The *Envisioning Cards*: A Toolkit for Catalyzing Humanistic and Technical Imaginations

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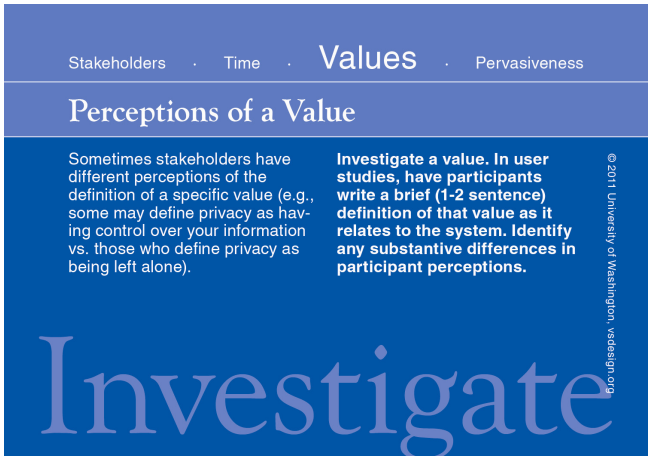


ABSTRACT
We introduce the *Envisioning Cards* – a versatile toolkit for attending to human values during design processes – and discuss their early use. Drawing on almost twenty years of work in value sensitive design, the Envisioning Cards are built upon a set of four envisioning criteria: stakeholders, time, values, and pervasiveness. Each card contains on one side a title and an evocative image related to the card theme; on the flip side, the card shows the envisioning criterion, elaborates on the theme, and provides a focused design activity. Reports from the field demonstrate use in a range of research and design activities including ideation, co-design, heuristic critique, and more.

Author Keywords
Design method; creativity; Envisioning Cards; time; pervasiveness; stakeholders; values; value sensitive design

ACM Classification Keywords
H.5.m Information interfaces and presentation (e.g., HCI): Miscellaneous.

INTRODUCTION
In a recent cover story for *interactions*, Liam Bannon has called for a rethinking of HCI, inviting the field to reorient itself, to be "centered on the exploration of new forms of living with and through technologies that give primacy to human actors, their values, and their activities" [1, p. 50]. This call for an even greater focus on what is important to individuals, groups, and societies, that is, a more human-centered perspective, will require the field to bring in new sensibilities, new approaches to conceptualizing and reporting research, new theory, and new methods. In this note we discuss the early use of the *Envisioning Cards* [4], a versatile tool for attending to human values during design processes. The Perceptions of a Value card, one of thirty-two 3.5 × 5.0 inch cards in the set, is shown above.

We see the Envisioning Cards as falling within a design toolkit genre, namely "cards," where ideas for design activities and approaches are represented in a compact, concise physical format. The physical format allows for persistence and recombination of the discrete ideas represented on individual cards. Two outstanding examples of this genre are the *IDEO Method Cards* [5] and the *Interactive Thread Cards* [7], both of which tend to represent process and methodological design knowledge.

THE ENVISIONING CARDS: STRUCTURE AND TONE
Drawing on almost twenty years of work in value sensitive design [3], the Envisioning Cards are built upon a set of four envisioning criteria that are intended to raise awareness of long-term and systemic issues in design [8]. The

Stakeholder criterion, a key concept in value sensitive design, emphasizes the range of effects of a technology, both on those who are in direct contact with a technology (direct stakeholders), and on those who might not be direct users, but whose lives are nevertheless affected by various interactions around the technology (indirect stakeholders). Inspired by the long-term perspective of urban planning, the **Time** criterion helps guide designers to consider the longer term implications of their work – implications that will only emerge after the technology has moved through initial phases of novelty to later phases of appropriation and integration into society. The **Value** criterion emphasizes the impact of technology on human values. Our use of the term values draws from the value sensitive design literature, "what a person or group of people consider important in life" [3]. The **Pervasiveness** criterion emphasizes systemic interactions that follow from the widespread adoption of an interactive technology. Technologies can become pervasive with respect to geographic (e.g., city navigation software use within urban areas), cultural (e.g., text messaging within the deaf community), demographic (e.g., online social networking sites among teenagers), and other factors.

The Envisioning Cards (see Table 1) is comprised of 28 themed cards and 4 "create your own" cards, one for each of the envisioning criteria. In addition, a 3-minute sand-timer is included to both symbolize and facilitate the possibility for meaningful use in a brief amount of time. Each envisioning card addresses a specific theme within one of these envisioning criteria. As can be seen in The Perceptions of a Value card reproduced above, one side of the card contains the card title and an evocative image related to the card theme. On the flip side, the card highlights the key criterion for the card; the card title; a theme describing the card's key concept; a focused design activity related to the theme; and a "big" action word such as "think," "identify," "sketch," or "ask."

Taken as a group, the card images seek to evoke the diversity, complexity and subtlety of human affairs, as well as the interconnections among people and technologies. To reflect cultural and geographic diversity, the photographs were taken in such political locales as Kazakastan, Rwanda, and the United States and at different seasons of the year. To speak to the diversity of human communities, the photographs include villages, open air market places, concrete office buildings, religious structures, and the like. To be applicable for envisioning many kinds of technologies, various levels of technical and societal granularity are represented including personal computers with avatars and large-scale infrastructure such as smart grids and transportation systems. To prompt consideration of diverse technologies and technological integration, the photographs portray digital and non-digital artifacts, as well as tools and infrastructure – electrical power lines, personal computers, photocopy machines, surveillance cameras, traffic lights, train tracks, wind turbines, and virtual reality. Finally, to expand further the treatment of values and to invite users to tailor the Envisioning Cards to specific design settings, the "create your own cards" provide a simple mechanism for adapting the deck.

REPORTS FROM THE FIELD

Starting in 2007, the Envisioning Cards have been developed through a fairly slow and iterative process, with some explorations of their use taking place outside of the development group. They have been used in prototype form since 2008 at such venues as research talks, conference workshops, and a tutorial at CHI 2009, and have been distributed to colleagues for exploration and reaction. Our colleagues are currently using the cards for a range of research and educational uses, including (1) to provide breadth in usable security analyses, (2) to foreground human-centered systemic effects in the design of health informatics systems in eastern Africa, and (3) to stimulate socio-technical imagination in graduate and undergraduate HCI design courses and capstone projects. In this section we report briefly on three other cases, with diverse design, analysis, and evaluation goals, seeking to convey how the cards were used in design processes.

Case 1: Stimulating Ideation and Iteration in Co-design

To surface key needs and features in a technical design, HCI researchers and designers often engage in co-design activities, such as low-fidelity prototyping. A long-standing issue is how to scaffold non-designers' active participation in the design process, including focused iterative design. Extending a study of mobile phones and safety for homeless youth [9], the authors used the Envisioning Cards in a two-step co-design activity. First participants, homeless young people, aged 19–34, were prompted to make a 3-D prototype using materials such as clay and broken mobile parts. The design goal was to envision mobile phone features that could help to keep homeless youth safe. In addition, participants filled out a "spec sheet," including name, key features, and operational notes. In the second step, participants were prompted to select an Envisioning Card, consider it, and if needed refine the original design.

Five groups independently completed this structured design activity. We found that the Envisioning Cards stimulated the creative exploration of the design space. Specifically, the following accounts illustrate how the cards helped the participants to reframe technical problems, to reconsider technical aspects of their designs, and generally to catalyze their technical imaginations. The Crossing National Boundaries card (see Table 1), for example, prompted one participant group to consider the operation of their design for homeless young people in Antarctica ("needs to function in sub-zero"), Australia ("needs to deal w/ extreme heat, sand + lightening"), and Japan ("needs to be able to function without interferring [sic] w/ other signals…"). The Consider the Long Now card prompted another group to write "It is ingrained into peoples dna so they are born with it and it becomes organic material," suggesting that

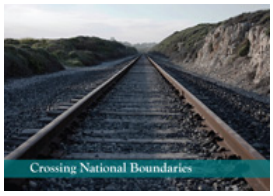
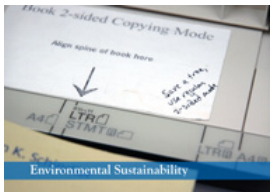
Image	Title and Theme	Activity
	***Crossing National Boundaries (Pervasiveness).*** Nations have different rules, customs, and infrastructure that affect use of a technology. What challenges will be encountered by your system if it is used in other countries?	Choose three countries across the globe and envision challenges for your system if it was deployed in each of those countries. Label any common concerns across the identified challenges.
	***Consider Children (Stakeholders).*** Children often appropriate systems originally designed for adults. How might this system influence a child's social and moral development?	Develop a scenario that portrays a seven-year old interacting with the system. How might the system influence the child's learning, or play with other children?
	***Environmental Sustainability (Values).*** Many systems can be applied or extended to support a desirable environmental outcome (e.g., a system designed to support efficient printing from web browsers may lead to less use of paper and ink). At the same time, systems may have unintended negative effects on the environment (e.g., pollution and waste created in the production of electronics).	Specify the required resources needed to create and support your system, and the byproducts of its production and use. Can your design be applied or extended to support a more positive environmental outcome?
	***Choosing Not to Use (Time)***. Some people may decide to use your system, or may attempt to remove themselves from an indirect stakeholder role (e.g., choosing not to publish a telephone number). How might deliberate non-use of the system affect a person's daily life (e.g., employability, relationships, civic participation)?	Picture your system in use many years from now. Identify three ways in which an individual's intentional non-use of the system might affect that person's daily life or the system as a whole.

Table 1. Sample Envisioning Cards with Image, Title, Theme, and Activity.

technologists explore how mobile phones might be placed in bodies. As a final example, the Consider Children card (see Table 1) prompted a third group to write about their design "Add safety features that prevent children for accessing inapp content," clarified with the note: "An 11-year old is able to use the phone to continually stay connected with friends and family with no danger of the phone getting destroyed." That is, the phone needs to be durable in the hands of an 11-year old.

Case 2: The Value Implications of Persuasive Profiling

Anticipating the uses, benefits, and harms of a new technology that is likely to diffuse widely is a recurrent challenge for HCI. At present, "persuasion profiling" is one such technology. Persuasion profiles, created through widespread monitoring of individual online behaviors, represent specific strategies based typically on authority (e.g., I do as others say) or consensus (e.g., I do as others do) that are likely to positively influence a person's actions across diverse commercial and social contexts. Persuasion profiles, however, appear to depend on a kind of deception or at least concealment; when individuals are informed that a particular influence strategy is being employed its effectiveness is undermined. Thus, making the operation of this technology transparent or obtaining informed consent prior to its use will likely reduce its effectiveness. On the other hand, when not informed of the expected behavioral effects of the profiles an individual's privacy and autonomy can be undermined. Given this dilemma, how should designers, individuals and societies respond?

Addressing this question, Kaptein, Eckles, and Davis [6] drew upon the Envisioning Cards to uncover the value implications and technical possibilities. They report the use of two cards: Value Tensions and Consider Children. The first card prompted the authors to consider the points of tension and congruence between advertisers and the users of social network sites. The second card prompted the authors to consider how children, and in turn their parents, might be affected by persuasion profiles (adults were the original direct stakeholder). These two reframings led the authors to consider people who, in general, are particularly susceptible to advertising and to consider possibilities for how the profiles might be shared, owned, and controlled.

With the design space opened to a range of issues and technical possibilities guided in part through the use of the Envisioning Cards, the authors reported that the next step was to converge and to focus on a set of issues comprehensively. To do so, the authors developed a value scenario in which a father is able to inspect his son's persuasion profile (created by the son's use of social network sites) and to use that profile to help his son lose weight. This scenario, in turn and again guided by the Envisioning Cards, allowed the authors to examine the

possible connections between commercial and health-based applications of persuasion profiles. Finally, Davis reports that the cards can be taken up quickly by designers new to value sensitive design and recommends that the Value Tensions card be used early on to help designers discuss the full space of values and tensions that might be addressed (see [4] "From the Community" discussion board).

Case 3: Heuristic Value Analysis of Infrastructure

Infrastructure shapes interaction; and, in turn, interaction design shapes human experience. Future Internet architecture, energy smart grids, and FastTrak transportation systems are but a few examples. In our third case study, akin to a heuristic evaluation to surface usability issues, one of the authors used the Envisioning Cards as an analytic heuristic tool to surface critical issues for potential cloud computing solutions [2]. To provide a flavor for this analytic assessment, results from considering three of the cards follow:

Political Realities. The Political Realities card calls attention to the ways in which "different political systems … can influence perceptions and practices that emerge in relation to [a technology]." Applied to cloud computing, how will the cloud support or hinder data sharing and communication among individuals who live within different political systems? Will users always be operating in networks or living within governments they trust? Or will it be the case that users sometimes will need (or want) to operate in networks that they fundamentally do not trust? How will the cloud support these different use cases?

Environmental Sustainability. The Environmental Sustainability card (see Table 1) directs designers to consider how a technology can "support a desirable environmental outcome" as well as situations in which "systems may have unintended negative effects on the environment." Applied to cloud computing, one effect entails continual electricity use; an unintended effect entails encouraging a proliferation of physical devices (e.g., 10 billion mobile devices). An analogy can be found in urban planning with debates around increased highways leading to greater sprawl and automobile use. As with transportation there are no simple answers here; however, the interaction among cloud computing and device proliferation, etc. warrants examination.

Crossing National Boundaries. This third card foregrounds the impact of national policies and regulations on technology development and use, recognizing that "nations have different rules, customs, and infrastructure that affect the use of a technology." Applied to cloud computing, how will various technical mechanisms enable or hinder communication and the exchange of digital goods and services across different legal frameworks. Particularly germane would be differing frameworks governing speech (e.g., what can be spoken and to whom), digital rights management, and intellectual property, among others.

Early and frequent consideration of the types of issues identified with these three cards and others in the deck can be immensely valuable in identifying large-scale socio-political issues early on in the design of technical infrastructure and resulting interactions.

CONCLUSION

Engaging values can be daunting; we believe in progress, not perfection. Robust like a pencil, the Envisioning Cards were designed to be a versatile tool, useful for many design processes: ideation, co-design, heuristic evaluation, critique, and more. Through their form and structure the cards position researchers and designers to consider values, time, pervasiveness, and stakeholders; that is, to attend to what is important in people's lives. The three cases point to rich and diverse applications, and suggest to us that the cards catalyze designers' humanistic and technical imaginations. Moving forward, as the cards diffuse, we believe that it will be important to explore and reflect upon their uses, but more, to seek systematic ways to place them within design processes and educational settings, to make HCI an even more human-centered practice.

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REFERENCES

1. Bannon, L. Reimagining HCI: Toward a more human-centered perspective. *interactions 18*, 4 (2011), 50-57.
2. Friedman, B. Human Values and Technical Infrastructure. Keynote presented at the Microsoft Security Summer Institute, Cle Elum, WA, USA, 2011, July 25.
3. Friedman, B., Kahn, P. H., Jr., and Borning, A. Value Sensitive Design and information systems. In *Human-computer interaction in management information systems: Foundations*, 348-372. M.E. Sharpe, 2006.
4. Friedman, B., Nathan, L. P., Kane, S., and Lin, J. *Envisioning Cards*. University of Washington, Seattle, WA, USA, 2011. Available at: envisioningcards.com
5. *IDEO Method Cards: 51 ways to inspire design*. IDEO, Palo Alto, CA, USA. Available at: ideo.com
6. Kaptein, M., Eckles, D., and Davis, J. Envisioning persuasion profiles: Challenges for public policy and ethical practice. *interactions 18*, 5 (2011), 66-69.
7. Mackay, M. *Interactive Thread: A participatory design toolkit*. interLiving, KTH, Sweden, 2002. Available at: interliving.kth.se/publications/thread/index.html
8. Nathan, L.P., Friedman, B., Klasjna, P.V., Kane, S.K., and Miller, J.K. Envisioning systemic effects on persons and society throughout interactive system design. In *Proc. DIS 2008*, ACM Press (2008), 1-10.
9. Woelfer, J.P., Iverson, A., Hendry, D.G., Friedman, B., and Gill, B. Improving the safety of homeless young people with mobile phones: Values, form and function. In *Proc. CHI 2011*, ACM Press (2011), 1707-1716.