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Kanopi

How might we improve the environmental and social outcomes of biodiversity conservation projects?

Masters of Design
Sam Rye



Kanopi

How might we improve the environmental and social outcomes of biodiversity conservation projects?

An exegesis submitted in partial fulfilment of the requirements for the degree of Master of Design, Massey University | Te Kunenga Ki Pūrehuroa, Wellington, Aotearoa New Zealand.

Research conducted: 2016-2018

Sam Rye

Abstract

The environmental conservation sector in New Zealand and Australia is not able to keep pace with the scale of the challenges facing it, causing widespread loss of our planet's biodiversity and the potential for profound societal challenges due to our reliance on ecosystem services. Many of the issues are interconnected and dynamic, brought about through the downstream effects of population growth and anthropocentric worldviews. Change is needed in how the conservation sector is able to operate, which better enables the existing sector stakeholders to create positive social and environmental outcomes. However the sector is chronically underfunded, and thus unable to muster the resources or a collective direction to address the systemic challenges alone. The challenges are complex (dynamic and emergent), yet we find the majority of resources poured into planning-based responses that are inadequate due to their reliance on predictive approaches to the unpredictable challenge. The alternative to planning, is prototyping; a culture rooted in experimentation, adaptation and continuous learning, in order to continually re-orientate efforts to a desired future.

This research project has focused on designing a targeted systems change intervention, rooted prototyping culture, which seeks to challenge power dynamics and the mental models of the types of impact that conservation groups can generate. Through systemic and strategic design, I have generated systems sight, crafted strategy, and developed a portfolio of concepts which serve as both technological and socio-cultural 'Trojan Mice' to challenge existing paradigms which limit the sector's ability to reverse biodiversity loss.

Keywords: systems change, systemic design, strategic design, environmental conservation

This exegesis is also available online at <https://kanopi.gitbook.io/mdes-exegesis/>

Acknowledgements

This is dedicated to my father, Mark, who passed away suddenly during my research. He was an inspiration to me, and a wonderful father. I love you and miss you deeply.

I also want to acknowledge my mother, Gill, who gave me an early insight into academic research and it's value to society, and supporting me to pursue what I felt like the world needed of me, even when it took me oceans away from her.

I thank my wonderful wife, Elinor, and my children, Ash & River, who supported me with encouragement and the space to explore this project, amidst the challenges and beauty of a young family's life.

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I also would like to acknowledge Jane Hollands from CWAD & FOSS, Kellie Gee from Upper Yarra Landcare, Peter Russell from Manawa Karioi, Monica Peters from Landcare Research, Lizzie Younger from Melbourne Water, Michele Frank from WWF NZ, and all of the other people I interviewed and designed with.

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Orientation

To find your way in this exegesis on <https://kanopi.gitbook.io/mdes-exegesis>, you could use one or more of these modes:

- **The Three Part Story** - if you prefer to see the videos which outline the intervention, navigate to the Thesis section where you will find the three of the videos explaining the research outputs together.
- **The Research Story** - start from the beginning and use the 'Next article' navigation at the bottom of each section to explore the story of the project as I have structured it.
- **Choose Your Own Adventure** - if you're interested in particular aspects of the research, the directory on the left signposts some places to begin your own reading, or use the search box at the top right to look for specific terms which may interest you.

The layers which make up this intervention, and thus the main chapters of this exegesis are:

1. **Generating Systems Sight**
2. **Crafting Strategy**
3. **Designing A Portfolio of Concepts**

I present the Portfolio of Concepts first to give form to the insights generated in the first two phases. Each section of this exegesis details my design practice, with detail about my design activities, snapshots of boundary artefacts, and reflections.

Introduction



Toitū te marae a Tāne-Mahuta, Toitū te marae a Tangaroa, Toitū te tangata.

If the land is well and the sea is well, the people will thrive.

- Māori whakatauki (proverb)

There is widespread international agreement about the scale of the crisis facing our planet's biodiversity (Convention on Biological Diversity 2014¹). There is clear evidence that human actions are what is causing this sixth mass extinction (Ceballos et al, 2015²), which at the current rate, may well lead to disastrous consequences for humanity (Cardinale et al, 2012³).

In this research project, I make the case that our current dominant forms of collective action are failing us. I explore a form of design practice that is rooted in complexity theory and systemic action, sharing the kinds of activities undertaken, insights generated, and outputs which emerged whilst designing a targeted systems change initiative (Mühlenbein, 2018⁴) for environmental conservation in Australia and New Zealand.

“Systems change is an intentional process designed to alter the status quo by shifting the function or structure of an identified system with purposeful interventions”

- Foster-Fishman et al, 2007⁵.

My focus is not on transition to radical new paradigms (Irwin et al, 2015⁶), but to develop interventions to challenge existing socio-economic paradigms (Design for Social Innovation - Manzini, 2015⁷) using systemic and strategic design.

I initiated this research as a direct response to the environmental challenges faced around the world, specifically my multitude of concerns about the loss of biodiversity, locally and globally. Having travelled the world from the plains of the Serengeti to the

¹ Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4. Montréal, 155 pages

² Ceballos, G., Ehrlich, P. R., Barnosky, A. D., García, A., Pringle, R. M., & Palmer, T. M. (2015). Accelerated modern human-induced species losses: Entering the sixth mass extinction. *Science Advances*, 1(5), e1400253–e1400253. <https://doi.org/10.1126/sciadv.1400253>

³ Cardinale, B. J., Duffy, J. E., Gonzalez, A., Hooper, D. U., Perrings, C., Venail, P., ... Naeem, S. (2012). Biodiversity loss and its impact on humanity. *Nature*. <https://doi.org/10.1038/nature11148>

⁴ Mühlenbein, O. (2018). Systems Change — Big or Small? *Stanford Social Innovation Review*, February, 3–6. Retrieved from https://ssir.org/articles/entry/systems_changebig_or_small

⁵ Foster-Fishman, P., Nowell, B. and Yang, H. (2007) 'Putting the system back into systems change; a framework for understanding and changing organizational and community systems'. *American Journal of Community Psychology* (39): pp.197–215.

⁶ Irwin, T., Kossoff, G., Tonkinwise, C., & Scupelli, P. (2015). Transition Design 2015. *Carnegie Mellon School of Design*, 32. <https://doi.org/10.1080/14487136.2015.1085688>

⁷ Manzini, E. (2015). *Design, When Everybody Designs - An Introduction to Design for Social Innovation*. (F. Ken & E. Stolterman, Eds.) (1st ed.). Cambridge: The MIT Press. Retrieved from <https://mitpress.mit.edu/books/design-when-everybody-designs>

jungles of Borneo, the Rocky Mountains of California to the rainforests of Te Wai o Pounamu (West Coast of New Zealand), I have a deep appreciation for our planet's biodiversity, for its intrinsic value, and for the myriad of value which we humans derive from it.

Strategies and action which operate at the scale and intensity necessary to reverse the rates of biodiversity loss remain elusive despite a continued increase in conservation efforts (Tittensor et al. 2014⁸). This calls into question whether our dominant approaches to collective action on biodiversity loss are appropriate for this challenge (Gavin et al, 2018⁹).

Despite ongoing work on various complex, global issues, we rarely achieve the goals we set for ourselves as a global society (such as the Sustainable Development Goals; Goalkeepers Report, 2017¹⁰), and this is cause for concern considering the scale of challenges facing our planet. Despite this, we continue to invest huge amounts of resources in centralised planning-centric processes, regardless of the acknowledgement that the majority of these plans with fail (Mintzberg, 1978¹¹; Boyer et al, 2013¹²). As a society we have become stuck in a predictive approach to complex problems (characterised by strategic planning), which by definition are unable to be predicted as they are emergent (Boulton, 2015¹³).

“No man ever steps in the same river twice, for it's not the same river and he's not the same man.”

- Heraclitus, Greek Philosopher

⁸ Tittensor, D. P., Walpole, M., Hill, S. L. L., Boyce, D. G., Britten, G. L., Burgess, N. D., ... Ye, Y. (2014). A mid-term analysis of progress toward international biodiversity targets. *Science (New York, N.Y.)*, 346(6206), 241–244. <https://doi.org/10.1126/science.1257484>

⁹ Gavin, M. C., McCarter, J., Berkes, F., Mead, A. T. P., Sterling, E. J., Tang, R., & Turner, N. J. (2018). Effective biodiversity conservation requires dynamic, pluralistic, partnership-based approaches. *Sustainability (Switzerland)*, 10(6), 1–11. <https://doi.org/10.3390/su10061846>

¹⁰ Bill & Melinda Gates Foundation. (2017). *Goalkeepers: The Stories Behind The Data*. Retrieved from https://datareport.goalkeepers.org/assets/downloads/Stories_behind_the_data_2017.pdf

¹¹ Mintzberg, H. (1978). *PATTERNS IN STRATEGY FORMATION**. *MANAGEMENT SCIENCE* (Vol. 24).

¹² Boyer, B., Cook, J. W., & Steinberg, M. (2013). *Legible Practises. Six stories about the craft of stewardship*. (1st ed.). Helsinki, Finland: Sitra, Helsinki Design Lab. Retrieved from <http://www.helsinkidesignlab.org/pages/legible-practises>

¹³ Boulton, J. G., Allen, P. M., & Bowman, C. (2015). *Embracing complexity: Strategic perspectives for an age of turbulence*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199565252.001.0001>

Acknowledging and embracing complexity demands alternative practices, rooted in prototyping culture (SNRC, 2010¹⁴; Hassan, 2015¹⁵), which focus on new ways of being and doing that include social and environmental justice (Escobar, 2018¹⁶) in order to change the paradigm in which we live and practice (Kuhn, 1962¹⁷).

This exegesis draws together my practice which is inspired by several domains, including:

- **Complexity science and systems practice** from thinkers and practitioners such as Jean Boulton (Complexity Science), Zaid Hassan (Social Labs Revolution), Dave Snowden (Cynefin), Donella Meadows (Systems Thinking), Adam Kahane (Social Change), Otto Scharmer (Theory U), Nassim Taleb (Antifragile), Ella Saltmarshe (The Point People), Jackie Mahendra (Citizen Engagement Lab / Omidyar).
- **Strategic and Fourth Order Design** from thinkers and practitioners such as Richard Buchanan (Wicked Problems in Design Thinking), Tony Golsby-Smith (Fourth Order Design), GK VanPatter (Humantific), Liz Sanders (MakeTools & Convivial Toolbox), Pieter Jan Stappers (Convivial Toolbox), Dan Hill (Strategic Design Vocabulary), Indy Johar (Systems Design, Dark Matter Labs), Terry Irwin & Cameron Tonkinwise (Transition Design), Ezio Manzini (Design, When Everybody Designs), Anna Meroni (Strategic Design), John Thackara (In The Bubble), Penny Hagen (Smallfire), Suhit Anantula (Business Models Inc).
- **Organisational and Platform Strategy** from thinkers and practitioners such as Adrienne Maree Brown (Emergent Strategy), Henry Mintzberg (Of Strategies Deliberate and Emergent), Richard Rumelt (Good Strategy & Bad Strategy), Simone Cicero (Platform Design Toolkit).

As part of an ongoing inquiry into working on complex challenges, I have adopted a mindset of evolutionary design; a perpetual dance of generating, evaluating and sensemaking in order to continuously evolve concepts to ensure they orientate and sustain impact. Change is constant; systems change is about influencing the direction.

In essence, tackling a complex challenge is about inhabiting an ongoing state of becoming, not having a final destination at which to arrive. Complex problems don't get *solved*, but they do *get better*.

¹⁴ Spanish National Research Council. (2010). Conference Abstracts. In *Prototyping cultures: social experimentation, do-it-yourself science and beta-knowledge* (p. 6). Madrid: Spanish National Research Council. Retrieved from <http://www.prototyping.es/prototyping-conference>

¹⁵ Prototyping culture (experiment-to-learn) can be seen as a viable alternative to planning culture (analyse-to-predict) when working in complexity, and is well described in Hassan, Z. (2015). The Rise of The Prototyping Paradigm. *Social Kritik*, 142, 1–13. Retrieved from <http://www.socialkritik.dk/#indhold131>

¹⁶ Escobar, A. (2018). *Designs for the Pluriverse: Radical Interdependence, Autonomy and the Making of Worlds*. (A. Escobar & D. Rocheleau, Eds.) (1st ed.). Durham and London: Duke University Press. Retrieved from <https://www.dukeupress.edu/designs-for-the-pluriverse>

¹⁷ Kuhn, T. S. (1962). *The Structure of Scientific Revolutions* (1st ed.). University of Chicago Press.

Metaphor: Complex Challenges

Systems change needs multiple layers of focus

“I couldn’t see the forest for the trees.”



Photo by Stefan Cosma, [unsplash/@stefanbc](https://unsplash.com/@stefanbc)

When we get close to a challenge it's easy to obscure the other, interrelated ones. We need to step back to get perspective, but also to see the context (the system) in which we're working.

When we step back, we notice there was a whole forest we couldn't see before, because we were too busy focusing on the trees.

This myopic view of the reality of a complex challenge is what my practice has evolved to avoid.

This exegesis is an exploration of developing system sight (seeing the forest), how to design strategy to channel insight into action (nurturing seeds), and developing concepts to give the action enough form to gain feedback about it's chance of survival (planting trees).

On Models

“All models are wrong, but some are useful.” - George Box¹⁸

In my research practice, I generate and then explore the raw data and insights through a wide variety of means. Many of these are visual, some are spatial, some static, some interactive, some abstract and some concrete.

This helps me think, see and understand the three or four dimensional nature of complex challenges. My approach helps me to zoom in and out of the research, to pull it apart and put it back together to see what I learn. I see it as a continuous form of synthesis - the images, maps, videos and sketches are all tools to help me generate a more nuanced, more realistic, and more constructive picture of the system of people, places and experiences, I research.

¹⁸ Box, G. E. P., & Draper, N. R. (1987). *Empirical Model-Building and Response Surfaces* (1st ed.). Wiley.

Scope of Research



Our future as the human species is fundamentally entwined with the fate of the world's biodiversity as we are beholden to the ecosystem services which sustain our lives and societies (Figgis et al, 2012¹⁹).

“man is a part of nature, and his war against nature is inevitably a war against himself.”

- Rachel Carson, Environmental Activist & Author of Silent Spring²⁰

I spent 7 years involved in various roles in the environmental sector in Malaysia, Australia and Aotearoa New Zealand. Having spent time and energy immersed in the sector, I was acutely aware of the sense of inertia that so many people involved in conservation felt - that despite investing so much energy, we were not winning the struggle to save and restore biodiversity.

The current state of biodiversity loss in New Zealand is acknowledged by the Department of Conservation as continuing on a downward trend despite the Biodiversity Strategy 2000-2020²¹.

“Despite the importance of biodiversity and a range of actions under the current strategy, our management methods have not halted the decline. Over 4000 indigenous species are now threatened or at risk of extinction.”

¹⁹ Figgis, P., Fitzsimons, J., & Irving, J. (2012). *Innovation for 21st Century Conservation*. (P. Figgis, J. Fitzsimons, & J. Irving, Eds.). Sydney: Australian Committee for IUCN Inc. Retrieved from

<https://www.natureaustralia.org.au/wp-content/uploads/2017/11/Innovation-for-21st-century-conservation.pdf>

²⁰ Carson, R. (1962). *Silent Spring* (First). Boston: Houghton Mifflin Co.

²¹ Department of Conservation. (2000). *The New Zealand Biodiversity Strategy*. Retrieved from

<https://www.doc.govt.nz/globalassets/documents/conservation/new-zealand-biodiversity-strategy-2000.pdf>



Figure 1

Australia's efforts are no better. In the Australian Government's 2016 State of the Environment Report²², it was found:

"The outlook for Australian biodiversity is generally poor, given the current overall poor status, deteriorating trends and increasing pressures. Our current investments in biodiversity management are not keeping pace with the scale and magnitude of current pressures."

²² Cresswell ID & Murphy HT (2017). Australia State of the Environment 2016: biodiversity, independent report to the Australian Government Minister for the Environment and Energy, Australian Government Department of the Environment and Energy, Canberra.

At the frontlines of the effort to conserve and restore biodiversity in Australia and New Zealand is the environmental conservation sector. The sector is made up of people in public, private, NGO and community organisations and individuals, actively involved in restoration planting, predator control, species translocation, weed control, breeding programs, environmental education and more. Whilst this sector is not the only one which has responsibilities and resources to tackle biodiversity loss, it is the one which has the strongest mandate to explicitly address it, and thus is where I have focused the majority of my research.

I focus initially on community-based conservation responses for two main reasons; firstly, there is evidence to suggest that community-based responses are more resilient than institutional responses (Schleicher et al, 2017²³; Brooks et al, 2013²⁴). Secondly, community-based responses tend towards greater citizen participation, which also addresses some of the additional challenges around nature disconnection and physical separation.

The findings of New Zealand Researcher and Practitioner, Dr. Monica Peters, have been particularly influential. Peters' PhD thesis on the ecology of community environmental groups²⁵ provided both baseline information and provocation for lines of enquiry into increasing the impact of conservation projects.

As evidenced by the 'New Zealand Biodiversity Strategy 2000-2020' and 'Australia State of the Environment 2016' reports, despite progress in various aspects of environmental management such as species trans-locations, improved predator control traps, and ecological restoration planning, the conservation sector has become a stuck system which is not meeting the local or global scale of the problem, including addressing the underlying causes of the challenges we face.

To address the sprawling, and seemingly intractable challenges outlined here, my project focused on developing a targeted systems change initiative which identifies systemic causes and barriers to change, and devises interventions to improve the health and outcomes of the system.

²³ Schleicher, J., Peres, C. A., Amano, T., Lactayo, W., & Leader-Williams, N. (2017). Conservation performance of different conservation governance regimes in the Peruvian Amazon. *Scientific Reports*, 7(1), 11318. <http://doi.org/10.1038/s41598-017-10736-w>

²⁴ Brooks, J., Waylen, K. A., & Mulder, M. B. (2013). Assessing community-based conservation projects: A systematic review and multilevel analysis of attitudinal, behavioral, ecological, and economic outcomes. *Environmental Evidence*, 2(2), 34. <http://doi.org/10.1186/2047-2382-2-2>

²⁵ Peters, M. A. (2016). *The ecology of community environmental groups: Integrating restoration, partnerships and citizen science*. University of Waikato, Hamilton, New Zealand. Retrieved from <https://hdl.handle.net/10289/10618>

In the RSA's recent report "*From Design Thinking to Systems Change*"²⁶, they outline various barriers to diffusion of design-led projects into existing systems. The report finds that "*Social innovators should be constantly looking to supplement market making activities... with other interventions aimed at preparing the system to support the innovation*". To that end, I concentrate on practical outcomes which have the possibility for immediate adoption, and the potential for sustaining the outcomes long enough to realise impact.

My approach is *targeted systems change*, not transformational systems change.

The idea of targeted systems change was introduced in a 2018 article by Odin Mühlenbein²⁷, as small, yet systematically-focused contributors to 'big vision' transformational change. Mühlenbein indicates these activities as easier to develop strategies for, and potentially more effective when working towards larger transformational change. This perspective is also mirrored in arguments put forward in "*Against Big Bets*" (Kramer, 2017²⁸) and "*Wheeling in the Trojan Mice*" (Mahendra, 2016²⁹), which represent a shifting narrative about how we understand systems change in society.

The 'Design for Interactions Framework' introduced by Carnegie Mellon Design School weaves complexity science, systems and social change, into a proposed spectrum of emerging design disciplines. Given my approach of targeted systems change to affect significant change, I locate my work in the Design for Social Innovation discipline.

²⁶ Conway, R., Masters, J., & Thorold, J. (2017). *From Design Thinking to Systems Change*. RSA Action and Research Centre. London. Retrieved from https://www.thersa.org/globalassets/pdfs/reports/rsa_from-design-thinking-to-system-change-report.pdf

²⁷ Mühlenbein, O. (2018). Systems Change — Big or Small? *Stanford Social Innovation Review*, February, 3–6. Retrieved from https://ssir.org/articles/entry/systems_changebig_or_small

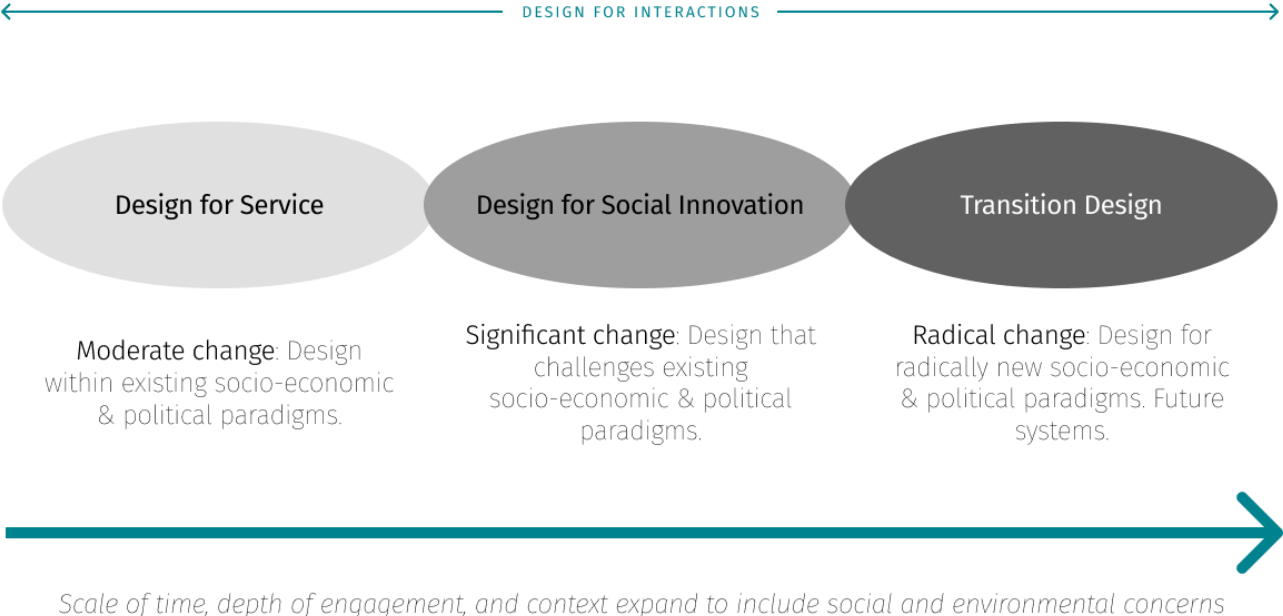
²⁸ Kramer, L. (2017). Against "Big Bets." *Stanford Social Innovation Review*, Summer(1). Retrieved from https://ssir.org/articles/entry/against_big_bets

²⁹ Mahendra, J. (2016). Wheeling in the Trojan Mice. *Stanford Social Innovation Review*, May, 4. Retrieved from https://ssir.org/articles/entry/wheeling_in_the_trojan_mice

Design as an Agent of Change

Based on 'Design For Interactions Framework' by Carnegie Mellon Design School

Image by Sam Rye,
Masters of Design (MDes)



Source: Carnegie Mellon Design School - Program Framework. 2017. <http://cmusod.barkandbyte.net/content/program-framework>

Research Questions

These questions represented the starting point of my research, and evolved in the Systems Sight phase - [see the revised versions here](#).

How can we use environmental volunteering experiences to change people's relationship with nature?

How might we support project coordinators to create better volunteering experiences?

How might we visualise the impact of environmental volunteers, to help them understand their efforts in new ways?

What types of business models can support and amplify the impact of an initiative in the conservation sector?

How can human-centred design methods contribute to designing better tools for the environmental conservation sector?

Landscape of Practice

My practice is largely characterised by working in high levels of complexity (dynamic and emergent contexts), often with multiple stakeholders, and with the express intention of shifting and changing systems.

In addition to Conservation, I have also spent time working on issues like youth mental health, local food systems, and developing peer learning networks in the public sector.

The field of 'Design for Systems' is most commonly talked about as 'fourth order of design' (Buchanan, 1992³⁰; Golsby-Smith, 1996³¹), or the "*fuzzy front end of Design*" where "*it is often not known whether the deliverable of the design process will be a product, a service, an interface, a building, etc*" (Sanders & Stappers, 2008)³². For more about [fourth order design, see the appendix](#).

During this project I worked at the intersection of Systemic Design and Design for Social Innovation.

³⁰ Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, 8(2), 7–35. <https://doi.org/10.2307/1511637>

³¹ Golsby-Smith, T. (1996). Fourth Order Design : A Practical Perspective. *Design Issues*, 12(1), 5–25.

³² Sanders, E. B.-N., & Stappers, P. J. (2008). Co-creation and the new landscapes of design. *CoDesign*, 4(1), 5–18. <https://doi.org/10.1080/15710880701875068>

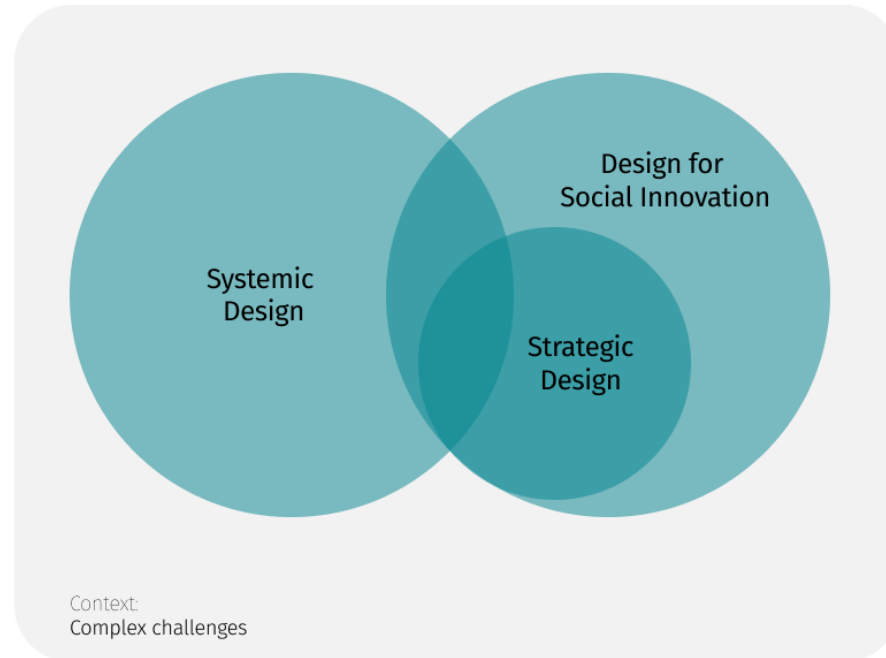
Design Practice

Challenging existing paradigms with systems-aware design practice

Image by Sam Rye,
Masters of Design (MDes)

TYPES OF ACTIVITIES:

- Semi structured stakeholder interviews
- Personal experience reflections
- Design ethnography
- Participatory probes
- Generative design
- Mapping - user journeys and organisational process
- Root cause (iceberg) analysis
- Systems mapping
- Secondary research
- Visual synthesis



TYPES OF ACTIVITIES:

- Semi structured user interviews
- Generative research
- Speculative design
- Product-Service-System prototypes
- Participatory action research
- Evaluative research
- Value proposition design
- Business model design
- Platform design

Sources:
Ryan, A. J. (2014). A Framework for Systemic Design. FORMakademisk: Relating Systems Thinking and Design II, 7(4), 1-14.
Manzini, E. (2015). Design, When Everybody Designs - An Introduction to Design for Social Innovation. (F. Ken & E. Stolterman, Eds.) (1st ed.). Cambridge: The MIT Press.
Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. Strategic Design Research Journal, 1(1), 31-38.

Systemic Design is a systems-aware design research practice blending systems thinking and human-centered design (Ryan, 2014³³).

Design for Social Innovation is a practice which brings the intent and potential to create significant change in existing socio-economic paradigms (Irwin et al, 2015³⁴; Manzini, 2015³⁵) within which strategic design offers an approach to “*problem setting and solving and thus to design decisions in turbulent and uncertain contexts*” (Meroni, 2008³⁶).

In articulating my practice, I notice that each phase of my process is a microcosm of my larger process. The below diagram identifies my process across the three sections of this research project, within each section is a prototype-research-synthesise cycle, based on the insight from Cynefin framework, that when working in complexity, the best approach is to probe-sense-respond (Snowden, 2007³⁷).

³³ Ryan, A. J. (2014). A Framework for Systemic Design. *FORMakademisk: Relating Systems Thinking and Design II*, 7(4), 1–14. <https://doi.org/10.7577/formakademisk.787>

³⁴ Irwin, T., Kossoff, G., Tonkinwise, C., & Scupelli, P. (2015). Transition Design 2015. *Carnegie Mellon School of Design*, 32. <https://doi.org/10.1080/14487136.2015.1085688>

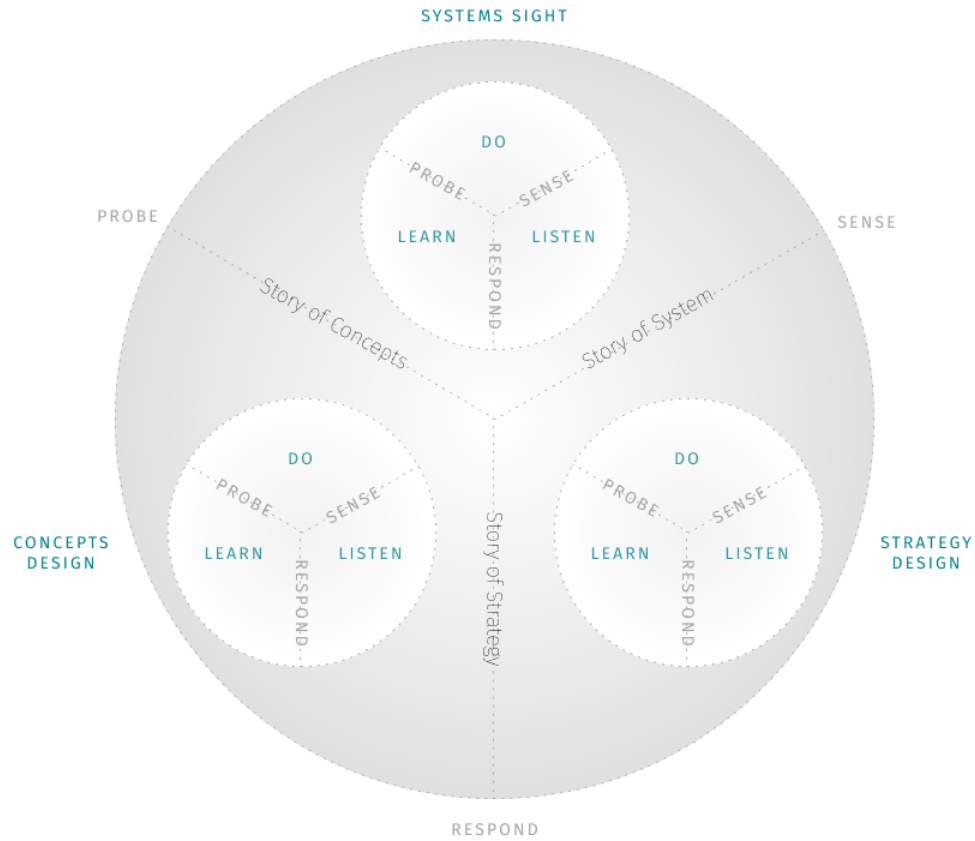
³⁵ Manzini, E. (2015). *Design, When Everybody Designs - An Introduction to Design for Social Innovation*. (F. Ken & E. Stolterman, Eds.) (1st ed.). Cambridge: The MIT Press. Retrieved from <https://mitpress.mit.edu/books/design-when-everybody-designs>

³⁶ Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. *Strategic Design Research Journal*, 1(1), 31–38. <https://doi.org/10.4013/sdri.20081.05>

³⁷ Snowden, D. (2007). Cynefin Framework. Retrieved from <http://cognitive-edge.com/>

Design Practice

My design process - fractals as iterative process



FRACTALS

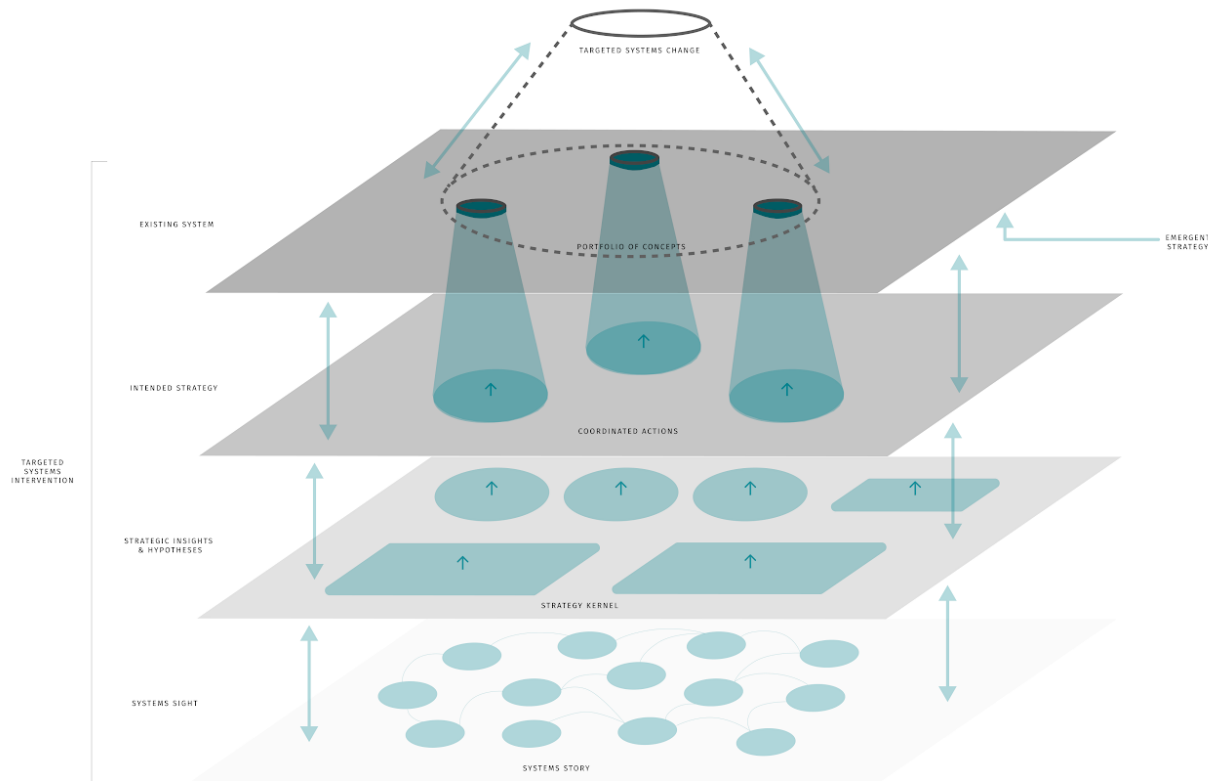
Fractals are infinitely complex patterns that are self-similar across different scales. They are created by repeating a simple process over and over in an ongoing feedback loop.

Reference: The Fractal Foundation

Targeted Systems Change Intervention: The Anatomy

Targeted Systems Change

Designing an intervention to challenge existing paradigms of the environmental conservation sector



INFLUENCING CHANGE

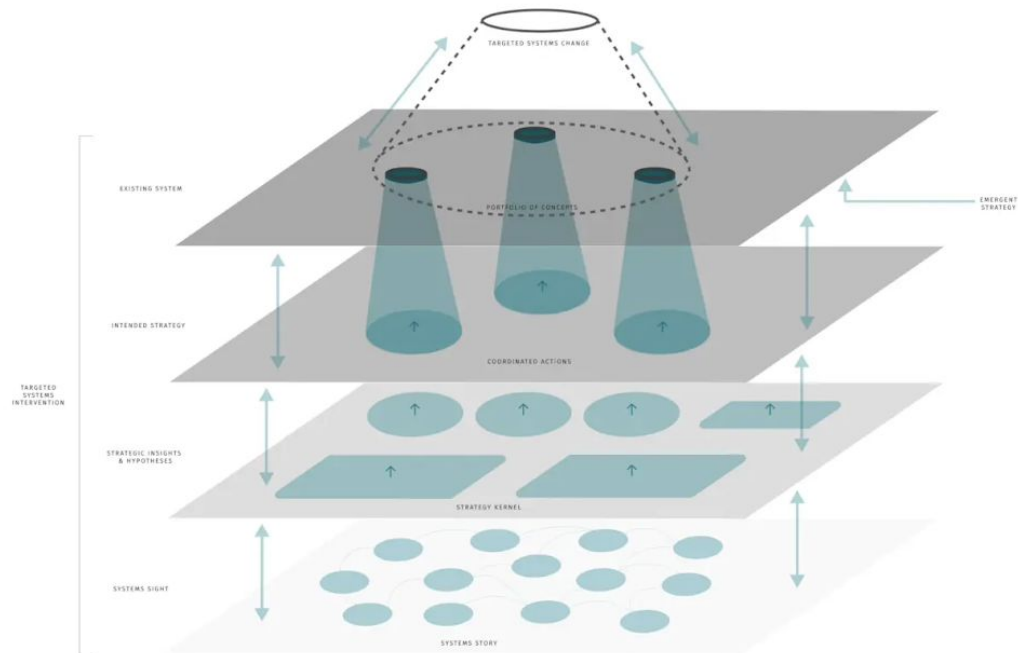
Change is constant. The goal of systems change initiatives is to intentionally influence the future of the system, towards a desired state.

This diagram is a framework for thinking about the layers of an initiative which come together to communicate, guide and evolve a targeted systems change intervention.

Thesis Part 1.0: Story of a Portfolio of Concepts

Targeted Systems Change

Designing an intervention to challenge existing paradigms of the environmental conservation sector



INFLUENCING CHANGE

12:35

change is constant. The goal of systems change initiatives is to intentionally influence the future of the system, towards a desired state.

This diagram is a framework for thinking about the layers of an initiative which come together to communicate, guide and pursue a targeted systems change intervention.

<https://vimeo.com/296145203>

1.1 - Concept - Photo Monitoring

Photo Monitoring

Portfolio of Concepts #1: Mobile Application

Image by Sam Rye,
Masters of Design (MDes)



kanopi-photo.launchaco.com

This concept is for a photo monitoring mobile application, which supports environmental group coordinators, rangers and volunteers to capture images of the project site work on their smartphone and create presentations for funders.

This is a technological intervention, which seeks to support groups to better understand their impact, improve their outcomes over time, and increase their funding.

Aim:

Tackle the challenges of short term photo monitoring, increasing the amount of groups who are able to contribute environmental monitoring and evaluation data over time.

Hypothesis:

By improving photo monitoring, we can increase the flow of financial and social capital into the sector. By creating this new feedback loop, groups can improve the effectiveness of their conservation activities through continuous reflection, and tell better stories about their work to funders, volunteers and other stakeholders.

Model:

To make it a sustainable intervention, the photo monitoring service would be charged for on a monthly or annual subscription basis, making it financial viable for small groups, as well as enterprise clients.

Learning goals:

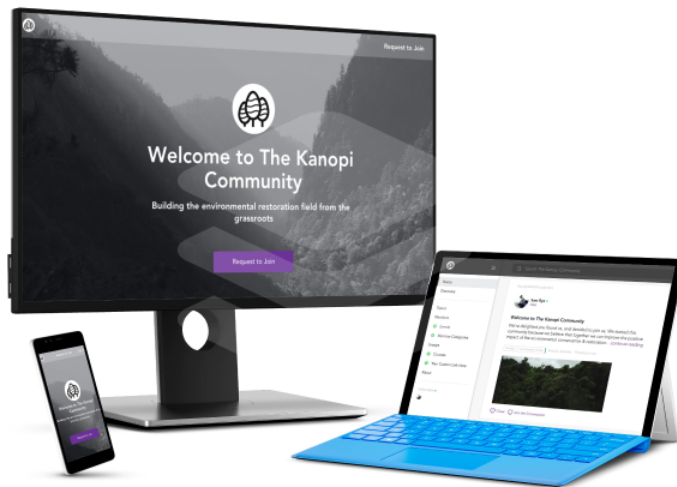
- How to enable more groups to engage in environmental monitoring and evaluation?
- How to make the data publicly available?
- Investigate best practice photo monitoring approaches for various types of activities.
- Investigate best practice storytelling approaches for photo monitoring images.
- Investigate the potential for sustainable social enterprise business models which reinvest profits in the environmental sector.

1.2 - Concept - Community of Practice

Community of Practice

Portfolio of Concepts #2: Peer-to-Peer Platform

Image by Sam Rye,
Masters of Design (MDes)



kanopi-community.launchaco.com

This concept is for a peer-to-peer community of practice, which supports a wide variety of people in the environmental conservation sector to connect, share and engage in shared work.

Whilst this has a technological underpinning, essentially this is a socio-cultural intervention which focuses on enabling greater connection, trust and skill building, from which could emerge the collective capacity to tackle any challenge facing the sector over time.

Aim:

Tackle the challenges of lack of capacity building opportunities in the sector, by creating a peer-to-peer community model. The aim of this is to increase the number of regular interactions and culture of knowledge creation and sharing across the sector.

Hypothesis:

By improving access to capacity building and new relationships, new possibilities emerge for how the sector can respond to challenges it faces. By addressing this with a cultural approach, the sector can change the design and intent of the system (the most powerful leverage points for systems change).

Model:

To make it a sustainable intervention, the community of practice would be free to join, with a fee for certain services such as a fellowship, prototyping coaching and potentially a marketplace fee. This would enable it to be financially feasible for individuals, members from small community groups, as well as enterprise clients.

Learning goals:

- Investigate what areas of capacity building are highest priorities.
- Investigate how to enable participatory design and development of a community of practice from within the environmental sector.
- Explore how to bridge skills and capabilities which don't exist in the sector, but are needed.
- Explore social enterprise business models which mirror advancements in the platform cooperative movement, to ensure the community of practice is owned and controlled by the sector.

1.3 - Concept - Workshop Resource

Workshop Resource

Portfolio of Concepts: #3 - Guide to facilitating a participatory workshop

Image by Sam Rye,
Masters of Design (MDes)



kanopi-resource.launchaco.com

This concept is for a workshop resource, which supports groups to explore the future together, with a focus on shared purpose, new models of governance, and action. The workshop uses organic materials to allow rapid adoption of living systems mindsets, to encourage more holistic discussion.

This is a socio-cultural intervention that seeks to deliver a simple guide to enable rapid transitions to ecocentric viewpoints, from which a group can explore their common future. It is based on participatory workshops I've run using organic toolkits in which individuals and groups investigate topics such as principles for new initiatives.

Aim:

Tackle the challenges of governance, alignment and momentum for groups, by offering a workshop plan which can be downloaded and run by groups themselves.

Hypothesis:

By targeting the capacity of groups to setup and maintain sustainable projects which learn and adapt to the changing landscape of conservation, they will gain greater momentum and improve their impact over time.

Model:

The resource would be free for anyone to use, licensed under Creative Commons, and could be combined with the Community of Practice concept to enable further reach and sharing of insights from workshop participants or organisers.

Learning goals:

- Investigate use of materials as a means to enable different futures to emerge.
- Investigate potential of standalone workshop resources (informed by process design) to answer emerging capacity building challenges.
- Investigate use of freely downloadable resources to increase reach and engagement with new individuals and groups.

Designing A Portfolio of Concepts

This section outlines the activities, artefacts and reflections used to design the portfolio of concepts.

Metaphor: Planting Trees

Systems change needs attention to form and learning

“If we want to restore a forest, we need to understand what enables trees to thrive.”



Photo by Chris Yang, [unsplash/@chrisyangchrisfilm](https://unsplash.com/@chrisyangchrisfilm)

This section aims to ‘examine a tree’ so we can better understand where to plant it, what other species it might attract and how to ensure it survives.

This idea draws on strategic design practice of creating a portfolio of concepts to bring to life and start testing the feasibility, viability and desirability for each, to increase the likelihood of successful targeted systems change.

Much like focusing on where to plant a tree without first considering the ecology of a system (relationship of organisms to one another and to their physical surroundings), without paying attention to the system it will be introduced into will likely mean a concept will not survive, or worse yet - will have negative consequences in the sector.

"Heaven and Earth are not partial. They do not kill living things out of cruelty or give them birth out of kindness. We do the same when we make straw dogs to use in sacrifices. We dress them up and put them on the altar, but not because we love them. And when the ceremony is over, we throw them into the street, but not because we hate them."

- Lao Tzu, Tao Te Ching (translated by Red Pine)³⁸

The concepts presented in this section are boundary objects (Ehn et al, 2014³⁹), an embodiment of the strategy crafted in this research project, created to give form to the actions and hypotheses that I designed.

Just like the straw dogs that Lao Tzu talks of in Tao Te Ching, the design of concepts is not the primary purpose of my research project. They may well be discarded, yet their purpose is to enable learning, and make action possible in a complex system - to probe, sense and respond to the emerging challenge.

As Dunne & Raby note in "*Speculative Everything*"⁴⁰, the purpose of designing "things" can be to speculate and explore possibilities to make the future more real and more malleable. The concepts are embodiments of scenarios (Meroni, 2008⁴¹) whereby a preferable future is pulled more sharply into focus.

As Meroni et al⁴² put forward in their paper "*Design for social innovation as a form of designing activism*", the role of the Designer can be to become embedded in the problem space in an open form of action research, to catalyse action and energy towards change desired by a community or system through prototyping.

³⁸ Pine, Red (1996). Lao-tzu's Taoteching. San Francisco: Mercury House.

³⁹ Ehn, P., Nilsson, E. M., & Topgaard, R. (2014). *Making Futures: Marginal Notes on Innovation, Design, and Democracy*. *Making Futures* (Vol. 7). <https://doi.org/10.1145/2662155.2662214>

⁴⁰ Dunne, A., & Raby, F. (2013). *Speculative everything : design, fiction, and social dreaming* (1st ed.). London: MIT Press. Retrieved from <https://mitpress.mit.edu/books/speculative-everything>

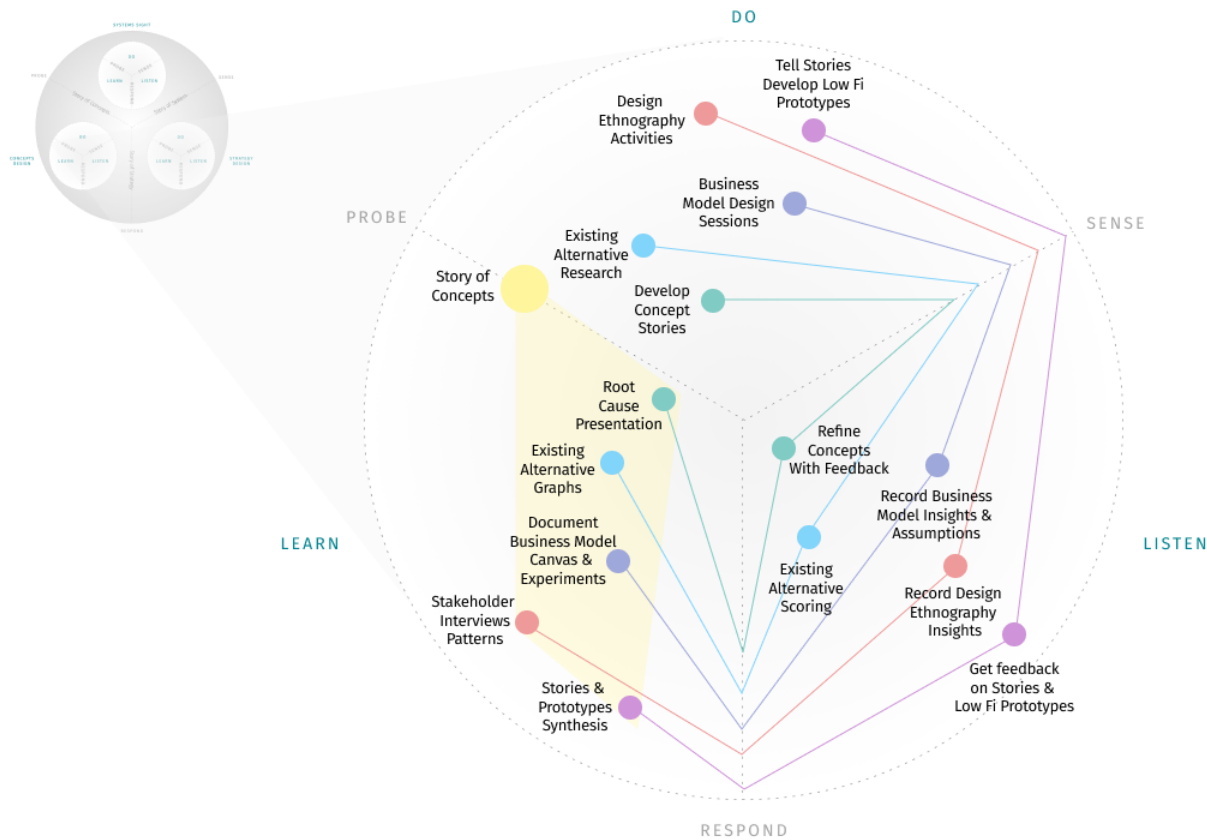
⁴¹ Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. *Strategic Design Research Journal*, 1(1), 31–38. <https://doi.org/10.4013/sdri.20081.05>

⁴² Meroni, A., Fassi, D., & Simeone, G. (2013). *Design for social innovation as a form of designing activism: An action format*. Milano.

Concept Design Activities

Designing a Portfolio of Concepts

Giving form to strategic insight and intent, to bring ideas to life and evolve the inquiry



PORTFOLIO OF CONCEPTS

When we accept that a complex system has no linear relationship in cause and effect, we realise that predictive, planning-based responses to change are ineffective.

Instead, developing a portfolio of concepts enables more experimentation - active exploration and adaptation to the future, as it emerges.

Reference: Boulton, J. G., Allen, P. M., & Bowman, C. (2015). Embracing complexity: Strategic perspectives for an age of turbulence. Oxford University Press.

Early stories & low fi prototypes

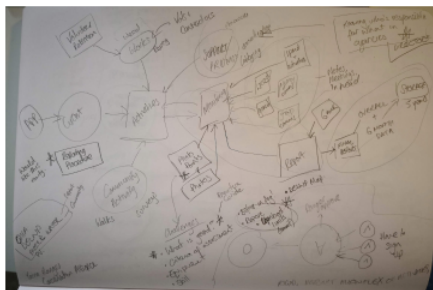
Exploring Concepts

Artefacts from Early Stories & Prototypes



“Imagine if you could take pictures with your smartphone and create a report for your funder?”

“What if we curated good practice resources for community group coordinators?”



Some of the earliest work in developing concepts, was done in the form of telling stories, imagining futures, and exploring what form those may take.

This included conversations with stakeholders not only about their problems and needs, but about what they could envision in their future. It also took the form of a workshop to test a hypothesis, and sketching different ideas.

The process of exploring options for a portfolio of concepts was divergent, exploring a wide range of options - from tech platforms to help manage event communication and management, workshops envisioning community principles, and exploring the feasibility of community platforms built on emerging technologies.

Involving stakeholders in the early phases of research increases the likelihood of accruing societal value (by asking open questions which encourage personal and collective reflection and exploration), as well as directly informing desired stakeholder use/experience of any form of “solution”, thus increasing the likelihood of success (Sanders, 2013. *Perspectives on Design in Participation*).

Key Insights

1. Moss moves people

As someone who makes sense of challenges and opportunities by projecting them onto metaphors, shapes and models, I was surprised by how delighted people were when I ran a workshop along these lines with organic materials, to help them think about what they wanted from a nascent community of practice.

I've often been frustrated by the 'world-as-machine' mindset and language, such as talking about people in organisations as a 'cog in a machine'. However, short of using metaphors of nature (such as a rainforest to describe an organisation), or moving people to more 'green' surrounds to have a conversation, it has been hard to shift these limiting mental models.

When I ran the organic toolkit workshop for the first time, people rapidly transitioned to what I would describe as exhibiting 'living systems mindsets'. This enabled conversations which fundamentally shifted the sense of what was desired and possible, for the group.

2. Learning needs to be alive

As I began to talk to people about curating a library of 'good practice' resources for environmental groups, I found that people seemed tepid on the idea. I was surprised, as from my experience of marketing and online publications, curated lists of resources and tools are popular.

With more interviews, I found that whilst people would use those resources, they really wanted to be able to evolve the resources for their own needs, share them with others, and forge relationships to work together with people on shared projects. This struck me to be very much how an open source technology community works, and I began to hear echoes of communities of practice which I had been involved with in previous years (such as the now defunct [Social Labs](#) Community of Practice, and [The Victorian Public Sector \(VPS\) Peer Academy](#)).

This helped me realise that no effort aimed at building capacity could be static (such as curated resources), instead they needed to draw on the concept of 'Scalable Learning' (Hagel & Seely Brown, 2017⁴³) to ensure that this culture is enabled through supporting people to learn together, in the face of emerging challenges.

3. Dropping good ideas

It was at this stage that I had to start converging my ideas, and start making choices about what I wouldn't be doing, even if I felt they were good ideas. One of these concepts, was something which had sparked this research project - a concept for supporting group coordinators to capture the everyday data of their project, and present it like an infographic, to better communicate their work with a variety of stakeholders.

I realised some concepts had preconditions which were not yet met, and thus the timing was just not right. For example, Community-based Conservation Groups were mostly underfunded, and thus generating more volunteer supply was not a useful strategy - whereas enabling them to build more loyalty in their volunteer base could be of use.

⁴³ Hagel, J. I., & Brown, J. S. (2017, August). Help Employees Create Value - Not Just Share It. *Harvard Business Review*, 1-4. Retrieved from <https://hbr.org/2017/08/help-employees-create-knowledge-not-just-share-it>

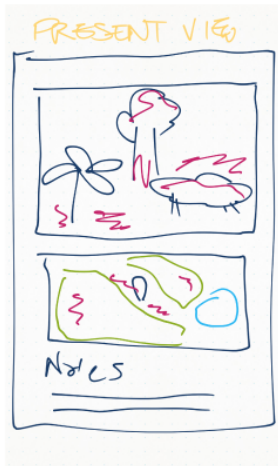
Design Ethnography

Exploring Concepts

Artefacts from Design Ethnography



“Taking good photos of weed control is difficult. We’re trying to show how we take green away from green.”



“Increasingly, the funders are expecting photos as evidence of work”



As my inquiry began to focus on supporting projects to tell better stories, I was invited to join Jane, the Project Coordinator for Community Weed Alliance of the Dandenongs (CWAD), on a photo monitoring activity and at a steering committee meeting.

As well as observing, I was able to do informal interviews, look at reports, and document everything with photography. It also spurred thoughts about possibilities, which I was able to capture quickly as sketches on my smartphone.

Key Insights

1. Short term monitoring

The opportunity to attend the photo monitoring activity was rich in insights, as I was able to see first hand what Jane was doing. I found CWAD did something out of the usual (from my personal experience) - they were using monitoring over a short timeframe - about 3 months on average.

This is not how the majority of photo monitoring is undertaken in the past. Traditionally photography was expensive, and was used for long term projects to observe change once or twice a year, over a number of years. Instead, CWAD were using it as a low cost way of doing compliance for small amounts of grant funding, taking photos before, just after, and 3 months after restoration activities.

2. Opportunities for smartphones

The observation was interesting as Jane was using a compact digital camera, to capture good enough photos for presentation purposes. She mentioned smartphones generally didn't capture the level detail, or dynamic contrast that was needed.

However, the curve of technology is bending towards very high quality cameras being embedded into mid-to-high end smartphones, which can be purchased second hand for as low as \$200 - about the price of a low end compact digital camera.

Likewise, from this ethnographic work, I was able to spot a range of issues with the process, which could be helped with the tools and sensors embedded in a smartphone, such as:

- No way to see previous photo taken at a location (unless printed out and brought with).
- Difficult to retrospectively work out what photos are taken in what locations, especially if someone else has to take over (no markers were being used).
- Have to record GPS locations manually, including where photographer was standing and direction of photo.
- Have to record weather conditions manually.
- Any additional annotations / notes for a site must be recorded manually.
- Photos had to be downloaded and stored manually.
- Presentations for funders would be created manually.

Using the location and direction derived from the smartphone's sensors, combined with time & date information embedded in EXIF data of a photo, and weather information from a data service, much of this could be automated. Paired with a mobile app which allowed a categorisation/tagging of photos, and the ability to make reports, this would be a much less costly exercise.

3. Photos can reveal the unseen

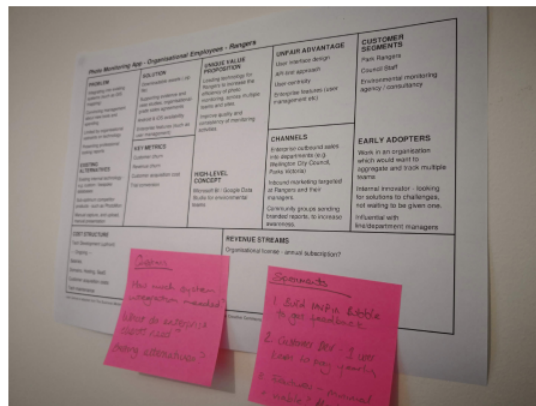
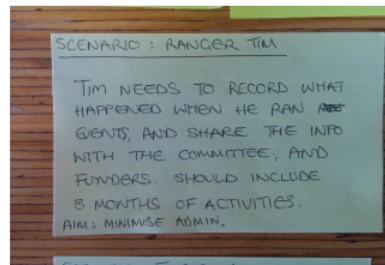
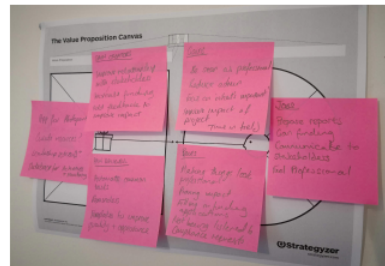
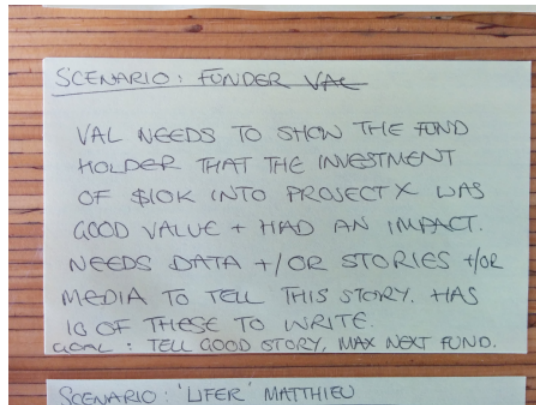
The benefit of being able to record everything with photography has been that I am able to revisit the images repeatedly to check my observations. The snapshot in time that a photograph provides, is incredibly useful as it enables us to see things which we didn't at the time for all manner of reasons, and likewise that sometimes we wouldn't see with video due to the moving nature of the medium (going frame by frame through a 90 minute activity is a huge use of resource).

One example of this is a photo I took of Jane perched in thick undergrowth trying to get enough distance from the subject, to get a reasonable image. When I saw the photo when I returned home, I thought it was just of the path, until I saw a hint of red in the bushes. This reminded me of how difficult it would be for her to find this spot again, to take the same photo in 3 months time, to complete the set for a presentation. It was this reminder which surfaced thoughts about different low cost solutions for finding a location down to a square metre, a condition for effective photo monitoring.

Value Proposition & Business Model Design

Exploring Concepts

Artefacts from Value Proposition Design & Business Modelling



In the scope of my research, I indicated that I was interested in investigating interventions which would be able to be sustained long enough to achieve the impact they were designed for.

Whilst I developed a portfolio of concepts at a high level, I was filtering ideas through a rubric of Feasible, Desirable and Viable. I used value proposition design, and the lean canvas to explore and shape the ideas, in order to quickly assess them. I did this as a solo activity, rapidly working through the canvases and exploring a variety of different ways in which options could be made sustainable - naturally this would be a much more extensive process if I decided to take an idea forward.

Key Insights

1. Back of the napkin

I find the lean canvas and value proposition canvas really useful strategic design methods, to rapidly assess an idea. Whilst they can feel very light on rigour on a first pass, over time I have found they are very good sensing tools to quickly establish what scale an idea would need to reach to become financially viable - as a business, charity or otherwise.

This process rapidly got me to the conclusion that there was multiple potential revenue models for the Photo Monitoring and Capacity Building concepts, and that it would be possible to explore novel social enterprise models which sought to reinvest profits back into the conservation sector.

2. Valuable ≠ Sustainable

Whilst the aforementioned ideas surfaced as financially viable (at initial exploration), there were several which were discarded as I couldn't see a short term path to financial viability. My experience with the environmental sector is that there is extreme risk aversion to entrepreneurial approaches, which is throttling the ability for technical and socio-cultural interventions to emerge.

So whilst filtering ideas for their desirability and feasibility to identify value, it was a stark reminder that most ideas will fail to have a positive impact as they will not be sustainable over time without a sound model which makes them viable.

3. Supporting Actions

As some of the ideas emerged, I noticed how some could break ground for others to follow.

For example, the third concept - a simple workshop resource - would work as an excellent way for groups to get to know about the capacity building initiative, or discover the photo monitoring tool.

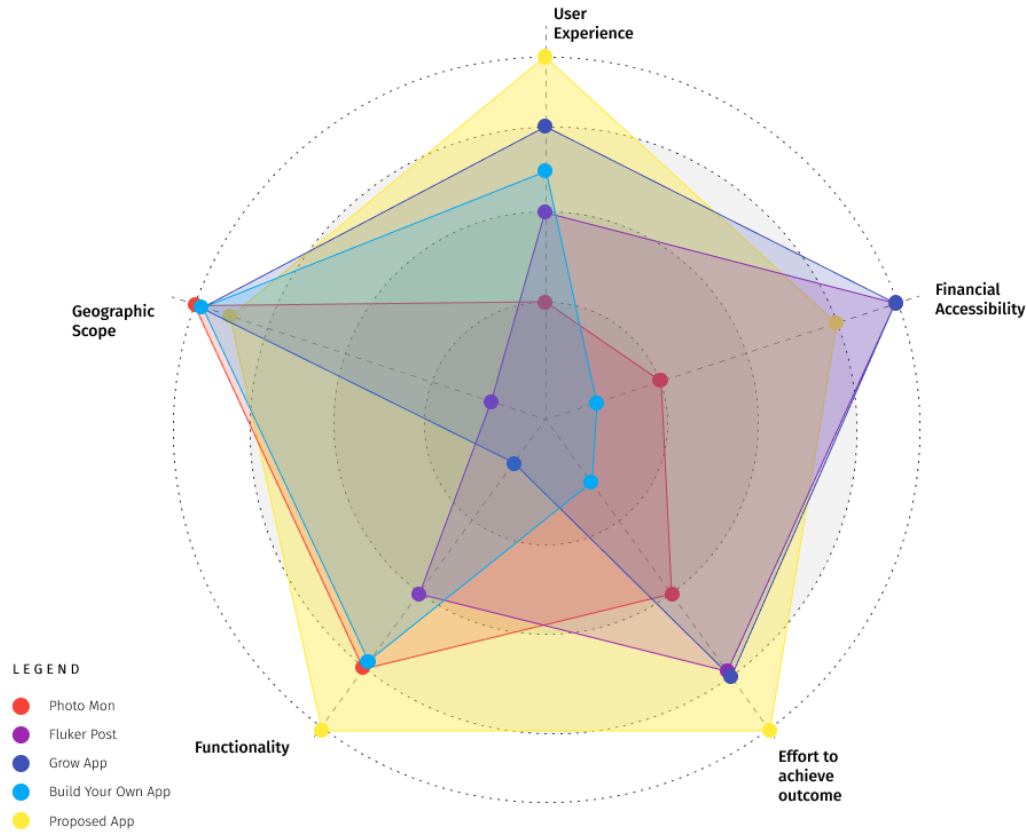
Product service systems (PSS) were introduced in Assistant Professor Anna Meroni's 2008 work on Strategic Design⁴⁴, as a mix of products, services, communication and people. Taking this provocation, it seems that the portfolio of concepts instead of being seen as discrete and individual, has the potential to evolve into a PSS.

⁴⁴ Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. *Strategic Design Research Journal*, 1(1), 31–38. <https://doi.org/10.4013/sdri.20081.05>

Existing Alternative Analysis

Exploring Concepts

Artefact from Comparative Analysis of Photo Monitoring solutions



Another exploration of the feasibility, desirability and viability of the portfolio of concepts was to explore what else was out there that could achieve the same ends.

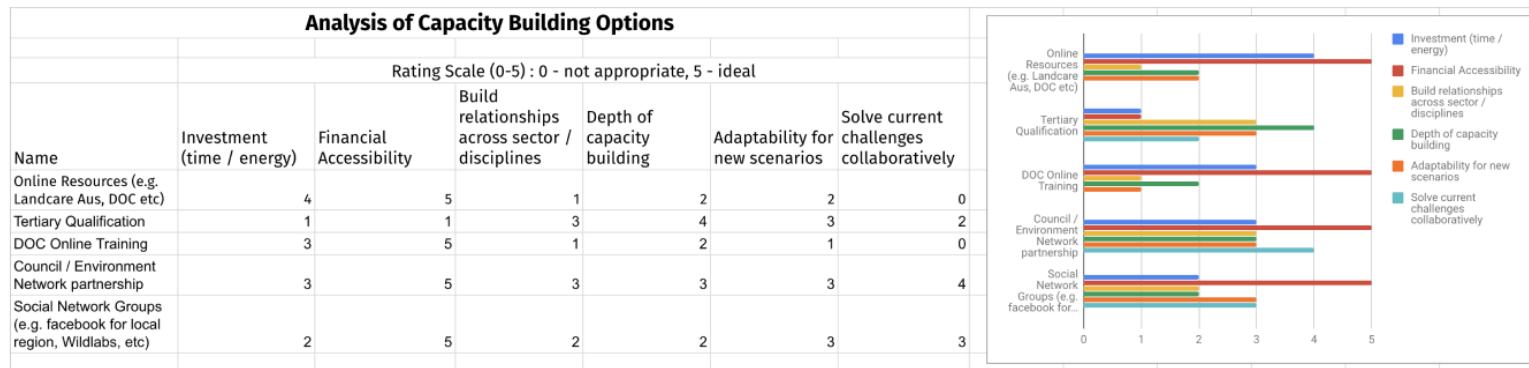
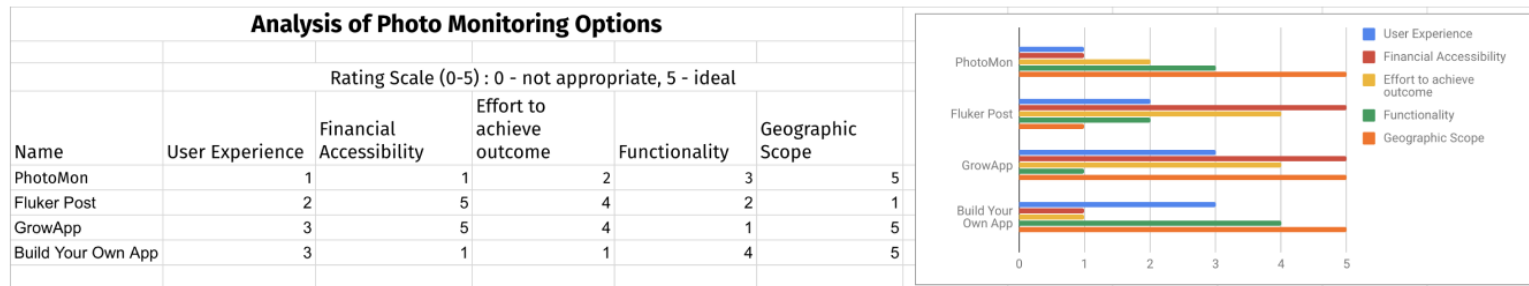
In this case, I did a basic market analysis against the personas and jobs to be done I had developed. I created a framework for scoring each alternative option based on my research findings about what people valued, then generated a graph to visualise the shape of each option.

This enabled me to look at opportunities for creating something different which had a blend of needs directed towards the specific needs of the people I seek to support.

Source: Primary Research & Analysis

Exploring Concepts

Artefacts from Comparative Analysis Data



Source: Primary Research & Analysis

Key Insights

1. Ideal shape

The exercise was very helpful in drawing together my research into an actionable framework to guide further design work on the concepts, and direct ongoing research activities.

Recognising the structural limitations (such as the way FlukerPosts was built around an academic research project) of alternatives helped to see what aspect of a business model may be sustainable and what may not be.

2. Leveraging emerging theory

One advantage of having worked in the sector, but also having had a very varied working life (and a research-centric personality), is that I have been exposed to a number of different disciplines.

In designing a concept in the capacity building area, I recognised that I was drawing on my work in social sciences, such as psychology, organisational learning theory, movement building, and wellbeing science.

3. Pricing strategies

Comparative analysis is always helpful to also build a picture of what it costs for someone to achieve their current goals, to help inform pricing strategy.

One aspect that emerged from my research was the challenge of pricing strategy for the community-based conservation groups. Many groups have some form of funding for time and/or operational overhead, however it's often less than it really takes to run a project. The governance, operations and administration of a group would typically rely on volunteers to some degree - whether it's people giving their time fully for free, or people who are employed, giving additional time 'to get the work that is needed to be done, done'.

The ramifications of this is that a traditional pricing strategy may look at costing a solution (such as the photo monitoring concept) against the time needed to achieve the outcome at the moment (e.g. 10 hours), and find a way to achieve the outcome quicker in

exchange for a fee (e.g. \$100). When a group doesn't value their time in financial terms, it makes product and pricing strategy much more difficult.

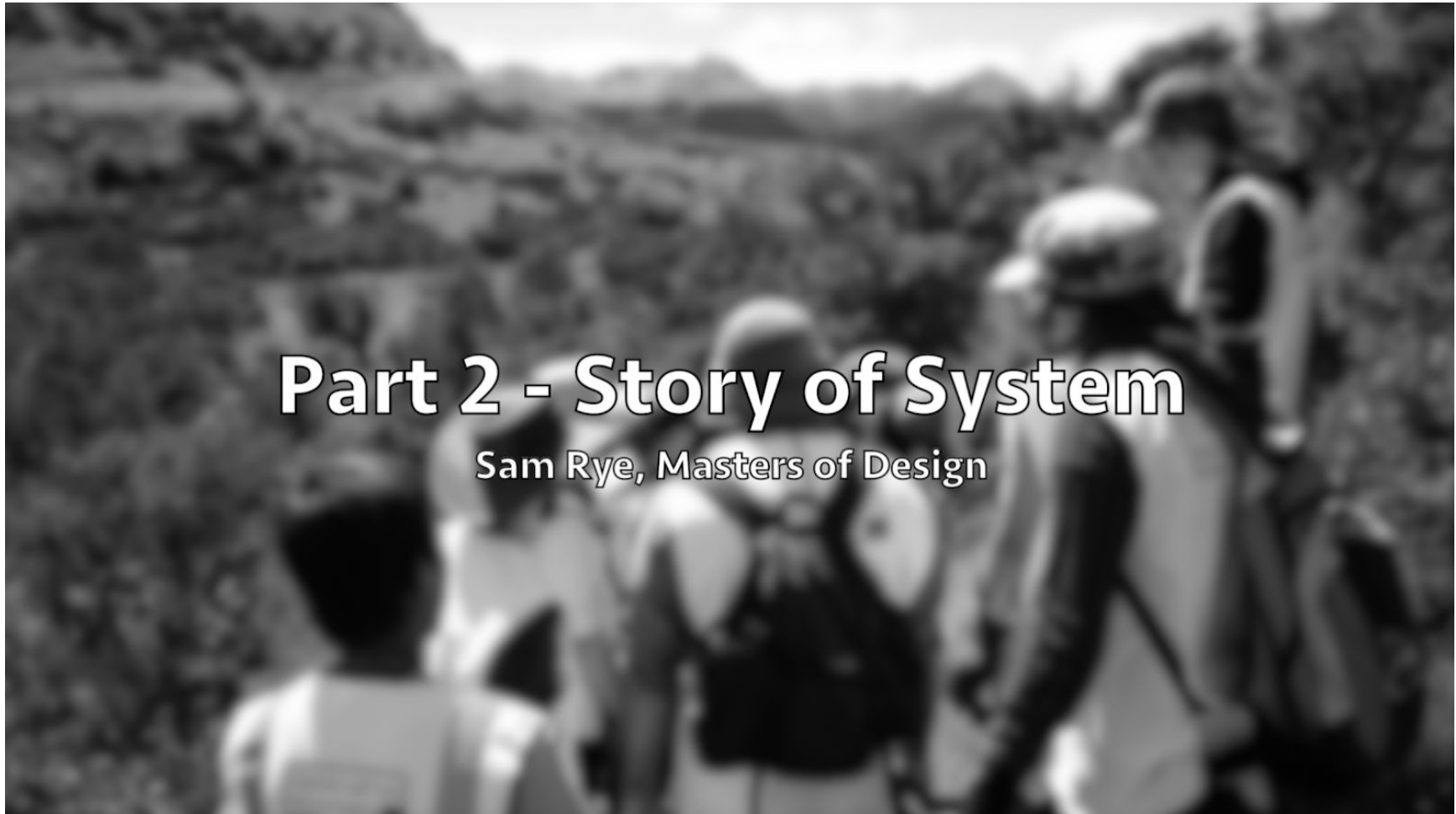
Portfolio of Concepts Reflection

Developing the portfolio was an exercise in integrating insights from the systems sight, the direction of strategy, and bringing the actions to life. I have a fair amount of experience in strategic design, especially with an entrepreneurial flavour - making ideas seem real, even if they're not yet.

Turning the strategic direction into these concepts was done to enable meaningful conversations with the stakeholders I sought to serve. Many stakeholders were busy, not able or willing to invest time in research about 'possibility', but keen to help shape the look and feel of something tangible. Building high fidelity prototypes such as user interface walkthroughs of the photo monitoring app wasn't my original intention, but it served to enable meaningful participation to better understand desirability and feasibility of ideas.

Part of the focus of the project was about sustaining impact, so looking at the underlying business model and possibilities for platform development were key to assessing the viability, and establish learning goals for each concept.

Thesis Part 2: Story Of System



<https://vimeo.com/296262047>

Generating Systems Sight

Metaphor: Seeing The Forest

Systems change needs attention to structures, patterns and relationships

“If we want to restore a forest, we need to understand what should live there.”



Photo by Sam Rye

This section aims to ‘explore the whole forest and its ecology’, in order to understand what exists, what is becoming, and what areas may benefit the most from action.

This idea draws on systemic design practice which researches both the structures, relationships and forces in a system, as well as the human and ecological needs. This is the kind of ‘pre-design and generative design’ needed at the fuzzy front end of design*.

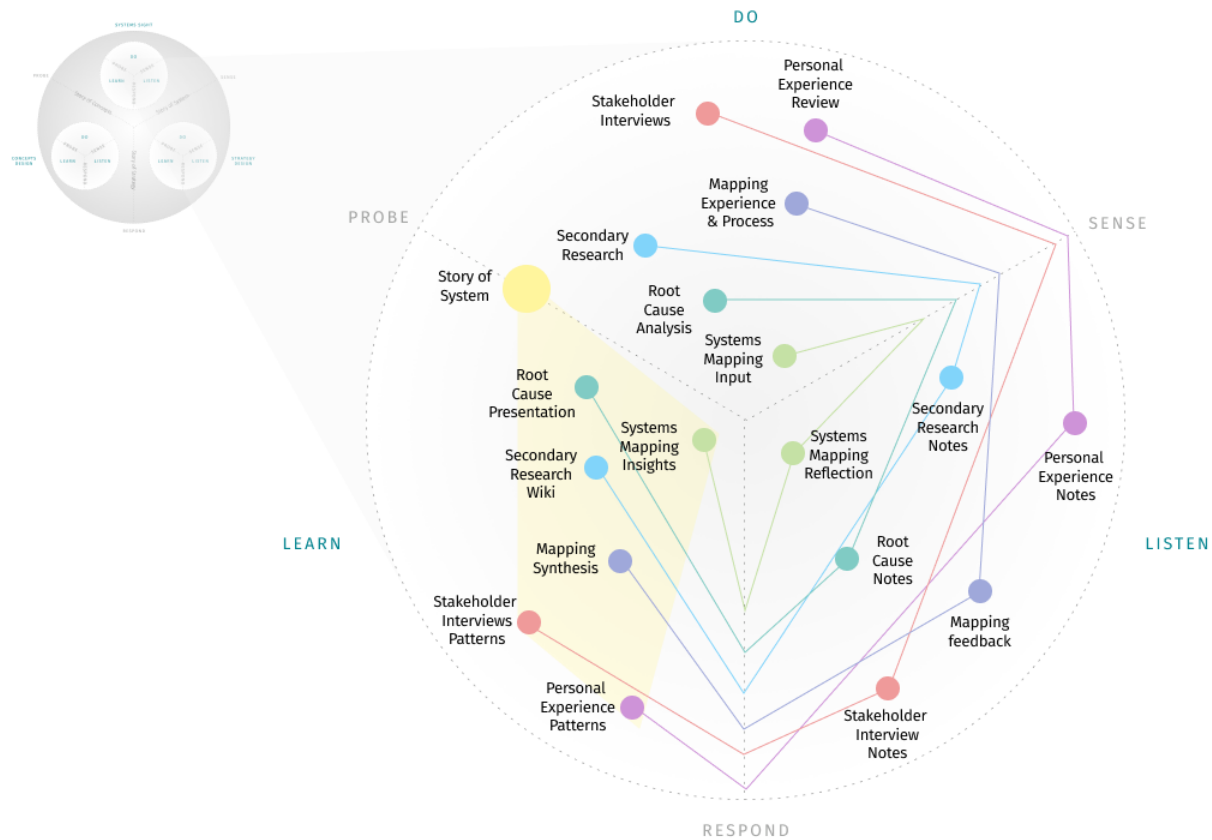
Much like taking the time to properly understand a forest before attempting to do restoration work, systemic design practice draws a wide boundary around a challenge in order to understand hidden relationships which aren’t always obvious, explore futures, and take accountability for outcomes.

*Reference: Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.

Systems Sight Activities

Generating Systems Sight

Building a sense of the system's structure, patterns, experiences and possibilities



LETTING GO

Co-founder of MIT's Presencing Institute, Otto Scharmer, asserts in his work on Theory U, that without immersing in the stories of a system, and suspending, observing and letting go of past patterns, we cannot move through and imagine new futures made from new possibilities.

Reference: Otto Scharmer, K. (2012). *Leading from the Emerging Future (First)*. San Francisco, USA: Berret-Koehler Publishers, Inc.

Capturing Personal Experience

Systems Sight

Artefacts from Capturing of Personal Experience



During my work in the conservation sector from 2007 to 2011 in Borneo, Australia and New Zealand, I was in positions which aimed to involve untrained citizens in environmental restoration activities such as tree planting, weed control, predator control and environmental monitoring.

My focus during this research period was to trigger my memories of my previous experiences, by accessing my old blog posts, photos, and videos. This was a relatively immersive approach thanks to my photography from the time, and my desire to share my experiences with friends and family overseas.

Most of the recollections were fed into the mapping exercises, such as 'a day in the life of a conservation team leader' and a spatial journey map for international volunteers visiting New Zealand. I also found archives of my photo monitoring activities for my employer of the time, Conservation Volunteers New Zealand, which spurred a line of enquiry into environmental monitoring and evaluation.

Key Insights

1. Project coordinators engage in a wide variety of tasks

In my role as a team leader with Conservation Volunteers, I was primarily concerned with running experiences for local and international volunteers. I was in a privileged position in the conservation sector - a stable, salaried role, backed by an organisation which valued professional development and developing strong processes to support staff. This is not the norm for project coordinators in the community sector, who mostly run their projects with very little money (some are part-paid, few are full time or paid a 'market rate' for their skills), many almost exclusively working with volunteers - both the governance and the people who turn up to take action on the ground. Project coordinators are often required to do a mix of volunteer recruitment (graphic design, marketing, administration), conservation planning (restoration management, project management, stakeholder liaison), event management (health & safety, conservation skill training, volunteer motivation, data capture), and project governance (report writing, grant applications, stakeholder liaison, financial accounting).

Project coordinators are often very knowledgeable about the practicalities of conservation, and many wish to do work which would have more impact. They are willing to learn new skills, try new approaches, and draw on lessons from outside the sector. The majority of this intention can be stifled by the lack of time available and the broad scope of their work which demands constant frame switching (which is a heavy cognitive load). However if some of the repetitive tasks which are currently done manually could be automated, semi-automated, or otherwise eliminated, it could release time and resources to focus on improving the impact of the project.

2. Project coordinators are pivotal and fragile

This breadth and depth of skills required often makes the coordinators vital to the project's survival, and in turn, over-relied upon, stressed and at risk of burnout.

When you add the 'underpaid' aspect to this situation, you often find that coordinators see their work as unsustainable in the long term. Some leave to find other work, or will stay in the role for a few years and then hand over the project to another person - with their knowledge and skills being lost, and having to be replicated by their successor if they have one.

With community-led conservation providing a significant portion of Australia and New Zealand's conservation activities (Peters et al, 2015⁴⁵), care and attention is needed to sustain their work.

3. More volunteers isn't always the answer

As a well resourced organisation, we still had limits on the scale of participation we could support. These limitations were often three fold:

- Amount of tools we had available (and could maintain to a high standard)
- Health & safety guidelines for Supervisor to Volunteer ratio
- Amount of time available for staffing multiple events

Often I have seen a focus on supporting conservation projects to find more volunteers, or alternatively to make it easier for volunteers to find activities - often represented by the regular cycle of people and organisations setting up digital platforms and portals to channel eager volunteer energy towards projects ([Collaborate](#), and [Nature Space](#) for example). Whilst removing friction of volunteering is important, it is not a silver bullet.

What most project coordinators really want, is more loyal and committed volunteers, who they can train a little, and know they will quietly get on with whatever task they are asked to do, without hurting themselves or someone else.

In short, a committed team of 7 volunteers who turn up every weekend may well do more than an untrained army of 30 who turn up once or twice a year.

⁴⁵ Peters, M. A., Hamilton, D., & Eames, C. (2015). Action on the ground: A review of community environmental groups' restoration objectives, activities and partnerships in New Zealand. *New Zealand Journal of Ecology*, 39(2), 179–189. <https://doi.org/10.2307/26198709>

Secondary Research


Systems Sight

Artefacts from Secondary Research

Pre-Design Insights
New Zealand History of Environmental Conservation Movement

<p>1800 CE - Early Māori settlement Extinction of several species due to hunting, and management practices and introduced species.</p>	<p>1800 CE - Māori expansion & sustainability Cultural principles introduced to maintain sustainable harvesting of food and land, such as hāhi and hāhiwhiri.</p>	<p>1800 CE - European introductions Captain Cook introduces wide range of plants, animals and other invasive species. A further wave of introductions occur.</p>
<p>1800 CE - Hemlock & Deer Culls European settlers increased forestry through to the 1920s which further destroyed fragile ecology - deer culls begin in 1920.</p>	<p>1862 CE - First National Park Ngāi Tahu, Ngāi Tahu and Rangitane. The reserves became the nucleus of Tongariro National Park.</p>	<p>1860 CE - European Settlement Widespread introduction of new species by settlers, and disastrous land management/clearing practices, cause irreparable harm to NZ ecology.</p>
<p>1960 CE - Māori Conservation Species conservation became a focus. Several parks created for iconic places were fought and won.</p>	<p>1980 CE - Forest Protection & DOC formation Increasing pressure to recognise native forests and protect them led to new National Parks, and establishment of DOC.</p>	<p>2000 CE - Ecosystems & Community-led Scientific advances indicated landscape conservation needed, not species. Growth in community-led conservation across the country.</p>

Reference: www.govt.nz/en/conservation-a-history/ www.doc.govt.nz/




Important Research Areas

Peters, M (20137) - The state of community-based restoration outcomes

- Investigate volunteer motivation
- Quantify community-led restoration outcomes
- Enhance groups' motivation

Peters, M, Hamilton, C

- The current state of community-based restoration outcomes
- Significant gains in restoration outcomes could be made by the sector
- The significant positive impact of community-based restoration on government agency-led restoration outcomes
- Prioritising these outcomes for monitoring programs

I conducted secondary research into a number of converging topics, such as the history and current state of community-led environmental conservation, strategic responses to biodiversity loss, the social impact of conservation and nature-based activities, and environmental volunteer motivation.

I also drew on literature from across a range of disciplines - design, social sciences, health and more - to inform my practice.

This research supplemented my personal experience, as well as the primary research I conducted into the sector.

Key Insights

1. There is systemic underfunding of environmental conservation in New Zealand and Australia

A common pattern that can be observed over the last 50+ years, is that there is not enough funding allocated by primary stewards of our biodiversity (National Governments) to protect and restore biodiversity from the damage which is occurring (Driscoll et al, 2017⁴⁶; McCarthy et al, 2012⁴⁷; Waldron et al, 2013⁴⁸). The philanthropic sector is being pressured to provide additional funding for the needs of environmental causes, however philanthropic money has traditionally not been a stable source of income over time, causing the environmental sector to be in a downward spiral of investment versus the scale of the problem.

2. Biodiversity Loss is accelerating and the window for meaningful action is closing

We are entering a sixth mass extinction, according to the 2015 findings of Ceballos et al⁴⁹, who modelled the extinction rates of mammals, birds, vertebrates, and other vertebrates, using conservative and very conservative figures, and still found that the extinction rates far outstrip background extinction levels.

“The evidence is incontrovertible that recent extinction rates are unprecedented in human history and highly unusual in Earth’s history. Our analysis emphasizes that our global society has started to destroy species of other organisms at an accelerating rate, initiating a mass extinction episode unparalleled for 65 million years. If the currently elevated extinction pace is allowed to continue, humans will soon (in as little as three human lifetimes) be deprived of many biodiversity benefits.” - Ceballos et al, 2015

⁴⁶ Driscoll, D., Christensen, B., & Ritchie, E. (2017). Government needs to front up billions, not millions, to save Australia’s threatened species. *The Conversation*, 1–5.

⁴⁷ McCarthy, D. P., Donald, P. F., Scharlemann, J. P. W., Buchanan, G. M., Balmford, A., Green, J. M. H., ... Butchart, S. H. M. (2012). Financial Costs of Meeting Global Biodiversity Conservation Targets: Current Spending and Unmet Needs. *Science*, 338(6109), 946–949. <https://doi.org/10.1126/science.1227608>

⁴⁸ Waldron, A., Mooers, A. O., Miller, D. C., Nibbelink, N., Redding, D., Kuhn, T. S., ... Gittleman, J. L. (2013). Targeting global conservation funding to limit immediate biodiversity declines. *Proceedings of the National Academy of Sciences*, 110(29), 12144–12148. <https://doi.org/10.1073/pnas.1221370110>

⁴⁹ Ceballos, G., Ehrlich, P. R., Barnosky, A. D., García, A., Pringle, R. M., & Palmer, T. M. (2015). Accelerated modern human-induced species losses: Entering the sixth mass extinction. *Science Advances*, 1(5), e1400253–e1400253. <https://doi.org/10.1126/sciadv.1400253>

The additional research from the likes of Wood et al⁵⁰, in the 2000 paper “*The Root Causes of Biodiversity Loss*” also cite the factors which are combining to the degradation are more complex and powerful than the efforts to prevent it.

3. Community-based Conservation Projects have some critical success factors

Across the world, people and organisations are involved in conservation activities, often with the best intentions. However many of these entities are not able or willing to invest in monitoring and evaluation, to ensure that the energy and resources which are being expended, are having the effect they intend - to protect and restore biodiversity.

*Brooks et al*⁵¹, found that there were several success factors for community-based conservation projects, regardless of where they were operating in the world. These included project design, community participation and capacity building were critical to the likelihood of success, as well as evaluation which spanned beyond environmental impact, to include social and economic impact. In their 2016 paper, *Peters et al*⁵² found that in New Zealand, there was a lack of community-based environmental monitoring (CBEM) data, however ‘*significant gains in CBEM could be made by targeting support towards groups managing small areas*’.

There was support for devolved, partnership-based, dynamic approaches to conservation, in *Gavin et al*⁵³ 2018 paper which critiques the global policy-based approaches to conservation, which involve vast resources in attempts to create centralised strategies for tackling biodiversity loss.

⁵⁰ Wood, A., Stedman-Edwards, P., & Mang, J. (2013). The root causes of biodiversity loss. *Ecology and Society*, 5(1), 3.

⁵¹ Brooks, J., Waylen, K. A., & Mulder, M. B. (2013). Assessing community-based conservation projects: A systematic review and multilevel analysis of attitudinal, behavioral, ecological, and economic outcomes. *Environmental Evidence*, 2(2), 34. <https://doi.org/10.1186/2047-2382-2-2>

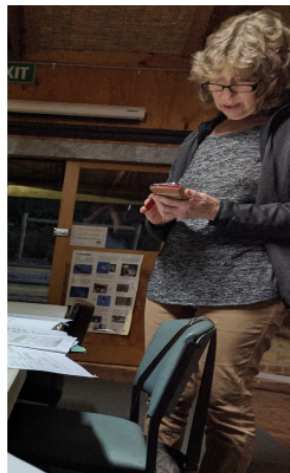
⁵² Peters, M., Hamilton, D., Eames, C., Innes, J., & Mason, N. (2016). The current state of community-based environmental monitoring in New Zealand. *New Zealand Journal of Ecology*, 40(3), 279–288. <https://doi.org/10.20417/nzjecol.40.37>

⁵³ Gavin, M. C., McCarter, J., Berkes, F., Mead, A. T. P., Sterling, E. J., Tang, R., & Turner, N. J. (2018). Effective biodiversity conservation requires dynamic, pluralistic, partnership-based approaches. *Sustainability (Switzerland)*, 10(6), 1–11. <https://doi.org/10.3390/su10061846>

Design Ethnography

Systems Sight

Artefacts from Design Ethnography



I conducted design ethnography with a variety of people working in the environmental conservation sector.

These interviews were with community-led conservation group coordinators (Upper Yarra Landcare Group, Friends of Sassafras Creek & Community Weed Alliance of the Dandenongs), funders of environmental activities (WWF NZ and Melbourne Water), and a Conservation & Citizen Science Sector Researcher and Consultant (Landcare NZ).

My approach was multi-modal - interviews, tree planting, and attending a committee meeting. These took place in a variety of settings; meeting rooms, online video links, cafes, project sites and a community hall.

Key Insights

1. The funding cycle drives most of the project activities

A common pattern in speaking to project coordinators and funders, was that there is a (relatively) short-term cyclical cycle which drives most of the activities of conservation projects which are led from the community sector (such as “Friends Of...” groups or Landcare chapters). Whilst this may not be a radical finding, the extent to which it held sway over the projects was stark. Most projects are focused on outcomes for a geographic region which will need 10+ years to really see meaningful positive impact on the biodiversity levels, however they were often engaged in 1 year funding cycles which drove their patterns of work and use of resources. I mapped this cycle with a project coordinator, and it was confirmed by funders and other coordinators.

2. There is a trend towards accepting photography as evidence

In conversations with the project coordinators and the funders, I found that often there was small amounts of money which are being granted for projects to undertake environmental restoration work and community engagement (often under \$20,000 NZD/AUD). Due to the nature of these small grants, and the short project durations (often a year or less), evaluation and reporting of the outcomes and impact was limited. Instead projects often had to report on their input activities (such as number of volunteers engaged, trees planted and hours spent on site), and were increasingly being asked to provide photos for evidence of the work on site. This was interesting as photography was becoming a proxy which replaced other forms of monitoring and evaluation, but often with little or no analysis beyond a description of weeds removed, or tree species planted.

I noted this process could be quite cumbersome and time consuming for some groups, as they had to capture, store and present the photos, provide GPS coordinates, and more.

3. We don't know the impact of the majority of community-led conservation projects

As I spoke with researcher and consultant, Monica Peters, and delved deeper into secondary research on the conservation sector, I found that there was a significant gap in data about the scale and effectiveness of environmental projects.

Given the consistent under investment in the environmental conservation sector (McCarthy et al, 2012⁵⁴), it isn't surprising that the majority of funding is channeled directly to on ground activities, rather than activities commonly seen as "overhead" such as monitoring, evaluation and capacity building - which could contribute to the qualitative and quantitative picture of the sector's impact (Peters et al, 2016⁵⁵). Likewise, the fragmentation of conservation grant making funding and its administration, has meant that there is no common platform to which projects submit their activity, monitoring or evaluation data [footnote about these categorisations]⁵⁶.

See section '[Conservation Data](#)' in Appendix for more information about these .

4. Recognising the social impact

There is a huge variety of research on the social impact of conservation activities and green spaces, on the participants of these experiences, however this is often ignored, forgotten and not accounted for by environmental projects as it is not their 'main focus'.

See the section '[Social Impact of Conservation](#)' in the Appendix for more information.

This is a major opportunity for environmental conservation to recognise the greater impact that it has as a sector on society, as well as an opportunity to access greater financial resources which are generally allocated to social initiatives which do not have the dual benefit of conservation. Indeed, if groups were more aware of the potential benefits, with some support they would be able to enhance the social outcomes of their on-ground group activities.

⁵⁴ McCarthy, D. P., Donald, P. F., Scharlemann, J. P. W., Buchanan, G. M., Balmford, A., Green, J. M. H., ... Butchart, S. H. M. (2012). Financial Costs of Meeting Global Biodiversity Conservation Targets: Current Spending and Unmet Needs. *Science*, 338(6109), 946–949. <https://doi.org/10.1126/science.1227608>

⁵⁵ Peters, M., Hamilton, D., Eames, C., Innes, J., & Mason, N. (2016). The current state of community-based environmental monitoring in New Zealand. *New Zealand Journal of Ecology*, 40(3), 279–288. <https://doi.org/10.20417/nzjecol.40.37>

⁵⁶ These three types of data are a categorisation which I have developed as part of my research.

Key Insights

1. Project Coordinators play many roles

In many community-based groups, I found that project coordinators also work as team leaders when there is an event happening. This leads them to juggle multiple tasks, and often negate the 'additional overhead' of tasks such as environmental monitoring, which could be done rapidly in the field, with the right tools.

2. Monitoring and Evaluation are currently perceived as time and/or resource intensive

Following on from the previous insight about holding multiple-roles, it was clear that currently the act of doing environmental monitoring and evaluation require significant investment. Whether it is taking time to specifically attend a project site, doing administrative work associated with logging and categorising, or using scant resources to employ an external consultant, the monitoring and evaluation activities are perceived as an expensive overhead.

3. Feedback Loops are needed for volunteers

In many cases, environmental volunteers' only way of finding out if they made a positive impact in an area, are to visit a project site themselves, or to read annual reports from the projects they volunteered with.

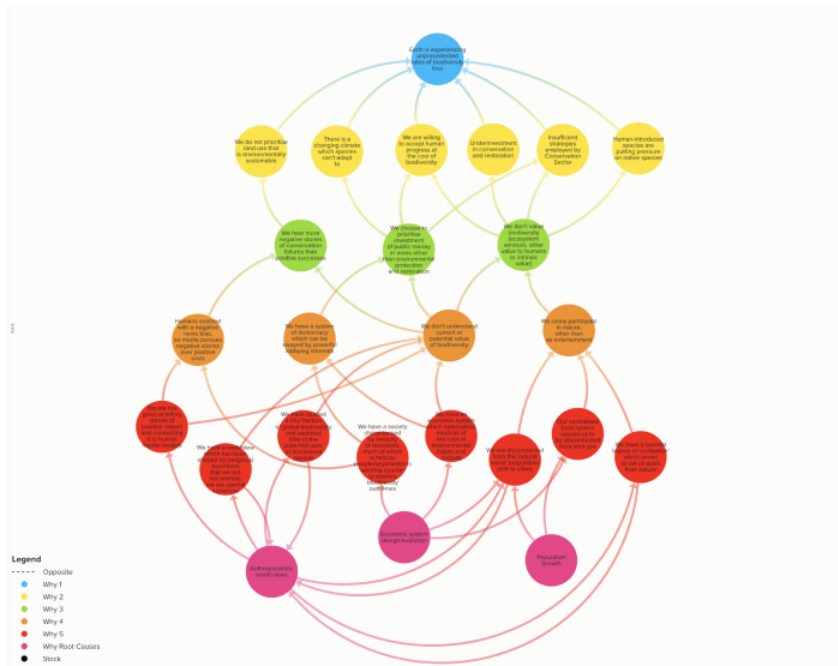
Volunteers increasingly expect more regular feedback loops about personal and collective impact, and progress of the project. I found evidence in my primary research that with regular project updates, volunteers would become more loyal to projects, and/or in addition are more likely to volunteer for other projects.

See ['Volunteer Types'](#) in the Appendix for more findings.

Root Cause Analysis

Systems Sight

Artefact from root cause analysis



I used root cause analysis to understand the hidden dimensions of the challenge of biodiversity loss, and to recognise the relationships and inertia present in the system.

The approach I used in this case, is based on a mix of the 5 Why's research method which originated in Toyota's Lean Manufacturing process in the 1970s and Iceberg Analysis a common systems thinking exercise.

This is not a model so much as a sensemaking tool - the reality of all complex problems is less like a tree with roots, and more like an underground root network which is intertwined and changing.

For the interactive version, see the Root Cause Analysis section in the appendix.

Key insights:

1. Understanding Value

Whilst a wide variety of approaches have been used to attempt to value 'nature' - from assigning economic value, to creating videos of the voice of nature, and much in between - it remains a challenge which continues to drive so many of the upstream and downstream issues.

2. Human Population Growth, Economic Systems & Anthropocentrism are root causes

Commonly identified root causes of biodiversity loss are population growth and the economic systems which allow the externalisation of 'costs' to the natural environment (Wood et al, 2013⁵⁷).

Yet in my root cause analysis I also found that one of the mental models which is keeping the biodiversity loss as a stuck problem, is a pervasive anthropocentric worldview (human-as-most-important-species). This worldview is particularly prevalent in Western ideologies which have been responsible for colonising so much of the world and injecting this worldview into other cultures through modern day economic colonisation and a culture of materialism. It is juxtaposed with a largely ecocentric worldview which is still deeply ingrained in the culture of certain peoples in those nations, such as Indigenous Australians, Māori, First Nations Americans & Canadians.

This insight forced me to recognise that design practice (and other disciplines) that is rooted in anthropocentric thinking (such as HCD), needs to be addressed directly, to reshape methods and mindsets.

3. We know so little

One aspect that was highlighted in my analysis was just how little we actually know about the biodiversity of our planet.

⁵⁷ Wood, A., Stedman-Edwards, P., & Mang, J. (2013). The root causes of biodiversity loss. *Ecology and Society*, 5(1), 3. Retrieved from <http://dlc.dlib.indiana.edu/dlc/bitstream/handle/10535/2>

In a podcast⁵⁸ with systems entrepreneur and founder of Project Drawdown, Paul Hawken, I was reminded that we know more about Mars, than we do about the biodiversity and ecology of a spoonful of Earth's soil.

If we don't understand what is here, let alone value it, how are we supposed to win a battle to save biodiversity from our own destructive force?

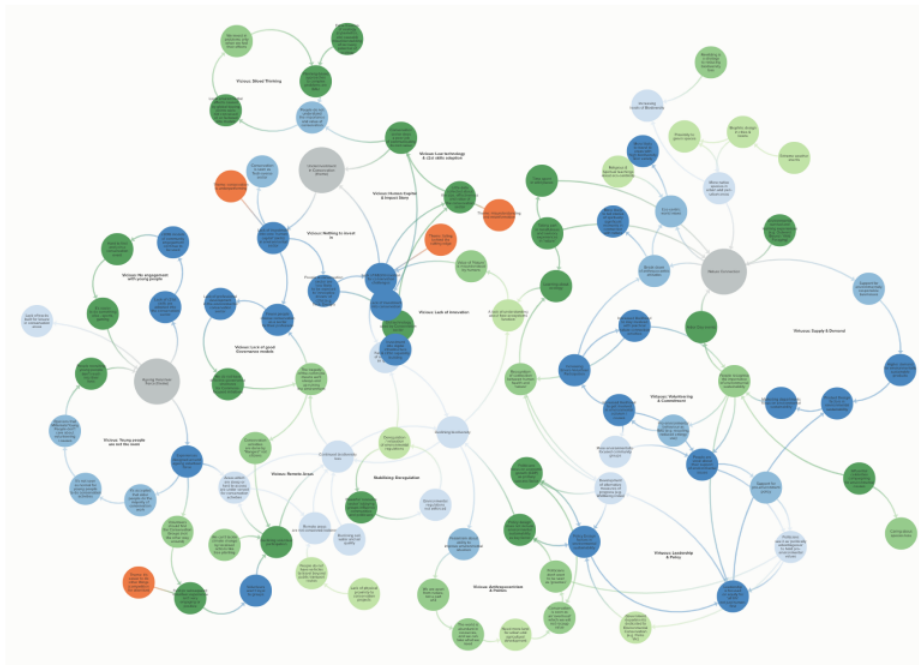
"Living wild species are like a library of books still unread. Our heedless destruction of them is akin to burning the library without ever having read its books." - John Dingell, US House of Representatives, 1955-2015.

⁵⁸ Gameau, D., & Hawken, P. (2018). Paul Hawken: Environmentalist, big thinker, solutions man. Retrieved October 5, 2018, from <https://www.dumbofeather.com/podcast/paul-hawken-environmentalist-big-thinker-solutions-man/>

Systems Mapping

Systems Sight

Artefact from systems mapping exercises



My approach to systems mapping activities was inspired by the work of Karen Grattan, Jeff Mohr and the team at The Omidyar Group, which they term Systems Practice.

The aim of this practice is to build up a comprehensive map of the system structures and forces, look for patterns where reinforcing and balancing loops occur, and then look for points of leverage.

Whilst this method, conducted as a participatory process, has huge potential, I found the amount of time needed challenging for many smaller organisations and (despite practitioners warning against) it often leads to a sense of the map as 'truth'. Given insights about complexity theory (systems are emergent), I feel this method needs some modification for further use in my practice.

Key insights:

1. Introducing New Feedback Loops

The systems leverage exercise was useful to spot opportunities for designing a greater degree of leverage into an intervention, as well as to spot pitfalls for which were likely to get the greatest resistance from the sector. Generally, according to Donella Meadows, “The higher the leverage point, the more the system will resist changing it”⁵⁹.

The opportunity for introducing new feedback loops to the system appears significant, as previous research indicated there were significant gaps in activity, monitoring and evaluation data.

2. Targeting Vicious Cycles

Looking at the systems mapping analysis closely, there were several vicious cycles identified, which were deeply connected to other cycles; namely a couple of cycles around young people’s involvement (or lack of), capacity building, and innovation.

These have elevated the need for not just a technological approach to sectoral change, but a socio-cultural response to the issues.

3. Anthropocentrism in Society

There’s a significant theme which has emerged from several angles in my research, which is the role that anthropocentrism (human-first world view) plays in corroding any response to biodiversity loss, even a flotilla of responses. At the very root of decision making (big and small) about the future seems to lie the pernicious intent to prioritise human development over the needs and potential of other living species.

In some way, this is where the whole research project began - an enquiry into how to create better volunteering experiences, to enable more people to have positive experiences of participation in the natural world. At the time, I perhaps didn’t recognise the goal I was striving towards was to shift people toward a more ecocentric worldview.

⁵⁹ Meadows, D. (1999). Leverage Points: Places to Intervene in a System. Academy for Systems Change, 1–12.
<https://doi.org/10.1080/02604020600912897>

There is great potential for the environmental conservation sector to play a central role in spreading and deepening a sense of ecocentrism. Kortenkamp & Moore⁶⁰ describe ecocentrism in their article in the Journal of Environmental Psychology: *“In an ecocentric ethic nature has moral consideration because it has intrinsic value, value aside from its usefulness to humans.”*.

Some say that US writer and environmental activist, Aldo Leopold, was the father of environmental ethics. He notes in his 1949 work:

“We abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect. There is no other way for land to survive the impact of mechanized man, nor for us to reap from it the esthetic harvest it is capable, under science, of contributing to culture.” - Aldo Leopold, *A Sand Country almanac*⁶¹

⁶⁰ Kortenkamp, K. V., & Moore, C. F. (2001). ECOCENTRISM AND ANTHROPOCENTRISM: MORAL REASONING ABOUT ECOLOGICAL COMMONS DILEMMAS. *Journal of Environmental Psychology*, 21(3), 261–272. <https://doi.org/10.1006/jevp.2001.0205>

⁶¹ Leopold, A., & Schwartz, C. W. (1949). *A Sand Country almanac, and sketches here and there*. Sand County almanac: and sketches here and there. New York: Oxford University Press, Inc. Retrieved from <https://www.aldoleopold.org/about/aldo-leopold/sand-county-almanac/>

Systems Sight Reflection

Systems Sight wasn't so much a phase, as a mindset, a set of methods, and a framework for navigating and thinking about the nuance of the sector.

What it made clear was that practice which suggests we 'isolate problems', and draw a boundary around the scope of a project is deeply problematic when it comes to the interconnectivity and emergent properties of systems.

I feel like the use of multiple methods for generating observations and insight, multiple methods for attempting to correlate and synthesise meaning, and recognise myself as a design embedded within the system rather than observing from the outside, were all vital to the development of a foundational story about the system and opportunities for intentional influence.

I believe there's a huge opportunity for using digital tools for arranging research in two significantly different ways:

1. Synthesis mapping with embedded research - taking the map at the heart of the Story of System further, to include qualitative and quantitative data (or links to other sources).
2. Research libraries - making insights more atomic, and storing them as databases instead of artefacts (inspired by [Polaris](#)).

Revised Research Questions

In the act of generating systems sight, I found my initial inquiry into volunteer experiences was useful but incomplete. Without further exploring the work of the community conservation groups as a whole, I would only be able to account for a very thin slice of the system's stakeholders, and therefor limit my ability to affect systems change.

The new research questions I formulated were:

How might we address systemic underfunding in the conservation sector, by focusing on the power imbalance between Funding bodies, and the community-based conservation projects and groups?

How might we better enable community conservation projects to tell the story of the socio-economic and environmental impact of their work?

How might we use data collected for existing funding compliance activities to address the gap in qualitative and quantitative data for on-ground activities, monitoring and evaluation?

What feedback loops could be created or strengthened, to increase the flow of financial resources into the environmental conservation sector? What shift in status quo would be needed to make that happen?

What models exist to enable low cost, scalable capacity building across individuals and groups who have no common livelihood (i.e. they don't necessarily work together)?

Thesis Part 3: Story Of Strategy



<https://vimeo.com/296262807>

Crafting Strategy

Metaphor: Nurturing Seeds

Systems change needs attention to strategic intent and emergence

“If we want to restore a forest, we need to go beyond just planting seeds.”



Photo by Sam Rye

Much like the challenges of effectively crafting strategy, nurturing seeds requires us to know what type of trees are best suited to the area, what threats they face, how many are needed, and what resources we have available to grow them.

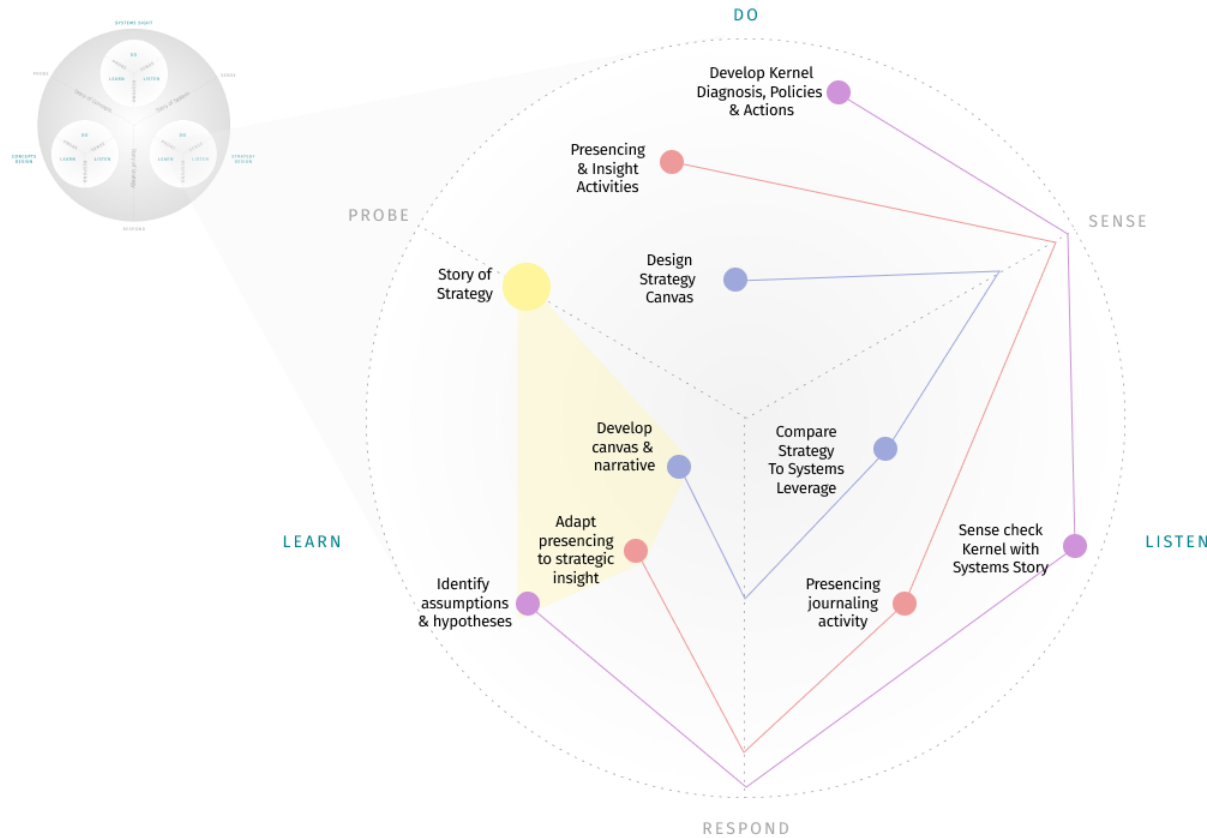
This phase of the research project was about moving from generating systems sight, to gaining insight about what types of interventions may influence targeted systems change, and assessing where and how to use resources available to grow and sustain those interventions .

Much like nurturing seeds and growing them into seedlings, strategy needs to be in constant dialogue with delivery to give them the best chance of survival by ensuring that we adapt to the changing conditions and landscapes.

Strategy Activities

Designing Strategy

Building on systems sight, to identify where to focus resources and energy



STRATEGIC INTENT

Complexity positions strategy design as synthesis - an articulation of hypotheses about how to influence the direction of change, instead of a plan for success.

Given this, we need to “review progress more often, regard failure as part of learning, act more quickly to seize opportunities, and be more prepared to adapt and learn. We are more accepting that we have to ‘learn by doing’ and that we cannot always know what will be successful.”

Reference: Boulton, Jean G.; Allen, Peter M.; Bowman, Cliff. Embracing Complexity: Strategic Perspectives for an Age of Turbulence (Page 166). OUP Oxford.

Strategic Leverage

Crafting Strategy

Artefact from systems leverage exercises

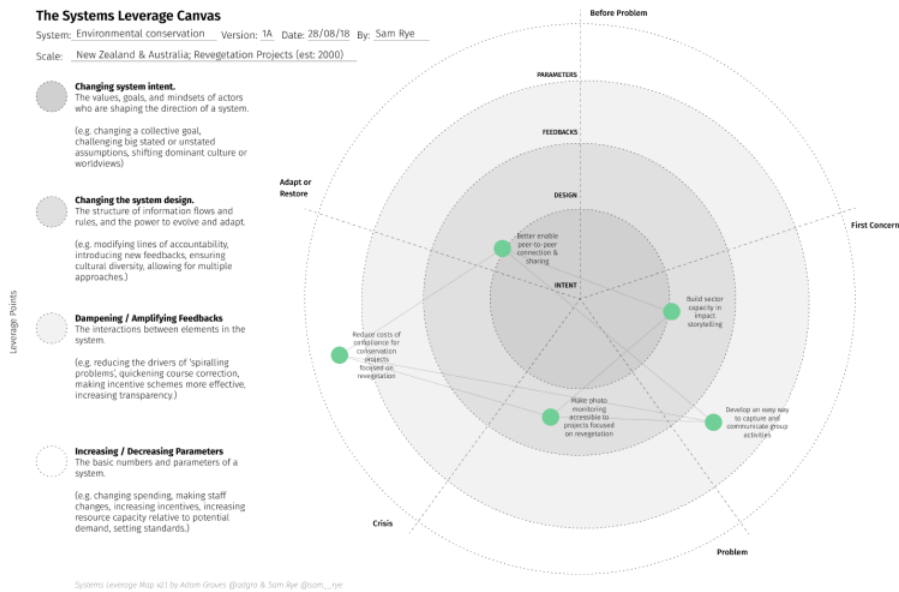


In beginning the crafting of strategy, I spoke with Adam Groves (a service designer at The Children's Society in the UK) about his work to translate some of MIT systems dynamics researcher, Donella Meadows' work for his current role. His adaptation of "points of systems leverage" into a matrix for thinking strategically about developing a portfolio of initiatives for systems change in the social care sector resonated.

I chose to adapt it to visualise a variety of possible interventions which were emerging from the story of the system that I was developing. This map showed a wide variety of scales and intents, as an exercise to see what I would not do, as well as what I could.

Crafting Strategy

Artefact from evolving the systems leverage exercise



In experimenting with the first version of the canvas, I realised the 2D nature of the canvas was restrictive due to the circularity of certain complex challenges (symptoms of issues which are not tackled can often feed into a negative pattern, becoming upstream causes of issues for other people or species). So I revised it to a circular form, with the greatest forms of leverage at the heart of the circle.

This exercise was very helpful in recognising where interventions were situated across the two spectrums of 'systems leverage' and 'time of intervention'.

Key Insights:

1. Outside In, to Inside Out

The simple act of creating a circular leverage map forced me to make one significant choice - should the highest leverage be on the outside or the inside? As I reflected on the words and insights of Donella Meadows' work, I saw that the intent and design had to be at the heart of the circle. I realised that whilst I intentionally positioned my work outside organisations in the conservation sector, due to the strength of 'system immune response' to new ideas and ways of working, I am also designing a systems intervention which gets to the very heart of who, how and why this systems is designed this way, and finding socio-cultural ways to address that.

2. Feedback Loops

I was surprised by how highly Meadows had rated 'creating new feedback loops' on her list. This gave me greater confidence in the value of the opportunity for supporting community-based conservation groups to gather and use data, to shift the power dynamics in the system.

3. Reducing Overheads

Equally I was surprised by how low down 'reducing costs' was on the list, which made me realise that whilst we could bring down the costs of overheads for groups through the use of technology, fundamentally it would be a very weak driver of systems change in the sector. This led me to realise that this may be more of a marketing feature, but not at the heart of what I was trying to achieve with any interventions.

Presencing & Strategic Insight

This research project is a deeply personal endeavour, it has no client per se, as it began and has continued in an entrepreneurial spirit. I have developed the scope and defined the boundaries, drawn on my personal experience and built relationships with people to further the research.

When I first came across Otto Scharmer's work on Theory U⁶² the Presencing Institute in 2009, his framework and process for change management and leadership for addressing root causes resonated deeply. Several times I was fortunate enough to be involved in gatherings which used social processes designed on Scharmer's Theory U approach, to guide a group to deep insights and instill personal motivation to act.

Whilst I have rarely seen this interior dimension explored in Design disciplines (other than to attempt to understand how creativity seemingly emerges from an individual), it is often recognised as important, and attended to accordingly in social and systems change circles.

"When moving into the state of presencing, perception begins to happen from a future possibility that depends on us to come into reality."

- Otto Scharmer, *Theory U*

⁶² Scharmer, C. O. (2009). *Theory U: Leading from the Future as It Emerges* (1st ed.). Berrett-Koehler Publishers.

Crafting Strategy

Artefacts from presencing and strategic insight activities



Photo of ant by [unsplash/@thomaskinto](#)

My approach to presencing when I'm not in a group process, is to seek out an area of wild nature (such as a mature forest or mountain landscape), shortly after having been fully immersed in synthesis of systems sight research.

Once immersed by natural surrounds, I often do some form of meditation or mindfulness practice aimed at enabling stillness and openness. This approach is also used in Biomimicry (nature-inspired design) to awaken senses.

As I turn my attention back to my research and to the wisdom of natural phenomena like the structure of trees, the flow of rivers and the structure of spiderwebs, I am able to explore the research and my relationship to it, from this sense of future possibility.

Almost without fail, significant insights are generated for a project from this practice.

Key Insights

1. Knowledge sharing: Ants

When I was deep in observation of a column of ants, I noticed some which went off exploring, sometimes collecting something, and then returned to the column briefly touching heads with at least one other ant. This drew my attention to the need for a community of practice which is rooted in exploration, reflection and regular interactions with others to pass on knowledge.

2. Feedback mechanisms: Rivers

The insight about a lack of feedback mechanisms for groups was based on observing the flow of a river - there is often no feedback for people engaged in activities upstream, as the water flows in a single direction.

3. Practice for Strategic Insight

Personally, I find my greatest strategic insight comes from the mix of synthesis activities as described in this section, and this time immersed in nature, in a state of presencing. Deriving strategic insights from a mix of research immersion, and natural forms has been an ongoing pursuit for me since speaking to an evolutionary biologist, Elizabet Sahtouris.

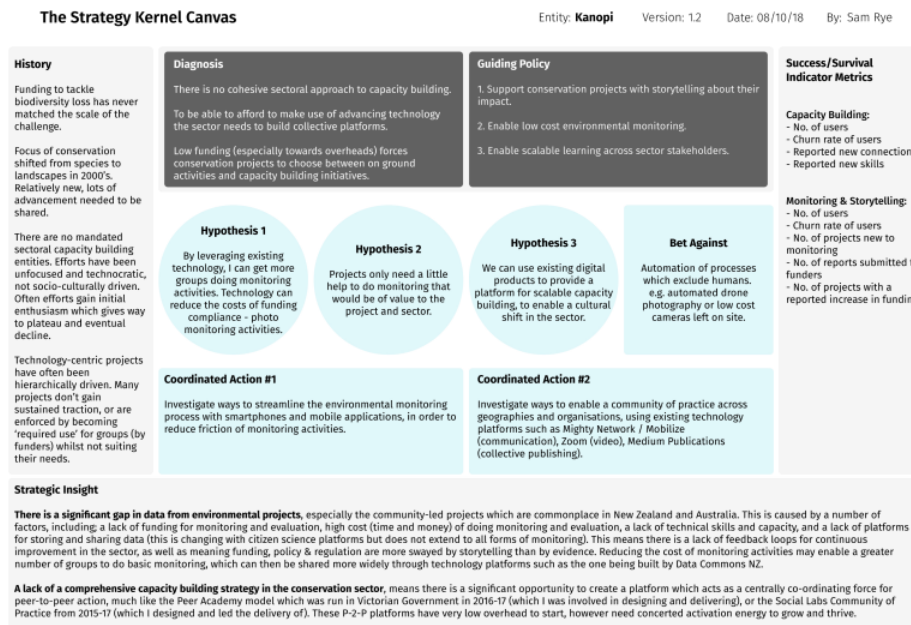
“No business has ever faced a problem that a rainforest hasn’t already solved. We need to spend more time learning from 3.6 billion years of R&D.”

- Elizabet Sahtouris

The Kernel & Signals

Crafting Strategy

Artefact from crafting a kernel of good strategy



“Good strategy is coherent action backed up by an argument, an effective mixture of thought and action with a basic underlying structure I call the kernel.”
- Richard Rumelt *Good Strategy Bad Strategy: the difference and why it matters*

Rumelt identifies the kernel of good strategy as:

1. A diagnosis that defines or explains the nature of the challenge.
2. A guiding policy for dealing with the challenge.
3. A set of coherent actions that are designed to carry out the guiding policy.

My approach to crafting strategy was to work Rumelt’s articulation of the kernel of good strategy, whilst adopting principles from complexity theory, emergent strategy and systems change practice. In practice, this means using the systems story as a synthesis from which I have designed a kernel (diagnosis, policies, actions), accompanied by a series of hypotheses, strategic insights and ‘signals’ to assess the success of the actions going forward, to help guide adaptation.

Key Insights

1. Diagnosis, Guiding Policies & Coordinated Actions

The process of drawing out the salient aspects from the systems story is what Mintzberg⁶³ talked about when he identified Strategic Thinking as involving intuition and creativity, and what author and educator, Jon Kolko⁶⁴ talks about when he calls design synthesis a messy process using abductive logic which involves “inference or intuition, and is directly aided and assisted by personal experience”.

From the synthesis work of the Story of System, I was able to create a written narrative of key elements of the history of the system, and a diagnosis of the system dynamics. The articulation of the guiding policies and coordinated actions were then rooted in this diagnosis, and the leverage points work in the systems sight process.

2. Hypotheses

My design practice has been increasingly leaning into using what I refer to as ‘atomic design research’, which is a process of clarifying clear learning goals from which I can set up research activities, and then evaluate and reflect on the outcomes. It evolved from a practice I wrote about as experimentation⁶⁵ whilst co-leading Lifehack (a social lab in New Zealand focused on youth mental health).

I find development of hypotheses a useful way of bridging from a diagnosis (“what’s happening here?”) and guiding policy (“what principles are we basing action on?”) to identify assumptions which need to be explored, in order to further inform the coordinated actions (“what are we going to do?”) and help them adaptive and change.

⁶³ Mintzberg, H. (1994). The fall and rise of strategic planning. *Harvard Business Review*, Jan-Feb, 11. Retrieved from <https://hbr.org/1994/01/the-fall-and-rise-of-strategic-planning>

⁶⁴ Kolko, J. (2010). Abductive Thinking and Sense Making: The Drivers of Design Synthesis. *Design Issues*, 26(1), 1–28. <http://doi.org/10.1162/desi.2010.26.1.15>

⁶⁵ Rye, S. (2015, August). Fieldnotes : How We Use Experiments To Drive Insight Learnings about the practice of running a Social Lab. *The Labs Wānanga*. Retrieved from <https://medium.com/the-labs-wananga/lab-craft-how-we-use-experiments-to-drive-insight-b06ea3b3145f>

3. Signals

When I wrote about '[working in the fog](#)' in the appendix section, I mentioned the need to regularly check a map and compass to ensure we're heading in the right direction. Signals are based on this idea, and represent the act of checking we're on the right track - they could be qualitative or quantitative, depending on the situation.

In this case, as I have identified clear coordinated actions which invite participation and use of a solution, I chose quantitative metrics which represent continued use, and associated behaviour change.

Crafting Strategy Reflection

The practice of crafting strategy, based on principles of complexity theory, is a fascinating emerging discipline which could consume vast time and energy in a project.

However, we know that in complex situations (rather than complicated ones), the emphasis needs to be on continual cycle of probe-sense-respond. From my experience this constant "fast thinking" cycle needs to be paired with what Daniel Kahneman⁶⁶ calls "slow thinking" which enables synthesis of the results of the fast cycles.

The more we build up these 'fast cycles', the more important advanced documentation becomes, to retrieve and action the insights for "slow thinking" synthesis.

⁶⁶ Kahneman, D. (2011). *Thinking Fast and Slow* (1st ed.). Farrar, Straus and Giroux. <https://doi.org/10.1007/s13398-014-0173-7.2>

Findings, Conclusions & Trajectory

Thesis Outputs

- a. Concepts Portfolio Video: <https://vimeo.com/296145203>
- b. Systems Story Video: <https://vimeo.com/296262047>
- c. Strategy Story Video: <https://vimeo.com/296262807>

Research Outcomes

The initial direction of this project was to investigate how I could support people to create better environmental volunteering experiences, as participating in environmental conservation action improves ongoing pro-environmental mindsets and decisions. This direction shifted as I explored the system, and found issues which were more systemic in nature.

My research aims were to design a targeted systems change intervention to tackle the underlying patterns and structures, and make sustained change to how the sector addresses biodiversity loss.

In the most part, for systems change initiatives to be successful, we need to identify areas of potential leverage and direct action and resources to them, in order to influence change. These insights need to be grounded in the lived experience of the system, as well as observations and understandings about the current and plausible future dynamics of the system.

To create a foundational understanding of the conservation sector I used a systemic design approach to generating systems sight. I then designed a strategy which highlighted three areas of action, and gave form to these actions in the shape of a portfolio of concepts in order to test my assumptions by probing the sector and sensing how it would respond, to generate further learning and influence change.

Whilst it is tempting to focus on the most concrete aspect of the research project - the portfolio of concepts - in order to assess its value, I draw us back to Golsby-Smith's assertion that fourth order design is about broadening the scope of enquiry "so that the product does not operate as a fragment in the world, but within useful and viable patterns"⁶⁷. In this sense, the Portfolio of Concepts is only 1/3 of the articulation of the targeted systems intervention. As I presented in the [diagram of the initiative](#), I believe the value of this creative work to be the holistic nature of the systems change initiative - a stack of layers which interrelate and inform one another.

I see this project as part of an ecology of initiatives which, together, are targeting large scale systems change towards a sector which can adequately address biodiversity loss, and reverse this trend.

On a more granular scale, my revised research questions were variations on themes of addressing power dynamics and systemic underinvestment in the sector. The targeted systems intervention directly seeks to alter power dynamics through convening a cross-sectoral community of practice, and enabling a bottom-up shift in how data is gathered, stored and woven into stories and reports for funders.

Beyond the Masters, I intend to continue the ongoing design and adaptation to respond to the emerging context of the conservation sector. In the next section I set out some plausible paths forward that I envisage for the project.

Future Trajectory

These future paths explore how I could use the portfolio of concepts to lead me forward in my practice and my relationship with the environmental conservation sector, in order to evolve the intervention over time.

⁶⁷ For more information about this definition and its context, see the [Fourth Order Design appendix](#). Quote from: Golsby-Smith, T. (1996). Fourth Order Design : A Practical Perspective. Design Issues, 12(1), 5–25.

Future Trajectory

Looking to the future for Kanopi as a targeted systems intervention

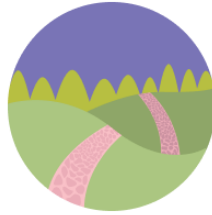


PATH 1: WALK

Build the mobile application, launch the community of practice.

Develop them into a platform for environmental monitoring, evaluation and storytelling.

Example:
SmartCitizen - a smart cities hardware project which developed a global community data platform.



PATH 2: STUMBLE

Develop workshop resource, open source, create a consulting service to do this for groups.

In isolation, this may be valuable but unlikely to create a significant impact.

Example:
The Platform Design Toolkit - an open source resource which evolved from a consulting practice.



PATH 3: JOG

Start an Impact Studio to work at the intersection of socio-cultural and technological systems change.

Dedicate energy to reimagining challenges at the heart of the environmental conservation sector.

Example:
Swarm - creative collaborators working on positive change initiatives.



PATH 4: RUN

Develop a Fellowship Program for Conservation Leaders, focused on rapidly building new ways of being and practicing together.

Cross-sectoral and cross-disciplinary, building capacity in systems change work in the sector.

Examples:
Lifehack Flourishing Fellowship, Systems Studio, School of Systems Change.



PATH 5: SPRINT

Run a social lab on biodiversity loss and 21st century conservation

This is one of the greatest leverage points, and the least well understood in the sector. It holds the greatest promise for meaningful change.

Examples:
Sustainable Oceans Lab, Sustainable Food Lab, Landscape Finance Lab

Illustration credit: vecteezy.com

Reflections

I have engaged in critical reflection throughout the project, which has deeply influenced the outcomes, the way in which I articulate my work, and areas of future research and personal/professional development that I intend to seek out. It has deepened my

relationship with Design approaches to complex problems, and enabled me to create new relationships with practitioners around the world who have been pioneering different approaches in this space.

Evolving focus

Within every phase of research, I noticed a shift in focus of the research. The systems sight enabled me to more clearly see the structures and patterns which limited community-based conservation, and the anthropocentric mental models of society which govern so many of our decisions. The designing of strategy helped me to see how diluting my resources across too many initiatives would be like building a house on sand, and brought a shift to a more limited set of coordinated actions. With the design and evolution of the portfolio of concepts came a shift from abstract directions to a more grounded form and associated learning goals.

As the project was part-time over 2.5 years, I have had a rare opportunity to engage in both quick iteration and a less hurried form of pattern spotting and evolution. These two modes (and the shades in between) have enabled much deeper recognition of the real challenges facing the system, but also rapid advances in the stories and visual artefacts which serve to provoke discussion, test assumptions and draw preferable futures more sharply into view (Dunne & Raby, 2013⁶⁸).

Participation and practice

At the beginning of this MDes, my practice was heavily influenced by social entrepreneurship - a blend of market-centric methodologies such as Customer Development and Lean Startup (Blank, 2003⁶⁹; Reis, 2011⁷⁰), and more participatory methods such as generative research (Sanders & Stappers, 2012⁷¹).

⁶⁸ Dunne, A., & Raby, F. (2013). *Speculative everything : design, fiction, and social dreaming* (1st ed.). London: MIT Press. Retrieved from <https://mitpress.mit.edu/books/speculative-everything>

⁶⁹ Blank, S. (2003). *The Four Steps to the Epiphany: Successful Strategies for Startups That Win* (1st ed.). Lulu Enterprises Incorporated, 2003.

⁷⁰ Ries, E. (2011). *The lean startup : how today's entrepreneurs use continuous innovation to create radically successful businesses* (1st ed.). Currency. Retrieved from <http://theleanstartup.com/book>

⁷¹ Sanders, E. B. N., & Stappers, P. J. (2012). *Convivial Toolbox: generative research for the front end of design* (3rd ed., Vol. 3). Amsterdam, The Netherlands: BIS Publishers. Retrieved from <http://www.bispublishers.com/convivial-design-toolbox.html>

When working on complex challenges, I believe deeply in enabling participation of people who will be affected by the decisions. Within the concept development phase, I was able to delve somewhat deeper into methods such as design ethnography and iterative prototyping approaches based on stakeholder feedback, however I was expecting to be able to use more participatory and collaborative approaches.

I was limited in this endeavour due to the majority of this phase coming at a time of great turbulence in my life. Having lost my father suddenly in the last 9 months of my part-time studies, I still decided to pursue my research as a means of catharsis and to maintain a focus on the work I find deep purpose in. However, I found that the truth in the statement “The success of an intervention depends on the interior condition of the intervenor.”⁷², in that I underestimated my grief and its effects. I didn’t have the emotional or cognitive capacity or the inclination to operate in the authentic, relational way, that I feel is vital for meaningful participation.

In the course of my research, new articles and books were published by the likes of Adrienne Maree Brown (Emergent Strategy), Arturo Escobar (Design for the Pluriverse), and Peter Jones (The Systemic Turn), all of which gave me greater insight and language for some of the methods and practices which I had been discovering or grappling with.

Documentation and Presentation

Perhaps one of the areas of greatest challenge and advancement through this research was that of documentation and presentation. Previously much of my work in crafting strategy and designing products, services and social processes, has been within organisations in collaborative teams. Our research, rationale, decision making and execution of concepts was all done within these collaborative coalitions, so the need for documentation and presentation of ideas was rarely required.

As I developed this research, I found this was a discipline which needed some work for me - I relied heavily on written documentation, which was often dense and hard to synthesis or communicate quickly and effectively.

⁷² Quote attributed to Bill O’Brien (CEO of Hanover Insurance) in Scharmer, C. O. (2016). *Theory U: Leading from the Future as It Emerges*. Berrett-Koehler Publishers.

Having spoken with various designers who engage in systemic, strategic and 'fuzzy front end' practice, it feels there is a common challenge is in how to present research findings which a) retain the richness of complexity, whilst also b) capturing the findings in a way which are able to be communicated and worked with as a *temporal artefact* to inform design decisions⁷³.

So throughout the project I played with a variety of approaches to share the outcomes of the research phase, from metaphor to animation, and systems maps to notated graphics. In the end, I found storytelling in the form of visual artefacts, supported with a narrative, the most pragmatic and clear.

I am quite content with the visual depiction of the layers of the systems intervention, and how they interact in this case. Whilst I never trained in visual communication design, I feel like there is significant opportunity in the future to explore how to communicate systems interventions, and the various data, insights and decision which are collected and made along the way.

⁷³ Late in my project, I found the work of Birger Sevaldson on Giga-mapping (appendix link) and the work of Peter Jones on synthesis maps (appendix link) which look like promising approaches for systemic design documentation and synthesis.

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List of figures

Figure 1:

Source: Department of Conservation and licensed by Sam Rye for re-use under the Creative Commons Attribution 4.0 International licence at <http://creativecommons.org/licenses/by/4.0/>

Figure 2:

Image by The Social Labs Fieldbook (Hassan, Craig et al) used under Creative Commons license, which can be found at <https://social-labs.org/fieldbook/>

Appendices

Ethics Application



Name: _____
Email: _____
Organisation: _____
City: _____

Interviews & Design Sessions

Volunteer impact: How might we improve the environmental and social outcomes of conservation projects?
by Sam Rye

INFORMATION SHEET

This information is valid for a period of five (5) years

Researcher Introduction

I am a post-grad student who has worked within environmental conservation, social entrepreneurship and technology for the last 10 years. I am exploring how we can make a difference in conservation, as I care deeply about reversing biodiversity loss, and believe that community-led conservation and community engagement plays an important role in doing this.

Participant Recruitment

I intend to work with a range of people in the conservation sector, including but not limited to; community group coordinators, environmental volunteers, paid conservation rangers/ coordinators, volunteer managers, conservation funders and international travellers who volunteer. For my interviews & design sessions I am focusing on working with people who have direct experience of the opportunities and challenges of conservation which involves communities.

Project Procedures

This research will focus on interviews and design sessions with participants and aim to involve them in the design, development and testing of prototype solutions, based on their own experiences.

I will use this research to create opportunities from June 2017 to August 2018, to support the design and testing of prototypes, some of which will be part-functional (some functions may need to be performed manually), and some which may be fully functional. You may be approached for these follow ups, if you indicate you are interested by email or in person.

Data Collection

All data collected in the project will be kept securely and safely in Google Drive which has industry-leading security. Find out more about Google Drive security levels here: https://support.google.com/au/intl/en_au/faq/security/

I will be using any collected data towards this research project to better understand the current reality of our research participant(s) and shape any solutions which emerge from this research component of this project.

Any photos or videos will be taken with the consent of the participants. This will include publishing consent in any public communications that may help to promote and/or explain the ideas I am researching.



Some data may be aggregated and may be published publicly. In this case, we will ensure the data is made anonymous. Where it is not possible, there will be a consent form, or opt out supplied to the participant.

Participant Involvement

This research will be undertaken in the form of one-on-one or group interviews, led by Sam Rye. Costs for travel can be reimbursed.

Participant's Rights

You are under no obligation to accept this invitation. If you decide to participate, you have the right to:

- Decline to answer any particular question;
- Withdraw from the study (no specific timeframe);
- Ask any questions about the study at any time during participation;
- Provide information on the understanding that your name will not be used unless you give permission to the researcher;
- Be given access to a summary of the project findings when it is concluded.
- Ask for the audio/video tape to be turned off at any time during the research.

Contacts

Please feel free to contact me at any stage if have any questions about the project:

Research Project

Sam Rye

Senior Lecturer and Research advisor

Tristram Sparks
Telephone: +64 (0)27 372 4597
Email: T.Sparks@massey.ac.nz

We take your privacy seriously. Your contact information will never be used for any other purpose other than to contact you about your participation in this production or design research.

This project has been evaluated by peer review and judged to be low risk. Consequently, it has not been reviewed by one of the University's Human Ethics Committees. The researcher(s) named above are responsible for the ethical conduct of this research.

If you have any concerns about the conduct of this research that you wish to raise with someone other than the researcher(s), please contact Professor John O'Neill, Director (Research Ethics), telephone 06 350 5249, email humanethics@massey.ac.nz.

Complexity

My understanding of complexity is shaped by the advancing field of complexity science, especially the work of Boulton, Allen & Bowman in their 2015 book *'Embracing Complexity'*⁷⁴. I build on this with my personal experiences and observations of natural living systems - such as rainforests, deserts and coral reefs.

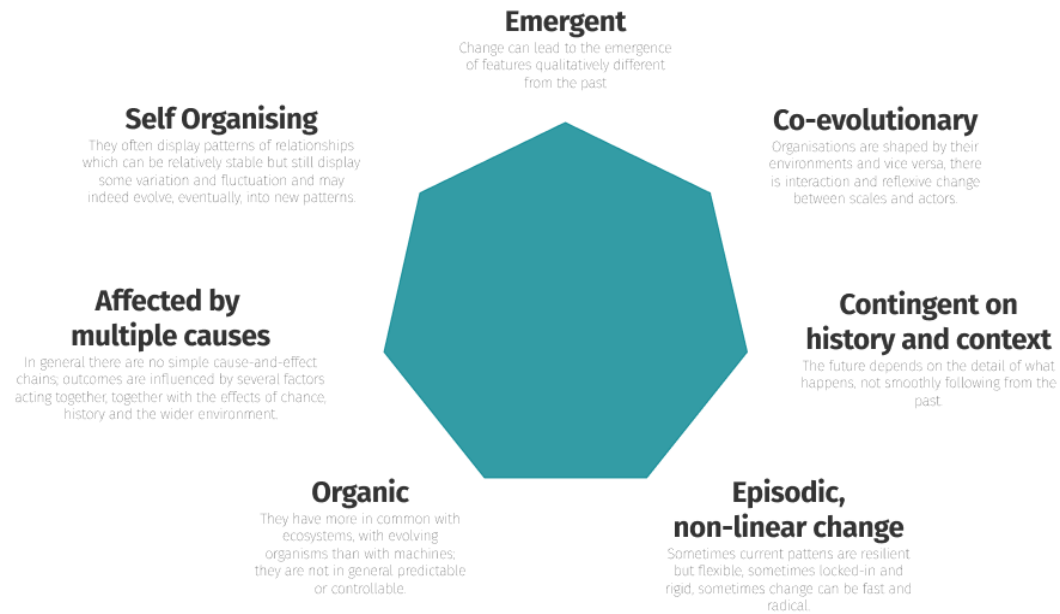
⁷⁴ Boulton, J. G., Allen, P. M., & Bowman, C. (2015). *Embracing complexity: Strategic perspectives for an age of turbulence*. Oxford University Press.
<https://doi.org/10.1093/acprof:oso/9780199565252.001.0001>

Complexity Theory

Insights from advances in Complexity Science

Image by Sam Rye,
Masters of Design (MDes)

COMPLEX SYSTEMS ACCORDING TO BOULTON ET AL



Source:
Boulton, J. G., Allen, P. M., & Bowman, C. (2015). Embracing complexity: Strategic perspectives for an age of turbulence. Oxford University Press.

Ecology of conservation initiatives

In pursuing targeted systems change, I locate myself as part of a wider ecology of initiatives which are working on different pieces of the bigger vision of transitioning conservation action around the world, such as [Tūhoe's Te Kawa o te Uruwera](#), [Landscape Finance Lab](#), [Predator Free NZ](#), [Data Commons NZ](#), [The Land & Water Forum](#), [Landcare Research Citizen Science Project](#), [WildLabs](#), [Conservify](#) and [Arribada](#).

Fourth Order Design

The landscape of design has been shifting for some time, with design educators, theorists, authors and practitioners exploring the role and contribution of design. Professor Richard Buchanan is credited with naming the shift in the challenges Design is applied to, in his 1992 paper 'Wicked Problems in Design Thinking'⁷⁵, where he outlines four orders with growing scale and complexity.

⁷⁵ Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, 8(2), 7–35. <https://doi.org/10.2307/1511637>

Buchanan's Four Orders of Design

Image by Sam Rye,
Masters of Design (MDes)



Source: Buchanan, R. (1992). Wicked Problems in Design Thinking. *Design Issues*, 8(2), 7-35. <https://doi.org/10.2307/1511637>

Various responses have been offered to the 'Four Orders' over the years, with key contributions from VanPatter & Pastor⁷⁶ which identified skills needed in the different orders of design, and Golsby-Smith in his 1996 article '*Fourth Order Design: A Practical*

⁷⁶ VanPatter, G., & Pastor, E. (2011). *Next Design Geographies: Understanding Design Thinking 1,2,3,4*. New York, United States: NextDesign Leadership Institute. Retrieved from https://issuu.com/nextd/docs/nextdfutures2011_v02

*Perspective*⁷⁷, which challenges the idea of domains, and focuses on the way in which designers work and how they take accountability for the success (or failure) of their actions.

Golsby-Smith claims that culture and community are the subject matter of fourth order design and adds that the Designer's role is to widen the scope of enquiry to better achieve success:

"the fourth order designer moves the boundary of the task out to encompass the issues of "Why are we doing this task?" and, in answering this question, "What does it tell us about our identity and value?". Similarly, the fourth order designer also will move the scope of the task out to encompass connected systems and activities; to achieve integration so that the product does not operate as a fragment in the world, but within useful and viable patterns. Finally, the fourth order designer widens the scope of this practical task to include the people involved in creating and using the product (i.e., the product decisions are not taken in isolation; nor are they driven primarily by the creative lone voice of the designer; but are developed in discussion with a sense of growing purpose and commitment." - Tony Golsby-Smith

As The Design Collective (a collective of highly respected Design theorists) highlight in their positioning paper 'DesignX', the contribution of design to the wider world, beyond products and services, could be that *"when combined with the knowledge and expertise of specialized disciplines, these design methods provide powerful ways to develop practical approaches to large, complex issues"*⁷⁸.

As I became more active in fourth order design work, I found both power and limitations in how human-centered design (HCD) methods (Norman, 1988⁷⁹; Rouse, 1991⁸⁰) had come to be practiced in industry. Whilst there was a strong need to better understand the experiences and needs of humans and to center them in the services and systems I was designing, I found the HCD methods to be overly reductionist of the complexity which they were being used to understand.

⁷⁷ Golsby-Smith, T. (1996). Fourth Order Design : A Practical Perspective. Design Issues, 12(1), 5–25. Retrieved from

<https://www-jstor-org.ezproxy.massey.ac.nz/stable/pdf/1511742.pdf?refreqid=excelsior%3Aa73afb235eca91e89d4c6af5fa22a2e4>

⁷⁸ The Design Collective. (2016). DesignX : A Future Path for Design. Retrieved from https://www.jnd.org/dn.mss/designx_a_future_pa.html

⁷⁹ Norman, D. A. (1988). *The Design of Everyday Things* (First). New York: Basic Books.

⁸⁰ Rouse, W. B. (1991). *Design for success : a human-centered approach to designing successful products and systems*. Wiley.

The drive of HCD methods to isolate problems and solve them, is characteristic of the Western problem-solving mindset (solutionism) which has enabled so much progress, and caused so much destruction - much of which the environmental conservation sector itself is battling with.

“When we set out to produce solutions, we tend to narrow our field of view in a way that makes us blind to underlying causes, and blind to the seeds of something better that already exist in the situation. They offer the chance to feed the possibilities, which is much different than fixing the problems.” - Marc Rettig, SVA Design for Social Innovation, Carnegie Mellon University⁸¹

In adapting my own practice to better acknowledge the complexity of the world we operate in, I worked with the insights and methods associated with complexity science (Boulton, 2015⁸²), systems thinking (Meadows, 2015⁸³; Taleb, 2014⁸⁴) and social change (Kahane, 2010⁸⁵; Hassan, 2014⁸⁶; Manzini, 2015⁸⁷; Brown, 2017⁸⁸).

Carnegie Mellon University defines Design for Social Innovation as “the design of new products, services, processes and policies that meet a social need more effectively than existing solutions.”⁸⁹ In recognising the breadth and depth of this definition, I identified the emerging practice of Strategic Design (Anna Meroni⁹⁰, 2008; Dan Hill, 2014⁹¹; Helsinki Design Lab, 2014⁹²; Nesta, 2017⁹³)

⁸¹ Rettig, M. (2015, December). The Problems With Problems. *Medium*. Retrieved from <https://medium.com/@mrettig/well-the-course-is-over-5c9ecf92039f>

⁸² Boulton, J. G., Allen, P. M., & Bowman, C. (2015). *Embracing complexity: Strategic perspectives for an age of turbulence*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199565252.001.0001>

⁸³ Meadows, D. H. (2008). *Thinking in Systems: A Primer*. (D. Wright, Ed.). Chelsea Green Publishing.

⁸⁴ Taleb, N. N. (2014). *Antifragile : Things That Gain from Disorder*. New York, United States: Random House Trade Paperbacks. Retrieved from <https://www.penguinrandomhouse.com/books/176227/antifragile-by-nassim-nicholas-taleb/9780812979688/>

⁸⁵ Kahane, A. (2010). *Power and Love: A Theory and Practice of Social Change* (1st ed.). San Francisco, USA: Berrett-Koehler Publishers. Retrieved from <https://www.bkconnection.com/books/title/power-and-love>

⁸⁶ Hassan, Z. (2014). *Towards A Theory Of Systemic Action*. Oxford.

⁸⁷ Manzini, E. (2015). *Design, When Everybody Designs*. (F. Ken & E. Stolterman, Eds.) (1st ed.). Cambridge: The MIT Press. Retrieved from <https://mitpress.mit.edu/books/design-when-everybody-designs>

⁸⁸ Brown, A. M. (2017). *Emergent Strategy: Shaping Change, Changing Worlds*. AK Press. Retrieved from <https://www.akpress.org/emergentstrategy.html>

⁸⁹ Carnegie Mellon School of Design. (2017). Design for Interactions Program Framework. Retrieved October 2, 2018, from <http://cmusod.barkandbyte.net/content/program-framework>

⁹⁰ Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. *Strategic Design Research Journal*, 1(1), 31–38. <https://doi.org/10.4013/sdrj.20081.05>

as a subset of Design for Social Innovation, and an area of my practice which is my strength when it comes to bringing projects to life.

Anna Meroni, Assistant Professor of Service Design and Strategic Design at Politecnico di Milano, posits that Strategic Design practice is about *Problem Setting and Problem Solving*, during which Product-Service-Systems (PSS) are developed in the context of a changing world. The demand for these new solutions comes from the recognition that destructive, extractive patterns of past systems, will not be appropriate for the societies of tomorrow.

“A PSS is a mix of products, services, communication and people; when conceived to answer a specific need, it is what we call a solution. The strategic design of Product Service Systems shifts the innovation focus from product or service design to an integrated product-service design strategy, orientated to produce solutions.” - Anna Meroni, *‘Strategic Design: where are we now?’*⁹⁴

In applying designerly approaches to the challenges faced in the environmental sector, I recognise the need to integrate with a wide variety of disciplines, geographies and cultures which already co-exist in order to be successful. Through this research, I found this in the work of the Systemic Design Research Network⁹⁵ (SDRN), which is attempting to develop a systems-aware design practice. They are developing practice which is rooted in design, that is actively conscious of the complexity of systems that are subject to this practice, not using systems thinking methods grafted onto HCD practice⁹⁶. The SDRN traces lineage of the practice to Buckminster Fuller’s Design Science⁹⁷ (an attempt to blend science and design), and the Ulm School of Design (experimental multidisciplinary design).

⁹¹ Hill, D. (2014). *Dark Matter and Trojan Horses: A Strategic Design Vocabulary*. Strelka Press. Retrieved from <https://strelka.com/en/press/books/dark-matter-and-trojan-horses-a-strategic-design-vocabulary>

⁹² Helsinki Design Lab. (2014). What is strategic design? Retrieved from <http://www.helsinkidesignlab.org/pages/what-is-strategic-design>

⁹³ Leurs, B., & Roberts, I. (2017). What do we mean by design? Retrieved July 25, 2018, from <https://www.nesta.org.uk/blog/what-do-we-mean-by-design/>

⁹⁴ Meroni, A. (2008). Strategic design: where are we now? Reflection around the foundations of a recent discipline. *Strategic Design Research Journal*, 1(1), 31–38. <https://doi.org/10.4013/sdri.20081.05>

⁹⁵ Systemic Design Research Network: <https://systemic-design.net/sdrn/>

⁹⁶ Ryan, A. J. (2014). A Framework for Systemic Design. *FORMakademisk: Relating Systems Thinking and Design II*, 7(4), 1–14. <https://doi.org/10.7577/formakademisk.787>

⁹⁷ Fuller, R. B. (2017). *Your Private Sky: The Art of Design Science*. (J. Krausse & C. Lichtenstein, Eds.). Lars Müller Publishers. Retrieved from <https://www.lars-mueller-publishers.com/your-private-sky-r-buckminster-fuller-2>

As SDRN co-organizer, Peter Jones puts forth in the 2017 paper, *'The Systemic Turn'*⁹⁸, *"The objective of systemic design is to affirmatively integrate systems thinking and systems methods to guide human-centered design for complex, multi-system, and multi-stakeholder services and programs across society."*

Strategy

Strategy is an overused term.

From my perspective, based on complexity theory, any strategy work must be rooted in the knowledge that we can't predict or control a system's response to our actions. Given this framing, I am influenced primarily by two perspectives: Strategic Insight and Adaptive & Emergent Strategy.

Regarding Strategic Insight, the seminal work by UCLA Professor Richard Rumelt, who argues that most of what is presented as strategy these days, isn't. Too often, strategy is confused for vision, goal setting and objectives. He also differentiates between good and bad strategy.

*"Good strategy almost always looks this simple and obvious and does not take a thick deck of PowerPoint slides to explain. It does not pop out of some "strategic management" tool, matrix, chart, triangle, or fill-in-the-blanks scheme. Instead, a talented leader identifies the one or two critical issues in the situation — the pivot points that can multiply the effectiveness of effort — and then focuses and concentrates action and resources on them." - Richard Rumelt, Good Strategy Bad Strategy: the difference and why it matters*⁹⁹.

Strategic insight focuses on recognising patterns, structures, relationships and trends, in order to identify leverage points and actions to move towards an intended outcome.

Adaptive & Emergent Strategy was an area pioneered by Professor Henry Mintzberg, drawing on previous work in 'adaptive' or 'entrepreneurial' strategy processes, which were distinct from 'planning' processes which are by far the greatest in volume and use,

⁹⁸ Jones, P. (2017). The Systemic Turn: Leverage for World Changing. *She Ji: The Journal of Design, Economics, and Innovation*, 3(3), 157–163. <https://doi.org/10.1016/j.sheji.2017.11.001>

⁹⁹ Rumelt, R. (2013). *Good Strategy / Bad Strategy: the difference and why it matters*. London: Profile Books Ltd. Retrieved from <https://profilebooks.com/good-strategy-bad-strategy.html>

despite woeful success rates of the likes of strategic planning. Mintzberg suggests that planning-based strategy is not really strategic thinking, he asserts that strategic thinking is about synthesis, involving intuition and creativity¹⁰⁰.

Whilst Mintzberg's work on adaptive and emergent forms of strategy were less prominent in strategy discourse for most of the 30+ years since he published 'Patterns of Strategy Formulation' in 1978¹⁰¹, there has been a revival in this practice as the world's complexity has accelerated, and the effects of strategic planning's failure have cut deeper into the outcomes for business, government and charity sectors. Importantly, emergent strategy is rooted in observations about complexity.

Recent additions to adaptive and emergent strategy understanding and practice include Sinha & Ventresca's '*Keywords: Building a language of systems change*'¹⁰² which articulates the reality of systems change being an emergent activity; Hassan's '*Towards a theory of systemic action*'¹⁰³ which juxtaposes the folly of predictive approaches to complexity such as strategic planning; Gaziulusoy's '*A critical review of approaches available for design and innovation teams*'¹⁰⁴ which found that the existing design and innovation approaches studied were not suitable structural, systemic, societal transformations; Boulton et al's '*Embracing Complexity*'¹⁰⁵ which highlights the importance of building a portfolio of concepts, experimenting and adapting; NPC's '*Systems Change*' Guide¹⁰⁶ which identifies systems change not as a methodology, but a way of thinking (and being) and an associated 'good practice' (not best practice).

I would also highlight the recent contribution of Adrienne Maree Brown's book, "*Emergent Strategy: Shaping Change, Changing Worlds*"¹⁰⁷ which draws on her work as a Sci-Fi Writer and Social & Environmental Justice facilitator & activist, to put forth a blend of complexity principles, social relationality, and a movement-organizing practice based in adaptation. Most books about strategy

¹⁰⁰ Mintzberg, H. (1994). The fall and rise of strategic planning. *Harvard Business Review*, Jan-Feb, 11. Retrieved from <https://hbr.org/1994/01/the-fall-and-rise-of-strategic-planning>

¹⁰¹ Mintzberg, H. (1978). *PATTERNS IN STRATEGY FORMATION**. *MANAGEMENT SCIENCE* (Vol. 24).

¹⁰² Sinha, R., & Ventresca, M. (2014). Keywords: Building a language of systems change. In E. Saltmarshe (Ed.), *Keywords: Building the language of system entrepreneurship* (Vol. 001, p. 36). Oxford: ICAEW.

¹⁰³ Hassan, Z. (2014). *Towards A Theory Of Systemic Action*. Oxford.

¹⁰⁴ Gaziulusoy, A. I. (2015). A critical review of approaches available for design and innovation teams through the perspective of sustainability science and system innovation theories. *Journal of Cleaner Production*, 107, 366–377. <https://doi.org/10.1016/j.jclepro.2015.01.012>

¹⁰⁵ Boulton, J. G., Allen, P. M., & Bowman, C. (2015). *Embracing complexity: Strategic perspectives for an age of turbulence*. Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780199565252.001.0001>

¹⁰⁶ Abercrombie, R., Harries, E., Wharton, R., & Lankelly Chase. (2015). *Systems change: A guide to what it is and how to do it*. NPC.

¹⁰⁷ Brown, A. M. (2017). *Emergent Strategy: Shaping Change, Changing Worlds*. AK Press. Retrieved from <https://www.akpress.org/emergentstrategy.html>

tend to avoid or ignore the interior condition and belief of those developing the strategy, but Brown dedicates the whole book to constantly intertwining this with the outward-facing action. As I've mentioned in the Systems Sight section, the limitation of any interventions in the environmental conservation sector, are related to the pervasiveness of anthropocentric worldviews - so Brown's focus on personal conditions and social relationships are welcomed. She also indicates a very simple idea - that to harness emergent strategy we need to pay attention to two things: intention and adaptation.

To visualise strategic intent and emergent strategy together, The Social Labs Fieldbook¹⁰⁸ presents Mintzberg's explanation in this diagram:

The Social Labs Fieldbook | Section 0 Core Concepts | Version 1.0 Draft | January 2015

0.9/ Emergent Strategies

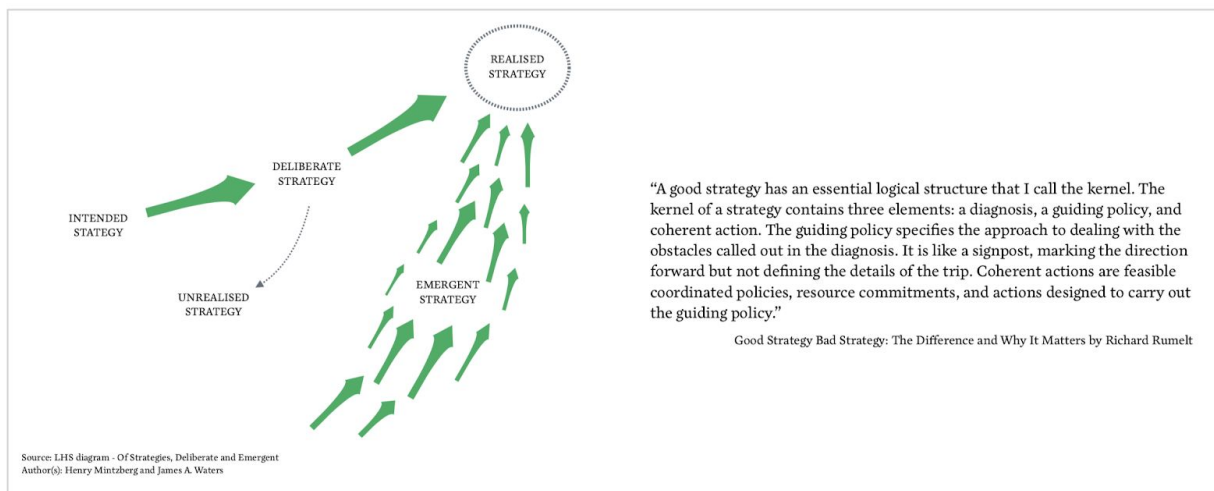


Image by The Social Labs Fieldbook (Hassan, Craig et al) used under Creative Commons license, which can be found at <https://social-labs.org/fieldbook/>

¹⁰⁸ Hassan, Z., Eisenstadt, M., & Sanghvi, M. (2015). Emergent Strategy. In *The Social Labs Fieldbook: a practical guide to next generation social labs* (v1.0, p. 11). Oxford: Social Laboratories Ltd. Retrieved from <https://social-labs.org/fieldbook/>

This image shows the potential for strategic intent and emergent strategy combining to form a more powerful path to realised strategy.

Working In The Fog

When we recognise that the context in which we're seeking to bring about change is complex, we need to act differently than if the problem was complicated or simple¹⁰⁹.

Working on a complicated problem is like walking in a forest you know well, where there's clear path to where you want to go. You need to be prepared, and look out for things which could disrupt your journey along the way, but essentially you're just navigating a clear path to get to where you need to go.

However, working on a complex problem is like getting dropped in a forest you don't know, in dense fog, and a name of somewhere you need to get to. You need to operate entirely differently, to *find your way* through using a map & compass regularly, asking people you meet, following rivers, scaling ridges, and recognising prominent features of the landscape.

This sense of 'working in the fog' is how I approached the early stages of my research project, in order to build 'systems sight' - a term to describe the process of building a mental model of the landscape of the challenge you face. Social Labs are essentially multi-year platforms for experimentation on social challenges by trans-disciplinary teams, much like a scientific lab would experiment in finding ways to tackle cancer.

In this phase of my research, I drew on the types of methods that are outlined in Theory U's 'downloading' and 'sensing' phases ("coming down the U") which aim to get deeper understanding about both the structure of the challenge (history and patterns) and the human experience of the challenge (emotions, beliefs, relationships). These methods also run parallel to common design research methods outlined in systemic design.

¹⁰⁹ Snowden, D. (2007). Cynefin Framework. Retrieved from <http://cognitive-edge.com/>

Conservation Data

I found there are four states of data which contribute to the picture of the community-led conservation:

States of Data in the Environmental Conservation Sector

Image by Sam Rye,
Masters of Design (MDes)

Not recorded <i>Example: observation of planting survival rates which is not saved</i>	Recorded, not shared <i>Example: observation noted in spreadsheets by a project coordinator</i>
Recorded, shared privately <i>Example: observation included in Funding report, which is not shared publicly by the funder</i>	Recorded, shared publicly <i>Example: observation shared to an open access citizen science platform</i>

Each project will make judgements about what categories of data (Activity, Monitoring, Evaluation) they record, how often, how and when it will be shared and who with, also how long they will store it. My research found that it is cheaper for projects not to record and store data, many will only do it as a compliance task associated with funding.

However, some of the pitfalls of not collecting this data are:

- No data to inform the improvement of the project (or sector) over time.
- No data to use to gain funding or in kind support from stakeholders.
- No data to indicate the individual or collective contribution towards environmental impact of projects in a region.
- No data to use to advocate for increased sectoral funding - such as showing in kind contributions from volunteers to leverage against national funding or philanthropy.
- No possibility to use the data for scientific or open data challenges¹¹⁰.

Social Impact of Conservation

The '[Healthy Parks, Healthy People Global](#)' initiative is a prime example of the research which is supported at a high level by National Parks Services in USA, South Africa and Australia. Additional projects such as '[Rethinking Parks](#)' from Nesta in the UK also feature significant research which points to the many social benefits.

Social benefits could be grouped as:

- Building Stewardship¹¹¹
- Building Community¹¹²

¹¹⁰ Open Data Challenges are commonly used citizen and industry engagement initiatives which use data from a system to identify and prototype new responses. They are widely seen as having the potential to unlock or create value for existing systems through a range of activities such as hackathons, service jams, world cafe, and other participatory processes. Examples include [Climathon NZ](#), [Delaware Open Data Challenge](#), and [ODI & Nesta's Open Data Challenge Series](#).

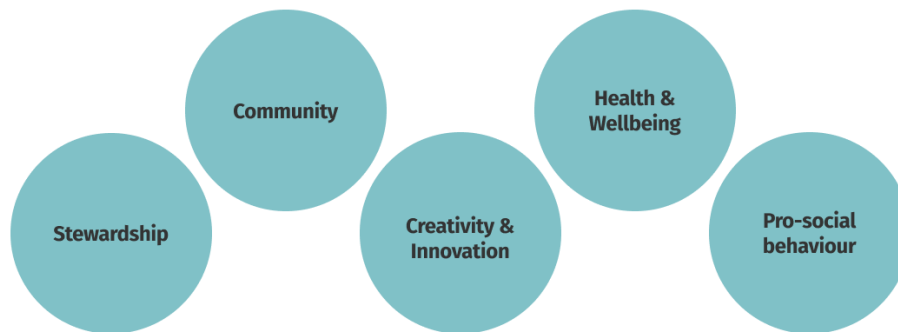
¹¹¹ Molsher, R., & Townsend, M. (2016). Improving wellbeing and environmental stewardship through volunteering in nature. *EcoHealth*, 13(1), 151–155. <https://doi.org/10.1007/s10393-015-1089-1>

¹¹² Lombardi, T., & Boland, M. (2010). *Creating a Community in the Park-The Evolution of the National Park Idea*. San Francisco. Retrieved from <http://www.hphpcentral.com/wp-content/uploads/2010/09/5000-Paper-by-Lombardi-and-Boland2.pdf>

- Building Physical and Mental Health & Wellbeing¹¹³
- Fostering Creativity and Innovation^{114 115}
- Pro-social Behaviour¹¹⁶

Social Impact of Environmental Conservation Projects

Image by Sam Rye,
Masters of Design (MDes)



Sources:
 Molsner, R., & Townsend, M. (2016). Improving wellbeing and environmental stewardship through volunteering in nature. *EcoHealth*, 13(1), 151–155.
 Lombardi, T., & Boland, M. (2010). *Creating a Community in the Park: The Evolution of the National Park Idea*. San Francisco.
 van Ham, C., & Klimmek, H. (2013). Restoring the Connection Between forests and Human Health. *Revolve*, 8–14.
 Atchley, R. A., Strayer, D. L., & Atchley, P. (2012). Creativity in the Wild: Improving Creative Reasoning through Immersion in Natural Settings. *PLoS ONE*, 7(12), 11–13. <https://doi.org/10.1371/journal.pone.0051474>
 Townsend, M., Henderson-Wilson, C., Warner, E., & Weiss, L. (2015). Healthy Parks Healthy People: the state of the evidence 2015, 103.

¹¹³ van Ham, C., & Klimmek, H. (2013). Restoring the Connection Between forests and Human Health. *Revolve*, 8–14. Retrieved from <http://www.hphpcentral.com/wp-content/uploads/2017/05/IUCN-article-Revolve-Magazine-Spring-2017.pdf>

¹¹⁴ Atchley, R. A., Strayer, D. L., & Atchley, P. (2012). Creativity in the Wild: Improving Creative Reasoning through Immersion in Natural Settings. *PLoS ONE*, 7(12), 11–13. <https://doi.org/10.1371/journal.pone.0051474>

¹¹⁵ Leong, L. Y. C., Fischer, R., & McClure, J. (2014). Are nature lovers more innovative? The relationship between connectedness with nature and cognitive styles. *Journal of Environmental Psychology*, 40, 57–63. <https://doi.org/10.1016/j.jenvp.2014.03.007>

¹¹⁶ Townsend, M., Henderson-Wilson, C., Warner, E., & Weiss, L. (2015). Healthy Parks Healthy People: the state of the evidence 2015, 103.

Types of Volunteers

Many volunteers are loyal to one or more projects - giving up several days a month to work in a range of weather conditions, to 'do their bit' for the environment. Many of them do it for a variety of reasons, but they rarely question whether their work makes an impact, because they see the project site changing in front of their eyes, and see the changes across multiple months and years. I characterise these volunteers as bumblebees - they keep coming back to the hive to do more work.

There have been many studies of volunteer motivation generally, and several more specifically about volunteers who engage in environmental conservation work. Some studies indicate the need for the sector to recognise volunteering not purely as an altruistic gesture, but as a leisure activity (Ringer, 1996¹¹⁷), as a Wellbeing strategy (Molsher & Townsend, 2016¹¹⁸), and even eco-aware adventure experiences (Nisbett & Strzelecka, 2016¹¹⁹).

There is a section of volunteers, who I characterise as butterflies, who want more variety, and see volunteering as a recreation activity that enables them to travel, socialise, and see new places. This isn't just the international 'voluntourism' phenomenon, it also exists in urban areas - such as the [Community Action Wellington Meetup Group](#) which works with a range of landowners to bring volunteers to their sites.

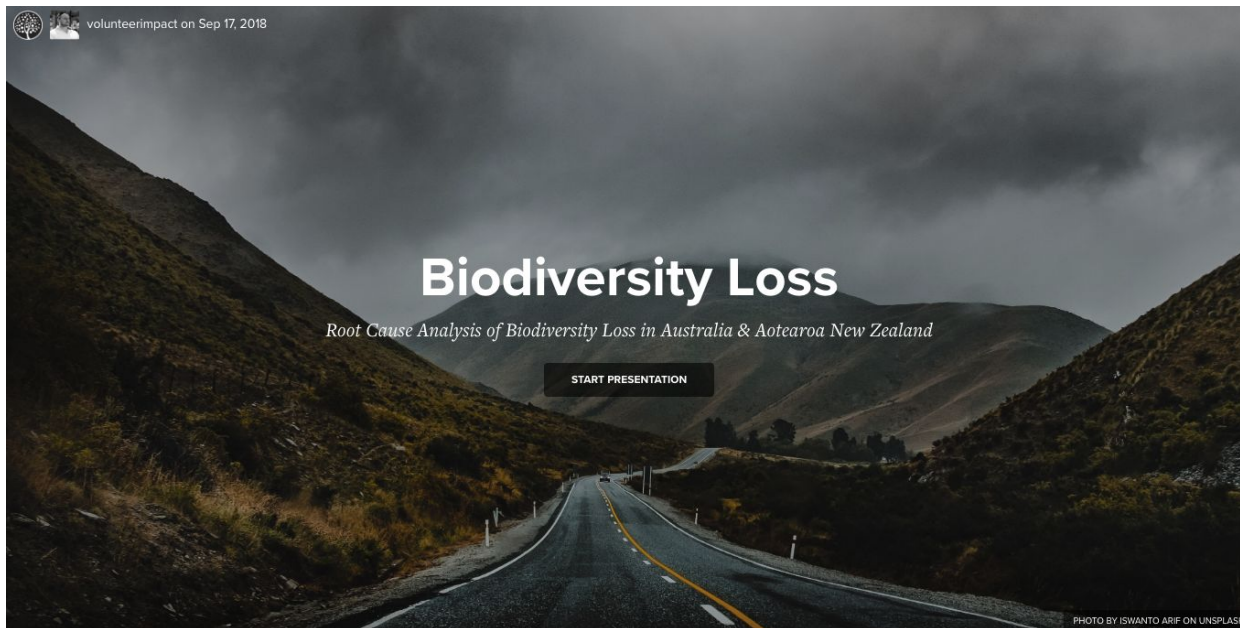
Having worked with this group in Wellington, I am aware of the desire of participants to stay in contact with the projects they have worked with, and better understand the cumulative total of activities they've been involved in, and the impact they have had across different projects.

¹¹⁷ Ringer, M. (1996). Critical analysis of obtaining desired outcomes from voluntary programmes. *Science for Conservation*, 28, 1–51. Retrieved from <https://www.doc.govt.nz/Documents/science-and-technical/sfc028.pdf>

¹¹⁸ Molsher, R., & Townsend, M. (2016). Improving wellbeing and environmental stewardship through volunteering in nature. *EcoHealth*, 13(1), 151–155. <https://doi.org/10.1007/s10393-015-1089-1>

¹¹⁹ Nisbett, G. S., & Strzelecka, M. (2016). Appealing to Goodwill or YOLO-Promoting Conservation Volunteering to Millennials. <https://doi.org/10.1007/s11266-016-9815-z>

Root Cause Analysis



Link to story: <https://volunteerimpact.kumu.io/biodiversity-loss>

Embed: `<iframe src="https://volunteerimpact.kumu.io/biodiversity-loss" width="1024" height="576" frameborder="0"></iframe>`

Documentation and Presentation of Systemic Design

I found several useful threads on documentation and presentation of work I would characterise as Systemic Design.

Examples of methods:

- [Giga-mapping](#) by Birger Sevaldson¹²⁰

¹²⁰ Sevaldson, B. (2011). Giga-mapping: Visualisation for complexity and systems thinking in design. In *Nordes '11: the 4th Nordic Design Research Conference* (pp. 137–156). Retrieved from <http://www.nordes.org/opj/index.php/n13/article/view/104/88>

- [Synthesis Maps](#) by Jones & Bowes¹²¹

Examples of articulating systems interventions:

- The Finance Innovation Lab - [Systems Change Strategy Report](#)¹²²
- Lifehack - [Final Impact Report](#)¹²³

Notes For Future Practice

In writing these notes, I am hinting to myself about some areas to explore in the future, based on the understanding that to not just influence systems change, but bring about new paradigms to work and live in, we need new forms of *practice* not just different methods and techniques.

New practices need to focus both on internal states, as well as external relationships and actions, as our challenges in this coming decade are vast, and centered around collective action on large complex challenges. It isn't enough just to be working on my personal practice, we need to be forging new spaces for rapid changes in practice for large groups of people.

These are elements of practice I want to work on more:

Listening and adapting

Deep nature observation

Focus on enabling collective action

Move at speed of trust

Embrace emergence

Inquiry Driven (make to understand)

¹²¹ Jones, P., & Bowes, J. (2017). Rendering Systems Visible for Design: Synthesis Maps as Constructivist Design Narratives. *She Ji: The Journal of Design, Economics, and Innovation*, 3(3), 229–248. <https://doi.org/10.1016/j.sheji.2017.12.001>

¹²² The Finance Innovation Lab. (2015). *A Strategy for Systems Change*. London, UK. Retrieved from <http://financeinnovationlab.org>

¹²³ Lifehack HQ. (2017). *Lifehack: Enhancing the conditions for young people to flourish in Aotearoa*. Wellington, New Zealand. Retrieved from <http://lifehackhq.co>

I also aim to further explore several methods which I feel may offer potential for the kind of practice I hope to embody in the future.

Positive Deviants

The idea behind Positive Deviance is one which is rooted in the belief that *“in every community there are certain individuals or groups whose uncommon behaviors and strategies enable them to find better solutions to problems than their peers, while having access to the same resources and facing similar or worse challenges”*¹²⁴.

This approach has pedigree as an approach to social innovation activities, backed by explorations like Creative Communities (Meroni, 2007¹²⁵), Future of Fish (Dahle et al, 2017¹²⁶), and the DOTT Festival (Thackara, 2016¹²⁷).

There has also been some work on this concept from the conservation sector (Post & Geldmann, 2018¹²⁸) which studied Tiger Reserves and Coral Reefs for positive outliers of success, and then sought reasons for this. They found the presence of exceptionally committed people (“conservation champions”) was a commonality in the reserves case, and in the case of Reefs, that “levels of engagement with local communities are high and sociocultural governance institutions are present”. They highlight the need for extensive surveying and interviewing as part of the process for surfacing and investigating the positive deviants in a community.

Exploring the positive deviants active across Australia and New Zealand could be a whole research project in itself, however if it had been embedded from the beginning of the project, it could have been something asked about in every interaction with stakeholders - yielding a surface scan of who is a positive outlier, and worth contacting for further research.

¹²⁴ Pascale, R., Sternin, J., & Sternin, M. (2010). *The Power of Positive Deviance: How Unlikely Innovators Solve the World’s Toughest Problems* (1st ed.). Harvard Business Review Press.

¹²⁵ Meroni, A. (2007). *Creative Communities - People inventing sustainable ways of living*. (A. Meroni, Ed.), *Work* (First). Milano. <https://doi.org/10.4135/9781412971959.n84>

¹²⁶ Future of Fish. (2017). Our Work. Retrieved from <http://futureoffish.org/services>

¹²⁷ John Thackara. (2016). Biennials and system change. In J. Thackara (Ed.), *Life’s Work: Biennials and Regeneration* (pp. 1–6). Ganges, Cevennes, France. Retrieved from <http://thackara.com/place-bioregion/biennials-and-system-change/#more-7063>

¹²⁸ Post, G., & Geldmann, J. (2018). Exceptional responders in conservation. *Conservation Biology*, 32(3), 576–583. <https://doi.org/10.1111/cobi.13006>

Participatory Probes

Introduced initially to this area through Liz Sanders & Pieter Jan Stappers work on the Convivial Toolbox, I feel there is much more to be explored for generative research at the front end.

- Understanding probes¹²⁹¹³⁰
- Beyond ethnographic probes - diegetic probes¹³¹
- Safe Fail Probes¹³²
- Materiality of Probes & Toolkits¹³³

¹²⁹ Mattelmäki, T. (2005). Applying probes – from inspirational notes to collaborative insights. *CoDesign*, 1(2), 83–102.
<https://doi.org/10.1080/15719880500135821>

¹³⁰ Sanders, E. B.-N., & Stappers, P. J. (2014). Probes, toolkits and prototypes: three approaches to making in codesigning. *CoDesign*, 10(1), 5–14.
<https://doi.org/10.1080/15710882.2014.888183>

¹³¹ Kirby, D. A. (2011). “The Future Is Now: Diegetic Prototypes and the Role of Popular Films in Generating Real-World Technological Development.” In *Lab Coats in Hollywood: Science, Scientists and Cinema*. Cambridge, MA: The MIT Press.

¹³² Cognitive Edge. (2018). Safe-to-Fail Probes. Retrieved October 17, 2018, from <http://cognitive-edge.com/methods/safe-to-fail-probes/>

¹³³ Broadley, C., Champion, K., & McHattie, L.-S. (2017). Materiality Matters: Exploring the use of design tools in innovation workshops with the craft and creative sector in the Northern Isles of Scotland. *The Design Journal*, 20(sup1), S550–S565. <https://doi.org/10.1080/14606925.2017.1353003>