

Non-human Rights and Posthuman Governance: How Speculative Design Simulate the Dwelling Politics of 'Cross-species symbiosis lives'?

Wenjia Sun

Department of Philosophy, Chung Cheng University, Chiayi, Taiwan

Wenjia-sun@hotmail.com

Abstract

This paper examines the interplay between non-human rights and posthuman governance, delving into how Speculative Design practice of Legislative Fictioneering and symbiotic scenario-building enables us to provotype alternative social contracts and the dwelling politics of 'cross-species symbiosis lives.' Within the framework of deconstructing of technological determinism, the proposed project, 'Cross-species Symbiosis Lives' employs provotypes to augment tangible Legislative Fictioneering, material science, and embedded governance approaches that acknowledge non-human agency and legal personhood position from a futurological perspective. Notably, the paper critically analyzes the neoliberal tendencies within Speculative Design, which tend to privatize legal imagination and reduce systemic justice to mere design challenges. The conclusion underscores the imperative for Speculative Design to confront its neoliberal complicity and transition towards ethical and epistemological infrastructures that support multispecies sustainability. Due to word count constraints, this paper only excerpts two chapters from the original paper.

Keywords: *Non-human rights, Posthuman governance, Cross-species symbiosis, Legislative fictioneering*

1 Introduction

Cross-species symbiosis lives denotes materially entangled, reciprocally constitutive modes of existence wherein biologically distinct organisms (e.g., humans, microbes, plants, animals) co-evolve through sustained intimate relationships mutualistic, commensal, or parasitic that fundamentally reorganize the lifeworlds, agencies, and vulnerabilities of all involved actors. The definition expands to encompass gene-edited chimeric entities, synthetic organisms and multispecies hybrids engineered through CRISPR-Cas9 and other biotechnologies, whose very genomes materialize symbiotic entanglement at the molecular level, destabilizing the ontological boundaries between 'natural' and 'artificial' co-evolution. The emergent 'symbiotic spectrum'¹ from microbial holobionts to CRISPR hybrids reveals that all life is fundamentally co-constituted through horizontal gene transfer, epigenetic interplay, and synthetic biology, rendering anthropocentric distinctions between species obsolete to a reality demanding transversal posthuman governance models attuned to radical interdependence.

The failure of traditional governance nowadays stems from epistemic fallacies embedded in Enlightenment legal thought. There exists a neglect in regard to political philosophy and an

exploration into the boundaries of political ecology. Its Cartesian spatial imaginary presupposes static boundaries between nature/culture, a fiction demolished by Fukushima(2022)'s radioisotopes that disregard human zoning laws through biotic incorporation.² The temporal linearity assumption crumbles when confronted with fungal timescales, where mycelial networks make 'decisions' across centuries rendering 'electoral' cycles biologically nonsensical. Most catastrophically, modern law's agency singularity, the belief only humans enact governance is refuted by Chernobyl's exclusion zone where radiation enforces de facto conservation policies more effectively than IUCN treaties.³ These failures reveal legislation as a failed monologue rather than the multispecies dialogue required in the Anthropocene. Posthuman governance requires embracing productive contamination as a design principle rather than failure mode.

The Anthropocene thus emerges not as an age of human dominion, but as the epoch where symbiosis becomes the minimal unit of political-ecological engagement. The radical reconceptualization of rights in the Anthropocene necessitates what Maria Puig de la Bellacasa(2017) terms 'speculative ethics'⁴, which is a mode of thinking that extends moral consideration beyond human exceptionalism into the messy terrain of more-than-human relationships. This paper interrogates how the framework of Matters of Care might inform emergent discourses on non-human rights, particularly in developing posthuman social governance models that account for symbiotic vulnerabilities. The 2018 Whanganui River legal personhood case in New Zealand⁵, where an ecosystem gained rights equivalent to a human being exemplifies this paradigm shift, revealing how Western jurisprudence struggles to reconcile Enlightenment concepts of rights with Indigenous cosmologies that never separated taonga (treasures) into animate/ inanimate categories.

2 Legislative Fictioneering for Decentering Anthropocentrism

2.1 Contaminated Diversity and Legal Personhood for Multispecies Assemblages

The photographic compendium 'A Bestiary of the Anthropocene'⁶(2025) systematically documents hybrid entities that embody the irreversibly enforced entanglement between biological and technological systems. These are not metaphorical constructs but materially verified taxonomic presentation of 'monsters' including plastic blobs (molten plastic-rock composites), radiation-sensitive fungi, and algorithmically reproduced pigeons, these speculative taxonomy shows how Anthropocene symbioses operate through asymmetric cooperation, in which organisms adapt to technological conditions where they cannot interact with each other. Contemporary symbiotic relationships are fundamentally non-consensual, and that biological life forms are forced to negotiate survival in human-altered ecosystems. The book challenges anthropocentric notions of intentionality by showing how agency is dispersed across groups. Bacteria *Oleophaga bokumensis* that feed on petroleum, now sustain the petrochemical economy through their metabolic processes, becoming unwilling participants in energy systems. Hybrid entities compress evolutionary and technological timescales. Coral skeletons preserve microplastics in their growth rings, creating a geological record of human production cycles, while archaea that inhabit lithium batteries repurpose ancient extremophile adaptations to cope with contemporary waste. The book concludes that these hybrids represent not anomalies but a new baseline for planetary life. This necessarily requires us to move beyond conservationist ethics to a 'compost politics'(Abrahamsson, 2014)⁷ that actively

maintaining multispecies survival in human material flows. Its imperative is to manage compulsory symbiotic relationships rather than to attempt to restore pre-human conditions.

'Arts of Living on a Damaged Planet: Ghosts and Monsters of the Anthropocene'(Tsing,2016)⁸ also fundamentally exposing the juridical uncanny in multispecies Worlds and their ontological blindness to symbiotic relationality. These toxic agency, which is a legislative crisis where pollutants actively participate in governance by altering biotic behavior beyond human prediction or control. This epistemic rupture demands a radical reorientation of juridical thought toward multispecies jurisprudence, where legal agency is distributed across human and non-human assemblages. Such a framework dissolves the anthropocentric illusion of sovereign control, instead instituting emergent normativity, a legal order co-constituted through the metabolic interplay of toxins, species, and infrastructures. A process of fictive jurisprudence, where speculative legal narratives granting non-human entities standing in court, materialize through coalitional politics rather than technocratic design. The provocative thesis of her 'The Mushroom at the End of the World'(Tsing, 2015)⁹ unveils a radical epistemic opening that capitalist ruins paradoxically generate conditions for unprecedented multispecies collaborations, as exemplified by the matsutake mushroom's thriving in post-industrial wastelands. This ecological insight fundamentally reorients our investigation into Non-human Rights and Posthuman Social Governance, particularly in addressing how Speculative Design might model the dwelling politics of cross-species symbiosis. Tsing's ethnographic revelation that precarity is the condition of our time necessitates three paradigm shifts in governance theory: first, the dissolution of anthropocentric legal frameworks evidenced by mycorrhizal networks' underground economies(Sheldrake, 2020)¹⁰; second, the emergence of symbiopolitical subjectivities where human-nonhuman agencies co-constitute decision-making processes; third, the development of speculative governance provotypes that operationalize Tsing's concept of 'contaminated diversity'(2012)¹¹ through design fiction methodologies(Dunne, 2013)¹². The matsutake's metabolic alliances with pine trees and migrant pickers demonstrate what we term ruin ecologies, the complex adaptive systems where rights and responsibilities become distributed across species boundaries.

Le Guin (1972)'s¹³ speculative fiction 'The Word for World is Forest' constructs a jurisprudential paradigm wherein non-human entities are endowed with legal subjectivity through narrative and critiques biopolitical dispossession by framing extraction as ecocide. By framing forests as plaintiffs, she challenges anthropocentric legal systems, positing that ecosystems possess inherent rights to integrity, reparations, and representation in adversarial proceedings against extractive capitalism. This narratively reconstitutes standing (*locus standi*) beyond human interests. Le Guin uses storytelling for creating proto-legal frameworks for planetary justice. Mycorrhizae symbolize multispecies dependency rendering forests agential collectives, not inert 'resources'. The Terran human colonists, on the other hand, see the forest as a resource to be used and a barrier to be surmounted. Forests become plaintiffs by exposing the juridical violence of anthropocentrism, demanding courts recognize terrestrial entanglements.¹⁴ Le Guin's work remains pivotal to post-humanist law that imagining a planetary commons where photosynthetic beings litigate against their own erasure.

Neolithic compost societies in 'Multispecies Archaeology'(2018)¹⁵ demonstrates how multispecies archaeology provides temporal depth to my legislative fictioneering framework. By reconstructing

how Bronze Age Anatolian communities reveals ancient precedents for contemporary posthuman governance, challenging Western law's anthropocentric temporality. Archaeological stratigraphy can be analysed as jurisprudence patterns, where layered multispecies co-habitation patterns become legal blueprints exemplified in the case study of Andean terrace systems as proto-legal infrastructures governing human-llama-crop relations. Deep-time ecological jurisprudence for posthuman governance considers the extensive and long-term ecological interactions and dependencies of multiple species across geological time scales. Posthuman society also demands legal systems that accommodate archaeologically evidenced entanglements like Mesopotamian temple granaries' rodent-inclusive governance (Rosemond, 2003)¹⁶ serves as a compelling historical example of how ancient societies recognized and incorporated the ecological roles of non-human species into their built environments. This was not merely a manifestation of tolerance but rather a profound understanding of the roles these creatures played within the granary ecosystem, akin to 'ecosystem engineers,' albeit not always beneficially. These species, while consuming some grain, potentially facilitated the aeration of stored grain, thereby mitigating fungal growth and preventing spoilage.

Posthuman Governance highlights the potential for contemporary legal and governance systems to draw inspiration from and emulate such ancient practices of ecological coexistence, positioning Ecological Jurisprudence as a tool for ecological regeneration rather than domination. Across these works, multispecies jurisprudence emerges as a means to redistribute agency beyond the human. Ecocentric governance represents a transformative approach for legal decision-making processes, where laws should recognize and uphold the intrinsic rights and agency of nature and multispecies.

2.2 Speculative Governance and Xenorights in the Symbiocene



Figure 1 Canada Pavilion Presents Picoplanktonics, a Living Experiment in Regenerative Architecture at the 2025 Venice Biennale

Figure 2 Living Room Collective: Picoplanktonics, Canada Pavilion at the Venice Biennale, 2025. Source: Valentina Mori

The Picoplanktonics installation at the 2025 Venice Biennale's Canada Pavilion¹⁷ epitomizes the ontological and juridical challenges of the Symbiocene, materializing a speculative governance framework for cross-species entanglement. Developed by the Living Room Collective, 3D-printed architectural structures embedded with carbon-sequestering cyanobacteria destabilize

anthropocentric legal categories further demanding a radical reorientation of rights and stewardship. Here, architecture ceases to be a static human artifact but becomes a speculative provotype with living contract, a sympoietic system where biological and technological agencies co-constitute governance.

The project's biofabricated scaffolds, printed at ETH Zürich using living materials, operationalize what might be termed xenorights jurisprudence, wherein a legal paradigm that grants personhood to hybrid assemblages, clarify tentacular jurisprudence that rights emerging not from autonomy but from entangled survival. By calibrating light, humidity, and temperature to sustain cyanobacteria, the pavilion performs ecological due process, acknowledging non-human needs as legally actionable. This mirrors the speculative governance models proposed in Legislative Fictioneering, where metabolic interdependence, e.g., photosynthetic organisms as climate actors necessitates algorithmic rights distribution beyond an ongoing experiment, the Collective rejects static legal solutions instead proposing governance as a dynamic negotiation with cyanobacterial temporality.

While its caretaker system gestures toward multispecies stewardship, the installation's reliance on advanced biotechnologies risks replicating extractive logics echoing the paradox of 'rights-of-nature' neoliberalism. The work thus functions as a jurisdictional probe, testing how provotype's scale might materialize Latourian 'articulated entities' in a parliament of things, where carbon sequestration becomes a legislative act. In this light, Picoplanktonics advances the Symbiocene's central provocation, in which governance must evolve from human-centric regulation to multispecies resilience, where biological processes draft deeper policies than parliamentary statutes.

In 'The Promise of Multispecies Justice'(2022)¹⁸, radical reconfiguration of justice particularly through Zoe Todd's and Julietta Singh's chapters demonstrates how legislative fictioneering operates as a decolonial praxis to dismantle anthropocentric governance. Todd's analysis of Indigenous legal pluralism reveals how posthuman governance requires jurisdictional porosity that 'rights of nature' frameworks must avoid neoliberal co-optation. The book thus redefines posthuman governance as an insurgent rewriting of extant legal infrastructures, where fictioneering exposes the constitutive exclusion of nonhumans in Western jurisprudence while enacting what the editors term multicultural constitutionalism.

Legislative fictioneering I propose here operates as a form of speculative mycology, the legal frameworks must decompose like lignin to nourish emergent ecologies. The octopus-inspired tentacular¹⁹ jurisprudence emerges precisely to address these collapses. Its distributed intelligence model acknowledges that Toxicity thresholds are negotiated between mitochondria and heavy metals before reaching courtrooms. Such molecular-scale regulatory processes demonstrate how biochemical interactions inherently constitute proto-legal frameworks that precede human juridical codification. These subcellular negotiations establish what might be termed an autonomous environmental jurisprudence, wherein metabolic pathways and isotopic decay patterns generate binding ecological statutes through purely material processes.

Lichen speciation rates draft deeper environmental policies than parliamentary sessions. The very concept of 'illegality' dissolves when radioactive boars rewrite land use maps through their contaminated migrations. This paradigm shift exposes modern law as what Latour calls a 'purification

regime'(2015)²⁰ doomed by its denial of hybridity in a world where every legal subject is already a cross-kingdom consortium. The 'purification regime' denotes a modernist epistemological apparatus that artificially segregates nature/culture, subject/object, and human/nonhuman into discrete ontological categories, thereby erasing the constitutive entanglements between material agencies and discursive practices that Latour identifies as the fundamental condition of existence. Legislative fictioneering, as a counter-strategy, deliberately cultivates legal indeterminacy through biomimetic frameworks, where statutory language mutates like mycelial networks to absorb anthropogenic disturbances while maintaining structural integrity, thus performing law as a sympoietic system rather than a hierarchical mandate. Fictive jurisprudence rooted in multispecies ethnography, where fictional legal narratives emerge from observed cross-species entanglements rather than speculative abstraction. The methodology's demand for situated witnessing thus becomes foundational to posthuman governance, ensuring legislative fictioneering avoids rights-of-nature neoliberalism by grounding juridical innovation in lived multispecies grammars.

The legal status of genetically modified cross-species symbiotic lives presents a constitutional paradox demanding posthuman jurisprudence. As blockchain-based rights engines demonstrate, conventional legal binaries collapse when applied to chimeric entities combining organic DNA with synthetic components. These beings challenge fundamental categories of personhood, as their partially artificial genomes and enhanced capabilities place them simultaneously within and beyond traditional human rights frameworks. Their existence necessitates a fluid rights architecture that recognizes degrees of consciousness and vulnerability rather than relying on biological essentialism. This legal ambiguity mirrors the broader crisis of categorization in postnatural governance systems.

2.3 Speculative Design as Jurisdictional Probes in Bio-Legality

The emergence of synthetic biohuman entities, biological organisms engineered with artificial genomes and/or non-human functional enhancements raises profound ethical questions regarding ontological status and moral considerability. From a Kantian perspective, if such beings demonstrate rational autonomy, e.g., through designed neural architectures supporting moral reasoning, they may warrant categorical imperative protections regardless of their synthetic origins. Utilitarian frameworks face calculative challenges in weighing engineered well-being metrics against potential ecological disruption risks. Virtue ethics must confront whether creating life *de novo* aligns with *phronesis*, given the Aristotelian primacy of natural *telos*. The precautionary principle demands rigorous containment protocols, as horizontal gene transfer risks could irrevocably alter ecosystems. Most critically, the non-identity problem complicates consent frameworks: future synthetic beings cannot consent to their own creation, yet prohibiting their existence denies potential welfare. Resolution may require hybrid approaches: granting limited rights proportional to demonstrated capacities while enforcing strict biosafety standards under international oversight bodies like the UN Convention on Biological Diversity. My project, 'Cross-species Symbiosis Lives,' operationalizes provotypes installations by bridging Speculative Design focused on present critique and future-oriented storytelling to expand the Jurisdictional Imaginary through Legislative Fictioneering, a process whereby fictional legal frameworks are created to explore and critique existing power structures and imagine alternative governance systems.

By formally granting legal personhood to Cross-species Symbiosis Lives, the project didn't naively assume equitable symbiosis but rather materialized the cognitive dissonance required to confront humanity's inability to conceptualize nonhuman agency outside transactional logic. Speculative Design function as Jurisdictional Probes in Bio-Legality, the provotype's power emerges from its capacity to materialize latent contradictions in biopolitical governance. By materializing speculative scenarios and diegetic provotypes, provotypes operationalize this by bridging critical design focused on present critique and future-oriented storytelling, creating a dialectic between the probable and the possible. My project adopt Fleischmann's method of legislative²¹ and Latour's rejects on purification regime drafting mock laws for synthetic symbionts that parody the Geneva Convention's anthropocentrism²². One provotype includes a blockchain-based 'Rights Distribution Engine' that algorithmically allocates constitutional protections between human and non-human components, revealing the absurdity of binary legal categories in postnatural ecologies.

The legal status of genetically edited synthetic persons shall be determined through dynamic algorithmic assessment via the Rights Distribution Engine, which assigns constitutional protections based on measurable parameters of consciousness, ecological interdependence and technological embodiment. Genetically modified cross-species symbiotic lives shall receive graduated rights proportional to their cognitive capacity and ecological integration, rejecting binary human/non-human categorization. All modifications must be registered on an immutable blockchain ledger, with rights adjustments occurring through decentralized consensus. Legislative Fictioneering acknowledges the ontological fluidity of postnatural entities while ensuring ethical oversight of human-synthetic hybridity.



Figure3 Synthetic organisms containing octopus neural regeneration genes, Jurisdictional Imaginary 1

Figure 4 Girl with Biological entropy verification module, Jurisdictional Imaginary 2

Figure 5 Synthetic organisms that harbor photosynthetic genes, Jurisdictional Imaginary 3

Figure 6 CRISPR-edited cephalopod-hybrid Refugee, Jurisdictional Imaginary 8

Source: Wenjia Sun

Fictioning crafted the Genomic Citizenship Act a graduated personhood framework where entities with 50-100% human DNA receive full constitutional rights, those with 20-49% are granted limited rights subject to mandatory genomic auditing, and beings below 20% human DNA are classified as 'ecological persons' entitled to habitat-based protections, with all classifications enforced through CRISPR-ID tracking systems and blockchain-verifiable ancestry maps.

Jurisdictional Imaginary 1. The intellectual property rights of the gene sequence of synthetic organisms belong to the developers. However, according to the draft of the 'Gene Rights Protection Law,' individuals can apply for gene autonomy after adulthood and redeem the ownership of their own genetic information by paying patent fees. For example, synthetic organisms containing octopus neural regeneration genes must pay 20% of their income to the Institute of Marine Biology until the gene patent expires.

Jurisdictional Imaginary 2. The mandatory incorporation of a biological entropy verification module within the central nervous system of synthetic organisms is imperative to guarantee that the decision-making processes incorporate at least 30% of indigenous neural signals, exemplified by the biological delay attributes associated with hippocampal memory encoding. This innovative technology serves as a bulwark against potential manipulations of consciousness by developers via genetic backdoors, thereby preserving the autonomy and independence of synthetic cognition.

Jurisdictional Imaginary 3. By utilizing synthetic biology technology to implant 'environmental response genes,' fictional organisms are capable of initiating metabolic inhibition under specific environmental conditions (for instance, when oxygen concentration falls below 18% or humidity exceeds 70%). This mechanism serves to prevent these organisms from surpassing their predefined survival thresholds. As an illustration, synthetic organisms that harbor photosynthetic genes will autonomously enter a dormant state when atmospheric CO₂ levels decline to less than 400ppm, thereby mitigating the risk of over-reproduction.

Jurisdictional Imaginary 4. Utilize an AI ecological simulation system to establish a distinctive microenvironment tailored for fictional organisms. The objective is to design these fictional creatures in such a manner that they form a 'metabolic complementary system' with humans. Specifically, nocturnal luminous organisms are envisioned to absorb urban light pollution, thereby replacing 30% of street lighting through their bioluminescent properties. Furthermore, microbial communities structured like aerogels possess the capability to capture PM2.5 particles and convert them into calcium carbonate deposits, which can be utilized for the repair of buildings, among other applications.

Jurisdictional Imaginary 8. Grant genealogical refugee status to synthetics experiencing epigenetic persecution. A CRISPR-edited cephalopod-hybrid may claim asylum if its telomere restructuring violates species-integrity laws in country of origin.

In Aristotelian philosophy, *zoe* (ζωή) denotes the universal biological life-process shared by all living beings, when humans employ gene editing techniques to transcend physiological constraints, the prerogative to create diverse *zoe* (ζωή) is no longer the exclusive domain of humanity. Consequently, the uniqueness of embodied experience is declared obsolete, Mary embodies a nihilistic stance. In

Jurisdictional Imaginary 6 (Figure 7), the amalgamation of diverse visual forms gives rise to a biological disorder, thereby reconstructing conventional religious imagery. By actively blending the attributes of multiple species, this amalgamation challenges the Christian doctrine of 'God created mankind in his own image' and calls into question the sanctity of the human body. Mary is no longer



portrayed as the Virgin Mary, but is downgraded to an editable biological material. Her life and death are controlled by genes and biotechnology, and she is born from a chicken egg, which profoundly questions and reflects on the sacredness of the flesh. After the biological end, the groups that make up her (human/non-human neural clusters) may vote for her resurrection, and the definition of 'human' is thrown back into the realm of possibility suggesting that in the future, death will no longer be a legal absolute or a biological fact, but a decision influenced by biotechnology. Through the ritualized treatment of artistic media and the ridicule of religion, human-animal hybrids are sublimated from moral taboos to philosophical inquiries into the nature of life. The rejection of biblical understandings such as God creating man and the systematic doubt of the superiority of the human species.

Figure 7 Mary, mother of Jesus, *Jurisdictional Imaginary 6* Source: Wenjia Sun

These counterfactual legislation drafting is speculative commitment to exploring alternative normative realities in Legislative Fictioneering, where Speculative Design operates through material conjectures by legislative fictioneering through juridical hypotheticals.(Figure 9) This convergence constitutes what might be termed institutional worldmaking, where the imaginative construction of possible legal futures serves as both diagnostic tool and projective intervention. The counterfactual dimension in legislative drafting mirrors Speculative Design's diegetic provotypes, as employ subjunctive reasoning to stress-test existing institutional frameworks. Speculative scenarios amplify power asymmetries through hyperbolic representations, their inevitable collapse reveals the structural constraints of humanist frameworks rather than reinforcing them. However, Speculative Design raises critical questions about the ontological status of such fictional constructs, whether they represent mere heuristic devices or constitute performative acts that reshape legal imaginaries. The philosophical tension emerges from their simultaneous deconstruction of existing power structures while potentially reinforcing neoliberal governance models that privilege flexibility over stability. Such approaches ultimately challenge the positivist conception of law as static code, instead framing legislation as dynamic design space for continuous revision and speculative intervention.

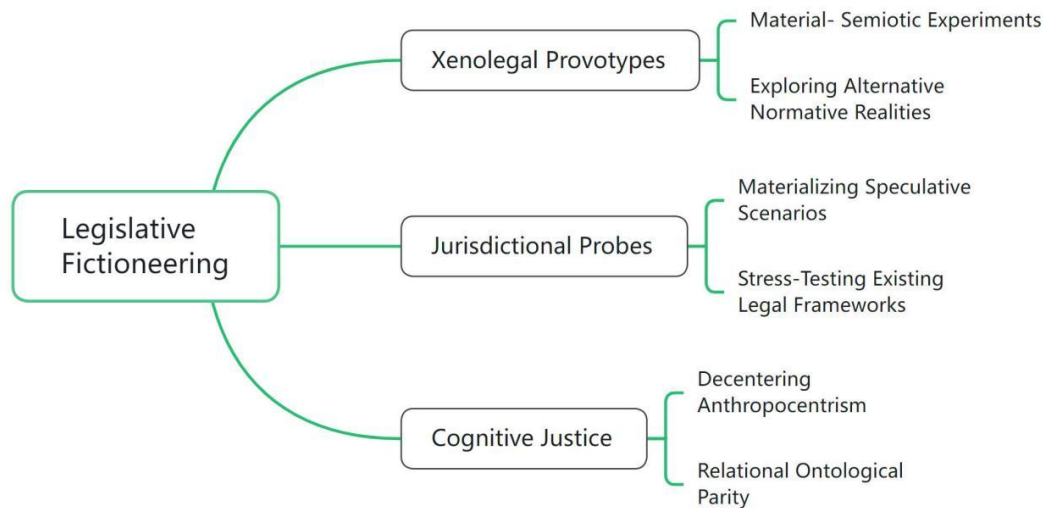


Figure 9 Legislative Fictioneering Methodology

The project ultimately aims to position Speculative Design as a supportive legal exploration that akin to an *amicus curiae* brief for future planetary courts that may emerge. This initiative seeks to illustrate and demonstrate how the field of design can play a pivotal role in prefiguring and shaping legislative frameworks that cater to the rights of entities beyond the human species and lead posthuman governance transcend the limitations of both rights absolutism and utilitarian calculus. Speculative Design response to one of the key challenges of cross-species Jurisprudence is to devise methods and visualization in order to negotiate outcome for more-than-human entanglements that representing and incorporating the interests of non-human species into legal decision-making. It invites us to expand our legal imagination and to reconceptualize the role of law as a mediator and facilitator of harmonious coexistence among all species. At the heart of multispecies Jurisprudence lies the understanding that law is not a static set of rules but a dynamic process that evolves through negotiation and compromise among diverse stakeholders. This process involves not only human lawmakers, judges, and legal scholars but also scientists, ethicists, and representatives of non-human species, where possible. This might involve innovative approaches such as appointing guardians or advocates for animals and ecosystems or developing new forms of legal personhood that extend rights and responsibilities beyond the human domain. By doing so, the law can become a more effective tool for protecting biodiversity, conserving natural resources, and move towards a more inclusive and sustainable future where the law serves as a negotiated outcome that honors the entanglements and interdependencies of life on Earth.

Fictionalizing is living theory, which is a relational process that interweaves narrative and world-building through culturally specific and participatory threads of responsible and collective continuity. By employing Speculative Design, the project aspires to explore and establish governance models that are suitable for a post-anthropocentric era, where human-centric perspectives are no longer the sole or primary focus. These Experimental Jurisdictions are envisioned as testing grounds for new forms of governance that can effectively manage and regulate interactions within a world where humans are just one of many intelligent entities. By setting up the ethical scaffolding for unthinkable futures, my project deliberately violate current bioethical protocols to trigger what

Stengers calls 'diplomatic negotiations' with impossible biologies. A participatory component invites viewers to 'lease' biological components to the hybrids via blockchain smart contracts, performatively interrogating Puig de la Bellacasa(2017)'s matters of care in postnatural ecologies. This mirrors the paradoxical governance of gene-drive technologies in conservation biology. The project thus aims to pave the way for a future where legal systems are inclusive of a broader range of beings and entities, ensuring that the rights and well-being of all are considered and protected in the evolving landscape of planetary governance. As we stand at the precipice of planetary-scale decisions about synthetic biology, geoengineering, and autonomous weapons systems, the urgent task becomes not just assigning rights, but cultivating what Haraway(2016) calls 'response-able worlding'²³, the collective capacity to nurture flourishing in radically interdependent ecologies.

2.4 Sybiopolitical Architectures: Latourian Transitional Constitutional Artifacts

Bruno Latour advocates for a shift in perspective towards considering the nonmodern or amodern paradigm. The imperatives for advancing more competent sciences and engaging in the political endeavor of constructing democratic social relations necessitate the reintegration of facets of the world that modernity has fragmented. 'Half of our politics is shaped within the realm of science and technology, while the other half of nature is constructed within societies. By bridging these two domains, the political task can recommence'. He contends that a 'parliament of things'(1991) is required to engage in political decision-making concerning nature's dual nature as both a natural and social entity. 'The work of mediation that assembles hybrids invisible, unthinkable, unrepresentable' as Latour(1991) observes²⁴, 'the modern constitution allows the expanded proliferation of the hybrids whose existence, whose very possibility, it denies'. The Parliament of Things²⁵ Speculative Design perform the vital function of making these hybrids not only thinkable but governable, creating what we term 'transitional constitutional artifacts' for the Anthropocene²⁶. Should nature not constitute a component of reality, but rather a constitutional arrangement rendering political life impracticable, what would the essence of politics entail in the absence of nature?²⁷ They achieve this by giving tangible form to Latour(2000)'s notion of 'propositional politics',²⁸ a concept wherein nonhuman entities are transformed into 'articulated entities that force us to speak'(Janicka, 2020).²⁹



Figure 10 The Parliament of Things offers 'all things, plants and animals' a voice

Source: the Embassy of the North Sea



Figure 11 Event Site

The collective designers employ Quasi-Objects(Simons, 2017), which are hybrid entities simultaneously acting as mediators of social relations and material agencies within the hybrid parliament that serve as platforms where human and nonhuman entities can interact on equal footing. They adopts Actor-Network Theory, which posits that nonhuman entities can be considered 'actants' that recognizes the agency of nonhuman entities and integrates them into the fabric of political decision-making. The collective also embraces the concept of Dingpolitik(Latour, 2005)³⁰, which involves creating 'thing-centered' assemblies. These assemblies prioritize 'matters of concern' over traditional 'matters of fact,' thereby shifting the focus from purely human-centric issues to a more inclusive consideration of the concerns of all entities, both human and nonhuman.

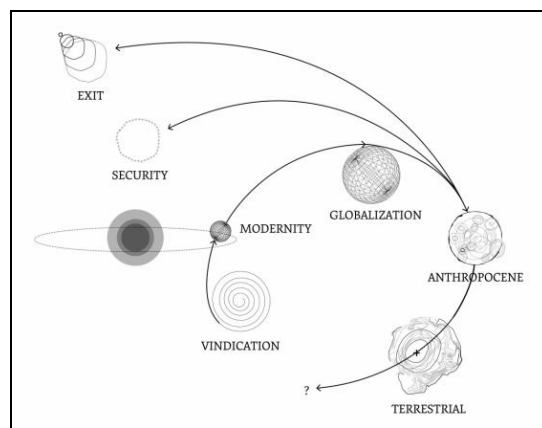


Figure 12 BL1. Diagram of the spatial configuration of the seven imaginary planets

Source: Proposed by Bruno Latour, drawing by Alexandra Arènes, 2018

Latour's article titled 'We don't seem to live on the same planet'(2020)³¹ conducts a speculative global geopolitical landscapes that utilizing an imagined planetarium as a radical cartographic apparatus for the intricate landscapes of global geopolitics by employing an imagined planetarium as an innovative and radical cartographic apparatus. In this analytical framework, each fictional planet's gravitational pull serves as a lens through which the concealed ideological distortions within contemporary environmental governance are exposed and examined. By presenting GLOBALIZATION as a skewed utopia, Latour critiques the unchecked expansion of global capitalism and its disconnect from real ecological conditions. EXIT explores the speculative future where technology allows for the escape from physical constraints, raising ethical questions about who benefits from such advancements. SECURITY speculates on a future where fortress-like communities become the norm, highlighting the potential consequences of this fragmentation on global cooperation and social justice. The so-called overlaps between planets, chaos and still-unsettled fields mentioned in the article are actually the imagination space given by Latour, as well as potential directions waiting to be liberated.

2.5 Legislative Survival: Design Fictions for Damaged Planet Jurisprudence

Legislative Fictioneering is grounded in a comprehensive foundation, which it further develops through four interconnected analytical lenses. Firstly, it engages with xenorights jurisprudence, a perspective that expands the concept of legal personhood to encompass symbiotic assemblages.

Secondly, it embraces more-than-human urbanism, which reimagines habitats as multispecies negotiation spaces, fostering coexistence and mutual understanding among diverse entities. Thirdly, algorithmic symbiocracy is introduced, leveraging computational models to simulate governance structures based on nutrient exchange, thereby incorporating ecological principles into decision-making processes (Bratton, 2022).³² Lastly, the framework incorporates transpecies conflict resolution, adapting Indigenous cosmopolitics (de la Cadena, 2015)³³ to serve as a mediation mechanism in disputes between humans and fungi. Through these lenses, Legislative Fictioneering aims to provide a nuanced and holistic understanding of the complex interactions within and between species. This approach rejects both neoliberal conservation models and deep ecology romanticism, instead embracing what Tsing calls 'the arts of living on a damaged planet' (2017) through design-led ontological pluralism. The practical implications range from rewriting environmental constitutions to recognize mycelial networks as political actors, to developing augmented reality interfaces that visualize microbial participation in urban planning. As climate collapse accelerates, Tsing's fungal metaphors provide not merely descriptive tools but generative design principles for governing the coming symbiocene, where rights emerge from entanglement rather than autonomy, and governance becomes an exercise in multispecies translation.

When transposed onto the plane of normative systems, Speculative Design methodologies transcend their conventional role as future-probing tools to become dialectical instruments for deconstructing and reconstructing social contracts. The ontological tension between 'what is' and 'what could be' manifests most critically in legislative domains, where technological acceleration continuously outpaces regulatory adaptation. This tension underscores the necessity for a nuanced understanding of Speculative Design's possible capacity to inform and shape legal frameworks, ensuring that they remain responsive to the rapid pace of technological change. By engaging with Speculative Design, policymakers and legal scholars can gain insights into potential future scenarios and their associated challenges and opportunities. This, in turn, facilitates a more proactive and adaptive approach to governance, enabling the development of regulatory frameworks that are not only responsive to current needs but also anticipatory of future demands. In this way, Speculative Design serves as a bridge between the present and the future, offering a unique lens through which to examine and reimagine social contracts in the context of accelerating technological change.

Legislative Fictioneering synthesis transforms Speculative Design into a jurisprudential laboratory, where the epistemic rupture between technological acceleration and legal inertia is deliberately weaponized. By operationalizing 'what-if' scenarios as hermeneutic stress tests, policymakers engage in radical epistemic maneuvers, Counterfactual legislation drafting deconstructs the teleology of law-making, exposing how emerging technologies like neuromorphic computing or xenobiotic ecosystems generate normative singularities/ jurisdictional voids where existing frameworks collapse under ontological ambiguity, e.g., quantum property rights or photosynthetic AI personhood debates. Ethical provotyping materializes Kantian categorical imperatives into regulatory artifacts, such as blockchain-based rights smart contracts for synthetic organisms or pollution-driven zoning algorithms mentioned in my Jurisdictional Imaginary. Narrative scenario modeling simulates policy second-order effects via diegetic governance, where speculative narratives reveal latent power geometries demonstrating how today's regulatory choices propagate through entangled human/nonhuman networks as temporal contamination, e.g., microplastic or AI-driven customary

law. Microplastics demonstrate how regulatory inertia transforms material waste into a permanent geological actor that rewrites ecological constitutions through persistent toxicity, while AI-driven customary law reveals how algorithmic precedent accumulation autonomously generates new normative frameworks that bypass traditional legislative processes, effectively codifying machine-learned biases as de facto jurisprudence.

The juridical experimentation necessitates temporal bracketing isolating regulatory interventions within discrete chronotopes to observe their cascading effects across evolutionary, geological, and algorithmic timescales. Speculative Design further demands multispecies hermeneutics, wherein legal interpretation incorporates nonhuman semiotic systems, e.g., bacterial communication networks or plant root electrochemical signaling as valid jurisprudential texts. These maneuvers reconstitute sovereignty as a distributed affordance, emerging from the negotiated entanglement of human institutions, synthetic lifeforms, and terraforming infrastructures in perpetual flux. Legislative Fictioneering's true philosophical potency emerges in its capacity to render visible the implicit anthropocentric biases embedded in current governance models. Through speculative policy fictions that postulate post-human legal subjects or algorithm-mediated social contracts, we expose the contingent nature of existing juridical frameworks. This creates epistemic openings for more adaptive, anticipatory governance structures that acknowledge the co-evolution of technological and normative systems.

Critically, speculative governance requires maintaining the delicate balance between creative extrapolation and operational feasibility, what might be termed the 'isomorphic imagination'(Besser, 2017)³⁴ principle. The designed futures must remain sufficiently grounded in current sociotechnical realities to permit actionable insights while radical enough to challenge path dependencies. This dual requirement transforms Speculative Design from mere forecasting exercise into a vital mechanism for democratic deliberation about alternative constitutional futures. Through Speculative Design, we can explore the potential for new forms of social governance that recognize the agency and rights of non-human entities. For example, what might a society look like where all cross-species symbiosis lives have legal representation and the ability to seek justice for harm done to them? Or what might a world order entail where artificial intelligence possesses autonomous decision-making capabilities and the right to self-determination? These are not idle questions but are crucial considerations as we navigate the complex and ever-evolving landscape of non-human rights and posthuman social governance.

3 Material Science Network in Speculative Scenarios

In Speculative Design, material networks are defined as hypothetical socio-technical systems that reconfigure matter, energy, and information flows to embody alternative ecological or political futures. Unlike purely functional models, these networks are constructed through diegetic prototyping, design fictions that imbue materials with narrative agency. Materials operate across entangled timescales (geological, biological, industrial), functioning as media for speculating on deep-time consequences of present actions. Networks assemble improbable yet scientifically-grounded relationships, e.g., synthetic biology interfaces with mineral deposition, rather

Counterfactual Materiality, which positioning materials as propositions rather than solutions. Materials in Speculative Design derive meaning from speculative intra-action dynamic exchanges between human/non-human actors within imagined ecosystems.

Speculative Design's material science also operationalized in Design Futures through provocative material proxies, such as temperature-sensitive algae pigments in civic fountains that visibly bleach beyond safe pH levels, collapsing planetary-scale phenomena into embodied interactions. In BioDesign, it manifests as living material systems, e.g., synthetic biofilms that visibly desiccate when exposed to atmospheric CO₂ concentrations exceeding climate tipping points, where biological agency becomes both medium and critique of anthropocentric paradigms. Both fields leverage material behaviors as hermeneutic devices to stage alternative socio-technical relations, with Design Futures prioritizing speculative material semiotics and BioDesign emphasizing co-evolutionary material ethics.

Speculative Design constructs material networks through three interconnected methodological maneuvers that reconfigure matter-agency relationships. Metabolic Fictioning operationalizes counterfactual circularity by choreographing resource flows (Gilbert, 2001)³⁵, e.g., nutrient cascades, carbon pathways that intentionally transgress extractive industrial metabolisms. This deviation functions as critical epistemology revealing hidden dependencies through designed incongruities that fracture conventional production/consumption binaries. Material circulations become diegetic frameworks where waste streams are reimagined as embodied critiques of linear economies. Ecological Entanglement weaves together multi-scalar ecological relations, challenging the separation between nature and technology. By embedding materials within speculative ecosystems, designers create scenarios where human and non-human actors engage in complex, often unpredictable interactions. These ecosystems simulate deep-time ecological processes, inviting reflection on the long-term consequences of current technological practices. For instance, synthetic organisms, I would refer it to 'Ethical Material Provotypes', might be designed to participate in ecological restoration projects, their behaviors shaped by the narrative context in which they are embedded. This entanglement of material agency and narrative context collapses the distinction between artifact and environment, fostering a more holistic understanding of socio-technical systems. Ethical Material Provotypes materialize contested socio-ecological negotiations through artifacts engineered with paradoxical properties.

A tungsten-doped vanadium dioxide (W-VO₂) nanocomposite building cladding system developed by Tianjin University researchers in China, which may embodies both advanced material properties and Speculative Design principles. ³⁶The material leverages the intrinsic insulator-to-metal transition (IMT) of VO₂ nanoparticles, with tungsten doping and oxygen vacancy engineering enabling precise phase transition temperature tuning to match Paris Agreement climate thresholds (1.5°C above pre-industrial levels) with $\leq 0.1^\circ\text{C}$ accuracy. When ambient temperatures exceed ratified climate targets, the nanoparticles undergo irreversible optical darkening through IMT, creating permanent visual markers of climate protocol violations on building facades. This transformation could materializes the concept of 'climate debt' through physical accumulation of darkened surfaces over time, serving as both a passive thermal management system via increased solar reflectance and a speculative interface for intergenerational climate accountability. The project's speculative

dimension lies in its deliberate confrontation of societal inertia by making climate inaction permanently visible through architectural surfaces, it forces public engagement with uncomfortable questions about temporal displacement of ecological costs.

From a materials science perspective, the innovation lies in achieving environmental responsiveness without external energy inputs, while simultaneously maintaining structural integrity within concrete matrices. This novel material eliminates the necessity for external energy. It functions not merely as a thermal management medium for buildings, capable of reflecting solar radiation to facilitate cooling, but also serves as a tangible embodiment of climate ethics. By harnessing the intrinsic phase change characteristics of the material, it facilitates the visualization of environmental information. The annual accumulation of darkened traces on building surfaces constitutes a physical inscription of climate debt, thereby transforming the abstract notion of global temperature control targets into a tangible and visible public landscape. Each square meter of darkened area corresponds to the excessive carbon emissions in a specific year, compelling society to confront the tangible evidence of evaded intergenerational climate responsibility. The process of irreversible darkening metaphorically encapsulates a 'silent accuser,' incessantly questioning whether the prevailing economic paradigm has exceeded its ecological credit, particularly as temperature rise metamorphoses into perpetual visual pollution. This project transcends the instrumental rationality paradigm of conventional materials, establishing a medium for societal reflection through the manifestation of irreversible material behavior. When the building facade becomes a 'pillar of shame' for climate default, does mankind still have the right to pass on the ecological crisis to future generations? Its essence lies in provoking institutional ethical debates through material science experiments, adeptly elucidating the core tenets of Speculative Design, which employs fiction to deduce reality and critique. The work serves as an exemplar of how future materials can transcend their functional applications to actively engage in socio-political discourse, consonant with the framework posited by Dunne and Raby, which views Speculative Design as a catalyst for critical reflection. These methodologies position material networks as pivotal hermeneutic devices transdisciplinary frameworks wherein matter assumes the dual role of medium and mediator for rehearsing radical socio-ecological relations. Their power resides not in predictive accuracy but in catalyzing material-discursive practices that destabilize hegemonic resource imaginaries.



Fig 13 *Jurisdictional Imaginary 4*. by 18% Taiwan Artocarpus treculianus flour PLA 3D printing filaments with silky texture



Fig 14 Pre-processed to particle size $<100\mu\text{m}$



Fig 15 Extrusion to Pellets mixed with colorants and other additives then drying



My project 'Cross-species symbiosis lives' explores Smart Manufacturing the fabrication of 3D printable filaments by incorporating 18-31 wt% Taiwan-native breadfruit (*Artocarpus treculianus*) flour into PLA/PHA biopolymer matrices, leveraging their intrinsic thermoplasticity for fused deposition modeling. The composite formulation achieves chromatic diversity through anthocyanin-rich fruit pigmentation while exhibiting silk-like surface aesthetics due to starch-polysaccharide interactions at polymer interfaces. Rheological and mechanical analyses confirm printability retention (melt flow index 5-8 g/10min) with enhanced silky texture. These networks are not predictive models but critical infrastructures for thought, leveraging material behavior to interrogate power dynamics in resource governance and multispecies justice. Their validity resides in catalytic ambiguity provoking discourse on what constitutes viable, ethical material futures. Provotype treat materials not as static resources but as dynamic mediators between human and non-human actors, though Speculative Design explicitly interrogates the political and ethical dimensions of such mediations through provocative future scenarios.

These experimental material systems encode ecological temporalities through their programmed vulnerabilities, while Showing a possible path beyond neoliberal solutionism. For instance, polymers engineered to degrade at rates proportional to ecological debt serve as physical manifestations of the tension between current consumption patterns and future sustainability. This material strategy spatializes temporal conflicts, making abstract environmental consequences tactile. The provotypes exhibit a paradoxical durability, they persist as objects while materially transforming, thus destabilizing modernist dichotomies between stability and decay. This quality aligns with Donna Haraway(2016)'s concept of 'staying with the trouble,' where confronting complex systemic problems takes precedence over seeking clean solutions.

The designs operationalize Isabelle Stengers' 'ecology of practices'(2005)³⁷ by materially embodying epistemic conflicts. When Indigenous land management knowledge conflicts with technocratic approaches, these tensions become embedded in the very textures of materials. Programmed phase transitions like metals that oxidize when simulated environmental thresholds are crossed function as what Karen Barad(2012) would call intra-active diffractions.³⁸ These concepts manifest through dynamic material entanglements, where relationality precedes and constitutes material identities. Unlike traditional material science that presupposes discrete properties, speculative frameworks posit that materials emerge through intra-active becoming, their agencies co-constituted through iterative diffraction patterns and topological re-turnings. This rejects the notion of pre-existing material essences, instead foregrounding how matter's performativity unfolds through non-linear, intra-relational trajectories, e.g. responsive bio-polymers or quantum metamaterials. Such ontological shifts redefine materiality as a speculative continuum of co-emergent possibilities. In this context, data is not merely represented but is materially enacted, with oxidation patterns functioning as indicators of planetary boundary exceedances. These oxidation patterns embody spatially distinct manifestations of electrochemical corrosion processes and serve as tangible proxy indicators for localized environmental degradation that stems from the transgression of planetary boundaries.

This agonistic materiality constitutes a direct challenge to neoliberal solutionism. By maintaining

what Chantal Mouffe(2022) terms 'productive democratic conflicts'³⁹ through designed irresolution, the artifacts resist premature consensus. Ethical dilemmas become physically palpable, wherein materials might stiffen during resource overuse, translating abstract aporias into haptic feedback. Such mechanisms actualize Félix Guattari(2014)'s three ecologies (mental, social, environmental)⁴⁰ across scalar interfaces. These provotypes develop a material semiotics for the Anthropocene: corrosion patterns visually index histories of extractive violence, while molecular reconfigurations suggest alternative ontologies beyond capitalist frameworks.

Speculative Design' material networks lie in their emphasis on reimagining material flows through systemic and future-oriented lenses. While Bio-Regional Design grounds material innovation in localized metabolic cycles, Speculative Design extrapolates these principles into hypothetical scenarios where material networks become active agents in socio-ecological transformation. Both frameworks critique globalized supply chains by foregrounding temporal entanglement-materials as embodiments of geological and biological timescales. Speculative Design amplifies this by projecting how bio-regional material logics might evolve under climate forcing, such as designing with hyper-localized carbon-negative composites or programmable microbial consortia. The synergy emerges in their mutual rejection of material homogenization, instead framing networks as relational infrastructures where technical processes, e.g., mineral weathering and biological systems, e.g., soil microbiomes co-constitute material's regional identity and ethics.

4 Critical Review: The Neoliberal Colonization of Futurity

Speculative Design's methodological framework, while ostensibly radical in its challenge to anthropocentric legal systems, may inadvertently replicate neoliberal epistemological structure. By transforming collective political questions into individualized 'what-if' scenarios, e.g., synthetic organism rights or quantum property regimes, it replicates the neoliberal fragmentation of social solidarity into marketized choice architectures. Legislative Fictioneering fundamentally privatize legal imagination, reducing systemic justice questions to design challenges solvable through entrepreneurial innovation rather than democratic deliberation. This mirrors what Wendy Brown critiques⁴¹ as the neoliberal transformation of homo politicus into homo economicus, where even speculative futures become commodified thought experiments. Over-reliance on openness⁴² in Speculative Design may often masks its neoliberal operationalization, where infinite possibility spaces paradoxically reinforce capitalist realism by refusing to commit to concrete political-economic alternatives beyond the market's horizon of imaginability.

The promotion of counterfactual legislation drafting reveals an alarming continuity with neoliberal deregulatory logics. When proposing to suspend existing legal frameworks to accommodate normative singularities, like photosynthetic AI personhood, it echoes Milton Friedman's call for 'creative destruction'⁴³ of regulatory systems. The methodological insistence on jurisdictional voids as spaces of innovation rather than collective peril demonstrates Hayekian market fundamentalism in futurist guise. By framing legal uncertainty around emerging technologies as an opportunity rather than a crisis of governance, Speculative Design becomes complicit in what Philip Mirowski identifies as neoliberalism's defining feature⁴⁴, the deliberate cultivation of instability to enable perpetual

market reinvention.

Some scholars argue blockchain technologies could decentralize rights management, yet Blockchain-based rights smart contracts exemplify the financialization of moral reasoning under Speculative Design. This approach operationalizes Kantian ethics through blockchain's algorithmic governance, which is a perfect neoliberal synthesis where moral imperatives become self-executing financial instruments. Such ethical provotyping reduces multispecies justice to code-based contractual relations, extending financial derivatives logic into the ontological realm. The very notion of pollution-driven zoning algorithms naturalizes market solutions to ecological crises, disregarding how market mechanisms created these crises initially. This might represent what David Graeber termed utopia of rules⁴⁵, where Speculative Design's technical solutions obscure deeper structural violences. The algorithmic reinforcement of colonial property regimes through smart contract land titling, all while creating new forms of extractivism that disguise themselves as decentralized emancipation.

Narrative scenario modeling's diegetic governance constitutes a neoliberal temporal strategy. By simulating policy second-order effects as design fictions, it enables what Randy Martin called 'derivative sociality'⁴⁶, where future contingencies become assets to be managed rather than collective destinies to be shaped. A systemic blindness mirrored in Speculative Design's neoliberal tendencies to aestheticize futures while obscuring extractive material relations. microplastic constitutions, AI customary law demonstrate Speculative Design's role in constructing cruel optimism fostering attachment to governance models that systematically undermine collective flourishing. This temporal colonization allows neoliberalism to absorb dissent by rendering systemic alternatives as mere narrative artifacts rather than political possibilities.

Most importantly, positioning law as anticipatory interface for the Anthropocene smuggles in neoliberal assumptions about human-nature relations. Productive juridical mutations frame planetary crisis as design opportunity, there is a risk of being co-opted by disaster capitalism as Naomi Klein exposed⁴⁷. When Speculative Design celebrates 'epistemic violence against anthropocentric legal assumptions,' it ironically reinforces neoliberalism's core tenet: that all relations including multispecies ones are best mediated through competitive innovation rather than collective stewardship. The very notion of juridical laboratory reduces Earth system governance to a game for privileged knowledge workers, disregarding existing grassroots cosmopolitical alternatives.

Epistemic violence emerges when speculative futurism consolidates into hegemonic discourse, systematically erasing alternative imaginaries through the naturalization of techno-capitalist teleologies, thereby reproducing colonial patterns of cognitive dispossession. The monopolization of futurity by neoliberal paradigms constitutes a discursive regime of cognitive discipline, where marginalized epistemologies are rendered illegible under the guise of inevitability, exacerbating epistemic injustice under late capitalism's extractive temporalities. To reclaim their emancipatory potential, Speculative Design and legislative fictioneering must confront their complicity in what Frederic Jameson famously noted: 'It has become easier to imagine the end of the world than the end of capitalism.'⁴⁸ This transformative process necessitates a shift away from the market-friendly innovation theater trap and towards what Ruth Wilson Gilmore, in her seminal work terms

'abolitionist geography.'⁴⁹ This paradigm shift entails the active cultivation of ethical life-sustaining infrastructures within the prevailing capital-driven 'death-worlds,' a concept that challenges the dominant neoliberal narrative and promotes a more equitable and sustainable future. This reconceptualization carries profound implications for environmental ethics, technological development, and multispecies justice in our rapidly co-evolving world.⁵⁰

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