HCI and Environmental Public Policy: Opportunities for Engagement

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ABSTRACT
This note discusses opportunities for the HCI community to engage with environmental public policy. It draws on insights and observations made during the primary author's recent work for a policy unit at Global Affairs Canada, which is a federal ministry of the Government of Canada. During that work, the primary author identified several domains of environmental public policy that are of direct relevance to the HCI community. This note contributes a preliminary discussion of how, why, with whom, and in what capacity HCI researchers and practitioners might engage with three types of environmental public policy: climate change, waste electrical and electronic equipment, and green ICT procurement policies. This builds on existing public policy and environmental knowledge within the HCI community and responds directly to calls from some members to engage with environmental public policy.

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INTRODUCTION
Several recent publications have included open calls for the HCI community to engage with and inform public policy related to environmental sustainability, security, and justice [21, 31, 34, 48]. This note offers a direct response to those calls; in it, we discuss the primary author's recent engagement with a policy unit of the Government of Canada's (GoC) Global Affairs Canada (GAC) ministry. That engagement included responding to—and winning—a competition, producing a short video, conducting a literature review, writing a research brief, identifying a set of non-state actors with whom GAC might partner, and compiling a list of policy recommendations, which focused on how digital technologies influence environmental change. We draw on the research and work that underpinned the primary author's submission to identify and discuss opportunities for HCI researchers and practitioners to engage with environmental public policy (EPP).

EPP is a subset of public policy; like most public policy domains, EPP is complex and highly contested, which might be why it remains largely unexplored and unaddressed by the HCI community. In many cities, countries and regions, EPP addresses a diverse set of issues that directly and indirectly influence the work of the HCI community, such as energy production and consumption, natural resource extraction, manufacturing, health, waste management, education, as well as urban, rural and international economic development. The practices, processes, and actors involved in setting, shaping, and enforcing those policies are as diverse as the issues themselves [18, 33, 39]. As a result, we believe that opportunities to engage with EPP could be of interest to many members of the HCI community, including but not limited to people working on sustainable HCI (SHCI), HCI for development (HCI4D), and public policy more broadly.

This note makes a public policy-focused contribution by using Vanessa's recent work with GAC to discuss how EPPs are relevant to HCI. The note is structured as follows: we begin by presenting an overview of existing literature that explores how and why the HCI community might engage with public policy. We then describe Vanessa's recent engagement with the GAC, and use that experience to discuss how, why, with whom, and in what capacity HCI researchers and practitioners might engage with three types of EPP: climate change, waste electrical and electronic equipment, and green ICT procurement policies. We close by discussing some of the challenges that HCI researchers might face when engaging with EPP.

HCI AND PUBLIC POLICY
Public policy is many things to many people [8, 15, 28]. For some, 'public policy' is a phrase that defies precise definition [8, 28]. For others, including many public policy scholars, public policy is the "set of interrelated decisions taken by a political actor or group of actors concerning the selection of goals and the means of achieving them within a specified situation" [28]. Those interrelated decisions can come in many forms—including in the form of 'indecision' and 'inaction'

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[15]—and can be made or influenced by a shifting range of people and groups. This is reflected in Lazar's statement that "taken broadly, public policy includes not only laws, regulations, enforcement actions, lawsuits, and court actions, but also human rights treaties, international technical standards, non-governmental organizations, and multinational organizations" [33]. Indeed, any sufficiently broad definition of public policy must include this wide range of actors and governance tools. It could also include households, media outlets, lobbying groups, private sector businesses, and any individual, organisation or object that belongs to "the complex array of state and societal actors involved in [government] decision-making processes" [28, pp.5]. The HCI community and its outputs are amongst those societal actors.

Members of the HCI community have been engaging with public policy for decades, both directly and indirectly. In the 1980s and 90s, some HCI researchers and practitioners worked to influence "accessibility" policies in the USA [34]. They designed interfaces that would be more usable for people of all physical and mental abilities, and worked to influence technical standards related to those interfaces [34]. Similar work on accessibility has continued to this day, with members of the HCI community examining and engaging with accessible designs, policies and laws around the world (e.g. [10, 23]). Some members of the community have also engaged with human rights [39], urban development [9, 52], and arts/innovation [17] policies, as well as relevant technical standards [36, 37]. Others have written magazine articles, some have worked with governmental organisations or been funded by government research bodies, and some have issued—as well as responded to—calls for activism related to complex social issues [11]. These actions and endeavours all arguably have direct or indirect effects on public policy.

The allure of public policy is likely due to its role as "a core component of social systems", which are tightly intertwined with the digital technologies, systems and practices that we study, design, and build in HCI [34]. Research has demonstrated that our digital and social systems directly influence the planet's ecological systems [21, 26, 31, 45, 48], which might be why some HCI researchers have called for increased engagement with environmental public policy [21, 31, 48].

INTERNATIONAL POLICY IDEAS CHALLENGE: AN EXAMPLE OF ENGAGING WITH EPP

In early 2016, GAC released the call for their inaugural International Policy Ideas Challenge (IPIC). The competition was designed to help GAC identify innovative and concrete solutions to emerging "international policy challenges", including: 1) Strengthening Canada's relations with North American partners, particularly the United States. 2) Adopting a North American approach to climate change and clean energy. 3) Re-energizing Canadian diplomacy and leadership in managing complex international crises. 4) Partnering with non-state actors in addressing global governance challenges. 5) Making better use of data and technology in the development of international policy [20].

Vanessa's academic and professional backgrounds in computer science, human security, and public policy led her to see connections across all five challenges, as well as with her work in HCI. She began examining GAC's policy documents, as well as recent news stories related to the priorities listed in the competition. She looked through GAC's project partners and locations, and began reviewing recent research about the environmental costs of digital technologies. After three weeks of reading diverse materials, making notes, and preparing her argument, Vanessa wrote a plain language research proposal focused on the entwined nature of digital technologies, environmental change, and public policy.

GAC received 83 submissions to the IPIC and commissioned five of those. Vanessa's submission was amongst the selected proposals, so she agreed to write a 4500-word research and policy brief, compose a list of ten relevant non-state actors, and prepare a 'design fiction' artefact for the Ministry. Preparation of these documents took a further five weeks. Vanessa conducted a literature review of recent publications in several academic databases and journals, including: GreenFile, JSTOR, Wiley, Environment and Planning, Nature, and the ACM's Digital Library. She also reviewed reports by several non-profit organisations and media outlets. The final submission contained references to work conducted by the HCI community, including projects on sustainable interaction design [4], the energy and data demand associated with Internet-connected devices [2, 26], and the disposal of digital technologies [45]. Vanessa also included considerable work from outside of HCI, such as publications related to earth's planetary boundaries [49], public policy [24], and resource management [14, 27, 53], as well as reports by non-profit organisations (e.g. [7]). The policy-focused narrative 'design fiction' artefact 'presented' the future announcement of one of the complex policy recommendations listed with the final submission. The full research brief is attached as supplementary material.

DISCUSSION AND REFLECTIONS

The focus of the IPIC's 'policy challenges' led Vanessa to examine intertwined public policies related to energy production and consumption, natural resource extraction, manufacturing, waste management, urban and rural economic development, international development, innovation, education, and green ICT procurement policies. Many of these policies are absent from HCI literature, which sparked an intense series of discussions amongst the authors of this paper. Lazar et al. suggest we should consider how public policies inform the HCI community's work, as well as how the HCI community might "inform public policy by providing expertise, taking part in the development of policy, and researching the impact of various policies" [34, pp.74]. We now explore those two dimensions with three of the urgent EPPs that appear to be absent from HCI literature: climate change, waste electrical and electronic equipment, and green ICT procurement policies.

Climate change policy

Climate change is one of the most pressing international public policy challenges; the effects of climate change will influence food, water, health, and economic security worldwide

[29]. Public policy responses to climate change have been diverse. Some governments developed their climate change policies over three decades ago, whereas others have only recently started to address climate change concerns [24, 29, 47]. Many cities, national governments, and intergovernmental organisations (e.g. the United Nations) have designed unique policy programmes, legal frameworks, and climate-focused projects to meet the goals that they have set. For example, New Zealand, Denmark, South Korea, China, and dozens of other countries have set national greenhouse gas emissions reduction targets, which are often supported by policies and projects that aim to reduce energy consumption, including through the use digital technologies.

Climate change policy informing HCI

Although no documentation explicitly states that climate change policy has influenced the HCI community, the emergence of the sustainable HCI community runs in tandem with the growth in climate change policy adoption worldwide. Some HCI research projects focused on behaviour change technologies, energy and data demand, and sustainable social practices also appear to align with climate change policy goals. However, no clear evidence suggests that work undertaken by HCI researchers and practitioners is a direct response to specific sets of governmental or intergovernmental climate change policies, projects, targets or goals.

HCI informing climate change policy

Again, there is no evidence to suggest that the HCI community has attempted to influence—or has successfully influenced—climate change policies. However, the HCI community has produced a considerable body of work exploring how social practices and digital technologies affect energy consumption in the home and workplace, as well as through distributed digital service design [2, 25, 26, 44]. The HCI community has also learned many lessons from persuasive technology projects [6, 19, 32, 42, 43]. These findings appear to have gone largely unnoticed by environmental public policymakers, whose efforts remain focused on behavioural change technologies [47], especially related to energy consumption (e.g. [12]). This focus opens an opportunity for the HCI community to share their expertise with policymakers, and possibly influence climate change policies.

Waste Electrical and Electronic Equipment (WEEE) policy

WEEE has been the fastest growing waste stream globally for over a decade [35, 53]. Early WEEE policies emerged in the late 1990s and early 2000s in response to reports about flows of electronics waste (e-waste) from 'developed' to 'less developed' or 'developing' countries [35, 53]. These e-waste flows often ended up in 'dumping grounds', where the electronics would be left in open pits and/or disassembled using informal waste processing mechanisms. Both endpoints led to serious soil, air, and water quality degradation, which damaged health of people living or working near the dumping grounds. Diverse WEEE policies in countries, cities, and regions worldwide attempted to address these issues. Some governments implemented mandatory WEEE collection schemes for electronics retailers, WEEE recycling codes of practice, and non-profit organisations that manage public WEEE recycling programmes or 'take-back' schemes [40]. Despite these changes, the illegal dumping, improper disposal, transboundary flows, and perpetual storage of WEEE continues to this day, and the successes and failures of WEEE policies have spawned a considerable body of research [1, 14, 35, 40].

WEEE policy informing HCI

WEEE policies have already had a direct influence on the types of hardware that we can use in HCI. The European Union's directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment ('RoHS Directive', Directive 2002/95/EC) influenced the material composition of hardware worldwide, including many of the devices that we use in the HCI community. Moreover, WEEE public policy has a direct influence on if, how, and when people store their end-of-life electronics [1, 14]. Dozens of non-HCI studies have found that policy variations can "lead to an indifferent disposer who, in all likelihood, might be tempted to illegally dump [their] used products or perpetually store them" [14]. These policy variations *might* have had an indirect influence on the findings of HCI studies related to why we preserve or repair digital technologies.

HCI informing WEEE policy

Once again, there is no evidence to suggest that HCI research has informed WEEE policies. However, many HCI studies might be of interest to policymakers who are looking to address the persistent failures of WEEE policies [1, 35, 40]. In particular, studies about repair practices and cultures (e.g. [30, 46, 50]), as well as many of the studies about obsolescence [45], might offer policymakers with new insights about the social practices that affect the implementation of their unsuccessful WEEE policies, systems and regulations. Moreover, some policymakers who work in international development and favour the widespread adoption of digital technologies (including those who Vanessa spoke with at GAC) might be unaware of the health and environmental issues associated with poor WEEE management. In these cases, members of the HCI community could use their interdisciplinary expertise on repair practices and obsolescence to help inform digitally focused international development policies.

Green ICT procurement policy

Governments often use their substantial purchasing power to influence the design, production, and consumption of products and services worldwide [5, 51]. They do this through their procurement policies, which they apply when they purchase goods, services, and other public works (e.g. support infrastructure). "Green" or "sustainable" procurement policies (GPP) emerged in the past four decades, and have attempted to integrate broader social and environmental concerns into public purchasing processes [5, 51]. GPPs have extended to the procurement of ICTs, with many governments adopting Green ICT procurement policies that rely on a range of environmental assessment tools, product design guidelines, and international technical standards [38]. For example, dozens of governments use the Electronic Product Environmental Assessment Tool (EPEAT) to meet their green ICT procurement needs, including the Government of Canada, the Australian Government, the Government of the City and County of San

Francisco, Warwickshire County Council (in the UK), and the Hainan Siyuan Province's government [22]. These governments represent a sizeable market [5, 51], which is why many ICT manufacturers and producers ensure their products meet any regulatory assessment criteria.

Green ICT procurement policy informing HCI

Like WEEE policies, green ICT public procurement policies have influenced the material composition and energy consumption of some of the technologies the HCI community uses. Beyond those influences, Green ICT procurement policies appear to be absent from HCI research, including much of the recent "digital civics" literature. Direct engagements with green ICT-related ISOs (e.g. ISO 11469) and EPEAT itself are entirely absent from HCI publications. Whilst many of Belvis' initial Sustainable Interaction Design principles [4] appear to align directly with the performance criteria set for EPEAT certified products (i.e. they "must meet environmental performance criteria that address: materials selection, design for product longevity, reuse and recycling, energy conservation, end-of-life management and corporate performance" [16]), the similarities could be purely coincidental.

HCI informing Green ICT procurement policy

Many Green ICT procurement policies focus primarily on hardware procurement, excluding software or digital service procurement. This oversight could be an area where the HCI community could provide expertise. We have access to a broad corpus of work that examines the environmental effects of hardware, software, and digital services, and that work could be used to inform narrowly scoped Green ICT procurement policies [2, 3, 13, 19, 26, 30, 41, 42, 44, 45, 46]. Moreover, GPPs have only only recently attracted much scholarship [5], and research on Green ICT procurement specifically is incredibly sparse. The HCI community could undertake specific research projects to help governments improve their existing Green ICT procurement policies (e.g. by rethinking their "asset management" cycles).

How to engage with EPPs

Public policymaking is geographically and temporally dynamic. Policymakers have their own unique social practices, processes, and agendas worldwide [18], and getting to know their unique practices, processes and agendas is critical for any successful engagements with policy. Even previously successful engagements with public policy in one jurisdiction might not be replicable elsewhere or at a later time, depending on the pressures faced by local public policymakers. Timing can be everything. As a result, there is no simple recipe for engaging with EPPs. However, there are some general actions that members of the HCI community can pursue if they hope to engage with EPPs around the world.

Who we could work with to develop or influence EPPs

We could begin by increasing our direct communication with environmental public policymakers. Their contact information and research procurement guidelines are often posted online, as are many public consultation calls. Direct communication with environmental policymakers could come in the form of specifically targeted "policy briefs", press releases, or presentations at industry and government-focused conferences. Alternatively, we could partner with non-state actors who have established reputations and networks in EPP. Many universities also have "science and technology policy" research groups (e.g. SPRU, AAAS, SECyT), as well as "science communication" teams; these groups and teams will likely already have established policy-specific relationships, and will be familiar with the local language of, and priorities for, policymaking. Reaching out to them would be wise.

Challenges we might face while engaging with EPPs

Engaging with EPP will demand considerable time and effort. As the IPIC process above illustrated, Vanessa had to read well outside of her current research focus and seek out a variety of document types from disciplines other than HCI. While these non-HCI publications were invaluable for her final research and policy brief, they were written for a very different audience than the HCI community. Vanessa's existing background in public policy allowed her to relatively quickly digest that information; however, some HCI researchers without a similar background might need to spend considerable time learning the relevant terms, methods, and debates. This work might not be seen as valuable by their academic institution or peers, despite a recent push by people like Lazar et al. to make space for such work [34, pp.125-131], but it is crucial.

Taking advantage of our unique skills and knowledge

The HCI community's interdisciplinary strengths could place many members in a unique position to engage with the digital dimensions and implications of EPP. A senior director at GAC told Vanessa that the department had selected her submission because of its quality and because they didn't have any employees with the type of interdisciplinary, technology-focused expertise that Vanessa's submission demonstrated. This lack of expertise might exist in other governmental departments, as well as with the other actors undertaking EPP work. Let's seize those opportunities if and where we can. Let's build on our calls to activism and engagement [48, 31] by reaching out to the organisations and government departments who craft EPP. And let's make room to consider more contributions about EPP from members of the community who do that work.

CONCLUSION

In this note, we made a public policy contribution to the HCI community by presenting and discussing a largely unaddressed policy domain: environmental public policy. We drew on insights and observations made during Vanessa's recent work for GAC, and discussed opportunities for the HCI community to engage with three domains of EPP: climate change, waste electrical and electronic equipment (WEEE), and green ICT procurement policies. Although direct engagement with these policies could bring a variety of challenges, we believe that efforts to engage with EPP will be worthwhile, especially for those of us who wish to do more than "just write papers" [48].

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