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NEW METHODS FOR THE DESIGN OF PRODUCTS THAT SUPPORT SOCIAL ROLE TRANSITIONS

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As designers transition from traditional HCI practice to experience design, they need new methods that connect experience theories to design practice. Research on product attachment – detailing why people love their stuff – indicates that attachment develops as people use products to discover who they are and desire to be. This finding hints at a design opportunity for products that support social role transition, when people must invent themselves in a new role. In advancing experience design, the authors chose to connect the theory on product attachment to design practice by developing two new design methods. They began a pilot project to design applications that could support first-year college students as they shed their high school identities to become college students. This paper documents the development of these methods, detailing the authors' application of these in a pilot study. In addition, it shares the authors' reflections on the effectiveness of these methods and on the larger issue of designing products to support social role transition as an emerging theme in experience design.

Keywords: interaction design, research through design, HCI, theory, design theory

Introduction

For more than 10 years, advances in computational technology have increasingly focused on the creation of new devices and services beyond the desktops of workers, taking computing into many different aspects of people's lives. Mirroring this expansion in the role of computing has been a broadening of scope in the interaction design community from *usability* to *user experience*. In this time, the discourse among interaction designers has shifted from "ease of use" and making things "user friendly" to the much less tangible issue of how to improve the quality of people's experience as they engage with products to interact with people, places, and things. To address this evolution in scope, design researchers have tried many new perspectives in order to discover design opportunities for interactive technology to bring value to people's lives including *fun* (Blythe et al., 2003), *pleasure* (Jordan, 2000), *emotion* (Norman, 2004), and *experience* (Shedroff, 2001; Buxton, 2007).

In taking these new perspectives, design researchers have increasingly turned to the social sciences, seeking a better understanding of people in order to discover new design opportunities. However, one area that seems to have been mostly overlooked, in this rush for new perspectives, is consumer behavior research, particularly the research on how people develop, maintain, and grow attachments to products. One of the main themes to emerge from this research is the strong connection between the social process of identity construction and the attachment people feel to specific products they use. In general, people seem to

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love possessions that help them define who they are and discover who they desire to be. They invest their psychic energy in these possessions through their repeated use, developing an attachment to the product and creating meaning that connects their self to the thing. In their investigations of product attachment, these researchers noted the importance of the different social roles people enact and the fact that when people transition from one role to another they often engage in a tremendous amount of consumption as they attempt to both invent and discover who they are and desire to be in a new role. The very fact that people form attachments to products they use provides evidence for the value artifacts play in people's lives and provides an important perspective for designers – as the makers of things – to consider during the design process.

Inspired by the idea that people love the things that help them to invent themselves, we began a research project to investigate the design opportunities around products that support life-stage transitions, when people take on a new social role. These transitions include having a child and becoming a parent; leaving school and finding a job and/or career path; retiring and inventing and discovering who you are outside your career; etc. This project has two main goals. First, we want to discover if there really are rich opportunities for products that support the identity construction process that takes place during a social role transition. Our design hunches from the literature are that we can improve the quality of the transition experience (i) by making a process that is tremendously implicit more explicit; and (ii) by helping people experiencing a transition to more fully explore who it is they might want to be. Second, we want to learn how to operationalize theory on product attachment, to gain critical insights on how the theory can best be applied within a human-centered design process to gain a novel perspective and find richer product opportunities.

Based on these goals, we began a pilot study to investigate design opportunities around the transition students experience when they shed their high school identity and discover and invent who they wish to be as a college student. In this study we tracked 20 students through their first semester, observing their transition process through interviews, photo-taking exercises, and monitoring of their use of social networking services such as Facebook, which the students used to create experimental, *digital selves*. Because this is a new space for the application of design, we lacked a rich set of design methods that could expose the design opportunities in the space of role transition. Therefore we took a research-through-design approach, attempting to learn how best to design for this space by actually designing for this space. In order to appropriately apply theories on product attachment to a design process, we developed two new design methods: TIPs (Transition-Identity Photos) and Transition Personas. TIPs provide a lens for designers to observe how people's perceptions of themselves in a specific role change over time. Transition Personas extend the Persona technique (Cooper & Saffo, 1999), helping designers to better grasp the whole transition in order to conceive of concepts that add value throughout the entire transition/identity construction experience.

In this paper we provide a review of literature on product attachment and describe how this points to design opportunities. We then share details on our design process. Next we describe the two design methods we developed, detailing how they link to the underlying theory and discussing how their use influenced our design process. Finally, we reflect on what we have learned about designing products intended to support social role transition and offer some implications for future design research investigating this space.

Background on product attachment

Noted psychologist William James (1890) wrote more than 100 years ago that people consider their possessions to be a part of their self. Since then researchers from a variety of disciplines have explored how the objects people live with become important and gain personal meaning. Goffman (1959) views objects as props, creating a link between the self and the activities and actions the props allow and promote in self-presentation. Through interviews with families, Csikszentmihalyi and Rochberg-Halton (1981) investigated the how people invest meaning in possessions by connecting certain objects with personal life goals, with people the person cares about, and with the spaces where they live their lives. They discuss how people use things to understand their self, define and reflect on social relationships, and find purpose in life. Recently, Turkle (2007) collected many personal stories about objects that help people think. Her storytellers' "focus is not on the object's instrumental power – how fast the train travels or how fast the computer calculates – but on the object as a companion in life experience" (p 5). In analyzing their stories, she discusses how objects can gain evocative qualities over time and how some objects can become so entwined with their user that they cannot be seen as separate from that person.

While many different groups have investigated the issue of object and self, consumer behavior researchers have done the most extensive work. In a seminal paper on product attachment, Belk (1988) describes how people participate in a social process of identity construction through their possession and use of different products. Building on Sartre's three states of existence – having, doing, and being – he discusses how people acquire possessions (having) to engage in an activity (doing), and through the having and doing with these possessions, begin to understand who they are and desire to be (being). He clearly connects the meaning products gain through

their repeated use with the process of identity construction.

In describing identity construction, McAdams uses the framing of a life story, an integration of stories people develop to create a cohesive sense of themselves that unites events from their past, experiences from the present, and imaginings of their future (McAdams, 2001). In following this theme of life story, consumer behavior researchers have detailed how the life story drives relationships people develop with brands (Fournier, 1998) and how the life story helps to reveal the attachment people feel to specific possessions. This framing of products as companions and signposts within a life story helps to explain why the function and aesthetics of a product are often significantly less important than social meaning in motivating people to purchase, use, and cherish a product (Csikszentmihalyi & Rochber-Halton, 1981; Solomon, 1983; Kleine et al., 1995). This insight is of particular relevance to interaction designers who still have a strong tradition of assessing their designs based on functional utility and operability.

In addition to life stories, consumer behavior researchers have increasingly recognized the importance of enacted social roles in the development of product attachment (Ahuvia, 2005). The application of social identity theory allowed researchers to focus on three main components: social role, social identity, and ideal identity (Kleine et al., 1993). The *social role* represents a person's perspective on a specific role she/he enacts – such as mother, daughter, sister, wife, student, athlete, etc. – based on all of the positive and negative examples they have experienced in their life. As a person repeatedly enacts a role and it becomes important to him/her, he/she develops both a *social identity* (a sense of him/herself in the role that incorporates all aspects including those he/she likes and doesn't like) and an *ideal identity* (a sense of who he/she desires to be in the role). In applying social identity theory to people's selection of new products, researchers found that the social identity and ideal identity had significantly more influence than the core self (Kleine et al. 1993).

Consumer behavior researchers have recognized that role transitions – when a person moves from one life stage to another – present a rich opportunity for new products to enter into people's lives (Solomon, 1983). People often feel apprehensive and anxious as they begin to enact a new role, relying heavily on stereotypical props to help them perform the role in a way that makes it clear to others (Solomon, 1983). During this transition process, people construct many provisional selves to both discover and invent who they should be by observing people's reactions to these possibilities (Ibarra, 1999). With the advent of the Internet, people have started to create what we call "digital selves". They use computer-mediated systems such as personal web pages to create experimental selves through an iterative process of design, critique, and redesign (Schau & Gilly, 2003). Researchers suspect they have gravitated towards this new mode of self-expression and construction because of the collapse in the boundary of what is real and what is possible (Schau & Gilly, 2003). The use of digital selves allows them to explore more freely and more rapidly who it is they want to be.

Design researchers from the Design and Emotion community have recently begun to look at product attachment research as a source of inspiration for industrial design. Govers and Mugge (2004) speculate that designers can design products with increased likelihood of attachment by making products with personality traits that match those of the target consumer. Schifferstein et al. (2003) recommend that designers make products with the intention of forming strong attachments, theorizing that an increase in attachment will lead to less overall consumption and a more sustainable environment. Finally, Savas (2002) claims that people increasingly have weaker attachments to products due to mass production, leading to an unsustainable consumption model because the things being made are expected to be temporary. However, his claim seems counter to the consumer behavior research that shows the attachment is "decommidified"; that the attachment is to a specific object (my Aeron Chair), and not to a kind of object (an Aeron Chair) (Kleine & Baker, 2004).

In the interaction design community this topic has seen a little focus. Norman's book on emotional design talks about the reflective level of design, where a product creates emotion by triggering a past memory, making people self-reflective (Norman, 2004). In addressing the difficulty of connecting the reflective level of design to an experience design process (Reimann, 2005), Reimann applies the persona technique he helped develop with Cooper (Cooper et al., 2007). In formulating the goals for a persona that this method employs, he distills the motivation into "who the user wants to be" (Reimann, 2005). This framing matches well with the consumer behavior research focus on identity construction. Cockton's work on worth-centered design also captures a key point of our focus (Cockton, 2006). Unlike most of the experience design research that has focused on the experience in the moment of interaction, his model focuses on the value or worth that develops during repeated interaction.

In our search of the design literature, we have found no application of product attachment theory to the design of actual things, other than our own previous work on a research theme we call *Designing for the Self*. This work has focused on the design of products that help people feel they are moving towards an idealized sense of themselves in a specific role. It has not had the social role transition focus of this current research. Our previous efforts have focused mostly on families, helping parents to feel as if they are becoming the parents they desire to be and

have included a reminder system for busy, dual-income families (Davidoff et al., 2007); an alarm clock to keep young children from waking their parents (Ozenc et al., 2007), a cooking support system to increase the likelihood of families eating together (Snyder et al., 2007); and a smart home system that automates the collecting of children's medical histories (Park et al., 2008). We have also investigated this space by creating a mobile phone application that helps Buddhists feel they are becoming the Buddhist they desire to be (Sterling & Zimmerman, 2007).

From the research on product attachment, we see an opportunity to advance experience design by focusing on the needs people have to reinvent themselves when they experience a social role transition. Our designerly hunch is that if products form attachments by passively participating in the identity construction process, then we might be able to increase the chance of forming or of strengthening an attachment by making the product more of an active participant in the self-construction process. As a co-constructor of the self, the product can scaffold the transition process, making the implicit decisions bound up in the process more explicit by helping people to more fully explore the possible selves they might become. In trying to approach this as a design task, we saw a need to understand the transition process, particularly the changes taking place in people's social identity and ideal identity for a specific role as people begin and end the transition.

The DigitalSelf project

In order to investigate the design opportunities around social role transitions, we began the DigitalSelf research project. Our intention was to build on the finding that people create experimental selves to share electronically as a process of self-invention. Our two main goals in this work were (i) to learn how to operationalize the theory on product attachment in a design process, and (ii) to test our hunch that interactive products that take a more explicit and active role in the identity construction process can improve the quality of the transition experience. From the literature, we could see many descriptions of the theory and a few recommendations from design researchers as to why it could be beneficial to apply the theory in the design of products. What we could not find were any examples of how to do this. Therefore, we chose to take a research-through-design approach (Zimmerman et al., 2007). In this approach, design researchers make novel things – things that lack design conventions – in order to both learn how to make this new kind of thing, and to begin the process of developing design patterns (Alexander et al., 1977) and design languages (Rheinfrank & Evenson, 1996) that allow other design researchers and practitioners to more easily enter this new space and extend and advance the work.

As a pilot project for DigitalSelf, we chose to focus on discovering opportunities for interactive products to improve the experience of first-year college students as they shed their high school identity and discover and invent who they wish to be as college students. We selected this specific transition for four reasons. First, unlike many social role transitions such as the death of a spouse or learning you have diabetes, the transition from high school student to college student is generally anticipated with excitement. While students have always struggled with this transition, they are typically filled with more anticipation than anxiety, and a focus on improving a positive experience seemed a safer bet for a pilot study into this new space. Second, since most incoming college students are between 17 and 25, they are still in the process of creating their life story and are more actively engaged in their self-creation process than older people (McAdams, 2001). Thus, it seems that they would benefit from more support in a fuller exploration of who it is they might want to become. Third, the emergence and rapid adoption of social networking software such as Facebook by college students provided strong evidence that students desire interactive products that can help them quickly create, critique, and reflect on possible selves. These social networking products have been designed to help people keep in touch with each other, and we saw a clear opportunity to leverage the role they play by adding in a more explicit exploration of and reflection on possible selves. Fourth, being at a university, we had easy access to first-year college students, as a new batch arrives each fall.

Following a traditional human-centered design approach, we conducted a design project with the following interrelated steps (see Table 1.).

We began the design process by first developing two hunches of where we thought the best opportunity for products to support social role transitions would be, based on the literature: (i) tools that allow students to see the changes they have made to their social networking profiles, in order to reflect on how these have evolved over time (and how they have changed as reflected in the changes to the profile) and (ii) tools that allow for more opportunistic acquisition of content used in the construction and maintenance of social networking pages. To recruit participants, we sent a screening email to approximately 800 incoming first-year students and we got replies from 90%. We suspect the response rate was so high because the request came from people at the university the students would soon be attending. They may have felt obligated to reply or they may have been excited about the idea of going to college and were happy to have an activity that helped them begin this process early. In the screener we asked about the amount of time they use social networking software. From the responses we selected 20 students, balancing educational majors and sex. In addition, we weighted the selection towards students with high usage of social networking services under the assumption that

Table 1. *Design phases and activities for DigitalSelf Project*

Phase	Activities
Define	• Created a territory map illustrating our Initial concept of the problem space
Discover	• Conducted monthly interviews with first-year college students over their first semester focusing on how they create digital selves using various social networking services and on their perceptions of how they have changed
	• Conducted weekly screen captures of participants' various digital selves
	• Collected TIPs photos and rationale every week
Synthesize	• Created affinity diagrams based on interview findings
	• Clustered and analyzed TIPs photos
	• Produced poster of individual participants' semester experience
	• Created dossiers for each participant
	• Created key transition phases based on data from all participants
	• Created Transition Persona for each transition phase
Generate	• Brainstormed design concepts
	• Clustered by theme and reduced set to cover core set of user needs
	• Documented as storyboards
Refine	• Conducted needs validation using our storyboard concepts (see Davidoff et al., 2007, for details on how to perform needs validation)
Reflect	• Reflected on the use of TIPs and Transition Personas
	• Reflected on the concept of designing products to support role transitions

they would continue to use the software as college students and that they would be more likely to use it in experimental ways as they already had a sense of what the software could do and what the nascent social mores around the use of this kind of software might be.

We tracked the students over their first semester at college. This included weekly screen captures of their digital selves including their blogs, photo blogs, online diaries, personal web pages, and social networking pages; weekly captures of the TIPs photos described in detail below, and monthly interviews about their use of the social networking software and their perception of how they had changed since arriving at school. The interviews were performed by masters' students as well as junior and senior undergraduates in the hope that the first-year students would be more willing to share with someone closer to their own age (Antle, 2006).

During the design process we encountered two main challenges. First, we did not have a design method that allowed us to capture changes in participants' self-perception over time. To connect our process to the theory on social role and attachment, we created TIPs. Second, during the Synthesis phase, we did not have a design method for creating a shared vision among the design team of a person across the entire transition experience. To address this we extended Cooper's method of personas (Cooper & Saffo, 1999) into what we call Transition Personas. In the following two sections we detail our experiences with these new methods.

TIPs

As people repeatedly enact a new social role and it becomes important to them, they develop a social identity of who they are as a manifestation of the social role, and they develop an ideal identity of who they wish to be for this specific role (Kleine et al., 1993). In designing the TIPs method, we borrowed this social identity framework of *social role*, *social identity*, and *ideal identity* as a guide to help us focus our observations of the transition. What we wanted was to monitor how these facets of self-perception changed, hoping this would both reveal key stages in the process and produce opportunities to improve the process. One of the challenges we faced arises from the fact that identity construction takes place below a person's awareness; in our case the students do not recognize many of the decisions they make that influence their identity construction as being related to identity construction. We wanted to "peek" inside their heads, sampling self-perception information over time. We also wanted to collect this information in a form that would help designers (i) *empathize with the students' struggle*; (ii) *create a grounded, informed intuition* about the students' needs; and (iii) provide the resources to help *designers achieve a new perspective* (Louridas, 1999) on the transition process.

To connect the theory to our practice we developed the (Transition-Identity Photos) TIPs method. In using this method, researchers ask participants to repeatedly take four types of photos allowing key themes as well as changes in self-perception to be exposed. Table 2 details the four types of photos. In addition

Table 2. *TIPs photo types*

Type	Photo motivation	Connection to social identity
Typical	Product others associate with the social role	Provides insights into how the participant views the new social role, and his/her view of what other people think of this role
Not me	Product others associate with the social role participant would never want associated with him/her	Provides insight into how participant wishes to distinguish him/herself from the mainstream, from the standard view of the social role
I use	Product participant uses in his/her enactment of the social role	Provides insight on the emerging social identity, on how he/she views him/herself in the current role through his/her selection of what to share
I want	Product participant desires in his/her enactment of the social role	Provides insight on the emerging ideal identity, on who he/she wishes to be through his/her selection of what to share

to the photos, this method asks participants to provide details on why they selected this product. These include questions such as when and where the people enacting the social role use the product; how the use of the product influences others' perception of the product's user; and how possession and use of the product influences how the enactors of the social role feel about themselves.

The design of this method was greatly influenced by current user-centered and experience design methods, leveraging their success in both collecting rich data and in building informed intuition for designers. Our goal was to build on current methods by extending them to better meet the framework of consumer behavior theory. Because we were interested in seeing across time, we looked at experience sampling (Larson & Csikszentmihalyi, 1983); however, in our case we were not looking to capture current experience but instead a current perception of self and other. The use of photographs in ethnographic research is well known (Collier & Collier, 1986) and HCI researchers have merged the use of photos and experience sampling by having participants make photo diaries (Carter & Mankoff, 2005). We liked the idea of a photo diary, of collecting images over time; however, our method differs in two important ways. First, we focus the photo-taking task with the intent of capturing perception of self, and not on capturing immediate experience users are having when taking the picture. Second, we did not have an elicitation session, where researchers sit with participants and review the photos. This is because the details in the picture that help participants remember what was happening in the moment are not important to our focus. Instead, our participants went though a reflective process in their selection and description of specific images; therefore, we analyzed the photos and their comments without further input.

In investigating methods that help designers consider factors beyond the traditional HCI focus of usability and utility, and that help designers build an empathic connection with participants, we looked at cultural probes (Gaver et al., 1999; Mattelmäki, 2006). When using this method, designers often ask participants to take pictures of objects and places that have specific, emotional meaning. In this way TIPs is really just a focused version of probes. However, in discussing probes, the creators challenge designers not to overly direct users and not to demand that the data collected be used in a formal analysis (Gaver et al., 2004). They feel that overstructuring the probes and tying activities too tightly to specific goals more similar to traditional user-centered need-finding methods prevents designers from seeing connections that could not be anticipated before the study. This is where our method deviates from probes. We wanted to intentionally connect the social identity framework to our research exploration; however, we did not want to lose the power of probes to influence designers and the power of photos to communicate information not easily captured in text or in an interview.

Finally, in designing this method we were motivated by the fact that consumer behavior researchers have used photo-taking of objects as a method to investigate product attachment (Wallendorf & Arnould, 1988; Dittmar, 2004). Our goal was not specifically to connect our findings to commercial products. Instead, we asked participants to take pictures of products because this is one of the main currencies they use for constructing their identities. By having them work with a form already related to this process, we hoped to gain stronger insights and to see patterns participants could never observe in themselves.

Application of TIPs in the DigitalSelf project

For the DigitalSelf project, we initially asked participants to take photos and describe six products each week. In the first week they took three pictures of products people associate with college students (Typical) and three pictures of products people associate with college students they would never want people to associate with them (Not me). The following week they took three pictures of products they regularly used as a college student (I Use) and three pictures of products they desired (I Want) as a college student. They continued to alternate "I Use"/"I Want" and "Typical"/"Not me" each week for the first semester, a total of 11 weeks. During week 10 students did

not take photos as almost all had returned home for the Thanksgiving holiday.

We prompted students to take the photos by emailing them an MS Word document each week with instructions as to the kind of photos to take. At the front of this document was a small set of questions asking students about their process of updating their digital-self: their web pages, blogs, diaries, and social networking profiles. In addition, the document had large frames for students to paste images into, and a set of questions to answer for each image. After the third week we reduced the number of pictures for each type of photo from three to two after feedback from the students that the process of selecting items and commenting took too long. Students submitted their photos by emailing the MS Word file back to the research team.

Findings

To gain a better understanding of the themes and trends, researchers printed out the individual images and attached them on large foam-core boards (Figure 1). We used four boards, one for each type of photo, and we arranged the images by time as the x-axis and by participant as the y-axis. Additionally, we used blue and purple labels for the participants to indicate their sex. In the first week we had very low rates of participation, only three of the 20 participants submitted images, so while we kept these images on the boards, we did not include these images in our analysis. Between week 2 and week 11 we received 612 images.

Emerging themes

We clustered the 612 images into categories based on both the contents of the image and the rationale participants used for selecting an image. These categories are particularly important in that they reveal the underlying themes the college students use to both define what a college student is and to define who they are as a college student. These categories reveal the currency by which the participants both see themselves and present themselves to others. The items they selected work as props in helping them discover and invent themselves in the experimental performances of who they might be. Categories included the following:

- Transportation: cars, bikes, plane ticket, ...
- Academics: textbooks, calculators, desks, desk lights, ...
- Sin/values: alcohol, illegal drugs, condoms, tattoo (tramp stamp), ...
- Maintenance: vacuum, laundry detergent, dish scrubber, ...
- Food: pizza, Ramen noodles, coffee, fridge, microwave, ...
- Fashion: jacket, hat, T-shirts, sunglasses, ...
- Leisure: sports, television, movies, music, music player, ...
- Money: cash, gold, credit cards, ...
- Communication: mobile phones, social networking web sites, IM, ...
- Computer: laptop, printer, wireless hub, jump drive, ...
- College label: Items with college name on them – college ID, hat, sweatshirt, T-shirt, ...

Figure 2 shows the percentage of each theme within the four categories: Typical, Not me, I Want, I Use. Academics, one of the most popular themes, appears often in "Typical" and "I Use" while appearing less frequently in "I Want" and infrequently in "Not me". Students appeared to connect their own personal activities as a college student with the stereotypical role of college student through the academic objects they used. Even when academic products appeared in "Not me", they generally functioned as indicators of academic specialization, such as the fine arts major that included a graphing calculator as a *Not me* image.

The sin/values theme appeared across all photo types, but they dominated the *Not me*. In the first week, nine of our 20 participants submitted photos of alcohol, indicating a strong connection between drinking and their preconception of what college is and is seen as. This surprised the research team, as we had already developed a sense of our own campus culture from our many years of being here, and this generally did not center on drinking. However, we immediately realized that the students had arrived with a model of college developed by film and television. This experienced reminded us of our expert blind spot in being so deeply ingrained in the local culture, and it made us more sensitive to our own biases and preconceptions of what the first-year experience would be.

While students called out drinking as a "Not me" behavior, many had pictures of themselves drinking on their own and their friends' social networking pages. Interestingly, images of alcohol, which are not legal for these under 21-year-olds, never appear on the "I Use" images. Many participants also sent in images of hard drugs such as cocaine and heroine. Finally, many students submitted images of birth control pills and condoms. Comments indicated people see college students as constantly engaging in casual sex, and participants did not want this perception cast on them. What is interesting is that the images of sexuality all involved health and reproduction. What we did not see were images of sex toys or pornography, as the students seemed to make no connection between these products and college life.

Food was an important theme across all image types but appeared most often in "Typical". We suspect this was particularly important because, in leaving home, students now had complete control and complete responsibility for feeding themselves. The submitted images often showed brand affiliations such as Starbucks coffee appearing in "Not me", "I Use", and "I Want". More interesting, however, was the dominance of a single product, Ramen noodles, an inexpensive and quick to prepare food, which appeared repeatedly across "I Use", "Typical", and "Not me". Food

Figure 1. Image of 2 of the four photo boards.

worked as a message for students to understand and communicate their college experience.

Leisure played a strong role in all types except "I Use". Not surprisingly, students complained about not having enough free time. What did surprise us was that very few images involved specific content such as a CD showing a band or the name of a song. In studying participants' digital selves, we noticed they detailed the music and other media they particularly like. They also claimed in the interviews that shared interest in music paved the way for them to introduce themselves to each other via social networking sites before arriving on campus. In terms of "Not me", many leisure images showed football and other sports revealing the high school connection to social activity surrounding athletics, which is not a part of the campus culture at this school.

Students submitted many images of money, indicating that the theme influenced their self-perception. We suspect this focus on money comes from the new freedom and new responsibilities students take on as they leave their family and become increasingly responsible for their day-to-day activities. Interestingly, while images of money appeared in all four types of photos, the topic of money was not seen on the digital selves students created.

Changes across time

To better understand the changes in self-perception taking place over time, we analyzed the images on each board across time. We looked both at the submission of individual participants and at the submission of all participants combined. In addition to drawing out the main themes students use to define themselves and their college experience, we also wanted to see how their perceptions changed over time in order to gain some insights on their transition to college student (see Figure 3). After arranging the photos on the photo boards and classifying them into themes, we looked to see what changes appeared over time.

In analyzing the "Typical" images, we noticed some small changes over time. Leisure started small, peaked in the middle, and then shrank towards the end. Mirroring this pattern was Academics, which started strong, dropped in the middle, and then became more important towards the end of the semester. This change in perception of college students aligned nicely with our interview findings. Most of our participants reported being in the top 10% of their high school class, but after

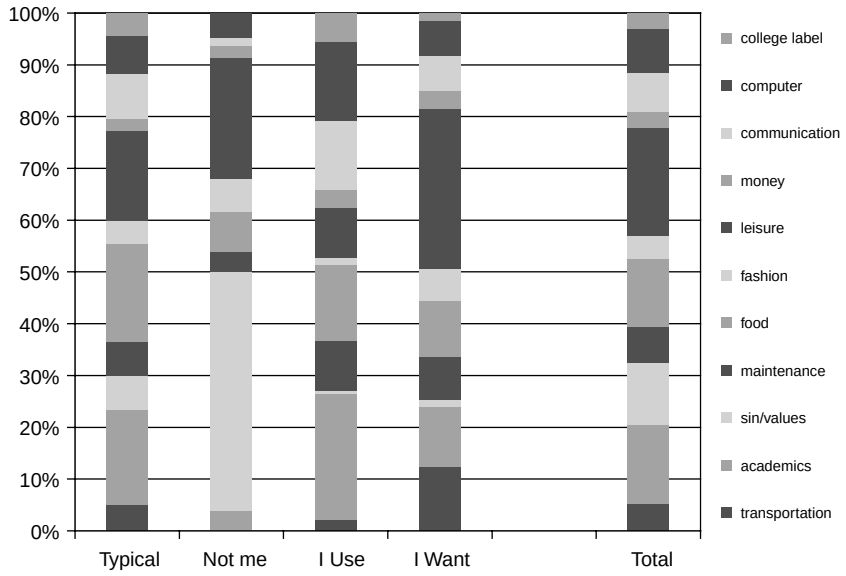

Figure 2. Chart detailing the percentage of images in each category for each of the four photo types (four left columns) and in total for all 612 images (column on far right).

their first major test at college most realized they were no longer in the top 10% and that the competition had increased. This experience seemed to challenge a core aspect of their identity as a student.

For type "Not me", we noticed that the number of images devoted to sin/values decreased over the semester. However, images of alcohol slowly began to be replaced by illegal drugs such as marijuana, cocaine, etc. We suspect that interest in alcohol may have decreased as a differentiator as student adjusted to being in college. In addition, sin/value images related to sex began to increase towards the end of the semester revealing the increasing importance of this topic to students living outside their family homes. Finally, food became increasingly important towards the end of the semester as students displayed a developing negative association with pizza, a food regularly served to participants at campus events, and inexpensive quick-serve foods that demonstrate a lack of time, lack of money, and lack of concern for health.

For type "I use", we saw a downward trend in academic products from the beginning to the middle of the semester and then a sharp rise in these products towards the end. This nicely matches with the images for "Typical", showing a link between their social identity and the social role of college student. Additionally we saw a rise in maintenance products in the middle of the semester with images of laundry soap, washing machines, and shower caddies used to carry shower supplies to a communal bathroom. The constant need to perform maintenance tasks they may not have performed at home – tasks mostly unanticipated by the participants in their anticipation of college – seemed to make these activities more present in the students' lives.

For type "I Want", we saw some very interesting changes in participants' desires. Many participants submitted images of luxury items such as sports cars and surround sound systems in the first few weeks. These items all seemed impractical given the lack of parking at the university and the tiny dorm rooms participants inhabit. Instead, they indicate what the students desire following college or outside the college context. By the middle of the semester, these luxury items declined and more practical and immediate items such as umbrellas and warm coats appeared. More academically oriented items such as requests for quiet, desks, and study aids also appear in the middle, matching the trend in "Typical" and "I Use". By the end of the semester students were submitting picture of themselves sleeping, images of home-cooked meals, and images of suitcases needed to go home. Within one semester they had transitioned from wanting to flee home for the independence of college to wanting to flee college for the safety and comfort of home.

Reflection on use of TIPs

In reflecting on our design and use of TIPs to gain insight into the social role transition process, we have identified several places where it advanced our design process. In addition, we learned a number of lessons that will improve our use of this method in the future.

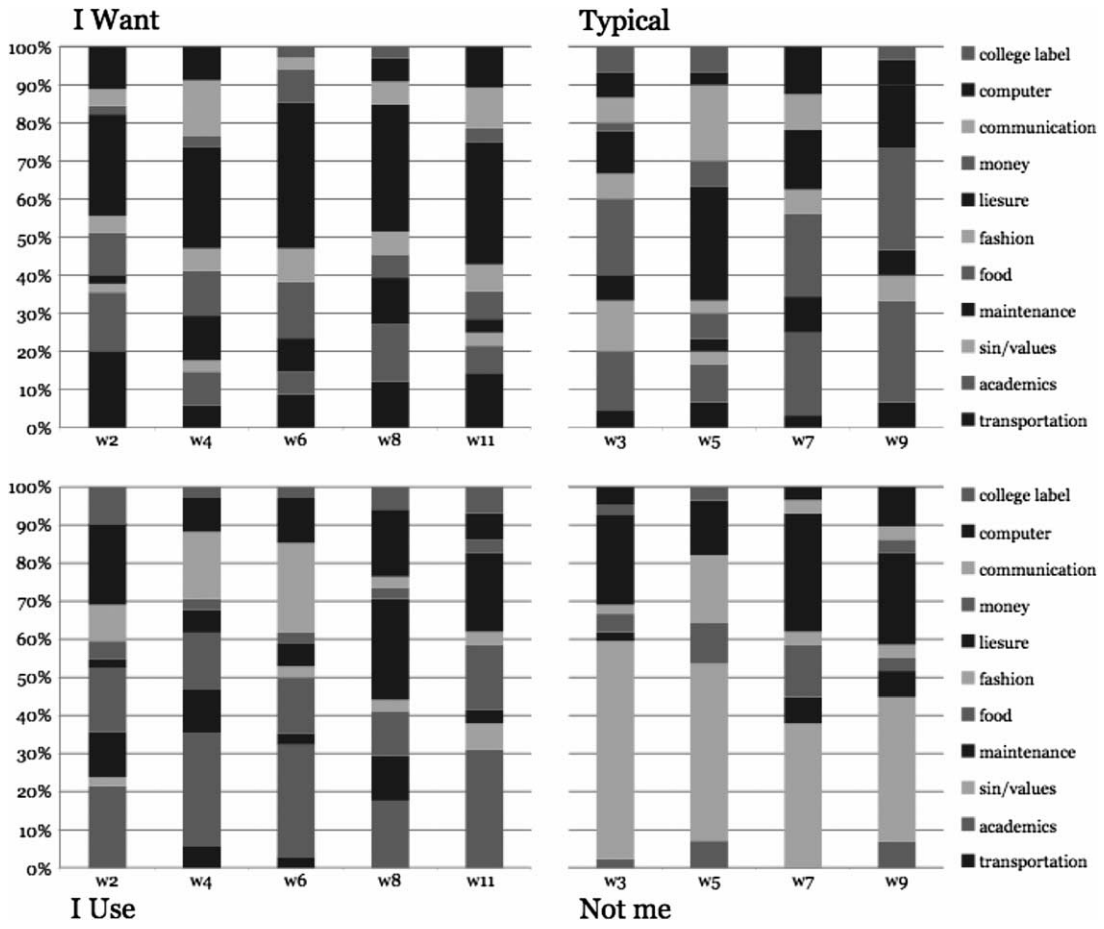

Figure 3. Chart showing change in percentage over time for each of the four image themes.

One of the greatest benefits of the TIPs method is that it revealed the themes that our target audience used to define themselves; themes that we could not directly access from traditional interviews and that would not come from observational methods such as contextual inquiry. The images and rationale for the objects participants found meaningful provided researchers with new insight into how students understand, create meaning, and communicate this new world and new role. The images also help the researchers discover their own preconceptions of what they expected to find having experienced this social role transition themselves in the past. The arrival of unexpected images forced us to step back and make a more accurate, empathic connection to this time in our own lives, reflecting on how the world is different in many ways for these students. Finally, the images worked as a bridge, allowing the designers to better see what the students considered to be the obvious elements of their own world they would never articulate.

In considering the social identity framework of social role, social identity, and ideal identity, the TIPs method provides an imperfect match. It reveals themes and changes over time, but does not clearly separate the findings into pieces that fit the framework's definition. However, this abstraction between the framework and the findings appears to be acceptable in that the TIPs intention is not to advance the underlying theoretical construct, but instead to motivate design. In this sense the TIPs method seems to have been quite successful.

In conducting a first trial using TIPS, we did gain several insights that should improve its future use. First, our participants used found images from the web considerably more often than they took photos of items. At first this concerned us, but over time we realized that this gave them much greater freedom to

imagine what it was they wanted instead of limiting themselves to items they could get physically close to. In the future we will ask them to acquire images instead of limiting the request to photos. Second, some participants were unclear whether they could reuse an image, or if they constantly needed to find new images for the same categories. In the future we will ask for the top things as opposed to any thing, allowing them to repeat if the item is still one of the top ones. Third, participants quickly became fatigued, and sent fewer details describing the photos over time. This may be in part due to them being overwhelmed with school, especially after their first experience learning there was considerably more academic competition at college than in high school. This problem most probably would not affect other target populations where researchers use TIPs to investigate social role transitions.

Transition personas

As our design team began the process of synthesizing the findings to make sense of what we had observed and to motivate the creation of concepts that could transform the world to a preferred state, we encountered a challenge. The needs we captured were full of conflicts, making it difficult to find a focus. Examples of the contradictions in needs included:

1A. Need to meet many new people in order to find the ones that will be good friends.
1B. Need to limit access to new people so students can invest and grow the friendships they have made.
2A. Need to make the development of a social support system of friends the top priority.
2B. Need to make academic performance the top priority.
3A. Need to try new activities to find the one that will make student happy.
3B. Need to focus on a single activity in order to make friends and see if student really likes it.
4A. Need to keep in touch with friends from home.
4B. Need to let go of friends at home in order to focus on emerging friendships at school.

It is this conflict that makes the social role transition a particularly interesting focus for product development. People need help to resolve the underlying issues that trigger the conflicts. However, current user-centered design methods provide very little insight into how to approach this challenge. In trying to bring some structure to the conflicting needs, we found ourselves facing something similar to what has been termed an "elastic user" (Cooper & Saffo, 1999). In the traditional case this involves different stakeholders playing a "what if" game, worrying about all the different and conflicting things all users might want to do. This problem can escalate to the point where a design team cannot agree on a design decision and the progress halts.

To address the problem of the elastic user, designers at Cooper developed the Persona method (Cooper & Saffo, 1999; Cooper et al., 2007). In using personas, design teams create a fictional user. This user functions as an archetype, and if the design works for this one user then it also umbrellas to support the needs of many other users. A persona is specifically represented as a real person to allow both the design and development teams to create an emotional attachment, inspiring them to address the persona's needs. Design teams get past the problems of an elastic user by making the design work exclusively for this single user. To create a focus on a single user, designers construct experience, life, and end goals for the persona. They then typically engage in a scenario-based design approach, using the persona as the driving character for many different scenarios. Researchers in the HCI community have evaluated the use of personas in development teams and have shared their insights and modifications of the method (Grudin & Pruitt, 2002; Antle, 2006).

To address our own kind of elastic/conflicted user, we extended the Persona method into what we call Transition Personas. In addition to addressing the elastic user problem, we identified two other important ways Personas could help. First, Reimann, a coauthor on the use of Personas (Cooper et al., 2007) linked the Persona method with Norman's model of emotion, and particularly to the reflective level of design (Reimann, 2005). This gave us some confidence that we could connect this method with the consumer behavior theory on product attachment as it seems to closely match with Norman's concept of a reflective, emotional trigger. Second, Belk's framework on how people extend themselves with products builds on Sartre's three states of existence: having, doing, and being. The Persona methods use of user goals provided a way of connecting this framework to our design process; in this case through the addition of having, doing, and being goals for the persona.

Design teams create Transition Personas following these four steps:

1. *Identify transition phases.* Based on research on a specific transition process, the team breaks down the transition into a small set of major phases. They do this by detailing the specific transition process of individual participants and then consolidating all of the processes into a set of unifying stages. Teams should try to keep this to less than nine phases, as it would be unwieldy to have more. The approach is similar to consolidating models in contextual design (Beyer & Holtzblatt, 1997). The main indication of a transition point is a change in goals or a change in activities that indicates a change in goals.

2. *Generate goals.* The team extracts key themes from the user research, looking for themes both that span all the phases and that are important in a single phase. The use of TIPs can help to discover the themes; however, the themes should not be limited to the TIPs findings. Instead, themes should come from the sum of all of the research on users and stakeholders. The design team then generates the experience, life, and end goals called for in the formal Persona method. Some of these will be specific to a phase; however, some, such as the life goals, may span several or all phases. Finally, the team generates having, doing, and being goals specific to each phase.
3. *Craft staged-personas.* The team generates a separate persona for each phase of the social role. This is not one persona going through each stage, but an entirely separate persona meant to umbrella the major issues of each phase. Like traditional Personas, these should include photographic images of the persona, a biographical summary, and the global and phase-specific goals.
4. *Create Persona book.* When the individual personas have been developed, the design team arranges them in a book in the order of transition phases. Following this, the team begins to generate scenarios that describe the experiences of the individual personas during their specific phase prior to any product intervention. These stories should come from the user research.

Application of Transition Personas in the DigitalSelf project

In conducting research, we broke our research team down into pairs that always worked together. Each pair had the responsibility for three or four individual participants. The use of pairs and the fact that different pairs owned participants had several advantages. First, working as a pair provided more flexibility in finding time to meet with participants regularly. Second, having one pair always interact with the same participant allowed for both a relationship to develop and for the researchers to observe more subtle changes in identity over time. Third, working in pairs allowed the researchers to discuss what they had seen during an interaction with a participant immediately following the interaction.

We began our development and use of Transition Personas by creating a dossier for each participant. Next, we mapped their overall experience. Each team made a map for an individual participant and then we shared all the maps together, working to develop a single framework that researchers could apply to all participants. Contents of the dossier and map came from responses during monthly interviews on their use of their digital selves; from weekly captures of theses digital selves; and from the TIPs contributions. Figure 4 provides an example of one of these maps.

To generate the transition phases, each research pair first generated a set of transition phases for each participant. They then consolidated these into a set that united the three or four participants an individual pair monitored. Next the research team all met together and working from both the individual examples and from the small-consolidated examples, we decided upon a five-phase transition process: Anticipation, Orientation, Mid-term, Thanksgiving, and Finals

Anticipation

This phase covers the time from when students commit to attending a school to the time when they arrive on campus to begin their first year. This phase involves connecting with other people locally who will be going to the same school and the use of social networking software to connect with people who will be first-year students. Students often connect via similar tastes in music and other media.

Orientation

This phase covers the students' arrival on campus to the time when classes begin. Students unpack and begin to inhabit their dorm rooms, decorating them to express their style, and often struggle as they do not yet know who they might be as a college student. The school provides many activities during this time, allowing incoming students to meet each other and to learn about the campus and areas near campus. During this phase, incoming students collect the names of many potential friends and look them up on social networking sites. Students also spend time using IM, email, social networking software, and their mobile phone to keep in touch with friends from home.

Mid-term

Almost all of the students who came to this school graduated in the top 10% of their high school class. They all think of themselves as well-above-average students. However, most of them experience a major exam in one or in many of their classes where they realize they are not an above-average student in this new environment and that the expectations at the school are a bit higher than they anticipated. Students also begin to realize that without their parents' physical presence, they must motivate themselves to both attend class and manage their time to work on homework. This phase runs from the beginning of classes to a point shortly after they realize they are not as academically competitive as they thought. In this phase students begin to pare down their "friends" at school from a large set of casual acquaintances to a small set of friends they spend time with working both on school work and on activities outside class. Students also struggle to maintain connections with friends from home as they lack current experiences to share with each other.

Thanksgiving

This phase begins shortly before the Thanksgiving Holiday in late November, when

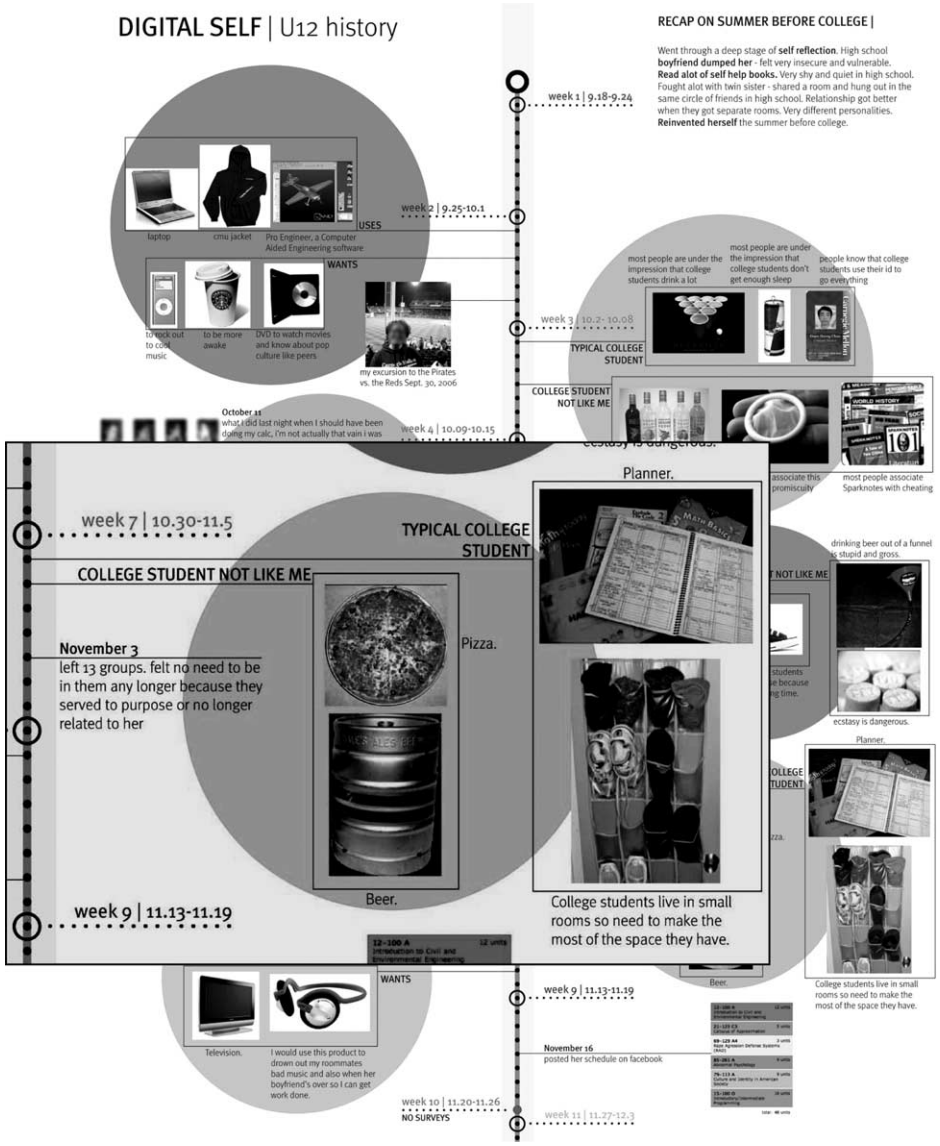

Figure 4. Map of participant U12's experience over the first semester with detail of week 7 experience.

students begin to focus on a brief escape from school and a return home. During this phase students invest more time on re-establishing connections with friends from home, arranging times to get together. Students look forward to the comforts of home and family.

Finals

This phase begins as students return from the Thanksgiving break. As finals begin, the schedule of classes gives way to the more open schedule of exams and final project deadlines. Students begin to take greater interest in academics, often letting social connections with new college friends fall off. Students also engage in more long-term social planning, making plans for activities during their month-long break with both new friends from school and friends from home.

Based on these five transition phases, we created the Transition Personas. In our process of both developing and using this method, we struggled with the idea of creating a single persona to bridge all phases of the transition, and we did create a few as pilots. However, we chose to create a separate persona for each phase because this allowed us to broaden issues of sex, major, cultural background, and relationship strengths across the different personas.

In creating the personas, we generated the following themes that span all of the phases:

- Academics: Summary of desires and brief experiences with respect to academics.
- Digital Self: Summary of activities and experiences around the construction and update of their digital selves and their interactions with others' digital selves.
- Relationships: Summary of short-term goals they set for themselves around making new friends and maintaining ongoing relationships.
- Activities: Summary of activities student participates in and the feelings and motivations for beginning and continuing participation in these new activities.
- Emotions: Summary of main stressors and stress releasers in student's life.

After creating the Persona book as described above, we began a round of concept generation involving sketching, group brainstorming in the studio, and bodystorming (Buchenau & Suri, 2000), where we generated ideas by situating ourselves in the contexts inhabited by our personas. The themes we generated that spanned the transition process (academics, digital self, relationships, etc.) were particularly helpful in guiding our ideation through scenario construction. They gave us a framework to help us more fully explore the space. We clustered our concepts based on the underlying needs they addressed, and then ranked the needs based on their connection to the identity-construction process and to value we inferred they would provide to our personas. We then filtered our concepts down to have one or two for each need, and documented them as short storyboards where our personas inhabited a context, encountered a problem, and experienced a product intervention that addressed the problem. Using these storyboards we conducted two needs validation sessions with first-year college students, looking for the overlap between the needs we had observed through our user research and the needs participants perceived in themselves (for more details on needs validation, please see Davidoff et al., 2007). The goal of these sessions was not to assess the value of any individual concept, but instead to reframe the design situation by better understanding the opportunity for technology to improve the transition process. We identified four main opportunity areas:

1. Students wanted systems that could reduce barriers to opportunistically joining group activities. For example, when students moved across campus, particularly early in the semester, they often encountered a group of students engaged in an activity, such as soccer or Frisbee, that they wished to join. Students wanted a method for detecting the needs within this group to have people join in without the social risk of approaching and asking that could easily lead to rejection. They wanted a product to work as an "ice breaker".
2. Students enjoyed spending time updating their social networking profiles to share with friends and family, and commenting on their friends' pages. They wanted to make parts of this activity more public and social, possibly through the use of interactive displays in their room, where the information could be more present, and where they could create different views of themselves and conversational threads based on groups such as family, friends from high school, friends from college, etc. However, they also desired to control the expression of their self to the different groups.
3. Students often had the desire to more opportunistically capture their immediate experience to share on their social network page as well as the desire to access and comment on their friends and acquaintances while on the go. They felt students would like mobile devices that could better support these activities.
4. Students saw the value in a system that could track their behavior with regard to their creation and management of their digital self and their activities commenting and interacting with their friends' digital selves. They could not articulate specifically why they wanted this, but we suspect that they desired to reflect on their own change during the transition process. Interestingly they felt they already knew how much time they were investing in their different activities, such as schoolwork, exercise, social networking, etc., and many felt they had not changed very much during their first semester.

Reflection on use of TIPs

After completing the needs validation sessions we spent time reflecting on the use of Transition Personas. In this process we reviewed our initial goal of designing products to support the role transition. Our main insight was that it is quite difficult to generate a specific application that can span the entire transition process.

In trying to generate concepts, we found it much easier to focus on the specific issues within a single phase; issues across the transition from one phase to another phase; or, at the most, issues spanning three phases. As hard as we tried, we did not generate many concept applications that spanned the entire transition process. We see two possible reasons for this result. First, during the creation of the transition personas we made the choice to

develop different personas for each phase instead of a single persona to span the entire process in order to hold on to more aspects of first-year students such as different majors, sex, home town, etc. This choice seemed to lead to a stronger focus on the issues in individual phases, and it may have been a lost opportunity to gain empathy for single person experiencing all phases. Additionally, there may not be a single application that can span this transition process, but instead the best approach might be a suite of products and services that address the specific needs of different phases and provide support for the entire transition process. We suspect that both of these issues are true and hope to try this again using a single Persona that spans the transition.

Discussion

We began this research project to investigate the design opportunities for products that more explicitly support social role transitions. As a step forward in this investigation, we developed and used two new design methods: TIPs and Transition Personas. In looking back at the development and use of these tools in a design case, we can see three important insights: Ambiguity around the conflict inherent in social role transition; a mismatch between social networking software and user needs; and desire to bridge the virtual and physical worlds.

In getting to know our participants using methods like TIPs and in trying to make sense of their transition experience using methods like Transition Personas, we continually observed the conflicts inherent in the social role transition. Our participants struggled to understand who they are and want to be. As interaction designers we often look for breakdowns people experience as an opportunity; however, in this case the struggle to make sense of the conflicts seems to be a core aspect of the experience. In addressing this situation, designers should be careful not to try to eliminate the conflicts. Instead, they should focus on giving people the tools to better understand the conflicts and to make them more aware of the issues they must resolve. The goal should be to make the transition more meaningful, not to help people transition more quickly.

In looking at the themes revealed by TIPs and the activities and topics on our participants' social networking sites, we see a real disconnect. Most of the themes the students used to describe their experience never show up on their pages. This seems to indicate a huge opportunity for social networking sites to do more than just help students make and maintain friendships. After working with the students, we feel there are great opportunities for these services to engage students in a broader exploration of who they might want to be through their process of presenting themselves to others. In addition, there is an unmet need to (i) help students control different presentations of themselves to different groups and (ii) allow them to better see and reflect on how they have changed over time.

Throughout our interactions, the students made strong differentiations between the virtual world of the digital selves and the physical world. They desired the reality of the physical world, but also want the flexibility and asynchrony of the virtual. We see a great opportunity here for products that can bridge these two worlds, particularly those that can make the virtual world considerably more accessible in the real world where students spend much of their time. Mobile devices seem like a great platform, but designers need to be careful not to construct a world where everyone is spending all their time looking at a tiny screen in their hand as they walk around unaware of the place they are in.

In thinking about incoming college students as representative of social role change, it is important to keep in mind that this social role transition is different from many others. One critical consideration in attempting to generalize the ideas to other groups is to remember that these students do not begin this process with a deeply ingrained sense of who they are. They have not yet developed a coherent life story that they are adding on to. Instead, they are still developing their underlying story.

In reflecting more broadly on the design process needed to *design for the self*, we have two important observations. First, it is hard to keep a focus on making products that help people explore who they might want to be. In our process, we found ourselves constantly drifting from this larger goal to address the more clearly identifiable problems at any given stage, such as the need to make friends during orientation. This is possibly due to interaction design's traditional focus on usability and utility. Second, evaluating the artifacts produced in *designing for the self* is quite challenging from a rapid prototyping process viewpoint. These products are intended to have an influence and to develop an attachment through repeated use during the transition process. This is nearly impossible to simulate in a controlled study. We suspect that the only way to truly evaluate the success of this style of design is to place working products in the field and measure their impact through actual use. This significantly increases the risk of trying to make commercial products that follow this philosophy of helping people discover and invent themselves in a new role.

Conclusion

As the interaction design community transitions from a utility focus to an experience focus, they must find new ways to make things. The idea of designing products that support social role transitions based on the research on how people develop attachments to their possessions shows some promise for broadening the perspective of designers moving to and experience focus. The two new design methods documented demonstrate how designers can borrow theories from other disciplines and apply them to design. They also show that current products such as social

networking software leave a lot of opportunity untapped in terms of social role transition.

Future work

In moving this work forward, we plan to prototype several concept applications that help students more broadly explore who it is they desire to be and that help them bridge the physical and virtual world. Our plan is to make working versions of these products and place them into the world for students to use.

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