

PATTERNING DIALOGUES

HOW STRUCTURED ITERATION SUPPORTS CHANGE

by LOUISE ST. PIERRE & MARI NURMINEN

DESIGN RESEARCHERS AT POWERTECH LABS

Sarah Bailey
Kevan D'Agostino
James Hallam
Cléa Lautrey
Amanda Leppi
Nayeli Santos

ADDITIONAL FACULTY

ecoTANK core studio 2013:
Hélène Day Fraser and Sarah Hay

FINANCIAL SUPPORT

Natural Sciences and Engineering
Research Council of Canada

A good conversation can change everything. As this three-year partnership between Powertech Labs and Emily Carr University of Art + Design demonstrates, good conversation can seed insights and change trajectories. In our case, iterative dialogue clarified business strategy, identified new markets, and deepened understanding about the technical and social systems surrounding the use of energy in British Columbia. It also helped us realize how important it is to connect with local communities when implementing sustainable change.

At the onset of the relationship, there were many unknowns. Powertech Labs, an engineering and testing company for the energy industry, had no prior exposure to design. Industrial designers at Emily Carr had little experience testing design methods for sustainability. Working together, we developed a structured dialogue that allowed for experimentation, reflection, and regular revision to our approaches.

There were three distinct phases over the three years. Each phase featured design research conducted during the summer term that provided a foundation for students who were working to develop ideas and concepts in the sustainable design studio course that was scheduled to follow (ecoTANK). The regular pacing of the phases allowed time for the learning on both sides to guide the relationship (Figure 1).

PHASE 1: CLEANER TRANSPORTATION

The first phase is best understood as typical design collaboration. Our focus was on the transition to cleaner transportation solutions, particularly electric vehicles (EVs). Powertech Labs was interested in exploring new market opportunities in EV-related services, but as a company that normally worked directly with other businesses, they were not familiar with researching and working with consumer-driven markets.

The partnership with Emily Carr was Powertech's first step towards including design as a part of their innovation process. In the summer of 2010, we placed two student design researchers inside Powertech Labs. They were given a framed set of research questions and two very specific tasks.

They were to function as design ambassadors to help Powertech Labs understand what industrial design could offer them. To this end, the design researchers used formal and informal methods to communicate ideas and make their progress visible. They posted design drawings and presentation panels in common spaces, engaged the employees in casual hallway conversations, invited these new colleagues to brainstorm with them, and prepared formal project presentations.

Parallel to this, they conducted preliminary design research to understand the social and cultural barriers impacting the adoption of EVs. They used many methods in this research-intensive summer including interviews, observations, scenario building, system analysis, inspiration gathering, and prototyping. In addition to end user and secondary research, they solicited input from engineers at Powertech Labs about current technical capabilities, infrastructure constraints, and challenges related to charging EVs.

The findings of the research team helped Powertech Labs understand how end users perceived EV-related innovation. Several emotional and practical barriers to the shift from conventional gasoline powered vehicles were identified: the amount of time it took to charge a vehicle, the limited travel distance with one charge, and the generalized fear of new technology. Figure 2 shows a probable mental model for how an EV driver in Vancouver might plan a drive. This illustrates how different it is from planning a trip with a gasoline powered vehicle. Academic research describes how the disruptive nature of change [1,3,6] can be

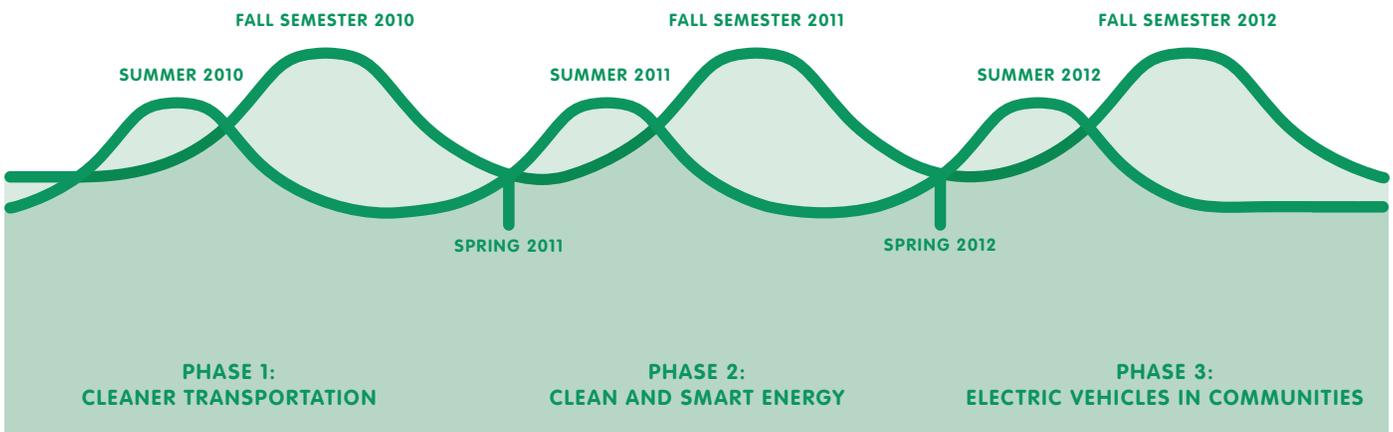
mediated by engaging the public end-users when developing new solutions. Further, when discussing the standard barriers to the diffusion of innovation (Figure 3), Rogers suggests that one way to overcome them is by aligning with the values, needs, and practices of our existing social system. [5]

In addition to the social system, EV charging solutions must integrate with the existing physical systems, such as the electrical grid. Considering how much EVs change the way we fuel our vehicles as well as the related business models, we learned how important it is to find right balance between system disruption and alignment with existing systems. For example, we experimented with building on familiar and well-accepted concepts by placing the chargers in parking lots and powering them from the electric grid. This did not divert us from sustainability related goals, as electricity is 90% hydroelectric in British Columbia. [2]

To initiate the second half of phase 1, the research team handed off their findings to students in the ecoTANK studio. This new group of students developed EV charging concepts. **Book 30** was a mobile app that would help people coordinate the thirty minutes of charging time with nearby service opportunities such as haircutting, a massage, or grocery shopping. **Rest and Recharge** was a scheme to set up charging stations at rest stops across Canada that would allow families to enjoy unique aspects of a region while waiting for their car to charge. Other students focused on social and cultural norms. **The Queue Report** challenged the North American expectation for speed and efficiency, and suggested that we might design situations differently so that waiting might be reframed as an enjoyable activity.

At the end of the 2010 fall semester the students presented 12 different ideas to Powertech Lab executives and initiated a wide-ranging dialogue. This revealed new market opportunities and customer segments for the company to pursue. It also facilitated a shift in thinking — from the installation of charging stations as an engineering task, to designing the user experience around charging. In many cases, this would have been hailed as a successful completion to the project, but our collaboration continued through two more iterations. This is where greater learning took place.

FIGURE 1. Research and ecoTANK development phases 2010-2012



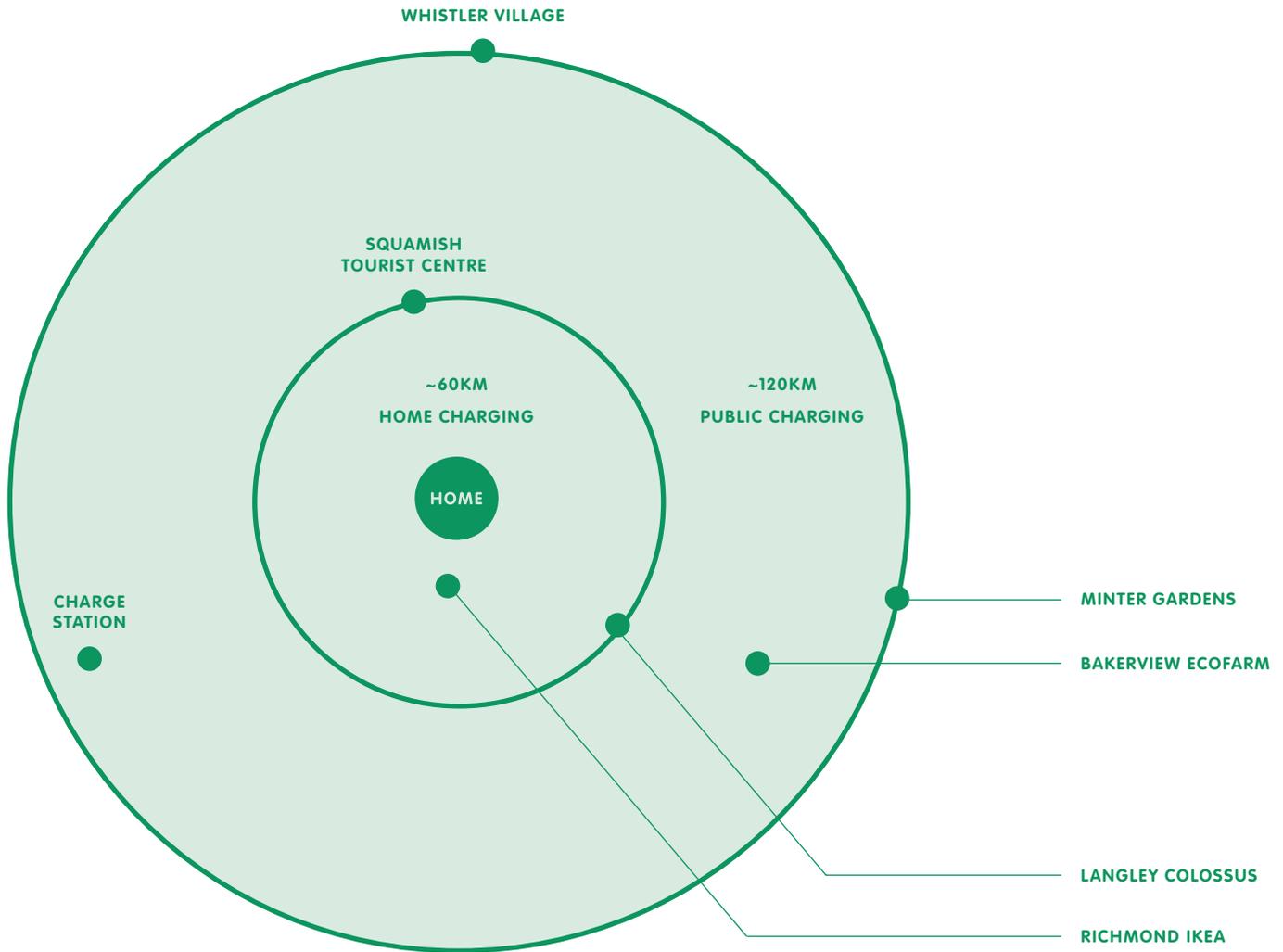


FIGURE 2. Getting drivers to re-think transportation lengths and routes was an important initiative by PowerTech. By placing electric vehicle charging stations in strategic points in and around Vancouver, new attitudes towards route planning and transportation can be created.

PHASE 2: CLEAN AND SMART ENERGY

Encouraged by the new strategies developed for EV charging in phase 1, Powertech Labs requested exploration about a different topic the following year: energy consumption in the home. At the time, Powertech was doing a business analysis to see if they were going to enter the energy management market at the consumer level, and Emily Carr was interested in investigating how design could support energy reduction. Most available data shows that energy consumption is steadily increasing across North America. [7]

As with the previous phase, this was divided into two parts. In the summer of 2011, the design research team conducted probes and contextual interviews to understand power usage in the home. They learned about the electric power system and related technologies from Powertech Labs' engineers. The preliminary findings were presented to a new group of students in the fall ecoTANK studio, and these students developed proposals. **Plug-E** was a power socket that would respond with fearful

facial expressions if you were overloading it. **Planet Chef** was an online game that coordinated a cooking competition potluck that included criteria about the amount of power used during cooking. Students also looked at alternative energy sources to offset supply from the grid, so some projects harnessed solar energy to power small appliances, or collected kinetic energy that is generated in domestic activity.

Once again, prototypes, models, videos and storyboards were brought to Powertech Labs for discussion. This had unexpected results. Through this conversation, Powertech gained enough understanding of behaviours and values around energy management at the consumer level to help them see clearly that this was not an attractive market. This exemplifies the value of exploratory questioning, followed by thoughtful reflection. Realizing what *will* not work is as important as gaining insights into what *will* work.

PHASE 3: ELECTRIC VEHICLES IN COMMUNITIES

By 2012 the ground had shifted. Powertech Labs now employed the summer researchers as designers working alongside their first in-house designer. Design had become part of their business. The learning engendered through the first two phases, along with this new internal expertise, helps us to establish new objectives: Powertech now wanted to engage with communities to determine what EV charging stations could look and feel like in their neighborhoods, and to reveal engagement and social innovation opportunities at the community and municipal level.

This shift to researching specific and locally grounded innovation enables what Ezio Manzini would call “quality of proximity.” [4] The design proposals that resulted during the 2012 ecoTANK core studio provide examples of this. **ElectriCity Culture Tours** was a tour company that mapped sustainable initiatives and companies around Vancouver. Participating communities would implement EV charging stations combined with a tour hub that would supply access to local tours, EVs, and information. The **EV Beacon** integrated a charger with a projector that could display large images to create a point of reference, information, and interaction at that location. This would offer an incentive for cultural institutions to become early adopters of the EV charging infrastructure. **Explore Local; Drive Change** was a program to incentivize or “drive” change in communities. Using the Commercial Drive area of Vancouver as a case study, the project proposed to create incentives for EV use by connecting EV charging with opportunities to support local businesses (Figures 4 and 5).

The work done in phase three reaffirmed the importance of designing for local context, with local communities. These projects built on the knowledge gained in phase one, where it became clear that dealing with the social side of the innovation was as important as dealing with the technological side, and that sustainable design could not progress without social innovation.

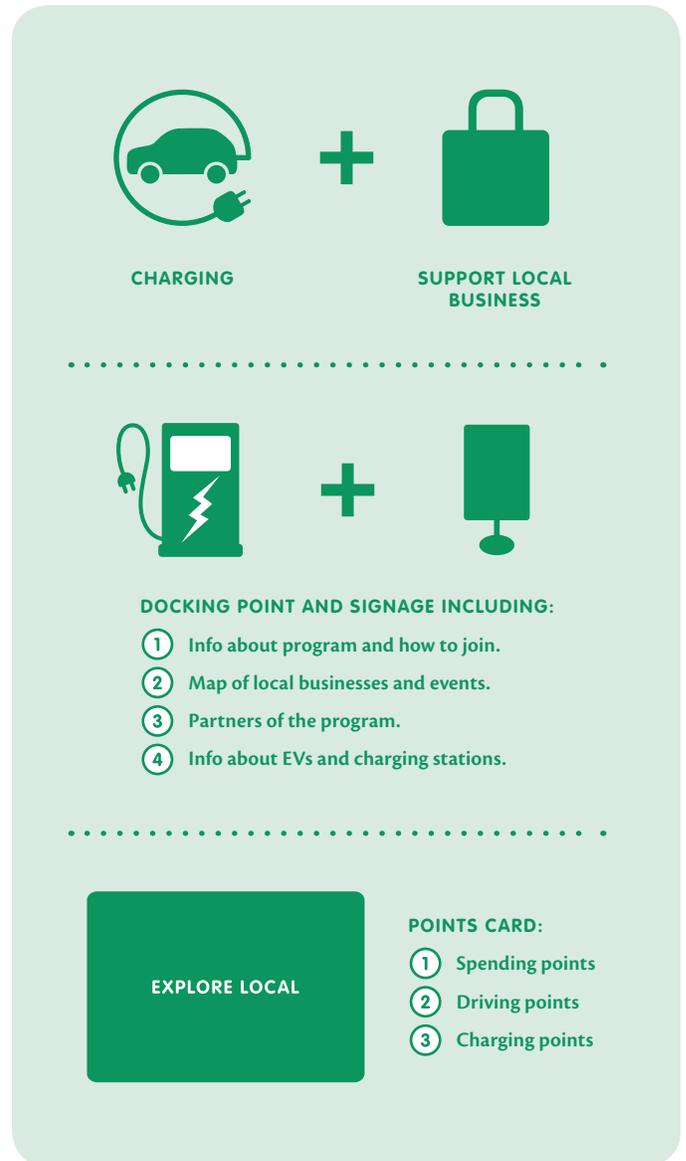


FIGURE 3. The innovation adoption curve shows that attempting to convince a mass of people to adopt a new idea is useless. It is the innovators and early adopters that need to be persuaded first.

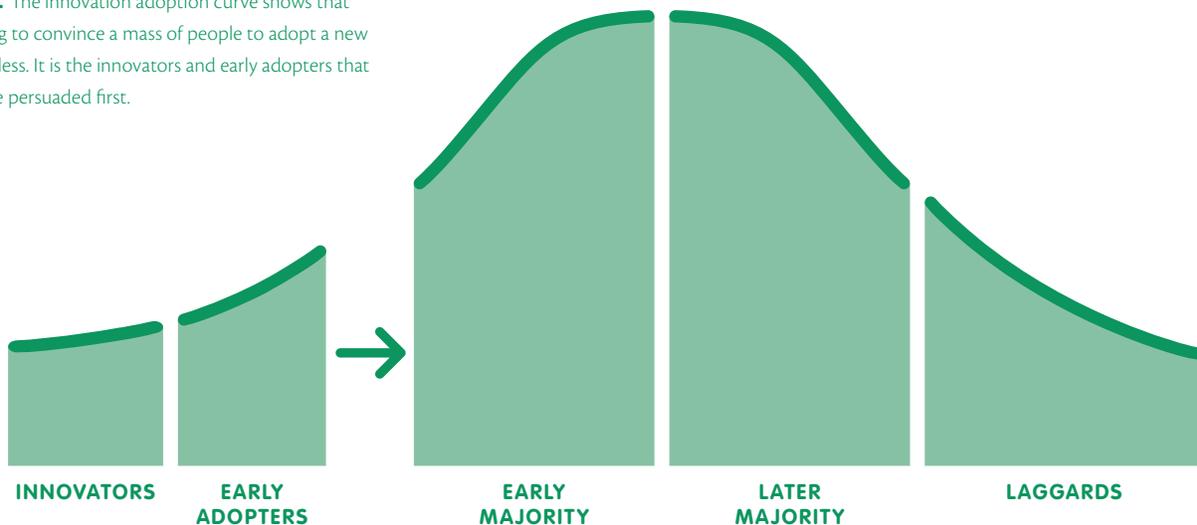


FIGURE 4. (OPPOSITE PAGE) EXPLORE LOCAL; DRIVE CHANGE aimed to connect EV charging stations with local Vancouver businesses. This was meant to incentivize EV use while also supporting the local community.

FIGURE 5. The **EXPLORE LOCAL** program would encompass the below components for its tour system. This project promoted not just electric vehicles, but also sustainable community activities.



SUMMARY THOUGHTS

The essence of this collaboration is that multiple modes of conversation over a period of time allowed for effective reflection. Design research in phase one illustrated the scope of the challenges in shifting to EVs. In phase two, demonstration prototypes helped Powertech Labs visualize and discuss the boundaries of their core business. These conversations and reflections led to the phase three shift from a single user to local communities. This process resulted in actionable design solutions for Powertech Labs, and a deeper understanding of sustainable design.

The iterative approach to the project also allowed us to modify our collaborative strategy based on the company’s state of readiness for design and community engagement. In the early project stages, the process was more structured, allowing Powertech Labs to become comfortable with a design approach to innovation. As the project moved to the second year and Powertech Labs became more familiar with design, we used generative approaches to explore more freely. In the third phase, Powertech Labs took more leadership in defining a research focus based in community engagement. The pacing and

reflexive nature of the process allowed Emily Carr to understand the mindset and receptiveness that the partner company had towards design and social innovation, and to adapt as those needs changed. It illustrates how conversations between companies, designers, and communities that include critical reflection and constant revision can help us discover a way to a sustainable future.

REFERENCES

[1] Christensen, C. and Raynor, M. *The Innovator’s Solution*. Harvard Business School Press, Boston, 2003. [2] Generation System, 2013. Retrieved January 26, 2013, from BC Hydro: http://www.bchydro.com/energy_in_bc/our_system/generation.html. [3] Leonard, D. *Wellspring of knowledge: Building and sustaining the sources of innovation*. Harvard Business School Press, Boston, 1998. [4] Manzini, E. Resilient Systems and Sustainable Qualities. *Current*, 4. 10–13 [5] Rogers, E. *Diffusion of Innovations*. The Free Press, New York, 1995. [6] Veryzer, R. Key factors affecting customer evaluation of discontinuous new products. *Journal of Product Innovation Management*, 15. 136–150. [7] Worldwide Trends in Energy Use and Efficiency, 2008, 43. Retrieved January 28, 2013, from International Energy Agency: <http://hopi.iea.org:10000/search/search/C.view=default/results?q=usage+trends>.