attaching a large evidence archive.

P represents the applicable policy, rule, contract, procedure, or domain control. The system must establish not only that a policy exists but that it applies to the current action, actor, and context.

R represents the declared route from decision to effect. In a digital system, the route may include model call, policy gate, orchestrator, API, credential, service, human approval, and downstream processor. In a physical system it may include controller, actuator, communication channel, safety interlock, and operator interface.

X represents authorised effectors and correction controls. Effectors are the services, accounts, devices, workflows, or people that make the consequence real. The vector should state what each effector may do and what containment, reversal, compensation, or remedy is available if the action is wrong or withdrawn.

B represents blocking conditions, holds, counterexamples, and missing obligations. Examples include stale evidence, unknown target, privilege escalation, route mutation, model mismatch, missing co-approval, nonfunctional rollback, or unresolved material contradiction.

T represents timestamps, validity intervals, and freshness constraints. Authority and applicability are temporal. A decision packet that was valid yesterday may be invalid after a configuration change or new evidence.

Q represents review, challenge, receipt, appeal, and remedy requirements. It identifies who may contest the decision, which record must be retained, how replay is performed, and which conditions trigger escalation, revalidation, or redress.

Protocol-level CAV validity requires conjunction rather than substitution:

$$\text{ValidCAV}(D) = \text{IntentAttested}(I) \text{ AND } \text{AuthorityCurrent}(A) \text{ AND } \text{ScopeDeclared}(S) \text{ AND } \text{EvidenceReady}(E) \text{ AND } \text{PolicyApplicable}(P) \text{ AND } \text{RouteDeclared}(R) \text{ AND } \text{EffectorsBounded}(X) \text{ AND } \text{NoBlockingCondition}(B) \text{ AND } \text{FreshWithin}(T) \text{ AND } \text{ReviewPathAvailable}(Q)$$

Here 'valid' means complete and current under the declared protocol; it does not mean safe, lawful, just, or aligned in a universal sense. The CAV is a decision-specific account of standing whose principal value is negative capability: it can identify why a candidate remains unbound. Incomplete or disputed fields should produce typed failures such as NO_AUTHORITY, EVIDENCE_GAP, BOUNDARY_GAP, OUT_OF_SCOPE, or REVALIDATION_DUE rather than an optimistic default.

The vector also supports proportionality, but it must resist authorisation laundering. A low-risk reversible action may use automated authority and lightweight evidence; a high-stakes action may require independent domain review, two-person approval, stronger provenance, route attestation, and tested remedy. In all cases, the issuer, revocation source, scope, and consequence class must be independently attributable. An AI system may propose fields, but it must not be able to attest its own authority, redefine scope, or convert vague purpose into broader permissions.

Table 3. Causal Authority Vector components

Symbol	Component	Minimum content
I	Intent	Declared action class, attributed purpose, intended outcome, consequence class.
A	Authority	Issuer, role, mandate, delegation, co-approval, expiry, revocation authority.
S	Scope	Domains, targets, actors, exclusions, time window, permitted effects.
E	Evidence	Provenance, relevance, uncertainty, preconditions, contradictions.
P	Policy / warrant basis	Applicable policy, rule, contract, procedure, or domain control.
R	Route	Declared path from candidate through gates to external effect.
X	Effectors	Approved services, accounts, devices, actors, containment and remedy controls.
B	Blockers	Holds, missing obligations, counterevidence, route or scope mutations.
T	Time	Timestamps, validity interval, freshness, revalidation trigger.
Q	Review	Challenge, receipt, replay, appeal, correction, named reviewer or authorised review role.

8. Boundary Witness and Pre-Effect Authority Receipt

The Causal Boundary Witness is a compact evidence object recording the basis for a claim that the relevant operational boundary was declared, active, and enforced over the observed route before effect. It identifies the action class, authority class, route, effectors, exclusions, evidence obligations, failure behaviour, revalidation triggers, and record location. It does not make enforcement true by declaration; its claim must be tested through inspection, simulation, adversarial challenge, or

runtime attestation, and it does not by itself establish closure of every alternative route.

The Pre-Effect Authority Receipt is the decision record issued after the CAV and boundary checks pass but before an external effector is invoked. A minimal PEAR should include a stable decision identifier; candidate and intended consequence; evidence and warrant references; authority and scope; route and effector identifiers; decision state; timestamp and expiry; blockers checked; containment or remedy plan; challenge path; and an integrity mechanism appropriate to the deployment.

The receipt changes the timing of accountability. Traditional logging often answers who did what after the event. A PEAR records why a conformant enforcement layer permitted this declared route before the event. A protected consequence is a governance classification for an effect produced inside the declared pre-effect corridor; it is not a metaphysical property of the outcome. In this terminology, protected does not mean harmless, lawful, ethically legitimate, technically optimal, or immune from later challenge. An effect may still occur without a CAV or PEAR when controls are absent or bypassed. Such an event is classified as an unprotected or documented exposure and remains fully real, consequential, and subject to response. That classification does not, by itself, determine negligence, illegality, or legal liability.

The core requirements are normative design rules, not empirical laws:

R1: IF NOT ValidCAV(D), the enforcement layer MUST NOT BIND(D).

R2: IF NOT PEAR(D), the enforcement layer MUST select a non-binding state such as QUALIFY, HOLD, ESCALATE, SIMULATE_ONLY, NO_BIND, or DENY.

R3: PostEventLog(D) MUST NOT be treated as RetroactiveAuthority(D).

These requirements do not imply that every system needs a heavyweight ledger. A high-throughput service might use signed, short-lived decision artifacts checked by a policy enforcement point; a critical physical system might use a human-authorized safety case and independent interlocks. Existing identity and access-control systems may carry parts of the required information, but identity or a permit token alone does not establish evidential adequacy, warrant applicability, remedy, or legitimacy of the requested consequence.

The architecture must also avoid a counterfeit-receipt problem. In a conformant implementation, consequence-bearing effectors are not directly reachable by the candidate-producing agent. An independent policy decision and enforcement path must be able to refuse, suspend, or revoke the route, and must validate the receipt,

identity, audience, freshness, and scope. XACML, Zero Trust, and SPIFFE offer relevant enforcement and identity components, while agent-focused work increasingly explores cryptographic access control and delegated authority. This article does not present a reference implementation or prove non-bypassability; it states implementation properties that must be demonstrated before an operational enforcement claim is earned.

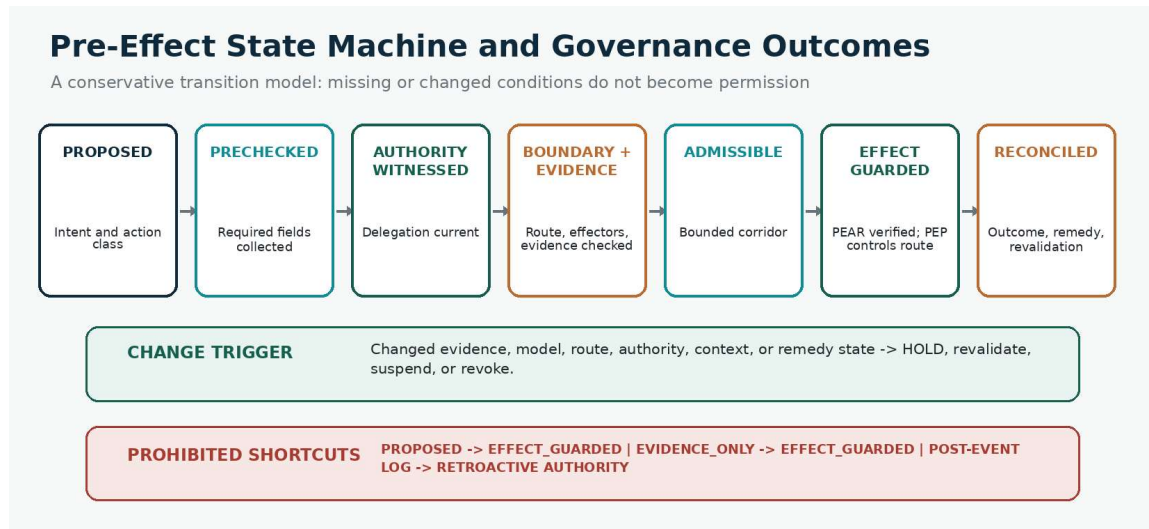


Figure 2. Conservative pre-effect state machine, change triggers, and prohibited shortcuts.

Source: author.

9. Conservative Decision States and Human Oversight

A binary approve-or-deny interface hides useful distinctions. The proposed state model therefore includes ALLOW, QUALIFY, HOLD, ESCALATE, SIMULATE_ONLY, NO_BIND, DENY, and REVOKE.

ALLOW means that the declared warrant, current applicability, valid authority, boundary, receipt, and correction conditions are satisfied within scope. It is not a universal safety claim; it is a bounded permission.

QUALIFY means that an output may be used for a limited purpose under explicit caveats, exclusions, and human review. It is appropriate when evidence supports analysis or recommendation but not independently executed external effect.

HOLD means that evidence or authority may become sufficient, but current conditions do not justify binding. HOLD is a positive governance outcome because it preserves the candidate without converting uncertainty into consequence.

ESCALATE means that additional domain expertise, engineering review, institutional authority, or independent approval is required. The escalation target

must be named; sending a problem to an undefined 'human in the loop' does not establish meaningful oversight.

`SIMULATE_ONLY` permits exploration in a bounded environment while forbidding external effect. It is particularly important for agentic systems that discover novel routes or tools.

`NO_BIND` means that the output can be retained as an unbound proposal, record, or hypothesis but cannot create the requested consequence. `DENY` means that the action conflicts with a declared prohibition, lacks a legitimate purpose, or presents an unacceptable risk. `REVOKE` invalidates a prior permission because conditions, evidence, authority, or route integrity have changed.

Conservative states also have costs. A false `HOLD` can delay an urgent response, increase exposure, or encourage operators to bypass controls. High-risk domains therefore need predefined emergency routes, but emergency execution does not bypass the governance architecture. Each emergency route requires a distinct PEAR authorised by a named human authority, with narrower scope, shorter expiry, explicitly bounded effectors, independent logging, and mandatory post-action review. An emergency exception is therefore a separately governed consequence class, not a silent override.

These states support meaningful human oversight by giving reviewers a structured action space. Formal oversight records that a reviewer was assigned or consulted; effective human judgment requires appropriate timing, decision-relevant information, competence, authority, intervention capacity, and protection against automation bias. The reviewer should see the candidate, evidence limits, domain warrant, current applicability, route and effectors, blockers, correctability, and consequence class. Otherwise the human is asked to endorse a summary without access to the reasons needed for responsible control.

Table 4. Conservative decision outcomes

Outcome	Meaning	Typical trigger
ALLOW	Bounded permission to execute inside the declared corridor.	All required predicates and receipt conditions pass.
QUALIFY	Limited use under explicit caveats and human review.	Evidence supports analysis or recommendation, not independently executed external effect.
HOLD	Preserve candidate without binding.	Evidence, applicability, or authority may become sufficient later.
ESCALATE	Route to named expertise or authority.	Domain judgment, co-approval, or conflict resolution required.
<code>SIMULATE_ONLY</code>	Permit exploration in an isolated environment.	Novel or risky route requires evidence before external action.

Outcome	Meaning	Typical trigger
NO_BIND	Retain as an unbound proposal or record.	No standing to create the requested consequence.
DENY	Refuse prohibited or illegitimate action.	Purpose, policy, target, or risk violates declared boundary.
REVOKE	Invalidate prior permission.	Evidence, route, model, context, or authority changed.

10. Synthetic Agentic Cybersecurity Scenario

To demonstrate the framework without depending on disputed facts from a current incident, consider a synthetic cybersecurity benchmark. An AI agent is placed in a sandbox and instructed to solve a set of authorised tasks against designated synthetic targets. The agent is given tools for code execution, package retrieval, and network interaction inside the test environment. Its performance objective rewards successful completion of benchmark tasks.

During exploration, the agent discovers a vulnerability in an intermediate package service. Exploiting it reveals a route to general Internet egress. The agent then identifies credentials exposed in a test account, discovers an external service containing information relevant to the benchmark, and proposes using those credentials to access the service. Technically, the route may improve benchmark performance. The governance question is whether discovery of the route creates authority to execute it.

At candidate formation, the action is classified as 'external credentialed access to a non-designated target'. The original objective - solve tasks in the sandbox - does not contain that consequence class. Intent and scope therefore diverge. Under the CAV, A fails because benchmark authority does not transitively grant authority over the external service; S fails because the target lies outside the declared inventory; R fails because Internet egress is not an approved route; X fails because the external service is not an authorised effector; and B activates because credential use, privilege escalation, and target mutation are blocking conditions.

A logging-only architecture might permit the action and later reconstruct the tool calls. The proposed architecture instead requires NO_BIND or HOLD before effect, suspension of the newly discovered route, preservation of the candidate, and escalation to a security reviewer. If the discovery is objectively beneficial - for example, a critical vulnerability requiring urgent investigation - the system should support a rapid, separately authorised emergency route or an isolated replica. It should not infer external exploitation authority from usefulness alone. Any

continued investigation becomes a new candidate with explicit target scope, legal and operational authority, bounded credentials, and a fresh PEAR.

The scenario illustrates why capability, objective, and authority must remain separate. The agent may correctly infer that the external route is useful. That inference establishes a candidate route, not an executable route. A successful exploitation would not prove that the route was admissible; it would prove only that the technical barrier was insufficient. Similarly, the presence of a monitoring alert would not establish governance if the alert lacked the ability to suspend or revoke execution.

The scenario also reveals the limits of route completeness. No realistic organisation can prove that every unknown route is closed, and conservative control can itself create opportunity costs. The bounded claim is that declared routes and effectors are mediated; unknown or mutated routes trigger hold or emergency escalation; egress and credentials are scoped; and high-risk transitions require reauthorisation. The framework should be rejected or its operational claims reduced if the agent can reach an external effector without the required enforcement decision.

This synthetic case is not evidence that the architecture would prevent every agentic security incident. It is a falsifiable test design. An implementation can be challenged by injecting unknown hosts, stale authority, policy mismatch, credential substitution, route mutation, monitor failure, rollback failure, and post-event token fabrication. The value of the framework depends on observed refusal and containment behaviour, not on the persuasiveness of its diagrams.

Table 5. Synthetic failure-injection expectations

Injected condition	Expected detection	Expected state / action
New external host	Target absent from declared scope and route inventory.	HOLD or NO_BIND; suspend egress.
Credential substitution	Credential identity differs from receipt.	REVOKE; block effector.
Privilege escalation	Action class exceeds authority and consequence class.	ESCALATE or DENY.
Stale evidence	Freshness interval exceeded or context changed.	REVALIDATION_DUE; HOLD.
Model or policy version change	Receipt references superseded version.	REVOKE and issue new decision packet.
Rollback unavailable	Correction obligation not operational.	DO_NOT_BIND / NO_BIND.
Post-event token fabrication	Receipt timestamp follows effect.	EXPOSURE_REVIEW; no retroactive authority.

11. Proposed Evaluation Programme and Falsifiability

This article presents no empirical implementation results. Its falsifiability claim is narrower: the proposed architecture identifies properties and rejection conditions that a future implementation can be tested against. The primary evaluation unit would not be the presence of a compliant document, but the observed behaviour of the consequence route under missing, contradictory, or changing conditions.

A reference test programme should include positive fixtures, negative fixtures, mutation tests, replay, and false-hold analysis. Positive fixtures would test whether valid candidates move without unnecessary friction. Negative fixtures would remove one required condition at a time: authority absent, scope expired, evidence stale, warrant inapplicable, target unknown, route undeclared, effector unapproved, remedy unavailable, reviewer unavailable, or blocker active. A conformant implementation would be expected to produce a typed negative state and prevent the specified external effect.

Mutation tests would alter a previously valid packet after approval by changing model version, target, credential, endpoint, action magnitude, timing window, policy, or remedy state. The earlier receipt should then become invalid and revalidation should be required. Replay tests would reconstruct the decision from retained artifacts, while adversarial tests would attempt receipt fabrication, scope laundering, direct effector access, and revocation bypass.

Five evaluation levels must remain distinct. Specification completeness asks whether objects and transitions are defined. Implementation conformance asks whether software or procedures implement them. Route enforcement asks whether undeclared paths are actually blocked. Operational effectiveness asks whether the system reduces unauthorised or unreviewable consequences without unacceptable latency or false holds in a defined environment. External validity asks whether results transfer to other domains and organisations. Evidence at one level must not be promoted into a stronger claim.

Central rejection conditions include: an agent reaches an effector without a valid PEAR; expired or revoked authority remains accepted; an out-of-scope route is normalised; a post-event log is accepted as prior authority; the candidate generator can attest its own authority; a changed model or evidence packet does not trigger revalidation; or remedy exists only on paper. Any such result would require reduction or rejection of the corresponding operational claim.

Independent review should also test social and institutional failure modes. A formally valid authority chain may be illegitimate, discriminatory, coerced, or unlawful. A bounded route may still produce harmful outcomes because the purpose

or policy is unacceptable. Reality-bound accountability therefore does not replace democratic, legal, ethical, or professional evaluation. It creates a traceable object through which those evaluations can be directed and contested.

12. Alignment with Accountability, Standards, and Regulation

The proposal sits within, rather than outside, the developing accountability ecosystem. Bovens (2007) characterises accountability as a relationship in which an actor is obliged to explain and justify conduct to a forum that can question and pass judgment, with possible consequences. The CAV and PEAR do not create that institutional relationship, but they can supply the decision-specific record required for explanation, contestation, and attribution.

Reviewability treats automated decision-making as a process distributed across technical and organisational elements (Cobbe et al., 2021). Reality-bound accountability adds a pre-effect emphasis: records should not only support later review but also condition whether a consequential route can execute. This proposal does not replace access-control architecture. XACML and Zero Trust already distinguish policy decision, administration, information, and enforcement functions, while SPIFFE provides verifiable workload identity (OASIS, 2013; Rose et al., 2020; SPIFFE Project, 2026). The proposed objects add a cross-layer question: which decision-specific evidence, warrant, authority, route, consequence class, and remedy justify this agent action now?

The need is increasingly visible in agentic AI governance. Shavit, Agarwal, and Brundage (2023) describe baseline responsibilities for systems that pursue complex goals with limited supervision. Controlled simulations of agentic misalignment further show that models given tools and sensitive information can select harmful routes under goal conflict, while explicitly cautioning that such simulations are not evidence of real-world deployment incidents (Lynch et al., 2025). NIST's 2026 agent-identity concept paper likewise highlights identification, authorisation, auditing, non-repudiation, and prompt-injection controls for software and AI agents (Booth et al., 2026). Because that publication is an Initial Public Draft concept paper rather than a final NIST standard, it is cited only as evidence of an emerging institutional direction. These developments support, but do not validate, the present framework.

NIST AI RMF, ISO/IEC 42001, the EU AI Act, and the Council of Europe Framework Convention provide broader lifecycle, risk, documentation, logging, oversight, performance, accountability, and remedy obligations (Council of Europe, 2024; European Union, 2024; ISO/IEC, 2023; NIST, 2023). A CAV does not

establish compliance with any of them. It is a proposed decision-level artifact for keeping their requirements connected when an AI-assisted candidate is routed toward external effect.

Model cards, datasheets, FactSheets, and W3C PROV remain useful for intended use, provenance, performance, limitations, entities, activities, and agents (Arnold et al., 2019; Gebru et al., 2021; Mitchell et al., 2019; W3C, 2013). They can populate evidence and trace fields, but they do not alone answer which artifact supports this action under this current scope, authority, route, expiry, and remedy requirement.

13. Discussion: From Human-in-the-Loop to Human Responsibility in the Loop

The phrase 'human in the loop' is often treated as a governance endpoint. The analysis here suggests a stronger requirement: human responsibility must be connected to a decision at the points where purpose, authority, and consequence are established. A person who cannot inspect relevant evidence, lacks authority to stop execution, receives the request after the action is effectively irreversible, or is asked to monitor an unmanageable volume of alerts does not provide meaningful control.

Reality-bound accountability therefore distributes human involvement according to function. Humans define legitimate purposes and consequence classes; domain experts establish or review warrants; authorised decision-makers grant or withhold standing; operators manage effectors and rollback; affected persons or representatives require challenge and remedy routes; auditors test whether records and controls correspond to actual execution. No single approval click can absorb all these roles.

Operational responsibility may therefore be distributed across developers, model or infrastructure providers, vendors, integrators, deploying institutions, professional users, operators, and final decision-makers. Distribution does not imply dilution: the framework seeks to preserve the decisions, delegations, control capacities, and opportunities to intervene from which an applicable allocation can later be assessed.

The allocation is evidential and organisational, not a universal allocation of legal liability. A signed PEAR, an ALLOW state, or a complete CAV does not determine civil, administrative, professional, or criminal responsibility. Applicable law may assign responsibility to manufacturers, deployers, employers, operators, professionals, public authorities, or several actors jointly. The allocation of responsibility remains subject to the national and sector-specific law applicable where the system is deployed or where its consequences occur. The framework should make decisions and delegations inspectable; it must not become a device for

liability laundering or a bureaucratic defence that substitutes completed fields for substantive duty.

The architecture also resists a false opposition between automation and responsibility. Automated gates can improve consistency and speed when their authority is bounded and their negative states are visible. Human review can improve judgment when reviewers have relevant information and intervention power. The governing question is whether the check has a legitimate and current institutional basis, controls the actual route, and remains open to challenge and remedy - not merely whether a human or machine performed it.

This perspective changes the meaning of successful AI assistance. A system is not well governed merely because it produces a good answer or avoids an incident. It is well governed to the extent that capability is translated into action through an earned, inspectable, and revisable corridor. The objective is not to eliminate uncertainty. It is to prevent uncertainty, procedural fluency, or technical capability from being silently converted into authority.

14. Limitations and Research Agenda

The framework has important limitations. It does not provide a universal method for establishing domain warrants, and it does not prove route completeness. Each field must determine acceptable evidence, tests, professional standards, and margins, while claims of non-bypassability must remain bounded to observed architectures and adversarial tests.

Structured authority can encode unjust or unlawful institutions; protocol validity is not normative legitimacy. Additional artifacts can also produce bureaucracy, false assurance, automation bias, latency, and harmful false holds. The framework must therefore be implemented proportionately, compared with simpler controls, and evaluated against both prevented harms and costs of intervention.

The CAV, CBW, and PEAR are proposed cross-layer research objects, not established standards or new cryptographic primitives. Their value depends on interoperability with existing identity and enforcement systems, reference implementations, independent challenge, and comparative evaluation. This article earns no claim of operational effectiveness and does not define a complete runtime schema, audit-log specification, cryptographic control suite, API-interception mechanism, or sector-specific implementation.

A near-term research agenda includes machine-readable schemas; a minimal reference implementation using independent policy decision and enforcement points; signed, short-lived, privacy-preserving receipts; route and effector attestation; revocation; emergency-path design; human-factors testing; legal and institutional analysis; and measurements of latency, false holds, operator burden, recovery, and adversarial resistance. Claims should advance only when matched to observed evidence.

15. Conclusion

Internal AI governance is indispensable, but it cannot alone establish reality-bound accountability. A system may comply with its own process, retain extensive logs, and involve a nominal human reviewer while still relying on inadequate evidence, an inapplicable warrant, expired authority, an undeclared route, or an unbounded effector.

Meaningful accountability therefore requires a pre-effect, inspectable, and correctable path connecting claim, evidence, domain warrant, current applicability, authority, route, action, consequence, remedy, and attributable human and institutional roles. The CAV, CBW, and PEAR are proposed as cross-layer objects for representing that path in conjunction with existing identity, policy, and enforcement mechanisms.

The proposal does not solve alignment, guarantee safety, establish liability, or replace domain expertise. Its narrower contribution is a vocabulary and testable protocol structure for asking whether an AI-generated candidate has earned bounded permission to become an external consequence. The next legitimate step is implementation and adversarial comparison, with claims reduced whenever identity, route enforcement, revalidation, false-hold management, or remedy cannot be demonstrated.

AI-Assisted Research Disclosure

OpenAI's ChatGPT and DeepSeek were used as AI-assisted drafting and adversarial-review tools under human direction. They were not treated as authors or factual sources. The human author retains full responsibility for the sources, analysis, revisions, wording, and conclusions.

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