Re-situating ecology in the design of data ecologies

Youngsil Lee

Design informatics, University of Edinburgh, ylee2@ed.ac.uk

Larissa Pschetz

Design informatics, University of Edinburgh, L.Pschetz@ed.ac.uk

Designers have long looked at ways in which data can inform their practice, in what could be seen as designing "from" data. However, they are increasingly looking at ways in which design can be carried out "with" and "by" data [1]. Oftentimes, this shift assumes data to be captured in a digital form, which is then structured (e.g. through datasets) and incorporated into the design. The collection of digital information is then referred to as a data ecology. The assumption of digitisation, however, neglects that such data flows are intrinsically connected to and originated from the material world and the physical manisfestation of human and more than human worlds. In this provocation, we invite designers to go back to pre-digital data (and indeed expand on it) to ask: what happens if we look beyond data sets and into the world to extend notions of data? What kinds of contexts emerge? What kinds of values? How design help to leverage this new complexity?

In a digital data ecology, we can think about how design can help surface values and tensions around data ecologies. For example, in the past, we looked at how data-driven systems could mediate access to energy infrastructures, and how the data ecology would change according to situational aspects. The energy storing Gigbliss hairdryers [2], for example, embodied different levels of control over data-driven autonomous systems, where the context defined the data flows, and this in turn was intrinsically connected to how and for whom the devices worked. The different contexts were mimicked by three different hair dryer models, the GigBliss Plus, Balance and Auto On one end of the spectrum is GigBlis Plus, operated under what could be seen as a user-centred approach: people would have control over all data transactions, holding a digital wallet that would collect any gains from energy transactions carried out with the device. On the other end of the spectrum, however, is GigBliss Auto where transactions would be defined based on agreements made with a third party, and users would have no control over when these would take place, where profits would go, and how long they would have the device.

This concept was extended to a series of connected kettles [3] that displayed data on the state of a local storage grid and allowed people to choose how to distribute energy stored in their devices. A long-term study of these kettles showed how people interpreted this data and attributed value to transactions which also influenced the way they responded to perceived needs of their neighbours, and ultimately helped to balance energy in the network..In these examples, data exists within a constellation of energy resources, objects, and people, but also values, interests, hierarchies, and politics, etc. It helps people recognize the real world more by actively involving them in the complex constellation, rather than leaving them behind it and passively receiving information from centralized systems. When we give more attention to material and natural systems, this complexity is extended to acknowledge a whole new group of actors and new sets of values.

Figure 1: GigBliss hairdryers: GigBliss Plus (left), Balance (centre) and Auto (right)

Furthermore, if we replace the hairdryer or kettle with a tomato, we can see more of what is crucial yet missing in the analysis of digital data ecologies [4, 5]. On one level, tomatoes have evolved over millennia to adapt to their environments, becoming a physical manifestation of the context they inhabit. Through selective breeding and variations in genotype and phenotype they came to become partners of different actors. As a tomato plant grows, it interacts with visible and invisible entities of its environment, leading to constant changes in size, colour, structure, and rhythm. In other words, its change and variation of form reveals entangled, situated, and localized relationships between the plant and its living and non-living environment - some of which have been tracked through cataloguing and new methods of genetic barcoding for human interests. Based on flows and purposes of consumer markets, energy availability and supply networks, which are often quantified but also materialised in different ways, the physical body and naturally encoded information of a tomato are modified for domestication. On a global scale, there is a tendency for them to be highly designed and engineered to meet diverse demands, conditions, and temporalities of local supply chains. Meanwhile, tomatoes have provided countless data as a model crop and commodity in the industrial process [6, 7, 8].

Building from this expanded notion of data with a tomato, we have invited a group of students to situate a living organism in the centre of a data ecology [5]. Through a design workshop, the students were asked to choose a specific living organism such as a butterfly or a cow and contextualize them with human and non-human entities that have a close relationship with it. They attempted to map the complex relationships between them while thinking about the meaning and purposes of the relationships of multiple entities. After that, they wrote down all emerging data related to entities, relationships, and contextual experience and knowledge. This exercise encouraged the students to expand their consideration on data to include other natural entities and the environment. To help them to digest and reflect on the exercise, we gave an individual post-assignment to explore nature to find their own data and elaborate on the meaning or interpretation it evokes. The result was a thought-provoking sample of evolved relationships between several entities and the environment. For example, one student mentioned the level in which dragonflies fly as an indicator of rain (data as index), while another student described coral as a signal of a collective and changing condition of sea with water temperature, sediments, and the degree of pollution. Some students also addressed the way in which these indicators and signals can provide crucial information for human survival.

Figure 2: overview of interpretations of data in the world by design students

Figure 3: Highlight of a few examples

The turning of attention to natural matters and living organisms in data ecologies brings to surface:

- the importance of acknowledging multiple actors and their interdependent relationship, including those beyond humans, machines and highly domesticated species, for the survival of human and non-human entities.
- the understanding that human and non-human actions and interactions have an impact on a more-than-human world.
- the attention to differences and emergence of data ecologies that result from unexpected encounters of spatial-temporal contexts, agencies, and matters.

- an opportunity to revisit the way we think about the artefacts and systems that we design. A way that fosters more meaningful engagement with the material world, and potentially allows us for greater consideration of more-than- human values.

By reconsidering and expanding data ecologies through matter, objects and organisms, we hope that designers and non-designers start to critically review their datasets, data practices, and systems and pursue diverse data ecologies that reconcile the human and more-than-human world with responsibility, care and appreciation in their actions and practices.

REFERENCES

[1] Chris Speed and Jon Oberlander. 2016. Designing from, with and by Data: Introducing the ablative framework. In *Proceedings of the International Design Research Society Conference*, 27–30.

[2] Larissa Pschetz, Kruakae Pothong, and Chris Speed. 2019. Autonomous Distributed Energy Systems: Problematising the Invisible through Design, Drama and Deliberation. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (CHI '19), 1–14. https://doi.org/10.1145/3290605.3300617

[3] Larissa Pschetz, Luis Lourenço Soares, Billy Dixon, Esteban Serrano, Ella Tallyn, and Joe Revans, 2020. Push-Pull Energy Futures | Proceedings of the 2020 ACM Designing Interactive Systems Conference. Retrieved April 19, 2023 from https://dl.acm.org/doi/abs/10.1145/3357236.3395551

[4] Youngsil Lee, Larissa Pschetz, and Chris Speed. 2022. Investigating materiality for a renewed focus on data design practice. *DRS2022: Bilbao* 25.

[5] (Under review) Youngsil Lee, Larissa Pschetz, and Chris Speed. 2023. Expanding Notions of Data for Ecological Futures. *Journal of Human-Coputer Interaction.*

[6] William Alexander. 2022. *Ten Tomatoes that Changed the World: A History.* Grand Central Publishing, New York.

[7] Heuts, F., & Mol, A. (2013). What Is a Good Tomato? A Case of Valuing in Practice. *Valuation Studies, 1*(2), Article 2. https://doi.org/10.3384/vs.2001-5992.1312125

[8] Heuvelink, E. (Ed.). (2005). *Tomatoes.* Cambridge, MA : CA