Rethink Design

A Vocabulary for Designing with AI

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DOI
10.59490/mg.110

Publication date
2024

Document Version
Final published version

Citation (APA)
Giaccardi, E., & Bendor, R. (Eds.) (2024). *Rethink Design: A Vocabulary for Designing with AI*. TU Delft OPEN Publishing. https://doi.org/10.59490/mg.110

RETHINK DESIGN

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A vocabulary for designing with AI

TU Delft OPEN

ALGORITHMIC SITES
REFLEXIVE DATA PRACTICES
INCLUSIVE DATA FUSION
ACTS OF INTERFACING
CO-PREDICTIVE RELATIONS
CONTESTABLE SYSTEMS
CALIBRATED TRUST
HAUNTOLOGY
COSMOVISION OF DATA
PHENO-DATA
ToSSPHERE
DIGITAL CONSENT PRACTICES
PUBLIC DELIBERATION ON DATA
AI AS MORAL DEVICE
LOGIC OF COMPLIANCE
AI GOVERNANCE
PROTOTEAMS

THE INDUSTRIAL REVOLUTION HAS COME AND GONE. We are now in the midst of a profound digital transformation of society, yet design practice remains anchored in the past.

As society faces the challenge of reconciling algorithmic logic with the creation of inclusive and equitable digital futures, it is clear that new design competencies are needed, as are new roles within companies and organisations. Designers must responsibly anticipate and guide this transformation by proactively imagining and manifesting alternative futures.

Despite expectations that new technologies will usher in an era of efficiency and comfort for all, scholars and practitioners must remain critical. The momentum gathered by new technologies often feels all-encompassing, making their logic and practices seem inevitable and natural. In this, technology appears as a force of nature, operating outside human agency and oversight.

Contemporary development and application of Artificial Intelligence (AI) can clearly be seen to share this characteristic, and so there is a need for a deeper understanding, both theoretical and

practical, of how to design with and for AI. This includes cutting through the noise of hyperbolic claims, corporate mystification, and techno-determinist narratives that shape how technologies are imagined, deployed, and experienced.

This book specifically addresses the question of how designers can engage with AI. Reflecting and responding to the dynamism of the field, it aims to be agile and accessible, offering not the final word but a brief, critical, and creative introduction. Emerging from the work of early-career researchers who have contributed one glossary entry each, the vocabulary presented here is intended as a sense-making instrument, a map for navigating flexibly a complex, emergent terrain, allowing readers to dip in and out as needed.

We hope this resource will provide an exciting and useful tool for understanding and shaping the intersection of design and digital technology in our rapidly evolving world.

Elisa Giaccardi
Roy Bendor
July 2024

IN JUST A FEW DECADES digital technologies have become integral to human conduct, permeating our societies, economies, and cultures, infusing our dreams and aspirations. This rapid integration has brought significant challenges to understanding and designing these technologies. The next generation of designers must revisit fundamental design principles as an anticipatory process aimed at preferable futures to effectively address these challenges and foster promising sociotechnical trajectories.

Design, as we currently know it, originated from the logic of industrial production. Designers have traditionally been trained in data collection methods honed in the context of industrial design to sustain mass production in the 20th century. These methods evolved into user-centred design, aiming to optimise the fit between product and user in order to minimise the financial risks associated with mass production. However, contemporary technologies, including networked digital objects and AI, along with the extractive data economies they feed, diverge from the logic of industrial production. Unlike the mass manufacturing of industrial products in factories, digital products undergo continuous development based on usage data and regular software updates during live deployment. This shift has blurred the conventional boundary between production and use, highlighting the importance of data as a mediator and a framework for the ongoing social construction of technology.

Developments in transition design, systemic design, more-than-human design, and regenerative design, along with a growing focus on not just form and interaction but also economics and politics, indicate the field's response to crisis. While most designers aim to genuinely benefit people and the planet, design practice struggles to reconcile data-driven logics with socially, economically, and politically sustainable models. Recent years have seen professional designers and product developers increasingly express deep concern regarding the role of technology in the world.

This shifting landscape raises numerous issues. One critical issue is the potential limits of our current primary framework for design—specifically, the boundaries of human- and user-centred design. Just as frames focused on human experience were initially developed to counter rationalist design, new frameworks must now be developed to tackle the implication of design with current matters of concern (e.g., social inequality and polarisation, inequitable distribution of the benefits of new technological innovation, and the climate crisis) and guide associated design practices and pedagogies. This necessitates addressing the new on its own terms rather than solely through the lens of the old.

Despite the technological acceleration of life, and society's often passive acceptance of the sweeping changes technology brings, designers find it challenging to accept that current concepts may be inadequate for understanding future possibilities. To envision and

critically examine future design directions, designers need more than practical tools and technologies; they need new conceptual frameworks with which to interpret and reorient the social role of design. Designers, in other words, need a new vocabulary with which to unpack, make sense of, problematise, and take advantage of new socio-technical possibilities.

●●●

This book presents a collection of 17 concepts developed through inquiries into, and explorations of, designing and living with massively interconnected, potentially autonomous, and seemingly intelligent technologies. Unlike older technologies, these do not wait for human action but engage the world proactively, making decisions, communicating, and sharing data at speeds and scales that challenge comprehension. They destabilise and undermine boundaries, often with disregard to moral imperatives, and reconfigure not only the material world but also our relationships with it, with each other, and with ourselves. And as they do so they invite reflection on our identity and aspirations, compelling us to reconsider what ›we‹ means.

Given the complexity and scope of these issues, a glossary format seems most appropriate. This format allows us to present new concepts in an accessible and organised manner, offering a crucial step between merely knowing about these technologies and truly contending with them. That said, given the highly situated

and contingent nature of any vocabulary, it is important to clarify how the choice of terms came to be and why, and how glossary entries have been generated to address the challenges we have just outlined. Before diving into this, let us first discuss the genesis and scope of the projects that incubated this vocabulary.

The vocabulary emerged from the European-funded Innovative Training Network called DCODE, which brought together 40 researchers from Europe, the United States, Asia, Australia, and South America, connecting design, engineering, the social sciences, and the humanities. DCODE's objective was to research and develop new design foundations for inclusive and equitable digital futures. The project started with the premise that while responsible research and innovation in data-driven technologies certainly require engineering know-how, the latter must be informed by advances in the social sciences and humanities. Without these interdisciplinary foundations, designers will not be able to adequately engage with the full scope and consequences of the digital transformation of everyday life.

The interdependencies of design decisions and interactions across various socio-technical levels—such as algorithms, terms of service, user experience (UX), business models, and governance—are crucial. These interconnected layers must be carefully considered to understand their impact on both everyday life and broader societal contexts. For instance, algorithms

can influence our daily routines, while terms of service shape the legal boundaries of our interactions. Similarly, the design of interfaces affects how we relate to each other, socio-economic models impact how we create and exchange value, and governance structures ensure regulatory compliance and ethical standards.

These considerations extend across different sectors. In healthcare, for instance, design decisions can affect patient outcomes, data privacy, and the overall character of medical services. In mobility, they influence transportation accessibility, environmental impact, and urban planning. Each sector has unique challenges and requirements, yet they all share the need for thoughtful design that anticipates the various effects of decisions made across the entire system.

Moreover, reframing ethical practices in these complex spaces presents significant challenges. How can designers ensure fairness, transparency, and accountability in algorithms, protect user privacy in terms of service, create inclusive and accessible interfaces, develop sustainable and equitable socio-economic models, and help establish governance frameworks that uphold these values?

The collapse of scale—from individual interactions to planetary impact—demands a holistic approach that can adapt to the complex dynamics of modern digital systems. Designers and organisations increasingly find themselves in a landscape characterised by high degrees of interconnection and uncertainty, where changes in one area can have cascading effects on others.

This requires a deep understanding of the system as a whole and the ability to anticipate and mitigate potential negative consequences. It also calls for expanding the design space to include multiple, sometimes overlapping, entry points for negotiation, rather than pursuing a single solution.

In this context, interdisciplinary collaboration becomes essential. Engineers, designers, social scientists, lawyers, economists, and humanities scholars must work together to develop comprehensive solutions that address both the technical and ethical dimensions of design, and promote more inclusive, equitable, and sustainable digital futures.

DCODE has identified 5 key research challenges to address these issues. They emphasise the need for designing inclusive human—algorithm relations, ensuring decentralised interactions that are trustworthy and benefit everyone—including the planet. They also highlight the importance of sustainable and just processes for value creation and exchange within data-driven socio-economic models, and the development of participatory and democratic mechanisms for public deliberation and data governance across systems. Most importantly, they advocate for imagining and prototyping future design practices that uphold anticipatory, deliberative, and responsive innovation approaches.

These 5 key challenges are reflected in the organisation of the vocabulary. We asked DCODE early-career scholars to distil one key term most significant to their research.

This process resulted in the identification of distinct terms, surfacing recurrent themes such as the need for working reflexively, acknowledging and navigating value tensions, and learning how to locate and sustain agency. In this sense, the glossary functions more like a diagram than a system, refraining from suggesting a single, unitary overview of the field and instead offering a set of complementary vistas, entry points, and insights.

We specifically asked for concepts that could be both critical and generative, capable of illuminating aspects that traditional concepts may obscure or fail to reveal. In addition to these concepts, we included an entry on »prototeams«, which explains the post-disciplinary mode of working introduced by the project. Prototeams foster the integration of knowledge across disciplines that is necessary for addressing the complex challenges faced by the project.

In an era in which digital transformation seems to have outpaced traditional design practices, the lexicon presented here sheds light on designerly thinking and practices that can tackle the complex challenges posed by modern technologies. In this sense, it offers a powerful counter-narrative for those who refuse to passively accept the sweeping changes brought by new technologies and instead seek to actively shape more inclusive, equitable, and sustainable digital futures.

HOW WILL WE CRAFT INCLUSIVE HUMAN-ALGORITHM RELATIONS?

Design anthropologists, data scientists, and engineers must learn to work together in the intricate process of designing algorithms and machine-learning pipelines. This collaboration is fundamental to developing the inclusive and reflexive practices necessary for fostering equitable digital futures for all members of society.

ALGORITHMIC SITES include all non-algorithmically mediated everyday practices and contexts where people make sense of algorithms and their transformative potential.

A focus on algorithmic sites shifts attention to meaning-making practices that unfold outside the relational, spatial, and temporal boundaries of human—computer interactions. This shift is crucial, because focusing solely on interactions excludes the experiences of those who do not or cannot engage directly with data-driven technologies but are still affected by hegemonic narratives of algorithmic life and the transformations that these technologies put in motion.

Contemporary empirical studies of algorithms often remain limited to artefacts and interfaces that facilitate human interaction with algorithmic code. However, as data-driven technologies increasingly aim to become ›invisible‹, there is an urgent need to understand how and where people make sense of algorithms without the mediating artefacts. The design anthropological concept of algorithmic sites encourages researchers to focus on the contingent everyday behaviours, attitudes, gestures, and emotions entangled with diverse understandings and perceptions of algorithms as these technologies continually transform daily life. The concept of algorithmic sites can inform novel

design processes and data practices by contextualising the social and cultural dynamics that give notions of algorithms a ›social life‹, such as imaginaries and folk theories. By doing so, algorithmic sites extend ethnographic approaches to account for the diverse relationships, human and non-human, that shape individual and collective notions of algorithms.

◯ KEY INSIGHTS

EXTENDED MEANING-MAKING PRACTICES
The idea of algorithmic sites calls attention to the everyday practices and contexts where people make sense of algorithms, beyond direct human—computer interactions.

SOCIAL AND CULTURAL DYNAMICS
Algorithmic sites ask designers to consider the social and cultural dynamics that shape understanding of algorithms and amplify the voices of those indirectly affected by algorithmic technologies and narratives.

◯ CASE STUDY

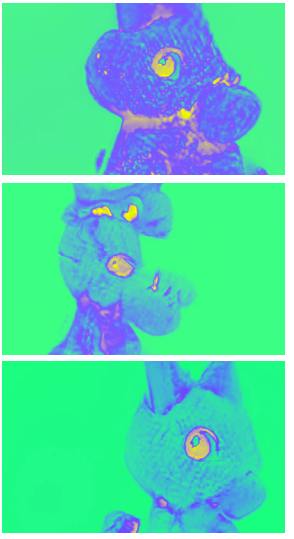
Ethnographic study (2022) by **Ignacio Garnham** in the algorithmic site of El Zonte, El Salvador, examining the *Bitcoin Beach* project's impact on local economic practices. The image captures how the community navigates the adoption of the Bitcoin algorithm through everyday engagements with material objects and practices.

◯ FURTHER READING

Garnham, I. & Smith, R. C. (2024). The social life of algorithmic values: Examining the impact of value-based frameworks in everyday life, in Westphal F., Peretz-Andersson, E., Riveiro M., Bach K., & Heintz F. (eds), *Proceedings of the 14th Scandinavian Conference on Artificial Intelligence,* SCAI 2024, 101—11. Linköping Electronic Conference Proceedings, 208. DOI.ORG/10.3384/ECP208012

Garnham, I. & Smith, R. C. (2023). The social life of algorithms: Tracing notions of algorithms beyond human—algorithm interactions, in Mori H., Asahi Y., Coman A., Vasilache S., & Rauterberg M. (eds), *HCI International 2023—Late Breaking Papers*. HCII 2023. Lecture Notes in Computer Science (Vol. 14056). Springer, Cham. DOI.ORG/10.1007/978-3-031-48044-7_20

REFLEXIVE DATA PRACTICES involve an introspective approach to addressing internalised biases in datasets used by algorithmic systems.



Reflexive Data Practices mark a significant departure from how data scientists and designers currently engage with AI. Instead of viewing AI systems as deterministic tools, reflexive data practices embrace the inherent uncertainties of machine learning, treating errors and surprises not as failures but as valuable indications, insights or opportunities for democratically contesting the outcomes of AI systems.

On the level of individuals, reflexive data practices are meant to raise awareness among data scientists and designers about the impactful, yet often undisclosed, choices they make. For data scientists, this includes critically examining decisions related to data wrangling, curation, and feature engineering. For designers, this includes reflecting on data training and curation in the use of generative AI tools and large language models (LLMs) by means of a variety of tactics including defamiliarisation and intentional bias exacerbation. On the level of companies, reflexive data practices can improve design processes by balancing technical choices, critical reflection, business imperatives, and organisational constraints.

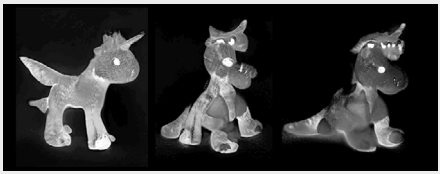
Unlike the engineering approaches to debiasing algorithms and datasets on a massive scale, reflexive data practices promote active human involvement, recognising that people interpret data through their social, cultural, and personal lenses. This shift towards relational design practices moves away from linear problem-solving frameworks, favouring dynamic processes of negotiation and reconfiguration.

◯ KEY INSIGHTS

ERRORS AND SURPRISES
In contrast to conventional engineering norms, errors and surprises are seen as opportunities for incorporating more diverse perspectives into the output of AI systems.

INTROSPECTION AND REFLEXIVITY
By using errors and surprises to engage in conversation with cultural norms and social hierarchies, reflexive data practices prompt data scientists and designers to confront their worldviews and biases in ways that counteract the system's opacity.

◯ CASE STUDY



Creating Monsters (2022) is a design project by **Anne Arzberger** that explores the queering of ›monstrous‹ child toys, merging unicorn and dinosaur features, to challenge personal biases and societal norms. The image illustrates reflexive tactics of data training and latent space navigation used to inspire designs to transcend traditional gender categories.

◯ FURTHER READING

Arzberger, A., Lupetti, M.L. & **Giaccardi, E.** (2024). Reflexive data curation: Embracing uncertainty in human–AI collaboration. Accepted for publication in *ACM Transactions of Computer–Human Interaction*.
JUST ACCEPTED (AUGUST 2024). DOI.ORG/10.1145/3689042

Balayn, A., **Yurrita Semperena,** M., Yang, J. & Gadiraju, U. (2023). »☑ Fairness toolkits, a checkbox culture?« On the factors that fragment developer practices in handling algorithmic harms, in *Proceedings of the 2023 AAAI/ACM Conference on AI, Ethics, and Society* (AIES '23). Association for Computing Machinery, New York, NY, USA, 482–495.
DOI.ORG/10.1145/3600211.3604674

INCLUSIVE DATA FUSION analyses and integrates diverse datasets for data-driven solutions that cater to historically marginalised or under-represented groups.

The use of inclusive data fusion is especially pertinent within transportation, where it surpasses conventional data integration methods by incorporating data from various transportation modes and user interactions. It combines structured data from both public and private mobility providers, alongside infrastructure data like traffic sensors and GPS information. Additionally, inclusive data fusion incorporates unstructured data from social media, user feedback, and crowd-sourced platforms, offering real-time insights into travel behaviours, preferences, and abilities, which are essential for tailoring the mobility experience and making it inclusive for everybody.

The application of inclusive data fusion can play a pivotal role in shaping the future of urban mobility by harnessing diverse datasets to inform decision-making processes that prioritise accessibility and customisation for all segments of society. Its significance is multifaceted. First, it ensures that mobility services are available to all people, including marginalised and underrepresented groups, thus promoting inclusivity. Second, it brings together structured and unstructured data to help

to understand travel preferences, informing better decision-making by planners and service providers to promote social equity.

○ KEY INSIGHTS

DIVERSE DATASETS
Inclusive data fusion addresses varied needs and priorities by considering diverse abilities, economic factors, and environmental sustainability in the development of personal mobility solutions.

DATA INTEGRATION AND ANALYSIS
Inclusive data fusion promotes the integration of diverse datasets to develop data-driven mobility solutions that cater to all people, including historically marginalised or underrepresented groups.

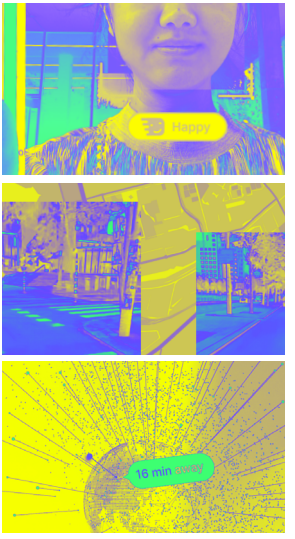
○ FURTHER READING

Turno, F. M. & Jackiva, I. Y. (2023). Graph-Based Approach for Personalized Travel Recommendations. *Transport and Telecommunication Journal*, 24(4), 423—433.
DOI.ORG/10.2478/TTJ-2023-0033

HOW WILL WE DESIGN AI SYSTEMS THAT BENEFIT PEOPLE AND THE PLANET?

Reimagining interaction with AI systems calls for new ways to negotiate the entangled relations and intentions of various human and nonhuman stakeholders. By fostering acts of inter-facing and contestation, designers can create new handles to address and manage potential power imbalances.

ACTS OF INTERFACING describe the dynamic and performative ways people connect with vast digital ecosystems, departing from traditional views of interfaces as static entities to be interpreted.



Acts of Interfacing emphasise ongoing processes where relationships within technological ecosystems are continually configured and reconfigured. They go beyond immediate button interactions, addressing broader socio-technical impacts of human—system interactions and system-to-system dynamics.

Unlike traditional interfaces, which focus on predictable interactions with static elements, acts of interfacing emphasise the dynamic and performative nature of these interactions. This means recognising that every interaction is part of a continuous process of negotiation and adjustment within a larger technological ecosystem. The fluidity of these interactions allows for a more nuanced understanding of how people engage with digital systems, acknowledging that these engagements are not fixed but constantly evolving.

Acts of interfacing reveal the dynamic, systemic, and planetary dimensions of interactions involving both human and nonhuman elements like algorithms and data flows. By tearing open the traditional interface with its smooth surfaces, acts of interfacing help locate and mobilise the

entangled agencies of multiple actors, both human and nonhuman. Recognising these more-than-human agencies allows for a deeper understanding of the existing control structures within these systems that can either be embraced or resisted. This engagement is crucial for identifying points of intervention and opportunities for co-performance, where multiple actors can collaborate to shape the system in meaningful ways, ultimately promoting a more inclusive and participatory approach to technology design.

KEY INSIGHTS

DYNAMIC RELATIONS
Acts of interfacing recognise that interactions with digital systems involve dynamic and performative engagements among diverse human and nonhuman actors, highlighting continuous negotiation and adaptation within digital ecosystems.

ENTANGLED AGENCIES
By illuminating the diverse human and nonhuman actors involved in co-performing agency, acts of interfacing expose existing control structures and reveal opportunities for intervention.

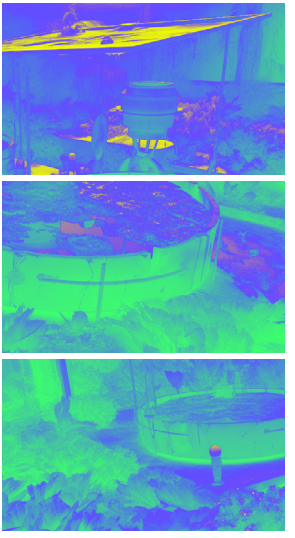
CASE STUDY

Cam Drive (2024) is a design experiment by **Yuxi Liu** exploring acts of interfacing in the context of food delivery services. Instead of tracking a map, customers receive live footage from the rider's perspective, revealing the delivery journey and challenging perceptions of convenience by exposing the hidden realities behind the service.

FURTHER READING

Liu, Y., Giaccardi, E., Redström, J. & Murray-Rust, D. (2024). Acts of interfacing in an entangled life, in Gray, C., Ciliotta Chehade, E., Hekkert, P., Forlano, L., Ciuccarelli, P., Lloyd, P. (eds), *DRS2024: Boston*, 23—28 June, Boston, USA.
DOI.ORG/10.21606/DRS.2024.779

CO-PREDICTIVE RELATIONS describe the dynamic interplay between algorithmic predictability and human unpredictability.



Co-predictive Relations underscores the complexity of interactions that blend physical and digital phenomena and environments, pointing to the mutual influence human behaviours and algorithmic models have on each other.

Co-predictive relations operate at the interface of virtual (simulated) and physical (actual) worlds. They suggest a productive path between an algorithmic system's intent to predict, and thus fix the identity, behaviour, and potentiality of agents, and the tendency of human actors to behave in complex, spontaneous, or unanticipated ways. Through the perspective opened up by co-predictive relations, the interaction between humans and predictive systems resembles a dance where both influence each other's capacity to imagine and act on the future in ways that express futurity. In turn, this form of co-performance posits the future itself as a co-produced horizon of possibility rather than a predetermined place or destination.

The concept prompts us to reconsider the design and use of predictive models. It encourages thinking beyond conventional applications focused solely on determining future outcomes.

By shifting from prediction (by algorithms) to co-prediction (by humans and algorithms), the impulse to reduce uncertainty is replaced by a more nuanced view of agency. Accordingly, no single agent determines the agential potentials of the other agents, and instead the freedom to shape, manifest, and therefore promote future possibilities is distributed across users, actors, and systems.

◯ KEY INSIGHTS

DYNAMIC INTERPLAY
Co-predictive relations emphasise the ongoing interaction and mutual shaping of algorithmic predictability and human unpredictability. They entail making outcomes more dynamic and spontaneous, and thus shape the future as a horizon of possibility rather than a predetermined outcome.

UNCERTAINTY AND UNPREDICTABILITY
Co-predictive relations challenge traditional approaches to prediction by adding a layer of unpredictability. They encourage designers to build contingency into models, embrace instead of hedge against uncertainty, and keep space for surprising, affective, or otherwise ›irrational‹ behaviour.

◯ CASE STUDY

Undoing Gracia (2023) is a design experiment by **Grace Turtle** exploring human—AI relationships. It conceptualises predictive AI as a ›borderland‹, where the self is fluid and the future open. Gracia, a digital twin of Grace's world, is inhabited by Grace and their generative agents—Lex, Tortugi, and Luna. Over weeks, they interact and evolve, transforming themselves and their world.

◯ FURTHER READING

Turtle, G.L. (2022). Mutant in the mirror: Queer becomings with AI, in Lockton, D., Lenzi, S., Hekkert, P., Oak, A., Sádaba, J., Lloyd, P. (eds), *DRS2022: Bilbao*, 25 June—3 July, Bilbao, Spain.
DOI.ORG/10.21606/DRS.2022.782

Turtle, G.L., Bendor, R. & Giaccardi, E. (2024). *Queering AI: Undoing the Self in the Algorithmic Borderlands*
[MANUSCRIPT SUBMITTED FOR PUBLICATION].

CONTESTABLE SYSTEMS are digital systems intentionally designed to enable citizens to challenge their decisions through their lifecycle.

The concept of contestability is an emerging principle recognised as a fundamental necessity as our society becomes increasingly entangled with algorithmic decision systems. While interpretations of contestation and contestability vary, they can be seen as an agonistic activity similar to democratic design where people and society in general need to engage, negotiate, and steer these technologies so they work for the benefit of all. Socio-technical agency pertaining to these technologies needs to be normalised and facilitated from the community level through to the design process itself by embedding affordances, levers, or opportunities for repair and reconfiguration.

While many algorithmic systems may be designed for contestability, all systems are inherently and necessarily contestable by whichever tactics available. Making this visible can be done by promoting adversarial debate arenas—spaces for adversarial debate between decision subjects (citizens) and system operators, that foster transparency and accountability in decision-making processes.

Contestable systems represent a shift towards a

broader design approach that embraces friction and refusal as human rights and ethical principles. This approach promotes an ongoing struggle and critical consensus before, during, and after the existence of these systems, which, in turn, are perceived as political artefacts. Contestability is therefore viewed as a form of agonistic pluralism, supporting continual evaluation and adaptation at the interface of human and machine decision-making.

◯ KEY INSIGHTS

HUMAN AGONISM
The design of contestable systems allows for human intervention at various stages, ensuring that decisions made by the system can be challenged and debated by individuals, both before and throughout the existence of the systems.

BROAD RANGE OF AFFORDANCES
Contestable systems can provide various affordances for contestation, including direct appeals to the decision system, participation in the design process as expert citizens, engagement with policymakers, and community-based interventions such as the Contestation Café model or emerging forms of AI Counterism.

◯ CASE STUDY

The Contestation Café (2022) is a speculative design project by **Robert Collins** exploring how the act of repair in the physical world translates into digital contestation against unfair AI and algorithmic systems. Inspired by the Repair Café model, the *Contestation Café* would teach individuals to contest and reclaim their agency. It features Fixers, experts who guide users in navigating and challenging automated decisions, empowering them to become Fixers of their own futures.

◯ FURTHER READING

Collins, R., Redström, J. & Rozendaal, M. (2024). The right to contestation: Towards repairing our interactions with algorithmic decision systems. *International Journal of Design*, 18(1), 95—106.
DOI.ORG/10.57698/V18I1.06

CALIBRATED TRUST refers to the design and implementation of AI systems that prioritise an iterative approach to ensure the development of trusted interactions.

Blind trust in AI systems can lead to overreliance and errors, while lack of trust can result in under-utilisation and underperformance of the system.

Unlike traditional notions of transparency, calibrated trust focuses on aligning the level of human trust with the capabilities of the AI system. It is especially relevant for AI systems classified as ›high-risk‹ by regulations like the European Union's AI Act, which can significantly impact people's health, safety, or fundamental rights, particularly in fields such as clinical AI.

Designers must prioritise calibrated trust as a central design aim for critical AI systems, implementing interventions to ensure that trust aligns with the system capabilities. Trust in AI systems is shaped by individual trust tendencies, contextual factors, and previous experiences with the system, both before and during interaction.

In clinical settings, factors influencing trust include the credibility and experience of the development team, training processes, clinical interaction, and the presence of a clinical ›champion‹ of the system. Clinicians' personal experiences, expertise, and interactions with the AI system also

influence their investment of trust in the system. Addressing these multifaceted dynamics can enhance human—AI collaboration and benefit patients.

◯ KEY INSIGHTS

CALIBRATED TRUST AS DESIGN PRIORITY
Achieving calibrated trust requires a focused design, development, and deployment process. Interventions for trust calibration are needed at various stages to ensure trust aligns appropriately with system capabilities.

CONTINUOUS MONITORING
Regular monitoring of AI performance and expert feedback are essential for maintaining trust and improving system performance, with trust repair mechanisms and moderation strategies needed to address breaches and adjust expectations.

◯ CASE STUDY

Analysis of design team dynamics at **Philips Design** in developing AI-powered ultrasound to expand access to maternal Healthcare (2022), aiming to decrease the training time of frontline workers in rural underserved communities who triage pregnant women. This case study, involving **Jacob Browne**, is part of DCODE research into Calibrated Trust as design principle to develop human-centered AI for clinical decision making.

◯ FURTHER READING

Browne, J. T., Bakker, S., Yu, B., **Lloyd, P. & Ben Allouch, S.** (2022). Trust in Clinical AI: Expanding the Unit of Analysis, in Schlobach S. et al. (eds), *HHAI2022: Augmenting Human Intellect*, 96—113. IOS Press Ebooks.
DOI.ORG/10.3233/FAIA220192

HOW WILL WE CREATE EQUITABLE SOCIO-ECONOMIC MODELS IN THE DIGITAL SOCIETY?

Data-driven technologies can enable unfair business models and economies. Surfacing and promoting alternative values is critical for more inclusive and sustainable socio-economic models in the digital society.

HAUNTOLOGY as applied in decolonial AI practices, involves understanding and mobilising contentious pasts to shape more inclusive digital futures.

Coined by French philosopher Jacques Derrida, hauntology merges the concepts of »haunting« and »ontology«, suggesting an ongoing dialogue with the ghosts of the past. These spectral presences, rooted in cultural, political, social, and economic legacies, persist in the present and exert influence on contemporary systems and future possibilities.

Hauntology challenges binary classifications of past, present, and future to encourage reflection on the complexities of historical influence. It offers an alternative understanding of temporality, one that is plural, political, situated, and constantly evolving.

As part of decolonial AI practices, hauntology explores how current design methodologies perpetuate and amplify colonial legacies digitally. In doing so, it extends beyond merely focusing on debiasing datasets to examine the flaws in the design processes intended to mitigate such biases. Recognising that coloniality operates as an independent system of oppression, even without colonial powers, hauntology highlights and addresses the relationship between the temporality

of design and the remnants of coloniality in systems. To achieve this goal, speculative tactics are used to summon and critically engage with historical influences, aiming to mitigate biases in datasets, outputs, and the individuals involved, while also shaping future possibilities.

○ KEY INSIGHTS

HISTORICAL LEGACIES
By maintaining a dialogue with the cultural, political, social, and economic legacies that persist and influence contemporary systems and future possibilities, hauntology offers designers a way to critically engage with the past and shape more inclusive futures.

SPECULATIVE TACTICS
Hauntology calls for speculative tactics to summon and engage with the ghosts of the past. By challenging binary time classifications, this metaphor invites designers to reflect on tensions within complex systems.

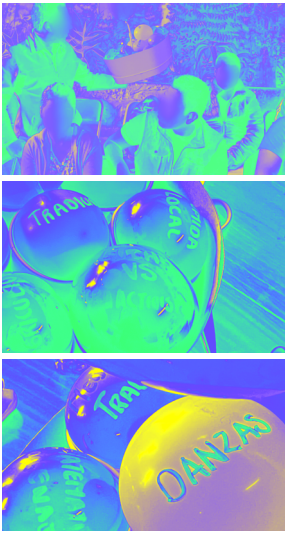
○ CASE STUDY

Hunting for ghosts of pasts & futures (2023) is a pedagogical experiment and a workshop format by **Mugdha Patil**, aimed at exploring how old ideas and assumptions from Western Industrialisation and colonialism still influence design today. Shown in the image are participants engaged in a symbolic »séance«, questioning these lingering impacts and seeking new, more aware design approaches.

○ FURTHER READING

Patil, M., Cila, N., Redstrom, J. & Giaccardi, E. (2024). In conversation with ghosts: Towards a hauntological approach to decolonial design practices in AI. *CoDesign,* 1—22.
DOI.ORG/10.1080/15710882.2024.2320269

COSMOVISION OF DATA is concerned with cultivating systemic relationships among humans, environments, and the order within which life is situated.



Cosmovision, particularly within the context of Indigenous Peoples from Latin America, involves both personal and collective comprehension of how life is situated between the physical and the spiritual dimensions of existence, and it symbolises the safeguarding of ancestral forms of knowledge, identity, and collaborative traditions.

Integrating cosmovision of data into research methodologies allows for the reassessment of technology's societal role, emphasising its relationality and integration within material and spiritual contexts. This approach promotes activism and mutual care within technological practices, acknowledging the interconnectedness of humans, nature, and data systems. Such integration challenges colonial assumptions that often underpin technology and impose development models, in favour of a more holistic and inclusive approach to innovation, grounded in respect for Indigenous ways of knowing, and ecological sustainability.

The perspective is informed by the specific cosmovision of the Masewal People in Mexico. It proposes novel approaches to data and information systems, integrating micro-, meso-, and

macro-cosmos perspectives. These offer designers different lenses for creating technologies that empower individual practices, foster communal actions, and support activist efforts.

KEY INSIGHTS

EPISTEMOLOGICAL ORIENTATION
Cosmovision influences how knowledge is preserved and shared in order to shape human—environment relationships and collective world-making processes. This orientation connects communal practices and activist efforts, emphasising the integration of cultural wisdom into broader societal and environmental contexts.

RELATIONAL TECHNOLOGY PERSPECTIVE
The notion rejects a view of technology as an abstract entity, and instead promotes a view of technology that is embedded in the order of life and must be perceived as a relational entity, rather than an isolated or independent one.

CASE STUDY

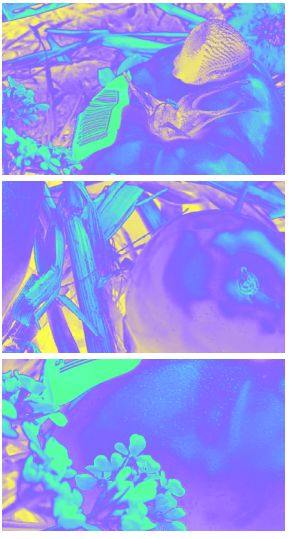
Fieldwork in Mexico (2023) by **Carlos Guerrero Millan** in collaboration with Tosepan, an Indigenous union of cooperatives formed by Masewal and Tutunaku individuals. In workshops, participants created prototypes powered by Indigenous values and explored how these principles could be integrated into technological efforts.

FURTHER READING

Guerrero Millan, C., Nissen, B. & Pschetz, L. (2024). Cosmovision of data: An Indigenous approach to technologies for self-determination, in *Proceedings of the CHI Conference on Human Factors in Computing Systems* (CHI '24), Article 167, 1—13. ACM, New York.
DOI.ORG/10.1145/3613904.3642598

Unión de Cooperativas Tosepan Titataniske, Consejo Altepet Tajpianij, AC Yeknemilis, Masehual Siuamej Mosenyolchicauani, et al. (2021). *Códice Masewal: Plan de vida, soñando los próximos cuarenta años.*
RETRIEVED FROM: TAEWALONI.NET/RECURSO/CODICE-MASEWAL/

PHENO-DATA promotes new data conceptualisations based on the ecologies and observable manifestations of living organisms in their environment.



Derived from »phenomena« and »data«, the term prompts a critical examination of the data concepts and practices that underpin Western industrialised socio-economic systems, considering their ethical and ecological implications. Pheno-data encourages exploration of data within interconnected ecologies of organisms, matter, and environments, focusing on ›livingness‹ as a way to regain our attentiveness, appreciation, and responsibility towards more-than-human ecologies.

Unlike standard datafication that abstracts entities, the ecological concept of pheno-data represents dynamic interactions between organisms and their surroundings, acknowledging how contextual interactions shape traits like colours, forms, movements, levels of responsiveness, and evolution through time. This challenges reductionist perspectives of data science, promotes diversity and resilience, and draws attention to the unpredictable aspect of data in context, contrasting with capitalist principles of uniformity and extraction.

Pheno-data emerges from practices of »phenofication«, helping designers to focus on the complexity of more-than-human ecosystems through

embodied, relational, and situated data given by multispecies. For example, foraging in human cultures connects individuals with their natural environment by attuning them to natural cycles of harvesting wild foods. In the field of design, these practices foster connections across multiple species, times, and spaces through sensory engagement, such as exploring colours, textures, and scents, and imagining more-than-human interactions. Observing the evolutionary diversity of plants enhances understanding of their context: not only their ecological interactions but also their cultural and historical significance and societal roles. This, in turn, cultivates community bonds, promotes ecological awareness and stewardship, and creates educational opportunities to enrich biodiversity.

◯ KEY INSIGHTS

SENSORY ENGAGEMENT
Pheno-fication helps practitioners reconnect with organisms' evolving bodies, allowing them to experience pheno-data that represents the vitality of living bodies and their ability to evoke emotions, memories, and imagination.

INTERSPECIES RELATIONS
Examining pheno-data within specific contexts highlights the intricate dynamics among humans, other species, and the environment. This approach allows designers to unveil the concrete significance of these relationships, diverging from prevalent anthropocentric narratives in economic, political, and technological realms.

◯ CASE STUDY

Fieldwork (2023) on urban farming in The Netherlands exploring how ecological data can influence sustainability goals through design methods. The image captures a data ecologies workshop by **Youngsil Lee** in collaboration with AMS, where participants examine the interconnected relationships between tomatoes, data, humans, and nature in a community garden setting.

◯ FURTHER READING

Lee, Y., Speed, C. & Pschetz, L. (2024). Pheno-data: Using tomatoes to rethink data and data practice for ecological worlds. *Human—Computer Interaction*, 1—23.
DOI.ORG/10.1080/07370024.2023.2300779

HOW WILL WE ENABLE PUBLIC DELIBERATION ON DATA AND ALGORITHMS?

Contracts between service providers, users, and third parties often complicate data generation, sharing, and flows. Building democratic forms of digital sovereignty and deliberation into systems is critical for democratic data governance.

ToSSPHERE refers to the dynamic and distributed policy ecosystems introduced by single Terms of Service (ToS) documents.

The ToSsphere encompasses the policies of the service itself and those from third-party service providers, as well as the legal frameworks they are bound by. The term combines »ToS«, the abbreviation for Terms of Service, and »sphere«, indicating the distributed, ecosystemic spaces where digital interactions occur.

The term foregrounds complexity by offering a conceptual framework to understand the intricate policy ecosystems present in modern connected environments. It surfaces power dynamics by using relational and power mapping that reveals the hidden digital ecosystems behind individual ToS agreements. By spatialising hierarchies, the term transforms ToS from flat documents into three-dimensional spaces distributed across geographies, shaped by the interactions among corporations, authorities, and individuals, thus enabling alternative design interventions. This allows for multiple-use scenarios with both individual ToS documents and the entire ecosystems they represent, thus creating a broader design space.

The conceptualisation of ToSsphere critiques the current practice of digital consent notices by

highlighting the overwhelming nature of the complex policy ecosystems that hide behind the single points of interaction typically represented with checkboxes or toggles for consent that accompany »I agree to Terms of Service« statements. By emphasising relationality within complexity, ToSsphere suggests the possibility of approaching these ecosystems as modular, enabling practices like patch-working, contestability, and public deliberation on data.

◯ KEY INSIGHTS

FOREGROUNDING COMPLEXITY
ToSsphere introduces a conceptual framework for designing systems and tools that help people navigate and understand intricate policy eco-systems and the interdependencies between various ToS documents.

RELATIONAL AND POWER MAPPING
By means of various mapping techniques, ToSsphere allows designers to unveil the power dynamics hidden within ecosystems, thus illustrating the distributed nature and relationships among corporations, authorities, and individuals, and making possible alternative design interventions.

◯ CASE STUDY

Unmaking of a femtech application's ToSsphere through its spatial mapping (2023). The image captures a section of the mapping done by **Seda Özçetin** in an urban forest in Umeå, Sweden, in exploration of insights to be gained through this unusual juxtaposition.

◯ FURTHER READING

Özçetin, S. & Redström, J. (2024). Rethinking ›Terms of Service‹ through programmatic time travel, in Gray, C., Ciliotta Chehade, E., Hekkert, P., Forlano, L., Ciuccarelli, P. & Lloyd, P. (eds), *DRS2024: Boston*, 23—28 June, Boston, USA.
DOI.ORG/10.21606/DRS.2024.838

Özçetin, S. & Wiltse, H. (2023). Terms of Entanglement: A posthumanist reading of Terms of Service. *Human—Computer Interaction*, 1—24.
DOI.ORG/10.1080/07370024.2023.2281928

DIGITAL CONSENT PRACTICES address consent for data disclosure in digital interactions as an ongoing process of information, dialogue, and negotiation.

Rather than viewing consent as a one-time agreement, digital consent practices conceptualise it as an ongoing process, fostering a participatory and evolving relationship between organisations and people.

Compared to existing practices, this reconceptualisation offers a more comprehensive and nuanced understanding of informed consent. It acknowledges the complexity of current consent practices, the individual and societal impact of data extraction, and the importance of considering both organisations and people's needs, values, and relations over time. It thereby recognises that consent is not just an exchange, but a transformation of the relationship between parties based on autonomy. Accordingly, it emphasises the need for designing for the wider scope of consent, including data practices and digital platform relations, rather than solely focusing on the UX/UI design of consent notices.

Digital consent practices are used to frame the interaction between organisations and people according to principles of continuous dialogue and adaptability. They emphasise the importance of

maintaining an active and evolving consent process, which can adapt over time to changes in user preferences and organisational needs, while keeping power dynamics transparent. Overall, this reconceptualisation of consenting to data disclosure seeks to address the limitations of current practices and challenge current policies that often facilitate quick and easy single-moment interactions.

○ KEY INSIGHTS

TEMPORAL ELEMENT
Digital consent is a dynamic journey that evolves over time and necessitates ongoing dialogue, communication, and engagement between people and systems.

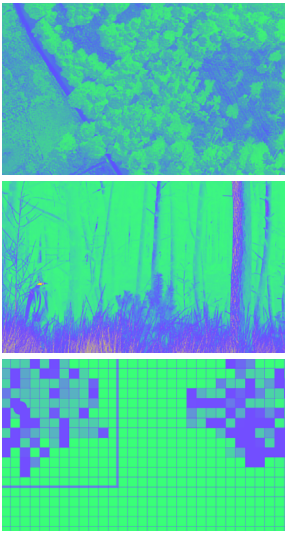
ADAPTABILITY
Emphasising adaptability, these practices allow the consent process to evolve in response to changes in user preferences and organisational needs.

○ FURTHER READING

Kempeneers, A.R. (2022). *Consent practices and disclosure interactions in the context of digital platforms* (Master's thesis, Delft University of Technology, Delft, The Netherlands).
RESOLVER.TUDELFT.NL/UUID:C758975D-8327-4595-B799-83EEB9FA841E

PUBLIC DELIBERATION ON DATA

calls for a participatory design approach adapted to the complexities of data-driven systems.



Public Deliberation on Data spans various scales and contexts, grounding data practices in everyday life and creating pathways to incorporate various stakeholder concerns, needs, and values into making meaningful changes to the socio-technical systems with which we are intertwined.

Proprietary data practices, anchored in corporate governance, reinforce power structures through extensive monitoring, prediction, and control. Given the significant impact of data-intensive systems—such as large language models (LLMs), image recognition, and algorithmic decision-making—these data practices can potentially undermine human integrity and democratic values by leveraging personal data for targeted behavioural modification.

Public deliberation on data differs from dominant data practices by prioritising public participation and fostering our collective responsibility to shape data production and use. It embodies a critical shift towards participatory design approaches that foster informed discourse, transparency, accountability, and the development of alternative paths that align with societal values and interests.

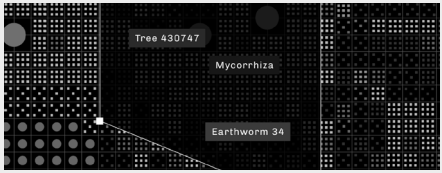
The main goal of designing for public deliberation on data is to secure data practices that are in the public interest and to uphold principles of democratic governance for data-intensive systems. For example, this approach can benefit the public interest by enhancing data literacy through storytelling and creating alternative narratives that could influence public discourse. It could also balance stakeholder dynamics, support advocacy for equitable resource allocation, infrastructure development, and, where possible, legislative change.

○ KEY INSIGHTS

EXPANDING BOUNDARIES
Extending public discourse beyond formal legislative bodies and political processes, is crucial for designers to seed discussions about the rules, dynamics, and power structures governing digitalisation.

RESHAPING NARRATIVES
Deliberative processes are catalysts for change. Employed by designers, they help reshape narratives and public discourse, influence dynamics among stakeholders, and impact the allocation of resources, infrastructures, and legislation.

○ CASE STUDY



Eco-urban futures (2023) is a project by **Seowoo Nam** in collaboration with Lucidminds AI. The project uses the concept of more-than-human bodies to explore new ways of interpreting and acting upon data, promoting participatory forest governance and urging policy-makers, urban planners, and citizens to reimagine healthier futures for ›us-with-the-forest‹.

○ FURTHER READING

Nam, S. (2023). *Eco-Urban Futures: A More-than-human Approach to Multi-Agent Simulation for the Digital Twin of Urban Forests* (Master's thesis, Delft University of Technology, Delft, The Netherlands).
RESOLVER.TUDELFT.NL/UUID:F0E9FC14-3555-4DD3-A41F-5C17BF1BEFCB

HOW WILL WE PROTOTYPE RESPONSIBLE DATA-DRIVEN DESIGN PRACTICES?

The responsible and sustainable digital transformation of society requires the prototyping of design practices that can ground anticipatory, deliberative, responsive, and inclusive innovation approaches, moving beyond value-based and compliance frameworks.

AI AS MORAL DEVICE recognises the tendency to consider AI systems as tools for streamlining ethical decisions without considering their underpinning political power structures.

The concept »moral device« draws from Albert Borgmann's moral philosophy, where it describes an automated tool that enables quick and simple moral decisions without the requirement of deeper knowledge or reflection upon the situation.

Given recent critiques of the biases ingrained in AI systems and the contextual nature of ethics, the aspiration for AI to provide indisputable moral answers seems to reflect an unattainable idealisation of technology that overlooks the complexity of moral decision-making. It risks commodifying morality and neglecting essential aspects of life that lie beyond convenience, including grappling with difficult choices and fostering meaningful connections with others and the world.

The notion of AI as moral device also depoliticises the application of AI in fields of broad social importance—such as social welfare, automated warfare, or economic equity—by considering AI systems as objective and thus better than human decision-making. By applying the lens of the device paradigm to AI and automated decision making, researchers investigating the socio-technical entanglements of data, automation, and politics

have a sharper vocabulary to identify the dynamics which contribute to this idealisation and depoliticisation of AI systems.

○ KEY INSIGHTS

CRITIQUE OF NORMATIVE STANDARDS
Viewing AI as a moral tool fosters a critical understanding of AI as an entity that commodifies ethics and diminishes opportunities for reflection and introspection, thereby questioning the application of normative standards.

POLITICISATION
This perspective also enables designers to challenge AI's alleged superior moral reasoning, often attributed to its extensive access to data, and to resist the automation of moral decisions, which effectively depoliticises the core components of AI, including datasets, models, and infrastructure.

○ FURTHER READING

Rattay, S., Rozendaal, M. & Shklovski, I. (2024). AI as the final moral device: Ethics in Industry AI imaginaries [MANUSCRIPT SUBMITTED FOR PUBLICATION].

LOGIC OF COMPLIANCE points to the intricate, intersecting legal mandates that affect the practical implementation of data governance.

Originating from the traditional legal concept of compliance, this term points to the obligation to adhere to quality standards and laws as this obligation is interpreted and implemented in technical practices by experts. It encompasses the justifications experts use as they bridge the gap between envisioned data governance laws and their interpretation and implementation in technical practice.

The term »compliance« in the context of the EU data regulation grounds legal expectations within technical practices. Drawing on Annemarie Mol's theory of the logic of practice, the term »logic of compliance« elucidates the rationales and justifications behind experts' contested practices when meeting regulatory obligations. In the EU's regulatory framework for Responsible AI, compliance ensures data quality, a critical objective under the AI Act. This is vital in high-risk domains such as healthcare, for example, where compliance underscores the regulatory paradox of balancing data quality with stringent regulatory obligations such as GDPR, where ensuring GDPR compliance in data collection can impact dataset

representativeness, essential for accuracy and overall quality in developing medical algorithmic systems responsibly.

Against this background, the logic of compliance serves a dual role: it justifies responsible data-driven processes while at the same time enabling compromises in outcomes such as, for example, the pursuit of high-quality datasets.

○ KEY INSIGHTS

NAVIGATING RESPONSIBLE CONDUCT AND DATASET INTEGRITY

The logic of compliance points to the importance of understanding how to navigate between facilitating responsible conduct and addressing challenges that affect dataset integrity and regulatory adherence.

PAYING ATTENTION TO MODES OF JUSTIFICATION

Compliance is not a simple matter of following rules, but requires negotiating justifications for managing contradictions and trade-offs in practice.

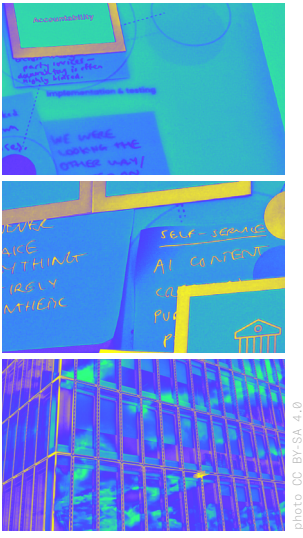
○ FURTHER READING

Avlona, N-R. & Shklovski, I. (2024). Torquing patients into data: Enactments of care about, for and through medical data in algorithmic systems. *Information, Communication & Society*, 27(4), 735—57.

DOI.ORG/10.1080/1369118X.2024.2320922

ARTIFICIAL INTELLIGENCE GOVERNANCE

concerns the multidimensional effort to ensure the responsible development and use of AI systems.



AI Governance comprises the design of institutional policies, regulatory frameworks, codes of conduct, and organisational processes. These efforts aim to tackle risks and harms associated with the integration of AI into everyday life, and to build guardrails for protecting fundamental rights.

In practice, AI governance can be multidimensional and even conflicting, involving a variety of domains, sectors, values, and practices. From a socio-technical perspective, AI governance can be thought of as a combination of internal and external governance practices continuously engaging with and influencing each other. Internal AI governance involves establishing organizational structures, conducting internal assessments and audits, and implementing accountability mechanisms. On the other hand, external AI governance focuses on inter-institutional relationships, regulatory initiatives, legislation, and public policies that align AI governance with public needs. While these efforts aim to protect and serve public interest, they can often be rigid, vague, and challenging to put into action in real contexts.

KEY INSIGHTS

SITUATING VALUE TENSIONS
Situating AI Governance within particular socio-technical and organisational contexts allows us to move away from abstracted values and principles, and towards embedded value tensions in practice.

SUSTAINED NEGOTIATION
AI Governance and its practice requires continuous negotiation within a shifting ecosystem of actors, organisations, infrastructures, and their interdependencies.

CASE STUDY

Mapping Responsible AI (2023) by **Aditi Surana** is a project conducted with the BBC to understand the distribution of roles and responsibilities across a typical AI pipeline. The image showcases a design board at a workshop conducted with internal stakeholders and staff members to unpack issues of organisational responsibility and procedural accountability as part of applying AI governance frameworks to practice.

FURTHER READING

Urquhart, L. D., McGarry, G. & Crabtree, A. (2022). Legal Provocations for HCI in the Design and Development of Trustworthy Autonomous Systems, *Nordic Human—Computer Interaction Conference*, 1—12.
DOI.ORG/10.1145/3546155.3546690

PROTOTEAMS are provisional or speculative teams prototyping and rehearsing future design practices.

Formed of researchers and practitioners from various disciplinary and professional backgrounds, prototeams work speculatively in real world-contexts. Prototeams address concrete cases by prototyping not only novel propositions with real-world applicability in various domains, but mainly revealing the knowledge and skills required to make those propositions in the first place.

Unlike regular multidisciplinary or interdisciplinary teams, prototeams are not fully functional teams. They are a provisional and speculative form of exploration, where team members come together to try out, to learn from their differences, and ultimately to make mistakes, as they work out how to cut across different expertises and disciplines. The »proto« is necessary to make failure normal, possible, expected—embracing the challenge of working ›after‹ existing design fields and ›before‹ a design brief is even formed.

A prototeams approach recognises the intractable nature of complex socio-technical design challenges and works to reveal the dimensions of this complexity. Teams are made up of individuals that do not share methods, but arrive with different

ways of knowing and doing, and are unsure of what ›success‹ might look like. Prototeams court failure rather than pursue a positivist path that provides predictable outcomes. By retaining a reflexive approach, they chart and illuminate the many unexpected, unrepresented, and marginalised aspects of designing with and through data-driven systems.

◯ KEY INSIGHTS

TRANSDISCIPLINARY BACKGROUNDS
Prototeams consist of researchers and practitioners from varied backgrounds working in real-world settings to prototype future professional design roles and practices, particularly addressing cases involving ›data complications‹.

EMBRACING FAILURE
Unlike fully functional teams, prototeams are temporary and exploratory, emphasising learning from diverse expertise and embracing failure as a normal part of the process to tackle complex sociotechnical design challenges.

REFLEXIVE APPROACH
Prototeams adopt a reflexive approach to reveal the complexities of design challenges, illuminate marginalised aspects, and embrace contingency and the possibility of failure over predictable outcomes.

◯ CASE STUDY

Uncommon Crowd (2022) is a **prototeam** experiment in collaboration with AMS and Open Future, exploring urban sensing technologies. The image illustrates a LARP in Bilbao where participants assumed various urban identities—such as CCTV cameras and undocumented immigrants—and contributed data reflecting those perspectives to the system.

◯ FURTHER READING

Turtle, G.L., Guerrero Millan, C., Özçetin, S., Patil, M. & Bendor, R. (2022). Sensing in the wild: A DCODE DRS Lab exploring a more-than-human approach to distributed urban sensing, in Lockton, D., Lloyd, P., Lenzi, S. (eds), *DRS2022: Bilbao*, 25 June—3 July, Bilbao, Spain.
DOI.ORG/10.21606/DRS.2022.912

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CONTRIBUTION

- **Reflexive Data Practices (p.16)**

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Lawyer and researcher from Greece. She focuses on the role of compliance and human expertise in the responsible design and deployment of AI systems. Natalia holds a Master's in Human Rights Law (LLM) from King's College London. She has worked on open-tech governance and gender issues for policy organisations and EU programmes.

CONTRIBUTION

- **Logic of Compliance (p.72)**

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CONTRIBUTIONS

- **Calibrated Trust (p.37)**
- **Prototeams (p.79)**

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CONTRIBUTIONS

- **Co-predictive relations (p.29)**
- **Prototeams (p.79)**

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CONTRIBUTION

- **Calibrated Trust (p.37)**

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CONTRIBUTION

- **Hauntology (p.42)**

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Irish artist and creative technician. His work explores the inherent noise and saturation of information in contemporary society through speculative artefacts and participatory design. He holds a Master's in Interactive Media from the University of Limerick.

CONTRIBUTIONS:

- **Contestable Systems (p.33)**

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Interdisciplinary researcher from Chile developing ethnographic approaches to investigate the co-evolution of algorithmic and social systems. He holds an MFA in Transdisciplinary Design from Parsons School of Design, has a background in social entrepreneurship, and is an alumnus of the Santa Fe and the Diverse Intelligence Institutes.

CONTRIBUTIONS:

- **Algorithmic Sites (p.12)**

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CONTRIBUTIONS:

- **Reflexive Data Practices (p.16)**
- **Acts of Interfacing (p.25)**
- **Hauntology (p.42)**
- **Prototeams (p.79)**

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Holds a Bachelor's and Licentiate in Architecture from Costa Rica and a double Master's in Urbanism and Sustainable Design from Germany and Egypt. Her current work, guided by anti-colonial and feminist perspectives, focuses on participatory design, social justice, and collaborative governance for more equitable digital futures.

CONTRIBUTIONS:

- **Public Deliberation on Data (p.63)**

CARLOS GUERRERO MILLAN

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Interdisciplinary designer and researcher from Mexico. His work focuses on community technologies, particularly collaborating with an Indigenous cooperative organisation. He is working on the co-creation of local notions of data and information, addressing topics of participation and technology appropriation for a community-led database.

CONTRIBUTIONS:

- **Cosmovision of Data (p.46)**

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CONTRIBUTIONS:

- **Inclusive Data Fusion (p.20)**
- **Prototeams (p.79)**

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Dutch technology consultant specialising in digital ethics. She holds a double degree in Strategic Product Design and Design for Interaction from Delft University of Technology. She was awarded Best Faculty Graduate 2022 for her graduation project within the DCODE Labs.

CONTRIBUTIONS:

- **Digital Consent Practices (p.59)**

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CONTRIBUTIONS:

- **Pheno-data (p.50)**

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CONTRIBUTIONS:

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CONTRIBUTIONS:

- **Calibrated Trust (p.37)**

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CONTRIBUTIONS:

- **AI Governance (p.76)**

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CONTRIBUTIONS:

- **Acts of Interfacing (p.25)**

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CONTRIBUTIONS:

- **Cosmovision of Data (p.46)**

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Designer from Turkey exploring care-centric approaches to forming relations with connected things. She holds an MSc and a Bachelor's in Industrial Design from Middle East Technical University (METU) and an MSc in Entrepreneurship from Lund University. She is also the co-founder and lead designer of Hamide Design Studio.

CONTRIBUTIONS:

- **ToSsphere (p.55)**

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Designer and researcher from India, combining public pedagogy, politics, data, and speculative thinking to designing for equitable futures. She has pursued graduate studies in Design Innovation and Citizenship from the Glasgow School of Art.

CONTRIBUTIONS:

- **Hauntology (p.42)**

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CONTRIBUTIONS:

- **Cosmovision of Data (p.46)**
- **Pheno-data (p.50)**

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CONTRIBUTIONS:

- **Calibrated Trust (p.37)**
- **Prototeams (p.79)**

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CONTRIBUTIONS:

- **Calibrated Trust (p.37)**

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CONTRIBUTIONS:

- **AI as Moral Device (p.68)**

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- **Acts of Interfacing (p. 25)**
- **Hauntology (p. 42)**
- **ToSsphere (p. 55)**
- **Public Deliberation on Data (p. 63)**
- **Prototeams (p. 79)**

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CONTRIBUTIONS:

- **Reflexive Data Practices (p. 16)**

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CONTRIBUTIONS:

- **Prototeams (p. 79)**

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CONTRIBUTIONS:

- **Algorithmic Sites (p. 12)**
- **Prototeams (p. 79)**

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CONTRIBUTIONS:

- **Pheno-data (p. 50)**
- **Prototeams (p. 79)**

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CONTRIBUTIONS:

- **AI Governance (p.76)**

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CONTRIBUTIONS:

- **Inclusive Data Fusion (p.20)**

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CONTRIBUTIONS:

- **Co-predictive relations (p.29)**

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CONTRIBUTIONS:

- **AI Governance (p.76)**

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CONTRIBUTIONS:

- **Public Deliberation on Data (p.63)**
- **Digital Consent Practices (p.59)**
- **Prototeams (p.79)**

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Umeå Institute of Design
Umeå University

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From March 2023

LUCIDMINDS

From March 2023

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Leids Universitair Medisch Centrum

Until February 2024

PHILIPS

From March 2024

Politecnico Milano 1863
Dipartimento di Design

ALGORITHMIC SITES
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REFLEXIVE DATA PRACTICES
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PUBLIC DELIBERATION ON DATA
Illustration, Seowoo Nam
Photos, PK15

AI GOVERNANCE
Workshop images, Aditi Surana
BBC Scotland offices (cover image)
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PROTOTEAMS
Carlos Guerrero Millan

Rethink Design—
A Vocabulary for Designing with AI
Ebook

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PK15 (AT/NL)

PROOFREADING
Helen Bleck (UK)

PUBLISHER
TU Delft OPEN Publishing
Delft University of Technology,
The Netherlands

DOI: doi.org/10.59490/mg.110
ISBN: 978-94-6366-914-6

KEYWORDS
AI, design, data, governance, human—algorithm interactions

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CONFLICT OF INTEREST
No conflict of interest to disclose.

USE OF AI
During the preparation of this work, the authors used ChatGPT 3.5 in order to provide the texts with uniform language and tone. After using this tool/service, the author(s) reviewed, edited and made the content their own as needed and take(s) full responsibility for the content of the publication.

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FUNDER INFORMATION AND GRANT NUMBER:
This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreement No 955990.

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The sweeping presence of Artificial Intelligence (AI) can be felt across nearly all social and economic domains. While the emergent, ›black-boxed‹ character of AI makes it difficult to pin down and interrogate, designers can ill afford not to engage with it in a pragmatic yet critical manner. This book collects 17 key terms reflecting the entangled nature of designing with AI, and touches on the effects of human—algorithm relations, the ethics of data collection and curation, the politics of multi-stakeholder collaboration with AI, and the need to develop democratic mechanisms to govern complex algorithmic systems. Taken together the terms provide an entry point for critically considering the challenges of designing with AI, while illustrating the value of design as a cross-disciplinary field of thinking and doing.

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