Co-Creation Toolkit Step 1:
Understanding the Foundations of Co-Creation

This resource will help you understand what co-creation is, and why people use it.

When you are done reading this document, proceed to 'Co-Creation Toolkit Step 2: The Cycle (A How-To Guide)'.

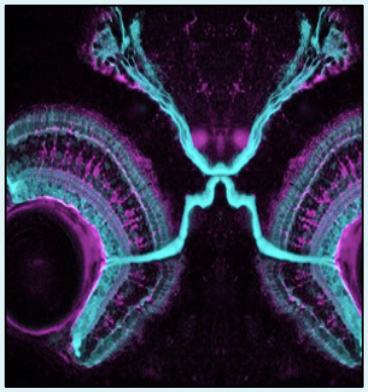
What is Co-Creation?

Co-creation is a collaborative and transformative research approach wherein researchers work directly with the people, communities, and sectors affected by an issue to jointly define problems, design and test ideas, and evaluate outcomes. While co-creation is often used to describe collaboration between academic and non-academic partners, it can also take place between researchers from different disciplinary backgrounds who work together as equal partners to shape the direction, methods, and interpretation of research. It refers to "any act of collective creativity that involves a broad range of relevant and affected actors in creative problem-solving that aims to produce a desired outcome."[i]

Co-creation is not just a buzzword. It is a rigorous way of ensuring research fits real-world contexts, values, and needs.

This is particularly useful and important in science and technology research and innovation, in part due to what is called the Collingridge Dilemma[ii]: in early stages of development, it is difficult to know exactly how technology will impact society. However, once the technology has become embedded, it is difficult to influence its development. One way to mitigate unforeseen risks and challenges is to embed co-creation into the process.

Lessons from the Field 1: Google Glass



Google Glass, launched in 2013, was an augmented-reality headset that projected digital information onto a transparent screen within the user's field of vision. It promised a seamless fusion of digital and physical worlds with hands-free access to data, images, and communication. Early adopters in healthcare envisioned it as a clinical tool: surgeons could stream live operations, access patient data mid-procedure, or consult remotely without breaking sterility.

However, Glass's short commercial life revealed deep sociotechnical frictions. Technical flaws like poor battery life, limited memory, unreliable connectivity hampered clinical performance. More consequentially, public reaction to its always-on camera crystallized anxieties about surveillance and privacy. Businesses declared "Glass-free zones," and media coined the epithet "Glasshole" for users seen as intrusive. In healthcare, concerns arose about recording patients without consent and data synchronization with Google's cloud. By 2015, Google withdrew the consumer version, later re-releasing it for enterprise settings only.

Ethically, Google Glass exemplifies the Collingridge dilemma: in early development, its social effects were unpredictable; once evident, the technology was already stigmatized and difficult to reorient. Furthermore, Google Glass reshaped the very meaning of privacy by blurring public and private perception, augmenting human vision with data layers that challenge moral norms of attention and consent. The company's promise to "put you back in control of your technology" masked asymmetries of power between users, bystanders, and corporate data infrastructures.

The device's failure underscores that innovation cannot rely on technical novelty alone; it must anticipate value mediation. Had Google engaged potential users, regulators, and publics in co-design and reflection before large-scale rollout, social acceptance might have evolved differently. For future AR or wearable systems, responsible co-creation means embedding deliberation about visibility, consent, and embodiment into design processes rather than retrofitting ethics after backlash.

Dougherty, Bryn, and Sherif M Badawy. "Using Google Glass in Nonsurgical Medical Settings: Systematic Review." JMIR mHealth and uHealth 5, no. 10 (2017): e159. https://doi.org/10.2196/mhealth.8671.

Kudina, Olya, and Peter-Paul Verbeek. "Ethics from Within: Google Glass, the Collingridge Dilemma, and the Mediated Value of Privacy." Science, Technology, & Human Values 44, no. 2 (2019): 291–314. https://doi.org/10.1177/0162243918793711.

Martinez-Millana, Antonio, Jose-Luis Bayo-Monton, Aroa Lizondo, Carlos Fernandez-Llatas, and Vicente Traver. "Evaluation of Google Glass Technical Limitations on Their Integration in Medical Systems." Sensors 16, no. 12 (2016): 2142. https://doi.org/10.3390/s16122142.

Wei, Nancy J, Bryn Dougherty, Aundria Myers, and Sherif M Badawy. "Using Google Glass in Surgical Settings: Systematic Review." JMIR mHealth and uHealth 6, no. 3 (2018): e54. https://doi.org/10.2196/mhealth.9409.

Co-Creation as Transformative Knowledge Production

Different approaches to knowledge production are described as Mode 1, 2, and 3[iii]. Mode 1 is the traditional way of doing research. In this approach, knowledge is created mainly inside universities and research institutions by experts who work within a single academic field, like physics, biology, or sociology. Researchers focus on building theories and discovering new facts that are seen as universal, or context-free. Once the discoveries are made, they are later shared or applied to real-world problems by others, such as engineers, doctors, or policymakers. In Mode 1, what counts as "good" knowledge is decided by other experts in the same discipline, following established scientific rules and standards.

Mode 2 is a more collaborative way of creating knowledge. Instead of keeping research within universities or labs, Mode 2 involves working directly with society. Researchers across disciplines team up with the people who are affected by the issue, like citizens, policymakers, businesses, and community groups, to co-create knowledge together. The process is cooperative and interactive, rather than experts simply handing down results from above. In addition to finding answers to fundamental or technical questions, in Mode 2, success starts to be measured by social impact and practical outcomes.

Mode 3 goes even further to a transformative way of creating knowledge. It doesn't just try to solve individual problems but aims to change the larger systems that cause those problems. For example, Mode 3 looks at how to make collaboration and shared learning a regular part of how organizations, governments, and communities operate. It brings together many different groups (universities, industries, governments, non-profits, and citizens) across different levels of society. The goal is long-term, system-wide transformation[iv]. The knowledge produced not only helps solve issues but also reshapes the values, relationships, and structures in society. Over time, these changes reinforce each other, leading to lasting improvements in how society works and learns.

Lessons from the Field 2: Sidewalk Toronto

The Toronto Smart Sidewalk, or Sidewalk Toronto, was a proposed partnership between Google's Sidewalk Labs and the public agency Waterfront Toronto to redevelop a section of the city's eastern waterfront into a smart city "from the internet up". Envisioned as a data-driven urban district powered by sensors, Wi-Fi, autonomous vehicles, and algorithmic management, it aimed to demonstrate how digital infrastructure could optimize energy use, mobility, and governance. Sidewalk Labs pledged $50 million to pilot technologies that would make this part of the city a model of efficient urbanism.

From the outset, however, the project provoked backlash over data governance, privatization, and democratic accountability. Residents and civil-society groups questioned who would own and manage the vast quantities of personal and environmental data collected by ubiquitous sensors. Critics argued that Sidewalk Labs blurred the boundary between civic planning and corporate experimentation. Meetings revealed fears that data decisions were treated as infallible and that opting out of surveillance would be impossible. The project, scholars argued, represented a new form of data colonialism, extracting citizens' behavioral information as an economic resource.

Empirical analyses confirm that declining public trust, opaque decision-making, and perceived corporate overreach drove the project's demise. Shimizu et al. identified three compounding factors: concerns about data storage outside Canada, dissatisfaction with Sidewalk's evasive communication, and suspicion that the company sought to influence public authority through tax concessions and expansion plans. As distrust deepened, social acceptance collapsed, leading Sidewalk Labs to withdraw in May 2020.

Ethically, the Toronto case crystallizes key tensions in smart-city innovation: between efficiency and autonomy, participation and surveillance, local governance and global corporate power. It exposes how co-creation rhetoric can mask asymmetrical control over data and design. The lesson is that truly "smart" cities must prioritize procedural justice (open data standards, local data trusts, and citizen oversight) over proprietary platforms. Toronto's experience stands as a cautionary reminder that civic legitimacy, not technical sophistication, determines the fate of urban innovation.

Shimizu, Yuho, Shin Osaki, Takaaki Hashimoto, and Kaori Karasawa. "Social Acceptance of Smart City Projects: Focus on the Sidewalk Toronto Case." Frontiers in Environmental Science 10 (May 2022): 898922. https://doi.org/10.3389/fenvs.2022.898922.

The Canadian Press. "Sidewalk Labs Releases Plan for Controversial Toronto Development amid Concerns about Privacy | CBC News." CBC News, June 24, 2019.

The Canadian Press. "Sidewalk Wants Cut of Property Taxes and Development Fees for Quayside Project | CBC News." CBC News, February 15, 2019.

The Mode 2 To Mode 3 Pipeline: Dutch ULLs

The following three examples illustrate how co-created research and innovation unfold in practice – from project-based, collaborative experiments in Mode 2 to co-creation that becomes embedded, self-sustaining, and system shaping in Mode 3.

Rotterdam, the Hague Region: Urban Living Labs

In Urban Living Labs (ULLs), researchers, residents, municipal actors, industry, and social organizations worked together to prototype solutions related to housing, sustainability, neighborhood planning, and quality of life. In the Mooi Mooier Middelland initiative, partners co-designed interventions to improve community wellbeing. In the "concept-house" initiative, partners collaborated on sustainable housing prototypes. The work generated valuable shared knowledge: learning cycles were iterative, community concerns shaped design, and research evidence was translated quickly into tangible interventions[v].

This is co-creation practiced well. However, it largely remained within the scale of the individual project. Knowledge was produced with communities, but the system itself did not structurally change. Therefore, it is an example of Mode 2 knowledge production.

Amsterdam, Buiksloterham: A Living Lab Manifesto

Buiksloterham in Amsterdam North began as a localized living lab in which residents, builders, public officials, knowledge institutions, and entrepreneurs collaboratively redesigned a former industrial area into a circular neighborhood. Early work involved co-designing waste systems, green mobility infrastructure, decentralized energy solutions, and participatory land-use planning. This phase reflects Mode 2: multi-stakeholder problem-solving embedded in a real setting, driven by shared experimentation rather than top-down planning. Over time, the neighborhood moved toward something closer to Mode 3. In 2015, more than twenty organizations signed the Manifesto Circular Buiksloterham, formalizing co-creation commitments and establishing a durable governance framework. Experimentation expanded, learning processes stabilized, and co-design became an ongoing method rather than a one-off project[vi].

However, research indicates that the transition toward Mode 3 is incomplete and uneven. While governance structures matured, participation was not always equitable, and institutional

fragmentation sometimes limited systemic transformation. This case therefore exemplifies a Mode 2 initiative *evolving* toward Mode 3, showing both the promise of long-term co-creation and the structural challenges that must be addressed to achieve full transformation.

SUMMALab: Scaling Co-Creation Across Dutch Cities

The SUMMALab network is a compelling example of a knowledge-production model intentionally designed to exceed the limits of Mode 2. Instead of operating as a single living lab, SUMMALab acts as a meta-lab linking multiple local labs across the Netherlands to share learning, compare experiments, and accelerate innovation on urban mobility.

Local labs continue to prototype solutions in context by trialling new mobility technologies, street designs, behavior models, and governance structures. In Mode 2 terms, this remains situated, collaborative, and iterative. What makes SUMMALab different is the infrastructure that connects these labs, enabling them to learn not only within projects but between them. Shared evaluation frameworks, cross-city reflection processes, and distributed-learning mechanisms help innovations travel more easily across municipalities and policy contexts[vii].

This structure reflects Mode 3 knowledge production: co-creation becomes a system property rather than an intervention. The meta-lab shifts co-production from isolated experiments to a networked learning architecture designed for long-term adaptability and system transformation.

While co-creation and Mode 1 are incompatible approaches, co-creation can be used to accomplish goals that lie on a continuum between Mode 2 and Mode 3.

Co-Creation Rationales

Co-creation works best when everyone involved understands the rationale for using co-creation. Rationales for using co-creation can be informed by history, empirical research, and/or new or pre-existing theory[viii]. Rationales give partners a way to hypothesize why co-creation is valuable, not just as a practical method, but as something that fits with deeper ideas about how people, systems, and knowledge work. These rationales should be stated explicitly and revised during and after co-creation.

Some theories argue that co-creation is necessary for solving complex problems. Other theories argue that it is ethical, since co-creation is about giving everyone a voice and redistributing power. Other theories show it is productive, creating better outcomes and ideas. Whether you are wanting to change services or broader systems, knowing how co-creation acts as a mechanism of change in your intervention is important for evaluation and for informing future co-creators.

See a list of theories used to justify co-creation in 'Co-Creation Toolkit Step 2: A How-To Guide', pages 13-15.

The Right Mindset for Co-Creation

Effective co-creation is not only a method. It is also a mindset. Technical skills matter, but they cannot substitute for dispositions that allow researchers, communities, and institutions to work together with integrity. Among many, three traits are foundational for co-creation: respect, curiosity, and open-mindedness. While these do not guarantee good co-creation, without them, even the best designed research will collapse into tokenism, extraction, or epistemic hierarchy.

Respect

Respect is an ethical stance that recognizes multiple forms of expertise: lived, cultural, embodied, spiritual, practical, and academic, as equally legitimate and deserving of space and attention. In practice, respect means slowing down enough to learn how people describe their own realities, needs, and concerns. It means doing research with, not for, communities, and recognizing when to step back so that others may step forward.

Lessons from the Field 3: Contact Tracing

During the COVID-19 pandemic, governments worldwide deployed digital contact-tracing apps to automate the identification and notification of exposure. These apps, built on Bluetooth or GPS, promised to accelerate epidemiological response by detecting proximity events and alerting users to potential infection. The public-health rationale was compelling: rapid, scalable, and data-driven containment. Yet the rollout illuminated profound ethical, social, and political challenges.

First, privacy and trust were paramount. Centralized architectures, in which governments stored contact data, raised fears of surveillance and misuse. Decentralized models preserved privacy but limited

epidemiological effectiveness. Many countries witnessed low adoption rates due to distrust in both state and corporate actors managing the data. In some contexts, like South Korea, extensive publication of movement data led to stigmatization; elsewhere, opacity around data access eroded legitimacy. Critics argued that voluntary consent was compromised when app use was linked to economic reopening or travel freedoms.

Scholars have suggested that these apps normalized new forms of data extraction under the guise of public health, deepening dependence on Big Tech infrastructures like Apple and Google. Rather than merely technical tools, these apps became instruments through which corporate and state power co-produced public-health governance.

Ultimately, most contact-tracing apps failed to achieve significant epidemiological impact. Effectiveness required 60–80 percent uptake, which few societies reached. The failure was not in code but in context: without public trust, transparent governance, or equity in smartphone access, digital fixes could not replace social solidarity or robust public-health systems.

Bardus, Marco, Melodie Al Daccache, Noel Maalouf, Rayan Al Sarih, and Imad H Elhajj. "Data Management and Privacy Policy of COVID-19 Contact-Tracing Apps: Systematic Review and Content Analysis." JMIR mHealth and uHealth 10, no. 7 (2022): e35195. https://doi.org/10.2196/35195.

Lucivero, Federica, Nina Hallowell, Stephanie Johnson, Barbara Prainsack, Gabrielle Samuel, and Tamar Sharon. "COVID-19 and Contact Tracing Apps: Ethical Challenges for a Social Experiment on a Global Scale." Journal of Bioethical Inquiry 17, no. 4 (2020): 835–39. https://doi.org/10.1007/s11673-020-10016-9.

Mann, Monique, Peta Mitchell, and Marcus Foth. "Between Surveillance and Technological Solutionism: A Critique of Privacy-Preserving Apps for COVID-19 Contact-Tracing." New Media & Society 26, no. 7 (2024): 4099–117. https://doi.org/10.1177/14614448221109800.

Nabeel, Ahmad, Salman K. Al-Sabah, and Hutan Ashrafian. "Digital Contact Tracing Applications against COVID-19: A Systematic Review." Medical Principles and Practice 31, no. 5 (2022): 424–32. https://doi.org/10.1159/000526672.

Sharon, Tamar. "Blind-Sided by Privacy? Digital Contact Tracing, the Apple/Google API and Big Tech's Newfound Role as Global Health Policy Makers." Ethics and Information Technology 23, no. S1 (2021): 45–57. https://doi.org/10.1007/s10676-020-09547-x.

Curiosity

Curiosity is the engine of co-creation. It is what allows researchers to hear what they did not expect, to be changed by evidence that did not fit existing models, and to remain excited even when insights are spontaneous or unplanned. Because all knowledge is situated[ix], our perspectives are limited. In practice, curiosity looks like asking more questions than you answer, seeking out voices you haven't heard yet, and treating surprises in the research cycle as generative, rather than as threats.

Open-Mindedness

Co-creation demands a willingness to loosen one's grip on outcomes, expertise, and intellectual ownership. Open-mindedness is not indecision, but rather the capacity to adapt when partners and projects announce needs, desires, and beliefs that were not anticipated. Knowledge is always partial, messy[x], and co-emergent rather than linear. Open-mindedness requires practicing epistemic humility[xi]: to recognize that our frameworks and questions are not universal, and that collaboration might very well reshape what counts as impactful knowledge production, credible evidence, or appropriate methods. In practice, open-mindedness looks like letting go of being right and bracketing pre-conceived notions. It also means adjusting methods, goals, or interpretations when partners' insights reveal new directions or unsettle assumptions.

Co-Creation: Speed versus Trust

Co-creation thrives in the tension between ambition and caution. Ambition drives experimentation and imagination, while caution protects against harm, exploitation, or the reproduction of the very inequities that co-creation seeks to dismantle. Philosopher Isabelle Stengers describes this as "slow science"[xii]: research that proceeds not quickly, but carefully, and not toward novelty, but toward accountability.

Slow science creates space for dissent, discomfort, and repair. It values process as much as output and insists that innovation should never move faster than relationships can hold it. This resonates with both Indigenous methodologies[xiii] and feminist ethics of care[xiv] which emphasise responsibility to people, land, history, and future worlds.

Co-creation is strongest when it advances only at the speed of trust. When you are ready to start co-creating, a crucial step is embedding proximate evaluators into the process so that you can understand how and when trust is forming.

Lessons from the Field 4: Care Robots

Care robots are a class of social and assistive technologies designed to supplement or replace human caregivers, especially in aging societies like Japan's. They range from humanoid companions such as Pepper and HAL to lifting aids and networked monitoring systems, all meant to automate aspects of eldercare. Japan's government and corporations promoted these devices as part of a broader "techno-welfare" vision to address demographic imbalance, imagining a future in which robots sustain both independence and national productivity.

The premise was that technological substitution could offset the labor shortage of caregivers by transforming care into programmable, replicable actions. Yet ethnographic and policy analyses reveal a profound mismatch between this technological imaginary and the lived realities of care. In practice, the introduction of care robots exposes the limits of what can be mechanized. Empathy, emotional attunement, and relational presence, qualities central to effective caregiving cannot be easily reproduced. On the ground, robots often failed to integrate into the daily routines of caregivers or residents. Workers found them cumbersome, ill-suited to local workflows, or emotionally alien. Many robots, like Pepper, ended up stored away, unused, or repurposed.

Ethically, these failures expose tensions between efficiency and human dignity. Furthermore, the rhetoric of "robotic salvation" risks de-skilling human caregivers and reducing them to machine attendants. Concerns have been raised that, by redirecting investment toward automation rather than improving labor conditions, the techno-fix diverts attention from structural reforms that would better address the care crisis. Japan's experiment thus stands as a cautionary tale of what happens when sociotechnical imaginaries move too quickly.

Murray, Stephanie H. "Whatever Happened to All Those Care Robots?" Family. The Atlantic, March 21, 2024. https://www.theatlantic.com/family/archive/2024/03/robots-have-not-revolutionized-caregiving-elder-care/677820/.

Wright, James. "Inside Japan's Long Experiment in Automating Elder Care." MIT Technology Review, January 9, 2023. https://www.technologyreview.com/2023/01/09/1065135/japan-automating-eldercare-robots/?gad_source=1&gad_campaignid=20737314952&gbraid=0AAAADgO_mhMSYuY9NoMehaV8lqurk8u1&gclid=CjwKCAjw0sfHBhB6EiwAQtv5qfuG09zVvdQ4YZU9ZAkDr-gLGrBcPKq2eQv4PTv7gXmQcH54V7ASFRoCOJ8QAvD_BwE.

"Introduction." In Robots Won't Save Japan, by James Wright. Cornell University Press, 2023. https://doi.org/10.1515/9781501768064-003.

Accessible and Inclusive Co-Creation Practices

Accessibility in the co-creation research involves negotiating (and challenging) disciplinary boundaries, supporting different communication styles, and remaining flexible to changing needs across the project lifecycle[xv]. Building these aspects into your project will ensure that language, format, and pace do not privilege one knowledge system over another. It is important to think through these elements to minimize challenges in planning, conducting, implementing, and evaluating co-creation[xvi].

Temporal Flexibility[xvii]

Temporal flexibility means allowing partners to co-determine timelines that reflect their capacity, energy, and life demands. Consider incorporating staggered check-ins, asynchronous contribution options, and pauses during meetings. In practice, temporal flexibility acknowledges that participation can remain valid even when time availability fluctuates.

Modality Flexibility[xviii, xix]

Modality flexibility recognizes that people communicate, think, and create knowledge through different formats beyond speech or text. This means that you should consider how to provide multiple parallel routes for engagement (visual, written, spoken, creative outputs).

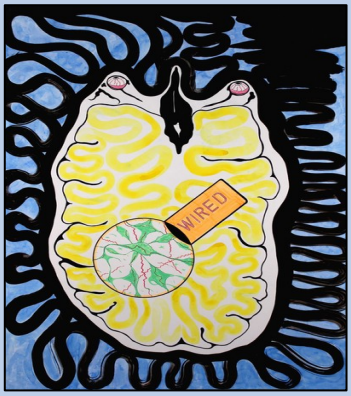
Participatory Flexibility [xx, xxi]

Participatory flexibility involves ensuring that leadership can rotate and shift, allowing partners to both lead and step back. Participatory flexibility also requires transparency about hierarchies throughout the research process. At times, like in highly technical or engineering contexts, not all members will be equally involved. Noting this and making sure that everyone is aware of when they can and should be involved, is crucial.

Communication Accessibility & Literacy[xxii]

Co-creation is only meaningful when everyone can fully engage. This requires attention to language, diversity, technological access, and clarity of format. The integration of science communication expertise in co-creation research is beneficial. All partners should be prepared to communicate in plain language without jargon. The research team might also consider developing a shared glossary that can be referred to throughout the research.

Lessons from the Field 5: Brain Computer Interfaces



Brain–computer interfaces (BCIs), deep brain stimulators (DBS), and cochlear implants are examples of neural and sensory prostheses that link the nervous system directly to machines. Cochlear implants, introduced in the late twentieth century, convert sound into electrical impulses that stimulate the auditory nerve, enabling some deaf users to perceive sound. More recent BCIs and neuromodulation devices record neural activity to restore movement or communication. These technologies blur distinctions between body, machine, and identity, raising complex ethical and cultural questions.

Ethical challenges cluster around informed consent, post-trial responsibilities, privacy, and the shifting definition of personhood. Neural implants are invasive, with unpredictable neurological and psychological consequences, making genuine informed consent difficult. Participants in neural-device trials may face ongoing maintenance costs, device failure, or abandonment once research funding ends. Wireless and cloud-connected BCIs create unprecedented risks of data breaches or hacking that could expose neural information or even alter device settings. Moreover, as commercial actors enter the neurotechnology field, questions arise about long-term care responsibilities. What happens to an implanted patient if the company collapses?

Anthropological studies further reveal that implants reshape social relations and notions of embodiment. In India, researchers have shown that cochlear implants produce a new form of dependency: families must maintain fragile external processors, charging coils and cables daily. The device, positioned as a gateway to "normalcy," imposes continuous care labor, often performed by mothers. Thus, technology meant to liberate can also discipline, demanding compliance with biomedical norms of hearing and speech.

Across these examples, failure or controversy arises when innovation disregards the relational, economic, and legal infrastructures necessary to sustain embodied technologies. Co-creation requires engaging not only surgeons and engineers but also users, families, and cultural communities in defining what counts as a "better" body or life.

Friedner, Michele. Sensory Futures: Deafness and Cochlear Implant Infrastructures in India. University of Minnesota, 2022.

Hendriks, Saskia, Christine Grady, Khara M. Ramos, et al. "Ethical Challenges of Risk, Informed Consent, and Posttrial Responsibilities in Human Research With Neural Devices: A Review." JAMA Neurology 76, no. 12 (2019): 1506. https://doi.org/10.1001/jamaneurol.2019.3523.

Lavazza, Andrea, Michela Balconi, Marcello Ienca, et al. "Neuralink's Brain-Computer Interfaces: Medical Innovations and Ethical Challenges." Frontiers in Human Dynamics 7 (March 2025): 1553905. https://doi.org/10.3389/fhumd.2025.1553905.

Schermer, Maartje. "The Mind and the Machine. On the Conceptual and Moral Implications of Brain-Machine Interaction." NanoEthics 3, no. 3 (2009): 217–30. https://doi.org/10.1007/s11569-009-0076-9.

Foundations Checklist

I understand what co-creation is (and what it is not)	
I can distinguish between Mode 1, Mode 2, and Mode 3 knowledge production	
I know the mindsets that support ethical, relational research	
I recognize the value of slowing down, listening, and building trust	
I am prepared to learn from others, and to be changed by that learning	

Now that you have walked through the "why" of co-creation (the values, histories, and commitments that make this work possible and important), 'Co-Creation Toolkit 2: A How-To Guide' invites you into the "how": designing cycles of collaboration, building relationships, and moving from shared intention to shared action.

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[v] Emma Puerari et al., "Co-Creation Dynamics in Urban Living Labs," Sustainability 10, no. 6 (2018): 1893, https://doi.org/10.3390/su10061893.

[vi] Federico Cuomo et al., "Transformative Urban Living Labs: Towards a Circular Economy in Amsterdam and Turin," Sustainability 12, no. 18 (2020): 7651, https://doi.org/10.3390/su12187651.

[vii] Christian Scholl et al., "Enhancing the Contribution of Urban Living Labs to Sustainability Transformations: Towards a Meta-Lab Approach," Urban Transformations 4, no. 1 (2022): 7, https://doi.org/10.1186/s42854-022-00038-4.

[viii] Marcellus Forh Mbah and Chidi Ezegwu, "Impactful Methodological Considerations for Knowledge Co-Creation in Sustainable Development Research," Sustainability 17, no. 1 (2024): 52, https://doi.org/10.3390/su17010052.

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