Design as reconfiguration: notes between ecology and interaction

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N.B. The term 'reconfiguration' is owed to Barad (2003), through Suchman (2007).

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INTRODUCTION: A DIFFICULTY AND AN APPROACH

"Sustainable interaction design" (Blevis 2007) and "sustainable interactive technology" (Nathan et al. 2009) may be contradictions in terms. Computational technologies, and the processes and relations required by the apparatus of industrial production upon whose existence the continued design, mass production, and retail distribution of designed objects is predicated, requires, at present and under any plausible future configuration of electricity generation, massive and indefinite inputs of nonrenewable fossil fuels and other mined materials, and the discharge of their use byproducts. This is in direct contravention of formulations of socio-ecological principles for a sustainable society derived from ecological science; namely, that for a sustainable relation between society and its material substrate, "mined and anthropogenic substances must not accumulate in the ecosphere" (Holmberg et al. 1996) and "harvesting rates [of natural resources] must not exceed the[ir] regeneration rate[s]" (Daly 1996).

The literature on ecological economics offers the analytical breadth in time and space required to meaningfully address "the challenges of sustainability" (Huang et al. 2009), and presents plausible and compelling but still pluralistic visions of sustainable futures. But it lacks a rich contextual understanding of why people do things (and in particular, why anyone would take concrete measures to engage personally with "the challenges of sustainability") and relies on policymakers for implementation. As a result, it has under present (and, we argue, plausible future) political conditions no plausible implementation path.

Put another way: literature in ecological economics presents clear aims without plausible methods, while discourses on sustainability in HCI present methods without a well-understood aim. Following Deming, we suggest: "Aim and method are essential. An aim without a method is useless. A method without an aim is

dangerous."

It is our aim in this paper to knit aims and methods in discourses on sustainability in HCI (and design broadly) and ecological economics. To do this, we first develop a metaphor for design which extends the metaphor, currently in wide use across disciplines and discourses, of a set of interconnecting actors as a *network* or *system*: *design as reconfiguration*. This metaphor allows us to describe design action, technology use, research, activism, advocacy, policy-making, the industrial production of objects, discourse, and so on within a common language: all of these activities are understood as *situated reconfigurations* within a *system*. Following epistemological insights from second-order cybernetics (e.g., von Foerster 1979) and feminist theory (canonically, Haraway 1988), we understand both the 'actors' under study (e.g., designer, activist, policymaker) and the analyst (e.g., researcher) as constituents of the same system. This metaphor has a number of convenient practical and theoretical features and plausible 'applications':

It syncretizes formalisms. Reconfiguration within systems can be represented both qualitatively and quantitatively; either of these, or a combination, or some other formalism, may be appropriate depending on the task at hand. In particular, mostly quantitative formalisms—a hypothetical 'poor systems theory'—may be appropriate for projection, envisioning, and planning, as in the literature on global modelling (see canonically Meadows et al. 1972; also Meadows et al. 1982 and Turner 2008).

It can bridge second- and third-paradigm (i.e., 'information-theoretic' and 'situated') approaches in HCI. Reconfiguration takes a situated view of human action (and is agnostic to the various understandings of 'the situation' in HCI; see Harrison et al. 2007, p. 8). At the same time, it is compatible with an ecological understanding of emergent and dynamic system properties like sustainability, resilience, vulnerability, and efficiency grounded in information theory (Ulanowicz et al. 2009) which addresses concerns about repressive or totalizing ecotopianisms (e.g., Pepper 2007 and Harvey 2000; explored as relevant to HCI in Dourish 2008). The situated actions of actors in the system (including the analyst) are understood as reconfigurations that can affect these emergent properties over time.

It can reconcile "humble theory" (Gaver 2006; cf. Philip and Abbas 2008) with the 'utopian' envisioning required to grapple with unsustainability (Meadows 1996).

It can connect the primarily sociological theory of the actor-network —"not a network connecting entities which are already there, but a network which configures ontologies" (Callon 1999, via Suchman 2007)—*with questions of sustainable scale, distribution, and allocation foregrounded in ecological economics*, which repudiates 'homo economicus' in favor of a model of "individual persons" whose "individual identity is defined by the quality of our social relations" consistent with a "concrete experience...of 'persons in community'" in which "relations are not just external, they are also internal—that is, the nature of the related entities (ourselves in this case) changes when relations among them change" (Costanza et al. 1997, Ch. 3).

It can connect phenomena across scales, but may also be compatible with a 'flat ontology' without scale (e.g., Marston et al. 2005). That is, it has no 'built-in' understandings of 'what a scale is'.

More generally, *it can link notions of agency, autonomy, complexity, and causality across the disciplines*; e.g., political theory (e.g., Bennett 2005); theoretical biology (e.g., Kauffman 2003); ecology (e.g., Ulanowicz 1990); philosophy of science and feminist theory (e.g., Barad 2003, 2007); and sociology of science (e.g., Latour 1987).

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