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Title

Designing otherwise: architecture beyond the human

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Abstract

This essay explores how architecture can expand its imaginative and ethical capacities in response to the climate emergency by engaging speculative fiction, visual media and more-than-human perspectives. Drawing on science-fiction narratives, visual abstraction and exhibition practices, it argues that architectural thinking must shift from representation to relation, from designing for the world to designing with it. Fiction offers models of environmental cohabitation that unsettle anthropocentric assumptions, while drawings and exhibitions translate these imaginaries into spatial forms. The essay considers the pedagogical implications of this shift, proposing that architectural education must embrace uncertainty, narrative and care as core design tools. Finally, it positions architecture not as a solution to planetary crisis, but as a speculative practice capable of holding contradiction, listening to more-than-human conditions and rehearsing alternative futures.

Keywords

speculative fiction, architectural imagination, more-than-human design, climate pedagogy, visual media, science fiction

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1. A crisis difficult to imagine

In 1965, Susan Sontag, in her essay 'The Imagination of Disaster' (Sontag, 1965), reflected on the role of science fiction in shaping the cultural imagination. Far from dismissing its dramatic visions of catastrophe, she saw in these stories a mirror of our collective anxieties, tools for thinking through crises before they arrive. Today, as the climate emergency unfolds with increasing urgency, this speculative function feels more relevant than ever. In an age defined by planetary instability, how might architects and designers begin to imagine the futures we are already living in?

The climate crisis challenges not only our infrastructures and economies, but also our ability to comprehend and represent it. As Amitav Ghosh argues in *The Great Derangement*, this is 'a crisis of culture, and thus of the imagination' (2016, p. 9). Scientific data is abundant, but data alone rarely moves audiences or practitioners. The difficulty lies in translating abstraction into awareness, and understanding a phenomenon that unfolds over decades, across oceans, and in registers we cannot always see or feel directly. Climate change is everywhere, yet it can often feel strangely distant from our daily lives. We know it is real, but we struggle to picture it, let alone design with it in mind (Figure 1).

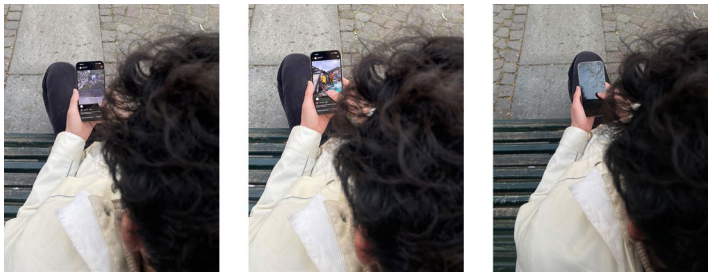

Figure 1. Mosaic of Instagram social media posts documenting climate-related disasters. The constant stream of crisis images saturates our perception, often producing paralysis rather than clarity. In an age of informational excess, the challenge is no longer just knowing, but imagining otherwise.

For architects and spatial thinkers, this crisis of imagination cuts deep. Our work depends on the ability to anticipate, to visualise, to make the future tangible. However, how do we give form to uncertainty? What does it mean to design in relation to forces – like atmospheric shifts, rising seas or slow drought – that resist clear images or fixed boundaries? Architecture, rooted in drawing, modelling and projecting, is inherently a visual practice. Moreover, when the future becomes harder to visualise, the entire framework of design is unsettled.

This essay proposes a method of reframing the climate emergency. Fiction allows us to imagine otherwise. It stretches our thinking, shifts perspectives and opens up spaces where ecological entanglements and more-than-human conditions can be explored and examined. Far from escapist, science fiction offers what Suvin (1979) called 'cognitive estrangement': a way to step outside the familiar in order to see it more clearly. Through invented worlds, speculative timelines and altered viewpoints, fiction cultivates a kind of imaginative literacy that is urgently needed in design disciplines.

Imagination, after all, is not a luxury. As Rendell & Rawes (2007) and others have argued, it is a critical part of the design process, a way of thinking that allows us to move between the known and the possible. Coleman (2018) describes 'imaging' as an interdisciplinary method that helps us question, unpack and reconfigure existing conditions. In architecture, this means more than representing reality; it means generating alternatives, working with abstraction, and drawing futures into being. While imagination enables abstraction and possibility, representation often works to stabilise and communicate those visions. The two are interconnected, but not synonymous: imagination speculates, while representation renders. This difference is essential in design pedagogy, where the goal is not only to draw but to provoke rethinking.

In *Are We Human?* (2016), Beatriz Colomina and Mark Wigley have argued that design is not merely a response to need but a producer of culture and subjectivity. To teach design, then, is not to train for market demands but to cultivate sensitivity: to what is excluded, to what is non-human, to what is yet to be thought. They remind us that design has historically been used to anaesthetise, to smoothover discomfort, to make environments legible and obedient. However, in a world of rising seas, collapsing certainties and ecological interdependence, pedagogy must do the opposite. It must train for discomfort, for the ability to stay with difficult questions, to listen across difference, and to imagine coexistence where none seems possible.

The following explores how science fiction can help architects engage with the climate emergency, not by offering blueprints, but by nurturing the capacity to imagine. Through stories of submerged cities, hybrid bodies and planetary estrangement, speculative fiction offers new perspectives on space, time and environmental relations. It invites us to ask not just what can be built, but how else we might live and with whom.

2. Fiction as method: Science fiction and the more-than-human

Science fiction is often framed as a cultural genre speaking about distant futures, but at its core it is less about the coming than about the present.

In the context of the climate emergency, speculative narratives offer a way of encountering ecological shifts not from above, with distance or detachment, but from within, through altered rhythms, perspectives and environments. These are not stories that predict the future but ones that help readers feel its textures, move slowly into its uncertainties, and reframe what is often taken for granted.

Science fiction works best when it unsettles the reader. It disorients just enough to allow new recognitions to surface. What Suvin (1979) called 'cognitive estrangement' is not about escape, but about thinking differently, estranging us from the habitual in order to return with sharper eyes. In the context of planetary transformation, this becomes a method of 'staying with the trouble', to borrow Donna Haraway's phrase (Haraway, 2016). It lets us imagine environmental conditions that are not theoretical, but lived environments that sweat, flood, breathe and forget.

In Han Song's *Oceano Rosso* (2018), for example, we descend into an oceanic world that is not only physically immersive but spiritually inhabited. Humanity has changed into aquatic hybrids, creatures whose bodies are shaped by water, as well as by a profound sensitivity to its moods and currents. The ocean is not passive. It is aware. It pulses with memory and desire, and the beings who live within it – half-human, half-fish – are attuned to its consciousness in a way surface dwellers never were. Their relationship to water is not extractive or defensive, but reciprocal. In that reciprocity, the ocean emerges not as a threat, but as a companion, a host, perhaps even a forgotten ancestor.

This kind of narrative reframes the environment not as something to be mastered or engineered, but as something to be in relation with. It proposes a mode of existence where survival depends not on controlling natural forces, but on listening to them. Fiction not only makes this idea thinkable; it makes it tangible, giving us sensory entry points into unfamiliar worlds.

In Chi Ta-wei's *The Membranes* (2021), this intimacy with the non-human becomes layered in new ways. Set in an underwater city protected by a synthetic dome, the novel blurs the boundaries between skin, climate and identity. Characters are shaped by biotechnology, but also by longing, memory and uncertainty about what their bodies are made of, who they are and what they are part of. The sea, again, is not a backdrop, but a condition. It presses in on the edges of the world, infiltrates dreams and complicates the distinction between natural and artificial. If the future is wet, then so is memory, and fiction becomes the filter through which we begin to absorb that idea.

These imaginaries do not arrive in isolation. They circulate alongside real concerns – rising seas, disappearing coastlines, shifting habitats – and offer ways to dwell within those anxieties without collapsing into despair. They teach how to think with water, not against it. In J. G Ballard's *The Drowned World* (1962), the world's cities have slowly submerged beneath tropical lagoons, not with dramatic violence but with quiet inevitability. In Ballard's book, time stretches and warps, memories slip away and landscapes turn prehistoric. The protagonist does not fight the change, he drifts with it, increasingly absorbed into the environment's altered rhythms. This surrender is not defeat, but a kind of metamorphosis. What emerges is a different understanding of space, not measured in zones or grids, but in temperature, light, humidity and instinct.

What connects these stories is not only their aquatic settings, but the way they push against the idea of design as control. They suggest that environments are not fixed but mutate, remember and dream. The beings who inhabit them, too, are in flux. In Kim Bo-Young's *On the Origin of Species* (2021), artificial life-forms recount myths of their own creation, questioning evolution, agency and belonging. The world they describe is shaped as much by emotion and intuition as it is by mechanics or genetics. This speculative storytelling challenges the clarity of categories, such as natural/artificial, human/non-human, and self/environment, and encourages us to imagine systems built not for stability, but for resonance.

Across these narratives, fiction does not simplify. It entangles. It lingers in uncertainty, holds competing truths and resists the demand to offer answers. It does not draw blueprints, but opens up space to think, to doubt, to feel. These are not exercises in fantasy; they are exercises in attention. It is a way to focus what usually escapes conventional gaze – currents, pulses, atmospheres – and to recognise them not as background noise, but as part of the shared world we inhabit and co-produce. Fiction becomes a mode of environmental literacy, an attunement to conditions that lie beyond the immediate scale of the human. It offers languages for the unspoken and forms for the unseen. In doing so, it expands the field of what we can imagine, not just technically or formally, but relationally. Not what we might build, but how we might live otherwise.

3. Exhibition and speculation in architecture

Architecture is a visual discipline. In fact, before anything is built it is imagined, sketched, drawn, modelled, rendered, represented. It begins not in concrete and steel, but in images. These images are not neutral: they frame, abstract and project. They shape how we understand space, what we consider possible, and with whom or for whom we design. If fiction provides the conceptual ground for thinking otherwise, then visual media – drawings, diagrams, models and exhibitions – translate that thinking into form.

This translation is not straightforward. As Coleman (2018) argues, imaging is an epistemological practice – an act that both produces and questions knowledge. It is through images that we engage with worlds we cannot fully grasp: temporalities beyond the human, systems that exceed perception, environments in flux. Jane Rendell similarly writes of imagination as a 'positive and productive' force in the design process, one that allows us to move between speculation and intervention (Rendell & Rawes, 2007, p. 207). To imagine is not simply to visualise what is not yet there; it is to reconfigure what is already in place.

Speculative exhibitions – especially those addressing climate and more-than-human conditions – take on this function with particular urgency. They are not just platforms for communication, but spaces for rehearsal. Like science fiction, they work through narrative, abstraction and estrangement. They enable us to inhabit

unfamiliar perspectives, linger in uncertainty and encounter environments that challenge anthropocentric habits of seeing. In these exhibitions, the more-than-human is not an abstract theme but a palpable presence. Floodwaters rise across large-scale floor maps. Rivers speak through sound installations. Droughts are not displayed as statistics, but as cracked earth, warped wood and silenced crops. Through these curatorial strategies, environmental forces are no longer represented at a distance – they are brought into the room, pressing against the viewer's body and field of vision. The goal is not clarity, but attunement.

In this sense, exhibitions serve as a bridge between speculative fiction and spatial design. They hold space for narratives to take visual form, and for images to exceed representation. The river in a drawing is not only a feature of terrain – it is a character, a force, a memory. The flood is not only a risk – it is a story, a rhythm, a presence. Through such media, the more-than-human becomes not just something we design for, but something we design with.

Recent exhibitions increasingly challenge architectural representation by foregrounding more-than-human perspectives through immersive, narrative-driven strategies. For example, 'Water is Coming' (Danish Architecture Center, Copenhagen, 2025) (Figure 2, top) staged a flooded future through spatialised prototypes, speculative storytelling and environmental soundscapes. Visitors stepped into floating pavilions, listened to fictional narrators from submerged cities, and engaged with water not as a threat but as a relational medium. Similarly, 'Prospecting Ocean' at the Columbia Graduate School of Architecture, Planning and Preservation in New York, 2025 (Figure 2, bottom) presented the ocean as a geopolitical agent, exposing its legal and infrastructural entanglements through forensic cartography and video. In both cases, the exhibition space becomes a narrative environment – a speculative and pedagogical infrastructure that activates more-than-human imaginaries while challenging disciplinary boundaries. These experiments recall the long legacy of architectural speculation, but shift the focus away from anthropocentric futures towards fluid, relational and post-human worlds.

Figure 2. (Left) 'Water is Coming' exhibition, Danish Architecture Center (DAC), Copenhagen, 2025. (Right) 'Prospecting Ocean' exhibition, Columbia Graduate School of Architecture, Planning and Preservation (GSAAP), New York, 2025. These curatorial experiments activate more-than-human imaginaries, staging water not as a threat but as a relational medium, and oceanic space as legal, political and narrative terrain.

This shift – from representation to relation – marks a critical transition in this essay. If fiction teaches how to think differently, exhibitions teach how to see differently. They reveal how imagination operates not only in literature, but in lines, colours, scales and textures. They train the eye to hold contradiction, to dwell in abstraction, and to recognise that environments are not backgrounds, but active participants in shaping how we live.

This visual and spatial literacy – this ability to engage with more-than-human conditions through form, story and image – is not a passive skill. It is a pedagogical tool. And it is here, in the tension between fiction, exhibition and design, that the possibility of reimagining architectural education begins to take shape.

This engagement with speculation is not without precedent. Architectural history is rich with visionary projects that imagined future cities and alternative worlds, such as Archigram's mobile infrastructures and the Metabolist megastructures of the 1960s. Many of these imaginaries were first presented through exhibitions, drawings and publications. The difference today lies not in the speculative impulse, but in the subjectivity: where past visions centred the human designer, today's experiments increasingly foreground more-than-human actors – rivers, bacteria, climates – as active agents. Just as historical exhibitions challenged the discipline to think anew, these contemporary examples aim not only to project futures but to question who is authorised to imagine them.

The fact that these exhibitions are staged within architecture institutions such as the DAC and Columbia GSAPP, and, more recently, at the Triennale di Milano which hosted the 'We the Bacteria: Notes Toward Biotic Architecture' exhibition (Columina & Wigley, 2025), signals a growing recognition that architecture itself must be reimagined not just as form, but as a speculative, relational and pedagogical practice.

4. Conclusion: Rehearsing otherwise

The long transition towards post-anthropocentric and post-carbon futures demands not only new materials and policies, but new epistemologies: ways of sensing, thinking and drawing that are attuned to a world where human agency is no longer central. Pedagogy, in this light, becomes a speculative act: a space for training not only professional skills, but perceptual shifts.

In this essay, science fiction has emerged as a tool that cultivates estrangement, dislodging dominant assumptions and creating space for reconfiguring our relationship with the world. Fiction is framed as a form of rehearsal, allowing us to inhabit uncertainty without resolving it, to simulate futures we do not yet know how to navigate. When brought into architectural education, it does not offer ready-made visions of the future, but invites the student into a process of cognitive estrangement. By displacing the human as the default subject and by imagining environments that shift, flood, forget or resist, fiction asks: What does it mean to design with others, other species, other temporalities and other forms of life? Within architectural education it offers students the opportunity to explore new temporalities, agencies and spatial configurations where the environment is not a backdrop but a protagonist.

However, fiction alone is not enough. As argued earlier, architectural imagination is shaped through visual abstraction: the act of drawing as a way of knowing. This visual epistemology is not passive. Imaging is 'a speculative method' (Coleman, 2018, p. 62) that can question and reconfigure existing conditions. When coupled with the destabilising potential of fiction, visual practice becomes a way of not only imagining but also manifesting alternatives. And so, sketches, diagrams and models all become sites for rethinking relations between humans and their environments.

In this way, speculative fiction and speculative design are two sides of the same pedagogical coin. Where fiction narrates the unfamiliar, drawing gives it form. Where story disorients, modelling rearranges. Teaching architecture through this lens means equipping students not only to solve problems, but to frame questions, to live with ambiguity, to embrace contradiction, to move between data and dreams.

What emerges, then, is not a pedagogy of solutions, but one of endurance and attentiveness: a way of learning that accepts discomfort as a condition of thinking, and uncertainty as a shared ground rather than a problem to be eliminated. To imagine otherwise, finally, is to accept unease: to resist the desire for stable ground, and to remain present within the shifting relations that bind humans, environments and futures together.

In his reflections on 'Architecture After Architecture' (2020), Jeremy Till echoed this call for radical reform, arguing that architecture, long complicit in the modern project of growth, order and control, must now reckon with its limitations. The climate crisis, for him, is not a problem to be solved but a predicament to be navigated, a condition that demands not just technical expertise but systemic rethinking. For Till, design pedagogy must shift away from aesthetics and technocratic fixes, and towards forms of 'sense-making' that are collaborative, situated and open-ended. In other words: speculative, relational and more-than-human. This speculative pedagogy is already emerging, not as a curriculum, but as a practice.

In a recent pedagogical experiment I conducted with a team from the Politecnico di Torino and Barnard College, Columbia University, New York, students explored the Bormida Valley – a territory in the Piedmont region of Italy – as a multispecies archive, developing speculative projects through narrative mapping, fieldwork and water-centred storytelling. During an immersive workshop called 'Imagining the Bormida Valley: Interfaces between past and future' (Figure 3), students from both institutions engaged with a diverse set of materials, ranging from technical data on water pollution, flood statistics and GIS layers, to speculative narratives drawn from literature and film about the valley. Their challenge was to confront both the past and the future of the Bormida River not as a problem to be solved, but as an open question to be approached through design. While the studio is still ongoing, it is already demonstrating how site-based pedagogy can foster engagement with more-than-human conditions through fiction, visual abstraction and interdisciplinary collaboration.

Figure 3. A selection of materials from the workshop 'Imagining the Bormida Valley: Interfaces between past and future' (Bormida Valley, Italy, 2025), including a poster, on-site photo and student sketches. Through fieldwork, speculative drawing and narrative design, students from the Politecnico di Torino and Barnard College, Columbia University, New York, engaged the Bormida River as a multispecies archive, rethinking how to design and imagine with water.

This pedagogical reframing is aligned with initiatives such as those developed at the Canadian Centre for Architecture (CCA), which use fiction not to escape architecture, but to expand its field. Its exhibitions and public programmes experiment with form, storytelling and representation. In one such project, speculative environments were imagined not as utopias but as mirrors, reflecting the blind spots of architectural modernism and the extractive logics that continue to underwrite the discipline. These critical framings, often curated as fragmented, layered or incomplete, resist the clarity of a single message; that is, to recognise that architectural thinking must be stretched, disoriented and reconfigured – not to produce certainty, but to build resilience, responsiveness and care. This requires a pedagogy that values attunement over control, speculation over prescription, and relation over separation.

In conclusion, this essay has traced a path from science fiction to pedagogy through the terrains of drawing, exhibition and environmental estrangement. Its argument is not that architecture must become something else, but that it must become more of what it already is at its best: a cultural, imaginative and ethical practice that does not simply represent the world, but participates in shaping how it is perceived, inhabited and shared.

In the face of planetary instability, architecture must stop pretending to be in command. It must begin to listen across species, across mediums, across time. The future does not need more blueprints. It needs stories, rehearsals, drawings and doubts. It needs the slow labour of imagining otherwise, and the courage to stay with that imagination until it starts to reshape practices of teaching, designing and living.

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References

Ballard, J. D. (1962). *The Drowned World.* Gollancz.

Bo-Young, K. (2021). *On the Origin of Species and Other Stories.* Kaya Press.

Chi, T. W. (2021). *The Membranes: A Novel.* Columbia University Press.

Coleman, R., (2018). Imaging. In C. Lury, R. Fensham, A. Heller-Nicholas, S. Lammes, A. Last, M. Michael & E. Uprichard (Eds.), *Routledge Handbook of Interdisciplinary Research Methods* (pp. 61–67). Routledge.

Colomina, B. & Wigley, M. (2016). *Are We Human? Notes on an Archaeology of Design.* Lars Müller Publishers.

Colomina, B. & Wigley, M. (2025). *We the Bacteria: Notes Toward Biotic Architecture.* Lars Müller Publishers.

Ghosh, A. (2016). *The Great Derangement: Climate Change and the Unthinkable.* University of Chicago Press.

Haraway, D. J. (2016). *Staying with the Trouble: Making Kin in the Chthulucene.* Duke University Press.

Rendell, J. & Rawes, P. (2007). Spatial imagination. In T. Inns (Ed.), *Designing for the 21st Century* (pp. 205–19). Gower Ashgate.

Song, H. (2018). *Oceano Rosso.* add editore.

Sontag, S. (1965). *Against Interpretation*. Picador.

Suvin, D. (1979). *Metamorphoses of Science Fiction.* Peter Lang

Till, J. (2020). Architecture after Architecture, lecture, Architecture Foundation 100-Day Studio, 2 April 2020. Transcript available at: www.jeremytill.net/read/130/architecture-after-architecture