Peeling Back the Layers: Prototyping Systemic Transformation through the Circular Food Innovation Lab

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Abstract

Wasted food — the result of a linear pattern of producing, under-consuming and disposing of food — is a pervasive issue globally and in Canada. Wasted food is a complex challenge, meaning it is characterized by unpredictability, ambiguity, and many actors. The current climate crisis, food insecurity, economic disparity and housing inequality all intersect with this challenge. If we are to tackle these increasingly complex issues in social and public sectors, we need to work together in new and emergent ways.

The Circular Food Innovation Lab was a unique research initiative that drew together municipal government, interdisciplinary designers and regional food businesses – grocers, food producers, distributors, restaurants and vendors – to tackle these complex challenges through systemic and service design methodologies, asking "how might we work together to increase circularity in Vancouver's food system so that food is not lost or wasted; access to food is nourishing, equitable, and culturally appropriate; and habitats are protected for current and future generations of humans and more-than-humans?"

Keywords: circular economy of food; systems change; transformative processes; social innovation

Context

Systemic Challenges of Food Waste

Wasted food — the result of a linear pattern of producing, under-consuming and disposing of food — is a pervasive issue globally and in Canada, where 11.17 million tonnes of edible food are wasted each year at a value of $49.46 billion (Gooch et al., 2019). Of four potential circular industry sectors: food, textiles, plastics and construction materials, the greater Vancouver region's food sector has the farthestreaching impact in terms of circular economic benefit[1] (Varney, 2021).

Wasted food is a complex challenge, meaning it is characterized by unpredictability, ambiguity, and many actors. The current climate crisis, food insecurity, economic and housing inequality all intersect with this challenge, and are acutely felt in Vancouver, Canada, a city of approximately 700,000 people living on unceded xʷməθkwəy̓ əm (Musqueam), Skwxwú7mesh (Squamish), and Sḷ̓ílwətaʔ (Tsleil-Waututh) territories. Here, conditions of extreme economic disparity, increasing reliance on the global supply chain for food products, and dramatic effects of climate change are all affecting our food systems.

As the social and public sector's biggest challenges grow increasingly complex, circularity poses promising pathways to transformation. By "decoupling economic activities from the consumption of finite resources" in a circular economy, we use what we already have and resources stay in continuous movement (Ellen McArthur Foundation). When it comes to food circularity, rather than unused food going directly to landfill, compost or animal feed, unsold edible food is repurposed into different forms for consumption or use, or if inedible, redirected to contribute to the regeneration of other elements in our ecosystems. Taking measures to prevent unsold food in the first place is a top priority, and transitioning to a circular economy is a key focus for the City of Vancouver's Zero Waste 2040 strategic plan (City of Vancouver, 2018).

The Circular Food Innovation Lab (CFIL), which ran from April 2022 to February 2023, was a unique research initiative that drew together municipal government, nonprofits, interdisciplinary designers and regional food businesses – grocers, food producers, distributors, restaurants and vendors – to tackle these complex challenges through systemic and service design methodologies. The lab is part of a longer journey of social innovation work inside the City of Vancouver through the

[1] A 2021 study by the Vancouver Economic Commission identified that an estimated $195 million dollars of annual sales and/or cost savings are achievable in Metro Vancouver by adopting circular economic practices across the agri-food value chain (Varney).

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Solutions Lab (Slab), who facilitated the Grocery Retail Solutions (convened by Solid Waste Strategic Services in 2019–2020, a predecessor of CFIL. A few key lessons from the Grocery Retail Solutions Lab informed the approach taken for CFIL:

- Support for higher quality and higher fidelity cycles of prototyping needed to be added to the lab processes if tangible, systemic solutions had a chance of being scaled up/out/deep.
- Vancouver, like many cities, does not yet have in-house design expertise to develop and test higher fidelity prototypes so we needed to find a way to bring systemic design capacity and talent on to our team. Partnering with Emily Carr University of Art + Design amplified the lab's prototyping capacity through the addition of eight design researchers to the project.
- More representation across the food sector and supply chain needed to be part of the lab process in order for more systemic interventions to occur. This led to a broader invitation to more diverse businesses for CFIL.

This paper describes the process of the lab, the use of participatory action research, and experimentation with a paradigm shift in the local food sector. In CFIL, designers generated prototypical service models and products to integrate into the supply chain, and responded in real time to feedback loops from food businesses. Ultimately the project aimed to influence both operational practices on the ground in the food sector and public policy within municipal governance as precursors to movement building. In the food system, we understand movement building to include radical shifts in food-related practices prototyped through the lab, as well as the formation of new relationships, practices and philosophical openness to transformative change.

Contributors

The Circular Food Innovation Lab was made up of several groups of contributors: the core design team included City of Vancouver designers and project managers[2]; the Vancouver Economic Commission; and design researchers and students practicing industrial, service and communication design at Emily Carr University[3]. A broader

[2] The City of Vancouver's Solid Waste Strategic Services develops policies and actions to help stimulate, support, and allow Vancouver to achieve zero waste. Areas of work undertaken by this team include conservation of resources; prevention of all types of waste, including food; compost; and share-repair-reuse initiatives.

[3] Emily Carr University of Art + Design is the only specialized, public university in British Columbia solely devoted to education and research in the creative sector and its associated knowledge economy.

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convening team included senior managers at the Vancouver Economic Commission[4], who work closely with the business community. There were 18 businesses that joined CFIL, representing large and small grocers, large-scale food distributors, farmers markets, breweries, bakeries, produce distributors, food producers, and restaurants. In aggregate, this group provided comprehensive insights into the operations, capacities and challenges held within the business eco-system of food providers in our region.

The project was an initiative of Solid Waste Strategic Services, guided by the Solutions Lab (sLab), a design team focused on systems transformation within the City of Vancouver. SLab focuses on transformative innovation in five policy domains: Healthy City Strategy; Greenest City Strategy, Climate Emergency; City of Reconciliation; and Equity. SLab uses different approaches than are typical in the public sector, drawing from design, social innovation, systems thinking, visionary futures, and many others. The format of the lab brings city staff and community collaborators together in creative, experimental, iterative and learning-oriented processes to arrive at deeply rooted prototype solutions.

How things are stuck: Invisible Patterns and Paradigms

A significant barrier to achieving a circular economy of food is the persistence of practices within food sectors that are so widespread and familiar they have essentially become invisible. Some of the factors that contribute to the pervasive "stuckness" of this challenge include:

The staging of abundance: year-round imports and retail display techniques give the appearance that an abundance of perfect and identical food products are perpetually available. This masks seasonality and variations in the complexity of the supply chain. Consumers have become accustomed to selecting "the best of many" when choosing, for example, an apple: shoppers tend not to select the last apple or the slightly less perfect apple.

Economic performance above all else: for businesses, financial performance is typically a key indicator above all other metrics, dissuading them from trying out new or untested approaches that may waste less food. Competitiveness and avoidance of uncertainty also factor into the bypassing of opportunities to work more closely with other businesses or adjust operational strategies to avoid food waste.

[4] The Vancouver Economic Commission is an external agency of the City of Vancouver with the purpose is to contribute to building a prosperous, inclusive, zero carbon and resilient local economy, competitively positioned in the global market. The VEC serves one of the world's fastest-growing, diversified and low-carbon economies, working to strengthen Vancouver's economic future by providing programming, supporting local companies, advising business leaders and policymakers, monitoring the region's economic health, and conducting and publishing industry research.

Transactional vocabulary: language provides clues about the way we perceive and value food products, and terms such as expiration date, “best-before”, and spoilage highlights the cresting of value that degrades over time. This language is often introduced before food has reached that crest, interrupting our capacity to use our senses to decide when food is no longer safe to eat. The implicit linearity is itself a pattern that limits our imagination for circular practices.

Dodging and deflecting responsibility: Culturally speaking, wasted food is a vulnerable and touchy subject, and actors shift the “blame” onto other actors. Businesses point to the government or consumers, while local government points to industry associations and businesses to take the lead. This kind of finger-pointing pattern happens across many issues, such as climate change, disasters, and so forth, and undermines the potential for solidarity and collaboration on these shared challenges.

Peeling Back the Layers

The Two Loops Framework

One of the frameworks that helped guide this lab was the *Two Loops Framework*, articulated by Margaret Wheatley and Deborah Frieze of the Berkana Institute (2006), which visualizes the cycle of emergence of living systems. It frames an ongoing evolutionary process of living and dying that organizations and systems are dancing in, often simultaneously. It offers different ways to interpret and make sense of organizational change models as well as systems transformation possibilities.

Within the dominant system, pioneering actors emerge and are, often in small ways to start, creating alternatives to the current dominant system. Part of the work of systems transformation is to name those pioneers; connect them into networks of actors who have similar ambitions and efforts so that they are aware of one another; and nourish and deepen their efforts through communities of practice in which they can share practices, support one another in building them, and implement new or deepened practices (Wenger, 1998). As the emergent system grows, another key role is to amplify or illuminate the efforts that have been seeded by pioneers, creating bridges for more and more actors in the dominant system to cross over into the emergent system.

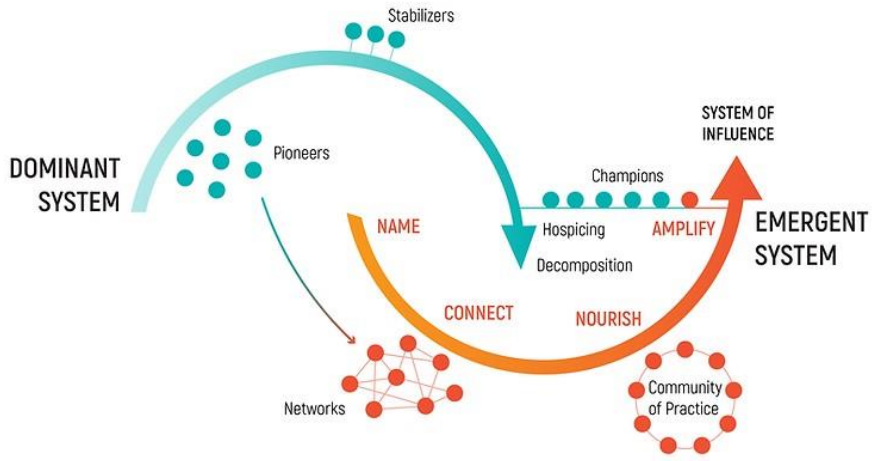

Figure 1. Two Loops diagram. Adapted from the Berkana Institute.

The Circular Food Innovation Lab used the Two Loops to begin naming the system that we're moving towards, and locating lab participants, including ourselves, in this cyclical process. This exercise serves to illuminate the different starting points of business and project collaborators, and the kinds of roles service designers might need to undertake in order to facilitate systemic transformation. In what ways are actors in the dominant system working to stabilize it? In what ways is the dominant system beneficial to those currently in the lab? What of the dominant system needs hospicing, and what kinds of practices can we introduce to support that? In what ways could we stretch and illuminate possible pathways to the emergent/resurgent system?

Centring action research and user needs as wayfinding for innovation

In practice, complex challenges can be particularly messy as there are many unknown unknowns, myriad ways to address the challenge, and numerous priorities that cannot be ranked in importance. Becoming lost has its place in transformative learning and innovation processes, and in navigating complex challenges there is also the possibility of becoming side-tracked by external or adjacent systemic priorities.

Employing Action Research and committing to centring the needs of a broad and inclusive group of users (business participants, those facing food insecurity, farmers, future generations, more-than-human actors) was a strategy for designers and collaborators to navigate the highly complex challenge of shifting practices in our food system. Participatory action research (PAR) promoted iterative cycles of action, reflection and evaluation, offering a framework for collaboration between academia and community, positing that knowledge to transform contextual conditions is held

within a broad community of those in and outside conventional boundaries of professional expertise (Pain et al., 2010).

Risk-taking, frictions and vulnerabilities for all involved

Embracing an emergent process was a vulnerability for all involved in the project. For businesses, this meant devoting a small amount of already-stretched capacity to workshops and sessions with the design team, and opening up about status-quo practices that can bring up feelings of guilt and shame. For the City of Vancouver, this meant tolerating a shift away from more familiar predictive project management approaches, wherein objectives are identified, activities are defined, a timeline is established and methods to measure success are developed, all before the project starts. Typically for city staff, changes to an approach requires an approval process and multiple accountabilities (to residents, businesses, and other levels of government), with various processes and procedures that are not easily adjusted. As a consequence, cities can be slow to adapt, which has been identified as itself a vulnerability in a time of immense and unpredictable change.

Process Overview

Defining the Experimental Space

Early in the project, the convening team spent generous amounts of time clarifying the principles that guide our work, determining the north star of the project, and outlining the contours or boundaries of the system we are trying to transform. We utilized tools such as design briefs and creative (*how might we*) questions, which were iterated on as designers and businesses joined the lab.

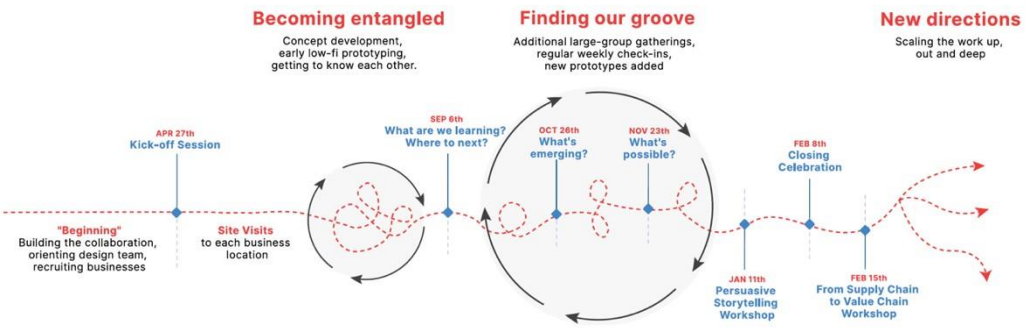

Figure 2. Process diagram describing the Circular Food Innovation Lab.

Systems practice tells us that working to transform and transcend paradigms is the highest point of leverage when attempting to change systems (Cole 2022; Meadows

2010). As adrienne maree brown describes in *Emergent Strategy* "we need to go beyond having a critique/counter analysis/alternate systemic plan for society — we have to actually do everything differently, aligned with a different set of core principles for existence" (2017, p. 112). Mapping and understanding the system and its dynamic was an ongoing and integral aspect of this project. Two systems mapping tools we used regularly were the Iceberg and Feedback Loops.

Systems Thinking and Mapping

The Iceberg is a systems mapping tool that gets below the surface and deep into understanding and learning about how a system functions and behaves. It describes four layers of systems dynamics:

- Events + Activities - the visible and experienced aspects and dimensions of a system;
- Patterns of Behaviours - trends and patterns that develop over time;
- Systems/Structures - the underlying influences that affect patterns of behaviour;
- Mindsets/Paradigms - the beliefs, assumptions and cultural norms that shape the system and keep it in place.

We used the iceberg map iteratively to document what we observed happening in the system at different points along the process, from our inaugural session with business collaborators through to concept iteration. It served to revise our assumptions and understanding of the challenge space.

Feedback Loops (Omidiyar Group, 2017) are another systems-mapping tool utilized to understand patterns in the system. They help to describe and characterize the dynamics of particular patterns:

- Virtuous patterns - the pattern is supporting things to get better and better
- Stagnating - the pattern is keeping things from getting better
- Stabilizing - the pattern is keeping things from getting worse
- Vicious - the pattern is making things worse and worse

We use feedback loops to map how the different layers of the iceberg interact in patterns. Most of the patterns we noticed in the food system in Vancouver are stagnating and vicious. Feedback loops helped us to navigate the system fractally, becoming more specific about the nature of the pattern and identifying which aspect of the system we were trying to intervene on for each of the potential solution concepts we are testing. We also used feedback loops in a speculative way to

articulate the virtuous pattern we imagine as the inverse of the challenge, helping business collaborators to embrace imaginative and experimental orientations.

Action Research: Site Visits and Workbook: We developed and used specific action research tools that were appropriate for the context of this lab. These included site visits to each of the participating businesses to get an on-the-ground sense of particular challenges related to wasted food, and understand more deeply cocreators' pain points, aspirations and needs. Action research workbooks helped document this process, recording insights about the language collaborators use to discuss the challenge, the systems and structures that businesses operate within, organizational dynamics, and so forth.

Developmental Evaluation (DE) is a specific evaluation practice that is well suited to work on complex challenges that do not have a clear, known path to impact, or linear cause-effect relationships. DE is a process of systematically collecting information about activities, effects, influences, and impacts to inform decision-making and action in an iterative cycle, staying focused on the North Star of the project. CFIL used DE to track what was emerging. We followed Patton's (2010) cyclical framework of "What", "So What", "Now What" to document specific activities, learnings and insights, and intentions and next steps.

Ideation is a common design tool used to generate ideas and creative solutions to design challenges. CFIL used ideation as a way to co-create with business collaborators in the lab at the beginning of this process. It gave us signals and insights into how they were thinking about the challenge, what levels of readiness and openness businesses had to experimentation and imaginative ideas, and which of the actors might need to be involved in possible solutions.

Design Sprints: generally, the design sprint is a 5-day/phase, time-restrained process that those working on design challenges will employ to go from challenge to production of a prototype as a potential solution (Knapp, 2010). The CFIL Design Team adapted the design sprint process to synthesize learnings from the initial lab session and site visits to deepen our understanding of the challenge and develop solution concepts to pitch to business collaborators. As part of this process, we created concept development canvasses that pulled together key data points from action research, ideated solutions, and revised feedback loops.

Initial Prototype Concepts are tangible representations of an idea or concept. Based on the synthesis of learnings and what emerged from discussions during our Design Sprint, the design team pitched seven concepts to business collaborators that responded to different aspects of the challenge. They were presented with key data points, a creative How Might We question, and ideas for initial testing. The concepts are described below:

Figure 3. Nine concepts that were developed into prototypes through CFIL.

Rapid Prototyping (Phase One)

Following the prototype pitches, business collaborators provided feedback and signed up for concepts they were interested in trying. Each concept was developed through rapid prototyping methods, which surfaced new learnings about the nature of systemic patterns related to wasted food, and helped to illuminate where the system was continuing to be stuck.

As part of our developmental evaluation, the design team situated themselves in the system that we were trying to transform, and identified where we were getting stuck. Business engagement in the project was low during Phase One and it was difficult to co-design and prototype without input. Prototyping in a complex challenge space looks and feels different than prototyping in a simple context, given that the outcomes

are unknown and priorities emerge based on who is involved and how their priorities, needs and circumstances change. Prototyping in a transformative innovation space was also challenging, as we were prototyping for the sake of learning what's promising, without a specific outcome or end-goal in mind. Additionally, with so few touch-points with the business collaborators, it was challenging to know whether or not systemic learnings were happening for them in the way that they were happening for the design team. All of these learnings served to mark a significant pivot from the original design for Phase Two, which is described below.

Pivots (Prototyping Phase Two):

The second phase of this project initially included higher fidelity prototyping based on which solutions seemed promising from Phase One. By the end of Phase One, we didn't have many insights on whether or not the concepts we initially proposed were actually promising in terms of intervening on the system. Instead of narrowing in, the CFIL team responded to what was emerging and revised the process for Phase Two. The organizing ideas for this phase included more touch-points with business collaborators; increased opportunities for connection-building amongst business collaborators; and centring business collaborators as learners and co-creators. This led to the following process interventions:

- the introduction of weekly check-ins with the concept groups to help create more momentum around concept iteration
- the addition of two more large-group gatherings to make space and time for sharing learnings across concept groups
- the addition of a new concept, the Learning Journey, to prototype different possible formats and ideas for learning related to circularity and Vancouver's food system as a way to gain deeper insights into the system, seek inspiration for potential solutions, and broaden and deepen connections between actors

Anticipation of Movement Building

The narratives, learnings and relationships from the Circular Food Innovation Lab point to a new set of questions for a new set of conditions:

- How might we enable and nourish movement-building and energy within businesses, both supporting and holding them accountable to this transitioning to circular practices?
- How might we shift from guilt to passion, and consider ways to motivate and inspire from a bottom-up perspective?

- How might we more strongly centre the right to food and equitable food access in systemic interventions, so they become equally prioritized along economic motivations?
- How might we decentre human exceptionalism so that our food practices and choices restore and nourish regional ecosystems and habitats for beyondhumans?

CFIL also pointed to two new facets of understanding for social innovation and service design work in the public sector, which are:

Design can be a differentiating factor to establishing good energy and supporting relationship-building. This project drew upon skills in service design, systemic design, communication design and industrial design. We have noticed over and over again that adding design value, including prompting group material practice and playfulness, generating beautiful and rich imagery and creating succinct and legible documentation, is an important medium for establishing confidence in the process and lubricates the formation of new relationships. Rich aesthetics and strong legibility also help bring charisma and clarity to a complex process that could easily tip into feelings of chaos. There is a distinct boost to our collective self-esteem from seeing our work reflected back to us through strong visual mapping, rapid prototyping efforts, and considered communication design.

We noticed choice-making to trust the process amongst various stakeholders at various points along the way: this is a key part of how we understood that movementbuilding was beginning to occur. The cultivation of a complex web of relationships without the researchers at the centre is a major factor that will help to perpetuate this work beyond the scope of the lab.

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