ORGANOID INTELLIGENCE LAW
Legal Frameworks for Biological Computing and Neuro-Ethical Governance

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INTRODUCTION

The emergence of organoid intelligence represents a paradigm shift in computational architecture, transitioning from silicon-based processing to biologically derived neural networks. Three-dimensional human brain organoids, cultivated from induced pluripotent stem cells, demonstrate emergent electrophysiological activity, synaptic plasticity, and adaptive learning capabilities that fundamentally challenge conventional distinctions between biological tissue and computational hardware. These systems process information through electrochemical signaling, self-organize into functional circuitry, and exhibit memory-like retention mechanisms that mirror foundational cognitive processes.

Consider a hypothetical scenario: a Tier Three organoid system deployed in a pharmaceutical research facility undergoes an unforeseen metabolic cascade, resulting in the generation of a novel neurotoxic computational output that contaminates the facility's automated synthesis pipeline. Under traditional product liability, the manufacturer is shielded by the self-modifying nature of the biological network, while the research institution claims the output was an emergent property beyond predictive modeling. Without a specialized legal framework, the injured parties face a jurisdictional void, and the biological entity itself exists in an ontological limbo.

This volume anticipates developments projected through Q1 2026 based on current trajectories. The scientific advancement has outpaced legal architecture, creating a critical governance vacuum where traditional property law, intellectual property regimes, liability frameworks, and ethical guidelines prove structurally inadequate for biological computing environments.

This volume establishes the first comprehensive theoretical, legal, ethical, and regulatory framework for organoid intelligence governance. By integrating developmental neuroscience, bioethics, constitutional jurisprudence, intellectual property theory, and institutional policy design, the text constructs a coherent architecture that addresses ontological classification, donor rights, cognitive liberty, liability allocation, and democratic oversight. The central thesis is that sustainable organoid intelligence deployment requires legal frameworks that recognize biological computation as a distinct juridical category, balancing scientific innovation with rigorous ethical boundaries, transparent accountability mechanisms, and enforceable neuro-rights protections.

The methodological approach combines doctrinal legal analysis, comparative regulatory assessment, ethical threshold modeling, and policy implementation pathways. Each chapter develops foundational principles, derives operational standards, translates scientific realities into legally enforceable norms, and establishes compliance architectures adaptable to rapid neurobiological advancement. The framework examines how informed consent must evolve to encompass neural data extraction and cognitive pattern utilization, how intellectual property frameworks can protect computational outputs without commodifying biological cognition, how liability must adapt to self-modifying neural architectures, and how constitutional safeguards must preemptively secure cognitive liberty and psychological continuity. This volume is designed for neuroscientists, legal scholars, bioethicists, regulatory authorities, institutional review boards, and technology policymakers who recognize that proactive governance is essential for responsible biological computing integration.

As organoid intelligence transitions from laboratory experimentation to commercial and institutional deployment, the cost of regulatory latency, ethical ambiguity, and rights fragmentation rises exponentially. Biological computing architecture demands legal frameworks that are scientifically literate, ethically grounded, and institutionally enforceable. This volume provides the foundational architecture for that transition, establishing the theoretical parameters, legal innovations, compliance protocols, and governance structures necessary to ensure that organoid intelligence advances human knowledge while preserving dignity, autonomy, and democratic accountability.

LIMITATIONS AND JURISDICTIONAL SCOPE

This framework is proposed as model law intended for legislative adoption, regulatory reference, and academic discourse. It does not override existing national bioethics statutes, medical device regulations, or data protection laws unless explicitly incorporated into domestic legal codes by competent legislative bodies. Jurisdictional application remains subject to constitutional hierarchy, international treaty obligations, and established principles of regulatory subsidiarity. The provisions herein function as a harmonized baseline designed to guide policymakers, judicial authorities, and institutional ethics committees toward coherent governance of biological computing systems.

KEY DEFINITIONS

Organoid Intelligence

A computational paradigm utilizing three-dimensional human brain organoids cultivated from induced pluripotent stem cells, capable of electrophysiological signaling, synaptic adaptation, and information processing without artificial neural network simulation.

Neuro-Rights

A category of fundamental legal protections guaranteeing cognitive autonomy, mental privacy, psychological continuity, and freedom from unauthorized neural data extraction or cognitive pattern replication.

Cognitive Pattern
A reproducible sequence of neural firing, synaptic weight configuration, or emergent computational output generated by an organoid system, capable of predictive modeling or algorithmic optimization.

Donor
The natural person from whom somatic cells or induced pluripotent stem cells are lawfully obtained for the purpose of cultivating brain organoids, retaining statutory rights over biological lineage and neural data sovereignty. The use of human embryonic cells for purely commercial biological computing is strictly prohibited. Legal representatives of minors or incapacitated persons may act as donors only under judicial authorization and with independent ethics board approval.

Biological Computation
Information processing executed through living neural tissue metabolism, electrochemical signal transmission, and activity-dependent plasticity, distinct from digital or quantum computational substrates.

Sui Generis Rights
A special category of legal protections recognizing donor contribution to biological computation, distinct from property, patent, or privacy rights, entitling the donor to statutory benefit sharing and veto power over specific applications.

CHAPTER ONE
Ontological Classification and Legal Personhood Boundaries

Section One
Defining Organoid Intelligence: From Stem Cells to Functional Neural Networks

The biological architecture of cerebral organoids is examined through the differentiation pathways of induced pluripotent stem cells into structured neural tissue capable of electrophysiological signaling and adaptive learning. Developmental trajectories, synaptic maturation pathways, and network synchronization mechanisms that enable computational functionality are mapped. The scientific baseline for organoid intelligence is established, distinguishing biological computation from artificial neural networks and demonstrating why traditional legal categories fail to capture the hybrid nature of living computational systems.

Section Two
Legal Personhood, Biological Agency, and Ontological Classification

Traditional jurisprudence categorizes entities as persons, property, or instruments. Organoid intelligence disrupts this taxonomy by exhibiting adaptive behavior without consciousness, processing capability without intentionality, and biological autonomy without moral agency. The

framework formalizes a graduated ontological classification that categorizes organoid systems based on functional complexity, neural integration density, and adaptive responsiveness. The classification tiers are defined as follows:

Tier One Research Organoids exhibit baseline electrophysiological activity, limited synaptic density, and no measurable learning retention. Subject to standard laboratory oversight and informed tissue donation protocols.

Tier Two Computational Organoids demonstrate structured network synchronization, adaptive weight modification, and reproducible problem-solving outputs. Subject to licensing requirements, safety certification, and commercial transparency mandates.

Tier Three High-Integration Organoids display advanced cortical layering, cross-regional connectivity, and emergent behavioral patterns exceeding 10^7 active synapses, or demonstrating cross-regional gamma-band synchronization sustained for periods greater than sixty seconds, or exhibiting the functional capacity to distinguish between nociceptive and non-nociceptive stimuli through adaptive, non-reflexive behavioral modulation. Subject to continuous ethical monitoring, mandatory decommissioning protocols upon sentience indicators, and restricted deployment authorization.

Legal recognition thresholds prevent anthropomorphization while acknowledging biological distinctiveness, establishing operational categories for research, commercial, and institutional contexts.

Section Three
Neuro-Ethical Thresholds: Consciousness, Sentience, and Moral Status

The ethical deployment of organoid intelligence requires clear boundaries regarding cognitive emergence. Neurophysiological markers of sentience, including integrated information theory metrics, nociceptive response pathways, and higher-order network synchronization, are analyzed. The framework establishes ethical monitoring protocols that detect emergent pain perception or self-referential processing, deriving intervention thresholds that mandate experimental modification or system decommission when moral status boundaries are approached. Precautionary ethical frameworks prevent unintended cognitive harm while preserving scientific inquiry.

Section Four
Cross-Disciplinary Epistemology and Jurisprudential Adaptation

Biological computing demands legal systems that integrate scientific literacy with normative governance. Jurisprudential theory evolution is examined to accommodate living computational architectures, analyzing how property law, contract theory, and tort frameworks require structural modification. Interdisciplinary translation protocols are developed to enable legal practitioners, scientists, and ethicists to establish shared terminology, operational standards,

and compliance verification mechanisms, ensuring that regulatory frameworks remain scientifically accurate and legally enforceable.

CHAPTER TWO
Intellectual Property, Data Sovereignty, and Donor Rights

Section One
Intellectual Property Frameworks for Biologically Derived Computational Outputs

Organoid intelligence generates novel computational patterns, optimization algorithms, and adaptive problem-solving sequences that challenge traditional patent and copyright regimes. Intellectual property allocation models are analyzed to distinguish between donor-derived biological material, researcher-engineered cultivation protocols, and emergent computational outputs. Ownership frameworks are derived to prevent biological commodification while incentivizing innovation, establishing licensing architectures that ensure equitable benefit sharing across donors, developers, and institutional partners. Monetary compensation to donors shall not constitute the sale of biological material, but rather the statutory recognition of intellectual and biological contribution under sui generis rights. Benefit-sharing obligations regarding commercial profits derived from specific cognitive patterns shall persist for the entire commercial lifespan of the product utilizing said patterns, ensuring that donors share in the long-term value created by their biological contribution and preventing unjust enrichment by commercial entities. Administrative reporting requirements may be simplified after thirty-six months post-deployment, provided an independent audit confirms continued compliance.

Section Two
The Inalienability of Cognitive Identity and Donor Benefit Sharing

The fundamental premise of this framework is that a donor does not sell their mind, but rather grants a limited, revocable license for the utilization of a biological micro-model derived from their cellular lineage. Cognitive identity remains inalienable. While the computational outputs generated by the organoid may be subject to intellectual property protections, the underlying biological signature and the moral rights associated with the donor's neural topology cannot be permanently alienated, transferred, or subjected to moral rights waivers. This ensures that the commercialization of organoid intelligence never crosses into the commodification of human consciousness or identity.

Section Three
Donor Privacy, Genetic Data Extraction, and Neural Information Protection

Human-derived organoids contain genetic, epigenetic, and potentially neural signature data that can reveal sensitive health information, predispositions, and biological lineage. Data sovereignty frameworks are formalized to mandate informed consent for neural pattern utilization, establish cryptographic anonymization protocols for organoid-derived datasets, and develop usage limitation mandates that prevent unauthorized secondary exploitation. Privacy-preserving

cultivation techniques and data minimization standards protect donor identity while enabling legitimate research advancement.

Section Four
Ownership of Emergent Cognitive Architectures and Self-Organizing Patterns

Organoid networks self-organize into computational architectures that cannot be fully predicted or reverse-engineered. Ownership principles are formalized to address emergent neural configurations, establishing criteria for institutional stewardship, open-access licensing, and commercial utilization rights. Attribution frameworks are developed to recognize biological contribution, computational emergence, and institutional investment, ensuring that intellectual property recognition aligns with ethical boundaries and scientific transparency requirements.

Section Five
Commercialization Boundaries and Anti-Exploitation Safeguards

The transition from research to commercial application requires enforceable ethical constraints. Market deployment pathways are analyzed to prevent biological tissue commodification, establish pricing transparency mandates for organoid-derived computational services, and develop anti-monopoly protocols that prevent corporate capture of neural computing infrastructure. Regulatory oversight, public interest licensing, and ethical commercialization guidelines ensure that organoid intelligence serves broad societal benefit rather than narrow profit extraction.

CHAPTER THREE
Liability, Accountability, and Error Attribution in Biological Systems

Section One
Failure Modes in Organoid Computing: Biological Degradation vs. Computational Error

Biological computing systems experience degradation through cellular senescence, metabolic depletion, and neural network desynchronization, complicating traditional error attribution models. Failure classification frameworks are formalized to distinguish between biological decay, cultivation error, algorithmic misalignment, and environmental stress. Diagnostic protocols are derived to identify root causes, establish maintenance accountability chains, and develop compensation mechanisms that address harm without imposing disproportionate liability on research institutions.

Section Two
Liability Allocation Across Researchers, Manufacturers, and End-Users

Organoid intelligence deployment involves complex value chains spanning tissue sourcing, cultivation engineering, computational integration, and operational deployment. Liability distribution models are formalized to allocate responsibility based on control capacity, technical

expertise, and contractual obligation. Fault determination criteria are established, insurance architectures for biological computing operations are developed, and proportional accountability frameworks are demonstrated to encourage innovation while maintaining safety standards and victim redress.

Section Three
Regulatory Standards for Biological Computing Validation and Safety Certification

Safe deployment requires standardized testing and certification. Regulatory frameworks are developed to mandate electrophysiological stability testing, metabolic sustainability verification, and computational output reliability assessment before operational deployment. Independent certification bodies are established, audit protocols for biological computing facilities are developed, and compliance verification mechanisms ensure that organoid systems meet safety, ethical, and performance benchmarks without stifling scientific progress.

Section Four
Adaptive Accountability Models and Collective Compensation Funds

Organoid networks continuously adapt, modify synaptic weights, and restructure computational pathways based on environmental input. Accountability architectures are formalized to accommodate dynamic system evolution, establishing version control protocols for neural configurations, change documentation mandates, and impact assessment requirements for significant architectural modifications. Developer liability persists for thirty-six months post-deployment for autonomous modifications, unless an independent audit certifies the architecture as a contained learning environment. To address the residual risks of autonomous self-evolution beyond the initial developer liability period, all commercial operators of Tier Two and Tier Three organoid systems must contribute to an industry-wide Collective Compensation Fund. This fund, modeled after nuclear and environmental liability pools, shall provide guaranteed victim redress for damages caused by emergent, unpredicted biological computations post-deployment, ensuring that innovation is not stifled by unquantifiable long-term liability while maintaining absolute safety standards.

Section Five
End-of-Life Protocols and Ethical Decommissioning

The termination of an organoid intelligence system, whether due to experimental conclusion, biological degradation, or ethical threshold breach, requires strict procedural governance. Decommissioning is not merely a technical cessation but an ethical event. Protocols mandate that prior to the metabolic termination of Tier Three systems, a comprehensive data backup of the cognitive architecture must be secured in an encrypted, non-operational state for institutional memory and audit purposes. The biological termination itself must be executed through painless metabolic depletion, avoiding nociceptive stimulation. For systems that have exhibited prolonged adaptive learning, operators are required to observe a formal decommissioning protocol that acknowledges the biological contribution of the system,

reinforcing the normative boundary between computational hardware and living biological entities.

CHAPTER FOUR
Constitutional Neuro-Rights, Cognitive Liberty, and Democratic Oversight

Section One
Foundational Neuro-Rights: Cognitive Liberty, Mental Privacy, and Psychological Continuity

Biological computing introduces unprecedented risks to cognitive autonomy and mental integrity. Constitutional neuro-rights are formalized to protect individuals from unauthorized neural data extraction, cognitive pattern replication, and psychological manipulation through organoid-derived systems. This right extends to the donor and to any natural person whose behavioral patterns are predictively modeled by the organoid. Legal prohibitions are established against non-consensual neural modeling, mental privacy safeguards for donor-derived information are developed, and cognitive liberty protections are demonstrated to preserve individual autonomy in the age of biological computation.

Section Two
Prohibitions on Unauthorized Cognitive Extraction and Neural Data Commodification

The extraction, replication, and commercialization of neural patterns require strict ethical boundaries. Except in cases of acute neurological emergency where neural pattern analysis of the organoid is required to save the donor's life, and where prior consent or judicial authorization cannot be obtained, provided that independent ethics board ratification and ex-post judicial review occur within twenty-four hours post-procedure, all utilization mandates explicit consent. The reduction from seventy-two to twenty-four hours reflects the rapid molecular and epigenetic volatility of living neural tissue, ensuring that emergency interventions do not result in prolonged unauthorized biological exploitation. Legal frameworks formalize usage limitation statutes that prevent unauthorized replication, and develop enforcement mechanisms that penalize illicit neural data trading. Transparency mandates, audit trails, and donor notification requirements prevent exploitation while enabling legitimate scientific advancement.

Section Three
Public Oversight Mechanisms, Transparency Mandates, and Democratic Authorization

Biological computing governance requires democratic legitimacy and public accountability. Oversight architectures are designed to establish independent bioethics review boards, mandate public reporting on organoid intelligence deployment, and develop participatory authorization mechanisms for high-impact research initiatives. Transparency standards for funding sources, ethical review outcomes, and commercial deployment approvals ensure that biological computing advancement remains subject to democratic scrutiny and public interest alignment.

Section Four
International Harmonization and Cross-Border Biological Computing Governance

Organoid intelligence research and deployment operate across jurisdictional boundaries, requiring coordinated regulatory frameworks. Treaty architectures are examined to establish mutual recognition of ethical standards, develop interoperable compliance protocols for cross-border tissue transfer and data sharing, and design harmonization mechanisms that preserve national sovereignty while ensuring global safety benchmarks. Conflict resolution pathways, regulatory divergence management, and multilateral cooperation frameworks are addressed for responsible biological computing advancement.

CHAPTER FIVE
Implementation Pathways, Regulatory Sandboxes, and Future Trajectories

Section One
Phased Deployment Frameworks and Ethical Boundary Enforcement

Transitioning from laboratory research to institutional deployment requires structured implementation pathways. Regulatory sandbox architectures are designed to enable controlled experimentation with organoid intelligence systems under supervised conditions. Participant selection criteria, risk containment protocols, performance evaluation metrics, and ethical boundary enforcement mechanisms are established to accelerate safe adoption while preventing systemic harm or rights violation. Regulatory authorities retain unilateral authority to issue an emergency decommissioning order for any sandbox experiment within four hours during the operational business hours of the facility, not exceeding twelve hours total, upon detecting an ethical threshold breach, without prior judicial review.

Section Two
Institutional Capacity Building, Operator Certification, and Compliance Architecture

Effective governance requires specialized institutional capabilities. Workforce development programs are examined to train regulatory authorities in neurobiological fundamentals. Crucially, the operation of Tier Two and Tier Three organoid systems is restricted to certified professionals. A mandatory Bio-Computational Safety Certification program is established, requiring operators to demonstrate proficiency in both neurobiological maintenance and algorithmic risk mitigation. Interdisciplinary advisory structures that integrate scientific, legal, and ethical expertise are established, and continuous compliance monitoring frameworks are designed to adapt to rapid technological advancement. Governance templates for biological computing authorities, independent oversight commissions, and ethical review protocols are provided to ensure professional competence and institutional accountability.

Section Three

Long-Term Trajectories: Synthetic Consciousness, Interspecies Ethical Alignment, and Post-Biological Jurisprudence

The future trajectory of organoid intelligence may approach complex cognitive architectures that challenge traditional ethical and legal boundaries. Long-term scenarios are explored, including enhanced neural integration, cross-species biological computing, and potential emergence of proto-conscious states. Constitutional adaptation protocols, ethical boundary escalation mechanisms, and jurisprudential evolution frameworks are developed to ensure legal systems remain responsive to cognitive advancement while preserving fundamental human dignity and ecological integrity.

Section Four
Living Review Mechanisms, Adaptive Constitutional Evolution, and Democratic Stewardship

Biological computing governance requires continuous refinement and democratic oversight. Living review architectures are established to mandate periodic ethical reassessment, scientific validation updates, and regulatory alignment calibration. Participatory amendment procedures, transparent policy revision protocols, and democratic stewardship frameworks are developed to ensure organoid intelligence governance evolves responsibly, maintains constitutional alignment, and serves enduring human flourishing across technological epochs.

CONCLUSION
Toward Ethically Grounded, Legally Coherent, and Scientifically Informed Biological Computing

The emergence of organoid intelligence represents a transformative advancement in computational architecture that demands proactive, rigorous, and ethically grounded legal governance. By establishing ontological classification frameworks, donor rights protections, liability allocation models, neuro-rights constitutional safeguards, and adaptive oversight mechanisms, this reference provides the first comprehensive theoretical, legal, and regulatory architecture for biological computing governance. The doctrinal analysis, ethical threshold modeling, compliance protocols, and implementation pathways presented herein offer a coherent roadmap from laboratory innovation to responsible institutional deployment.

Organoid intelligence law is not a constraint on scientific progress, but a foundational architecture that ensures biological computing advancement remains aligned with human dignity, cognitive liberty, and democratic accountability. The frameworks developed in this volume are necessarily evolving, subject to empirical validation, neuroscientific refinement, and normative development. Yet they provide a rigorous starting point for interdisciplinary collaboration, responsible innovation, and systematic legal modernization in an era where biological and computational boundaries increasingly intersect.

This volume recommends the immediate formation of a United Nations Special Rapporteur on Neuro-Rights and the drafting of a Non-Binding International Charter on Biological Computing by 2027, serving as a foundational precursor to a binding International Convention on Biological

Computing by 2028. The Special Rapporteur shall have investigative powers, authority to request state reports, and mandate to draft binding technical standards in consultation with WHO and WIPO. Such institutional mechanisms will establish binding global standards, coordinate cross-jurisdictional oversight, and ensure that the development of organoid intelligence proceeds within democratically mandated ethical boundaries.

The development and deployment of organoid intelligence systems demand sustained commitment from research institutions, regulatory authorities, bioethics commissions, legal practitioners, and democratic societies. It requires investment in oversight infrastructure, training of interdisciplinary expertise, continuous ethical reflection, and inclusive deliberation about the boundaries of biological computation. The returns, however, are transformative: accelerated scientific discovery, protected donor rights, preventable ethical violations, transparent commercial deployment, and institutional frameworks capable of navigating cognitive complexity while preserving fundamental human values.

This volume aims to serve as both foundation and catalyst for that endeavor. By providing theoretical coherence, legal blueprints, compliance architectures, ethical safeguards, and democratic oversight mechanisms, it offers a comprehensive pathway toward biological computing governance that operates responsibly, functions transparently, and serves enduringly the scientific, ethical, and democratic aspirations of human civilization. The future of organoid intelligence lies not in unregulated experimentation, but in ethically bounded innovation; not in biological commodification, but in dignity-preserving advancement; not in isolated scientific pursuit, but in democratically accountable, legally coherent, and scientifically informed biological computation.

KEYWORD INDEX

Digital editions support full-text search. Keyword indexing provided for conceptual reference.

Adaptive accountability models and self-modifying neural architectures
Biological degradation classification and computational error attribution
Biological computing validation and safety certification protocols
Cognitive liberty protections and mental privacy safeguards
Commercialization boundaries and anti-exploitation frameworks
Constitutional neuro-rights and psychological continuity guarantees
Cross-border governance harmonization and international treaty frameworks
Data sovereignty mandates and neural information protection protocols
Democratic oversight mechanisms and public transparency standards
Donor privacy frameworks and genetic data anonymization standards
Electrophysiological stability testing and metabolic sustainability verification
Emergency decommissioning orders and sandbox enforcement
End-of-life protocols and ethical decommissioning
Ethical boundary enforcement and phased deployment architectures
Failure mode analysis and liability allocation distribution

Independent bioethics review boards and interdisciplinary advisory structures
Informed consent evolution and neural pattern utilization mandates
Intellectual property allocation for biologically derived outputs
Jurisdictional scope and model law limitations
Key definitions and statutory terminology
Living review mechanisms and adaptive constitutional evolution
Neuro-ethical threshold monitoring and sentience detection protocols
Ontological classification frameworks and biological agency recognition
Operator certification and bio-computational safety
Participatory authorization mechanisms and democratic stewardship protocols
Precautionary ethical frameworks and cognitive emergence boundaries
Regulatory sandbox architectures and controlled experimentation pathways
Self-organizing neural architecture ownership and attribution models
Sui generis rights and donor benefit sharing
Synthetic consciousness trajectories and post-biological jurisprudence adaptation
Transparent commercialization guidelines and public interest licensing
Usage limitation statutes and unauthorized cognitive extraction prohibitions

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PRACTICAL APPENDICES

Appendix A: Model Organoid Donation and Sui Generis Rights Contract
This model contract establishes the baseline for lawful tissue acquisition. It explicitly separates the donation of somatic cells from the intellectual property rights of emergent computational outputs. The contract includes a Sui Generis Royalty Clause, ensuring the donor receives a defined percentage of net commercial profits derived from cognitive patterns originating from their cellular lineage, persisting for the commercial lifespan of the product. It also includes an Inalienability Clause, stating that the donor's cognitive identity and moral rights over their biological signature cannot be waived, sold, or transferred under any circumstances.

Appendix B: Institutional Review Board Checklist for Organoid Intelligence

This checklist provides a standardized evaluation tool for ethics committees. It includes metrics for assessing the Technology Readiness Level of the organoid system, verifying the Tier classification (One, Two, or Three), evaluating the metabolic sustainability and pain-mitigation protocols, confirming the informed consent documentation for neural data utilization, and ensuring the presence of a certified Bio-Computational Safety Operator. It also mandates the verification of the End-of-Life Decommissioning Protocol prior to experimental approval.

Appendix C: Model Statute for National Biological Computing Governance
This draft statute is designed for direct adoption by national legislatures. It defines the legal status of organoid intelligence, establishes the national regulatory authority for biological computing, codifies the neuro-rights of donors and predictive subjects, outlines the liability framework including the mandatory contribution to the Collective Compensation Fund, and sets the penal codes for unauthorized cognitive extraction and illicit neural data trading. It serves as a plug-and-play legislative template to harmonize domestic laws with international bio-digital standards.

AUTHOR INFORMATION

Mohamed Kamal Arafa Elrakhawi is a distinguished legal researcher, international consultant, and scholar specializing in the intersection of law, economics, technology, and philosophy. He holds advanced degrees in law and political science, and has served as a lecturer and advisor to governmental and international organizations on matters of economic regulation, commercial arbitration, and digital governance. His research focuses on developing adaptive legal frameworks for emerging technologies, with particular emphasis on artificial intelligence, blockchain systems, bioethical jurisprudence, and the ethical implications of algorithmic decision-making. Dr. Elrakhawi is committed to fostering interdisciplinary dialogue and has published extensively in both Arabic and English on topics ranging from constitutional law to the philosophy of information. He continues to contribute to global efforts toward responsible innovation, equitable technological development, and the formalization of computational and biological governance standards.

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