User data spectrum theory: Collecting, interpreting, and implementing user data in organizations

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User data spectrum theory: 
Collecting, interpreting, and implementing user data in organizations

by

Andrea Jo Peer

A dissertation submitted to the graduate faculty
in partial fulfillment of the requirements for the degree of
DOCTOR OF PHILOSOPHY

Major: Human Computer Interaction

Program of Study Committee:
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NOMENCLATURE

**Design**: There are many definitions of design. For this research, the term design describes both product and process. Most important to this body of work is the process description. A design process is a set of methods and a structured way to go about creating something for an end goal or to encourage a change of state in the world. The final product is the thing that the world/end-user interacts with. Interaction can encompass any and/or all types, including physical, emotional, or cognitive interaction.

**Designer**: A person who has had training in a design discipline. In an HCI context, this person may have the title of usability engineer, user interface designer, user experience designer, interaction designer, information architect, user-centered design consultant, or human-centered designer.

**Design research**: An inquiry focused on producing a contribution of knowledge. An intention to produce knowledge and not the work to more immediately inform the development of a commercial product (Zimmerman, Stolterman, & Forlizzi, 2010).

**Discovery sprint**: A sprint dedicated to gathering user data and testing prototypes before development. This type of sprint is seen in extreme and dual track development environments.

**Development sprint**: A sprint dedicated to developing. It is no different from regular sprints, except that usually a discovery sprint has happened prior and user data is being fed into the development sprint activity. This type of sprint is seen in extreme and dual track development environments.

**Human-centered design**: “Human-centered design is characterized by: the active involvement of users and a clear understanding of user and task requirements; an appropriate allocation of function between users and technology; the iteration of design solutions; multi-disciplinary design” (International Organization for Standardization, 1999, ISO 13407).
Interpreting user data: The act of translating user data collected into design language and/or system requirements.

Implementing user data: The act of incorporating user data into the actual design or functionality of the system.

Software development process: A structure imposed on the development efforts of software. There are many different types of software development processes, also referred to as lifecycles.

Sprint: The basic unit of development in an agile scrum. Usually a sprint is 1 week to 1 month in duration.

Usability: “[Usability refers to] the extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use” (International Organization for Standardization, 1998, ISO 9241-11). Usually there are performance and satisfaction measures that quantify the usability of a system.

User: “Can be a paying customer, internal employee, physician, call-center operator, automobile driver, cell phone owner, or any person attempting to accomplish some goal—typically with some type of software, website, or machine.” (Sauro & Lewis, 2012, p. 9)

User-centered design: User-centered design (UCD) is an approach to design that focuses on learning about the people who will use the product. UCD processes incorporate user-centric methods during the planning, design and development of a product.

User data: Any data that represent the thoughts, actions, behaviors, words, needs, wants, context, and environments of the end stakeholder(s) interacting with the system.

User experience (UX): “A consequence of a user’s internal state (predispositions, expectations, needs, motivation, mood, etc.), the characteristics of the designed system (e.g.
complexity, purpose, usability, functionality, etc.) and the context (or the environment) within which the interaction occurs (e.g. organizational/social setting, meaningfulness of the activity, voluntariness of use, etc.)” (Hassenzahl & Tractinsky, 2006, p. 91-97).

**User research:** “User research is the systematic study of the goals, needs, and capability of users so as to specify design, construction or improvement of tools to benefit how users work and live” (Schumacher, 2010, p. 6).

**UX capacity:** UX capacity is an organization’s facility or power to perform UX practices and produce UX results.

REFERENCES


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encouraged creativity and hard work. This dissertation would not have been possible without them.
ABSTRACT

Organizations interested in increasing their user experience (UX) capacity lack the tools they need to know how to do so. This dissertation addresses this challenge via three major research efforts: 1) the creation of User Data Spectrum theory and a User Data Spectrum survey for helping organizations better invest resources to grow their UX capacity, 2) a new UX method and model for organizations that want to capitalize on spoken words from end users called Rapid Meaningful Scenarios (RMS), and 3) a recommendation for UX education in response to the current ACM SIGCHI education Living Curriculum initiative. The User Data Spectrum work is based on 30 interviews and 110 survey responses from UX stakeholders across 120 companies. These data informed the theory as well as a factor analysis performed to identify the most relevant items in the User Data Spectrum survey. The Rapid Meaningful Scenarios methodology was developed based on iterative UX experience with a real-world organization and refined to aid UX professionals in creating structured results based on end users' words. The UX education recommendation integrates experience with the HCI curriculum at Iowa State University and curriculum discussions within the SIGCHI community over the past 5 years. The overall contribution of this research is a set of tools that will enable UX professionals and organizations to better strategize how to increase their UX capacity.
CHAPTER 1

INTRODUCTION

1.1. Problem Statement

This dissertation addresses a critical problem facing companies developing software products today: This goal is the essence of creating a good user experience (UX). However, companies differ in their UX maturity. While existing tools exist to enable companies to measure their UX maturity, a gap arises in the next step. Once a company knows its UX maturity level, there are no agreed upon methods for it to know what it can do to increase its UX maturity. This research addresses this gap.

Businesses developing customer facing software products today struggle to keep a competitive edge. Some might argue that speed to market is the competitive advantage. However, Joe Pine and Jim Gilmore, Dean Helen LeBaron Hilton Endowed Co-chairs at the College of Family & Consumer Sciences at Iowa State University and visiting scholars at MIT Design Lab, have suggested that the global consumer market is moving into an economy where experience is the most valued commodity (Pine & Gilmore, 1999). Competitiveness in this experience economy is less about speed to market and more about delivering and/or producing an experience for end users that emotionally compels them and drives repeat business and viral demand.

Company leaders and academic researchers have begun to explore whether user experience (UX) might offer the most potentially useful path to deliver on the promise of the experience economy (Forlizzi & Ford, 2000). Scholars and practitioners in the UX field have long recognized the need for UX practitioners to address the challenge of incorporating greater responsiveness to human emotion, behavior, and psychological needs into consumer technology.
products, thereby promoting more pleasurable and joyful (or hedonic) responses through technology interactions (Carroll, 1997; Hassenzahl, 2014; Norman, 2003). John Carroll, an established thought leader in the UX field, speaking about the end product, has argued “that virtually every aspect of the product experience is overdetermined by independent psychological rationales inherent in its design” (Carroll & Kellogg, 1989, p. 7). No matter how brilliantly crafted the engineering, the users’ connection to the psychological rationales in the design will supersede the engineering intent. Psychologist Mark Hassenzahl, a well-recognized scholar in the UX field, has discussed the concept of “product character,” which is a mechanism designers can incorporate into products that communicates to the user the practical and hedonic possibilities of the product (Hassenzahl, 2005, p. 32). One of the founders of the UX field, Don Norman (2003), in his recent research on emotional design, encourages UX designers to primarily focus on producing emotionally stimulating products and move away from a primary focus of efficiency and effectiveness. Karen Holtzblatt, another leader in the UX field, has noted that joy is a key component of products that are well designed, and that joy is part of the basis for products being deemed “cool” (Holtzblatt, 2011). UX scholars and practitioners call for technology to not only be easy to understand, as once was the design goal, but to also evoke human emotion, motivate human behavior, and connect to deeper psychological triggers. While this concept of responding to human needs—be it emotional, behavioral or psychological—is highly dependent on the user’s situation, the goal remains to promote an affective response from the end user and thereby establish an experience with or through that technology product.

Organizations have increasingly embraced the UX field by hiring more UX practitioners and putting UX-educated people in positions of power and authority within their organization. While bringing in UX skills is an effective start, organizations still face myriad dilemmas in
establishing practical ways to meet the new reality of delivering in the experience economy.

Most notably, incorporating UX into the product development process is a well-known challenge (Earthly, Jones, & Bevan, 2001). UX does not happen in a vacuum. If done well, it must adapt to the organization’s practices and culture. There are now standards from the International Organization for Standardization (ISO) and established models that organizations and UX practitioners can use to overcome these challenges. Most notable and relevant to embedding UX, the usability maturity model in ISO TR 18529 contains a structured set of processes derived from ISO 13407. ISO 13407 has since been replaced with ISO 9241-210. These standards can be used to assess the extent to which an organization is capable of carrying out a user-centered design. The standards then lay the foundation for the body of research on UX maturity models by Earthy et al. (2001). In 2007, Law, Roto, Vermeeren, Kort, and Hassenzahl (2008) established the UX Manifesto, demanding that UX be a part of the product development process in organizations. While the UX Manifesto and body of standards give strong guidelines as to how UX might be embedded into an organization, Venturi and Troost (2004) conducted a survey on what practices are actually being implemented within organizations. They quoted a finding by Rosenbaum that of 134 HCI professionals, “lack of knowledge and ineffective communication on UCD” as well as “resistance to user-centered design or usability” accounted for 56.6% (combined) of the reason why usability does not play a strategic role in product development within organizations (Rosenbaum, Rohn, & Humburg, as cited in Venturi & Troost, 2004, p. 449). Similarly, another body of scholars, notably Nielsen, Bias, and Mayhew, supported this by making claims of developers not using UX approaches and organizational culture prejudices against UX practice (as noted by Mayhew & Bias, 1994; Norman, 1999). Furthermore, the Rosenbaum study showed that the “major obstacles to a greater strategic impact are resource constraints, which were
mentioned by 28.6% of the respondents, resistance to user-centered design or usability (26%), lack of knowledge and ineffective communication on UCD (combined: 30.6%)” (Rosenbaum, Rohn, & Humburg, as cited in Venturi & Troost, 2004, p. 449).

In order for organizations to realize the potential of user experience to deliver in the experience economy, this dissertation explores ways to grow an organization’s UX capacity. UX capacity is an organization’s facility or power to perform UX practices and produce UX results. UX is fundamentally related to the design of a system. The role of UX could be primarily focused or span a range anywhere from the front-end design to the back-end architecture design or everything in between. Historically, the primary paradigm of research on UX capacity centers on maturity models. A maturity model is a construct that an organization may use to access itself—its methodologies and practices. ISO standards encouraged organizations to use maturity models to assess and then advance methods, processes, and practices. Today, academic research has identified two primary UX maturity models: a usability maturity model (Jokela, 2010) and another by Earthy (1996). However, a query of a representative sample of industry-based UX thought leaders identified eight additional models. These include the enterprise maturity model by Ashley and Desmond (2009), the corporate UX maturity model by Van Tyne (2009), and the corporate usability model by Nielsen (2006). Other industry thought leaders include the widely recognized industry blog, JohnnyHolland.org; Tomar Sharon, UX leader at Google and author of It’s Our Research; and Eric Schaffer, a leader in HCI certification courses (Feijo, 2010; Schaffer & Lahiri, 2013; Sharon, 2012).

One commonality of these diverse ways of modeling UX capacity is that they excel in identifying the current maturity level relative to their UX practice. However, this does not take into consideration the essence of how UX capacity is developed differently across organizations.
This research explores two hypotheses: 1) The social and cultural nuances of organizations shape the trajectories of UX development and 2) Organizations can benefit by first identifying and then working in alignment with their orientation to UX, irrespective of their relative maturity state.

1.2. Purpose of This Study

This dissertation investigates three key questions related to UX theory and practice to help businesses adapt to the changing demands of technology consumers.

1. How can organizations better capitalize on the potential of UX as an avenue to implement responsiveness to human emotion, behavior and psychological needs into their technology products?

2. How can diverse organizations more deeply embed UX design practice in their product development practices to increase their UX Maturity?

3. How can academia and industry prepare UX practitioners with adequate skill sets to select and carry out UX methods within organizational contexts as the field continues to change?

1.3. Contribution of This Study

The primary contribution of this work is the development of the User Data Survey to create a tool that organizations can use to place themselves on the User Data Spectrum, a scale described below, to have a better identification of their UX orientation. By identifying their UX orientation, different organizations may learn how to grow their UX capacity using a customized company-specific approach by focusing on four variables, also identified through the User Data Survey, in a way that fits the nuances of their organizational culture. The secondary contribution of this research is an exploration of one of the variables in the User Data Spectrum, skill set,
through a discussion of HCI education and a case study applying the User Data Spectrum to one organization.

1.4. Organization of This Study

To investigate these questions, Chapter 2 begins with the literature review, focusing specifically on research related to these questions. For example, how might organizations meet the challenges related to implementing a more responsive UX and develop appropriate training and professional development paths for their UX labor force? The final theme addressed in the literature review is the challenge of implementing UX in different organizations. The literature explored there lays the foundation for the arguments that figure in later chapters.

Chapter 3 explains the need for the central contribution of this dissertation, which is a new survey called the User Data Spectrum survey. Chapter 4 describes the research and supporting justification for how this tool was designed. Chapter 5 evaluates the ability of the tool to be used by organizations for the purpose of growing their UX capacity.

Chapter 6 focuses on the difficulties diverse organizations encounter as they try to embed UX design practice more deeply into product development. It presents a case study about a higher education organization, the Center for the Integration of Research, Teaching and Learning (CIRTL). The User Data Spectrum survey was not fully developed at the time this case was conducted. However, this chapter demonstrates how some of the principles that later informed the User Data Spectrum were implemented to support CIRTL’s goals and its online product.

Since skill set is one of the growth variables of greatest potential significance in the User Data Spectrum theory, Chapter 7 suggests how industry and academia can work together synergistically to continue to create new solutions. Chapter 8 considers limitations of this body of research and avenues for future research suggested by this study.
REFERENCES


CHAPTER 2

LITERATURE REVIEW

To address the research questions noted in Chapter 1, this literature review addresses the following three different yet related areas of research: 1) how organizations increase their UX capabilities, 2) how this process differs across organizations, and 3) what education and training preparation is required to do so. Each of these areas is explored below, emphasizing the underlying issues they share and highlighting the meta or unifying concepts that inform the arguments in the remaining chapters of this dissertation.

1. How can organizations better capitalize on the potential of UX as an avenue to implement responsiveness to human emotion, behavior, and psychological needs into their technology products?

2. How can diverse organizations more deeply embed UX design practice in their product development practices to increase their UX Maturity?

3. How can academia and industry prepare UX practitioners with adequate skill sets to select and carry out UX methods within organizational contexts as the field continues to change?

2.1. The Challenge of Implementing a More Responsive UX

Scholars and practitioners in the field have long recognized the need for UX practitioners to address the challenge of incorporating greater responsiveness to human emotional, behavioral, and psychological needs into technology products. Recently, however, the call has evolved from responding to more mechanical usability and task accomplishment to promoting more pleasurable and joyful (or hedonic) responses through technology interactions. Psychologist Mark Hassenzahl (2005) discussed the concept of “product character,” which is the mechanism
that communicates to the user the practical and hedonic possibilities of the product. At a basic level, communication is a form of responding to the human. Schmitt (1999), who founded the Center on Global Brand Leadership at Columbia Business School, argued customers want products “that dazzle their senses, touch their hearts and stimulate their minds” (p. 22). The call is for technology not only to be easy to understand, as once was the design goal, but also to evoke human emotion, motivate human behavior, and connect to deeper psychological triggers. While this concept of responding to human needs—be it emotional, behavioral, or psychological—is highly dependent on the user’s situation, the goal remains to promote an affective response from the end user.

One could argue that the call to be responsive to human emotions, behavior, and psychological needs is a historic characterization of the field of human computer interaction (HCI). Harrison, Tatar, and Sengers (2007) articulated this history in their article, “The Three Paradigms of HCI.” Human factors and classical cognitivism/information processing were the first two paradigms of the field of HCI; the third they called the “phenomenologically-situated paradigm” (Harrison et al., 2007, p. 1). Harrison et al.’s third paradigm articulated the shift in paradigm to an intentional focus on context, social effects, and emotional state/response of users when designing the experience. Harrison et al. clearly articulated the complexities associated with the shifting focus of this third paradigm. Don Norman, in his research on emotional design, contended that the affective response of the user is based on the heuristic of a design (Norman, 2004). Hassenzahl’s view, however, is more nuanced. He asserted that users’ experience of emotion cannot be manufactured, though the likelihood of a particular emotional response increases if designers, in the design process, strive to address the underlying psychological needs of the user. Of course, design is both a noun and verb. In other words, the design is the final end
product that the user interacts with. But design is also the process the designer uses to create the end product. With more of an engineering orientation, Norman focuses more on the noun; and Hassenzahl, with more of a design orientation, focuses more on the verb.

If the focus is on design as a verb, the question becomes “How might a designer incorporate responsiveness into the design process?” And if the focus is on design as a noun, the question is, “How might the end product be perceived to be responsive?” Carroll (1989), speaking about the process, asserted that “HCI designs characteristically embody multiple, distinct psychological claims” (p. 1). Furthermore, speaking about the end product, Carroll (1989) argued “that virtually every aspect of a system’s usability is overdetermined by independent psychological rationales inherent in its design” (p. 7). No matter how brilliantly crafted the engineering, the users’ connection to the psychological rationales in the design will supersede the engineering intent.

Whether design is a verb or a noun, pursuit of responsiveness clearly has evolved from the beginnings of the field in the mid-1990s. One can even argue that the definition of responsiveness in the early days of the field would not be sufficient today to capture the call for responsiveness to which my research points. In the mid-1990s, Eberts (1987) and Eberts & Eberts (1989) classified the field of HCI as having four major approaches: (a) the empirical approach, (b) the cognitive approach, (c) the predictive modeling approach, and (d) the anthropomorphic approach. All four of Ebert’s approaches would fall into the first and second paradigms in Harrison’s (2007) research on the three paradigms of HCI. All early approaches and paradigms have the beginnings of responsiveness. It is worth reviewing these four approaches because organizations have adopted UX practices using each of them.
2.1.1. The Empirical Approach

The empirical approach uses classical experimental design to quantify a person or end user’s ability to use the system being designed (Eberts & Eberts, 1989). The standard usability testing method is an example of this approach. While usability testing remains an important step in the user-centered design (UCD) process today, the primary objective is to ensure the end user has little to no difficulty accomplishing the task for which the system was designed. It is about the utility of the system and not primarily about the degree of emotional response evoked by that interaction. Satisfaction questions such as SUS, SUMI, SUM, PSSUQ, and SEQ (Brooke, 1996; Kirakowski & Corbett, 1993; Sauro, 2016; Sauro & Kindlund, 2005) are established measures in the field of user experience; however, satisfaction is at best a latent variable of emotional response. Jarrett and Oliver (as cited in Carroll, 2003) articulated that satisfaction can also occur when the end user is indifferent or in a neutral emotional state. Irrespective of the accuracy of the measure of emotional response used in the empirical approach, the point remains that this is a quantitative design paradigm to measure whether a design has achieved responsiveness to human emotion, behavior, and psychological needs. This approach is most frequent among software companies.

2.1.2. The Cognitive Approach

In the 1980s, as understanding of the workings of the human brain and drivers of human action increased, the effort to promote responsiveness focused more on targeting logical analysis of cognitive processes leading to particular behavioral responses. HCI research turned its attention from the heuristic approach to a focus on the cognitive capacity of the end users. The cognitive approach uses research on how humans perceive, store, retrieve, process, manipulate, and respond to information (Eberts & Eberts, 1989). The most significant foundational research
that emerged from the cognitive approach was Craik (1967) and Johnson-Laird’s (1981) early research on mental models. But mental models proliferated throughout the field when Norman (1983) created his triangle that combined research on mental models (the user’s understanding of the system and world), conceptual models (the engineer’s understanding of the system built), and interface design (the graphics of the interface; Allen, 1997; Carroll & Reitman, 1987; Craik, 1967; Johnson-Laird, 1981). Theories about metaphors, spatial reasoning, problem solving, attentional models, perception, and neural networks were used in the design of systems with the cognitive approach.

While the cognitive approach aligns with Harrison’s (2007) first and second paradigms, the use of metaphors (e.g., using a trashcan icon on the screen to communicate the act of deleting, similar to how one would throw something away in the physical world) has phenomenological undertones. Developing symbols that users can relate to is a first step toward responsiveness. However, as Harrison (2007) described, the phenomenology focus was a side effect or on the periphery of the focused research. The research attention was centered on the cognitive capacity and response and not yet primarily focused on the emotional or hedonic.

2.1.3. The Predictive Modeling Approach

The predictive modeling approach was a natural branch from the cognitive approach. The predictive modeling approach turned attention to focus on the cognitive logic behind task accomplishment. Even today, most standard user-experience measures (such as time-on-task and errors) reflect this moment in the history of approaches to UX design. It can also be argued that the cognitive revolution in HCI was paramount in establishing the field of HCI (Harrison et al., 2007). Card, Moran & Newell (1983) stated that many cognitive paradigms could be compared to computer information processing paradigms. These paradigms portray the mind as like a
computer and human interaction with computers as a coupling of information processors working together to accomplish a goal. Therefore, HCI should be focused on enabling communication between the human processor and the computer processor to accomplish the goal.

The cognitive and information processing work that make up the cognitive approach to HCI resulted in computational models. The models describe the observed state or a targeted end user and the state of the computer in order to optimize the relationship. These models are the essence of the predictive modeling approach to HCI. The most notable cognitive models that have persisted as a cornerstone of cognitive model research are the GOMS (goals, operators, method, and selection) family of models developed by Newell (1994). Laird (2012) developed the Soar architecture as a unified theory of cognition (Biswas & Robinson, 2010). While the cognitive models under the GOMS family allow HCI designers to construct systems based on cognitive decision-making processes, the Soar architecture (a cognitive architecture that falls under the cognitive approach) better supports approaches to solving problems through chunking mechanisms. Chunking is a method of dividing larger problems into smaller solvable chunks (Biswas & Robinson, 2010; Laird, Rosenbloom, & Newell, 1984; Newell, 1994). There are other models that couple cognition and ergonomics such as Fitt’s law (used for prediction of movement over time) and Hick’s law (used for predicting visual search time; Biswas & Robinson, 2010; Fitts, 1954; Hick, 1952).

In 2005, Grudin articulated that ACM SIGCHI (the most popular conference in HCI) was more dominated by the classical cognitive/information processing paradigm than any other paradigm (as cited in Harrison et al., 2007). While the cognitive approach and the predictive modeling approach are still dominant paradigms in HCI and are the first methods by which UX
practices might incorporate responsiveness into systems, the primary focus area is on cognitive processing and not the hedonic phenomenon (often unable to be explained by cognitive research alone) that also creates the feeling of responsiveness for end users.

2.1.4. The Anthropomorphic Approach

Designers began by trying to model the computer after the characteristics of the human, prompted by the assumption that if the computer could mimic something about human appearance or affect, doing so would elicit a sense of responsiveness from humans. That resulted in Clippy and, more recently, human-like avatars. Such products attempted to leverage the theory of anthropomorphism, in which users attribute human-like traits to nonhuman things, and subsequently feel a human response toward the nonhuman object. Unfortunately, these efforts to promote human emotion have sometimes fallen victim to the “uncanny valley” effect. This phenomenon actually undercuts the desired goal, because the avatar is perceived as so human-like that it creates cognitive dissonance and interferes with the human’s willingness to accept this proxy as a representative for him- or herself. As Lim argued, “Computers do not need affective abilities for the fanciful goal of becoming humanoids”; instead, Lim called for a “meeker and more practical goal” for “computers to function with intelligence and sensitivity towards humans” (as cited in Peter & Beale, 2008, p. 97). Nass and Yen summarized the tendency for humans to anthropomorphize their technology in the popular press summary of their years of research, *The Man Who Lied to His Laptop* (2010).

2.1.5. Other Research Pursuits in Responsiveness

Beyond Ebert’s four approaches, it is important to note influence of biomechanics and human factors aspects of interaction in the history of research regarding responsiveness to human emotion, behavior and psychological needs. The biomechanics of human behaviors are dictated
by the physical makeup of the humans performing those behaviors. For example, people under five feet tall cannot be military pilots, because a person of that height cannot reach the foot pedals and instrumentation of the aircraft. The aircraft design dictates the behavior.

Transitioning from biomechanics, which focuses on the interaction between human and physical objects, to software development, which primarily focuses on the interaction between human and computer programs, most software technologies do not have the immediate behavioral implications that physical objects do. Focusing on Harrison’s phenomenological paradigm in HCI, software technologies may rely on an associated psychological need. For example, researcher and therapist Tara Donker (2013) studied apps given to high risk youths. The app requested the youths to input their emotional state at any given moment; then, depending on their entry, the app would provide an activity for them to do with the intention of altering their current emotional state (Donker, 2013). Fitness apps are another example of attempting to influence user behavior. Most apps have some sort of visual or tactical feedback to promote a particular behavior. Through a little haptic feedback on one’s wrist, for example, the Apple Watch tells the user to stand after a period of inactivity.

Additionally, research in online communities focuses on designing systems based on the human psychological need for connectedness and considers the phenomena associated with social contexts as the central research focus that informs the design of online communities (Carroll, 2014; Preece, 2000).

Throughout the history of HCI and the multitude of approaches to UX, scholars have demonstrated that UX provides an avenue to implement responsiveness to human emotion, behavior, and psychological needs in our technology products. Because emotion, behavior, and psychological needs are interrelated, the end experience cannot be cleanly parsed and credit
given to each aspect of the experience. Furthermore, some scholars have proposed that the human response cannot be fabricated; therefore, attention can only be paid to the design process (Hassenzahl, 2005). Alternatively, focus on the heuristics of the final product may achieve what Schmitt (1999) envisioned: the products that “dazzle their senses, touch their hearts and stimulate their minds” (p. 205).

2.2. The Challenge of Implementing UX in Different Organizations

Another theme emerging in the literature is an argument that for the field to advance, UX design practice needs to be more deeply embedded in the product development practices of organizations. In order to do this, chosen UX methods have to fit an organization's culture. The previous section discussed how UX is incorporated into a product with the purpose of creating a hedonic experience. It is also important to understand the body of thought on the more tactical practice of UX. Research on how employees practice UX within an organization reveal both opportunity and challenges in incorporating UX within product development practices.

First, UX does not happen in a vacuum. If done well, it must adapt to the organization’s practices and culture. There is no pure form of UX practice. That is why it is important to provide a general overview of what the research tells us about product development practices within organizations. It should be noted that a full exploration of product development processes lies beyond the scope of this dissertation. However, a general overview is pertinent.

All products, be they software, hardware, or services, follow a process to move from concept to market. The process is referred to as the product development life cycle (PDLC), or more specifically in software, the software development life cycle (SDLC). Both of these life cycles have many models. Additionally, organizations may range from flat and one dimensional to complex hierarchies and matrices, which often dictate suitable product development
processes. Considering the product development process in the organizational structure is a critical issue for this dissertation because the amount of hierarchy is usually tied to the organization structure and calls for certain kinds of UX strategy and practice. Likewise, the amount of hierarchy influences the product development process within the organization. For example, large companies developing many products, like Microsoft, Google, or John Deere, rely on portfolios and overarching enterprise processes to increase the chances of cross business alignment and management of the subsequent cross business interdependencies. A small start-up with maybe only one product can afford to be much more flexible in its product development process as the cross business nature of the bigger organizations does not exist (Hudson, 2009).

The implementation of UX practices is dependent upon understanding of the larger PDLC and SDLC.

UX practice in organizations usually starts with a few select methods being incorporated at some stage of the product development lifecycle (Bevan, 2009; Earthy, Jones, & Bevan, 2001). Implementing UX methods in the SDLC is often the first step of organizations to incorporate UX in the product development process; however as organizations mature and increase the UX capacity, full UX models may be implemented within the product development process. User-centered design (UCD), started by Norman (1986), is the most dominant methodology within the field of User Experience. There are several UCD models. Venturi’s definition captures the common understanding of the benefit of organizations implementing UCD into their organization: “UCD integration improves its impact on the company business and that UCD infrastructure, communication and manager commitment play a major role in establishing the UCD maturity into the company” (Venturi, Troost, & Jokela, 2006, p. 449). Though some variations exist in UX models, ISO standards and UX maturity models typically
are based on the UCD model (Herrman, 2010; Jokela, 2010; Nielsen, 2006; Van Tyne, 2009). UX is a broader term that does not necessarily come with the formal methods that UCD supposes. Most importantly and relevant to the question of what motivates an organization to embed UX into product development practices is the research demonstrating the return on investment of UCD. Venturi, Bevan, and Bias have produced several scholarly works that show UCD integration does in fact provide value to an organization’s bottom line (Bevan, 1995; Bias, Mayhew, & Upmanyu, 2002; Venturi & Troost, 2004).

In 2007, Law, Vermeeren, Hassenzahl, and Blythe conducted a workshop at an ACM SIGCHI conference that not only acknowledged the need for a UX manifesto but attempted to draft one. The primary impetus behind this attempt to draft the UX manifesto was to recognize that UX deserves as much attention as the parallel agile manifesto created by Beck, Beedle, Van Bennekum, and Cockburn (2009; Law et al., 2007). By definition, such efforts by industry leaders are not peer-reviewed scholarship. However, the forum is scholarly and internationally recognized. Additionally, Law, the facilitator of the workshop, is well published in the field (Law et al., 2007). One of the key questions raised was how to embed UX in the product development practice. Law et al. (2007) asked in their UX manifesto, “Are there any well-defined policies [that] position UX in a map of the Information Technology (IT) landscape, which is populated by usability, human factors, interaction design, software engineering, marketing, and other domains?” (p. 1). What is particularly relevant for this dissertation is the section in the UX Manifesto that addressed the policies that link UX and software engineering. The assertion is that these policies can be found “in the definition of quality models that address a mesh of functional and non-functional quality factors (e.g. reliability, security, accessibility) determining user acceptance” (Law et al., 2007, p. 2). Such calls demonstrate the understanding
on the part of industry and technology scholars that to achieve the desired product value, UX needs to be embedded into the product development process within organizations. The UX Manifesto created by Law et al. spurred practitioners into action and gave greater visibility to the work of scholars on this important topic. Even governmental standard bodies took note. In 2001, Bevan documented the wide resulting body of standards related to UX practice with input from the UX community. Most notable and relevant to embedding UX, the usability maturity model in ISO TR 18529 contains a structured set of processes derived from ISO 13407 (Bevan, 2001). These standards can be used to assess the extent to which an organization is capable of carrying out a user-centered design. The standards then laid the foundation for the body of research on UX maturity models by Earthy and Bevan. ISO 15504, “Software Process Assessment Scale: Incomplete, Performed, Managed, Established, Predictable or Optimizing” (Earthy et al., 2001) provided a method for rating “each human-centered design (HCD) process” (p. 558). Bevan (2001) underscored the significance of this development, saying that Earthy et al. “assert that software engineers, system engineers and usability professionals have a professional responsibility to adopt the definition of good practice in ISO 13407 and ISO TR 18529 as their baseline” (p. 568).

While the UX manifesto and body of standards give strong guidelines as to how UX might be embedded into an organization, Venturi and Troost (2004) conducted a survey on what practices were actually being implemented within organizations. They quoted a finding by Rosenbaum that of 134 HCI professionals, “lack of knowledge and ineffective communication on UCD” as well as “resistance to user-centered design or usability” accounted for 56.6% (combined) of the reason why usability does not play a strategic role in product development within organizations (p. 449). Similarly, another body of scholars, notably Nielsen, Bias, and
Mayhew, supported this by making claims of developers not using UX approaches and organizational culture prejudices against UX practice (Mayhew & Bias, 1994; Nielsen, 2006). Furthermore, the Rosenbaum study shows that the major “obstacles to a greater strategic impact are resource constraints, which were mentioned by 28.6% of the respondents, resistance to user-centered design or usability (26%), lack of knowledge and ineffective communication on UCD (combined: 30.6%)” (p. 340).

Hellman and Rönkkö (2008) articulated one of the key issues that drives this dissertation inquiry with their question, “How do industry and manufacturers manage to successfully get a UX idea into and through the development cycle? That is, to develop and sell it in the market within the right timeframe and with the right content” (p. 32).

In agile development, in an effort to address the deficits of waterfall development, teams are directed to take smaller parts of the product to develop and make quick iterations on that product. This direction aimed to prioritize action over documentation and planning. However, in the pursuit of action and breaking a product down into manageable chunks of development efforts, the full vision of the product often is lost and therefore the intended experience is compromised. UX by nature addresses problems holistically. The industry trend toward more of the agile development methodologies further exacerbates the difficulty of deeply embedding UX into the product development process. Bevan’s work on ISO standards and the *Usability Book of Knowledge* (User Experience Professionals’ Association, n.d.) clearly directs how UX methods might be incorporated into the smaller chunks of development work in an agile process. However, Hellman and Rönkkö (2008) added to this work and addressed the holistic nature of UX contrasted with the compartmentalized approach in agile with his research. They introduced a model by which UX establishes an experience vision, which is assessed throughout the
development process. By introducing the assessment of the experience vision throughout the development process, Hellman and Rönkkö provided a mechanism by which organizations may measure the “temperature of UX in the product during the development between vision and final product” (Hellman & Rönkkö, 2008, p. 34). Temperature here refers to how well the small chunk of development work that is being presented (as a part of the bigger product delivery) hits the holistic UX mark. Further, Hellman and Rönkkö urged that UX practitioners are most effective when in leadership positions in the organization to be champions of the experience vision.

This section of the literature review notes the both the wide variety of approaches that organizations have used to integrate UX practices, and the growing standardization of UX methods. Interestingly, Hellman and Rönkkö’s (2008) suggestion of establishing an experience vision, in a sense, echoes Hassenzahl’s (2005) emphasis on including the hedonic element of human experience in the design process. These calls for more attention to the complexity of evoking responses through design raise the question of how to educated and prepare UX practitioners to meet this challenge.

2.3. The Challenge of Building Adequately Skilled UX Practitioners to Select and Carry Out UX Methods Within the Organizational Context

Some scholars have argued that UX practitioners must have the adequate skill set to select and carry out these methods within the organizational context (Bevan, 2005). At a very abstract level, the assumption made for this research is that knowledge required for UX skills is acquired through both formal and informal education. Formal education may include a range of activities from professional training events to degree programs at accredited universities. The concept of skill set, in this research, is a construct that depends on both university education and training from professional societies in the field. A timeline of the HCI education field shows
spikes in activity and plateaus or gaps followed by bursts of research and writing about the field that led to a mass exodus of parts of the community, such as social science researchers, as virtual reality and high tech researchers entered the field. Because of the plateaus and spikes in the field, the literature around the skill set focused on investigating the underlying epistemology of the theory and practice. Questions emerged about how this epistemology differed from the related epistemologies behind science, engineering, and design. Additionally, researchers questioned whether HCI could be a discipline in itself. Scholars like Long and Carroll (1989, 2003) drove deep into the exploration and articulations of the epistemology, whereas other scholars, Churchill and Preece (2013) focused on developing a curriculum based on the premise that this is a field unto itself. Recent developments in higher education, such as the rise of massive open online course and other online educational opportunities, have increased the availability of high-quality professional development opportunities delivered by leaders in the field. Currently, there is little research investigating the differences in skill set mastery between individuals who pursued piecemeal taking of courses versus those who pursued a traditional university curriculum.

The exploration of the HCI epistemology started in the early 1980s when the field of HCI emerged. Early explorations were largely informed by the dominant field of study, cognitive engineering. One of the first articles that explored the field of HCI as a discipline reflects the influence of cognitive engineering paradigms on the field; in their 1989 article, “Conceptions of the Discipline of HCI: Craft, Applied Science, and Engineering,” Long and Dowell attempted to frame the field of study. Carroll (2010) recognized that these researchers were the first to do the necessary work of defining this new field. In keeping with the prevalent paradigm in the 1980s and early 1990s focused on efficiency and task accomplishment, Long and Dowell articulated the benefit of more clearly defining the field through a model; the field would advance through
achieving a broadly practiced, “expert performance of relatively low-level tasks domains in which ‘human behavior can be usefully deterministic’” (Long & Dowell, 1989, p. 19). It is interesting to note here that the tone of the language used in this period reflects the drive to measure and quantify human behavior.

Long and Dowell (1989) were the first researchers to organize the discipline primarily into three distinct categories: engineering, science, and craft. In this article, Long and Dowell explored the discipline through each of these three emphases. Because of their training as engineers, they tended to gravitate to the evaluation of each category by the way it lends itself to generalization. Ultimately, they concluded that the science and craft of HCI are not sufficiently generalizable. While important for practitioners, the academic discipline of HCI should be primarily grounded in engineering because of its generalizability (Long & Dowell, 1989). Carroll (2010) recognized the contribution of Long and Dowell for providing the “intellectual scaffolding” for taking on the difficult task of defining the discipline HCI. In fact, as he articulated a more refined definition in keeping with the more contemporary focus on user experience, he continued to draw on Long and Dowell’s categories. From 1980 to today, these three categories have remained foundational, although researchers have explored new approaches to help them work in concert in both academic and industrial applications. Carroll (2010) proposed a useful way of conceiving the relationship among the three: craft, as the primary source of innovation in HCI, drives science; science, as the mechanism to understand those innovations after they occur, provides a foundation for engineering models. Carroll also supported looking at these three categories acting in concert and examined how they may be linked up to define the field of HCI instead of looking at each category in isolation or as competing. The science part of HCI, however, is fragmented, and that fragmentation continues to
grow with the melding of cognitive sciences, social sciences, and design theory. Long and Dowell, Nottingham, and Carroll discussed this fragmentation and the challenge it posed to creating a coherent epistemological foundation for HCI (Carroll, 2010). Carroll referred to this as the “methodological fragmentation” that may be an inherent characterization of the field of HCI and argued that this fragmentation needed be accepted, leveraged, or at a minimum coped with. The conclusion Carroll provided on conceptualizing the discipline of HCI is that “HCI is a meta-discipline, a community formed around the ever-expanding concept of usability” (Carroll, 2010, p. 11). Shneiderman (2011) supported this approach in his article discussing meta and micro-HCI. However, Carroll (2010) also stated that disciplinary models that can be used to address challenges in HCI, while rigid, might be useful tools. The foundational epistemology of HCI may be fragmented, but an acceptance of this fragmentation may be critical to the success of HCI as a discipline. As Carroll (2010) stated, structure for the discipline may not come for a shared epistemology but instead from an agreed-upon set of disciplinary models. HCI curriculum work, from the original 1992 effort to the present, builds on these key concepts (Hewett et al., 1992).

There have been two major spikes of effort with respect to defining a universal HCI curriculum. The initial spike was in 1992, when the Special Interest Group on Computer-Human Interaction (SIGCHI) decided to define the field, develop a recommended curriculum, and define the courses that make up that curriculum (Hewett et al., 1992). The group consisted of practitioners and scholars of HCI. The foundation of the curriculum was from a computer science perspective; however, the special interest group (SIG) stressed the importance of considering a broader perspective with specific emphasis on considerations for context of use. After a 2-year effort, the SIG produced a report and a website containing the reference material for the curriculum recommendation (Strong, 1994). The curriculum recommendation proposed
four courses that concentrated on computer science, psychology, and information systems. The curriculum working group provided sequencing recommendations, course objectives, course content, recommended prerequisites, and course resources. They also provided recommendations for how HCI might be incorporated into different disciplinary tracks. The body of work produced from this SIG carried the field for about 10 years. In 2014, through her time on the SIGCHI Executive Committee, education became a main focus for Elizabeth Churchill. She joined forces with Jenny Preece and Anne Bowser to re-examine the needs regarding an HCI curriculum. After 2 years of research, resulting in several publications (Churchill, Bowser, & Preece, 2013; 2016; Churchill, Preece, & Bowser, 2013), and input from members of the SIGCHI community, they recommended a living curriculum. The living curriculum was born out of the idea that the field was moving too fast to have a static curriculum. This, in fact, acknowledged Carroll’s (2010) assertion that HCI does not necessarily have a common epistemology; furthermore, this lack of common epistemology is characteristic of the field and should be embraced as such. Similar to Long and Carroll’s pursuit of defining the discipline, Churchill (2013) supported the need to define to some extent the knowledge, beliefs, concepts, attitudes, and scope of the philosophy in order to build and have community discourse. As of CHI 2016, the living curriculum remains the proposal; however, the investment needed to make it a reality has yet to come forth.

While these ideas were germinating, another approach on the topic of HCI curriculum and developing UX professionals arose in 2005. Bevan (2005) published an article at CHI 2005 recognizing the role of the UX professional. Like the scholars before him, he recognized the multidisciplinary nature of HCI and questioned how the field could both leverage the differences and reap the benefits of a multidisciplinary profession. He acknowledged that a lack of consensus remained about what constituted good UX professional practice. However, instead of
looking toward academic institutions to provide this skill set, he aligned with the Usability Professionals Association (UPA, now the User Experience Professionals Association, or UXPA) to create the usability body of knowledge and a curriculum to help fill the skills gap for a UX professional (Bevan, 2005).

This was the moment in which two streams began to be created for preparation of UX professionals. Well-recognized professionals and scholars (e.g., Norman, Schaffer, and Bevin) started to give certificate courses. Additionally, the websites Interactions.org, Usability.gov, and UXmatters.com were all created with content populated by well-recognized scholars and practitioners. Around 2010, following the rise of online courses such as MOOCs, additional and more structured programs on UX emerged from providers such as Coursera, Unicorn University, and Udemy. Most striking about these endeavors is the participation and contribution of people who are recognized as authorities by both scholars and practitioners.

2.4. Conclusion

This literature review explored the three underlying questions for this body of research:

1. How can organizations better capitalize on the potential of UX as an avenue to implement responsiveness to human emotional, behavioral, and psychological needs into their technology products?

2. How can diverse organizations more deeply embed UX design practice in their product development practices to increase their UX Maturity?

3. How can academia and industry prepare UX practitioners with adequate skill sets to select and carry out UX methods within organizational contexts as the field continues to change?
The following chapters explore these questions further. The User Data Spectrum Survey is designed as part of this dissertation research that organizations may use to first identify their orientation toward user experience. The aim here is to enable organizations to see how they can grow their UX capacity by more deeply embedding UX design practice into their product development practice and enhancing the skill set of their UX practitioners in a manner that fits with their orientation. Chapter 6 is a case study that analyzes how an organization more deeply embedded UX design practice into their product development. Finally, Chapter 7 addresses the question of how to prepare UX practitioners to best carry out UX methods within organizations.

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CHAPTER 3
THE NEED FOR A NEW DIAGNOSTIC TOOL TO MAXIMIZE ORGANIZATIONS’ UX CAPACITY

The prior chapter examined the literature associated with the three major themes driving this dissertation: the philosophical approach to UX, methodological approach to UX practice, and the practical approach to increasing UX capacity within an organization. Currently, no diagnostic tool exists that both helps organizations identify their orientation to UX and growth strategy for UX capacity and accounts for all three issues. This chapter establishes the need for such a tool by first discussing the rise of UX, the challenge of integrating UX with product development processes, and the challenge of measuring UX maturity within organizations that vary significantly in structure and culture. The User Data Spectrum is then described as a new method of evaluating organizations' approach to UX, and the need for a tool to measure an organizations' position on the User Data Spectrum is noted.

3.1. Why is the Need for UX Analysis Tools Increasing?

From a business perspective in the 21st century, global society could be defined as the experience economy (Pine & Gilmore, 1998). Customers have evolved from seeking functional benefits in the early 1900s, to seeking emotional and identity benefits in the mid-1990s, to seeking meaning benefits in the present day. Functional benefits served the practical needs of the workforce, such as assuring that factory line was built in a way that accommodated the biomechanics of the human body, enabling workers to perform the job as fast and effectively as possible. The functional focus was primarily about the speed at which a task could be accomplished. Emotional and identity benefits were best described by Norman’s (2004) Emotional Design as the visceral, behavioral, and reflective emotions that good design evokes.
The focus of emotionally stimulating products moved away from a quest solely for efficiency and effectiveness and encouraged the designer to capture the emotional aspects of the work as well (Norman, 2003).

A good example is the improved working experience for wine grape pickers who were given a product that allowed them to both capture and hold the grapes they picked, as well as the use of a comfortable chair when they were on a break from a tough day of grape harvesting (Norman, 2003). The makeshift chair allowed the tired wine pickers to re-energize by relaxing and engaging in conversation with fellow pickers (Norman, 2003). This example also illustrates the reach of design into all aspects of product development. Not only are the needs of the final customer, the wine buyer, considered; the needs of the people making the product are considered in design terms. Expanding on the emotional design concepts with the goal to create products that produce meaningful moments that translate into the desired meaning benefits. A good example of this is the Hug Shirt by CuteCircuit (https://cutecircuit.com/the-hug-shirt/). The Hug Shirt, named “one of the Best Inventions of the Year in 2006 [by] Time” (“Best Inventions of 2006,” n.d.; CuteCircuit, n.d., para. 11), is a shirt that allows people to send and receive hugs based on the strength of the sender’s touch, body temperature, and heartbeat. The shirt produces a meaningful moment because it responds to the basic human need for connectedness (Chien, Diefenbach, & Hassenzahl, 2013; Diefenbach, Hassenzahl, Eckoldt, & Laschke, 2010; Hassenzahl, 2013).

In response to the transition from function to emotion to experience, companies have had to evolve from a focus on products to a focus that encompasses brands and now experience (Diller, Shedroff, & Rhea, 2005). This transition poses a significant challenge to organizations because the concept of experience can be elusive and difficult to define (Jay, 2005). Hassenzahl
(2014) and Norman (2003) defined experiences as “memorized stories of use and consumption.” Activity theory research describes experience as a “complex combination of actions, emotions, and thoughts” (Kaptelinin & Nardi, 2006, p. 182). Hassenzahl (2014) further described an experience as subjective, holistic, situated, dynamic, and worthwhile. Sheldon, Elliot, Kim, and Kasser (2001) provided a light in the dark tunnel of trying to capture experience with their study linking universal psychological needs to experience. The Hug Shirt, for example, evokes the experience of getting and sending a hug, which is linked to the universal psychological need of relatedness. Other universal psychological needs that could be used as the patterns for experience design are autonomy, competence, self-actualization, physical thriving, pleasure–stimulation, money–luxury, security, self-esteem, and popularity–influence (Sheldon et al., 2001).

Responding to the incredible challenge of clearly defining what makes an experience, companies have embraced the growing UX field. The role of user experience personnel (otherwise labeled as user-centered designer, interaction designer, human-centered designer, or usability engineer, among other titles) is to blend engineering, design, and science (Carroll, 2010) and shape products that meet customer expectations in form and function as well as evoke emotional and meaningful experiences (Hassenzahl, 2010; Hassenzahl & Wessler, 2011; Norman, 2002).

Several indications in industry reflect rapidly growing demand for this field. On the job search site, Onward Search, the number of UX job requests has increased 171% from 2011 to 2012. Another technical recruiting firm in California, QConnects, reported a 70% increase in UX job requests between 2011 and 2012 (Baldwin, 2013). The salary of UX people in industry has also increased. According to The Creative Group, a division of Robert Half Technology, salaries went up 6.2% in 2012 and were expected to increase an additional 4.8% in 2013 (Baldwin,
2013). Top IT companies are putting UX people in positions of power, as indicated by Yahoo’s hiring in 2012 of Marissa Mayer, a top executive. IT companies are also restructuring to accommodate UCD practice, as suggested by the popular Cagan model of dual track development and lean UX (Cagan, 2008).\(^1\) Regardless of the trend, what happens if UX is not taken into consideration when designing products? According to Curt Raffi, marketing director for Metanga (the software-as-a-service division of MetraTech), if companies are not “embracing user experience, then they don’t understand what it means to create an application or an online service” (Baz, 2013, “In-House or Outsourced?” para. 5).

When companies are able to deliver quality user experience, there are incredible returns. Most notable is the iPhone, which set a standard of what a user experience should be with a product. Despite the many usability issues with the iPhone, users love it and are loyal to the product. The iPhone has shown its impact with market share, size, and growth since its launch in 2007 (Laugesen, 2010). The iPhone had 30% of the market share in 2009 (only 2 years after launch); 42 million iPhones had been sold as of December 2009, and 36% of people planning to buy a smartphone planned to buy an iPhone as of September 2009 (Laugesen, 2010). Seven years later, in 2015, Apple iPhone still controlled 43.5% of the smartphone market (Campbell, 2015).

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\(^1\) The Cagan model is a product development method articulated by Marty Cagan. In this method, there is a concept of a Sprint 0 in which UX, technical, and business leads define the product direction using various UX methods. Lean UX is a practice of UX that emphasizes high levels of collaboration between the development teams and the UX practitioners over documentation and artifact deliverables.
Of the nine factors contributing to the iPhone’s success, its ability to “understand and meet [user] preferences” was the second most important factor (Laugesen & Yuan, 2010, p. 96). Even if users opt for another smartphone, the sleek design and integrated experience of the iPhone has put pressure on competitors to deliver a similar experience in order to have similar market impact and profits. The success of the iPhone also derives from its ability to deliver meaning; it meets many of the universal psychological needs mentioned above (Sheldon et al., 2001). It promotes security, for example, for parents who feel they can better locate their children. It even inspires self-esteem in those who were scared of technology because they might break it but can now zoom through the iPhone’s features.

Studies have linked UX not only to increased sales but also to increased productivity, customer satisfaction, and loyalty; decreased training and support costs; decreased development time and costs; and decreased maintenance costs (Bevan, 2005; Venturi & Troost, 2004). Although UX offers significant monetary incentives, interestingly, companies are usually not aware of these benefits. The attraction of UX remains the promise of enabling companies to deliver the experience that users are demanding. However, that experience remains elusive because of the problems inherent in UX. The next sections examine the problems that new diagnostic tools must take into consideration: (a) the difficulties inherent in UX; (b) the difficulties inherent in product development; and (c) the variations in how organizations incorporate UX into product development.

3.2. Why Is UX So Hard?

Designing and developing technology systems is a complicated process. This body of research defines a technology product as any computer-based entity, which includes software. Usually technology products also include a hardware component, but this is not required. For
example, the plethora of software as a service applications in the market today are provided by companies who are open to any hardware platform. That is not to say they ignore the hardware effects on the use of their software, but hardware is something they do not control for.

The process of designing and developing a technology product involves engineers, designers, marketers, human resources personnel, managers, analysts, and many other parts of the business. Each person plays a vital role to the success or failure of that product. There are hundreds of ways to go about developing technology products, and thousands of variables that must be considered. Historically, the process of developing technology followed a general pattern:

• An innovative idea was born in the mind of one or a few engineers who tinkered away to see if the idea was possible.
• The idea was made into something tangible, which would be demoed to management.
• If management saw potential, the company would conduct market research to assess if it was a viable opportunity.
• Next, the manufacturing and/or development plan would be put in place with just-less-than-needed resources.
• The completed product would be put through a quality assurance/testing process.
• Once it passed the quality checks, a product would finally be released (International Organization for Standardization, 2015).

Over time the process has been dramatically sped up with the advent of agile development methods. While the process has become leaner, with iterative steps, more frequent testing, and much less emphasis on planning, the general process remains the same. The beginning of the process is still an innovative idea in the minds of engineers. In the past 10 years,
UCD has started to penetrate the development process (Bevan, 2009; Earthy, Jones, & Bevan, 2001; Jokela, 2010; Salah & Paige, 2012; Tu, Zhang, He, Zhang, & Li, 2011; Venturi, Troost, & Jokela, 2006).

UCD is the most dominant methodology within the field of UX; the ISO standards and UX maturity models often are tied to this methodology. Though I recognize other methodologies and practices exist within the UX field, for the purposes of this section of this chapter, I will use the terms UCD and UX almost interchangeably because UCD is the most formal, most prevalent, and most researched methodology. Most often, the adoption of UCD starts in the form of usability testing. Once the product has been developed, usability testing is conducted to understand the areas in which users struggle with the product. Depending on feasibility, minor changes are made or training plans created to overcome the usability challenges. Today, companies are starting to take more seriously the opportunity that the UCD process offers. They see potential in involving users early in the development process, rather than waiting until the systems is completely developed. While the tide is slowly changing, challenges and obstacles remain for companies to overcome in order to fully realize the benefits that UCD may offer.

At the heart of UCD is user data: any information that represents the thoughts, behaviors, words, needs, wants, context, and environments of the end stakeholder(s) interacting with the system. Three critical aspects of design and development pose challenges to how companies capitalize on user data: (a) what value decision makers place on user data; (b) how UCD methods are carried out and the resulting user data are interpreted; and (c) how the user data are prioritized in the decision-making process and ultimately manifested in the final product.

To be clear, this research does not recommend UCD as a one-size-fits-all solution to address these challenges. Just as the agile method of development has a unique hybrid in each
company, so should UCD. Nor does the research propose a strict predictive model that
compaines may use to improve their UCD practice. Unfortunately, there are too many complex
variables in the environments in which companies design and develop technology products.
Instead, this research proposes that each organization has an inherent orientation toward user
data; once a company understands its orientation, it can focus on four key growth variables to
make necessary changes and improvements in the practice of UCD. Not only is this body of
research aimed at helping companies improve their UCD practice, it also supports the adoption
of a strategic user experience practice that will lead to better collection, interpretation, and
implementation of user data.

UCD, or whatever UX practice a company employs, has to be integrated into the product
development process. Thus, makers of any new diagnostic tool need to understand not only why
UX is so hard but also the challenges inherent in product development that all organizations face.

3.3. Why Is Product Development So Difficult?

Every company approaches product design in a slightly different way, but there is a
general pattern that most companies follow. It starts with a concept. During the concept phase,
there are three major initiatives that usually take place: (a) market opportunity and/or response
based on market research usually conducted by marketing or business analysts; (b) product
vision usually pushed by business leadership or engineers; and (c) user research driven by user
experience designers. Market research directs the product toward opportunities in the market for
the product or in response to competitive pressures. Product vision is usually driven by internal
thought leaders based on innovation. User research is conducted by gathering direct or indirect
user data within the product scope. All companies are structured differently, and these three
major activities can take different forms with different roles depending on the structure of the organization.

Once a product has been loosely identified, the next major effort is technical feasibility and iterative prototype testing for concept validation. These are parallel track efforts. In addition, there could be additional business justification activities that need to take place.

When the company has more clearly scoped the product and identified technical constraints, then it moves into carving out the requirements for the product. Most important in this step is identifying the minimal viable features given the market opportunity, product vision, and user research. Management sets timelines, marketing identifies how to bundle and sell the product, and development begins.

Ideally, the UX effort stays about 0.5–2 sprints ahead of development, conducting usability testing on requirements to be fed into development. A technical lead is also involved in the UX effort to ensure technical constraints are understood and accounted for.

Quality assurance measures are a part of every sprint release. Quality assurance involves both verification and validation activities. Validation activities use the same scenarios generated during concept testing. The overarching goal is to release as often as possible. In order to do this and keep the cadence, ready access to users is critical.

The last thing that any diagnostic tool needs to account for is the difficulty of incorporating UX into product development practice.

3.4. Why Is Incorporating UX Into the Product Development Process So Difficult?

Verification and validation are two fundamental concepts of software development. Verification answers the question, “Have we built the product right?” Software engineers, information architects, and programmers are primarily responsible for addressing this question
using their knowledge of the structure of programming languages, tracking bugs, and mechanisms to integrate data elements. Validation answers the question, “Are we building the right product?” Project managers, business analysts, and quality assurance and interaction designers are primarily responsible for the validation question using sound requirements collection, testing, and management practices. Answering “yes” to the validation question essentially means that the product being developed is what, when, and how the customers desire the product. This leads to the purchase, use, and proliferation of the given product, which in turn reaps a positive return on investment for the company producing the product. Understanding what customers need, want, and are willing to buy is an incredibly difficult task. Customers are heavily influenced by many factors such as their social network, their level of confidence with technology, and their previous technology experiences, to name a few. Furthermore, working with customers and getting their perspectives on the development process is a difficult practice, which often lacks structure and takes a level of expertise to translate customer input into programmable requirements. As companies start to move toward more iterative software development methods, developing working relationships with stakeholders and customers throughout the development process is gaining in popularity. UCD is an approach to product development, which puts the end user at the heart of all development decisions. UCD consists of many different practices and methods, which are not tied to any specific software development methodology. Therefore, UCD activities may be integrated into any organization’s system development process. When companies implement UCD activities at the right time, in the right way, and by the right people, they are better able to deliver products that are more user friendly for customers, employees, and organizations. Ultimately, UCD activities allow companies to
validate their products and deliver systems so that they can feel confident in answering “Yes, we are building the right product.”

As mentioned before, this research focuses on UCD because it has become the most common practice of UX in industry. Norman (1986) initially coined the term “user-centered design” and built on this original work with his more popular book, *The Psychology of Everyday Things* (later revised and retitled *The Design of Everyday Things*; Norman, 2002). In his work, Norman highlighted hundreds of everyday objects that are confusing to use. He advocated for products to be designed based on the needs and tasks of the end user. The structure of tasks associated with the object should be simplified and the operation of the object should be clearly visible (Norman, 1988). One classic example Norman gave is the stovetop. The burners and burner controls typically do not clearly map to one another; the user is left guessing which burner control is linked to which burner or forced to read a small textual label. Norman also described the concept and importance of understanding a user’s mental map as it relates to the use of an object. For example, many users think that by turning the burner control to high, the actual burner will heat up faster than putting it at a low setting. This is based on the users’ mental model that higher means faster and lower means slower. In reality, the burner will heat at the same rate irrespective of the temperature setting. The last major concept that Norman introduced is the popularizing of the concept of affordances, originally created by Gibson (1977).

Essentially, does the object visually and/or physically communicate a particular action that it affords to the user? Norman described the concept of affordance through the example of a door. If a door has a long horizontal bar that may be pushed, this tells the user that the door needs to be pushed in order to open. However, another door may have an outward-protruding handle to be
grasped, indicating that the door must be pulled in order to open. Norman applied the term UCD more broadly to all physical objects not just software.

Much of Norman’s work stemmed from the Applied Information-Processing Psychology Project (AIP) done in 1974 at Xerox Palo Alto Research Center. AIP attempted to capture a user’s applied psychology within a given context. In 1999, the International Organization for Standardization (ISO) established the human-centered design (HCD) principles (originally ISO 13407 (1999) recently updated to ISO 9241-210 (2010)). These ISO standards describe HCD principles to include active involvement of users and a clear understanding of user and task requirements. In 2010, the Usability Professional Association (UPA) defined UCD as “An approach or philosophy that emphasizes early and continuous involvement of users in the design and evaluation process.” (User Experience Professionals’ Association [UPA], n.d.). Through the years, the focus of UCD has shifted from the development of physical objects to the design of software tools. This transition is in alignment with the shift in industry focus and the human–computer interaction (HCI) community. HCI practitioners and researchers are the prime advocates for the UCD approach to the design and development of products. The HCI field has had three generations of maturation.

The first generation of HCI focused on computer science and cognitive psychology. Norman, a cognitive psychologist, was one of the field’s founding fathers. The primary focus during the first generation was on the cognitive connection and impact between technology and users. The second generation focused on the physical nature of objects, such as Norman’s affordance concept. The research in this generation largely falls under the umbrella of human factors. The exact focus of the third generation (the current generation) is yet to be determined, but the most popular topics include ubiquitous computing, social computing, and virtual reality.
Likewise, job titles for those who specialize in UCD have changed from human factors specialist and usability engineer to user experience specialist, UCD specialist, or HCD specialist. The evolution of the HCI field has influences UCD theory and methods. As a result, UCD activities today encourage a broad understanding of the user’s cognition, mental maps, physical capabilities, tasks, goals, activities, social context, and environment. UCD may be considered a practice, a methodology, a framework, a philosophy, a discipline, and an approach to system development and evaluation. Key tenets of UCD are that it is data-driven, contextual, focused on the users and their tasks throughout the system development lifecycle, grounded in measurement and observed user behavior, and focused on user performance as well as user satisfaction. But most important to businesses, UCD is a method by which return on investment may be measured and the artifact may be evaluated.

UCD is both a philosophy and a set of activities, which may be plugged into any software development process. As a philosophy, I assert that there are three key assumptions with UCD. The first key assumption of UCD is that users inherently know what they want; however, they lack the skills, abilities and knowledge to be able to articulate their requirements in a way that would allow developers to build software. The second assumption of UCD is that having the user in mind for every design and development decision is paramount to making products that are more user friendly, with which users will be able to perform tasks with greater ease and higher levels of satisfaction. The third key assumption of UCD is that the artifact (or system being developed) may be measured in terms of user performance and user satisfaction. UCD is not simply asking users what they want nor is it the design of the user interface. That would be fruitless; as Nielsen (1993) would say, “Users are not designers, and designers are not users” (p. 91). UCD as a philosophy has the goal of creating a meaningful, productive, and satisfying
experience through technology for a target set of users given a particular task or series of tasks. Satisfaction is measured through immediate response to the interaction. Productivity is measured through task accomplishment and all relative task goals. Meaning is more difficult to measure and speaks to the longitudinal effects of the artifact on the user.

There are two pieces of work that best capture the concept of the meaningful experience: Flow (Csikszentmihalyi, 1990) and Emotional Design (Norman, 2004). Csikszentmihalyi (1990) described the interaction elements that create the optimal experience for users, which promote feelings of enjoyment, creativity, and deep satisfaction with life. As Norman (2004) described it, a meaningful experience can occur on three levels: visceral, behavioral, or reflective. On the visceral level, a user finds the object to be aesthetically appealing. On the behavioral level, the user is able to effectively use the object and finds pleasure in doing so. On, the reflective level, the object appeals to the user’s self-image, pride, and values. The object is a reflection of the user’s identity.

Given the UCD philosophy, if users know what they want but lack the knowledge, skills, and abilities to articulate this into a workable set of requirements, how is the development team to accomplish the UCD goal? This is where UCD activities come into play. If used at the right time, in the right way, and by the right people during the system development process, UCD activities allow the development team to deliver a product that creates a meaningful, productive, and satisfying experience for the target set of users. Through observed and measured data, the development team can to put the user at the heart of all development decisions.

There are conflicting views of the proper UCD process. At a broad viewpoint, it is generally agreed that there is a planning phase, an analysis phase, a prototyping phase, and then a deployment and evaluation phase. Treating UCD as a process can lead to confusion on the part
of traditional development teams, as they already have a system development process in place. Where, when, and how does the UCD process fit into the already established development process? To avoid this confusion, UCD is treated in this research as a series of activities that can be plugged into whatever development process a team currently uses. The UCD activities have been divided into six general categories, which align with most software development processes. The six categories are: (a) explore the problem space; (b) profiles, personas, and scenarios; (c) task analysis; (d) design and prototyping; (e) development; (f) deployment and evaluation. Within each category, there are several UCD activities that a company may incorporate into its development process in order to capture the perspective of the user. There are several factors that must be considered in order to determine what, when, how, and by whom UCD activities should be carried out for a new tool, which are addressed in the next chapter.

3.5. The Challenge of Measuring UX Maturity: The Differences Between UX and Product Development Across Organizations

Despite the promise UX offers, effective development and implementation remain elusive. UX practices manifest differently in every organization. There are a handful of UX maturity models that describe how human-centered an organization is, both in terms of its orientation to the product and its culture, and assess which level of maturity the organization currently exhibits (Earthy, 1999). Maturity models illustrate how people and/or organizations progress through stages of development toward an end goal. The general premise of all the maturity models is that organizations progress through the levels of maturity as they grow their UX abilities and investments. What the maturity models fail to fully address is how one organization is able to progress from Level 1 to Level 2. They also do not address the fact that progress may look and be very different from one company to another. For example, one
recommended step in the maturity path is to put UX-skilled people in positions of power and authority to gain strategic advantage in implementing UX practices in organization processes. Essentially this recommendation encourages companies to find the leverage points and place UX resources there. But all companies have different structures with different leverage points. An engineering organization (Baxter, Courage, & Caine, 2015) may require the UX resource to be a strategic vendor on contract with the lead engineer instead of an internal UX resource. A marketing organization, however (Baxter et al., 2015) would require a focus on modifying marketing practices to augment UX; marketing is traditionally more attitudinally focused whereas UX is behaviorally focused. Each organization will mature from Level 1 to Level 2 but must do so in ways that align with its organizational culture.

Right now there is no uniform practice for using diagnostic tools to help organizations identify where on the UX maturity model they are or chart the right course for their UX practice and investment. The maturity models feature categories that list observable behaviors and statements that reflect an organization in every step of maturation. Some tools exist, however, that have made great strides in helping organizations identify the right course of action relative to their UX practice. For example, companies can use tools like the UX Planner, developed by Ferre and Bevan (2010) to select the best UX method for them, given their particular risk tolerance and resource availability. Although Bevan (2009) made a groundbreaking start on the journey to a diagnostic tool, much more work is needed in this area.

What still remain to be addressed are the more subtle cultural aspects that influence UX practice, such as the skill set and attitude of the organization’s employees or how representative the designer of the system is of the user of the system and how strong the design vision is within the company. The diagnostic tool presented in Chapter 4 of this dissertation, the User Data
Spectrum survey, addresses these cultural aspects. The User Data Spectrum survey builds on UX maturity model research and the prior diagnostic tool work such as the UX Planner. The aim of the User Data Spectrum is to help organizations identify what type of organizational culture they have relevant to their UX practice. Developing a clearer understanding of this measure will enable them to build their UX capacity by engaging in critical activities that help will facilitate their progress through the maturation steps.

However, it should be noted that the use of the term organizational culture in this dissertation is not entirely adequate to describe this concept. There is no single, agreed-upon definition of organizational culture. The outcome of organizational culture is a “pattern of behavior” (Kilmann, 1985, p. 41) defining how people within the company complete their work and interact with one another and with people outside the organization. The particular products that the organizations produce influence their organizational cultures, but many other more abstract characteristics shape organizational culture as well. Resource allocation (as mentioned above), organizational structure, performance measures, leadership, expressed values, and the tools that organizations use are just a few things that shape organizational culture (Needle, 2010).

3.6. The New Diagnostic Tool: The User Data Spectrum Survey

Companies need a new diagnostic tool to identify where they fall on a spectrum in terms of their orientation toward user experience and their capacity to evolve their UX practice. For this research, the focus is on those aspects of culture that have direct impact on UX practice and have not been covered by previous research. I claim that organizational culture reflects a company’s orientation toward user data management. Once an organization’s orientation is identified, four key areas identified in this research need be assessed in order to grow UX capacity: design vision, process, representativeness, and skill set. It is important to note that the
unit of analysis is on the individual level for the variables of representativeness and skill set and on the organizational level for the variables of design vision and process. As the following section demonstrates, this complexity is necessary because it has implications for understanding where organizations fall on the data spectrum and therefore how they may consider growing their UX capacity to maximize success of their products.

3.7. What Is UX Capacity and What Does It Mean to Have It?

UX is fundamentally related to the design of a system. The role of UX could be primarily focused or span a range from the front-end design to the back-end architecture design and everything in between. Capacity is “the facility or power to produce, perform, or deploy” (“Capacity,” n.d.). Putting these two concepts together, UX capacity is an organization’s facility and power to perform UX practices and produce UX results. Organizations demonstrating more advanced maturity levels in the maturity model research have high UX capacity (Earthy, 1996). According to Earthy’s (1996) model, at Level E (institutionalized), for example, the human-centered approach of UX influences the management of all system lifecycle processes (Earthy, 1996). Organizations at Level E give resources, people, and attention to their UX practice. It is interwoven into all of their processes and is at the forefront of their minds while developing a product. The person in charge of UX has the money, resources and power to implement UX system wide. While there is a rich history of maturity models, a broad definition best serves to make the connection between UX capacity and how UX manifests in organizations. Though maturity models address the power part of UX capacity, they sometimes fail to fully address the facility part of the definition (Earthy, 1996; Earthy et al., 2001; User Experience Professionals’ Association, n.d.). In other words, they fail to facilitate the conditions needed. As an example, the skill set of the UX resource carrying out the UX practice is an indicator of
facility. If the team charged with UX development has a skill set based in engineering (with no UX), then it might not be able to imagine how to facilitate the conditions needed to build UX in the organization. The diagnostic tool presented in the next chapter of this dissertation addresses both facility and power variables relevant to UX practice, which, if invested in, will increase an organization’s UX capacity. The purpose of the diagnostic tool is to identify where on the spectrum of orientation the organizations fall.

3.7.1 The User Data Spectrum

On one end of the User Data Spectrum is “genius” design, and on the other end is “participatory” design. Participatory design was originated by Suchman (Suchman, 1988). Organizations that land closer to the genius side of the spectrum tend to have a creative philosophical orientation. The creative orientation attributes product success to the brilliance of engineering genius. Companies with that orientation highly prize “Eureka!” moments and innovation. A common phrase one might hear within a creative organization is, “We know what we want to create and have a strong sense of what users will like. Let’s let the market decide once we get our great idea into the users’ hands.” Respondents on the other side of the spectrum tend to have a collaborative philosophical orientation to product development. Those with a collaborative orientation attribute product success to how well the company enables end users to shape their own product experience. Compassion and empathy for the end user are highly prized in this orientation. A common phrase one might hear within a collaborative organization is, “If we don’t get users to design the final product with us, we will never deliver what they need. Our success depends on their deep involvement.”

The User Data Spectrum survey empowers organizations to identify their location on the spectrum as shown in Figure 3.1. Knowing where they are on the spectrum is vital because it
should inspire them or help them see how to advance to another level on the spectrum. For instance, institutions that land on the participatory end of the spectrum will not benefit from trying to move themselves to the other end of the spectrum. Rather, the benefit to the company derives from better understanding their UX identity so they can realize their unique potential. As noted earlier, the way one organization is able to progress from Level 1 to Level 2 in the maturity models may be very different from the progress of another company.

![Figure 3.1. The User Data Spectrum.](image)

After the orientation is identified, this research has revealed four key variables, as described below, that need to be understood to see precisely how the differences in the way companies mature should be taken into account to enable truly effective UX design: (a) the skill set of the user data source or the person/group making decisions on behalf of the user(s); (b) the representativeness of the user data source; (c) the strength of the product vision within the organization; and (d) the process by which the organization develops products. These four key variables emerged from 30 interviews conducted to inform the User Data Spectrum Survey. Additionally, the researcher of this dissertation has 10 years of experience in the user experience field and has worked with over 150 companies in a consultant capacity. During those
consultation engagements, a standard set of information is collected specifically about the organization’s orientation, UX practice, and team structure.

Figure 3.2 illustrates the relationship between the User Data Spectrum orientation placement and the maturity path after investing in the four growth variables.

**Figure 3.2.** UX maturity from the end-user orientation on the User Data Spectrum.

### 3.7.2. Skill Set of the Source

Some companies hire or invest money in UX-educated and -experienced people, while others hire or invest money in graphic designers with a dash of UX exposure. Still others reassign people in other capacities such as business analyst or engineering into a UX job but give them little to no professional development in the UX field. Every way that UX manifests has consequences. When a person has been reassigned to a UX job with no UX background, UX
continues to be unclear and ill defined; it hurts the overall ability to advance UX practice, and it most likely is very frustrating for the person trying to perform the job.²

3.7.3. Representativeness of the Source

Another variable in how UX manifests is the degree to which the people designing and making decisions about the end product are representative of the end user. For example, they may be representative of the end user in terms of their demographics, aptitude, characteristics, content knowledge, or similar personal experience. One could argue that Google search engineers are representative of the end Google user because they personally have had the experience of trying to search for something on the web. In contrast, a UX designer designing displays for a tractor cab who has no agriculture experience would not be representative of the end user. The UX designer designing the tractor may be able to intellectually recognize the impact of the long days under difficult conditions that a farmer has to endure; but someone who has not lived that experience has only a limited ability to viscerally understand that life.

3.7.4. Product Design Vision

One last major variable in how UX manifests depends on the strength of the experience vision for the product. For example, Steve Jobs had a clear experience vision for his users. He was going to change the world by delivering computing to the masses in a way that was fun and fulfilling (Hapgood, 2011). The phrase “experience vision” also includes a phenomenon where there can be anywhere from one to hundreds of people who contribute to the making of a product. The challenge for many people involved is having a clear sense of the intended experience with the product. What sometimes is lacking is an experience-based vision for that experience.

² When a person who is not trained, educated, or experienced in UX is placed in a UX role, it also hurts the field’s ability to grow and advance the global practice.
product. In other words, they may not know how the end users’ life will be better or different because they have this product. Getting a clearer measure of experience vision is important because without it different aspects of a company are operating from very different assumptions.

3.7.5. Product Development Process

Finally, the fourth variable considered in the User Data Spectrum tool is the product development process that the organization and the product team follows and how much user experience is incorporated into that process. There has been substantial research on the UX process and implantation of UX methods in product development processes (Bevan, 2009; Earthy, 1999). Creative process, method selection, access to user data, and user data collection, interpretation, and implementation are just a few critical UX activities that could be infused into the product development process within the company. Which activities and how the activities are carried out are often paramount to the success of UX adoption within a company.

In summary, the User Data Spectrum tool empowers organizations to identify where on the spectrum they fall by assessing the organization’s orientation followed by four major variables: (a) the skill set of the user data source or the person/group making decisions on behalf of the user(s); (b) the representativeness of the user data source; (c) the strength of the product vision within the organization; and (d) the process by which the organization develops products. The next chapter will describe the design of the User Data Spectrum Survey aimed at capturing the variables articulated in this chapter.

REFERENCES


CHAPTER 4

USER DATA SPECTRUM SURVEY DESIGN

4.1. Goal and Design of the User Data Spectrum Survey

4.1.1. Aims of the Survey

The concept of user experience (UX) can be elusive, and the skill set required to implement optimal UX is difficult to find. There is growing interest in UX; for instance, relevant university courses are being designed. Yet, there are not enough courses or other resources to meet the demand for accurate understanding of developing products with UX methodology. Thus, companies seek to expand their ability to capitalize on user design experience. This chapter describes a survey that represents the first step toward the kind of tool that Chapter 3 indicates is needed. To be clear, the survey is intended to inform the eventual development of a fully validated diagnostic tool. This current survey aims to measure key factors that influence an organization’s ability to grow in its practice of UX design. It responds to the problem described in each of the preceding chapters: the tools that exist to measure the maturity of an organization do not address the uniqueness of each organization and the diversity of UX practices across organizations. Therefore, this survey is designed to gather information to shed light on how UX practice can be better understood. This survey operates on the hypothesis that each organization has a unique culture that affects how it traverses a UX maturity model. With greater awareness of organizational culture as it relates to UX variables, the ability of an organization to strengthen its UX capacity increases. A particular aim of this survey is to capture information typically more associated with humanistic inquiry. Though it is not always appropriate to project individual traits onto an organization, the concept of selfhood, particularly the goal of having an authentic self, does have an equivalent in an organization’s identity. Though one individual’s
growth may vary from another individual’s growth, both may be maturing. To extend this analogy to organizations, this survey aims to tease out how understanding these subtle differences can enable an organization to embrace its particular identity and adopt UX practices that are more conducive to that organization’s growth and success. This chapter describes the rationale for the design of this survey and analyzes the challenges inherent in this project.

4.2. Overview of Opportunities and Challenges Represented in the Survey

The objective of this research is theory building. Though the work is informed by prior research, it aims to create new theoretical explanations for some of the phenomena emerging in this dynamic and fast-changing field. The formulation of the hypotheses driving the design of this tool, in part, reflects my three years of experience working within organizations exploring these research questions and trying to identify the variables that drive the differences in UX practices. One such question, for example, is: Why are two organizations that are both at Maturity Level 1 (as described by any of the UX maturity models on record) using very different UX practices and having equal success?

One goal in designing and executing this survey was to include a range of companies and types of employees that are representative of the product development industries. This study has managed to collect information from a diverse array of companies. They vary in size, ranging from one to more than 10,000 employees, and they produce a diverse array of products including manufactured products, hardware, software, and services.

4.3. Overview of the Supporting Survey Theory

The survey in this research is the first step toward creating the final User Data Spectrum Tool. The final tool is beyond the scope of this research. The fundamental theory supporting this survey is that all organizations have an inherent orientation toward end-user data. If an
organization can identify its End-User Data Orientation, it can better invest in the four growth variables in a manner that aligns with its orientation. The result would be an increase in its UX capacity (an organization’s facility or power to perform UX practices and produce UX results) and ultimately a greater UX maturity (as defined by the UX maturity models).

An organization’s end-user data orientation lies on the User Data Spectrum. On one end of the spectrum is “genius” design, and on the other end is “participatory”. Organizations who land closer to the genius side of the spectrum tend to have a creative philosophical orientation. As noted in Chapter 3, companies with a genius orientation attribute product success to the brilliance of their internal employees whereas companies on the other side of the spectrum tend to have a collaborative philosophical orientation to product development attributing product success to early involvement with end-users.

This research constitutes a step toward designing a final tool that will empower organizations to identify their location on the spectrum shown in Figure 3.1. Knowing where they are on the spectrum is vital because it should inspire them or help them see how to advance to a higher UX maturity level in alignment with their End-User Data Orientation.

After the orientation is identified, four key variables need to be understood to see precisely how the differences in the way companies mature should be taken into account to enable truly effective UX design: (a) the skill set of the user data source or the person/group making decisions on behalf of the user(s); (b) the representativeness of the user data source; (c) the strength of the product vision within the organization; and (d) the process by which the organization develops products. Figure 3.2 illustrates the relationship between the User Data Spectrum orientation placement and the maturity path after investing in the four growth variables.
4.4. Survey Design

4.4.1. Good UX Research Practice Versus Organization Orientation

It is possible to witness good UX research on the genius and participatory side of the data spectrum. Clearly delineating the difference between good UX research practice and organization orientation, however, is problematic. The line between providing strong facilitation to drive UX deliverables and acting on behalf of the users is not easily drawn. The key to understanding this challenge lies in making the distinction between facilitation of processes that lead to UX deliverables and business decisions about the contents of the UX deliverables. It is therefore necessary to differentiate three dimensions where facilitation and decisions about content may take place: collection, interpretation, and implementation. (Table 4.1).

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Collection</td>
<td>Gathering user data</td>
</tr>
<tr>
<td>Interpretation</td>
<td>Translating data to system requirements</td>
</tr>
<tr>
<td>Implementation</td>
<td>Integrating data &amp; requirements with system</td>
</tr>
</tbody>
</table>

However, this differentiation is not obvious; interviews with user researchers employed by companies participating in the survey design indicated confusion about the difference between orientation and the common practice of doing user research. For example, a genius company may collect user data early on in the design process. The way it approaches and interprets user data will differ from how a participatory organization does these tasks. Both, however, are facilitating a research engagement. The confusion apparent in the interviews with UX research employees indicates that it is important to define the practice of facilitation before examining the three areas of collection, interpretation and implementation. Facilitation is a...
structured process that is repeated, irrespective of the system that is being designed. It is a structured way to get data, a structured way to interpret data, and/or a structured way to implement data. Thus, it is related to the UX methods that are used to generate UX outcomes. Good UX research practice requires good facilitation. For example, using a card sort method is a form of facilitation to improve information architecture design. In the card sort method, data is obtained through asking users to place variables into categories (open or closed). This is a structured process that is repeated regardless of the system that is being designed. After users have placed variables into categories, the next step is to look at tree graphs or item-by-item matrices to interpret the data. Then, the last step in the card sort process is to generate some form of communication artifact to give recommendations on design direction to the development teams. This process demonstrates the concept of facilitation.

Facilitation takes place during all three dimensions where decisions about content may take place: collection, interpretation, and implementation. Collection occurs when the organization gathers data about the user. Interpretation occurs in the act of translating the data collected into system requirements. Implementation occurs when the data and interpretation of the data is integrated into the system. Table 1 lists the three dimensions of user data handling.

How facilitation manifests in each of these three different dimensions reflects where an organization may fall on the User Data Spectrum, because it indicates how inclined an organization is to interpreting on behalf of versus interpreting in collaboration with end users. For example, how might the card sort facilitation description differ in a genius design type of company and a participatory design type company (as described in Chapter 3)? During the collection phase of card sort, both a genius and a participatory company ask the user to place variables into categories (open or closed). A genius company may create the variables and prefer
a closed method because it will have made decisions on behalf of the user as to which variables
needed to be considered. However, a participatory company may work with the users to create
the variables that need be grouped and may prefer an open method.

Interpretation of the data is the next part of the process. After users have placed variables
into categories, the practitioner looks at the tree graph or item-by-item matrix. A genius company
may look at the tree graph and make a determination about the best information architecture to
implement based on the analysis of data processed. However, a participatory company may
include the users as it reviews the tree graph or item-by-item matrix and ask for confirmation of
what the data is suggesting for the desired information architecture.

The last step in the card sort process is implementation. The goal here is to generate some
form of communication artifact to give a recommendation on design direction to the
development teams. A genius company determines when, how, and where to implement the new
information architecture. A participatory company may involve the user in deciding when, how,
and where would be best to incorporate the new information architecture. In both cases, the
company follows the card sort method. The difference is the degree to which end users are
involved in the actual interpretation and implementation of decision making throughout the
process. ³

³ During the collection phase, the distinction between genius and participatory is less clear as
very few companies would collaborate with users to determine the collection items. The
propensity of an organization to involve the end user in those decisions is at the heart of the
organization’s orientation.
4.4.2. Systems Knowledge Versus Content Knowledge

When looking at best practice, there is another dimension of *design with* versus *on behalf of* that needs to be considered. A user’s ability to effectively design with depends on two variables, making four dimensions. The two variables are their knowledge about the system and their knowledge about the content of the system. Table 4.2 illustrates these four dimensions.

<table>
<thead>
<tr>
<th>System knowledge</th>
<th>Content knowledge</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Singular</td>
<td>System singular</td>
<td>System singular</td>
</tr>
<tr>
<td></td>
<td>Content singular</td>
<td>Content global</td>
</tr>
<tr>
<td>Global</td>
<td>System global</td>
<td>System global</td>
</tr>
<tr>
<td></td>
<td>Content singular</td>
<td>Content global</td>
</tr>
</tbody>
</table>

*Note.* These are the two variables that affect a user’s ability to participate in design. Users in the lower right corner are best for participation.

For example, if a company were developing a text-editing tool and wanted to take a *design with* (more participatory) approach, then it would first need to consider whether the users understand the system of word processing. For example, do they understand the basic functionality of text editing such as cut, copy, and paste functions? This is a purely technical understanding of these things. The other issue to consider is their content understanding. For example, do they understand the concept of cut, copy, and paste and how a user would need to use those functions? If the answer is yes to both of those questions, then the second variables need be considered. Do the users only know these things relative to their own experience with text editing tools or do they know them on a more global scale? For example, do they have an understanding of the 20 text editing tools in the industry today, their code structure, and the functionality they offer? I call this differentiation the singular versus global understanding. In summary, the two variables on four dimensions are system singular, system global, content
singular, and content global. If a company wants to pursue a design with approach (i.e., full participatory), it will be more successful if the users with whom it wants to design have a high global understanding for both system and content. The more the end user tends toward singular understanding, the more the company may need to consider less design with and more design on behalf of, moving it to the left on the User Data Spectrum.

To recap, orientation on the User Data Spectrum needs to consider the degree to which the organization’s philosophical perspective is collaborate versus create, in other words designing with versus designing on behalf of the end user.

4.5. Survey Design Overview

The User Data Spectrum survey consists of approximately 90 questions and takes respondents approximately 60 minutes to complete. The large number of questions will be reduced in future versions of the survey after cross validation analysis of the items is performed. The survey is broken into eight main parts. This chapter addresses each part of the survey in depth. Each section of this chapter provides an overview section and a goal section for each part of the survey. The term “overview” for each of the sections describing the survey refers to the information the survey sought to capture. The term “goal,” by contrast, seeks to connect that section of the survey to the User Data Spectrum.

4.5.1. Survey Components

Introduction. General introduction to the survey. A time to set expectations (45–60 min.) for time commitment and signature of the informed consent form.

Part I: General organization characteristics (six questions). Baseline of the organizational profile. At the core, this is the foundation for determining comparisons in the findings based on organizational characteristics.
Part II: Orientation (15 questions). This the most important part of the entire survey. This is the foundation of the research questions in this dissertation. These questions try to identify where organizations fall on the spectrum and their philosophical orientation toward product development.

Introduction to Part III to Part IV (eight questions). This section goes one level deeper, from looking at the entire organization in Part I to looking at individual product teams and the makeup of those teams. It also captures the process by which the product teams develop their product.

Part III: Design Vision (three questions). This part attempts to capture how strong the product direction is and where that direction comes from (e.g., top down, grassroots, middle management, free-for-all). The unit of analysis is at the team and organization level.

Part IV: Skill Set (eight questions). This part attempts to capture data about the skill set of the team members who are collecting, interpreting, and implementing user data. This section drills down to the individual level; however, the data will be looked at in aggregate for the team.

Part V: Representativeness (24 questions). This section assesses the team’s ability to empathize with the end user. The questions are geared toward assessing individual roles on the team and the team members’ ability to empathize. Empathy is assessed according to two factors, similar life experiences or individual demographic characteristics that the teams have in common with the end users.

Part VI: Process (eight questions). This section measures the product development process that the organization and the product team uses and how much user experience is incorporated into that process. Several key parts of the process are examined: creative reviews;
method selection; access to user data; and user data collection, interpretation, and implementation.

**Part VII: UX Maturity (four questions).** This section is dedicated to making the connection to the UX maturity literature to examine the relationship between the data spectrum, the four associated variables, and the UX maturity body of research.

**Part VIII: Final Questions (three questions).** These questions are a baseline assessment of the survey respondents’ understanding of the concepts of user data, user experience, and how to implement the UX process. The reason these are at the end of main sections is because they may be intimidating questions for those not knowledgeable about user experience. If presented at the begin of the survey, these questions might alienate them from the subject of product development by using technical language of the UX field.

4.6. **Description of Each Survey Component**

4.6.1. **Part I: General Organization Characteristics and Motivation**

The first organization in which I experienced UX was during my career in the military, before UX was popular and before UX jobs were common. When I started this research, I moved from the military to the corporate sector. My experience in industry gave me insights into a variety of types of companies. As part of my graduate research, with the approval of the organizations with which I was working, I continued to explore how UX was different in each organization. I spent time in a small, entrepreneurial private company that had a niche market delivering software as a service. The company was about four years old and had experienced exponential growth, with a 40% increase in the number of UX employees in the year prior. I also spent time in a large manufacturing company (80,000+ employees, only six of whom were in UX), whose primary product was delivering mechanical vehicles with embedded software.
Organization attributes such as size, type of industry, and type of product seem to have an impact on the UX practice and culture in the organizations I have experienced. The questions in Part I capture these organization characteristics. The general approach to the response options in this section is a mix between traditional responses as provided by the Census Bureau (https://www.osha.gov/pls/imis/sic_manual.html) and UX specific sources such as UXmatters (http://www.uxmatters.com/) and other UX scholarly efforts.

I turned to the Census Bureau system of classification called the SIC (https://www.osha.gov/pls/imis/sic_manual.html). The SIC classification provides categories that other researchers can also use to compare their study with this research. The job list came from the Census Bureau (Beckhusen, 2016) for the same reason. Due to the emerging nature of UX, though, the Census Bureau job categories (e.g. Computer support specialists, Computer systems analysts, Computer programmers) fall short for the UX field listing no designer specialties. To respond to this shortcoming, I supplemented Census Bureau categories with those used by UXmatters (Six, 2010), (e.g., Research techniques, project management, persuasive writing, mediation and facilitation, visual design, interaction design). UXmatters is a group of scholars and practitioners based in the Netherlands that produces articles (both scholarly articles and blog posts) that address many aspects of the UX field. Their job search categories are fairly broad like the Census Bureau categories of jobs; yet, at the same time, they provide a level of granularity that more accurately reflects the types of UX jobs in current industry. The final list contains 19 industries, 5 UX job categories, and 17 product development roles. See Table 4.3 for the questions asked relevant to industry, role and job as well as Appendix A for the full list of answer options in the survey.
The list of 17 roles came from my experience in the organizations in which I had been embedded. The roles listed were the common roles I saw on product teams and in the organization.

The list of roles came from my experience in the organizations in which I had been embedded. The roles listed were the common roles I saw on product teams and in the organization.

Finally, the last question in this section attempts to get a baseline understanding of the respondents’ design education and/or experience. Design understanding would affect the survey results; filtering on those respondents with and without a design background might be needed during data analysis.

Table 4.3

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q5</td>
<td>What industry are you in? (check all that apply)</td>
</tr>
<tr>
<td>Q6</td>
<td>What type of product(s) do you sell? (check all that apply)</td>
</tr>
<tr>
<td>Q8</td>
<td>How large is your company?</td>
</tr>
<tr>
<td>Q60</td>
<td>Is your company private or public?</td>
</tr>
<tr>
<td>Q10</td>
<td>What role do you play in your organization? (check all that apply)</td>
</tr>
<tr>
<td>Q11</td>
<td>Do you have any design education and/or experience? (check all that apply)</td>
</tr>
</tbody>
</table>

4.7. Part II: Orientation

4.7.1. Overview of the Orientation Section

Placement along the User Data Spectrum is based on the organization’s philosophical orientation to product development. Of course, this philosophical orientation reflects a kind of idealized approach devoid of organizational system influences and varying degrees of support. Nonetheless, the primary goal of the User Data Spectrum Survey is to identify where on the spectrum the company lands.
It is important to note that the orientation assessment is intended for products that will have an audience or market. For example, the founders of Linux initially created the Linux platform for their own purposes, but then opened it up to others (https://www.linux.com/what-is-linux). In terms of the User Data Spectrum, they knew what they wanted to create, so they would fall on the genius side of the spectrum. However, they were the only ones adopting it; therefore, this type of product is outside the scope of User Data Spectrum research. Once they decided to share their invention with the masses, they immediately opened up the platform to fellow programmers who would eventually consume the product and played an active role in developing the product; this most likely places Linux squarely on the participatory side of the spectrum.

Throughout this chapter, the terms genius design and create are equivalent. To recap, organizations who land closer to the genius side of the spectrum tend to have a create philosophical orientation. The create orientation attributes product success to the brilliance of engineering genius. Respondents falling on the other side of the spectrum tend to have a “collaborate” philosophical orientation to product development. Those with a collaborate orientation attribute product success to how well the company enables end users to shape their own product experience. Therefore, the terms participatory design and collaborate are equivalent in this chapter.
4.7.2. Goal of the Orientation Section

The orientation section is designed to assess philosophical orientation to the role the end user should play in product development. Should end users be active in the design of the software? Should users play a role in determining what software features to build? Should the end users contribute to how the software is built?

As noted earlier, placement along the User Data Spectrum is based on the philosophical orientation to product development. The survey is designed to capture the subtleties of locating a company on the spectrum, and it does not assume an orientation heavily on one end or the other. The questions, listed below, are designed to capture the variation that exists in actual companies on the spectrum between genius and participatory design.

In order to elicit this information, the questions query the survey participants’ values around direct end-user engagement versus non-direct or expert engagement in paths toward product development. Questions 12 and 13 are intended to clearly demarcate where the survey respondent falls on the spectrum between genius and participatory design orientations. Some companies will fall squarely on one side of the spectrum or the other, thereby making the orientation clear. However, Questions 14, 15, and 16 are designed to account for the multiple
values and nuances that exist within companies with respect to orientation. Companies were asked, how much of the 8-hr chunk they would desire to spend with experts versus end users if they opted to allocate time with the two groups in a prior question. For example, respondents can elect to spend 80% of the time with end users and 20% of the time with experts. But if respondents structure the day with the experts first and the end users second, that demonstrates a different orientation. For instance, a choice to spend time with experts before end users could indicate an inclination toward genius design, because the respondents value the input of the experts to set the course for the day. However, if they elect to spend the beginning of their day with end users and the end of the day with experts, their choice could indicate an inclination toward participatory design; it suggests that they value the data collected from direct user interaction to set the direction for the product. As noted earlier, there is a further subtlety that is worth mentioning here: the distinction between designing with and designing on behalf of the end user. In its discussion of future research possibilities, Chapter 8 further considers this issue.

For this research, the survey focused on capturing a gross understanding of general orientation. Other factors that may be indicators of orientation include what people think contributes to user adoption and product success (Question 17). My hypothesis is that if someone attributes product success to great engineering or internal talent, then his/her orientation would tend toward the genius design side of the spectrum. However, if someone attributes product success to involving users during the design phases, then her/his orientation might be more toward participatory design.

When it comes to user adoption (Question 18), discerning End-User Data Orientation becomes more difficult. If survey respondents attribute user adoption to items that are market dependent or company driven, this could suggest they have a genius orientation. Market
dependent items include market readiness and time to market. Attributing user adoption to these factors suggests that it less important that the product is of a particular quality and more important that the sociotechnical climate is ready. Climate goes beyond one person’s willingness to adopt and suggests that social pressure drives adoption. For example, buyers may be attracted to the iPhone because it suggests a cool social status. Attributing user adoption to a strong public relations campaign also could indicate a genius orientation, because public relations campaigns are about convincing users that they want the product. In other words, it is about marketing savvy instead of user-driven need. On the other hand, factors such as word of mouth, user’s first impression, and product usefulness are ultimately determined by the end user, and therefore could indicate a participatory orientation. Finally, attributing user adoption to product quality could suggest either genius or participatory orientation. From my field research, there seems to be no clear pattern about product quality with respect to orientation. I hypothesize that prioritizing product quality could be more a factor of company’s UX maturity than orientation, assuming that more mature companies have more of a quality orientation than less mature companies. This survey is intended to provide data with respect to this uncertainty.

Another indicator of orientation is when the organization chooses to engage the end user in the product development process. Questions 46, 47, and 57 all drive at understanding when the organization engages users. One assumption in Question 57 is that the organization uses an agile methodology to develop its product. If this is not true, this could be potential limitation in the survey respondent’s ability to properly place where users are involved in the product development process.

The last four questions in the orientation part of the survey are open ended. The goal of these four questions is to give respondents an opportunity to freely express their orientation
toward user involvement. Why, how, and when users should be involved as well as what leads to overall product success are all covered by these four questions.

Table 4.4

*Part II Questions*

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q11</td>
<td>Introduction to section</td>
</tr>
</tbody>
</table>
| Q12 | Mark your level of agreement to the following statements (1-Strongly disagree, 7-Strongly agree):  
- I believe that companies who get product direction from innovative thought leaders are most successful.  
- I believe that companies who get product direction from direct interactions with end users are the most successful. |
| Q13 | Mark the level of agreement to the following statements for your company (1-Strongly disagree, 7-Strongly agree):  
- My company believes that companies who get product direction from innovative thought leaders are most successful.  
- My company believes that companies who get product direction from direct interactions with end users are the most successful. |
| Q14 | If you could have a day with expert product development consultants or a day with end users which would you choose in order to give you the best product direction.  
- Spend full day with expert product development consultants (1)  
- Spend full day with end users (2) |
| Q15 | If you could have a percentage of your day with either, how would you break up your day?  
- 100% with end users  
- 80% with end users, 20% with experts  
- 50% with end users, 50% with experts  
- 80% with experts, 20% with end users  
- 100% with experts |
| Q16 | Since you elected to spend a percentage of your day with both, when would you meet with end users versus expert product development consultants in the single day? |
Table 4.4 continued

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q17</td>
<td>Of the following, rank in priority order which has the largest impact on the potential success of the released product (1-least impact, 7-highest impact):</td>
</tr>
<tr>
<td></td>
<td>• Great design</td>
</tr>
<tr>
<td></td>
<td>• Involving users during the design phases</td>
</tr>
<tr>
<td></td>
<td>• Involving users during the development phases</td>
</tr>
<tr>
<td></td>
<td>• Sound quality assurance</td>
</tr>
<tr>
<td></td>
<td>• Great engineering</td>
</tr>
<tr>
<td></td>
<td>• Great ideas</td>
</tr>
<tr>
<td></td>
<td>• Great development process</td>
</tr>
<tr>
<td></td>
<td>• Internal talent</td>
</tr>
<tr>
<td></td>
<td>• Data-driven decisions</td>
</tr>
<tr>
<td></td>
<td>• Shared product vision</td>
</tr>
<tr>
<td></td>
<td>• Great market penetration strategy</td>
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<td></td>
<td>• Communication strategy to pose value to customers</td>
</tr>
<tr>
<td>Q18</td>
<td>Of the following, rank in priority order which has the largest impact on user adoption of a product (1-least impact, 7-highest impact):</td>
</tr>
<tr>
<td></td>
<td>• Market readiness</td>
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<td></td>
<td>• Time to market</td>
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<td></td>
<td>• Product quality</td>
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<tr>
<td></td>
<td>• User’s first impression</td>
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<tr>
<td></td>
<td>• PR campaign</td>
</tr>
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<td></td>
<td>• Word of mouth</td>
</tr>
<tr>
<td></td>
<td>• Product usefulness</td>
</tr>
<tr>
<td>Q46</td>
<td>Does your organization involve users or collect user data at any point during the product development lifecycle?</td>
</tr>
<tr>
<td>Q47</td>
<td>Does your organization involve the user or user data in any other way in the product development process? Please explain.</td>
</tr>
<tr>
<td>Q57</td>
<td>Let’s imagine that your organization has a 2 week sprint. And let’s also imagine that there is a period of time prior to that 2 week sprint (pre sprint) and a period of time after that 2 week sprint (post sprint). At the end of the post time, the features developed during the 2 week sprint will be released to market (released). Identify when you would have the user do what during that sprint. Check all that apply.</td>
</tr>
<tr>
<td>Q20</td>
<td>Why should the end user be/not be involved in the final product? (Please describe in one or two sentences)</td>
</tr>
<tr>
<td>Q22</td>
<td>How involved should the end user be in the final product? (Please describe in one or two sentences)</td>
</tr>
<tr>
<td>Q23</td>
<td>When should the end user be involved? (Please describe in one or two sentences)</td>
</tr>
<tr>
<td>Q24</td>
<td>Where do the best product ideas come from? (Please describe in one or two sentences)</td>
</tr>
</tbody>
</table>
4.8. Introductions to Parts III and IV

4.8.1. Overview of the Introduction Section

This research predicts that the maturity of the product, the nature of the product, and the roles on the product development team will play a large part in how the respondents answer the subsequent questions. The Introduction to Parts III and IV captures these dimensions.

The stage of development that a product is in often has a large impact on the role of UX practice. The term *stage of development* most often describes the stage of maturity that a product is in. Indirectly, stage of development is also linked to the process by which a product is brought to market. There are many models for product development processes; in the software world, this might more appropriately be referred to as the software development life cycle model. What informed my thinking about the stages of product development is my experience in and with industry, in both the business and software development fields. When I think about product development, I think through a UCD process lens. UCD is a structured process supported by standards such as ISO 9001 (2015). Just as agile manifestations in industry are variations of the pure agile methodology, UCD implementations vary; no organization follows a pure user-centered design process. Instead, there are four prominent models of UCD used in industry today, but most companies have their own unique adaptation of the UCD process. The four most prominent models are from usability.gov (Usability.gov, n.d.), Usability Professional Association UPA (Usability Professional Association [UPA], n.d.), Usability Body of Knowledge (BoK) (Usability Professional Association [UPA], n.d.), and the Usability Planner (Usability Planner, n.d.). The Usability Planner and Usability BoK were led by the same scholar, Nigel Bevan. Additionally, many contributions to the Usability BoK came from UPA.
participants. All this is to say that the community of contributors to the slightly different UCD models still has a fair amount of cohesion. The UCD models are shown in Table 4.5.

Table 4.5

<table>
<thead>
<tr>
<th>UCD Models</th>
<th>Stages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Usability.gov</td>
<td>Planning your site; collecting data from users (analyze); developing prototypes (design); writing content; conducting usability testing with users (test and refine)</td>
</tr>
<tr>
<td>UPA process</td>
<td>Analysis; design; implementation; deployment</td>
</tr>
<tr>
<td>Usability BoK</td>
<td>Analysis and requirements; design; evaluation (test &amp; measure); implementation; management (planning &amp; feasibility)</td>
</tr>
<tr>
<td>Usability planner</td>
<td>Concept; planning; understanding needs; requirements; analyze requirements; design/Development</td>
</tr>
</tbody>
</table>

*Note. BoK = Body of knowledge.*

**User experience versus user-centered design.** UX is a broader umbrella which is over UCD. UX speaks more to the general approach of development, whereas UCD is a structured process supported by standards such as ISO 14307 and TR813.

In an attempt to not require product maturity, process knowledge, or UCD knowledge on the part of the respondent, the response options to Question 26 are derived from general process stages consistent in most process models but are generic so as to not require in-depth process knowledge. The basic UCD steps are as follows:

- Initial research
- Conceptual
- Initial design
- Early development
- Quality testing (prerelease)
- Beta (released to a limited number of customers)
- Full production
- Sustainment
- Other

The team makeup, roles, and skills are also included in this section. Each company may have a host of people involved in product design and development. Some companies have a very
small, concentrated number of people working on delivering a product, while others might be larger and have more distributed teams that work together. Also, depending on how large the product is, there could be handoffs between teams so no one team sees a product through the entire life span of that product. The questions are designed to accommodate small and large teams, distributed and nondistributed teams, as well as cradle to grave teams and handoff team environments.

An inherent issue in this line of research is being able to distinguish the impact of the individual as opposed to the team, organization, or larger system in which the individual works. This survey tries to balance gathering information about the individual and the larger system in order to map how these factors interrelate. The connection to the system is addressed in the survey through process understanding (Questions 36, 38, 39, 44). The connection to the individual is addressed through questions focusing on individual impact (Questions 11, 12_1, 13_1, 28, 40). The connection to the team is addressed through identifying the makeup of the team (Question 29). The connection to the organization is addressed through organizational demographics (Questions 5, 6, 8, 60).

4.8.2. Goal of the Intro Section

This section aims to gather information about the product development process, the makeup of the team delivering the product, and the product in general. This information forms meaningful groups of survey responses which aid in data analysis. Grouping the data by the responses to these questions is somewhat analogous to the way a sociologist searches for patterns in demographic groups. These questions are directed toward the organization demographics.
Table 4.6
Questions for Parts III–IV

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q25</td>
<td>The next few sections will require you think about a current product you are working on.</td>
</tr>
</tbody>
</table>
| Q26 | What stage of development is it in?  
  • Initial research  
  • Conceptual  
  • Initial design  
  • Early development  
  • Quality testing (prerelease)  
  • Beta (released to a limited number of customers)  
  • Full production  
  • Sustainment  
  • Other ____ |
| Q27 | How long have you been on the project? |
| Q28 | What is your role? (check all that apply) |
| Q29 | Who is involved in developing the product? (check all that apply) |
| Q30 | How is the product released? |
| Q31 | What is the tangible thing the user interacts with for the product you identified? (check all that apply) |
| Q32 | In one to two sentences, briefly describe what is most significant about the product you are currently working on. |

4.9. Part III: Design Vision

4.9.1. Overview of the Design Vision Section

The term design describes both product and process. Most important to this body of work is the process description. A design process is a set of methods and a structured way to go about creating something for an end goal or to encourage a change of state in the world. The final product is the thing that the world/end user interacts with. Interaction can encompass any or all types, including physical, emotional, and cognitive.

Inherent in this definition of design as embracing the physical, emotional, and cognitive is a focus on the human role in design. This concept of design places a high value on quality.
From a systems perspective, quality addresses system performance, load ability, and speed. This perspective, by contrast, focuses on less tangible measures of quality, such as the feeling of being in control that drivers get from gripping a steering wheel or the emotional impact of the emoticons that come standard with Apple iOS 10’s text messaging features.

4.9.2. Strength, Source, Shared Understanding

The term design vision encompasses the definition of design and also includes the strength, source, and shared understanding of the design vision. Question 34 elicits information about the strength, source, and shared understanding of the vision. Strength or clarity refers to having a clear end goal and to how the product will make a difference and set a clear standard for evaluating the quality of that product. More indirect ways of assessing the success of a product include user experience and / or brand, philosophy or goals. Strength of design vision, finally, is also marked by clear standards that must be met before the product can be released. The source of the design vision could a person, an artifact, or a narrative that underwrites the vision for the product. The strength of the design vision depends on different factors related to each of these three types of sources. If the source is a person, the strength of design vision correlates with the role and influence of that person in the organization. If the source is an artifact, the strength correlates with how readily accessible the artifact is. And if the source is a narrative, the strength reflects the persuasiveness and coherence of the message.

4.9.3. Goal of the Design Vision Section

In relation to the user design spectrum, a genius company cannot deliver a high-quality user experience unless it has a strong design vision. But a participatory company has room for a somewhat more amorphous design vision because it can rely on quality being identified by direct end user involvement. At Apple, a company that most exemplifies a genius company, the
dominant source of their design vision came from their leader, Steve Jobs. Also, two respondents interviewed describe the pervasive design vision within Apple; every product has the potential to change personalized computing forever was pervasive throughout the organization. On the other side of the spectrum, a participatory organization may not have as strong a message about the product vision but instead may focus on the process the company takes to get to the final product.

Table 4.7

Part III Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q34</td>
<td>Please mark your level of agreement with the following statements:</td>
</tr>
<tr>
<td></td>
<td>• Shared understanding/buy-in</td>
</tr>
<tr>
<td></td>
<td>• Everyone on the team follows the design guidelines.</td>
</tr>
<tr>
<td></td>
<td>• Everyone on the team believes that the design guidelines are important.</td>
</tr>
<tr>
<td></td>
<td>• Everyone on the team believes that the goal is important.</td>
</tr>
<tr>
<td></td>
<td>• The team follows the style guidelines.</td>
</tr>
<tr>
<td></td>
<td>• The team follows the brand goals.</td>
</tr>
<tr>
<td></td>
<td>• Strength / Clarity</td>
</tr>
<tr>
<td></td>
<td>• There is a clear end goal for the impact of the design.</td>
</tr>
<tr>
<td></td>
<td>• It is clear how the product will make a difference for the end-user.</td>
</tr>
<tr>
<td></td>
<td>• There is a clear standard of quality with respect to the design of the product.</td>
</tr>
<tr>
<td></td>
<td>• If this product does not meet that standard of quality, it will not ship.</td>
</tr>
<tr>
<td></td>
<td>• There are clear user experience goals for this product.</td>
</tr>
<tr>
<td></td>
<td>• There are clear brand goals with the product.</td>
</tr>
<tr>
<td></td>
<td>• Source</td>
</tr>
<tr>
<td></td>
<td>• There are clear design guidelines for this product.</td>
</tr>
<tr>
<td></td>
<td>• There are style guidelines for this product.</td>
</tr>
<tr>
<td></td>
<td>• Quality is defined by the end user for this product.</td>
</tr>
</tbody>
</table>
Table 4.7 continued

Part III Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q35</td>
<td>Where does the design vision for your organization come from? (Check all that apply)</td>
</tr>
<tr>
<td></td>
<td>• Just leadership</td>
</tr>
<tr>
<td></td>
<td>• Just grassroots</td>
</tr>
<tr>
<td></td>
<td>• Just middle management</td>
</tr>
<tr>
<td></td>
<td>• Everyone</td>
</tr>
<tr>
<td></td>
<td>• No one</td>
</tr>
</tbody>
</table>

4.10. Part IV: Skill Set

4.10.1. Overview of the Skill Set Section

It is difficult to assess skills without measuring behaviors associated with those skills. Due to the nature of this survey, direct observational assessment of UX skills within the organization was not possible. Therefore, this section gathers information about skill sets through three lenses: role orientation, process orientation, and the UXmatters (Six, 2010) skill set orientation. It seeks to understand the respondents’ perception of their proficiency, the proficiency of their teammates, and the general proficiency of their organization in each of these categories. Looking through these three lenses offers a more complex and nuanced picture of skill sets in lieu of direct behavioral observation. In all questions for this section where proficiency is assessed, it is perceived proficiency and it is measured on a 7-point Likert-type scale. The 7-point proficiency scale used is as follows:

• 1: Not at all proficient
• 2: Knows the basics (limited)
• 3: Novice (limited)
• 4: Unsure
• 5: Intermediate (practical application)
• 6: Advanced (a go to in the organization)
• 7: Expert (recognized authority)

In every organization, a role may manifest differently. For example, a business analyst in one organization may be charged with creating use cases and driving development work, whereas in another organization the business analysts assesses the market opportunity and drive overall product direction. Thus, the list of roles described in the survey also reflects this variability. The definitions of the list of roles in the survey may be subjective to the survey respondent’s experience. The data collected about skill set when looking through the role lens will be influenced by the expectations of the survey respondent about what that role should do. The variability that this introduces hinders neither the utility of survey results nor the ability of the response data to shed meaning on the perceived proficiency of the people in each of the roles. The roles fall into three general categories: technical, business, and design. These three general areas cover the gamut of roles observed during early in this research when I was embedded in several companies. The survey captures both the respondents’ roles and the roles present on their respective product delivery team(s). With respect to assessing the proficiency of roles at an organizational level, the aggregate of participants' ratings for each role has been used in the design of the survey.

The second lens used to assess perceived skill set elicits information about process orientation. As explained in the previous section on the overall survey design, collection, interpretation, and implementation are the three major parts of the UCD process. The data collected about skill set when looking through the process lens is influenced by the expectations of the survey respondent about what that role should do relative to that part of the process. Again, the variability that this introduces does not hinder the utility of the survey results or the
ability of the response data to shed light on the perceived proficiency of the organization in each phase of the process. With respect to assessing proficiency at each phase of the process at an organizational level, the aggregate of participants’ ratings for each phase for all roles will be used.

As noted earlier, I drew upon the skill set listing in UXmatters (Six, 2010) to generate the list of actions, characteristics, priorities and attitudes that indicate proficiency relative to the data spectrum. Six (2010) breaks skills of UX professionals into nine major categories: core, business, communication, interpersonal, usability, media, technical, tools, and personal attributes. She does not address every skill listed in every category; however, she does address the general nine categories directly. Another challenge when asking about skill set directly is the difference between asking about the skill set of an individual and asking about the general skill set of the organization. The survey addresses that challenge by using different approaches to assessing individual skill sets and organizational skill sets. Individual skill sets are measured indirectly through the expectations of roles at each phase in the process. The assessment of organizational skill sets is elicited through direct questions (Table 4.8).

Table 4.8
Skill Set Item Survey Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>How would you describe your overall company’s degree of proficiency with the following?</td>
</tr>
<tr>
<td></td>
<td>Core skills</td>
</tr>
<tr>
<td></td>
<td>• Coming up with great product ideas</td>
</tr>
<tr>
<td></td>
<td>• Designing beautiful interfaces</td>
</tr>
<tr>
<td></td>
<td>• Conducting ethnographic research</td>
</tr>
<tr>
<td></td>
<td>• Creating a holistic experience for an entire product line</td>
</tr>
<tr>
<td></td>
<td>Business skills</td>
</tr>
<tr>
<td></td>
<td>• Identifying market opportunity</td>
</tr>
<tr>
<td></td>
<td>• Identifying the MVPs</td>
</tr>
<tr>
<td></td>
<td>• Communication skills</td>
</tr>
<tr>
<td></td>
<td>• Translating user needs into design requirements</td>
</tr>
</tbody>
</table>
### Table 4.8 continued

*Skill Set Item Survey Questions*

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Translating design ideas to development teams</td>
</tr>
<tr>
<td></td>
<td>Interpersonal skills</td>
</tr>
<tr>
<td></td>
<td>Listening to the user’s needs</td>
</tr>
<tr>
<td></td>
<td>Usability skills</td>
</tr>
<tr>
<td></td>
<td>Conducting usability tests</td>
</tr>
<tr>
<td></td>
<td>Responding to user feedback post release</td>
</tr>
<tr>
<td></td>
<td>Analyzing the effectiveness of released products</td>
</tr>
<tr>
<td></td>
<td>Media skills</td>
</tr>
<tr>
<td></td>
<td>Technical skills</td>
</tr>
<tr>
<td></td>
<td>Speed of iterating on product releases</td>
</tr>
<tr>
<td></td>
<td>Tools skills</td>
</tr>
</tbody>
</table>

### 4.10.2. Goal of the Skill Set Section

On the User Data Spectrum, the differing skills of individuals and of organizations, particularly in high-functioning organizations, are likely to match with where those entities land on the User Data Spectrum. Participatory companies may require higher core skills, such as user research and usability skills, whereas genius companies who do not engage in direct user data collection methods may not require high levels of user research and usability skills.

### Table 4.9

*Part IV Questions*

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q37</td>
<td>For the roles you identify that are on your team, rank their level of proficiency in their job. Include yourself. If you have multiple people in the same role, think of the most proficient person and rank him/her.</td>
</tr>
<tr>
<td>Q42</td>
<td>The questions below will use the following definitions: User Data = Any data that represents the thoughts, actions, behaviors, words, needs, wants, context, and environments of the end stakeholder(s) interacting with the system. Interpret User Data = The act of translating user data collected into design language and/or system requirements. Implement User Data = The act of incorporating user data into the actual design or functionality of the system.</td>
</tr>
</tbody>
</table>
Table 4.9 continued

Part IV Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q36</td>
<td>Who is responsible on your team for bringing user data to the development process?</td>
</tr>
<tr>
<td>Q44</td>
<td>For those that you selected above that are responsible to collect user data, rate their level of proficiency. Rate yourself if you are the one that collects user data. If you have multiple people in the same role, think of the most proficient person and rank him/her.</td>
</tr>
<tr>
<td>Q38</td>
<td>For those that you selected above that are responsible to interpret user data, rate their level of proficiency. Rate yourself if you are the one that interprets user data. If you have multiple people in the same role, think of the most proficient person and rank him/her.</td>
</tr>
<tr>
<td>Q39</td>
<td>For those that you selected above that are responsible to implement user data, rate their level of proficiency. Rate yourself if you are the one that implements user data. If you have multiple people in the same role, think of the most proficient person and rank him/her.</td>
</tr>
<tr>
<td>Q40</td>
<td>What is your background?</td>
</tr>
<tr>
<td>Q41</td>
<td>How would you describe your overall company’s degree of proficiency with the following?</td>
</tr>
</tbody>
</table>

4.11. Part V: Representativeness

4.11.1. Overview of the Representativeness Section

Representativeness emerged as a critical variable related to the User Data Spectrum research during the design of this survey. When a company engages in collecting, interpreting, and implementing user data, it must have the ability to choose the best collection methods, take the data collected and translate them, and then apply that translation to the product design. There are many variables that need be factored into the methods selection, translation, and implementation process. This research suggests that the degree to which a decision maker is representative of the target end user of her product is related to where her company falls on the User Data Spectrum.
At the core of representativeness is empathy. There is a fair amount of research on empathy across many fields of study, e.g., Gibbons (2010); Miaskiewicz (2008). “One who empathizes suffers along with the one who feels the sensations directly. Empathy is similar to sympathy, but empathy usually suggests stronger, more instinctive feeling” (“Empathy,” n.d.). Similarly, empathy is a core skill of UX practitioners (Six, 2010). UX research methods such as day-in-the-life-of direct observation are intended to promote and foster empathy for end users. Psychology literature describes two types of empathy: state and trait. Trait empathy is based on personal characteristics that the observer may share with the one observed—in this case, designer and end user(s). Shared traits may include demographics (age, race, gender, socioeconomic status, and residence location), aptitude, attitude, cognitive abilities, physical abilities, knowledge, and values. However, a state type of empathy is when the observer and observed have gone through similar experiences or the observer can relate to the emotional impact of the observed (Felt, 2011). In the design literature, Kouprie and Visser (2009) referred to these two types of empathy as affective and cognitive. Affective empathy is when the observer can identify with the emotional response and feelings of the observed, similar to the state type of empathy in psychology literature. Cognitive empathy is when the observer understands and may share the same perspective as the observed, just as in trait empathy (Kouprie & Visser, 2009).

The representativeness measure in this survey assesses both state and trait types of empathy for individuals of the product development team. Aggregate of individual responses for the same organization will be used to assess organization representativeness.

4.11.2. Goal of the Representativeness Section

Assessing the representativeness of decision makers in product development is an important aspect of the User Data Spectrum research. The importance of individual responders’
degree of representativeness of the end user is related to whether or not that person is responsible for collecting, interpreting, and implementing user data. I propose that empathy is a limiting factor irrespective of placement along the spectrum; however, the degree of representativeness that the team possesses for end users is important to understand. If a team is more representative of end users, it may be able to flourish without as much direct user contact; however, if a team is low on representativeness, it may fare better on the participatory end of the spectrum where more direct user interaction takes place. Essentially, the degree to which members of the organization cannot empathize with end users, on both state and trait aspects, is the extent to which an organization might ultimately use this tool to see that it would benefit from following a participatory model. For example, when I worked for John Deere, which produces equipment for farmers, I had low representativeness of end users. I have no agricultural background, and I did not match the demographics of the target audience of farmers I designed for. Therefore, I relied on direct interaction with the farmers to better serve them through my designs.

Table 4.10

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q64</td>
<td>Describe the gender of the target end user for product. (check all that apply)</td>
</tr>
<tr>
<td>Q65</td>
<td>Describe the ethnicity of the target end user for your product. (check all that apply)</td>
</tr>
<tr>
<td>Q66</td>
<td>Describe the region that the target end user for your product live. (check all that apply)</td>
</tr>
<tr>
<td>Q67</td>
<td>Describe the age of the target end user for your product. (check all that apply)</td>
</tr>
<tr>
<td>Q68</td>
<td>Describe the education level of your target end user for your product. (check all that apply)</td>
</tr>
<tr>
<td>Q69</td>
<td>Describe the income level of your target end user for your product. (check all that apply)</td>
</tr>
<tr>
<td>Q61</td>
<td>Describe the target end user of your product.</td>
</tr>
<tr>
<td>Q62</td>
<td>What is your target end user’s knowledge level with respect to the content in your product?</td>
</tr>
</tbody>
</table>
Table 4.10 continued

*Part V Questions*

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q49</td>
<td>What is the context of use for the product you described above? (Select all that apply.)</td>
</tr>
<tr>
<td>Q50</td>
<td>How will this product change your user’s life? Explain in 1-2 sentences.</td>
</tr>
<tr>
<td>Q51</td>
<td>Why is that important to you? Explain in 1-2 sentences.</td>
</tr>
<tr>
<td>Q70</td>
<td>Describe your gender.</td>
</tr>
<tr>
<td>Q71</td>
<td>Describe your ethnicity.</td>
</tr>
<tr>
<td>Q72</td>
<td>Describe the region you currently live.</td>
</tr>
<tr>
<td>Q73</td>
<td>Describe your age.</td>
</tr>
<tr>
<td>Q74</td>
<td>Describe your education level.</td>
</tr>
<tr>
<td>Q75</td>
<td>Describe your income level.</td>
</tr>
<tr>
<td>Q76</td>
<td>Describe your level of technical aptitude and favoritism towards technology.</td>
</tr>
<tr>
<td>Q77</td>
<td>What is your knowledge level with respect to the content in your product?</td>
</tr>
<tr>
<td>Q52</td>
<td>Will you use the end product you are making?</td>
</tr>
<tr>
<td>Q54</td>
<td>Are you similar to your end user?</td>
</tr>
<tr>
<td>Q55</td>
<td>How are you similar to the end user of your product?</td>
</tr>
</tbody>
</table>

4.12. Part VI: Process

4.12.1. Overview of the Process Section

This section of the User Data Spectrum survey assesses the product development process of the organization as it relates to the user-centered design process and user data.

There are many ways to develop products. The first portion of this part of the survey attempts to collect data about the most popular process types and steps relevant to user-centered design. Asking if the organization does design reviews or requires sign-off from design leaders highlights whether the company prioritizes the design part of product development. Asking if the organization follows a user-centered design process, implements user experience methods, or incorporates a Sprint 0 are all direct questions about how user centered its product development
process is. Finally, asking if the organization follows an agile process is an important general indicator of the product development process.

Whether an organization follows a formal UCD process or uses a more “guerrilla” style, ad-hoc approach, an important indicator the maturity of its practice is the degree to which it finds value in the data generated from the process. In many cases maturity is connected to how much value is placed on the data and the amount of rigor used in the process. In this section of the survey, there are questions gathering data about the perception of rigor in the collecting, interpreting, and implementing of the user data. There are also questions about the value of the data collected and whether the data are used to drive product decision making. The survey asks if respondents have access to data or not. Perception of access could impact how they see their agency or role in the process.

Finally, there are questions that attempt to assess if distance exists between those on the team collecting the user data and those making product decisions. For instance, a user researcher could investigate how a user interacts in a particular context, create the artifact of the findings, hand that off to a development team, and then be removed from the remainder of the effort. Then the development team would take the artifact. If the team has a product owner responsible for making product decisions but removed from direct observation of users’ interactions with the product in context, then distance clearly exists between the point of user data collection and the point of decision.

4.12.2. Goal of the Process Section

The relation of process to the User Data Spectrum is less clear than with other variables collected. Genius and participatory organizations alike may follow an agile process, a user-centered design process, incorporate UX methods, participate in design reviews, and require
sign-off from design leadership. The degree of rigor also does not suggest whether a company will land one side of the spectrum or the other.

When it comes to the degree to which people in the company buy into the UX process and have access to user data, there may be nuances that affect where a company falls between the two sides of the User Data Spectrum. In a UX mature organization, the level of buy-in will be high. However, in a genius company, the source of user data is employees; therefore, the buy-in is more dependent on the people presenting the data. In a participatory organization, the buy-in is more dependent on the process by which the data was collected. Access to the user data also would be high in both types of companies if they are in a mature state. However, that access is more likely to be in the form of artifacts in a participatory company as opposed to oral tradition in a genius company.

Table 4.11

Part VI Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q57</td>
<td>Please check all that apply for your organization.</td>
</tr>
<tr>
<td></td>
<td>• Our company regularly does internal design critiques and reviews.</td>
</tr>
<tr>
<td></td>
<td>• Our company requires sign off from leadership on designs.</td>
</tr>
<tr>
<td></td>
<td>• Our company uses an agile development product development process.</td>
</tr>
<tr>
<td></td>
<td>• We have a Sprint 0 as a part of our agile process (or a sprint that is dedicated to user research prior to going into development)</td>
</tr>
<tr>
<td></td>
<td>• Our company uses a user-centered design process to develop products.</td>
</tr>
<tr>
<td></td>
<td>• Our company implements user experience methods into product development process.</td>
</tr>
<tr>
<td>Q88</td>
<td>The level of rigor for the questions above depend most on</td>
</tr>
<tr>
<td></td>
<td>• Who is conducting the method</td>
</tr>
<tr>
<td></td>
<td>• The method selected</td>
</tr>
<tr>
<td></td>
<td>• Neither of these</td>
</tr>
<tr>
<td></td>
<td>• Both of these</td>
</tr>
<tr>
<td>Q81</td>
<td>Mark your level of agreement.</td>
</tr>
<tr>
<td></td>
<td>• The user data collection methods used are rigorous.</td>
</tr>
<tr>
<td></td>
<td>• The user data interpretation methods used are rigorous</td>
</tr>
<tr>
<td></td>
<td>• The user data integration methods into the product are rigorous.</td>
</tr>
</tbody>
</table>
Table 4.11 continued

Part VI Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
</table>
| Q80 | Please check all that apply for your organization.  
• The people in the company making decisions about the product(s) are the same ones collecting data about the end users.  
• The people in the company making decisions about the product(s) are the same ones directly interacting with the end users. |
| Q87 | For your organization, how would you respond to the following sentence: We reflect and improve our product development process |
| Q89 | Mark you level of agreement to the following statements for your organization.  
• I buy in to the product development process  
• I think the user data we collect is valuable  
• We make data driven decisions about products we develop |
| Q90 | Mark you level of agreement to the following statements for your organization.  
• I have ready access to previously collected user data.  
• I have ready access to user data collected from web analytics. |

4.13. Part VII: UX Maturity

4.13.1. Overview of the UX Maturity Section

Historically, research into the UX maturity of organizations has been a priori. Often consultants would use UX maturity scales such as Level A, B, C, D, and E to determine the best course of action to implement UX practices and processes into a given organization. There are several bodies of research with respect to UX maturity models, and the HCI community has not yet settled on a dominant model. However, there is a general consistent pattern to all of the models. At the lowest level of maturity, the organization does not think there is a problem with respect to usability and finds no value in taking any action to address usability problems. Often no resources, people or budget, are put toward user-centered activities. The next stage of maturity is some kind of awakening to the possibility that there may be a problem with usability but no sense of a clear path as to what to do about it. The third stage couples the awakening with education and awareness that there are methods that a company may use to address the
usability/UX problems with its products. Then, the last few stages are reached when the organization starts to dedicate more resources, people and/or funding, and eventually incorporates the methods into its mainstream product development process. Finally, there is full buy-in to UX methods and approach throughout every level of the company. (See Chapter 2 for more information on UX maturity model research.) The questions in this section are based on those scales.

4.13.2. Goal of the UX Maturity Section

The scores for the UX maturity section are aggregated at the organization level. There is no direct association between an organization’s maturity state and where it lies on the User Data Spectrum. The goal in analyzing the UX maturity data is to see if there is a connection between the maturity level of the organization and how it scores in each variable section. The theory is that if an organization starts at one point on the User Data Spectrum, then its ideal maturity path forms a triangular range via development in the four variables, rather than automatically maturing left or right on the spectrum. Figure 3.2 in Chapter 3 illustrates this concept. Table 4.12 shows the survey questions in the UX Maturity section.

Table 4.12

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q59</td>
<td>Mark your level of agreement with the following statements.</td>
</tr>
<tr>
<td></td>
<td>Does business management understand that usability and user-centered design must be part of the business strategy? (1)</td>
</tr>
<tr>
<td></td>
<td>Does business management set usability goals on usability for systems? Is there a reward mechanism for reaching these goals? (2)</td>
</tr>
<tr>
<td></td>
<td>Is UCD focus addressed in acquisition activities? Are usability goals shared with the customer? (3)</td>
</tr>
<tr>
<td></td>
<td>Does business management take action to know how the usability of their product compares to that of their competitors? (4)</td>
</tr>
</tbody>
</table>
Table 4.12 continued

Part VII Questions

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Does senior management take action to maintain/improve user-centered design skills, resources, technology, awareness and culture in the organization? (5)</td>
</tr>
<tr>
<td></td>
<td>Are direct/indirect, short-term and long-term business benefits tracked by business management? (6)</td>
</tr>
<tr>
<td></td>
<td>Have common terminology, templates, or tools for the exchange of data between the different professions involved in UCD been developed and used? (7)</td>
</tr>
<tr>
<td></td>
<td>Are UCD outcomes (e.g., design solutions, error reports) understood and applied inside the company? (8)</td>
</tr>
<tr>
<td></td>
<td>Is effective communication made to raise the awareness and culture of UCD inside your company? (9)</td>
</tr>
<tr>
<td></td>
<td>Is effective communication made to raise the awareness and culture of UCD outside your company? (10)</td>
</tr>
</tbody>
</table>


4.14.1. Overview of the Final Section

The last section of the survey is free response and intended to capture a text-based baseline assessment of the survey respondents’ perspective about user data, user experience, and how to deliver quality.

4.14.2. Goal of the Final Section

Relating the answers to this part of the survey to the User Data Spectrum, free text responses will evaluate the survey respondent’s philosophical perspective and whether it leans toward collaborating with end users during product development versus creating on behalf of end users during product development.
Table 4.13
**Part VIII Questions**

<table>
<thead>
<tr>
<th>No.</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>What is user data?</td>
</tr>
<tr>
<td>Q3</td>
<td>What is user experience?</td>
</tr>
<tr>
<td>Q4</td>
<td>From your perspective, how do you deliver a quality user experience?</td>
</tr>
</tbody>
</table>

**REFERENCES**


CHAPTER 5
USER DATA SPECTRUM FINDINGS

5.1. Introduction

The User Data Spectrum is a theoretical construct with the goal of ultimately creating the final User Data Spectrum Tool that companies may use to better assess their end-user data orientation. This research specifically focuses on the creation of an initial survey that will examine the critical questions and determine the most parsimonious model for the final User Data Spectrum Survey. The resulting survey can then be validated in future work to create the final User Data Spectrum tool.

5.2. Basic Premise of the Research

The fundamental theory supporting this survey is that all organizations have an inherent orientation toward end-user data. If an organization can identify its end-user data orientation it can better invest in the four growth variables in a manner that aligns with its orientation. The result will be an increase in its user experience (UX) capacity (an organization’s facility or power to perform UX practices and produce UX results) and UX maturity (as defined by the UX maturity models).

An organization’s end-user data orientation lies on the User Data Spectrum. On one end of the spectrum is “genius” design, and on the other end is “participatory” design. Participatory design as a concept is based in part on Suchman (1988). Organizations that land closer to the genius side of the spectrum tend to have a creative philosophical orientation.

The final tool that this research contributes a step toward designing will empower organizations to identify their location on the spectrum, as shown in Figure 3.1. Knowing where they are on the spectrum is vital because, as noted earlier in Chapters 3 and 4, the way one
organization progresses from Level 1 to Level 2 in the UX maturity models may be very different from the progress of another company.

After the orientation is identified, four key growth variables need to be understood to see precisely how the differences in the way companies mature should be taken into account to enable truly effective UX design: (a) the skill set of the user data source or the person/group making decisions on behalf of the user(s); (b) the representativeness of the user data source; (c) the strength of the product vision within the organization; and (d) the process by which the organization develops products. Figure 5.2 illustrates the relationship between the User Data Spectrum orientation placement and the maturity path after investing in the four growth variables.
Figure 5.1. User data spectrum maturity trajectory with four growth variables.

5.3. Respondents

The survey was distributed to approximately 500 people. There was 110 total responses (22% response rate). Respondents completed on average 45% of the survey. 29 respondents (26.85%) completed 90% of the survey. Six respondents (5.56%) completed 100% of the survey. Partially completed surveys contained relevant data and were included in the analysis.

Distribution was based on network associations, namely a private e-mail list called UTEST, which includes UX professionals such as Jacob Nielsen and Jared Spool, as well as scholars such as Don Norman and Nigel Bevan. The survey was also distributed to 288 industry associates via my LinkedIn network.
Of the 110 responses, 22 respondents volunteered information about the companies they worked for. Of those 22 respondents, 16 are unique. Only two companies had multiple responses per company. A further discussion about the limitation of the unit of analysis may be found in Chapter 8; however, it is important to note that for this analysis, each response was treated as a unique company as well as the data point representative of the company. Therefore, it is assumed that 110 companies are represented in this research.

5.4. Analysis

As discussed in Chapter 4, there are eight constructs in the full data spectrum model (see Figure 5.3). The model includes one dependent variable (UX maturity), four independent growth variables (representativeness, skill set, design vision, process), the key moderating variable (end-user data orientation), and two additional moderator variables (product maturity, team structure). This analysis assesses each of the eight constructs to determine the best fit survey items for each construct as well as an analysis of the full User Data Spectrum model using the best fit items for each construct. The analysis will answer the question of the extent to which the four growth variables affect UX Maturity and whether they are moderated by End-User Data Orientation, Product Maturity, and Team Structure.

Table 5.1 shows each construct in the full model, the variable code used for each construct, the variable type, and the number of measurement items collected for each construct.
### Table 5.1

*Constructs and Items in Full User Data Spectrum Model*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Construct</th>
<th>Variable code</th>
<th>Variable type</th>
<th>No. of survey items</th>
</tr>
</thead>
<tbody>
<tr>
<td>UX maturity</td>
<td>UXM</td>
<td>Dependent variable</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Representativeness</td>
<td>R</td>
<td>Independent variable</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Skill set</td>
<td>SS</td>
<td>Independent variable</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Design vision</td>
<td>DV</td>
<td>Independent variable</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td>P</td>
<td>Independent variable</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Orientation</td>
<td>O</td>
<td>Key moderating variable</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Product maturity</td>
<td>PM</td>
<td>Moderating variable</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Team structure</td>
<td>TS</td>
<td>Moderating variable</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 5.2. Full User Data Spectrum model.*
5.5. Method

Of the 110 responses collected, each data row is considered a data row for the organization in which the respondent works. Of those, 37 responses contained complete data for all eight constructs. To determine the most parsimonious final User Data Spectrum model, each construct had to be analyzed in a stepwise fashion to determine the items with the best fit. A stepwise approach was used because of the challenge posed with the 37 unique data points compared with the number of variables (four independent variables, three moderating variables, one dependent variable, and 16 relationship terms) in the full model. A well-known complication in statistical analysis is the over-identifying challenge, which happens when the number of independent variables grows to be close to the number of unique cases, leading the R-squared value closer to 1, which overinflates correlation findings. The stepwise approach addresses this concern. The final model computation was based on a smaller subset of variables that were significant during the stepwise analysis. Additionally, through each step of the analysis, terms found to be not significant were reduced from the final model.

When each construct was analyzed to determine which items best measured the final construct, a targeted location method (Myers, 2015) was used in the construct evaluation. In the targeted location method, one item is specified as the target variable or key marker and loaded into the factor analysis with a weight of 1. All other items are loaded with a weight of 0.9. In SPSS software, the function used to perform this analysis is the Procrustes rotation of a factor matrix to a target matrix. Typically, a confirmatory factor analysis (CFA) is used to determine if items measure a final latent variable; however, CFA does not allow one to maximize the item with the highest predicted connection to the latent variable. While all items for each construct had the potential to measure the final variable, based on prior research in the formation of the
survey (see Chapter 3), some items were far more likely to contribute to the determination of the final variable measure. This favored the targeted location method over CFA.

Once the best fit item was identified for each construct, a regression analysis was performed to determine the correlation coefficients between the dependent variable of UX maturity (UXM), one of the growth variables (R, DV, SS, and P), and orientation (O). Given the four growth variables, this procedure was conducted four times. The result was the R-squared value for each growth variable and the relationship with UX maturity and orientation. Then the model was run adding the two other moderating variables of team structure (TS) and product maturity (PM). This was again done four times, once per each growth variable. The result was the R-squared value for each growth variable and the relationship with UX maturity, orientation, PM, and TS. Finally, the full model was run with all eight constructs. The result was the R-squared value for each growth variable and its relationship with UX maturity, orientation, PM, and TS.

### 5.6. Findings

#### 5.6.1. End-User Data Orientation Construct Analysis

The end-user data orientation construct is the most important part of the entire User Data Spectrum Survey, as it is the foundation of two of the research questions driving this dissertation:

1. How can organizations better capitalize on the potential of UX as an avenue to implement responsiveness to human emotion, behavior and psychological needs into their technology products?
2. How can diverse organizations more deeply embed UX design practice in their product development practices to increase their UX Maturity?
The orientation section of the survey contains questions to elicit the survey respondents’ values regarding direct end user engagement versus non direct or expert engagement in paths toward product development. It is postulated that a user’s response to items O1–O11 will determine where on the spectrum (Figure 3.1) the respondent’s company falls.

Organizations who land closer to the genius side of the spectrum tend to have a *create* philosophical orientation. The create orientation attributes product success to the brilliance of engineering genius. Eureka moments and innovation are highly prized in companies with that orientation. A common phrase one might hear within a create organization is, “We know what we want to create and have a strong sense of what users will like. Let’s let the market decide once we get our great idea into the users’ hands.” Steve Jobs captured this orientation best when he said, “A lot of times, people don’t know what they want until you show it to them” (Reinhardt, 1998, p. 62). Respondents falling on the other side of the spectrum tend to have a “collaborate” philosophical orientation to product development. Those with a collaborate orientation attribute product success to how well the company enables end users to shape their own product experience. Compassion and empathy for the end user are highly prized in this orientation. A common phrase one might hear within a collaborate organization is, “If we don’t get users to design the final product with us, we will never deliver what they need. Our success depends on their involvement.” End-user data orientation is a latent variable that has 11 items (O1–O11) in the User Data Spectrum Survey. The 11 items in the survey associated with the orientation construct attempt to identify where on the spectrum (Figure 5.3) organizations fall and their philosophical orientation toward product development. Table 5.2 shows the question and possible answers for each of the items O1–O11. This table also shows the orientation coding associated with the item answers. All orientation items result in a integer from −3 to 3 as
placement on the spectrum with −3 being on the far left (Genius side) and 3 being on the far right (Participatory side) with 0 as neutral in the middle. The integers are as follows:

- High Genius = −3
- Medium Genius = −2
- Low Genius = −1
- Neutral = 0
- Low Participatory = 1
- Medium Participatory = 2
- High Participatory = 3

The sample size for the end-user data orientation construct analysis was $n = 74$.

Table 5.2

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Answer choices and answer codes</th>
</tr>
</thead>
</table>
| O1   | Mark your level of agreement with the following statement: I believe that companies who get product direction from innovative thought leaders are most successful. | (1) Strongly Disagree - Part High  
(2) Disagree - Part Med  
(3) Somewhat Disagree - Part Low  
(4) Neither Agree Nor Disagree - Neutral  
(5) Somewhat Agree - Gen Low  
(6) Agree - Gen Med  
(7) Strongly Agree - Gen High |
| O2   | Mark your level of agreement with the following statement: I believe that companies who get product direction from direct interactions with end users are the most successful. | (1) Strongly Disagree - Gen High  
(2) Disagree - Gen Med  
(3) Somewhat Disagree - Gen Low  
(4) Neither Agree Nor Disagree - Neutral  
(5) Somewhat Agree - Part Low  
(6) Agree - Part Med  
(7) Strongly Agree - Part High |
| O3   | Mark the level of agreement with the following statement for your company: My company believes that companies who get product direction from innovative thought leaders are most successful. | (1) Strongly Disagree - Part High  
(2) Disagree - Part Med  
(3) Somewhat Disagree - Part Low  
(4) Neither Agree Nor Disagree - Neutral  
(5) Somewhat Agree - Gen Low  
(6) Agree - Gen Med  
(7) Strongly Agree - Gen High |
Table 5.2 continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Answer choices and answer codes</th>
</tr>
</thead>
</table>
| **O4** | Mark the level of agreement to the following statement for your company: My company believes that companies who get product direction from direct interactions with end users are the most successful. | (1) Strongly Disagree - Gen High  
(2) Disagree - Gen Med  
(3) Somewhat Disagree - Gen Low  
(4) Neither Agree Nor Disagree - Neutral  
(5) Somewhat Agree - Part Low  
(6) Agree - Part Med  
(7) Strongly Agree - Part High |
| **O5** | If you could have a day with expert product development consultants or a day with end users, which would you choose in order to give you the best product direction? | With expert - Gen High  
With end users - Part High |
| **O6** | If you could have a percentage of your day with either end users or product development consultants/experts, how would you break up your day? | 100% with end users - Part High  
80% with end users, 20% with experts - Part Med  
50% with end users, 50% with experts - Neutral  
80% with experts, 20% with end users - Gen Med  
100% with experts - Gen High |
| **O7** | Since you elected to spend a percentage of your day with both, when would you meet with end users versus expert product development consultants in the single day? | By the hour selection from 8am-4pm |
| **O8** | Of the following, rank in priority order which has the largest impact on the potential success of the released product (1-least impact, 12-highest impact): | Great design - Gen  
Involving users during the design phases - Part  
Involving users during the development phases - Part  
Sound quality assurance - Gen  
Great engineering - Gen  
Great ideas - Gen  
Great development process - Part  
Internal talent - Gen  
Data-driven decisions - Gen  
Shared product vision - Part  
Great market penetration strategy - Gen  
Communication strategy to pose value
Table 5.2 continued

<table>
<thead>
<tr>
<th>Item</th>
<th>Question</th>
<th>Answer choices and answer codes to customers - Part</th>
</tr>
</thead>
</table>
| O9   | Of the following, rank in priority order which has the largest impact on user adoption of a product (1-least impact, 7-highest impact): | Market readiness - Gen  
Time to market - Gen  
Product quality - Part  
User's first impression - Part  
PR campaign - Gen  
Word of mouth - Gen  
Product usefulness - Part |
| O10  | Does your organization involve users or collect user data at any point during the product development lifecycle? | Yes - Part  
No - Gen |
| O11  | Does your organization involve users or collect user data at any point during the product development lifecycle? | Yes - Part  
No - Gen |
| O12  | Let’s imagine that your organization has a 2-week sprint. And let’s also imagine that there is a period of time prior to that 2-week sprint (pre sprint) and a period of time after that 2-week sprint (post sprint). At the end of the post time, the features developed during the 2-week sprint will be released to market (released). Identify when you would have the user do what. Check all that apply. | No user involvement - Gen  
We set the direction for the product - Gen  
Internal innovation activities - Gen  
User helps create the design of the system - Part  
We learn what users do in context - Part  
We learn what users want - Part  
We learn how users will use our product - Part  
We learn what will not work for users - Part  
We learn if users will adopt our product - Gen  
We determine what users want - Part  
User tells us if the product works for them - Part  
User tell us if they will buy the product - Gen |

Note. Gen = Genius; Part = Participatory.

Of the 11 items, the survey tool that I designed assumes that O6 is the best variable to use as the key marker in the targeted location analysis. The five responses available in O6 cover the
full representation of options on the User Data Spectrum for how a company could choose to divide the day between experts and end users.

![Diagram showing User Data Orientation](image)

*Figure 5.3. End-user data orientation analysis.*

Initial analysis of the orientation data (Figure 5.4) included looking at the descriptive statistics. In order to analyze the descriptive statistics, a lookup table was created to tie the orientation questions to the placement on the User Data Spectrum. Items O1 and O3 are statements that are genius-design oriented. Items O2 and O4 are statements that are participatory-design oriented. Items O1 and O2 capture individuals’ orientation; Items O3 and O4 capture individuals’ perceptions of their company’s orientation. A 7-point Likert-type agreement scale was used for these questions, where 1 = *strongly disagree* and 7 = *strongly agree*. Table 5.3 shows how items O1–O4 and the respective scale answers relate to the orientation construct.
Table 5.3
*Items O1–O4 and the Orientation Code Per Answers*

<table>
<thead>
<tr>
<th>Response</th>
<th>O1</th>
<th>O2</th>
<th>O3</th>
<th>O4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strongly disagree</td>
<td>I believe that companies who get product direction from innovative thought leaders are most successful.</td>
<td>I believe that companies who get product direction from direct interactions with end users are the most successful.</td>
<td>My company believes that companies who get product direction from innovative thought leaders are most successful.</td>
<td>My company believes that companies who get product direction from direct interactions with end users are the most successful.</td>
</tr>
<tr>
<td>Disagree</td>
<td>Genius Orientation</td>
<td>Participatory Orientation</td>
<td>Genius Orientation</td>
<td>Participatory Orientation</td>
</tr>
<tr>
<td>Somewhat disagree</td>
<td>Part High</td>
<td>Gen High</td>
<td>Part High</td>
<td>Gen High</td>
</tr>
<tr>
<td>Neither agree nor disagree</td>
<td>Neutae</td>
<td>Neutae</td>
<td>Neutae</td>
<td>Neutae</td>
</tr>
<tr>
<td>Somewhat agree</td>
<td>Gen Low</td>
<td>Part Low</td>
<td>Gen Low</td>
<td>Part Low</td>
</tr>
<tr>
<td>Agree</td>
<td>Gen Med</td>
<td>Part Med</td>
<td>Gen Med</td>
<td>Part Med</td>
</tr>
<tr>
<td>Strongly agree</td>
<td>Gen High</td>
<td>Part High</td>
<td>Gen High</td>
<td>Part High</td>
</tr>
</tbody>
</table>

*Note.* Gen = Genius, Part = Participatory.
The stacked bar graph in Figure 5.6 shows how each respondent’s answers landed on the Spectrum using the code in Table 5.3. The red are the genius questions and the lavender are the participatory questions. Because O1 and O2 represent opposite ends of the Spectrum (as do O3 and O4), if respondents fully grasp the question items, respond according to the theory of the User Data Spectrum, and answer consistently, red bars balance lavender bars across the midline. However, some respondents, for example, answered both O1 and O2 with participatory choices, pushing both bars to the right of Neutral. While there is a strong indication that the questions align with the intention on the individual orientations, there is more variance in the responses of how respondents ranked their company orientation (O3 and O4). This variation is likely a reflection of the difficulty of one person representing characteristics of both genius and participatory design views within the person’s company, or the person’s aspiration that ideally, the company should support both viewpoints.
Figure 5.4. Illustrating the 74 responses for O1 and O2 (left red and lavender, respectively) and O3 and O4 (right red and lavender, respectively). If respondents fully grasp the question items, respond according to the theory of the User Data Spectrum, and answer consistently, red bars would balance lavender bars across the midline.
Item O1 had a Cronbach’s Alpha of .697 (Table 5.12). This item was found to be a reliable measure of End-User Data Orientation and was used in full model analysis.

Items O2, O3, and O4 did not fit the model and therefore were found to not be significant measurements of End-User Data Orientation and were dropped from the model for the full model analysis.

The second aspect of orientation, Item O5, is about where product direction comes from in order to produce great products. Initially, respondents were asked to rank whether they would prefer to spend a day with experts or a day with end users. A preference for spending more time with experts reflects an orientation toward genius. A preference for spending more time with end users, on the other hand, indicated a participatory orientation. Table 5.4 shows the response to Item O5 and that 78% (n = 58) of respondents fall toward the participatory end of the spectrum with 21% (16) falling on the genius end.

Table 5.4  
*Item O5 Response and Orientation Code*

<table>
<thead>
<tr>
<th>Response Options</th>
<th>Spectrum code</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spend full day with end users</td>
<td>Part High</td>
<td>58</td>
<td>78.38%</td>
</tr>
<tr>
<td>Spend full day with expert product development consultants</td>
<td>Gen High</td>
<td>16</td>
<td>21.62%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>74</td>
<td>n</td>
</tr>
</tbody>
</table>
Items O5 did not fit the model and therefore was found to not be a significant measurement of End-User Data Orientation and were dropped from the model for the full model analysis.

Stepping away from a forced dichotomy by allowing respondents to provide a more nuanced breakdown of how they would want to spend their day. Figure 5.5 showed gradations from genius to participatory orientation; notice that seven divisions exist. Going forward, these quadrants will be referenced as genius high, genius medium, and genius low, with one neutral quadrant, along with participatory high, participatory medium, and participatory low. In keeping with the last question, if respondents chose to spend 100% of their day with end users, that would indicate a high participatory orientation. Table 5.5 (Item O6) shows that 94% (n = 52) of respondents split their day between end users and experts. Fifty-six percent (n = 29) of respondents choose to spend all or most of their day with end users, and only 8% (n = 4) choose to spend all or most of their day with experts. Interestingly, 43% (n = 22) of respondents split their day evenly between experts and end users.

Table 5.5
Item O6 Response and Orientation Code

<table>
<thead>
<tr>
<th>Response Options</th>
<th>Spectrum code</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% with end users</td>
<td>Part High</td>
<td>3</td>
<td>5.88</td>
</tr>
<tr>
<td>80% with end users, 20% with experts</td>
<td>Part Med</td>
<td>26</td>
<td>50.98</td>
</tr>
<tr>
<td>50% with end users, 50% with experts</td>
<td>Neutral</td>
<td>22</td>
<td>43.14</td>
</tr>
<tr>
<td>80% with experts, 20% with end users</td>
<td>Gen Med</td>
<td>4</td>
<td>7.84</td>
</tr>
<tr>
<td>100% with experts</td>
<td>Gen High</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>
Item O6 had a Cronbach’s Alpha of .534 (Table 5.12). This item was found to be a reliable measure of End-User Data Orientation and was used in full model analysis.

If a company chose to engage with both experts and end users in Item O6, Item O7 asked how it would allocate its time during that day. Figure 5.7 shows the way the Item O7 question was presented.

Looking across all companies that answered Item O7 (n = 68), there were eight possible time intervals to which companies could allocate their time during the day. The top two responses were that 25% of time would be allocated to experts (39.71% of all companies, n = 27) and 50% of the time would be allocated to experts (38.24% of all companies, n = 26). Table 5.6 shows the breakdown of each time allocation possibility.
Table 5.6
*Responses for Time Allocation With Experts*

<table>
<thead>
<tr>
<th>% of day with experts</th>
<th>Orientation score</th>
<th>Count</th>
<th>% of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00</td>
<td>3</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>12.50</td>
<td>2</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>25.00</td>
<td>2</td>
<td>27</td>
<td>39.71</td>
</tr>
<tr>
<td>37.50</td>
<td>1</td>
<td>11</td>
<td>16.18</td>
</tr>
<tr>
<td>50.00</td>
<td>0</td>
<td>26</td>
<td>38.24</td>
</tr>
<tr>
<td>62.50</td>
<td>−1</td>
<td>1</td>
<td>1.47</td>
</tr>
<tr>
<td>75.00</td>
<td>−2</td>
<td>3</td>
<td>4.41</td>
</tr>
<tr>
<td>87.50</td>
<td>−2</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>100.00</td>
<td>−3</td>
<td>0</td>
<td>0.00</td>
</tr>
</tbody>
</table>

Table 5.7 illustrates the pattern for how companies would structure their day: Irrespective of orientation, the hours at the beginning, middle, and end of the day would be with experts, and the hours from 9:00 a.m. to noon and then again from 1:00 p.m. to 3:00 p.m. would be spent with end users. Figure 5.8 illustrates this in graph form.

Table 5.7
*Item O7 Responses Across All Companies*

<table>
<thead>
<tr>
<th>Orientation</th>
<th>A.M.</th>
<th>P.M.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>8–9</td>
<td>9–10</td>
</tr>
<tr>
<td>Part (1)</td>
<td>30</td>
<td>46</td>
</tr>
<tr>
<td>Gen (−1)</td>
<td>−38</td>
<td>−22</td>
</tr>
<tr>
<td>Orientation</td>
<td>Gen</td>
<td>Part</td>
</tr>
<tr>
<td>Diff</td>
<td>68</td>
<td>68</td>
</tr>
</tbody>
</table>

Orientation % 55.88% 67.65% 79.41% 61.76% −52.94% 58.82% 58.82% −52.94%

*Note.* Part = Participatory; Gen = Genius; Diff = Difference between Gen and Part.
Figure 5.6. Item O7 responses for all companies.

Item O7 had a Cronbach’s Alpha of .521 (Table 5.12). This item was found to be a reliable measure of End-User Data Orientation and was used in full model analysis.

Item O8 analyzed how companies prioritized 12 possible impacts on the potential success of a released product. Figure 5.9 shows the question and 12 possible impacts ranked.
Seven of the 12 impact options were associated with a genius orientation if prioritized in the top 50% of options. Five of the options were associated with a participatory orientation if prioritized in the top 50% of options. Table 5.8 shows the responses for all respondents ($n = 67$). Each possible rank (1–12) is a column; the green cells highlight the most frequent rank number for each of the 12 options.
Most interestingly, 32 of 67 companies (48%) ranked genius options as their top priorities; however, 17 of 67 companies (25%) ranked participatory options as their top priorities, despite the fact that a majority of companies fell on the participatory side of the spectrum in items O1–O7.

Item O8 did not fit the model and therefore was found to not be a significant measurement of End-User Data Orientation and was dropped from the model for the full model analysis.

Item O9 addressed how companies prioritized seven possible impact factors on the user adoption of a released product. Figure 5.10 shows the Item O9 question and seven factors.
Of the following, rank in priority order which as the largest impact on user adoption of a product (1-least impact, 7-highest impact):

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market readiness</td>
<td>1</td>
</tr>
<tr>
<td>Time to market</td>
<td>2</td>
</tr>
<tr>
<td>Product quality</td>
<td>3</td>
</tr>
<tr>
<td>User's first impression</td>
<td>4</td>
</tr>
<tr>
<td>PR campaign</td>
<td>5</td>
</tr>
<tr>
<td>Word of mouth</td>
<td>6</td>
</tr>
<tr>
<td>Product usefulness</td>
<td>7</td>
</tr>
</tbody>
</table>

Figure 5.8. Item O9 survey question.

Four of the seven impact factors were associated with a genius orientation if prioritized in the top 50% of options. Three of the options were associated with a participatory orientation if prioritized in the top 50% of options. Table 5.9 shows the responses for all respondents ($n = 67$). Each possible rank (1–7) is a column; the green cells highlight the most frequent rank number for each of the 12 options.
Table 5.9
Item O9 Responses (n=67)

<table>
<thead>
<tr>
<th>Response</th>
<th>Q18. Of the following, rank in priority order which has the largest impact on user adoption of a product (1-least impact, 7-highest impact):</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Orientation 1 2 3 4 5 6 7</td>
</tr>
<tr>
<td>Market readiness</td>
<td>Gen 10 14 6 13 12 7 5</td>
</tr>
<tr>
<td>Time to market</td>
<td>Gen 2 7 7 8 9 16 18</td>
</tr>
<tr>
<td>PR campaign</td>
<td>Gen 13 8 7 4 9 12 14</td>
</tr>
<tr>
<td>Word of mouth</td>
<td>Gen 8 5 13 10 14 9 8</td>
</tr>
<tr>
<td>Product quality</td>
<td>Part 5 8 15 17 10 9 3</td>
</tr>
<tr>
<td>User’s first impression</td>
<td>Part 9 12 12 13 4 5 12</td>
</tr>
<tr>
<td>Product usefulness</td>
<td>Part 20 13 7 2 9 9 7</td>
</tr>
</tbody>
</table>

Note. Part = Participatory; Gen = Genius.

Despite there being one more genius orientation impact factor to rank, 29 of 67 (43%) companies ranked a participatory option as their top impact to user adoption.

Item O9 did not fit the model and therefore was found to not be a significant measurement of End-User Data Orientation and was dropped from the model for the full model analysis.

Item O10 was the most direct question posed to each respondent about involvement of the end user in product development. Figure 5.11 shows the item O10 question and possible responses.
Figure 5.9. Item O10 survey question.

Fifty-one of 60 companies (85%) who responded to this item choose the answer “yes.” Nine of 60 companies (15%) choose “no” or “it depends”—indicators of a genius orientation.

Item O10 did not fit the model and therefore was found to not be a significant measurement of End-User Data Orientation and was dropped from the model for the full model analysis.

Item O11 was a free text response to the direct question posed in Item O10. The code for O11 was the exact same as O10. This duplication did not impact the reliability assessment of the construct as each item was assessed for reliability individually.

Item O12 introduced when end-user data was brought into the product development lifecycle and in what way. Figure 5.12 shows the Item O12 question and possible responses.
Figure 5.10. Item O12 survey question.

Table 5.10 shows the responses for all respondents \((n = 48)\). The orientation code is based on the end-user data activity and the time in the product development lifecycle. For example, if a company stated that it engaged in the activity “We learn what users want” during
the pre-sprint or 2-week sprint, it would lean toward a participatory orientation because it is creating with the end user to help shape the product. However, if it engaged in the same activity post sprint or once released, it would have a genius orientation because it did not rely on the end user to help create the product.

Table 5.10
Item O12 Orientation Coding (n = 48)

<table>
<thead>
<tr>
<th>O12 Item Question</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>If all true</th>
</tr>
</thead>
<tbody>
<tr>
<td>No user involvement</td>
<td>Pre sprint</td>
<td>2-week sprint</td>
<td>Post sprint</td>
<td>Released</td>
<td>If all true</td>
</tr>
<tr>
<td>We set the direction for the product</td>
<td>Gen</td>
<td>Gen</td>
<td>Gen</td>
<td>Gen</td>
<td>−3 Gen High</td>
</tr>
<tr>
<td>Internal innovation activities</td>
<td>Gen</td>
<td>Gen</td>
<td>Gen</td>
<td>Gen</td>
<td>−3 Gen High</td>
</tr>
<tr>
<td>User helps create the design of the system</td>
<td>Part</td>
<td>Part</td>
<td>Part</td>
<td>Part</td>
<td>3 Part High</td>
</tr>
<tr>
<td>We learn what users do in context</td>
<td>Part</td>
<td>Part</td>
<td>Part</td>
<td>Part</td>
<td>3 Part High</td>
</tr>
<tr>
<td>We learn what users want</td>
<td>Part</td>
<td>Part</td>
<td>Gen</td>
<td>Gen</td>
<td>1 Low Part</td>
</tr>
<tr>
<td>We learn how users will use our product</td>
<td>Part</td>
<td>Part</td>
<td>Gen</td>
<td>Gen</td>
<td>2 Med Part</td>
</tr>
<tr>
<td>We learn what will not work for users</td>
<td>Part</td>
<td>Part</td>
<td>Gen</td>
<td>Gen</td>
<td>2 Med Part</td>
</tr>
<tr>
<td>We learn if users will adopt our product</td>
<td>Part</td>
<td>Part</td>
<td>Gen</td>
<td>Gen</td>
<td>−1 Low Gen</td>
</tr>
<tr>
<td>We determine what users want</td>
<td>Gen</td>
<td>Gen</td>
<td>Gen</td>
<td>Gen</td>
<td>−3 Gen High</td>
</tr>
<tr>
<td>Users tell us if the product works for them</td>
<td>Part</td>
<td>Part</td>
<td>Part</td>
<td>Part</td>
<td>3 Part High</td>
</tr>
</tbody>
</table>

*Note. Part = Participatory; Gen = Genius.*

Table 5.11 shows the response count for each end-user activity at each stage of the product development lifecycle. After analyzing and assigning an orientation code to all
companies, 15 of 53 (28%) had a genius orientation, which is a similar percentage of respondents leaning toward a genius orientation as was observed in items O1–O7 and O9–O10.

Table 5.11
Item O12 Responses (n = 48)

<table>
<thead>
<tr>
<th>O12 Item Answer</th>
<th>Pre sprint</th>
<th>2-week sprint</th>
<th>Post sprint</th>
<th>Released</th>
</tr>
</thead>
<tbody>
<tr>
<td>No user involvement</td>
<td>5</td>
<td>15</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>We set the direction for the product</td>
<td>49</td>
<td>10</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Internal innovation activities</td>
<td>44</td>
<td>25</td>
<td>11</td>
<td>12</td>
</tr>
<tr>
<td>User helps create the design of the system</td>
<td>38</td>
<td>20</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>We learn what users do in context</td>
<td>45</td>
<td>17</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>We learn what users want</td>
<td>51</td>
<td>13</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>We learn how users will use our product</td>
<td>34</td>
<td>20</td>
<td>29</td>
<td>31</td>
</tr>
<tr>
<td>We learn what will not work for users</td>
<td>38</td>
<td>23</td>
<td>29</td>
<td>24</td>
</tr>
<tr>
<td>We learn if users will adopt our product</td>
<td>24</td>
<td>10</td>
<td>26</td>
<td>34</td>
</tr>
<tr>
<td>We determine what users want</td>
<td>50</td>
<td>15</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>User tells us if the product works for them</td>
<td>15</td>
<td>18</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>User tells us if they will buy the product</td>
<td>23</td>
<td>10</td>
<td>27</td>
<td>32</td>
</tr>
</tbody>
</table>

Item O12 did not fit the model and therefore was found to not be a significant measurement of End-User Data Orientation and was dropped from the model for the full model analysis.

In summary, Items O1–O12 were run through the targeted location method to determine the items with the best fit and which best measured end-user data orientation (Figure 5.4). Table 5.13 shows the findings. Items O1, O6, O7, and O12 were found to be the items that most reliably measure orientation and were used in the final model analysis.
Table 5.12
*Orientation Reliability Statistics (n = 48)*

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.708</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5.13
*Orientation Item-Total Statistics (n = 48)*

<table>
<thead>
<tr>
<th>Item</th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orientation 1</td>
<td>2.2325</td>
<td>5.724</td>
<td>.422</td>
<td>.697</td>
</tr>
<tr>
<td>Orientation 6</td>
<td>- .2467</td>
<td>4.820</td>
<td>.650</td>
<td>.534</td>
</tr>
<tr>
<td>Orientation 7</td>
<td>.0033</td>
<td>5.080</td>
<td>.680</td>
<td>.521</td>
</tr>
<tr>
<td>Orientation 12</td>
<td>.3958</td>
<td>7.861</td>
<td>.262</td>
<td>.754</td>
</tr>
</tbody>
</table>

5.6.2. Four Growth Variables Construct Analysis

There are four growth variables in the User Data Spectrum model: representativeness; skill set; design vision; and process. Recall that the basic premise of the User Data Spectrum model is that in order for a company to increase its UX capacity, it should invest in the growth variables in alignment with its orientation to ultimately increase its UX maturity. Each growth variable had a series of questions in the User Data Spectrum Survey. Representativeness had 36 questions, skill set had 10 questions, design vision had three questions, and process had eight questions. Figure 5.13 illustrates each growth variable and the items contributing to the variable. Just as with the analysis for end-user data orientation, a targeted location method was used for each growth variable to determine the best fit for the items related to the construct. The key markers for each are indicated in yellow in Figure 5.13.
Figure 5.11. Four growth variable constructs.

**Representativeness construct.** The representativeness construct only had one item. While the research explored state and trait factors of representativeness, trait was the only one supported in the User Data Spectrum Survey. Respondents were asked if they were similar to the end user of their product regarding traits such as gender, age, ethnicity, income, education, geographic residence, annual income, technical aptitude, and favoritism toward technology. If respondents reported being the same as the end user of the product on each trait question, they were given a score for the percentage of sameness of all possible trait questions. Representativeness scores ranged from 0% to 100% with the majority being below 50% sameness (34 of 39 respondents; 87%). Figure 5.15 shows the amount of respondents for the percent sameness ranges. The sample size for representativeness was \( n = 39 \).
Table 5.15

*Representativeness (n = 39)*

<table>
<thead>
<tr>
<th>% Same</th>
<th># of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>4</td>
</tr>
<tr>
<td>1-25%</td>
<td>20</td>
</tr>
<tr>
<td>26-49%</td>
<td>10</td>
</tr>
<tr>
<td>50%</td>
<td>3</td>
</tr>
<tr>
<td>51-75%</td>
<td>1</td>
</tr>
<tr>
<td>76-99%</td>
<td>0</td>
</tr>
<tr>
<td>100%</td>
<td>1</td>
</tr>
</tbody>
</table>

There was only one item (% same) for representativeness, therefore that item (R1 in Figure 5.13) was used in the full model analysis.

**Process construct.** The process construct had eight items. All process items were scored on a 0%–100% scale based on the strength of the process reported by the company. A nonexistent process would be 0%, whereas 100% would be a strong process. Table 5.15 shows the P1 item. P1 had six process elements that a company could say it does, or partially does. If the company said it did that element, it received the maximum score. If it said it did the element sometimes, then it was given a partial score. Companies that said they did not do the element or were not sure were given a 0% score. The process that most companies affirmatively said they do is to use an agile development process (65% of companies in this survey).

Table 5.15

*P1 Item (n = 38)*

<table>
<thead>
<tr>
<th>P1 Item</th>
<th>Yes</th>
<th>No</th>
<th>Sometimes</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company regularly does internal design critiques and reviews. (1)</td>
<td>42.11%</td>
<td>15.79%</td>
<td>39.47%</td>
<td>2.63%</td>
</tr>
<tr>
<td>Our company requires sign off from leadership on designs. (2)</td>
<td>28.95%</td>
<td>23.68%</td>
<td>47.37%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Table 5.15. continued

\[n = 38\]

<table>
<thead>
<tr>
<th>P1 Item (n = 38)</th>
<th>Yes</th>
<th>No</th>
<th>Sometimes</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company uses an agile development product development process. (3)</td>
<td>65.79%</td>
<td>7.89%</td>
<td>23.68%</td>
<td>2.63%</td>
</tr>
<tr>
<td>We have a Sprint 0 as a part of our agile process (or a sprint that is dedicated to user research prior to going into development) (4)</td>
<td>28.95%</td>
<td>21.05%</td>
<td>47.37%</td>
<td>2.63%</td>
</tr>
<tr>
<td>Our company uses a user-centered design process to develop products. (5)</td>
<td>36.84%</td>
<td>13.16%</td>
<td>44.74%</td>
<td>5.26%</td>
</tr>
<tr>
<td>Our company implements user experience methods into product development process. (6)</td>
<td>36.84%</td>
<td>7.89%</td>
<td>55.26%</td>
<td>0.00%</td>
</tr>
</tbody>
</table>

Items P2 and P3 analyzed the perceived rigor of the UX processes used within the organization. Stronger agreement translated to higher percentage for the measurement.

Responses ranged from 0% to 100% and a variance of 0.07 for P2 and 0.17 for P3. Item P4 asked companies about the distance of control between the people in the organization carrying out user data work and those making decisions on user experience for the product. Responses ranged from 0% to 100% with a variance of 0.11. Item P5 analyzed whether the company participated in any activities that focused on improving the process through reflection on the process. Item P6 analyzed whether the company saw value in the user data the company used and/or collected and the use of that data within the product development life cycle. Responses ranged from 0% to 100% with a variance of 0.06. Item P7 analyzed the access to user data within the company. Responses ranged from 0% to 100% with a variance of 0.09. Sample size for all process items was \( n = 37 \).
Table 5.16  
*Process Reliability Statistics (n = 37)*

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.765</td>
<td>4</td>
</tr>
</tbody>
</table>

Table 5.17  
*Process Item-Total Statistics (n = 37)*

<table>
<thead>
<tr>
<th></th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>1.0995</td>
<td>.437</td>
<td>.483</td>
<td>.759</td>
</tr>
<tr>
<td>P2</td>
<td>1.5014</td>
<td>.325</td>
<td>.610</td>
<td>.684</td>
</tr>
<tr>
<td>P6</td>
<td>1.1789</td>
<td>.347</td>
<td>.574</td>
<td>.704</td>
</tr>
<tr>
<td>P7</td>
<td>1.3705</td>
<td>.280</td>
<td>.647</td>
<td>.668</td>
</tr>
</tbody>
</table>

The final process construct with items P1, P2, P6, and P7 is depicted in Figure 5.14.

![Image](image)

**Figure 5.12. Final Process Construct**

**Design vision construct.** The design vision construct consisted of four items, DV1–DV4. DV4 was an aggregate of DV1, DV2, and DV3. All design vision items analyzed the source (DV2), clarity (DV1), and shared understanding (DV3) within the organization of the design vision. Table 5.19 shows the list of questions and the category each question contributed to.
Responses ranged from 23% to 94% with a variance of 0.03. Sample size for all process items was $n = 39$. Table 5.21 reveals that items DV1, DV2, and DV3 all had reliability scores of 0.6 or higher and were deterred to be the best fit items to measure design vision.
Table 5.20  
**Design Vision Reliability Statistics (n = 39)**

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.819</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5.21  
**Design Vision Item-Total Statistics (n = 39)**

<table>
<thead>
<tr>
<th></th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV1</td>
<td>.272973</td>
<td>.012</td>
<td>.828</td>
<td>.612</td>
</tr>
<tr>
<td>DV2</td>
<td>.51891 .028</td>
<td>.028</td>
<td>.697</td>
<td>.872</td>
</tr>
<tr>
<td>DV3</td>
<td>.381081 .015</td>
<td>.015</td>
<td>.781</td>
<td>.633</td>
</tr>
</tbody>
</table>

The final design vision construct with items DV1, DV2, and DV3 is depicted in Figure 5.15.

**Figure 5.13. Final Design Vision Construct**

**Skill set construct.** The skill set construct consisted of five items. These items analyzed the proficiency of the people within the organization collecting (SS1), interpreting (SS2), and implementing (SS3) user data. Item SS4 analyzed the overall proficiency of the organization regarding critical user data activities. Figure 5.16 shows the 13 questions that each company
answered related to its user data skill set. All skill set items were scored on a 7-point Likert-type scale for strength of proficiency (where 1 = not at all proficient and 7 = expert recognized authority).

<table>
<thead>
<tr>
<th>How would you describe your overall company's degree of proficiency with the following?</th>
<th>Not at all proficient</th>
<th>Knows the basics (limited)</th>
<th>Novice (limited)</th>
<th>Intermediate (practical application)</th>
<th>Advanced (a go to in the org)</th>
<th>Expert (recognized authority)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening to the user's needs</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Translating user needs into design requirements</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Coming up with great product ideas</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Designing beautiful interfaces</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Conducting ethnographic research</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Conducting usability tests</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Translating design ideas to development teams</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Creating a holistic experience for an entire product line</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Responding to user feedback post release</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Analyzing the effectiveness of released products</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Speed of iterating on product releases</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Identifying market opportunity</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>Identifying the MVPs</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Figure 5.14. Item SS4 questions.

Responses ranged from 0% to 88% with a variance of 0.04. Sample size for all process items was $n = 45$. Table 5.23 reveals that items S1-S5 all had reliability scores of 0.6 or higher and were determined to be the best fit items to measure design vision.
Table 5.22

Skill Set Reliability Statistics (n = 45)

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.801</td>
<td>3</td>
</tr>
</tbody>
</table>

Table 5.23

Skill Set Item-Total Statistics (n = 45)

<table>
<thead>
<tr>
<th></th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS1</td>
<td>2.5550</td>
<td>.630</td>
<td>.849</td>
<td>.724</td>
</tr>
<tr>
<td>SS2</td>
<td>2.5244</td>
<td>.431</td>
<td>.835</td>
<td>.667</td>
</tr>
<tr>
<td>SS3</td>
<td>2.5397</td>
<td>.550</td>
<td>.636</td>
<td>.746</td>
</tr>
<tr>
<td>SS4</td>
<td>2.4741</td>
<td>.606</td>
<td>.444</td>
<td>.812</td>
</tr>
<tr>
<td>SS5</td>
<td>2.6079</td>
<td>.725</td>
<td>.334</td>
<td>.826</td>
</tr>
</tbody>
</table>

The final skill set construct with items SS1, SS2, SS3, SS4, and SS5 is depicted in Figure 5.17.

Figure 5.15. Final Skill Set Construct

In summary, each of the four growth variable constructs was run through the targeted location method to determine the items with the best fit for each construct and which items best measured the final construct. The resulting constructs (Figure 5.18) and items with a reliability
Chronbach’s alpha of 0.6 or higher were representativeness had one item R1; design vision had three items DV1, DV2 and DV3; process had four items P1, P2, P6, P7; and skill set had five items SS1, SS2, SS3, SS4, and SS5.

Figure 5.16. Final Growth Variable Constructs

5.6.3. Team Structure and Product Maturity Construct Analysis

The team structure construct consisted of two items: TS1 and TS2. All team structure questions analyzed the size (TS2) and control (TS1) that an organization has. Measurement of control was based on whether the company was a private or public company. Public companies were considered to have higher control than private companies. Of the data collected, 29 companies were private, 57 companies were public, and 19 were other or none (n = 110). Item TS2 assessed how many roles existed on a given product team to determine the size of the team structure within the organization. There were 17 possible roles, with an “Other” option that companies could pick from. Companies were measured on a 0%–100% scale. If a company had
all 17 roles, it was given 100%; if a company had none of the roles, it was given 0%. Responses ranged from 0% to 94% with a variance of 0.08. Sample size for all process items was $n = 110$.

The product maturity construct consisted of two items: PM1 and PM2. Item PM1 analyzed the stage of development for the product being analyzed. Table 5.24 shows the 11 possible stages that a company could select. How early or late a stage the product was reported to be in determined its maturity. Initial research is considered an early stage, and full production is considered a late stage. Responses ranged from 0% to 100% with a variance of 0.11. Sample size for all PM1 was $n = 110$.

Table 5.24
Item PM1 Survey Questions

<table>
<thead>
<tr>
<th>What stage of development is it in?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial research</td>
</tr>
<tr>
<td>Conceptual</td>
</tr>
<tr>
<td>Initial design</td>
</tr>
<tr>
<td>Early development</td>
</tr>
<tr>
<td>Quality testing (prerelease)</td>
</tr>
<tr>
<td>Beta (released to a limited number of customers)</td>
</tr>
<tr>
<td>Full production</td>
</tr>
<tr>
<td>Sustainment</td>
</tr>
<tr>
<td>Other ________________________________</td>
</tr>
<tr>
<td>No data</td>
</tr>
<tr>
<td>No response ____________________________</td>
</tr>
</tbody>
</table>

Item PM2 assessed how the product was released. Table 5.25 shows the three possible responses for the product release strategy. Big releases indicate a slower release strategy, whereas iterative releases (daily or weekly) indicate a faster release strategy. Each response was
rated on a 0%–100% scale where 0% is slow and 100% is fast. Responses ranged from 0% to 100% with a variance of 0.03. Sample size for all PM2 items was $n = 110$.

Table 5.25
*Item PM2 Survey Questions*

| How is the product released? | Big releases at major milestones | Iterative releases daily, weekly | Big releases at major milestones, Iterative releases daily, weekly |

The TS and PM measures were then evaluated as potential moderators for the relationship between growth variables and end-user data orientation. Table 5.27 and 5.29 shows the findings.

Table 5.26
*Product Maturity Reliability Statistics (n = 110)*

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.321</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 5.27
*Team Structure Item-Total Statistics (n = 110)*

<table>
<thead>
<tr>
<th></th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>PM1 Score</td>
<td>.7545</td>
<td>.026</td>
<td>.239</td>
<td>.</td>
</tr>
<tr>
<td>PM2 Score</td>
<td>.2520</td>
<td>.106</td>
<td>.239</td>
<td>.</td>
</tr>
</tbody>
</table>

Table 5.28
*Team Structure Reliability Statistics (n = 110)*

<table>
<thead>
<tr>
<th>Cronbach's Alpha</th>
<th>N of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>.514</td>
<td>2</td>
</tr>
</tbody>
</table>
Table 5.29  
*Product Maturity Item-Total Statistics (n = 110)*

<table>
<thead>
<tr>
<th></th>
<th>Scale Mean if Item Deleted</th>
<th>Scale Variance if Item Deleted</th>
<th>Corrected Item-Total Correlation</th>
<th>Cronbach's Alpha if Item Deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS1 Score</td>
<td>.2145</td>
<td>.078</td>
<td>.360</td>
<td>.</td>
</tr>
<tr>
<td>TS2 Score</td>
<td>.7098</td>
<td>.139</td>
<td>.360</td>
<td>.</td>
</tr>
</tbody>
</table>

5.6.4. UX Maturity Construct Analysis

UX maturity is a measure of the amount of power, control, influence, and support UX practice has within an organization. Increasing UX capacity leads to UX maturity. A 12-item established measure for UX maturity by Venturi and Troost (2004) is used in the User Data Spectrum Survey. Table 5.30 shows the UX maturity questions from Venturi and Trost’s work and how they were presented in the User Data Spectrum Survey. Organizations were given a 0%-100% score based on their response to these 12 items. Responses ranged from 0% to 100% with a variance of 0.08. Sample size for all process items was $n = 37$. 
Table 5.30
UX Maturity Item Questions

<table>
<thead>
<tr>
<th>Mark your level of agreement with the following statements. UCD = user-centered design</th>
<th>Yes</th>
<th>No</th>
<th>Not sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does business management understand that usability and UCD must be part of the business strategy?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does business management set usability goals on usability for systems?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is there a reward mechanism for reaching these goals?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is UCD focus addressed in acquisition activities?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are usability goals shared with the customer?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does business management take action to know how the usability of their product compares to that of their competitors?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does senior management take action to maintain/improve UCD skills, resources, technology, awareness, and culture in the organization?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are direct/indirect, short-term, and long term business benefits tracked by business management?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Have common terminology, templates, or tools for the exchange of data between the different professions involved in UCD been developed and used?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are UCD outcomes (e.g., design solutions, error reports) understood and applied inside the company?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is effective communication made to raise the awareness and culture of UCD inside your company?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is effective communication made to raise the awareness and culture of UCD outside your company?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.6.5. Full Model Analysis

This study’s implicit hypothesis was that a model consisting of some subset of the four independent variables (Representativeness, Process, Design Vision, and Skill Set) and their interactions with Orientation, Team Structure, and Product Maturity representing moderator effects would explain a significant proportion of variance in the study’s dependent variable, UX Maturity. This hypothesis was tested by submitting the four independent variables and their 12 one-way interactions with the three moderator variables to a backward elimination multiple regression predicting standing on the dependent variable. The first time the full model was run through the regression analysis, the model that emerged explained 71% of the variance in UX Maturity (63% adjusted), which is unusually strong. However, End-User Data Orientation did not have a significant moderating effect on any variable in the model.

The full model was run a second time with End-User Data Orientation excluded since it was shown to not have a significant moderating effect in the full model analysis. This allowed for five more companies to be included in the analysis that had no End-User Data Orientation measurement. With the higher number of cases, the model included two fewer terms and the R-squared fell to .631 (.571 adjusted). However, this is still a huge level of explained variance and the significance level actually increased.

This analysis produced a five-variable model for which $R^2 = .631$ (.571 adjusted). The residuals were tested for normality using the Shapiro-Wilks test, which resulted in a $W = .972$, $p = .47$, thereby indicating that the assumption of normality of the error term of the regression was satisfied and permitting the application of the F test to the regression effect. This resulted in an $F(5, 31) = 10.596$, $p < .001$. The implicit null hypothesis is consequently rejected. The identified
subset of variables and their moderators explained a significant and substantial proportion of variance in UX Maturity.

Table 5.31

*Coefficients, Part Correlations, and Tolerances of Predictors included in the Model*

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Unstandardized Coefficients</th>
<th>Part Correlation</th>
<th>Tolerance (Collinearity)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>-0.515</td>
<td>0.003</td>
<td></td>
</tr>
<tr>
<td>Skill Set</td>
<td>0.608</td>
<td>0.004</td>
<td>0.334</td>
</tr>
<tr>
<td>Process</td>
<td>1.144</td>
<td>0.000</td>
<td>0.701</td>
</tr>
<tr>
<td>Skill Set x Team Structure</td>
<td>3.047</td>
<td>0.027</td>
<td>0.253</td>
</tr>
<tr>
<td>Process x Product Maturity</td>
<td>-4.725</td>
<td>0.002</td>
<td>-0.364</td>
</tr>
<tr>
<td>Design Vision x Product Maturity</td>
<td>9.159</td>
<td>0.010</td>
<td>0.301</td>
</tr>
</tbody>
</table>

The identities and roles of the predictors identified as significant in the model are conveyed in Table 5.31. All of the predictors had Tolerance values well above .10, indicating that multicollinearity did not reach a problematic level for any of the selected predictors. The p-values of the coefficients for all of the predictors were well below the study’s alpha level of .05. The strongest contributors to the model, as revealed by the part correlations, were Process and its interaction with Product Maturity. Each of the predictors contributed at least 6.45% or more to the percentage of explained variance in the dependent variable.

In conclusion, analysis of each of the seven constructs (End-Data User Orientation, four growth variables, team structure, and product maturity) revealed that at least one or more items sufficiently measured the end construct. Further, for each construct questions can be deleted from the survey to reduce the amount of questions needed to reliable measure each construct. Analysis of the full model revealed that growth variables explained up to 71% of the variance in UX Maturity. Product maturity and team structure had moderating effects on the growth
variables and UX Maturity. Orientation did not show a significant moderating effect in the full User Data Spectrum model. The final model is depicted in Figure 5.19.

![Figure 5.17. Resulting User Data Spectrum Model.](image)

### 5.7. Limitations

This research has several limitations. The most serious of these is sample size. Although 110 responses were collected (a 22% response rate), only 37 of the 110 respondents completed the entire survey, most likely due to the length of the survey. The 37 data points are problematic for analysis of the full model, because the full model has 24 variables. The similarity of the sample size and the number of variables increases the risk of over-identification and inflate R-
squared values. For this research, a stepwise method was followed to minimize the risk of this limitation. However, a more robust sample size would yield a more statistically sound approach.

Another limitation is some confusion in unit of analysis between the individual and the organization. In organizational research, there is precedent for an individual to represent the company (Schein, 1983). However, traditionally this only applies when the individual is also the founder of the company. Of the 110 responses, 22 respondents volunteered information about the company they worked for. Of those 22 respondents, 16 are unique. Only two companies have multiple responses per company. A further discussion about the limitation of the unit of analysis may be found in Chapter 8. However, it is important to note that for this analysis, each response was treated as a unique company as well as the data point representative of the company. Therefore, 110 companies are represented in this research.

A third noteworthy limitation is that of the 110 responses, 27 reporting having the role of HCI consultant. Of the final group of 37 companies used in the analysis, 12 (32%) reported having an HCI consultant role. Naturally, to participate in the work of HCI consulting, one must have an orientation that favors user data; this may skew the results toward a participatory orientation. Future research should include an analysis that looks at the data set with and without respondents who reported having an HCI consultant role.

A primary limitation of the survey is that it is yet to be determined if this body of research is generalizable to all business organizations worldwide that rely on software components. First, the respondents to the survey predominately came from companies based in North America. Additionally, respondents from software development teams and companies were specifically targeted. However, it is not clear if the full range of companies in that industry is represented in the sample. It is also yet to be determined if the type of product a company
produces impacts their ability to use the spectrum. For example, would a company selling a software as a service (SaaS) be able to benefit from the spectrum in the same way as a transportation company that makes software as one small part of its products? Despite these potential limitations, the range of survey takers offers a broad enough sample to provide relevant data to shed light on the central research questions.

REFERENCES


CHAPTER 6
RAPID MEANINGFUL SCENARIOS

This chapter is an extended version of a paper submitted to The International Journal of Human-Computer Interaction, with author list:
Andrea Peer, Janee Triplett, Holly Bender

Andrea Peer’s roles in this research included substantial contributions to (a) the conception and design of the theory, namely the development of the rapid meaningful scenarios approach (the user experience process, the strategic organization connection, and statistical analysis); and (b) collection of university data from each member user. She wrote all of the portions of this chapter.

This material is based upon work supported by the National Science Foundation under Grant No. DUE-1231286 Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

6.1. Opening

This chapter presents an example of how the User Data Spectrum operates in an actual organization. The methodology used in this example is design research. Design research involves research that takes place as a part of the design process. During this research, the designer has to analyze human behavior, from which he would then “derive quantities, qualities, and relationships” (Bayazit, 2004, p. 32).
This example illustrates how to translate an organization’s description of their UX needs into a technology system that effectively meets those needs. To understand how the design research featured in this chapter relates to the questions driving this dissertation, it is essential to understand the organization that was seeking a more effective technological design. Imagine an organization whose sole mission is to improve teaching in higher education as a method to make dramatic changes in STEM undergraduate education. This organization, the Center for the Integration of Research, Teaching and Learning (CIRTL), works with limited dollars and limited people. In 2012 CIRTL tasked a small team to develop a technology system for their rapidly growing organization. I and one other researcher led a small software development team in a three-month assessment of the current technology use by organization members and were prepared to present the technology recommendation to the leadership team. The team started its presentations with the following kinds of statements that they had gathered from stakeholders:

- “I am a local CIRTL program lead and I want to share my resources with the CIRTL network.”
- “I am a brand new graduate student and have to be a TA in an intro level course. I want resources to guide me on how to teach.”
- “I am a department chair. What is the benefit of getting involved with CIRTL to my graduate students?”
- “I am a CIRTL university leader and I want to let people at my university know about what is happening and how to get involved.”

The first thought for most of the organization leadership was, “Why are they telling us these stories instead of giving us a list of system requirements?”
Our small team explained that how the organization chooses to design the technologies will affect how the organization members interact, the information received about organization activities, and how the members participate in the larger organization initiatives (Ren, Kraut, & Kiesler, 2007). The design of the technologies must encourage commitment and contribution by members in order for the organization to be successful. What our team had actually done is capture the users’ words and put them into meaningful short stories. The research described in this chapter addresses the challenge of capturing and translating those words into meaningful technologies.

This kind of situation and its diverse constituents reflect the kinds of dilemmas many organizations face. This chapter offers a kind of case study focused on how my team helped address those dilemmas using a technique we developed called the Rapid Meaningful Scenarios (RMS) method.

6.2. Translating Human Expression Into Useful Technologies

Organizations that employ user experience (UX) practices often begin with the descriptions of difficulties clients are having, and human language is often the medium by which they are expressed. In the field of UX, there is a multitude of methods by which a UX practitioner might interact with user words. To offer just two examples, there are 61 UX methods in the Usability Book of Knowledge (User Experience Professionals’ Association, n.d.); 36 (59%) of those methods involve user words as the primary data source. There are 20 UX methods on the Nielsen Norman Group (NNg) site; 10 (50%) of those methods involve user words as the data source (Rohrer, 2014). Interpreting the meaning of the language users express is often daunting, especially since most product development life cycles occur in fast-paced
development environments. Plus, the skill sets of those collecting user data generally do not include sophisticated methods for translating user words into system requirements.

How, then, do organizations translate and make use of users’ spoken words? The job of UX professionals is to translate those words into a meaningful story that will help develop products that are usable and valuable. How do they do this efficiently? What method can they use to be better translators? Though I strongly believe testing should be grounded as much as possible in actual user behavior, fact is that what users say during interactions with them represents a real opportunity.

The challenge with any UX method, no matter how quantitative one tries to be, is that users verbally deliver a slew of requirements that often are not sufficiently captured. It is possible to transcribe every word that users express and conduct rigorous analyses on the transcripts. Transcription, however, is pricey and time consuming, and interpreting transcripts requires a level of expertise in discourse analysis.

As a result of these challenges, user data in the form of words often become noise in the design process, is lost in translation, or completely disregarded. The gravity of this issue becomes clear when one considers the conceptual and abstract nature of initial design decisions. During concept phases, the system is less tangible and affords fewer interaction options, so user evaluation consists of more verbalized responses to design concepts as opposed to actual behavior with a functional system.

6.3. Rapid Meaningful Scenario Development

The problems of CIRTL are just one example of the difficulty of translating human expression into useful technologies. Thus, we developed a process called rapid meaningful scenarios (RMS). The target audience for RMS is practitioners who are trained in user-centered
design (UCD) but are not skilled in qualitative methods or discourse analysis. RMS offers a framework for making meaning of the users’ words captured during interviews and usability testing. The process allows a small team to quickly step from unstructured human expressions to meaningful scenario analysis and then to prototype design and development. Similar to the goal of the User Data Spectrum discussed in Chapters 3 and 4, RMS is a specific UX method that can help an organization ground product development in user data.

The RMS method follows a path similar to the User Data Spectrum in that it first attempts to capture the organization’s orientation by rooting the organization’s vision into the interview protocol. Then it considers the four variables in the User Data Spectrum work—design vision, representativeness, skill set, and process—in order to create the best UX practice for the organization. Finally, the closing section of this chapter illustrates the challenges and opportunities in current HCI education through a discussion of the abilities of the UX team involved in this case study.

6.4. Overview of CIRTL and its Needs Assessment Initiative

The Center for the Integration of Research, Teaching and Learning (CIRTL), established in 2006, originally consisted of six universities. Originally funded by the National Science Foundation (NSF), the mission of CIRTL is to improve science, technology, engineering, and mathematics (STEM) education and thereby increase STEM undergraduate retention rates across the United States. Improving STEM education may include better teaching in STEM classrooms, increasing diversity in STEM fields, and improving the overall STEM literacy of the nation.

In order to make this improvement, CIRTL uses graduate education as the leverage point. As of 2013, there are approximately 421 PhD-granting universities in the United States. Approximately 23% of these universities in the US that grant doctorates (96 of 421) are
classified as the higher research activity universities by the Carnegie group. The majority of
doctorate recipients come from the 96 research universities in this category (National Center for
Science and Engineering Statistics, n.d.). The idea behind CIRTL is to target graduates at the
small percentage of doctorate-granting universities and thereby have major impact on STEM
education once those graduate students enter into the teaching ranks at the colleges and
universities around the country. Specifically, CIRTL members develop and deliver programs that
place teaching as a critical skill set for graduate students at these few doctorate-granting
universities. In order to achieve this goal, CIRTL embraces the advancement of three major core
ideas: teaching-as-research, learning communities, and learning through diversity.

In 2011, CIRTL grew from six to 23 universities. With this growth, a new technology
system was needed to support the CIRTL community. Starting in May 2012, a small team was
assembled to assess the current and future IT needs of the CIRTL network. The primary goal of
the team was to analyze current use of CIRTL technologies and identify future IT needs to
support the growth of the network. The team consisted of UX researchers, designers, software
developers, and technical experts.

Over the course of the summer of 2012, the team conducted 61 interviews, facilitated 40
usability testing sessions, generated 81 scenarios, designed and developed four major iterations
of a prototype, conducted artifact analysis on the current CIRTL.net site, created a test server,
and created a warehouse site to share all of the needs assessment work with the community. The
RMS method emerged over the course of this summer needs assessment. The team did not set
out to create a new method; however, but due to constraints in time, money, and access to users,
the RMS method was born. This research describes the process taken, the findings from all of the
needs assessment activities, and the subsequent creation of RMS.
6.5. RMS Overview

The RMS method consists of four major steps:

- Strategic vision analysis
- Interview protocol creation
- Intervention
  - 3-day sprints, interviews, generating scenarios, and prototype testing
  - Prototype iteration
  - Release decision
- Scenario validation

The strategic vision analysis and interview protocol creation steps come at the very beginning of the engagement with the organization. The intervention step consists of three parts that the UX team may repeat for each specific engagement within the larger organization engagement. Finally, the scenario validation step may be used to analyze the validity of the scenarios created during the process as they would potentially emerge during traditional transcript analysis methods on the corpus of text transcripts. The last step is not necessary for the RMS method to be successful; however, it was conducted for this case to validate the scenarios created via the RMS method. The next section provides a general explanation of the four major steps.

6.5.1. Strategic Vision Analysis

Strategic vision analysis serves two purposes. The first is to identify the factors that are key for the success of the organization. In other words, the team seeks to ascertain the degree to which organization thinks the users should participate in the process. This is the same goal that
gave rise to the User Data Spectrum (see Chapter 3). Strategic analysis can take the form of artifact analysis, interviews with and surveys of organizational leaders, and direct observation.

6.5.2. Interview Protocol Creation

The strategic vision analysis bounds and scopes the creation of the interview protocol. The generation of the protocol follows traditional methods, with the three options of structured, semi-structured, or open interviews. The RMS method encourages the iteration of prototypes. However, the interview protocol should remain constant for all engagements.

6.5.3. Intervention

Intervention is largely about method selection. My work in conducting research studies convinced me that the most useful interventions are ones that are a combination of multiple methods and multiple collection mechanisms for data. Most important, interventions are iterative. The RMS method contains the 3-day sprint, the prototype iteration, and release decision.

6.5.4. Three-Day Sprints: Interviews, Generating Scenarios, and Prototype Testing

Once the initial strategic vision analysis and interview protocol are complete, the RMS intervention relies on a UCD approach to conduct the interviews, generate scenarios, and test a prototype. UCD is an approach to software development that started in the early 1980s (Ghaoui, 2005; Norman & Draper, 1986). The basic premise of UCD is that users are aware of their needs but rarely have adequate knowledge, skills, abilities, or understanding of the technical possibilities to clearly translate their needs into technical requirements. Despite this, technical requirements are needed so that a developer knows how to develop the system. The craft of optimum UX, the end goal of UCD, is one of translation of system needs through design (Carroll, 2010; Carroll, Rosson, Chin, & Koenemann, 1998). RMS is a method (similar to many
UX methods) based on the assertion that collecting and analyzing data through direct observations and interactions with users, and then testing and evaluating the outcomes, achieves the best translation. RMS relies on primary data to capture accurate user behavior rather than secondary sources of data. Primary sources come directly from observing, testing, and/or interacting with end users. Secondary sources are assumptions inferred from relevant facts that pertain to users. RMS assumes that systems that are designed predominantly from primary sources of information are more likely to meet user expectations and support user goals, thereby generating the least amount of risk for the hosting organization. The intervention part of RMS targets the acquisition of primary data sources through direct observations and interactions with users in the context of their system use.

The RMS method described here would best serve organizations with a more participatory orientation on the User Data Spectrum. As Chapter 3 explains, a participatory orientation seeks to design with the end user in designing and developing the technology, as opposed to a genius orientation that designs for the end user. Weaving the users’ words into the fabric of the technology design, as RMS does, is an inherently collaborative process. Thus, RMS seeks to have the users drive how the technology is designed.

RMS relies on direct observations and engagement with end users and the end user context of use. If the end users are in one location, then there will only be one site to visit; however, like most systems, if there are multiple site locations where end users will engage with the system, there will be multiple site visits. Sites should be selected according to which sites give the best representation of users. The number of sites is based on saturation; in other words, site engagements should continue until saturation is experienced, i.e., the data collected begins to appear redundant.
Each 3-day site consisted of six major steps: (a) preparation, (b) interviews, (c) generating scenarios, (d) usability testing, (e) analysis, and (f) sharing findings with organization leadership and key stakeholders. It should be noted that a 3-day engagement to collect user requirements, create a prototype and test that prototype is unprecedented in common product development practice. The most popular model is a 2-week period for these activities with the most advanced companies. The activities of each step are outlined below.

**Preparation.** All on-site activities are planned and coordinated with the stakeholder at the site to be visited. If there are strategic artifacts that are specific to the site to be visited, those elements should be incorporated into the interview protocol. Then communication material is generated for the site stakeholders to educate them about the larger organization engagement and their role in that effort.

**Interviews.** One-hour, semi structured, face-to-face interviews are held with site stakeholders and end users. It is recommended to start with site leaders (formal and informal), and then move on to other end users and stakeholders. Most importantly, the end users engaged in the site visit must be representative of the final end users of the system.

**Generating scenarios.** After Day 1 of interviews, the UX team gathers notes taken during the interviews and generates the scenarios for that site. The team also examined the full organization list of scenarios and identifies whether the scenarios generated at other sites are applicable to the current site.

**Usability testing.** In 1-hr, face-to-face sessions, end users are asked to perform approximately five tasks with the current software and then five additional, similar tasks on a new prototype. Ideally, the same users who participated in the interviews participate in the
usability testing sessions; but this is not required if all users are representative of the final end users at that site.

**Analysis.** Usability testing data is processed and UX measures are compared with those from each site visited.

**Sharing.** A 1-hr meeting is held with the organization leaders and key stakeholders to share findings from the 3-day site visit.

![RMS intervention process](image)

*Figure 6.1. RMS intervention process.*

UCD emphasizes the use of prototypes as a design strategy. When requirements gathering remain only verbal, users often do not have an accurate account of their technology practices and create requirements that are either inaccurate or not grounded in behavior. Prototyping provides a tangible replica of a system, which the user may interact with, thereby providing more accurate and richer information for requirements gathering.

Given the short time window, which RMS is dedicated to supporting, it is important to select a prototyping approach that allows the UX team to interact with as many sites and end users as possible. The RMS prototyping approach combines Carroll’s scenarios-based design
method (Go & Carroll, 2004) with the rapid iteration testing and evaluation (RITE) method supporting rapid prototype iterations (Medlock, Wixon, Terrano, Romero, & Fulton, 2002). The combination of these two development methods involves taking user data, presented during user interviews, and quickly transforming it into scenarios, which supply design direction and evaluation guidance. The combination of the RITE and scenario-based design methods aligns with the minimal time allotted for on-site visits and the short overall time for prototype development. This combination of the RITE method and scenario-based design method is the essence of this new strategy, called the Rapid Meaningful Scenarios (RMS) Method.

Scenarios depict users and their objective, motivation, challenge, and context (Carroll, 1995). Scenarios allow a system development effort to be scalable and best serve the users in the dynamic environment in which the system is to be deployed. After each interview, several scenarios are generated by the UX team. Each scenario contains at a minimum a primary actor (in the CIRTL case, for example, a graduate student), a task that the actor wants to accomplish (e.g., connecting with other graduate students), and an outcome (such as having a conversation). Applying RMS in other contexts would require the identification of different actors, tasks, and desired outcomes. The UX team members who create the scenarios in this use case followed the basic scenario creation principles with the three main elements of actor, task/goal, and outcome. However, the CIRTL experience led, upon deeper analysis, to additional considerations were incorporated into the creation of the scenarios. These additional considerations were uncovered when one member of the UX team interviewed another member of the UX team to assess the mental model used in the scenario generation process. The following two additional considerations were developed per the mental model analysis.
First, when hearing an end user’s responses to the interview questions, the team considered the relationship that the end user had to the organization and the mission of that organization. Questions asked by interviewers during interviews, such as:

- Is this person an important hub in the network/part of the strategy?
  - What is his or her position in the local and larger organization? What is his or her role? Whom does he or she influence in the hierarchal structure and information organization structures? Whom does he or she interact with, and how often?
  - Which end user(s) can this person adequately represent? (The answer to this question will determine the actors who can be used in the scenarios created from the interview with this person.)
  - Is he or she the center of social hubs? Is he or she at the top of the hierarchy? Whom is he or she in charge of? (As a rule of thumb, for enterprise-wide technology solutions, scenarios created from those closer to the end users’ position in the organization structure tend to be more valid than those created from employees who reside at the top of the organizational structure.)
- What are the user challenges? How can those challenges be turned into opportunities to show worth and promote technology penetration into the organization?

Once these initial questions are considered, the second consideration focuses on liberties taken need to be addressed. A liberty in the case of RMS is anything that the researcher creates or any assertion on behalf of the user that did not come directly from users. If the liberty taken influences the system functions, then that liberty should not be taken. If the liberty taken influences the business strategy, then it should be taken. For example, in the case of CIRTL, one of the participants expressed the need to be able to find resources on the CIRTL network site that
would help her be a better educator in her class. This expressed need translates to a resource section on the site and is an example of a request for a system function. Therefore, liberties about what the user wants to do with the resources, how the resources should be structured, and the relationship of the resource-seeking behavior to other site behaviors should not be taken. On the other hand, one CIRTL leader expressed concern about needing to share the value of being a part of CIRTL with her fellow colleagues. Liberties about how to illustrate the value of CIRTL (e.g., creating promotional materials like data visualizations) should be taken. Decisions about system functions are within the skill set of the UX design team; therefore, the risk of taking liberties with user words is minimal. However, taking liberties about the content and setting the tone of the virtual presence of the organization lies beyond the skill set and domain of the UX team. It is critical that the organization establish the tone and create the content without injection of bias from the UX team. After all, the organization leadership sets the boundaries for the business strategy.

Scenarios are used to inform design. Knowing what users want to do, how they want to do it, what order they want to do it in, and what context they are working in allows the UX team to design, develop, and test iterations of a prototype.

6.5.5. Prototype Iteration

When testing prototypes, scenarios are used for the tasks that users are asked to accomplish with the prototype. A baseline can be helpful if the new technology is intended to replace an existing technology. Best testing practices are used, such as counterbalancing tasks within a system test and alternating the testing order of baseline and prototype across participants to reduce the bias in the data (“Counterbalancing,” n.d.; Cozby, 2008). Also, no more than one
prototype was tested with each participant during each site visit, to keep participants from becoming too familiar with the prototype.

After every system test, the industry standard System Usability Score (SUS) (Brooke, 1996) is administered. The SUS is used as the system measure comparable within and between site visits and systems. RMS is always evaluating whether the prototype SUS is higher than the baseline within a site visit, and whether the gap of difference is increasing with each new visit. Lastly, according to industry standards and research (Sauro, 2016), a SUS score of 80 or higher suggests a usable system, and a score of 60 or lower suggests a system that has poor usability. When a score falls between 60 and 80, it is left to the organization’s discretion to determine if it wants to invest more in improving the usability. During the prototype iterations, it is more important that the SUS score improves with each visit and the prototype SUS is higher than the baseline. It is not until the decision to release that a SUS score above 80 needs to be achieved.

6.5.6. Release Decision

Across the site visits, the UX team using RMS needs to be aware of when there is saturation in the data. Saturation is when the same things are heard from visit to visit and fewer new scenarios can be generated. Once saturation occurs in the interview results and the UX team believes the prototype is correctly aligned with the organization’s goals and the user’s needs, the product is ready for the development cycle for production.4

4 New products may need to be directionally correct in order to hit the market opportunity; however, existing products may be able to focus at the feature level and be less directionally correct as they are in the market and have greater room to grow.
6.5.7. Scenario Validation

An organization that chooses to implement RMS does not need to follow the typical step of scenario validation. RMS evolved over the course of the CIRTL engagements. Prior to RMS, at the end of each visit, the UX team used basic scenario development methods—identify the actors, their objective/motivation/challenge, and their context (Carroll, 1995). This basic scenario development process was sufficient during the CIRTL visits. However, at the end of the CIRTL engagement, the UX research team wanted to test the dependability of the scenarios created. The team engaged in two activities to test the scenarios.

First, one member of the UX research team interviewed the other member of the UX team about the process of scenario creation, with the goal of assessing the mental model used in the scenario generation process. This process is described above in the scenario creation overview. It should be noted that in addition to the scenarios created, two types of scenarios were discovered during this interview process. The first type is the traditional type of scenario described above and described in scenario research. The second type we called a benchmark scenario. This type of scenario had no active task. It was about a feeling or an experience that the users wished to have by engaging with the CIRTL community. It captured a stated expectation with respect to the use of the system, not a behavior statement. An example of a statement that generated a benchmark scenario might be, “I feel like the people I connect to through CIRTL are like me.” We later decided to not call this a scenario but used it as an additional measure for the baseline and prototype. We used a 7-point agreement Likert-type scale and turned the benchmark scenario into a posttask survey question about the system.

Second, transcripts were produced for all user interviews (n=63) and coded. The research team used a grounded theory approach (Glaser & Strauss, 2009) to analyze and code the corpus
of transcription text. A random sample of the scenarios was tested against the transcription text codes, and the emerging themes in the findings were tested again against the transcription text. After the CIRTL engagement, the research team evaluated the strength of this rapid way of generating scenarios again by comparing a traditional qualitative evaluation of the transcription of interviews to determine if the same final scenarios and themes would emerge. The same scenarios and themes did emerge in that traditional analysis.

6.6. Applying RMS to CIRTL

6.6.1. Strategic Vision Analysis

The strategic vision analysis for CIRTL involved the UX team first evaluating CIRTL’s strategic growth plan vision. Next, two members of the UX team each examined each university’s two-page plan for implementing its local learning community in order to establish the basic services of the CIRTL IT infrastructure. The team created a mind map of each two-page plan, identifying central themes to guide the interview protocols and visually displaying them on one artifact.

Upon reviewing the CIRTL strategic vision documentation and each university’s two-page report, the team determined that the new CIRTL IT infrastructure must support

• distance learning,
• online learning communities,
• national virtual meetings,
• access to and exchange of CIRTL resources,
• data collection for research and evaluation, and
• network studies with the requisite security.
From this initial assessment the team determined that the future CIRTL infrastructure team would have three main duties:

- enable all users to meet the CIRTL mission;
- support users (faculty and students alike) so that they can engage in and contribute to the cross-network community; and
- provide the technical capability and service to committees to support their diverse initiatives.

6.6.2. Interview Protocol Creation

The interview protocol questions were rooted in CIRTL’s strategic vision statement. To ensure success, the UX team made sure that the user experience activities were clearly aligned with and supportive of CIRTL’s organization strategy and vision, per recommendation from Earthy (1998).

6.6.3. Intervention

**Three-day sprints: Interviews, generating scenarios, and prototype testing.** CIRTL IT needs assessment was approximately a 3-month engagement. In the 3-day sprints, the team conducted 101 engagements across five universities. One hundred and two CIRTL members participated. In addition to university stakeholders, members of CIRTL leadership and CIRTL Central (the main administrative body for CIRTL) were interviewed.

**Interview.** Members of CIRTL Central, the Curriculum Development Committee, and the Research and Evaluation Committee were interviewed. A prototype was designed, developed, and tested with CIRTL Central and the Curriculum Development Committee. One instructor of a CIRTL online course was also interviewed and a prototype was developed with the 81 scenarios, which were not yet tested.
After the first day and a half of interviews with stakeholders at each site, the team used the collected scenarios to design a functional prototype. On the third day, the prototype and the current cirtl.net system were presented to the users. They were asked to carry out the scenarios generated from the first 2 days using both systems. Systems were counterbalanced to mitigate carryover effects. User behavior analysis was conducted to measure efficiency, errors, and user satisfaction.

Scenarios were used to inform design. Knowing what users wanted to do, how they wanted to do it, what order they wanted to do it in, and what context they were working in while doing it allowed the team to design, develop and test four major iterations of a prototype.

6.6.4. Intervention Results and Prototype Iterations

UCD best practice recommends conducting a needs assessment that collects primary data from as many members of a system as possible. To that end, ideally a needs assessment would have been conducted on site with as many CIRTL institutions within the network as possible, but due to time and budget constraints, five universities (three from the original six, and two new to the network) were visited. In addition, members of CIRTL Central, the Curriculum Development Committee, and the Research and Evaluation Committee were involved in on-site needs assessment activities. Table 6.1 shows the count for each activity for all site visits.

<table>
<thead>
<tr>
<th>University/Stakeholder</th>
<th>Total</th>
<th>Interview</th>
<th>Usability testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRTL Central</td>
<td>15</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>Madison–Delta</td>
<td>10</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>ISU</td>
<td>22</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>MSU</td>
<td>14</td>
<td>8</td>
<td>6</td>
</tr>
<tr>
<td>Missouri</td>
<td>18</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Texas A&amp;M</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Vanderbilt</td>
<td>7</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>Curriculum</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Research</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>
To represent various levels of engagement of people at each site visit, Table 6.2 shows the breakdown of the university role of each person engaged at each site visit, and Table 6.3 shows the CIRTL roles involved.

Table 6.2
University Role of All People Engaged in Site Visits

<table>
<thead>
<tr>
<th>Role</th>
<th>Total</th>
<th>Interview</th>
<th>Usability test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Faculty</td>
<td>41</td>
<td>32</td>
<td>10</td>
</tr>
<tr>
<td>Graduate student</td>
<td>21</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Post doc</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Staff</td>
<td>25</td>
<td>11</td>
<td>9</td>
</tr>
<tr>
<td>Administrator</td>
<td>13</td>
<td>13</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>102</td>
<td>63</td>
<td>42</td>
</tr>
</tbody>
</table>

Table 6.3
CIRTL Role of All People Engaged in Site Visits

<table>
<thead>
<tr>
<th>Role</th>
<th>Total</th>
<th>Interview</th>
<th>Usability test</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIRTL member, coordinator, lead, rep</td>
<td>41</td>
<td>26</td>
<td>18</td>
</tr>
<tr>
<td>Graduate student</td>
<td>21</td>
<td>6</td>
<td>15</td>
</tr>
<tr>
<td>Post doc</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>STEM faculty member</td>
<td>25</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>University stakeholder</td>
<td>13</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>102</td>
<td>63</td>
<td>42</td>
</tr>
</tbody>
</table>

6.6.5. Generating Scenario Results

Eighty-one scenarios were generated from the 60 stakeholder interviews (Table 6.3—does not include research committee scenarios). Among all scenarios, 67% (54 of the 80 scenarios) were discovered in more than one university, whereas 33% of scenarios were unique to one university. (See scenario table in Appendix B.)
All interviews were later transcribed and coded to ensure accuracy of the scenarios created with the RMS method. Three major themes emerged from the both methods of analysis, which was a validation of RMS: connect, learn, and communicate/share.

**Connect.** The connect theme involved forming human-to-human connections. This could include individuals to individuals, individuals to learning communities, or individuals to the larger CIRTL online community. The main motivators for seeking connection were the users’ identifying characteristics such as discipline, university, and role in the CIRTL network.

**Learn.** The second theme, learn, included “self-directed” and “guide me” principles. Self-directed describes cases where the users wanted to follow their own process to find information, whereas guide me describes cases where users wanted facilitation in order to navigate CIRTL resources.

**Communicate/share.** The third theme, communicate/share, involved the transmission of information and resources. Communicate/Share consisted of four main subthemes, which varied according to what was being transmitted and how it was transmitted.

These three major themes were used to guide each prototype design iteration.

**6.6.6. Prototype Testing Results**

Across all testing sessions, the prototype showed improved user performance and satisfaction over the current cirtl.net system as measured through SUS and verbal reports provided in the think-aloud protocol followed during testing. In total, 38 testing sessions were conducted. (See Tables 6.1–6.3 for a breakdown of the people who participated in testing.) Figure 6.2 shows the average SUS score for each visit. Note that the prototype tested at the first school visited was not a clickable prototype. The prototype at the first school was presented to users and their initial response was requested. Then, participants verbally described what they
would do in each scenario, so a SUS was not appropriate to capture. Also note that the MSU and MU visits resulted in a higher average baseline SUS score then the prototype. Of note with this finding is that MSU was one of the original three schools that helped to form CIRTL and had established technology systems far more advanced than any other university in the CIRTL network.

![Figure 6.2. SUS comparison of means.](image)

Looking deeper at the data across all visits, Table 6.4 shows the descriptive statistics.

### Table 6.4
**Collective Descriptive Statistics**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>UW SUS</th>
<th>ISU SUS</th>
<th>MSU SUS</th>
<th>MU SUS</th>
<th>VU SUS</th>
<th>Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Base</td>
<td>Proto</td>
<td>Base</td>
<td>Proto</td>
<td>Base</td>
<td>Proto</td>
</tr>
<tr>
<td>Avg</td>
<td>51.14</td>
<td>none</td>
<td>59.64</td>
<td>62.14</td>
<td>62.92</td>
<td>70.00</td>
</tr>
<tr>
<td>St Dev</td>
<td>8.53</td>
<td></td>
<td>9.03</td>
<td></td>
<td>70.00</td>
<td>77.14</td>
</tr>
<tr>
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<td></td>
<td>70.00</td>
<td></td>
<td>70.00</td>
<td>70.00</td>
</tr>
<tr>
<td>Min</td>
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<td></td>
<td>57.14</td>
<td></td>
<td>47.50</td>
<td>63.93</td>
</tr>
<tr>
<td>Median</td>
<td>59.64</td>
<td></td>
<td>57.14</td>
<td></td>
<td>57.14</td>
<td>63.93</td>
</tr>
</tbody>
</table>

Note. Base = baseline; Proto = prototype.
A 2-sample t-test was used to compare SUS scores of the baseline versus the prototype across all 38 testing events. Figure 6.3 shows the results of the t-test calculation tool (Sauro, n.d.)

It is a misuse of the statistical calculations below to say that the prototype is statistically greater than the baseline because the RITE method was used to gather data. While the RITE method supports more rapid decisions for organizations, the claim cannot be made in this case that the prototype preformed statistically better than the baseline because the baseline changed on every visit.

*Figure 6.3. Two-sample t-test for all 38 testing events.*

In addition, analyzing the last visit via a 2-sample t-test, Figure 4 shows that there is a 99% chance that the prototype performed statistically better than the baseline \((p=.02)\).
Figure 6.4. Two-sample t-test for last on-site visit.

6.6.7. Sharing of Results: Final Design Recommendation

Based on saturation levels from interacting with stakeholders, the final prototype is estimated to contain about 75% of the total system requirements, based on the count of rapid meaningful scenarios that were satisfied in the prototype. This means we had a solid understanding of the key features that needed to be a part of the new CIRTL.net system and were ready to hand the requirements to a developer.

Current content that acts like the news. When designing technology, it is important to base the design on something with which users are already familiar with to improve the user experience. Almost all CIRTL users referred to their use and love of news sites. Digging deeper into the nuances of CIRTL users’ interaction with news sites, one thing emerged: The “freshness” (date posted or last update time) of the content determined how much value the user placed on that particular news site. In other words, users looked at the date when news items were posted to determine if the site was a good source. CIRTL.net must have content updates at least every 24 hr. to stay valuable to CIRTL users. See Figure 6.5 for the baseline and final
design recommendation. In the baseline, a time stamp is denoted by the blog entry. In the prototype, two things were changed to promote the feel of freshness users desired on news sites. The first is the term *updated*; the second involved showing the number of comments on a blog entry to highlight community activity. Another part of the freshness issue is that members have to actively be contributing in order for content to be fresh. Prototype testing revealed that users preferred blogs posted in the past 24 hr. on the home page as a measure of freshness.

![Figure 6.5. Content needs to be like news and current.](image)

**Seeing faces is important.** Members reported that the initial face-to-face network meeting was a key success factor, which determined how comfortable users felt when engaging online with other members. Face images were added to the prototype design in three key places:
to show authors of blog posts, to show faces in learning communities, and on the member directory. Figure 6.6 depicts changes to blog entries and groups.

Figure 6.6. Seeing faces is important.

**University dashboard concept.** Second to discipline, members identified with the online community by their university affiliation. Members first want to see the activities and members at their university before visiting the larger CIRTL network. Likewise, sharing and tracking each university’s program progress is important to individual members at each university as well as across the network. Members expressed the desire to see what other universities are doing for their CIRTL initiatives. The Research and Evaluation Committee also greatly benefitted from the data available on university dashboards. Openly sharing the progress made by each university with respect to the CIRTL mission promotes healthy social pressure between universities and is a
way in which members of the network can hold each other accountable to the larger CIRTL goals. Having one location to show, report, and update CIRTL goal progress is an effective and efficient way for each university and the larger CIRTL network to track and display progress.

“Find it—take it—adapt it—share it” model. All universities expressed the need to exchange resources but said it was critical to adapt those resources to their local context. The “find it, take it, adapt it, share it” model that we developed supports the open exchange, modification, and re-sharing of CIRTL artifacts. It also promotes discovery about how other universities are using CIRTL resources. There is no version of this concept in the baseline. This model was embraced enthusiastically by CIRTL members at the spring 2013 meeting at the University of Pittsburgh. Figure 6.7 shows the concept design in the prototype.

![Figure 6.7. “Find it—take it—adapt it—share it” concept in prototype.](image)

Member directory. Metadata on users and the ability to follow other members was an important feature for CIRTL users. Incorporating social media interactions was mildly supported by CIRTL users. Users were unable to find a central and comprehensive member directory in the
baseline. Figure 6.8 shows the new member directory design. Access to the directory has been moved the second level of navigation; the ability to search and filter through the member directory is included, and social media interactions such as “follow” and e-mail are also included. The e-mail connection method was most often preferred by users when trying to make contact with other CIRTL members. The search and filter by university, discipline, and position were additional key needs found through prototype testing.

![Member Directory](image)

**Figure 6.8.** Member directory in prototype.

**Learning community space.** A dedicated space for each learning community was identified as a critical feature. Additionally, the space needed to help promote the desired action of a formal learning community such as a shared vision, goals, and resource exchange. The baseline was viewed by users as a place to get information about the learning communities. With the prototype, users were able to see action steps within the community such as engaging in concentrated discussions with other community members, connecting with specific members in
that community to exchange ideas and resources, seeing resources relevant only to that community, and managing community projects with the tools provided in the prototype (Figure 6.9).

![Learning Community Space](image)

**Figure 6.9.** Learning community space in baseline and prototype.

### 6.6.8. Presentation and Feedback From The CIRTL Community

A summary of the needs assessment effort was presented at the CIRTL network meeting in October 2012. The presentation was well received by attendees and fueled many conversations, which continued in an online prototype on which the CIRTL community commented. Information technology emerged as one of the top two priorities for CIRTL budget allocation going forward.
6.7. Conclusion of CIRTL Intervention

A user-centered design approach was used to determine the IT needs of the expanded CIRTL network. Based on the 63 user interviews and 42 prototype testing sessions with network members and CIRTL committee members, the needs assessment effort created a prototype design to support the CIRTL organization’s strategic vision. Providing a way for members to connect, learn, and communicate/share with one another through technology that is customized to their needs will lead to the ultimate success of the CIRTL network. The way CIRTL technologies are designed will affect how CIRTL members interact, the information members will receive, and the way members participate with the CIRTL network (Ren et al., 2007). This CIRTL IT vision is designed to encourage commitment and contribution by all participating institutions with the ultimate goal of a successful and self-sustaining network exchange.

After the 96 engagements, saturation was reached, and we advised CIRTL to proceed with development of the system that had been developed during the RMS engagements. Unfortunately, CIRTL then lost funding for a period of time. The next grant received was 100% dedicated to the development of the recommended technology system. It was fully released in the fall of 2015.

6.8. Conclusion

The speed of software development in most organizations today is daunting. When making product decisions, the language most widely accepted by organizations tends to be data and numbers. However, user words are equally, if not more important, for designing a user-centered system. The RMS method provides a framework that allows organizations to operate at the speed required by today’s business environment as well as incorporate user words in a rigorous way by leveraging scenarios (Go & Carroll, 2004). RMS provides another way to
leverage this body of research on scenarios, as well as rapid iterative development processes, to meet the needs of time-constrained organizations.

The CIRTL case study exemplifies the implementation of the RMS method into an organization software development process. The improved SUS scores, quantity of user engagements, and qualitative evaluation on the transcriptions support the utility of the RMS method.

The UX team for the CIRTL engagement exemplifies some of the challenges and opportunities addressed in the next chapter on UX education. At the time I led the team, I had eight years of industry experience and was working toward a PhD in human computer interaction. My co-leader had 15 years in industry experience and was nearly finished with her graduate study in the field. Though our academic training was located in the College of Business, a majority of UX-related graduate programs come out of schools of design, computer science, or psychology departments. The other two members of our team had only short periods of time in industry and were Masters students in fields related to psychology, design, and computer science. This team is representative of students in UX-related academic programs today. In traditional UX higher education programs, students learn methods (e.g., prototyping and usability testing), but seldom do they get exposed to how to select methods that align with the organization context or have opportunities to apply them over several iterations of a product life span. In selecting a method, they are not exposed to why different methods succeed more or less in different organizations due to issues such as UX maturity, organizational culture, and other issues referenced in the User Data Spectrum chapter (Chapter 3). Often students learn UX in a kind of rhythm-free environment, as opposed to the actual cadence that characterizes software development in organizations. Trying to fit UX software development in the time frame that
cadence dictates is very hard in a school setting. Adapting UX practice to the business strategy of the organization is vital; yet, seldom are students exposed to business settings. Thus, the next chapter addresses these challenges as it considers the future of HCI education.

REFERENCES


The UX team members who participated in the CIRTL engagement were: Dr. Janea Triplet, Instructional Experiences at College of Southern Idaho; Jose Camou, Lead UX Designer Sixth Edge; James Fiderlick, Software Developer and Founder of Sixth Edge; Dr. Paul Mangiamele, User Experience Designer at Roche Sequencing; and Dr. Andrea Peer, Onboarding Customer Success Manager at UserZoom.
CHAPTER 7
THE FUTURE OF USER EXPERIENCE EDUCATION

This chapter is an extended version of a paper accepted to ACM’s Interactions magazine, with author Andrea Peer

Andrea Peer’s role in this research was as the primary researcher and author including all substantial contributions to (a) the conception and (b) participation in the SIGCHI HCI education initiatives. She wrote all of the portions of this chapter.

7.1. The Future of User Experience Education

As other chapters have shown, a key problem in growing user experience (UX) capacity in organizations is a lack of academic preparation or evenness in preparation of professionals to develop a truly useful human-computer interaction (HCI) skill set. To support the evolution of the field of HCI, educational programs are needed that will provide both structure and complexity maps. This chapter examines how the HCI’s living curriculum can meet those educational needs (Churchill, Bowser, & Preece, 2013; Churchill, Preece, & Bowser, 2014). My experience with HCI in both industry and academia informs my vision of HCI education as a constructive way forward to meet the challenges of this evolving, complex system.

5 While the field referred to in this paper is called human–computer interaction (HCI), there are other names by which it is known to institutions and practitioners, such as human-centered interaction, human-centered design, and interaction design. Additionally, the research and concepts extend to the overarching umbrella field and practice of UX.
In industry, I operate in a strategic capacity, striving to mature the UX practice and user-centered design philosophy of a Fortune 500 manufacturing company. To use recent jargon, I would be considered a UX strategist. And yet, the majority of my daily working hours involve usability testing, persona development, and wireframing—all activities that align more with what are commonly described as the job duties of a UX practitioner. But at my core, I am a social scientist. I rely on the underlying theories of HCI and employ these theories in my design practice. I recently completed a 2-year project, creating the HCI curriculum at Iowa State University. In this role, I saw the challenges of developing a rigorous research program for a multidisciplinary graduate degree that embraced students from all undergraduate programs, none of which were HCI. In this role, there was the additional challenge of balancing the “I need these skills now” demand from students in industry with the “I have this really cool idea for technology” excitement from the full-time systems students.

These conflicting motivations reflect the fact that at the core of the discipline are humanist values. Generally, this serves the field quite well in research and practice; these values work like an orchestra conductor, directing the instruments, melodies, and rhythms of a diverse community. But at this time in its maturation, the humanistic core of HCI cannot provide all the structure and guidance that this orchestra needs to create a harmonious tune. Humanistic values demand consideration of all possibilities of the human condition. However, it may be necessary for a time to bracket some considerations and prioritize the ones that serve the largest number of people, simply to give a more functional definition to this emerging discipline. Practitioners now need to consider from the perspectives of both industry and academia how structure can reshape HCI education to increase quality and credibility.
The HCI living curriculum initiative was born out of the idea that the field is evolving too fast to have a static curriculum. The idea came from Elizabeth Churchill and Jenny Preece (Preece was a part of the original HCI curriculum effort). At an HCI education luncheon at CHI 2013, Churchill expressed the need for the HCI community to have a living, dynamic recommendation for HCI courses and curricula (Churchill et al., 2014). This effort would allow the HCI curriculum recommendations to be current, relevant, and reflective of the multitude of HCI philosophies and practices that exist in the ever-expanding, global community.

Management information systems (MIS) is an interdisciplinary field that has many of the same foci as the HCI field does but is at a later state of disciplinary maturity. A look at MIS may provide perspective. Long and Dowell (1989), from the MIS field, stated that a disciplinary field is “the use of knowledge to support practices seeking solutions to a general problem having a particular scope” (p. 5). What are the knowledge, solutions, problems, and scope of HCI? This common question was echoed in the HCI Education Survey, conducted by Churchill et al. (2013). Even if HCI were treated as a “sensibility” or a “philosophy that is embodied and enacted with contemporary tools” (Churchill et al., 2013, p. 47) and not as a single field, there is still a need to define to some extent the knowledge, beliefs, concepts, attitudes, and scope of the philosophy in order to build and have community discourse.

Elizabeth Churchill is currently the director of user experience at Google. She is the executive vice president of the Association of Computing Machinery’s Special Interest Group on Human Computer Interaction and an ACM Distinguished Scientist. She is actively involved and well published in the current research on HCI education. She reviewed this paper and made subsequent modifications from her feedback to increase accuracy of the references to her work.
When suggesting a need for structure and guidance, the end of that journey may seem like dogma. However, there is no need to embrace a strict, single interpretation or fixed curriculum. That path must be followed for a short while to fortify the foundation of the field. Autonomy and novelty, usually the opposites of dogma, will remain the building supplies in this field, and must be embraced. But a field without boundaries is somewhat like a city facing urban sprawl. How far can a city expand before it loses the characteristics that made it unique? Those who visit it go there for a purpose. They want something from that city. If that city loses its identity, why would people desire to travel there—or even know about it? A philosophy so vaguely and broadly defined is subject to the same perils.

To put the problem into business language, HCI maturity calls for a healthy dose of scope management. I propose that the HCI curriculum effort may achieve structure and guidance as well as growth by embracing two key actions: (a) move beyond the philosophical debate about HCI as a field or a philosophy and provide practical curricular structures to serve students and the field; (b) follow the lead of a contemporary music crowdsourcing project to help shape and visualize the connections in the complex HCI system.

In order to really understand the two recommendations, it is helpful to first briefly explain the state of the HCI field. This first section will help lay the foundation that inspired the two recommendations.

7.2. Laying the Foundation: The State of the Debate for HCI as a Field

Some see HCI as a field and some as a philosophy. However HCI is defined, how can the structure and guidance be put in place to support growth and further the HCI curriculum efforts?
Figure 7.1. Depiction of HCI as a discipline from the 1992 Curriculum initiative. From “ACM SIGCHI Curricula for Human-Computer Interaction” by Hewett, T., Baecker, R., Card, S., Carey, T., Gasen, J., Mantei, M., Perlman, G., Srong, G., Verplank, W., p. 173. Copyright 1992 by ACM.

7.2.1. Evolution From Simple to Complex

Two figures illustrate the evolution of the field from simple to complex. The depiction of HCI in the 1992 curriculum from the Association for Computing Machinery (ACM) SIGCHI is shown in Figure 7.1. What was an excellent depiction at the time now has evolved into a much more complex depiction of HCI with Carroll’s (2010) use of Dan Saffer’s image as shown in Figure 7.2 (Seta, 2005). The 1992 effort broke the education buckets into five categories (N, the nature of HCI; U, the use and context of computers; H, human characteristics; C, computer system and interface architecture; and D, the development process). Fast forward to John Carroll’s (2010) description of HCI as a “community of communities” (p. 30) in which the knowledge domains overlap and intersect in numerous ways.
Of course, these two images are not directly comparable. The goal of Figure 7.1 is to represent the field in its entirety from an academic’s perspective and a practitioner’s perspective. Figure 7.2 reflects how the field is represented in daily usage in business. However, both figures represent the field as it is commonly understood.

**Figure 7.2.** Carroll’s Conception of the HCI discipline. From “Conceptualizing a Possible Discipline of Human–Computer Interaction,” by J. Carroll, *Interacting with Computers*, 22. Copyright 2009 by Elsevier.

The evolution captured by these two images occurred because the interaction part of HCI was less mature in 1992, plus each area was less involved than it is today. As the 1992
curriculum suggests, the use and context (U) segment of the curriculum was focused on
efficiency and productivity in organizations. This area has exploded into many more nuances of
use and context. As evidence of this explosion, one simply needs to look at the CHI 2013 (n.d.)
program to find a breadth of uses and contexts that now are part of the focus. These uses range
from “death” to “interacting in the wild,” and the contexts range from “the kitchen” to “the
crowd.” Each use and context demands a full curriculum of knowledge and attention in its own
right. The interaction components originally focused on screen/user interface interactions,
whereas today the world of technology is wearable, ubiquitous, and multifaceted, and again,
worthy of the full concentration of study.

Because of the dynamic, increasingly overlapping, and ever-growing nature of each HCI,
one might lean toward an HCI-oriented perspective that focuses on a single category. For
example, an engineer may focus on wearable computing technologies. But if she has no
awareness of the social theory that would be relevant to the use of the wearable device, can she
be representative of the HCI knowledge domain without a basic understanding of context or use
implications? Consider another example: a designer who wishes to push further down the road of
flat design without awareness of the research on affordances. While this project would be
potentially revolutionary from a design discipline perspective, someone educated in HCI would
be remiss in not at least addressing the ramifications of flat design for the theory of affordances.
Both of these examples illustrate how categories of knowledge within HCI are influenced by
their intersection with and surrounding HCI knowledge ecosystem.

Like a structural equation model, no one variable can be treated in isolation. All variables
create ripple effects on each other. The goal in managing such a complex system is to understand
which variables have the greatest impact on the others and ensure those connections are
highlighted and supported. Foundation courses in an HCI living curriculum, or courses that are marked as critical building blocks, provide HCI students with a solid base understanding of HCI principles that will prepare them to respond to an ever-changing future. Consider again the example of the engineer. If she had a solid HCI base, when faced with future challenges and creative endeavors, she would be able to see through the HCI lens and the end result would be an engineering feat tailored to the individual’s or society’s needs. Furthermore, having a solid and shared HCI education base not only prepares individuals, it facilitates communication within the community educated with this curriculum.

In sum, the evolution of HCI from a simple to a complex system requires a different approach to HCI education, one that allows both/and rather than either/or. Continuing the conversation that implicitly opposes HCI-centric and HCI-oriented approaches will not address these challenges, because that conversation assumes that HCI is a simple system that can either be mastered or applied in a linear fashion, neither of which is true. The conversation must be changed to one that embraces the complex system that is HCI. This requires starting to discuss where clarity with the simple systems contained in HCI can be supplied to those who request it, while also dedicating resources to mapping the complex HCI system and making connections to other systems that wish to interact with it.

Implementing this both/and concept in the context of a curriculum requires overcoming disciplinary boundaries. In an attempt to understand the ramifications of complex systems in traditional academic fiefdoms, Newell and Klein (1996) discussed the effects of interdisciplinary studies in the 21st century on higher education institutions. One of the first points they made is the shift from simple systems to complex ones. Simple systems are structured with linear connections and rely on hierarchy. They “operate according to a single set of rules that can be
understood using reductionist thinking” (Newell & Klein, 1996, p. 156). Complex systems, on the other hand, may contain simple systems but are not based on linear connections. “The interaction of genuine or perceived incompatibilities gives complex systems their unique unstable behaviors” (Newell & Klein, 1996, p. 156). And the terminology and methods for understanding the system also change as one moves through it (Prigogine & Stengers, 1984). Clearly HCI, once a simple system, is now a complex system; the challenges found in the recent SIGCHI education research (Churchill et al., 2014) are indications of this shift.

As Carroll (2013) noted,

HCI is not fundamentally about the laws of nature. Rather, it manages innovation to ensure that human values and human priorities are advanced, and not diminished through new technology. This is what created HCI; this is what led HCI off the desktop; it will continue to lead HCI to new regions of technology-mediated human possibility. This is why usability is an open-ended concept, and can never be reduced to a fixed checklist.

(2.4, para. 6)

I deeply respect and agree with Carroll’s perspective: HCI is not fundamentally about the laws of nature. However, those laws allow students to get their first foothold in the field. In every syllabus shared on the SIGCHI (n.d.) education webpages, mastery of either methods or theories is the primary learning goal. Methods and theories are laws of nature. They share a truth that our community has adopted. Again, as Carroll (2013) argued, “conceptions of how underlying science informs and is informed by the worlds of practice and activity have evolved continually in HCI since its inception” (2.6, para. 4). The challenges of mapping the new territory are really just another phase of this evolution.
7.3. Beyond Philosophical Debate: Create Practical Curricular Structures to Serve

Students and the Field

All of this theoretical insight into the nature of the field does not answer the specifics of how this both/and theory should be applied in curricular terms. The first step I recommend in the HCI living curriculum effort is to incorporate the understanding that HCI is no longer a simple system with one straight recommendation for the educational path. Recent calls for flexibility in curriculum design, as described in education research, are evidence of this.

While a few people have called for a unified, singular curriculum reflecting an agreed-upon canon of HCI research, methods, and practices, most believe that flexibility in curriculum design is essential, even if a general HCI “sensibility” can be agreed upon (Churchill et al., 2014, p. 14).

As I sat in the HCI education luncheons at CHI2011 and 2012, I heard the call for structure and guidance from SIGCHI as an important direction for the HCI curriculum. I also appreciated the resistance to one-size-fits-all, prescriptive curriculum recommendations when the HCI field is constantly growing and having to adapt to the fast moving technology space. Figure 7.3 shows a possible both/and approach by looking at the HCI-oriented versus HCI-centric questions and making recommendations about an HCI curriculum.
Figure 7.3. Proposed guide for Living Curriculum initiative

In this diagram, the grey boxes represent the time spent or the number of credit hours dedicated toward courses that are HCI-oriented (a general HCI sensibility—methods, procedures, etc.) versus courses that are HCI-centric (HCI theory, models, research, etc.). This diagram is just a suggestion of how the breakdown of time spent in HCI-oriented versus HCI-centric might look for each stakeholder group. The undergraduate students seeking HCI courses usually are coming from other domains (as only five undergraduate HCI programs exist in the world; “Education in HCI,” n.d.). Undergraduates need an introduction to the fundamentals of the HCI field, hence the small part of the grey box in the HCI-centric triangle. Mostly, however, they seek a way to test software or assess the impact of their technology on humans, hence the portion of the grey box in the HCI-oriented triangle.

Shifting to the master’s degree box, the proportion in each triangle is almost 50–50. Master’s students may be fully immersed in an HCI program and require more HCI theory (the HCI-centric triangle) but also require methods and practices (the HCI-oriented triangle). Master’s students who are co-majoring in HCI might have their own grey box that is shifted
more toward the HCI-oriented triangle, as they could be seeking an HCI co-major to augment their primary field of pursuit. Practitioners are usually in need of immediately applicable knowledge. In my experience, practitioners have little tolerance for theory without a clear path to application.

Finally, the PhD students are those who will grow the field, and they require an HCI-centric curriculum rich in theory. Although the PhD grey box is confined to the HCI triangle, in actuality it probably would expand into the HCI-oriented triangle. However, when a PhD student practices HCI methods, she has an understanding of the history, underlying theory, and ramifications of the chosen practice for the larger system she is working in.

In summary, the grey boxes are recommendations about the percentage of time spent or percentage of the total activities in HCI-centric versus HCI-oriented type courses and activities. A simple HCI knowledge base would suffice for both undergraduate and practitioner because the ripple effect of not knowing the complex system is not as grave. Also, the ramifications for quality and growth of HCI are minimal. However, the grey boxes also suggest how the HCI curriculum could be mapped to the home discipline in which the recipients operate.

Perhaps it would be more effective to first look to those operating on the left side of the image. There, educators are trying to deliver HCI education to undergraduates, master’s students, and practitioners in education settings that are rife with discipline fiefdoms. Due to their current operations, taking an either/or approach is required. However, those focused on education on the right side of the equation (the educators delivering HCI education to master’s and PhD students and advanced practitioners) call for autonomy and creative freedom to shape the HCI field in response to the changing landscape. Therefore, making recommendations on the grey boxes would be the most constructive activity of the HCI living curriculum work. Look again at the
engineering student focused on wearable technologies. If that student were seeking a master’s degree in a computer science program, the HCI living curriculum effort would make recommendations to that computer science program about which and how many classes that student would need to have an HCI orientation. On the other side, if that student were pursuing an HCI master’s degree with an emphasis in wearable computing, then the curriculum would recommend the HCI courses and number of credits to have an HCI-centric perspective.

7.4. Crowdsource to Visualize the Connections in the Complex HCI System

The second major recommendation that the HCI living curriculum group can implement is to support an effort to visualize the complex HCI system, including the ripple effects within the system and even into intersecting systems. This visualization will help educators and students operating on the right side of Figure 7.3 better incorporate their innovations into HCI. The first step in this effort will entail creating complex maps where the hubs are the intersections of disciplines. These base station hubs are the simple systems that contain HCI base knowledge, such as methods and practices. The complexity of the system emerges as the map is built out from the hub. The work to recognize patterns across hubs and to other disciplines would be supported by the HCI living curriculum effort.

A contemporary music crowdsourcing project, the Johnny Cash Project (Milk, 2010), is a perfect example of how the HCI community could go about visualizing the complex HCI system and the important connections within that system. The Johnny Cash Project is a global project paying tribute to the late music legend, Johnny Cash. The goal of the project is to provide a space where those affected by the work and life of Johnny Cash can contribute a single image that makes up an artistic frame, which then is added to an integrated collection of frames that is applied to Cash’s original music video, “Ain’t No Grave.” As the music video plays, the
contributed frames seamlessly flow into one another, recreating a new image of Cash’s contribution. The video director, Chris Milk (2010), envisions that when the frames are strung together and played in sequence over the song, the portraits will create a moving, ever evolving homage to this beloved musical icon. What’s more, as new people discover and contribute to the project, this living portrait will continue to transform and grow, so it’s virtually never the same video twice. (para. 2)

Just as Milk has created a forum where Cash fans can collectively contribute to his legacy, so too would the HCI living curriculum group create a space where HCI contributions could be framed together, creating a seamless expression of the current and future state of the field. The role of the living curriculum committee would be to create the template of the space (e.g., the images of Cash and the video selected); the role of the community would be to contribute to this living visualization of the field.

The Johnny Cash Project (Milk, 2010) represents the use of crowdsourcing to gather ideas from the community to make sure diverse voices around the globe can contribute to the understanding of HCI. The next step could involve more deliberation on these ideas by the living curriculum committee. Imagine an old overhead projector and the transparencies that were used for presentations on it. Now, think about creating one master transparency that captures the complex HCI system with a connected network of hubs. All contributing, related, and pertinent fields would have separate transparencies. When each field transparency is overlaid on the HCI complex system transparency, critical connection points are highlighted and common theoretical roots are revealed.

For example, imagine a PhD student enrolled in an HCI curriculum who wants to dedicate his research focus to developing virtual spaces that promote collaboration among
experts in the field of biology. The HCI transparency refers to the relevant topics/hubs such as online community creation, designing for sociability, and computer-supported cooperative work, along with the basic HCI theory and models. Now, overlay a transparency layer for the field of biology. Here, one would find the domain knowledge of the field of biology. The process that the student uses to design for the online biology community probably will not vary, but the methods he chooses will be affected by the ways that members of the biology field currently collaborate. Mapping the biology field transparency on top of the HCI transparency, the student may look for similar relevant theories between the two domains so that he may better design for and ultimately serve the online community of biologists.

Other considerations when viewing the intersections between the two transparencies will involve determining how much domain knowledge is needed to design that system and where the line needs to be drawn between domain knowledge understanding and traditional user research. The more expertise in the domain is required in order to produce the end research goal, the greater the level of complexity will be because of the number of variables that must be considered.

Another way to look at the HCI mapping concept is to try and capture all of the niches in the field into a connected diagram. It might look similar to Carroll’s (2010) image (Figure 7.2). Each niche has the possibility of creating micro fractures in the system unless it is clearly connected to the larger network in some way. Each niche also has the potential to expand the HCI knowledge base out to other disciplines. The key is to provide guidance on the broadening activities and the deepening activities, taking into consideration Figure 7.3. If a student is on the right side of the diagram, the recombination may be to cover more of the HCI complexity map and make more connections to the relevant overlaying transparency layers from other fields. If
the student is toward the left side of the diagram, the HCI living curriculum may recommend traversing less of the HCI complex map and making only a single connection to other fields. The key assertion is that if one covers more of the HCI complex map and makes more connections to other fields, the contribution to the HCI field will be more profound and lasting compared to that of someone who traverses less of the complex map and makes fewer connections. Further, if the student is able to evolve an HCI method during application of the method to the biology online community system, and he brings that knowledge back to the HCI complex map, he is operating on the right side of the diagram, benefiting from the HCI knowledge base.

7.5. Conclusion

In summary, it is time for the HCI living curriculum to address the call for structure from those on the left side of Figure 7.3. As stated above, now is the time to make clear curricular recommendations. In response to those on the right side of Figure 7.3, a template must be created to which the HCI community members may contribute in order to capture the HCI complex map and related transparency layers. Then recommendations can be made on the number of hubs one must cover and the number of connections one must make to be representative of an HCI-centric member of the field. I acknowledge that this is but one recommendation. I also acknowledge that, as its name suggests, the living curriculum committee effort will be an ever-evolving project and the approach will need to be re-evaluated periodically.

Nonetheless, HCI offers the kind of supportive structure for curriculum development that will be critical to producing graduates capable of implementing user experience with respect to their unique organizations, which is the primary focus of this dissertation.
REFERENCES


CHAPTER 8

DISCUSSION

8.1. Discussion

Generally speaking, this work offers three contributions. The most significant is the User Data Spectrum theory and survey for helping organizations better invest resources to grow their UX capacity. The second is a new method, Rapid Meaningful Scenarios (RMS), which could provide a model for organizations that want to capitalize on spoken words from end users. The third is a recommendation for UX education in response to the current SIGCHI education initiatives. This chapter provides a brief summary of this work, notes limitations, and future work.

The User Data Spectrum theory and survey offer one approach to answering two of the foundational questions this dissertation sought to address: how organizations can better capitalize on the potential of UX as an avenue to implement responsiveness to their clients’ emotional, behavioral and psychological needs into their technology products; and how diverse organizations can more deeply embed UX design practice in their product development practices to increase their UX Maturity? To answer Question 1, the first version of the mechanism to measure the orientation of a company was created. Supporting an organization to identify its orientation on the spectrum between genius and participatory allows it to more wisely invest in UX in a manner that is more authentic to its culture. Identification of orientation is the first step to support this claim. A targeted location method was used to determine the reliability of each of the O1-O12 items. It was determined that O1, O6, O7, and O12 were the best measures of orientation. The second part of the claim—that if a company knows its orientation, it can more wisely invest to grow its UX capacity—was answered by the regression analysis of a model that
features orientation as moderating variable between each of the four growth variables and UX maturity. Counter to expectations, the results did not demonstrate a statistically significant moderating effect of orientation in the full model. Because this result runs counter to my personal experience with 150 companies, one conclusion is the survey questions may oversimplify the User Data Spectrum, and not capture it sufficiently, especially for the organizational perspective (see Figure 5.6). The challenge with the current full model is that it represents a snapshot in time, predicting how various factors would affect UX Maturity. My hypothesis was that end-user data orientation would impact how UX Maturity will change given changes in four growth variables. To fully test this hypothesis in future work, it would be necessary to examine pre- and post-conditions at multiple organizations to identify whether the changes in survey answers aligned with end-user data orientation. For example, two people might be in the doctors’ office for a checkup, and they have identical heart health ratings at this moment in time, but because one has a lifelong smoking habit, and one runs regularly, any changes they make in their future behavior will affect their heart health dramatically differently. Similarly, two organizations having the same UX Maturity scores today might see their UX Maturity change very differently based on the same investments in the growth variables, because the organizations have different end-user data orientation.

To answer question two, the first version of the mechanism to measure four growth variables (representativeness, skill set, design vision, and process) was created. The premise of this approach is that how and to what degree a company invests in each of the four growth variables should be in alignment with their orientation. This alignment fosters the possible conditions for a more deeply embedded UX design practice in the product development process. It was determined that all four growth variables have a significant relationship to UX maturity.
Question 3 is: How can academia and industry prepare UX practitioners with adequate skill sets to select and carry out UX methods within organizational contexts as the field continues to change? This question was addressed through the Chapter 7 on the future of UX education. Investing in the living curriculum initiative while also establishing for students a core domain of knowledge provides a structure for those who are HCI oriented while also supporting freedom of discovery in the field for those who are HCI centric.

To summarize, it is believed that this work will contribute to the eventual development of an effective User Data Spectrum tool that organizations can use to grow their UX capacity, which will in turn increase their UX maturity. The future vision for this work is that organizations will be able to use the tool to identify their end-user orientations and then determine the strategy for investing into the four growth variables to ultimately help them increase their UX maturity in a manner that is authentic to their culture.

In addition, this work provides an example of a case study that organizations may use to overcome the challenge of collecting, interpreting, and implementing human words into impactful products in a timeframe that supports an agile product development process. The RMS method is a guide that organizations may use for this purpose.

Finally, this research addresses curricular issues around the development of an appropriate skill for meeting UX challenges: skill set is one of the growth variables in the User Data Spectrum survey. In order to help organizations who need UX practitioners with strong skill sets, this research provides recommendations for the future of UX education.

8.2. Limitations

An overarching limitation of this research is the large degree of variance within and the dynamic nature of the user experience field. Specifically, few researchers have analyzed how
user experience is practiced holistically within organizations in recent years. Most of the knowledge that is circulated within the broader community about this topic is found in trade journal, popular blogs, and white papers developed by companies. Though there is a large amount of research within the Management Information Systems (MIS) field about organizations and product development processes, that work mostly does not consider user experience practice.

Another substantial potential limitation in this research assumes that the concept of that End-User Data Orientation is innate. Foundational to the User Data Spectrum theory is the assumption that all companies have an innate orientation towards user experience. The language used in most of the UX research would call this a quality orientation (Nigal Bevan, 1995; Nigal Bevan & Azuma, 1997; Nigel Bevan, 2009; Yahaya & Deraman, 2010). Once a company can identify its orientation, then it can better identify the steps and investment it should make to grow its UX capacity in a manner that is authentic to their organization. To put a practical spin on it, a company with a predominately engineering culture (such as General Motors or Google) would take a different course of action to grow its UX capacity than a company that has a design culture (like Adobe or Apple). There was no research found, however, that addressed whether organizations have innate characteristics as individuals do. The closest research on found related to this idea was research on culture, specifically Edgar H. Schein's 2010 work (2010). However, when that work uses the language of "innateness," it may just apply to individual psychology and not to an organization. Looking at the literature on design thinking, however, offers an interesting way of linking these concepts. Design thinking refers to a shift in organizational culture advocated by practice. Some of the research on the cultural change associated with incorporating design thinking with an organization discusses a user experience orientation (AlHogail, 2015; Gotcheva, Oedewald, Wahlström, & Macchi, 2016; Gruber, Leon & George,
n.d.). However, the user experience orientation aligns with the traditional UX maturity model research that supports incorporation of UX practice within an organization and does not address philosophical perspectives regarding end-user data as addressed with the End-User Data Orientation variable, featured in this dissertation research. James O’Toole proposes, for example, the existence of different types of orientations (i.e., customer orientation, product orientation, learning orientation, etc.) within companies (Bennis & O'Toole, 2005; O'Toole, 1991; O'Toole, 1995). This orientation concept in O’Toole’s work is based on the value they place on the orientation type. This is the most similar work that could be found regarding the concept of orientation. However, it does not address the issue of whether orientation is innate.

A minor limitation of the RMS research is that the User Data Spectrum survey was not developed at time the RMS trial happened. Therefore, the application of the User Data Spectrum approach is retroactive in this research.

### 8.3. Future Directions

The immediate next steps for this research are to use the best-fit model represented by the User Data Spectrum to create the first actual version of the User Data Spectrum Tool. The next step is to then deploy the User Data Spectrum Tool in organizations to validate and determine the final Tool that could be commercialized. An iterative method could be used such as the one described in DeVellis’s work (DeVillis, 2012). The end goal is to have the Tool serve as a guide for all organizations to identify their end-data orientation and determine how they would invest in the four growth variables. Once an organization uses the Tool to determine these, additional research could study, longitudinally, how the UX maturity evolves for organizations that use and follow the tool versus those that do not use the tool.
A prediction from the User Data Spectrum model is that End-User Data Orientation will have a moderating effect on the UX maturity, i.e., if a company invests in the growth variables without knowing its End-User Data Orientation, the investment may be wasted or require more time than necessary. To test this hypothesis completely, the current model parameters could be used to develop a simulation of all possible investment scenarios. Using this simulation, a company could experiment with investment strategies over multiple time frames and the End-User Data Orientation score to see which approach increases its UX capacity most quickly.

A parallel effort for future research could be to deploy the User Data Spectrum survey within several companies in order to achieve a greater sample size within each company. The next step of this effort would be to compare the final User Data Spectrum survey results from that to the final results this body of research. If there is little to no statistically significant difference, the concept that one participant within an organization could be treated as a company data point has ramifications on organization research. Furthermore, the RMS method could be applied within several organizations to determine the potential generalizability of this method.

The most interesting and broad future research could be to more fully explore the idea that innateness can apply to organizational psychology and not just individual psychology. Specifically, exploring and achieving a greater understanding of whether user-data orientation is innate to an organization will potentially have implications for the feasibility of changing orientations. In this same research vein, it would be illuminating to conduct a historical meta-analysis on companies to determine if any company has moved from genius to participatory or vice versa. Deeper in that line of research is the following question: what is the angle (or the maximum tolerance) of that maturation triangle or range? Additional research could be conducted into each of the four variables as well.
REFERENCES


APPENDIX A

USER DATA SPECTRUM SURVEY

Q63 Thank you for agreeing to participate in this online survey. This survey will take approximately 30 min to complete. The purpose of this survey is to capture information about organizations' user experience orientation and practice. You do not need to be a user experience expert to participate in this survey. If you participate in the design, development and direction of bringing a product to market, you are encouraged to take this survey. No personally identifiable data will be collected nor used for this survey. If you wish to get the findings of this research, you will have the opportunity to give your contact information at the end of the survey. Thank you for your time and input to advance this research.

Q5 What industry are you in? (check all that apply)
- HCI / Usability Consulting (1)
- Consulting/human resources (2)
- Computer Telecommunications (3)
- Internet/E-Commerce (4)
- Training (5)
- Manufacturing (6)
- Health/Medical Services (7)
- Government, Aerospace/defense, Postal Service (8)
- Software (9)
- Agriculture, Forestry, Fishing and Hunting (10)
- Rail Transportation (11)
- Financial - Funds, Trusts, and Other Financial Services, Monetary Authorities, Central Bank (12)
- Education (13)
- Religious Organizations (15)
- Labor Unions and Similar Labor Organizations (16)
- Political Organizations (17)
- Private Households (18)
- Public Administration (19)
- Other (20)
Q6 What type of product(s) do you sell? (check all that apply)
- Manufactured products (1)
- Hardware (2)
- Software (3)
- Software as a service (4)
- Platform as a service (5)
- Service(s) (6)
- Other (7)

Q8 How large is your company?
- 1 to 19 employees (1)
- 20 to 99 employees (2)
- 100 to 499 employees (3)
- 500 to 9,999 employees (4)
- 10,000 or more employees (5)

Q60 Is your company private or public?
- Public (1)
- Private (2)
- Don’t know (3)
- Other (4)

Q10 What role do you play in your organization? (check all that apply)
- Software developer (1)
- Back end developer (2)
- Front end developer (3)
- Quality assurance (4)
- Business analyst (5)
- Scrum Master (6)
- Project manager (7)
- Program manager (8)
- Product Owner (9)
- Solutions architect (10)
- Administration (11)
- Engineer (12)
- UX designer (13)
- Interaction designer (14)
- Graphic designer (15)
- Senior Leadership (CEO, COO, CIO, CTO, CFO) (16)
- Other (17)
Q11 Do you have any design education and/or experience? (check all that apply)

- I have a degree (BS, MS, PhD) in a UX related field (Human factors, User Experience, Human Computer Interaction) (1)
- I have experience with user experience but no education (2)
- I've taken certificate classes user experience (3)
- I have no user experience education or experience (4)
- I have a related degree to UX (visual design, information architecture, graphic design, library science) (5)

Q11 This section will ask questions about you and your companies general approach to product development and how much end users should be involved in product development.
Q12 Mark your level of agreement to the following statements:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I believe that companies who get product direction from innovative thought leaders are most successful. (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>I believe that companies who get product direction from direct interactions with end users are the most successful. (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q13 Mark the level of agreement to the following statements for your company:

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>My company believes that companies who get product direction from innovative thought leaders are most successful. (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>My company believes that companies who get product direction from direct interactions with end users are the most successful. (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q14 If you could have a day with expert product development consultants or a day with end users which would you choose in order to give you the best product direction.
- Spend full day with expert product development consultants (1)
- Spend full day with end users (2)

Q15 If you could have a percentage of your day with either end users or product development consultant experts, how would you break up your day?
- 100% with end users (1)
- 80% with end users, 20% with experts (2)
- 50% with end users, 50% with experts (3)
- 80% with experts, 20% with end users (4)
- 100% with experts (5)

Answer: If you could have a percentage of your day with either, how would you break up your day? 80% with end users, 20% with experts is selected.
Or If you could have a percentage of your day with either, how would you break up your day? 50% with end users, 50% with experts is selected.
Or If you could have a percentage of your day with either, how would you break up your day? 80% with experts, 20% with end users is selected.

Q16 Since you elected to spend a percent of your day with both, when would you meet with end users versus expert product development consultants in the single day?

<table>
<thead>
<tr>
<th>Time</th>
<th>End Users (1)</th>
<th>Expert Product Development Consultants (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8-9am (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-10am (2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-11am (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11-Noon (4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-1pm (5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1-2pm (6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-3pm (7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3-4pm (8)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q17 Of the following, rank in priority order which has the largest impact on the potential success of the released product (1-least impact, 12-highest impact):

1. Great design
2. Involving users during the design phases
3. Involving users during the development phases
4. Sound quality assurance
5. Great engineering
6. Great ideas
7. Great development process
8. Internal talent
9. Data-driven decisions
10. Shared product vision
11. Great market penetration strategy
12. Communication strategy to pose value to customers

Q18 Of the following, rank in priority order which as the largest impact on user adoption of a product (1-least impact, 7-highest impact):

1. Market readiness
2. Time to market
3. Product quality
4. User's first impression
5. PR campaign
6. Word of mouth
7. Product usefulness

Q46 Does your organization involve users or collect user data at any point during the product development lifecycle?

- Yes (1)
- No (2)
- It Depends (3)

Q47 Does your organization involve the user or user data in any other way in the product development process? Please explain.
Q57 Let’s imagine that your organization has a 2 week sprint. And let’s also imagine that there is a period of time prior to that 2 week sprint (pre sprint) and a period of time after that 2 week sprint (post sprint). At the end of the post time, the features developed during the 2 week sprint will be released to market (released). Identify when you would have the user do what. Check all that apply.

<table>
<thead>
<tr>
<th></th>
<th>Pre Sprint (1)</th>
<th>2 Week Sprint (2)</th>
<th>Post Sprint (3)</th>
<th>Released (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No user involvement (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We set the direction for the product (2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Internal innovation activities (3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User helps create the design of the system (4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We learn what users do in context (5)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We learn what users want (6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We learn how users will use our product (7)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We learn what will not work for users (8)</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>We learn if users will adopt our product (9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>We determine what users want (10)</td>
<td></td>
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</tr>
<tr>
<td>User tells us if the product works for them (11)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User tells us if they will buy the product (12)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Q20 Why should the end user be/not be involved in the final product? (Please describe in one or two sentences)

Q22 How involved should the end user be in the final product? (Please describe in one or two sentences)

Q23 When should the end user be involved? (Please describe in one or two sentences)

Q24 Where do the best product ideas come from? (Please describe in one or two sentences)

Q25 The next few sections will require you think about a current product you are working on.

Q26 What stage of development is it in?
- Initial research (1)
- Conceptual (2)
- Initial design (3)
- Early development (4)
- Quality testing (pre release) (5)
- Beta (released to a limited number of customers) (6)
- Full production (7)
- Sustainment (8)
- Other (9) __________________

Q27 How long have you been on the project?
- 0-1 year (1)
- 2-5 years (2)
- 5-10 years (3)
- 10+ years (4)
Q28 What is your role? (check all that apply)
- Software developer (1)
- Back end developer (2)
- Front end developer (3)
- Quality assurance (4)
- Business analyst (5)
- Scrum Master (6)
- Project manager (7)
- Program manager (8)
- Product Owner (9)
- Solutions architect (10)
- Administration (11)
- Engineer (12)
- UX designer (13)
- Interaction designer (14)
- Graphic designer (15)
- Senior Leadership (CEO, COO, CIO, CTO, CFO) (16)
- Other (17) ____________________

Q29 Who is involved in developing the product? (check all that apply)
- Software developer (1)
- Back end developer (2)
- Front end developer (3)
- Quality assurance (4)
- Business analyst (5)
- Scrum Master (6)
- Project manager (7)
- Program manager (8)
- Product Owner (9)
- Solutions architect (10)
- Administration (11)
- Engineer (12)
- UX designer (13)
- Interaction designer (14)
- Graphic designer (15)
- Senior Leadership (CEO, COO, CIO, CTO, CFO) (16)
- Other (17) ____________________

Q30 How is the product released?
- Big releases at major milestones (1)
- Iterative releases daily, weekly (2)
Q31 What is the tangible thing the user interacts with for the product you identified? (check all that apply)
- Display (graphical interface via mouse or direct manipulation) (1)
- Physical device (such as a steering wheel, handle, etc.) (2)
- Service (such as a consulting service) (3)
- Other (4) ____________________

Q32 In one to two sentences, briefly describe what is most significant about the product you are currently working on.

Q33 There are many definitions of design. For this research, design is defined as follows:
Design: The term design describes both product and process. Most important to this body of work is the process description. A design process is a set of methods and a structured way to go about creating something for an end goal or to encourage a change of state in the world. The final product is the thing that the world/end-user interacts with. Interaction can encompass any and/or all types to include: physical, emotional, or cognitive.
Q34 Please mark your level of agreement with the following statements:

<table>
<thead>
<tr>
<th>There are clear design guidelines for this product. (1)</th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everyone on the team follows the design guidelines. (2)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Everyone on the team believes that the design guidelines are important. (3)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>There is a clear end goal for the impact of the design. (4)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Everyone on the team believes that the goal is important. (5)</td>
<td></td>
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<tr>
<td>It is clear how the product will make a difference for the end-user. (6)</td>
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<tr>
<td>---------------------------------------------------------------</td>
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</tr>
<tr>
<td>There is a clear standard of quality with respect to the design of the product. (7)</td>
<td></td>
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<tr>
<td>If this product doesn't meet that standard of quality it will not ship. (8)</td>
<td></td>
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<tr>
<td>Quality is defined by the end-user for this product. (9)</td>
<td></td>
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<tr>
<td>There are clear user experience goals for this product. (10)</td>
<td></td>
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<tr>
<td>There are style guidelines for this product. (11)</td>
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</tr>
</tbody>
</table>
The team follows the style guidelines. (12)  
There are clear brand goals with the product. (13)  
The team follows the brand goals. (14)  

Q35 Where does the design vision for your organization come from? (Check all that apply)  
- Just leadership (1)  
- Just grass roots (2)  
- Just middle management (3)  
- Everyone (4)  
- No one (5)  
- Other (6)  

Q37 For the roles you identify that are on your team, rank their level of proficiency in their job. Include yourself. If you have multiple people in the same role, think of the most proficient person and rank him/her.

Q42 The questions below will use the following definitions: User Data = Any data that represents the thoughts, actions, behaviors, words, needs, wants, context, and environments of the end stakeholder(s) interacting with the system. Interpret User Data = The act of translating user data collected into design language and/or system requirements. Implement User Data = The act of incorporating user data into the actual design or functionality of the system.
Q36 Who is responsible on your team for bringing user data to the development process?

<table>
<thead>
<tr>
<th>Collects User Data (9)</th>
<th>Interprets User Data (10)</th>
<th>Implements User Data (11)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tbody>
</table>

Q44 For those that you selected above that are responsible to collect user data, rate their level of proficiency. Rate yourself if you are the one that collects user data. If you have multiple people in the same role, think of the most proficient person and rank him/her.
Q38 The people you selected above who interpret user data are listed below. Rate their level of proficiency. Rate yourself if you are the one that interprets user data. If you have multiple people in the same role, think of the most proficient person and rank him/her.

Q39 The people you selected above who implement user data are listed below. Rate their level of proficiency. Rate yourself if you are the one that implements user data. If you have multiple people in the same role, think of the most proficient person and rank him/her.

Q40 What is your background?
   Education (1)
   Experience (2)
   Interests (3)
Q41 How would you describe your overall company’s degree of proficiency with the following?

<table>
<thead>
<tr>
<th></th>
<th>Not at all proficient (1)</th>
<th>Knows the basics (limited) (2)</th>
<th>Novice (limited) (3)</th>
<th>Unsur e (4)</th>
<th>Intermediate (practical application) (5)</th>
<th>Advanced (a go to in the org) (6)</th>
<th>Expert (recognized authority) (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Listening to the user’s needs (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Translating user needs into design requirements (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Coming up with great product ideas (3)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Designing beautiful interfaces (4)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
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<td></td>
<td>○</td>
</tr>
<tr>
<td>Conducting ethnographic research (5)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Conducting usability tests (6)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Translating design ideas to development teams (7)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
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<td></td>
<td>○</td>
</tr>
<tr>
<td>Creating a holistic experience for an entire product line (8)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
<tr>
<td>Responding to user feedback post release (9)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td></td>
<td></td>
<td></td>
<td>○</td>
</tr>
</tbody>
</table>
### Analyzing the Effectiveness of Released Products (10)
- Speed of iterating on product releases (11)
- Identifying market opportunity (12)
- Identifying the MVPs (13)

<table>
<thead>
<tr>
<th>Question</th>
<th>Male</th>
<th>Female</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q64</td>
<td></td>
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<tr>
<td>Q65</td>
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</tr>
<tr>
<td>Q66</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q64 Describe the gender of the target end user for product. (check all that apply)
- Male (1)
- Female (2)
- Other (3) ________________

Q65 Describe the ethnicity of the target end user for your product. (check all that apply)
- Hispanic (1)
- Black (2)
- Asian (3)
- White (4)
- Other (5) ________________

Q66 Describe the region that the target end user for your product live. (check all that apply)
- United States (1)
- Canada (2)
- South America (3)
- Africa (4)
- Asia (5)
- Europe (6)
- Middle East (7)
- Other (8) ________________
Q67 Describe the age of the target end user for your product. (check all that apply)
- Under 18 (1)
- 18-25 (2)
- 26-45 (3)
- 46 or older (4)

Q68 Describe the education level of you target end user for your product. (check all that apply)
- No degree (1)
- High school (2)
- College - Associates or Bachelors (3)
- Masters (4)
- PhD (5)
- Other (6) ________________

Q69 Describe the income level of your target end user for your product. (check all that apply)
- (1)
- 30-50K annual (2)
- 51-100 annual (3)
- 101-200 annual (4)
- >200 annual (5)
- Other (6)

<table>
<thead>
<tr>
<th>Q61 Describe the target end user of your product.</th>
<th>Far Below Average (1)</th>
<th>Below Average (2)</th>
<th>Just Below Average (3)</th>
<th>Average (4)</th>
<th>Just Above Average (5)</th>
<th>Above Average (6)</th>
<th>Far Above Average (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the average level of technical aptitude? (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>What is the average favoritism towards technology? (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>
Q62 What is your target end user's knowledge level with respect to the content in your product?

<table>
<thead>
<tr>
<th>Novice: Subject matter expert (1)</th>
<th>1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>7 (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

Q49 What is the context of use for the product you described above? (Select all that apply.)

- Home (1)
- Business (2)
- On the go (3)
- In the car (4)
- In a work vehicle (5)
- In public places (6)
- In private spaces (7)
- Out in the elements (8)
- Other (9) ________________

Q50 How will this product change your user's life? Explain in 1-2 sentences.

Q51 Why is that important to you? Explain in 1-2 sentences.

Q70 Describe yourself

- Male (1)
- Female (2)
- Other (3) ________________

Q71 Describe yourself

- Hispanic (1)
- Black (2)
- Asian (3)
- White (4)
- Other (5) ________________
Q72 Describe the region you currently live.
- United States (1)
- Canada (2)
- South America (3)
- Africa (4)
- Asia (5)
- Europe (6)
- Middle East (7)
- Other (8) ____________________

Q73 Describe your age.
- Under 18 (1)
- 18-25 (2)
- 26-45 (3)
- 46 or older (4)

Q74 Describe your education level.
- No degree (1)
- High school (2)
- College - Associates or Bachelors (3)
- Masters (4)
- PhD (5)
- Other (6) ____________________

Q75 Describe your income level.
- (1)
- 30-50K annual (2)
- 51-100 annual (3)
- 101-200 annual (4)
- >200 annual (5)
- Other (6)
Q76 Describe yourself

<table>
<thead>
<tr>
<th>Far Below Average (1)</th>
<th>Below Average (2)</th>
<th>Just Below Average (3)</th>
<th>Average (4)</th>
<th>Just Above Average (5)</th>
<th>Above Average (6)</th>
<th>Far Above Average (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your level of technical aptitude? (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
<tr>
<td>What is your favoritism towards technology? (2)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
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<td>○</td>
</tr>
</tbody>
</table>

Q77 What is your knowledge level with respect to the content in your product?

<table>
<thead>
<tr>
<th>1 (1)</th>
<th>2 (2)</th>
<th>3 (3)</th>
<th>4 (4)</th>
<th>5 (5)</th>
<th>6 (6)</th>
<th>7 (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice: Subject matter expert (1)</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
<td>○</td>
</tr>
</tbody>
</table>

Q52 Will you use the end product you are making?
- Yes (1)
- No (2)
- Maybe (3) ________________

Q54 Are you similar to your end user?
- Yes (1)
- No (2)
- Maybe (3) ________________

Answer If Are you similar to your end user? Yes Is Selected Or Are you similar to your end user? Maybe Is Selected

Q55 How are you similar to the end user of your product?

Q84 Are the members on your team similar to your end user?
- Yes (1)
- No (2)
- Maybe (3) ________________
Answer: If Are the members on your team similar to your end user? Yes Is Selected  Or Are the members on your team similar to your end user? Maybe Is Selected

Q85 How are the members on your team similar to the end user of your product?

Q57 Please check all that apply for your organization.

<table>
<thead>
<tr>
<th></th>
<th>Yes (1)</th>
<th>No (2)</th>
<th>Sometimes (3)</th>
<th>Not Sure (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Our company regularly does</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>internal design critiques and</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>reviews. (1)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Our company requires sign off</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>from leadership on designs. (2)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Our company uses an agile</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>development product development</td>
<td></td>
<td></td>
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<tr>
<td>process. (3)</td>
<td></td>
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<tr>
<td>We have a Sprint 0 as a part of</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>our agile process (or a sprint</td>
<td></td>
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<tr>
<td>that is dedicated to user research prior to going into development) (4)</td>
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</tr>
<tr>
<td>Our company uses a user-</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>centered design process to</td>
<td></td>
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<tr>
<td>develop products. (5)</td>
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<tr>
<td>Our company implements user</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>experience methods into product</td>
<td></td>
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<tr>
<td>development process. (6)</td>
<td></td>
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</tr>
</tbody>
</table>
Q81 Mark your level of agreement for your organization.

<table>
<thead>
<tr>
<th>The user data collection methods used are rigorous. (1)</th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The user data interpretation methods used are rigorous. (2)</td>
<td></td>
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<tr>
<td>The user data integration methods into the product are rigorous. (3)</td>
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</tr>
</tbody>
</table>

Q88 The level of rigor for the questions above depend most on

- Who is conducting the method (1)
- The method selected (2)
- Neither of these (3)
- Both of these (4)
Q80 Please check all that apply for your organization.

<table>
<thead>
<tr>
<th></th>
<th>Yes (1)</th>
<th>No (2)</th>
<th>Sometimes (3)</th>
<th>Not Sure (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The people in the company making decisions about the product(s) are the same ones collecting data about the end users. (1)</td>
<td></td>
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</tr>
<tr>
<td>The people in the company making decisions about the product(s) are the same ones directly interacting with the end users. (2)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Q87 For your organization, how would you respond to the following sentence: We reflect and improve our product development process

- Regularly (1)
- Sometimes (2)
- Never (3)
- Not sure (4)
- Other (5) ____________________
Q89 Mark your level of agreement to the following statements for your organization.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I buy in to the product</td>
<td></td>
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<tr>
<td>development process (1)</td>
<td></td>
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<tr>
<td>I think the user data we</td>
<td></td>
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<tr>
<td>collect is valuable (2)</td>
<td></td>
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<tr>
<td>We make data driven decisions</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>about products we develop (3)</td>
<td></td>
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</tr>
</tbody>
</table>

Q90 Mark your level of agreement to the following statements for your organization.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I have ready access to</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>previously collected user data</td>
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<td>(1)</td>
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<tr>
<td>I have ready access to</td>
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</tr>
<tr>
<td>user data collected from web</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>analytics. (2)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
Q91 What value does the organization place on the various types of user data?

<table>
<thead>
<tr>
<th>Data Source</th>
<th>Not at all Important (1)</th>
<th>Very Unimportant (2)</th>
<th>Somewhat Unimportant (3)</th>
<th>Neither Important nor Unimportant (4)</th>
<th>Somewhat Important (5)</th>
<th>Very Important (6)</th>
<th>Extremely Important (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direct behavior observation (1)</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
</tr>
<tr>
<td>Data from usability testing (2)</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
</tr>
<tr>
<td>Web analytics (3)</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
</tr>
<tr>
<td>User interviews (4)</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
</tr>
<tr>
<td>Focus groups (5)</td>
<td>°</td>
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<tr>
<td>User surveys (6)</td>
<td>°</td>
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<tr>
<td>Market research (7)</td>
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<tr>
<td>User attitude data (8)</td>
<td>°</td>
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<tr>
<td>Market share (9)</td>
<td>°</td>
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<tr>
<td>Other (10)</td>
<td>°</td>
<td>°</td>
<td>°</td>
<td>°</td>
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<td>°</td>
</tr>
</tbody>
</table>
Q59 Mark your level of agreement with the following statements. UCD = User-Centered Design

<p>| Does business management understand that usability and User Centered Design must be part of the business strategy? (1) | Yes (1) | No (2) | Not Sure (3) |
| Does business management set usability goals on usability for systems? (2) | | | |
| Is there a reward mechanism for reaching these goals? (11) | | | |
| Is UCD focus addressed in acquisition activities? (3) | | | |
| Are usability goals shared with the customer? (13) | | | |
| Does business management take action to know how the usability of their product compares to that of their competitors? (4) | | | |
| Does senior management take action to maintain/improve user-centered design skills, resources, technology, awareness and culture in the organization? (5) | | | |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Possibly</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are direct/indirect, short-term and long-term business benefits tracked by business management? (6)</td>
<td></td>
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</tr>
<tr>
<td>Have common terminology, templates or tools for the exchange of data between the different professions involved in UCD been developed and used? (7)</td>
<td></td>
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</tr>
<tr>
<td>Are UCD outcomes (e.g. design solutions, error reports) understood and applied inside the company? (8)</td>
<td></td>
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</tr>
<tr>
<td>Is effective communication made to raise the awareness and culture of UCD inside your company? (9)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Is effective communication made to raise the awareness and culture of UCD outside your company? (10)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q93 Who is/are the UX champion(s) within the organizations? (check all that apply)
- Senior leadership (1)
- Middle management (2)
- Immediate supervisor (3)
- Grass roots (4)
- No one (5)
- Everyone (6)
- Some units (7)
- Other (8)
Q94 Mark your level of agreement for each level in the organization. The UX strategy is well known?

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree (1)</th>
<th>Disagree (2)</th>
<th>Somewhat Disagree (3)</th>
<th>Neither Agree nor Disagree (4)</th>
<th>Somewhat Agree (5)</th>
<th>Agree (6)</th>
<th>Strongly Agree (7)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization wide (1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Your product development team(s) (2)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>You know it (3)</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Q1 What is user data?

Q3 How do you define user experience?

Q4 From your perspective how do you deliver a quality user experience?

Q94 Thank you for participating in the User Data Spectrum research. If you would like to get a copy of the findings from this research please provide your contact information below.
Name (1)
Email (2)
## APPENDIX B

### CIRTL 81 RESULTING SCENARIOS

<table>
<thead>
<tr>
<th>Scenario ID</th>
<th>Scenario</th>
<th>Origin Place</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>I am a brand new graduate student and have to be a TA in an intro level course. I want resources to guide me on how to teach.</td>
<td>Madison, ISU, VU</td>
</tr>
<tr>
<td>2</td>
<td>I am a second year graduate student and I have TAed for a semester. Now I have to teach the course. I need mentors, feedback and guidance on how to improve my teaching.</td>
<td>Madison</td>
</tr>
<tr>
<td>3</td>
<td>I am a CIRTL University leader and I want to let people at my university know about what is happening and how to get involved.</td>
<td>Madison, ISU, MSU, MU</td>
</tr>
<tr>
<td>4</td>
<td>I am a CIRTL graduate student member and I am doing something pretty cool I want to share with the network</td>
<td>Madison</td>
</tr>
<tr>
<td>5</td>
<td>I am doing research for my teaching and I just heard about CIRTL. I thought I was the only one. I now want to learn more about what they do.</td>
<td>Madison</td>
</tr>
<tr>
<td>6</td>
<td>I am a graduate student and I now realize how much I love teaching but I am not supported to do this at my Department. I would really love a support unit and people to collaborate with.</td>
<td>Madison, VU</td>
</tr>
<tr>
<td>7</td>
<td>I have to teach Geology 101 and I am super excited but would like to collaborate on it so that I can do the best job possible. The tough part is that I am the only graduate student teaching it right now. How do I find collaborators?</td>
<td>Madison</td>
</tr>
<tr>
<td>8</td>
<td>I am a member of CIRTL Central and I want to share with the network about some really cool research we have found over the past year regarding CIRTL impact.</td>
<td>Madison, ISU</td>
</tr>
<tr>
<td>9</td>
<td>I am a member of CIRTL Central and I have to share that we just got funded with all of the University Leaders.</td>
<td>Madison</td>
</tr>
<tr>
<td>10</td>
<td>I am a graduate student and I have had quite a bit of experience now with teaching. I am looking for new ideas and resources from highly reputable and impactful educators.</td>
<td>Madison</td>
</tr>
<tr>
<td>11</td>
<td>I am a member of the Center for Excellence in Learning and Teaching (CELT)/Center for Teaching (CFT) at my university. I have heard about CIRTL but I am not sure how they fit into the big picture of graduate student development at my university.</td>
<td>Madison, ISU, VU</td>
</tr>
<tr>
<td>12</td>
<td>I am someone who is passionate about how to teach and I want to have a discussion with like-minded people about the philosophy of teaching and how to have greater impact.</td>
<td>Madison, ISU</td>
</tr>
<tr>
<td>13</td>
<td>I want to find out what the research says about teaching and how people learn?</td>
<td>Madison</td>
</tr>
<tr>
<td>14</td>
<td>I am a University Leader and I want to evaluate our initiatives. What resources do I have available to me via the CIRTL Network to set up an evaluation system?</td>
<td>Madison</td>
</tr>
<tr>
<td>15</td>
<td>I am a local CIRTL program lead and I want to share my resources with the CIRTL network.</td>
<td>Madison, MSU, MU, VU</td>
</tr>
<tr>
<td>16</td>
<td>I am a local CIRTL program leader and I want to connect with a content expert</td>
<td>Madison, VU</td>
</tr>
<tr>
<td>17</td>
<td>I am local program study participant and I want to share the great work I am doing right now and get feedback on it from the CIRTL network.</td>
<td>Madison, MSU</td>
</tr>
<tr>
<td>18</td>
<td>I am a higher up. I've heard this CIRTL is the best thing since sliced bread, and I want to see what it's all about and why.</td>
<td>Bob, ISU</td>
</tr>
<tr>
<td>19</td>
<td>I am a co-rep for the CIRTL institutional leader and I want to see what people in my position at other institutions are doing.</td>
<td>ISU, VU</td>
</tr>
<tr>
<td>20</td>
<td>I am a graduate coordinator and I am interested in CIRTL but I don't want another thing on my plate, how do I find out if CIRTL will help me or hurt me?</td>
<td>ISU</td>
</tr>
<tr>
<td>21</td>
<td>I am a graduate student and I want to share my experiences and learn about other graduate student experiences with respect to teaching but I don't want my faculty lead to see any potential negative things I have to say. Basically, I want to be free to express my challenges and not fear repercussions from this.</td>
<td>ISU</td>
</tr>
<tr>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>I am a CIRTL Member and I want to find out what the timeline is or where CIRTL is headed. How do I find that information?</td>
<td>ISU, VU</td>
</tr>
<tr>
<td>24</td>
<td>I am a faculty member interested in the local level mission of teaching graduate students how to teach better. I would be interested in joining a mission like this but want to know how much time this will entail.</td>
<td>ISU, VU</td>
</tr>
<tr>
<td>25</td>
<td>I am a co-rep for the CIRTL institutional leader and I need to write letters of recommendation for a former student that participated in the local CIRTL. How do I find information about that particular student?</td>
<td>ISU</td>
</tr>
<tr>
<td>26</td>
<td>I am a department chair, what is the benefit of getting involved with CIRTL to my graduate students?</td>
<td>ISU, MSU, MU, VU</td>
</tr>
<tr>
<td>27</td>
<td>I am a department chair and I am not convinced that teaching is really the reason for low retention of undergraduate students. What studies have been done to support this?</td>
<td>ISU, VU</td>
</tr>
<tr>
<td>28</td>
<td>I am a graduate student and I may be interested in getting involved in CIRTL but I have limited time and need to be sure that this program is worth my time and will help me advance my career as a faculty member.</td>
<td>ISU, VU</td>
</tr>
<tr>
<td>29</td>
<td>I want to read about what CIRTL members are doing to improve teaching and then ask a question to a community discussing issues that are relative to my question.</td>
<td>ISU</td>
</tr>
<tr>
<td>30</td>
<td>I heard that CIRTL has a network of 25 universities. How do I tap into that network?</td>
<td>ISU</td>
</tr>
<tr>
<td>31</td>
<td>How do I advertise to local university people about what CIRTL initiatives are happening at my university?</td>
<td>ISU, MSU</td>
</tr>
<tr>
<td>32</td>
<td>I am a faculty member and would like to find other people in my same/similar discipline to observe and possibly discuss teaching ideas and methods to deepen my own teaching impact.</td>
<td>ISU, MSU, MU</td>
</tr>
<tr>
<td>33</td>
<td>I am a CIRTL university leader and I need help about how to get people at my university know what are the benefits of joining CIRTL.</td>
<td>ISU, MSU, MU</td>
</tr>
<tr>
<td>34</td>
<td>I am a graduate student and would like to find other graduate students in my same/similar discipline to connect with and possibly discuss teaching ideas and methods to advance my teaching skills.</td>
<td>ISU, VU</td>
</tr>
<tr>
<td>35</td>
<td>Our department provides mentorship to our graduate students via their TA experience. Can CIRTL enhance this program?</td>
<td>ISU, MSU, MU, VU</td>
</tr>
<tr>
<td>36</td>
<td>What are CIRTL members doing?</td>
<td>MSU, VU</td>
</tr>
<tr>
<td>37</td>
<td>I just attended a face-to-face meeting at my University about teaching and I would like to ask a follow up question to the group that was at the meeting.</td>
<td>MSU</td>
</tr>
<tr>
<td>38</td>
<td>I am a member of the Center for Excellence in Learning and Teaching (CELT)/Center for Teaching (CFT) at my university. I have heard about CIRTL but I am not sure how they fit into the big picture of graduate student development at my university.</td>
<td>MSU</td>
</tr>
<tr>
<td>39</td>
<td>I am a CIRTL member and I want to sign up for the weekly CIRTL newsletter.</td>
<td>MSU</td>
</tr>
<tr>
<td>40</td>
<td>I am a graduate student and I am interested to find out what teaching job opportunities are open.</td>
<td>MSU</td>
</tr>
<tr>
<td>41</td>
<td>I would like to see what’s happening at my university with respect to CIRTL</td>
<td>MSU, MU</td>
</tr>
<tr>
<td>42</td>
<td>I would like to see what’s happening at other universities so that I might try them. (Note: similar university structure/culture/resources is important)</td>
<td>MSU, VU</td>
</tr>
<tr>
<td>43</td>
<td>I want to find a faculty who will mentor me as I develop my teaching skills.</td>
<td>MSU, MU</td>
</tr>
<tr>
<td>44</td>
<td>What are the benefits of being in CIRTL?</td>
<td>MSU, MU</td>
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<tr>
<td>45</td>
<td>I want to sign up for an upcoming event. Choose an event you find interesting and sign up for it.</td>
<td>MSU</td>
</tr>
<tr>
<td>46</td>
<td>I want to work with another CIRTL member at a different university on a TAR project focused on effective use of technology.</td>
<td>MSU</td>
</tr>
<tr>
<td>47</td>
<td>What data supports the impact of CIRTL initiatives</td>
<td>MSU</td>
</tr>
<tr>
<td>48</td>
<td>I want to join and participate in a CIRTL list serve.</td>
<td>MSU</td>
</tr>
<tr>
<td>49</td>
<td>I want to join a learning community but first I want to know what the objective of the community is and how they plan to measure it.</td>
<td>MSU</td>
</tr>
<tr>
<td>50</td>
<td>I want to be able to post a discussion in a safe environment meaning I know who is a part of the discussion and it feels private.</td>
<td>MSU, VU</td>
</tr>
<tr>
<td>51</td>
<td>I want new graduate teaching development ideas but I don't want to reinvent the wheel. I need the ability to adapt what I find on the CIRTL network to my local situation.</td>
<td>MSU, MU</td>
</tr>
<tr>
<td>52</td>
<td>I want to see what other universities are doing for CIRTL initiatives.</td>
<td>MSU, VU</td>
</tr>
<tr>
<td>53</td>
<td>I am a STEM faculty and I want to evaluate my teaching but I would like to partner with a CIRTL faculty member who is knowledgeable about how to carry out teaching as research.</td>
<td>MSU, MU</td>
</tr>
<tr>
<td>54</td>
<td>I want to learn what my CIRTL counterparts are doing at other universities.</td>
<td>MSU, VU</td>
</tr>
<tr>
<td>55</td>
<td>I want to see who is involved with CIRTL at my local university.</td>
<td>MSU</td>
</tr>
<tr>
<td>56</td>
<td>I am a brand new graduate student going through a TA training program and I just learned about CIRTL. I want to be a good teacher and I would like to see how CIRTL can help me do that.</td>
<td>MSU, VU</td>
</tr>
<tr>
<td>57</td>
<td>I respect the work of 'Name of Person' and I would like to be notified about her activity on the CIRTL network.</td>
<td>MSU</td>
</tr>
<tr>
<td>58</td>
<td>I am a CIRTL member and I want to sign up for a CIRTL course.</td>
<td>Curriculum</td>
</tr>
<tr>
<td>59</td>
<td>I am a graduate student and I want to see what courses are offered through CIRTL</td>
<td>Curriculum</td>
</tr>
<tr>
<td>60</td>
<td>I would like to sign up to be notified about CIRTL course offerings</td>
<td>Curriculum</td>
</tr>
<tr>
<td>61</td>
<td>I am managing the course registration process and I need to determine the priority ranking of the students who have registered in order to decide who may take the course.</td>
<td>Curriculum</td>
</tr>
<tr>
<td>62</td>
<td>We have decided who from the list of registered students will be eligible to take the course. Now I need to send a message to those students. (Jose - see Asana for this email template)</td>
<td>Curriculum</td>
</tr>
<tr>
<td>63</td>
<td>I am a university CIRTL member and I want to propose a new course to delivery to the CIRTL network.</td>
<td>Curriculum</td>
</tr>
<tr>
<td>64</td>
<td>We are the CIRTL curriculum course approval committee and we need a space to evaluate the courses submitted by the universities</td>
<td>Curriculum</td>
</tr>
<tr>
<td>65</td>
<td>I am a faculty member and interested to teach a CIRTL course but I want to see what is required to teach such a course.</td>
<td>Curriculum</td>
</tr>
<tr>
<td>66</td>
<td>I am a faculty member who is a CIRTL member for my institution. I would like to propose a course about learning through diversity to teach in the CIRTL network. What are the requirements for CIRTL to consider this course?</td>
<td>MU</td>
</tr>
<tr>
<td>67</td>
<td>I am a CIRTL institution leader and I would like to learn how other universities are getting started with respect to getting buy-in from members of the universities.</td>
<td>MU</td>
</tr>
<tr>
<td>68</td>
<td>I am a graduate student coordinator and I need material that explains what CIRTL is so that I may present it to my graduate students.</td>
<td>MU</td>
</tr>
<tr>
<td>69</td>
<td>I would like to know how many credits a CIRTL course is and what the enrollment process is to take the course.</td>
<td>MU</td>
</tr>
<tr>
<td>70</td>
<td>I would like to understand the governance structure of CIRTL</td>
<td>MU</td>
</tr>
<tr>
<td></td>
<td>Question</td>
<td></td>
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<tr>
<td>----</td>
<td>--------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>71</td>
<td>What do the CIRTL core ideas really mean and how to apply them as we develop our local CIRTL program.</td>
<td>MU</td>
</tr>
<tr>
<td>72</td>
<td>I want to see the research that supports the claim that graduate students are better researchers if they develop their teaching skills during graduate school.</td>
<td>MU</td>
</tr>
<tr>
<td>73</td>
<td>I want to learn how to overcome challenges with respect to teaching from someone at a school similar to mine (resources, size, structure, etc.)</td>
<td>VU</td>
</tr>
<tr>
<td>74</td>
<td>I want to make sure that what we are doing at my school can be used by other schools in the CIRTL network. How do I share what we doing and see who is using it?</td>
<td>VU</td>
</tr>
<tr>
<td>75</td>
<td>Setting up CIRTL courses at our university is proving to be very difficult. How have other universities done it?</td>
<td>VU</td>
</tr>
<tr>
<td>76</td>
<td>I want to work with discipline experts to design a course in my department.</td>
<td>VU</td>
</tr>
<tr>
<td>77</td>
<td>I want to do something with CIRTL but I only have 2 hours a week. What is available given this time limitation?</td>
<td>VU</td>
</tr>
<tr>
<td>78</td>
<td>I have challenges with respect to the way my university is structured and trying to fit CIRTL into that structure. I want to see if other universities have dealt with similar challenges and how they overcame them.</td>
<td>VU</td>
</tr>
<tr>
<td>79</td>
<td>I want to see what the other universities are focused on without having to talk to anyone.</td>
<td>VU</td>
</tr>
<tr>
<td>80</td>
<td>What is the CIRTL presence in my discipline?</td>
<td>VU</td>
</tr>
<tr>
<td>81</td>
<td>How can CIRTL be mutually beneficial to faculty and graduate students alike?</td>
<td>VU</td>
</tr>
</tbody>
</table>