

Should Do, Can Do, Can Know

Sustainability and Other Reflections on One Hundred and One Interaction Design Projects

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ABSTRACT

This paper characterizes six years of final projects from an interaction design master's program at our School of Design in Hong Kong. Our reporting includes a thematic analysis of the specific application areas in which these diverse designers made their choices, along the dimensions of values and vision (*Should Do*), concepts and approaches (*Can Do*), domain knowledge (*Can Know*), and interactive *Forms*. The dimensions of *Should Do* and *Can Do* are particularly privileged in this paper. In this particular reporting of our analysis, we are especially interested in trends relating to sustainability and its relation to other values-orientations. This interest owes to our concern as a faculty for fostering a school of thinking and practice that balances all of these dimensions. Our analysis demonstrates the use and value of the *Should Do, Can Do, Can Know* framing as an analytical tool for design. Moreover, our work characterizes the common strategies among our 101 designers. As such, it provides a lens and points of inspiration for others, more generally. As a service, we present our entire analysis in table form as an Appendix.

CCS CONCEPTS

• Human-centered computing → HCI theory, concepts and models • Human-centered computing → Interaction design theory, concepts and paradigms

KEYWORDS

Interaction design; Schools of design; Values-oriented design; Sustainability; Meta-analysis; Design Frames;

INTRODUCTION

In this paper, we share our understanding of *the content* of the 101 final projects completed to date in our interaction design program at our school of design. In this sharing, we are stating something

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Analytic Frame	Emergent Classifications	
Should Do	Should Do Meta Themes	Primary Should Do Themes
	Everywhere	Sustainability Preserve Cultural Heritage
	Near	Inclusivity Maintain Social Order Connecting People
Can Do	Here	Improving Health Personal Development
	Can Do Meta Themes	Primary Can Do Themes
	Preserve	Organize
		Itinerary Annotate & Link
		Connect
		Combine With Utility Distance Collaboration Match Interests
Can Know	Change	Persuade
		Scaffold Behaviors Motivate With Metaphor Gamification Promote Awareness
		Disrupt
Forms		Redirective Practice Subscription Services
	Can Know Meta Themes	Primary Can Know Themes
	Measurements	Amount And Quality
	Collections	Inventory Cultural Artifact
	Needs	Psychology Travel Acculturation Needs
	Meta Forms	Primary Forms
	Virtual	Mobile App Desktop App Web Site Tablet App Virtual Reality App Mobile Game
	Physical	Interactive Product Installation
	Strategic	Service

Table 1. Analytic Frame and Emergent Classifications for 101 Interaction Design Projects

Imposed	Emergent		
Analytic Frame	Level-3 & Level-2 (Branch-Level) Tags	Level-1 (Twig-Level) Tags	Level-0 (Leaf-Level) Tags
Should Do, Can Do, Can Know Forms	Meta Themes	Primary Themes	Secondary Themes
	Meta Forms	Primary Forms	Secondary Forms
	e.g. here, near, everywhere	e.g. sustainability, inclusivity, ...	e.g. food, music, news sources, ...
Tables 1,3	Table 1	Tables 1,5	Table 5

Table 2. Imposed and Emergent Themes

about the school of thought and style at our school of design within our program of interaction design. We propose a way to frame the projects in order to understand the nature and trends in the content. Our framing and reflective analysis yields an emergent characterization and classification of the actual content of the collection of projects. This characterization and classification is useful as a lens with which others can understand their own collection of projects. It is also useful as a catalogue of inspirations and prompts for other designers and programs and practices. Finally, we are also proposing a way to understand how the content of a school's designs contribute to its school of thought. In particular, we illustrate how sustainability design values and approaches are positioned in the overall map of the 101 open-topic design projects, in reflecting the trend of the past 6 years' school of thought among our designers.

In this paper, we classify the collection of projects in our program by imposing the three-element frame stated in the title, namely *Should Do*, *Can Do*, and *Can Know*. This imposed framing allows us to characterize whole projects and our collection of projects as a whole in terms of (a) the values and vision they embody and entail—that which designers believe they *Should Do* as matters of conscience, (b) the concepts and approaches they achieve—that which designers enact as a matter of what they *Can Do* as matters of ontological design, and (c) the knowledge required to allow designers to do what they *Should Do*—that which designers *Can Know*, as matters of Art and science and epistemology. We explain and attribute the origins of this frame later in the paper. In addition to this three-element frame, we also characterize the *Forms* these projects signify and prototype as designs.

What emerges from our tagging according to this frame—the analysis of our collection of projects organized by our analytic frame—is a classification of our collection over these past six years of our program. We labeled each project based on its documentation with a descriptive phrase for each element of the analytic frame. We call these leaf-level labels secondary themes. For each element of the analytic frame, we were able to provide an emergent meta theme and twig-level primary themes from an accounting for each project of these leaf-level secondary themes.

Analytic Frame	Common Names	Common Design Triangle	First-order Transdisciplinary Design
Should Do	Motivations Vision Predispositions Values	Desirable	What we must do (Values level)
Can Do	Concepts Approaches Strategies	Viable	What we want to do (Normative level)
Can Know	Domain-knowledge	Feasible	What we are capable of doing (Pragmatic level)
			What exists (Empirical level)

Table 3. Derivation of the Analytic Frame

The meta themes and primary themes are presented in Table 1. The meta themes, primary themes, and secondary themes emerged as strict hierarchies, except in the case of the *Should Do* analytic frame element, where the meta theme of *here, near, and everywhere* emerged as a partial hierarchical structuring of its constituent primary and secondary themes. This is explained more fully below and in Diagram 1 (p.5). Table 1 appears on the first page as a summary of some important takeaways from this paper. We refer to this table often in what follows and explain how it was constructed and its utility. Table 2 charts the terminology we use.

This paper is organized in three main sections. In the first section which includes this introduction, we describe our method and limitations, origins and attributions for our analytic frame—*Should Do*, *Can Do*, and *Can Know*, and finally an accounting of additional essential background. In the second section, we describe our analysis and emergent classifications in individual subsections devoted to each of the elements of the analytic frame, as well as to project *Forms*. In this second section, we pay particular attention to measured trends and speculative reflections about why the designers chose to do what they did. In the third and final section, we argue for the utility of the analytic frame as a general tool, describe how the emergent classifications may be used as points of inspiration for others, and finally point to future analyses, including alternative ways of looking at our collection in an ongoing and rolling manner as new projects are added. Also in this final section, we consider how a school of thought of interaction design at a school of design that may be compared with other schools of thought at other schools of interaction design whether design-centered programs or HCI-centered programs or other related collectives.

Method and Limitations

Our analysis involves 101 projects over 6 years of running the program. The method may be described as comparative qualitative analysis, more specifically thematic analysis. It may also be understood as reflective design theory. As such, there are limitations to this analysis compared to studies which commission

outsider, independent coders. Our methodology is similar to that employed by Hassenzahl et al. [23].

Limitations notwithstanding, the methodological approach does reflect the structure of the program. In the program, each designer is assigned two faculty advisors. One advisor—the general advisor—oversees all projects, meeting with each designer once per week over the 10-week project period. Other advisors—the individual advisors—oversee a subset of designers, from as few as 1 to as many as 6 per year. The organization is designed to ensure that one faculty is aware in broad overview of everything that is going on, while others are responsible for individual depth. All faculty meet and discuss the designer's project at the individual level from time to time. All of the faculty who advised designers in 2018 except one are the authors of this paper. 3 of the 5 authors, i.e. the general advisor and two of the individual advisors, have served since and including the first class graduating in 2013.

In keeping with this organization, all 101 projects were classified and labelled primarily by the general advisor, who is the one in the best position to understand all projects in relation one to another. The labels and their structure were carefully checked and revised by the other individual advisors who are co-authors of this paper. We followed a process that is illustrated with three project examples in the section Emergent Classifications below. We arrived at the labels together by close review of each project's documentation, based on our close familiarity with the projects, and by consensus among all authors about how to interpret the most salient emphasis of each designer's own account. Clearly there are some limitations to this method. Because the general advisor has influenced all projects, there are limitations to making claims about the independence of designer choices about what they *Should Do*, *Can Do*, and *Can Know*. Similarly, the designers are influenced by their individual advisors and all advisors may have influenced the project *Forms*. Nevertheless, the designers do have total control in their decision making.

Should Do, Can Do, Can Know

The analytic design frame we have used in our analysis and described above is inspired by and related to prior work in HCI and beyond. Table 3 describes these inspirations.

The second column shows some common names associated with each of the three analytic frame elements. *Should Do* refers to motivations, vision, predispositions, and/or values. *Can Do* refers to concepts, approaches, and/or strategies. *Can Know* refers to domain knowledge. These common names are pervasive in HCI and interaction design.

About *Should Do*, we can point to a strong inspiration in the notion of Value Sensitive Design (VSD) due to Friedman et al. [15] [16] who pioneered the idea that values are an integral and intrinsic part of design in HCI. [vsdesign.org] states "*Value sensitive design seeks to provide theory and method to account for human values in a principled and systematic manner throughout the design process.*" In our curriculum, project level statements about *Should Do* take the form of vision statements as described in Hekkert and

Van Dijk [24]—required reading for our designers and clearly an influence over their design process and planning.

The third column shows what we are calling the common design triangle. Here, *Should Do* relates to what is desirable. *Can Do* relates to what is viable. *Can Know* relates to what is feasible. This triangle of design thinking appears recently in Brown [11] without further attribution. It is pervasive in design and hard to trace in origins. It may owe to multiple perspective analysis due to Bowonder [10] and Linstone [30]. It has appeared in curricula at ID-IIT where it was likely introduced by Larry Keeley and in curricula at CMU Design where it was likely introduced by Shelly Evensen.

Should Do, Can Do, Can Know may also be understood as a simplification of transdisciplinary design theory. That is the fourth column. The dotted line denotes that the four-place framing of first-order transdisciplinary design theory maps onto our analytic frame, but not in a way that is one to one. Transdisciplinary design theory origins with Max-Neef [33] and Nicolescu [35]. It is represented in HCI by Blevis et al. [8] [9], Rogers [40], Rogers et al. [41], and perhaps elsewhere. It is not necessary to understand transdisciplinary design theory to understand our analytic frame. However, it is important to note that *Should Do, Can Do, Can Know* is an analytic frame that enables us to transcend constrained notions of disciplinary boundaries. That is a design perspective that we take as an integral part of our school of thought. Many others may also do so.

Other Background

Recent years have seen a range of design methods or frames created for designing for values including human ("user") values, social values and cultural values. Vermaas et al. [45]:192 discuss a series of design methods—at a higher, methodological level—that have been used in design for values. They illustrate Participatory Design and Vision in Product Design as two different approaches to design for values, as well as Transformation Design and Social Implication Design as the respective extensions of the former two approaches used for social design. All four design methods are described as procedures to which designers can adhere. The designer needs to be able to "*consider both social and [']user['] values and explicitly reason about them*" and it is up to them how to address these values. In another prominent approach, Friedman et al. [15] surveys 14 design or design research methods and/or techniques, such as *Stakeholder Analysis*, *Value Scenario*, and *Value Sensitive Action-Reflection Model*. Together with strategies and heuristics, the set of 14 methods equip designers with a design toolbox that helps solve different problems along the design process, including identifying values for stakeholders.

We have already described the connection of *Should Do* to values orientation in HCI. Our designers are also engaged in making interaction designs—physical, strategic, virtual or combinations. As such, the politics of making and the values they entail are well represented in HCI (e.g. Avle & Lindtner [2], Bardzell et al. [3], Lindtner et al. [31]). We feature sustainability in this paper. Many of the topics that our designers take up with respect to sustainability

are also well represented in HCI (e.g. *Social Justice*: Bates et al. [4] Joshi & Cerrato Pargman [26] ; *Blockchain*: Baytas et al. [5] ; *Respect*: Blevis [7] ; *Food*: Clear et al. [12] , Comber & Thieme [13] , Thieme et al. [43] ; *Scale*: Hazas et al. [22] ; *Disruption*: Knowles et al. [27] [28] [29] ; *Fashion*: Pan et al. [36] ; *Teaching*: Pargman & Eriksson [38] in Hazas & Nathan [21] ; *Energy and digital infrastructure*: Preist et al. [39] , Simm et al. [42]). Design theory also plays a role in motivating our designers' work related to sustainability in particular and designer values in general (e.g. *Structure-preserving transformations*: Alexander [1] ; *Behavioral change*: Bharna et al. [6] , Midden et al. [34] ; *Futuring, particularly redirective practice*: Fry [18] [19] [20] ; *Vision statements*: Hekkert & Van Dijk [45] ; *Design politics*: Ekbja & Nardi [14] , Heskett [25] , Margolin [32] , Papanek [37]). The tradition of emphasizing designer's values in CS is actually quite long if not sparser than some other areas of CS (e.g. Winograd [46] , Winograd & Flores [47]).

Another line of reflective research draw strategies from analysis of design artifacts, which can embody a wide variety of values. Drawing from the domain of HCI and Interaction Design and focusing on *experiential value* in design, Hassenzahl et al. [23] reviewed 143 published artifacts—including design concepts and technologies—that address people's feelings of relatedness in close relationships. The outcome was a collection of six broad design strategies to create a non-verbal experience of relatedness: *awareness, expressivity, physicalness, gift giving, joint action, and memories*. Just as Hassenzahl et al. see the collection of the strategies as inspirations of and starting points to experience-oriented design, the result of our reflective analysis of 101 design projects can serve as a source of inspiration for other design programs and practices.

EMERGENT CLASSIFICATIONS

Three Examples

It is helpful to begin with a few examples. We have chosen to describe three projects in Table 4. These are chosen in part because they are particularly excellent projects in our view, and also because they are all sustainability themed projects which we wish to feature in this reporting. Importantly, there are many other projects we may choose, and we will in future reporting beyond this paper. All 101 projects were tagged in the same way illustrated in the table, but of course there is not room to present the entire analysis of 1,515 tags (101 project rows * 15 classification columns) in this paper format.

The letters in the second column of the table denote the order in which we constructed the complete table. Accordingly, we started by listing all projects by year and title as step A.

Next, based on a careful reading of the project materials—particularly the reports which vary from 20-100 pages, we tagged the primary and secondary *Should Do* themes in step B. For project E1 *Clutter to Ensoulment*, the designer clearly situates her work as sustainability. Her work promotes reuse over disposal most prominently. For project E2 *Distributed Ledger Technology* (DLT),

		Project E1	Project E2	Project E3
Year	A	2014	2018	2018
Project	A	<i>Clutter to Ensoulment by Rhiddi Shah</i>	<i>Distributed Ledger Technology by Dustin Stupp</i>	<i>Owners of Clothing by TJ Trisnadi</i>
Should Do Meta Theme	F	Everywhere	Everywhere	Everywhere
Should Do (Vision, Motivation)	B	Sustainability	Sustainability	Sustainability
Secondary Should Do	B	Reuse	Trustless systems	Fashion
Can Do Meta-Structure 2nd Order	G	Change	Change	Change
Can Do Meta Theme	F	Disrupt	Persuade	Disrupt
Can Do (Concept, Approach, Strategy)	C	Redirective practice	Promote awareness	Redirective practice
Secondary Can Do	C	Free-cycling in place of disposal	Public/ distributed ledger technologies, blockchain	Provenance
Can Know Meta Theme	F	Measurements	Measurements	Collections
Can Know (Domain knowledge)	D	Amount and quality	Amount and quality	Inventory
Secondary Can Know	D	Things of value to others	Energy use	Clothing
Forms Meta Theme	F	Physical	Physical	Strategic
Forms	E	Installation	Installation	Service
Secondary Forms	E	Free-cycling public sculpture	Public sculpture	Smart tagging

Table 4. Classification of Three Example Sustainability Themed Projects

the designer's primary focus is also sustainability with an emphasis on the trustless property of such systems. For project E3 *Owners of Clothing*, the designer's primary focus is also on sustainability with an emphasis on the role of fashion—especially fast fashion—in promoting unsustainable behaviors.

Continuing with step C, we tagged the primary and secondary *Can Do* themes. For project E1, the designer uses a strategy of redirective practice to try to get people to free-cycle things they no longer need, rather than dispose of them. The designer of project E2 used an approach of promoting awareness to make it easier for

people to understand the operational semantics of blockchain—a type of DLT. By specializing on blockchain implementations of DLT, the designer's focus shifted from the trustless character of DLT's to the wholly unsustainable energy use associated with particularly cryptocurrency applications of the technology. For project E3, the designer also used a strategy of redirective practice by trying to see if associating provenance—the history of things, particularly ownership—with clothing could foster less consumption of brand new things, and more reuse.

Next, we looked at primary and secondary *Can Know* themes in step D. The designer of project E1 focused on what kind of things people would be willing to free-cycle rather than discard, and particularly the amount and quality of these things. She also focused on what kinds of things others would value. For project E2, the designer focused on the amount of energy used by DLTs—particularly cryptocurrencies—as a matter of unsustainable and wasteful resource use. For project E3, the designer focused on the collections of clothing that allow individual owners to cherish and personalize in a curatorial way—we use the tag inventory for this kind of collection, rather than an amount and quality of measurement.

Continuing with step E, we tagged primary and secondary *Forms*. For project E1, the designer created an installation in the form of a public sculpture designed to promote free-cycling. The sculpture consists of three bins that change balance as free-cycling artifacts are added or adopted. The change in balance of the sculpture is accentuated by lights mimicking the action of a ball rolling in reaction to these changes in tilt. For project E2, the designer also created an installation that creates a physical visualization of how DLTs—particular blockchains—work. This public installation uses soil to denote energy, a slow moving conveyor belt to denote time, and an extraction apparatus to denote mining and construction of blocks. For project E3, the designer created a service that uses smart tagging and hangers with built-in displays to provide access to timelines denoting the provenance of particular items of clothing.

As step F, we looked at the primary themes for each of the analytic frame elements to see if they could be further classified into broader categories. In terms of the *Should Do* Meta Themes, all three projects targeted large scale change—we tag them everywhere. In terms of the *Can Do* Meta Themes, projects E1 and E3 targeted disruption of current practices by substituting more sustainable ones. E2 targeted persuasion, by trying to make an unsustainable use of energy more visible. In terms of *Can Know* Meta Themes, E1 and E2 focus on measurements in terms of the amount and quality of free-cyclable objects and energy use respectfully. E3 focuses on collections as we describe above. In terms of *Forms* Meta Themes, E1 and E2 are both physical in form. E3, while it has physical and digital forms, is primarily a strategic service.

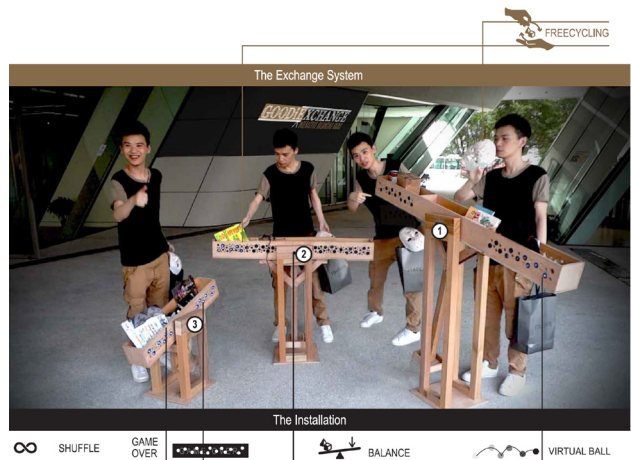
Finally in step G, we noticed that our *Can Do* Meta Themes may be further classified into two main groups, namely change or preserve. All of our examples in this section fall within the change classification.



Owners of Clothing by TJ Trisnadi



Distributed Ledger Technology by Dustin Stupp



Clutter to Ensoulment by Rhiddi Shah

Figure 1. Three Sustainability Themed Projects, E3 (top) E2 (middle) E1 (bottom).

	Connecting people	Improving health	Industry	Maintain social order	Personal development	Preserve cultural heritage	Sustainability	Grand Total
Secondary Should Do Themes								
Active ageing		1						1
Activities for the elderly	1			1				2
Adaptation to air quality						1		1
Air quality		1						1
Animal well-being						1		1
Art appreciation				1				1
Balance (at home)		1						1
Balance (at work)		2						2
Blind and low sighted			1					1
Blind and low sighted students			1					1
Budget				1				1
Celebrate landmarks					1			1
Cognitive off-loading				1				1
Cooking at home						1		1
Crafts				2	1			3
Day to day behaviors						1		1
Dialects					1			1
Discourage bad driving			1					1
Distance relationships	1							1
Eating alone				1				1
Empty nesters	1							1
Energy						1		1
Exercise		1		1				2
Exercise (groups)		1						1
Exercise (public)		1						1
Farming				1				1
Fashion						2		2
Fireworks and sky lamps					1			1
Food	1	1						2
Future self				1				1
Gender equality			1					1
Goal setting				1				1
Growing	1							1
Healthy home cooking	1							1
Housing						1		1
Information access				1				1
Language				1	1			2
Living						1		1
Locals and nonlocals	2					1		3
Marital harmony			1					1
Medicine		2						2
Memories		1						1
Mitigate seasonal affective disorder				1				1
Music performance				1				1
News sources			1					1
Nostalgia	1				1			2
Online/Offline balance				3				3
Overcome depression		1						1
Overcoming procrastination				1				1
Photography	1				1			2
Poetry					1			1
Presentation skills				1				1
Programming				1				1
Public transportation safety			1					1
Reading				1				1
Relationships balance	1							1
Relocation	2							2
Reuse						1		1
Roommates			1					1
Safe driving				1				1
Scheduling				1				1
Seafood						1		1
Self-sufficiency				1				1
Sharing	1							1
Sleep		4						4
Sports				1				1
Student cohorts and alumni	1							1
Students and resources	1							1
Support bereavement		1			1			2
Transportation						1		1
Travel	1			2				3
Trustless systems						1		1
Understanding anosmia		1						1
Understanding anxiety		1						1
Understanding depression		1						1
Understanding personality				1				1
Urban cycling						1		1
Usable security			1					1
Volunteers and the elderly	1							1
Grand Total	18	21	3	6	29	10	14	101

Table 5. Primary and Secondary *Should Do* Themes

Should Do Primary and Secondary Themes

The notion of *Should Do* is one of vision, motivation, or predispositions. *Should Do* relates to desirability, which may be individually based on altruistic values or pragmatic personal concerns or any other notions of what matters. When asked to choose a project theme without restriction, what themes do our designers choose? What do they think matters? What *should* they do?

Early on, we have already introduced the *Should Do* analytic frame element and its meta themes, primary themes, and secondary themes, as well as the method we used to assign themes through three examples. In this section, we present additional details and reflections.

Table 5 shows the leaf-level secondary *Should Do* themes that we assigned to each of the 101 projects, in relation to the emergent primary *Should Do* themes, which demonstrates a large variety. This is expected since designers naturally try to find their own thematic area in order to set their work apart from others. In Table 5, we can also see that there are several places in which projects with the same secondary theme were classified with different primary themes. This is not surprising given how complex the projects are and how individual designers may have different perspectives on the values that motivate their projects, even when the project level themes are the same.

Here, Near, & Everywhere

We have also explained in the introduction that per Table 1, *Should Do* meta themes *here*, *near*, & *everywhere* are not strictly hierarchical with respect to the *Should Do* primary themes. This is made visible clearly in Diagram 1. *Here*, *near*, & *everywhere* relate to the scale of focus of each project. By *scale of focus*, we mean to characterize the projects according to emphases ranging from the personal level to the community level to global levels. This is not the same as physical proximity. For example, a project connecting parents and children at a distance is classified with primary *Should Do* theme *connecting people* and meta theme tag *near*. We may think of *here*, *near*, and *everywhere* as referring to proximity of awareness.

By *here*, we mean personal scale of focus—that is things close around me, personal issues. This includes most projects with primary *Should Do* themes *personal development* and *improving health*. The majority—not all—of these projects focus on the scale of self—that is, my personal development rather than others, my health more than the public health. From Diagram 1, we can see that among projects classified as *improving health*, a very few are more about global health than individual health, more about *everywhere* than *here*, respectively.

By *near*, we mean community level scale of focus—that is things where I live and things close to me: relationships, community, and society. This includes most projects with primary *Should Do* themes *connecting people*—the issues facing friends, family, and

strangers, *maintaining social order*—for example, driving politely or maintaining a good marriage, and *inclusivity*—for example supporting low and non-sighted people because that is mostly an issue of supporting local community that varies greatly from one community to another.

By *everywhere*, we mean global and environmental scale of focus—that is things everywhere, national and international and global issues. This includes all projects with primary *Should Do* themes *preserve cultural heritage* and most projects with *sustainability* themes.

Sustainability and Here, Near, & Everywhere

Per Diagram 1 and as explained above, scale of focus is highly but not wholly related to the primary *Should Do* themes. It is sufficient to note that the primary *Should Do* themes represent a continuum of scales of focus from *here* to *near* to *everywhere*, rather than discrete categories. We speculate that the more a designer thinks about scale in larger terms, the more her work is likely to be motivated explicitly by notions of sustainability.

From Diagram 2, we can see a growing interest in sustainability over the most recent years, though sustainability is not the only *Should Do* theme our designers chose. Diagram 3 adds to this by considering only the *Should Do* meta theme over years. We can see in early years, fewer projects engaged the everywhere scale. In later years, there is more polarization ending with nearly equal distribution between here—the focus on the scale of the personal and everywhere—the focus on the scale of the national or global, and the middle near—the focus on the scale of community—is squeezed between these two.

Can Do

The notion of *Can Do* is one of design concept, approach, or strategy. It is about the designer's angle from which she approaches the design context and reflects her ontological view of the entities existing in relation to each other in the design space. For example, a *Can Do* theme *match interests* empowers people of different groups in the community through connection, whereas *motivate with metaphor* uses people's cognitive facility with metaphor to understand current situations with new perspectives, leading to new actions.

Emergent from our analysis, there are two levels of meta themes for *Can Do* (Table 1 and Diagram 4). The *Can Do* themes are ordered on a gradual scale where the extent of changes induced by design strategies increases. These range from organizing or connecting people in current situations to creating services that persuade people to change or that disrupt incumbent forms—that is, from *organize* to *connect* to *persuade* to *disrupt*. These strategies range over two approaches at the top level, namely *preserve* and *change*. From preservation to change is a continuous spectrum of possible design approaches. To understand this better, we may appeal to Christopher Alexander's classic notion of structure-preserving transformations [1], since it combines features of preservation with features of change. Alexander models this combination after nature's intrinsically zero-waste systems. He



Diagram 1. Here, Near, & Everywhere by Primary Should Do Themes

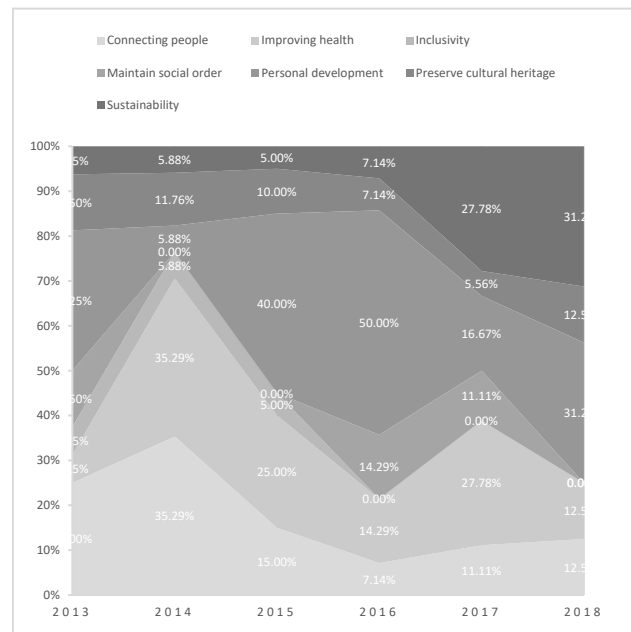


Diagram 2. Primary Should Do Themes by Year

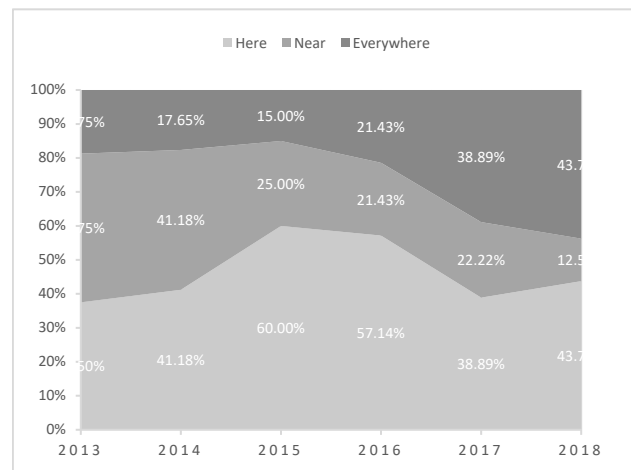


Diagram 3. Here, Near, & Everywhere by Year

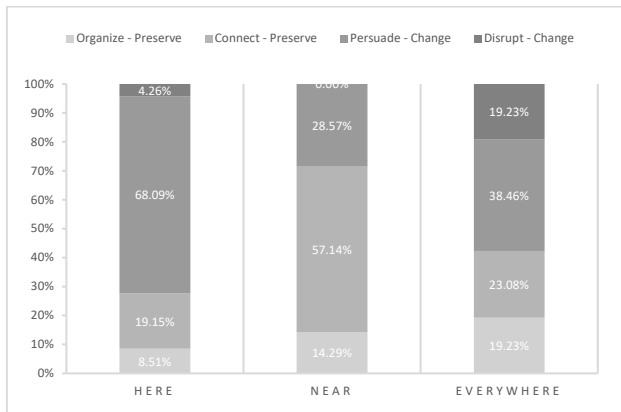


Diagram 4. Can Do Meta Themes by Here, Near, & Everywhere

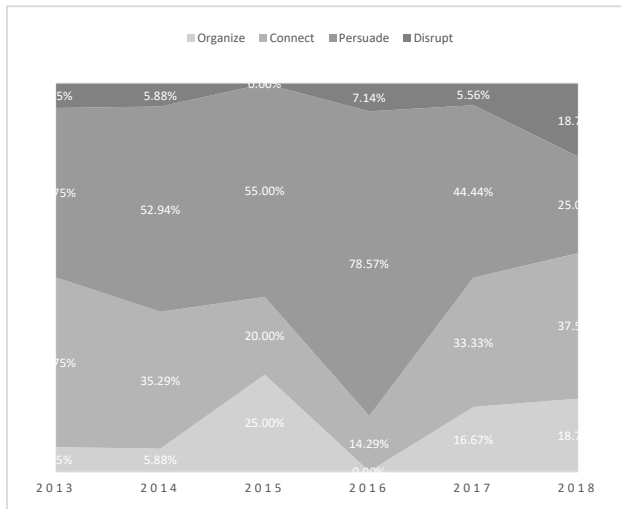


Diagram 5. Can Do Meta Themes by Year

states that built environment is best when it changes over time organically, preserving the best existing structure while changing to adapt to current needs. Thus, as in Alexander's account, both preservation and change may be strategies for sustainable practices.

Looking at Diagram 5, we can see that except in 2016, preservation is nearly as popular as change. Within preservation, connecting is generally more common than organizing, except in 2015. Within change, persuasion is everywhere more common than disruption. In the latest year of the project collection, appealing to disruption as a design strategy was popular among our designers. We can speculate that the more that certain aspects of present situations are perceived as unsustainable by large numbers of people (e.g. food sources—particularly fisheries, fast fashion, and private transportation), the more that disruption appeals as a strategy and the more that the marketplace is receptive to such strategies. When things are not yet perceived by large enough numbers of people as unsustainable (e.g. adaptation to poor air quality, energy use for speculation instead of essential needs), persuasion may be more favored. Persuasion as a strategy is common among institutional entrepreneurs (see Thornton et al. [44])

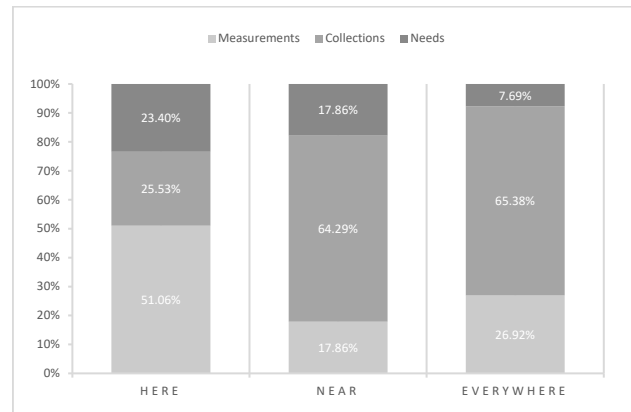


Diagram 6. Can Know Meta Themes by Here, Near, & Everywhere

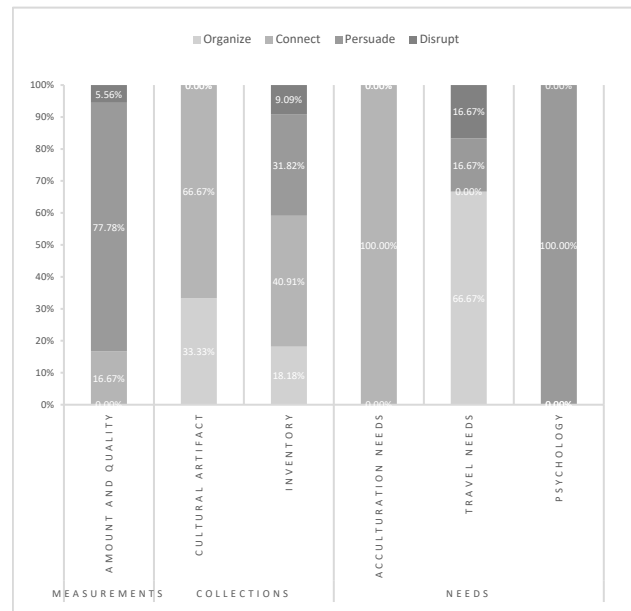


Diagram 7. Can Do Meta Themes by Can Know Meta & Primary Themes

In relating *Can Do* to *Should Do* (Diagram 4), we noticed that the *preservation* is more popular when designers focus on *near* scales of focus. When focusing on *here* or *everywhere*, *change* is more popular. This may suggest that designers and the people who concern them are more likely to have a more positive attitude towards their communities and other near relationships, preferring them the way they are. Further, designers who focus on personal issues or larger societal, national, or global issues are less satisfied with the status quo.

Can Know

The notion of *Can Know* is the notion of the domain knowledge a designer needs to acquire in order to support the *Can Do* themes she wants to do, according to the *Should Do* themes she cares about. For *Can Know*, the primary themes that emerged from our tagging

are *amount and quality*, *cultural artifacts*, *inventories*, *acculturation needs*, *travel needs*, and *psychology*. Clearly, these are not the only domains of knowledge. It is interesting in-and-of-itself that these themes characterize the formal knowledge that our designers use to scaffold their designs. Three meta themes emerged, namely *measurements*, *collections*, and *needs*. By *measurements*, we mean that the design depends most centrally on domain knowledge that is largely quantitative (e.g. air quality, daylight, energy use). By *collections*, we mean that the design depends most centrally on domain knowledge that is largely embodied in a collection of things—most likely curated in some way (e.g. clothing collections, crafts, photographs). By *needs*, we mean that the design depends most centrally on domain knowledge about providing a service to people (e.g. personality assessment, mental health, travel plans).

In Diagram 6, the larger preference for *here* themes with measurement domain knowledge may be related in some ways to trends like *quantifiable me*, and other very personal metrics. The larger preferences for *near* and *everywhere* themes for collections domain knowledge may be an artifact of a preference by designers for collections as an aesthetic form of knowledge and interests over measurements as a scientific form of knowledge and interests. That is, many designers are more inclined towards Art and aesthetics than to sciences, including social sciences, as a matter of the skill sets they have that prompted them to become designers in the first place. Our example of E2 above—the DLT Systems project—is a good example of a counter-example to this speculation.

In relating *Can Know* to *Can Do* (Diagram 7), we do not notice any patterns, except for three interesting yet possibly self-evident observations. First, for *cultural artifacts* (N=11), all designers adopted a *preserve* approach—that is, *organize* and *connect*. This shows a consistent positive attitude towards sustaining culture by valuing the cultural artifacts. Second, for projects involving *psychology* (N=7) *Can Know*, which is under the meta theme *needs*, all designers adopted a *change* attitude towards the *Can Do* and more specifically used a *persuade* approach. This *may* show that our designers were very careful when it comes to addressing people's psychological needs, by choosing a gentler way—i.e., *persuade* rather than *disrupt*—to help their stakeholders feel better about or for themselves. Third, for *acculturation needs* (N=5), all designers adopted a *preserve*, specifically *connect* approach. This *may* show that our designers understand acculturation as an act of preservation accomplished by means of fostering understandings through connecting people. These projects focus on connecting people from different situations or backgrounds together in order to prompt them to value one another.

Forms

Since our designers are interaction designers, it is not surprising that most of the projects focus on virtual forms as in Diagrams 8 and 9. Moreover, every project integrates some aspect of virtual form, even when virtual form is not the main focus. Some projects focus on strategic design, but only a few. Quite a few projects do focus on physical forms. The facilities and expert help available for

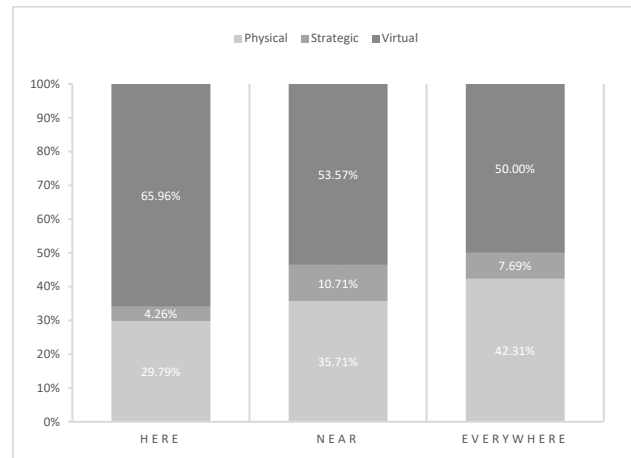


Diagram 8. Meta Forms by Here, Near, & Everywhere

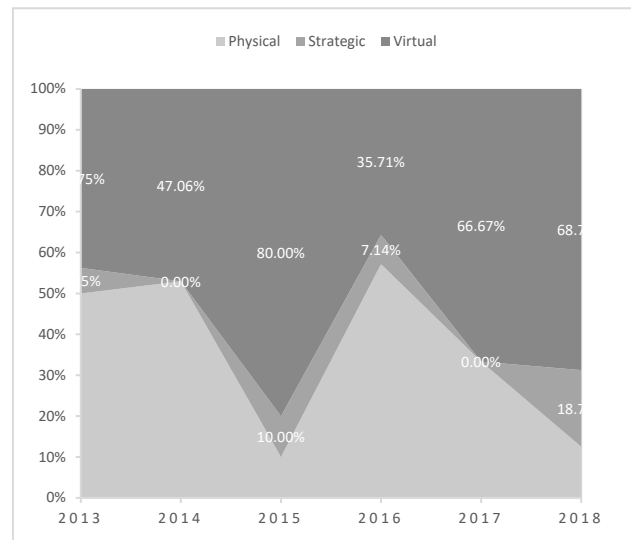


Diagram 9. Meta Forms Themes by Year

making physical forms at our school are quite good, and as good as the expert help available for making virtual forms. So, these choices are entirely the made by the designers.

The more our designers focused on *here*—that is, the scale of the personal—the more likely they were to focus on virtual form. This is not a big effect. The more our designers focused on *near* and *everywhere*—that is, the larger scales—the more likely they were to choose physical or strategic forms. Again, this is not a big effect.

SUMMARY

We arrived at several layers of emergent themes by applying an analytic frame to classify 101 design projects produced over six years in our program. We based our classification on experience with these projects, as well as a thorough review of documentation—ranging from 20-100 pages, prototypes—ranging from medium to high fidelity, and visual media (i.e. posters and videos). We privileged sustainability in our reporting here.

School of Thought

We claim that our understanding reported here is sound. We are not claiming in any way that our understanding is complete. Many other analyses and thematic classifications are possible. For example, the *Should Do* meta themes *here*, *near*, and *everywhere* are a sound and interesting classification of the primary and secondary *Should Do* themes. However, there may be other ways to look at the values entailed in these projects. To illustrate, some may understand that all of the primary *Should Do* themes are matters of sustainability. If adopting this understanding, we might characterize the meta *Should Do* themes as relating to the stated epistemological commitments of each designer towards sustainability, rather than scale of focus as in *here*, *near*, and *everywhere*. By contrast, some could argue that all of the primary *Should Do* themes are matters of economic opportunity. If adopting this understanding, we might characterize the meta *Should Do* themes differently. Our school of thought tends to emphasize the sustainability perspective. Some designers embrace this perspective more than some others.

Likewise, the *Can Do* meta themes of *preserve*—sub themes *organize* and *connect*—and *change*—sub themes *persuade* and *disrupt*—are sound descriptions of the strategies and approaches our designers choose when deciding to what to do. We have argued that from *preserve* to *change* is a continuum and moreover, after Christopher Alexander's [1] notion of *structure-preserving transformations*, we have argued that adopting a sustainability focus entails both preservation and change. That is another element of our school of thought.

About *Can Know* meta themes of *measurements*, *collections*, and *needs*, we believe that all these forms of domain knowledge are important considerations for designers. This seems obvious. Yet, choosing the skill sets to emphasize that provide access equally to these forms entails judgements about how to balance which specific skills designers are taught, which kinds of backgrounds are required by the program, and the kinds of roles that designers can undertake in their careers.

About *Forms* meta themes of *physical*, *strategic* and *virtual*, we believe that all of these are required of our designers as well. It is possibly common to imagine that the virtual is the primary form for interaction design; however, we believe that the virtual, physical, and strategic are all foundational competencies for designers in our school of thought.

Utility of the Frame

The analytic frame of *Should Do*, *Can Do*, and *Can Know* is a useful way to classify a large collection of design projects, because the frame allows for understanding the values and vision, approaches and concepts, and domain knowledge associated with the collection. Moreover, the frame is a useful guide for designers to use as a generative tool when deciding on these dimensions for the projects they undertake. Importantly, designers are not required to work from *Should Do* to *Can Do* to *Can Know* to *Forms*. These frame-elements may serve as prompts which may be applied and

revisited at various stages of design process. Notwithstanding, starting with *Should Do* is a strategy that privileges values and vision over pragmatics-first or technology-first or form-first approaches. In our school of thought, we value this values-first approach, requiring our designers to begin with meaningful statements of vision.

Utility of the Emergent Categories

The emergent categories articulated in Table 1 and then discussed throughout are useful guide for designers to use as a generative tool when deciding on different aspects of the projects they undertake. Using these categories is useful at various stages of design processes—for example, when circumstances permit a designer to choose her own design space, considering scale of focus in terms of *here*, *near*, and *everywhere* can help guide such decisions. The primary *Should Do* themes, namely *personal development*, *improving health*, *connecting people*, *maintaining social order*, *inclusivity*, *preserving cultural heritage*, and *sustainability* are sound—but not exhaustive—choices of prompts. In turn, when circumstances permit a designer to choose what to do, she can turn to top level notions from change to preserve to help guide her decision. The primary *Can Do* themes, namely *itinerary*, *annotate and link*, *combine with utility*, *distance collaboration*, *match interests*, *scaffold behaviors*, *motivate with metaphor*, *gamification*, *promote awareness*, *redirective practice*, and *subscription services* are likewise sound—but not exhaustive—choices of strategies. The emergent themes for *Can Know* and choice of forms are similarly motivated as decision guidance tools.

Future

We have set three goals for future work of this research.

First, we plan to expand our reporting by privileging other values aside from sustainability, for example experiential values. Comparison between different analyses based on different values will help enrich the utility of the frame and strengthen its theoretical rigor, so that it can better benefit other researchers.

Second, we hope to partner with other schools of design and programs in interaction design and/or HCI to see what emerges from a similar analysis of other project collections, and how this compares with ours. We already have one such partnership in the works. Such comparisons will enable us to construct broader theories about the nature of interaction design and HCI education.

Finally, we plan to continue rolling and ongoing analysis of the design projects undertaken at our school. We do not see *Should Do*, *Can Do*, *Can Know* as a static analytic frame, but rather remain open to new ways of framing our understandings of the content of our designers' projects. We are especially interested in working with others to advance general understandings and effectiveness of interaction design as a force for good.

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We gratefully acknowledge the reviewers and organizers of ACM Limits 2019, as well as the many designers whose work is discussed here.

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Appendix

Should Do, Can Do, Can Know

Sustainability and Other Reflections on One Hundred and One Interaction Design Projects

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Year	Project	Should Do Meta- Structure	Should Do (Vision, Motivation)	Secondary Should Do	Can Do Meta- Structure 2nd Order	Can Do Meta- Structure	Can Do (Concept, Approach, Strategy)	Secondary Can Do	Can Know Meta- Structure	Can Know (Domain knowledge)	Secondary Can Know	Forms Meta- Structure	Forms	Secondary Forms
2017	Fresh Fridge (Joann)	Here	Sustainability	Cooking at home	Preserve	Connect	Combine with utility Match interests	Smart fridge and grocery App Barter	Collections	Inventory	Recipes, groceries Housing	Virtual	Mobile app Service	Smart fridge
2018	Co-Living for Elderly and Exchange Student (Kelly)	Everywhere	Sustainability	Housing	Preserve	Connect			Collections	Inventory		Strategic		
2018	Adopting a Plant (Viola)	Everywhere	Sustainability	Living	Preserve	Connect	Match interests	Park plant nurseries and plant adopters Provenance	Collections	Inventory	Plants	Virtual	Mobile app	Service
2018	Owners of Cloths (TJ)	Everywhere	Sustainability	Fashion	Change	Disrupt	Redirective practice		Collections	Inventory	Clothing	Strategic	Service	Smart tagging
2017	Capsoclose: Try capsule wardrobe the new way (Jiahui)	Everywhere	Sustainability	Fashion	Change	Disrupt	Redirective practice	Cull wardrobe while preserving fashionability	Collections	Inventory	Clothing	Virtual	Mobile app	Intelligent hangers
2017	Symbiosis App (Bella)	Everywhere	Sustainability	Day to day behaviors	Change	Persuade	Motivate with metaphor	Link environmental well-being and individual behaviors	Collections	Inventory	Good behaviors	Virtual	Mobile app	
2017	Catalyst: How We Get People To Love Shelter Cats (Siqi)	Everywhere	Sustainability	Animal well-being	Preserve	Connect	Distance collaboration	Remote play	Measurements	Amount and quality	Human-animal interactions	Virtual	Mobile app	Telepresence, Robotics
2014	Clutter to Ensoulment (Riddhi)	Everywhere	Sustainability	Reuse	Change	Disrupt	Redirective practice	Free-cycling in place of disposal	Measurements	Amount and quality	Things of value to others	Physical	Installation	Free-cycling public sculpture
2016	Bring Sustainable Seafood into daily practice (Sunny)	Everywhere	Sustainability	Seafood	Change	Disrupt	Redirective practice	Promote sustainable food	Measurements	Amount and quality	Seafood	Physical	Installation	Grocery kiosk
2013	Unmasking Mask (Mick)	Everywhere	Sustainability	Adaptation to air quality	Change	Persuade	Promote awareness	Digital mask	Measurements	Amount and quality	PM2.5	Physical	Interactive product	Smart mask
2015	Domestic Energy Consumption (Horace)	Everywhere	Sustainability	Energy	Change	Persuade	Promote awareness	Mechanism of awareness	Measurements	Amount and quality	Energy use	Virtual	Desktop app	Home energy monitoring dashboard
2018	Distributed Ledger Technology (Dustin)	Everywhere	Sustainability	Trustless systems	Change	Persuade	Promote awareness	Public/distributed ledger technologies, blockchain	Measurements	Amount and quality	Energy use	Physical	Installation	
2018	Shared Autonomous Cars (Ritesh)	Everywhere	Sustainability	Transportation	Change	Disrupt	Subscription services	Sharing economy transportation	Needs	Travel needs		Virtual	Mobile app	Vehicle interior
2017	Better Me Bike Helmet (Kiyan)	Everywhere	Sustainability	Urban cycling	Change	Persuade	Motivate with metaphor	Treasure hunt and cycling	Needs	Travel needs	Cycling routes	Physical	Interactive product	Helmet, lights, tokens
2016	Wishlamp (Yao)	Everywhere	Preserve cultural heritage	Fireworks and sky lamps	Preserve	Connect	Combine with utility	From polluting forms to household objects	Collections	Cultural artifact	Celebration forms	Physical	Interactive product	Telepresence, Calligraphy lamps
2018	Tang Poetry (Cici)	Everywhere	Preserve cultural heritage	Poetry	Preserve	Connect	Combine with utility	Weather	Collections	Cultural artifact	Poetry	Virtual	Mobile app	
2013	Designing for Craft Connection (Haodan)	Everywhere	Preserve cultural heritage	Crafts	Preserve	Connect	Match interests	Rural artisans and urbanites	Collections	Inventory	Crafts and artisans	Physical	Installation	Service
2018	Herbal Tea and Culture (Holly)	Everywhere	Preserve cultural heritage	Locals and nonlocals	Preserve	Organize	Itinerary		Collections	Cultural artifact	Tea	Virtual	Mobile app	Mobile service

2017	Geometrical Hong Kong: An Immersive & Interactive Virtual Reality Tour (Shirley)	Everywhere	Preserve cultural heritage	Celebrate landmarks	Preserve	Organize	Annotate and link	Geometry and virtual heritage	Collections	Inventory	Landmarks	Virtual	Virtual reality app	Virtual reality content, and headset print materials, video
2015	Ours: Design for Retaining Chinese Dialects (Rachel)	Everywhere	Preserve cultural heritage	Language	Preserve	Organize	Annotate and link	Movies to dialects	Collections	Inventory	Movies, native speakers	Virtual	Mobile app	Dialect dubbers
2015	Digital Memorial Space (Wallace)	Everywhere	Preserve cultural heritage	Support bereavement	Preserve	Organize	Annotate and link	Artifacts associated with the deceased	Collections	Inventory	Personal artifacts	Physical	Installation	Virtual columbarium
2014	The Shanghai Dialect Game (Arno)	Everywhere	Preserve cultural heritage	Dialects	Change	Persuade	Gamification	Treasure hunt (parents and their children)	Collections	Inventory	Culturally significant locations	Physical	Installation	Cartoons
2013	Photo Turntable: Creating Digital and Tangible Photo Albums (Pu)	Everywhere	Preserve cultural heritage	Photography	Change	Persuade	Motivate with metaphor	Photographs and phonographs	Collections	Inventory	Photographs	Physical	Interactive product	Photodisc player, album cover printer, desktop app
2014	I Remember (Yeelog)	Everywhere	Preserve cultural heritage	Nostalgia	Change	Persuade	Promote awareness	Recreation of nostalgic environment	Collections	Inventory	Elements of historic environment	Physical	Installation	Talking bowls, authentic props, braille, double bottle opener
2017	To-Gather: Coordinate Activities for the Elderly (Donna)	Here	Personal development	Activities for the elderly	Preserve	Connect	Match interests	Activities	Collections	Inventory	Capabilities and needs	Virtual	Mobile app	
2018	Craftsman and Students (Emma)	Here	Personal development	Crafts	Preserve	Connect	Match interests	Craftspeople and students	Collections	Inventory	Craft projects	Virtual	Mobile app	Service
2017	ShareR: Sharing Delicacy Application (Yingtong)	Here	Personal development	Eating alone	Preserve	Connect	Match interests	Sharing food orders	Collections	Inventory	Participating restaurants	Virtual	Mobile app	
2015	Formerly: Design for Holiday Farming (Iris)	Here	Personal development	Farming	Preserve	Connect	Match interests	Farmers and holiday farmers	Collections	Inventory	Participating farms	Virtual	Mobile app	Service
2015	iQuestion (Mubarak)	Near	Personal development	Information access	Preserve	Connect	Match interests	Crowd-sourced questions and answers	Collections	Inventory	Questions and answers	Virtual	Mobile app	
2013	Internet Addiction (Jason)	Here	Personal development	Online/Offline balance	Change	Disrupt	Redirective practice	Social event alternatives to online time	Collections	Inventory	Offline events	Virtual	Web site	
2018	Handcraft and Zen (Claire)	Here	Personal development	Crafts	Change	Disrupt	Subscription services	DIY	Collections	Inventory	Craft projects	Virtual	Mobile app	Service
2015	Art Ring (Snowy)	Here	Personal development	Art appreciation	Preserve	Organize	Annotate and link	Gallery and print forms	Collections	Inventory	Art and explanations	Strategic	Service	Mobile App, print forms, QR codes
2017	Solar Plan: Micro Gains, Small Wins (Chloe)	Here	Personal development	Goal setting	Change	Persuade	Motivate with metaphor	Cultural heritage and personal schedule and goal setting	Collections	Inventory	Times of year and goals	Virtual	Mobile app	
2016	Design Process of Code Ground (Rock)	Here	Personal development	Programming	Change	Persuade	Motivate with metaphor	Tangible objects	Collections	Inventory	Program components	Physical	Interactive product	Tangible objects tabletop
2015	Peep: A Place for Everything and Everything a Place (Frances)	Here	Personal development	Cognitive off-loading	Change	Persuade	Scaffold behaviors	Help people remember where they put things	Collections	Inventory	Personal artifacts	Virtual	Mobile app	Sensor-enabled containers
2013	Nali: Book Tracking System (Venus)	Here	Personal development	Reading	Preserve	Connect	Match interests	Readers and books	Measurements	Amount and quality	Reading and book tracking	Virtual	Mobile app	

2015	Design for Novice Drivers (Johnson)	Here	Personal development	Safe driving	Preserve	Connect	Match interests	Driving students and instructors	Measurements	Amount and quality	Driving behaviors	Virtual	Mobile app	OBD II device, heads up display
2015	Budget Cuckoo (Cecilia)	Here	Personal development	Budget	Change	Persuade	Motivate with metaphor	Mechanism of awareness	Measurements	Amount and quality	Resources and spending	Virtual	Mobile app	Budgets, dollars to hours worked
2013	The Jar of Sunshine (Cheryl)	Here	Personal development	Mitigate seasonal affective disorder	Change	Persuade	Motivate with metaphor	Mood and sunshine	Measurements	Amount and quality	Daylight	Physical	Interactive product	Jar, broch, website, color choices
2016	Mindfulness Tea Set: Steeped in Flow (Priscilla)	Here	Personal development	Online/Offline balance	Change	Persuade	Motivate with metaphor	Tea break	Measurements	Amount and quality	Online vs offline time	Physical	Interactive product	Mechanism of awareness
2014	Bacteria Battle (Huan)	Here	Personal development	Overcoming procrastination	Change	Persuade	Motivate with metaphor	Good and bad bacteria, good and bad work habits	Measurements	Amount and quality	Work time and leisure time activities	Virtual	Mobile app	
2016	Shapin' Up (Theo)	Here	Personal development	Exercise	Change	Persuade	Scaffold behaviors	Mechanism of awareness	Measurements	Amount and quality	Facial measurements	Virtual	Mobile app	Magic Mirror
2016	Phonogram: Interactive Music Practicing Device (Daisy)	Here	Personal development	Music performance	Change	Persuade	Scaffold behaviors	Music practice device	Measurements	Amount and quality	Practice	Physical	Interactive product	Phonograph form
2016	Raeye: Your Personal Advisor to get You off Your Screen (Denny)	Here	Personal development	Online/Offline balance	Change	Persuade	Scaffold behaviors	Chaotic and harmonious sculptural movement	Measurements	Amount and quality	Online vs offline time	Physical	Interactive product	Kinetic sculpture
2016	Presentation Practice System (Chang-hui)	Here	Personal development	Presentation skills	Change	Persuade	Scaffold behaviors	Presentation practice system	Measurements	Amount and quality	Practice	Virtual	Desktop app	
2016	Team(m)an Getting Work Done before Deadlines (Yuxi)	Here	Personal development	Scheduling	Change	Persuade	Scaffold behaviors	Share schedule	Measurements	Amount and quality		Virtual	Mobile app	
2013	Ouch Tennis Kit (Sara)	Here	Personal development	Sports	Change	Persuade	Scaffold behaviors	Bio-feedback tools	Measurements	Amount and quality		Physical	Interactive product	Wearable sports equipment, sensors, web site
2013	Character Discovery (Xiao)	Here	Personal development	Language	Preserve	Connect	Combine with utility	Travel and learning local language	Needs	Acculturation needs		Virtual	Mobile app	Public maps, QR codes
2018	Travel Alone (Leah)	Here	Personal development	Self-sufficiency	Preserve	Organize	Itinerary		Needs	Travel needs		Virtual	Mobile app	Augmented reality
2018	Itinerary Planning for Time Constrained People (Qadeer)	Here	Personal development	Travel	Preserve	Organize	Itinerary		Needs	Travel needs		Virtual	Mobile app	
2015	Clementine (Billy)	Here	Personal development	Travel	Preserve	Organize	Itinerary		Needs	Travel needs		Virtual	Mobile app	
2018	Solitude (Past me & Future me) (Lana)	Here	Personal development	Future self	Change	Persuade	Motivate with metaphor	Messages to future self	Needs	Psychology	Self-assessment	Virtual	Mobile app	Diary App
2015	The Wizard World: Magic Place to Decode Personality (Glory)	Here	Personal development	Understanding personality	Change	Persuade	Promote awareness	Personality assessment tool	Needs	Psychology	Personality frames	Virtual	Mobile app	
2017	JT Robot: Roommates Manager (Yuki)	Near	Maintain social order	Roommates	Preserve	Connect	Match interests	Roommates and tasks	Collections	Inventory	Household tasks	Physical	Interactive product	Robot, AI, speech
2017	Beyond Your Borders: Hearing The Controversies	Everywhere	Maintain social order	News sources	Change	Persuade	Promote awareness	Diversifying news aggregator algorithms	Collections	Inventory	News sources	Virtual	Web site	Multi-faceted news aggregator

2013	Across The World (Qinglin) Drowsy Bus Driver (Hong)	Near	Maintain social order	Public transportation safety	Preserve	Connect	Combine with utility	Bus drivers, communications, images of traffic conditions	Measurements	Amount and quality		Physical	Interactive product	Image capture and sharing
2016	Marriage Tree & Marriage Minder (Weiyi)	Near	Maintain social order	Marital harmony	Change	Persuade	Motivate with metaphor	Mechanism of awareness	Measurements	Amount and quality	Tone of interactions	Physical	Interactive product	Kinetic tree sculpture (Wedding ducks)
2016	Calmers: Get Away from Road Rage (Yingchen)	Near	Maintain social order	Discourage bad driving	Change	Persuade	Scaffold behaviors	Reputation system	Measurements	Amount and quality	Driving behaviors	Physical	Interactive product	In car feedback & monitoring
2013	The Design of Pocket Pass (Alix)	Near	Maintain social order	Usable security	Change	Persuade	Scaffold behaviors	Mechanism of external cognition, dual factor authentication	Measurements	Amount and quality	Human memory	Physical	Interactive product	Physical second factor password decoder device
2014	Notetaking for Visually Impaired Students (Tanmaya)	Near	Inclusivity	Blind and low sighted students	Preserve	Organize	Annotate and link	Digital version of physical notepad	Collections	Inventory	Non-visual gestures	Virtual	Mobile app	Simplified gestural command system
2015	Ghost Helper: Collaborative Gender Neutral Game Design (Sherry)	Near	Inclusivity	Gender equality	Change	Persuade	Gamification	Children's games disassociating gender and occupations	Collections	Inventory	Occupations	Virtual	Mobile game	Ghost characters (gender neutral), occupations
2013	Lookin' Good (Sue)	Near	Inclusivity	Blind and low sighted	Change	Persuade	Promote awareness	Confidence through coordinated fashion and appearance	Collections	Inventory	Clothing	Physical	Interactive product	Digital clothing tags system
2017	Starry: Star Story (Chris)	Everywhere	Improving health	Support bereavement	Preserve	Organize	Annotate and link	Artifacts associated with the deceased	Collections	Inventory	Personal artifacts	Virtual	Mobile app	Interactive urn
2017	MemoryPin: Virtual to Tangible Memories (Mia)	Near	Improving health	Memories	Change	Persuade	Motivate with metaphor	Moments and digital keepsakes	Collections	Inventory	Social media interactions	Physical	Interactive product	Tangible keepsake, App
2014	Ageing Choice (Tommy)	Here	Improving health	Active ageing	Change	Persuade	Promote awareness	Emotions	Collections	Inventory	Emotions	Physical	Installation	Emotions wall interactive sculpture
2014	Bikelette: Design for Healthy Urban Life (Sunnie)	Here	Improving health	Exercise (groups)	Preserve	Connect	Match interests	People to cycling groups	Measurements	Amount and quality	Cyclers	Physical	Interactive product	Tablet App, Mobile App
2015	NOC: Nourish Your Sleep and Lives (Innes)	Here	Improving health	Sleep	Change	Persuade	Gamification	Sleep habits	Measurements	Amount and quality	Sleep	Virtual	Mobile app	Aesthetic figures denoting sleeping habits
2014	The Slow Clock (Chhavi)	Here	Improving health	Balance (at home)	Change	Persuade	Motivate with metaphor	Time keeping and life pace	Measurements	Amount and quality	Pace and activities	Physical	Interactive product	Internet of things, household
2015	TryShell (Caroline)	Here	Improving health	Overcome depression	Change	Persuade	Motivate with metaphor	Treasure hunt (shells) and walking	Measurements	Amount and quality	Exercise	Virtual	Mobile app	
2018	Prepare for a Sleep/Trip (Wagi)	Here	Improving health	Sleep	Change	Persuade	Motivate with metaphor	Sleep and travel	Measurements	Amount and quality	Sleep	Virtual	Mobile app	Diary clock docking station
2016	Air Quality Wristband (Cody)	Everywhere	Improving health	Air quality	Change	Persuade	Promote awareness	Show local air quality	Measurements	Amount and quality	PM2.5	Virtual	Mobile app	Air quality monitor wristband
2014	Hobnob: A System Design for Healthy	Here	Improving health	Balance (at work)	Change	Persuade	Promote awareness	Social messages at work	Measurements	Amount and quality	Work and social balance	Virtual	Tablet app	

	Working Environment (Ankita)													
2014	Caring: Design for Office Worker's Body and Heart (Vivian)	Here	Improving health	Exercise	Change	Persuade	Scaffold behaviors	Mental support (from friends and family)	Measurements	Amount and quality	Exercise, sitting time	Virtual	Mobile app	Interactive wearable
2014	Push Pull Fit Ground (Quincy)	Here	Improving health	Exercise (public)	Change	Persuade	Scaffold behaviors	Public exercise stations	Measurements	Amount and quality	Exercisers	Physical	Installation	Public exercise stations, Mobile App
2015	Nufood (Lynn)	Here	Improving health	Food	Change	Persuade	Scaffold behaviors	Mechanism of awareness	Measurements	Amount and quality	Food	Virtual	Mobile app	Budgets, food to health
2018	Health in Traditional Chinese Medicine (Tim)	Here	Improving health	Medicine	Change	Persuade	Scaffold behaviors	Diagnosis and prescription	Measurements	Amount and quality	TCM metrics	Strategic	Service	Augmented reality Mirror and App
2013	Med Manager (Fish)	Here	Improving health	Medicine	Change	Persuade	Scaffold behaviors	Medicine reminder (Elderly)	Measurements	Amount and quality	Medicines	Virtual	Tablet app	Smart medical card, service
2016	Sleep and the Surrounding Environment (Carrie)	Here	Improving health	Sleep	Change	Persuade	Scaffold behaviors	Conditions conducive to good sleep	Measurements	Amount and quality	Sleep	Virtual	Mobile app	Lighting and timing
2017	Clockless Clock: Balance (Jean)	Here	Improving health	Balance (at work)	Change	Persuade	Motivate with metaphor	Granularity and timekeeping	Needs	Psychology	Time	Physical	Installation	Multi-granular wall clock
2017	Nose and Rose: Understanding Anosmia (Hosea)	Here	Improving health	Understanding anosmia	Change	Persuade	Motivate with metaphor	Smell and other senses	Needs	Psychology	Physiology (smell)	Physical	Installation	Gallery of smell
2017	Beyond Empathy (Maryna)	Here	Improving health	Understanding depression	Change	Persuade	Motivate with metaphor	Expose operational semantics	Needs	Psychology	Depression	Physical	Installation	
2015	Anxiety Disorders (Charlie)	Here	Improving health	Understanding anxiety	Change	Persuade	Promote awareness	Overcoming anxiety	Needs	Psychology	Anxiety conditions	Virtual	Mobile app	Forum
2015	The Sleep Ritual (Scott)	Here	Improving health	Sleep	Change	Persuade	Scaffold behaviors	Sleep habits	Needs	Psychology	Sleep environments and practices	Physical	Interactive product	Sleeping lamp (Mobile app controlled)
2018	Connect Strangers via Umbrella Sharing (Sam)	Near	Connecting people	Sharing	Preserve	Connect	Combine with utility	Shared economy	Collections	Inventory	Serendipitous thoughts	Virtual	Mobile app	Service
2018	Parents with Children Living Abroad (Joyce)	Near	Connecting people	Relationships balance	Preserve	Connect	Distance collaboration	Private mediation, special messaging device	Collections	Inventory	Intra-family messages	Physical	Interactive product	Telepresence device
2013	Linked Farms (Diego)	Near	Connecting people	Growing	Preserve	Connect	Match interests	Farmers and holiday farmers	Collections	Inventory	Participating farms	Strategic	Service	Web site, Not for profit, farmers, holiday farmers
2014	Dine-in (Fred)	Near	Connecting people	Healthy home cooking	Preserve	Connect	Match interests	Home cooks with diners	Collections	Inventory	Cooks and guests	Virtual	Mobile app	Service
2014	Host and Guest (Sophia)	Near	Connecting people	Locals and nonlocals	Preserve	Connect	Match interests	Tourists and willing hosts	Collections	Inventory	Participating hosts	Virtual	Mobile app	Service
2014	Moments (Woody)	Near	Connecting people	Photography	Preserve	Connect	Match interests	Individuals with photographers	Collections	Inventory	Photographers, Models	Virtual	Desktop app	Service
2013	Kulla: Connecting Students to School Resources (Pansy)	Near	Connecting people	Students and resources	Preserve	Connect	Match interests	Students to resources	Collections	Inventory	Resources for students	Virtual	Web site	Logos and branding
2016	Match Me Up: The Volunteer Matching Multi-Device Application (Joanna)	Near	Connecting people	Volunteers and the elderly	Preserve	Connect	Match interests	Skills and needs	Collections	Inventory	Requests for help and helpers	Strategic	Service	Multiple forms

2017	Remember: Connecting Elderly (Peiyan)	Near	Connecting people	Activities for the elderly	Preserve	Organize	Annotate and link	Rekindle old connections	Collections	Inventory	Photographic collections	Virtual	Mobile app	Photographs
2015	Remember and Reconnect (Jessica)	Near	Connecting people	Nostalgia	Preserve	Organize	Annotate and link	Photographs to old friends	Collections	Inventory	Old photographs	Virtual	Mobile app	
2014	A.Loha.S (Elaine)	Near	Connecting people	Empty nesters	Change	Persuade	Promote awareness	Community activities	Collections	Inventory	Community activities	Physical	Installation	Public displays for local community
2015	Eat & Meet (Emma)	Near	Connecting people	Food	Change	Persuade	Scaffold behaviors	Being social	Collections	Inventory	Participating restaurants	Strategic	Service	Choose others to share a meal
2014	Pokemo (Michelle)	Near	Connecting people	Distance relationships	Preserve	Connect	Distance collaboration	Telepresence	Measurements	Amount and quality	Mood of interactions	Physical	Interactive product	Interactive rings, App
2015	The Basketball People (Kesaven)	Near	Connecting people	Locals and nonlocals	Preserve	Connect	Match interests	Pick-up sports	Needs	Acculturation needs		Virtual	Mobile app	Photo-wall
2017	Fitin: Design for Newcomers (Yue)	Near	Connecting people	Relocation	Preserve	Connect	Match interests	Newcomers and incumbents	Needs	Acculturation needs		Virtual	Mobile app	Bulletin board
2014	Helping Hands: Designing for Displaced Urban Singles (Allison)	Near	Connecting people	Relocation	Preserve	Connect	Match interests	Newcomers and incumbents	Needs	Acculturation needs		Virtual	Web site	
2013	Village (Vincenzo)	Near	Connecting people	Student cohorts and alumni	Preserve	Connect	Match interests	Cohorts and alumni	Needs	Acculturation needs		Virtual	Desktop app	Service
2013	The Social Plane (Vincent)	Near	Connecting people	Travel	Preserve	Organize	Itinerary	Social travelling	Needs	Travel needs		Virtual	Mobile app	Airplane seatback app