



Supporting Creativity Within Web-based Self-services

Elizabeth M. Gerber* and Caitlin K. Martin

Northwestern University, Chicago, Illinois, United States

Web-based customization self-services encourage consumers to co-develop products, heightening expectations that anyone can engage in creative work. Yet personal creative ability and experience may vary greatly. This research examines how Web-based customization self-services may be designed to better support a customer's experience and performance with the service and suggest that designers of online customization systems consider and apply such an approach. Drawing from psychological and human computer interaction research concerned with motivating and sustaining creativity, and investigating popular online examples, we formalize a set of design principles to support customer creativity within Web-based customization self-services including: providing an optimal challenge, autonomy, community, encouragement, and resources, giving permission to take risks, facilitating goal setting, supporting positive affect, and encouraging mastery experiences. We close with a discussion of the broader implications of manufacturing companies transitioning into service providers and the possibilities of developing task-specific design principles for different types of Web-based services.

Keywords – Creativity, Customization, Creativity Support Tools, Design Principles, Web-based Self-services.

Relevance to Design Practice – This paper encourages service designers to view the action of customization as a creative process and provides nine theoretically grounded design principles to support customer creativity within Web-based customization self-services.

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Introduction

Web-based customization self-services allow and encourage a diverse set of consumers to engage in creative work. In the not-too-distant past most consumers purchased mass-manufactured products from a physical store, whereas today people can remotely acquire a variety of individually tailored items ranging from sneakers to wedding invitations. Increasingly, companies provide online configurator software, inviting consumers to customize their own products: Timbuk2 beckons, “customize a bag” (Timbuk2: www.timbuk2.com); Chocri bids, “design your own chocolate bar” (Chocri: www.createmychocolate.com); and miMuesli calls, “mingle your favourite Muesli” (Muesli: uk.mymuesli.com).

These Web-based customization self-services expand expectations for creative performance for anyone with Internet access, yet customers' creative ability, and their perception of it, may vary greatly. Though technology has the potential to enable this mass cultivation of creativity, people will be more motivated to use such self-services if they believe they are able to use these tools to take creative action and will be more encouraged to return if they feel their product is a successful result of their efforts. If performance expectations and perceived performance are aligned there are potential benefits for both the individual customer and the providing manufacturer. If these aspects of the online experience are mismatched, customer satisfaction suffers possibly resulting in a decrease in the revenue and customer base of the provider (Meuter, Ostrom, Roundtree, & Bitner, 2000; Zeithaml, Parasuraman, & Malhotra, 2002). Given enhanced performance opportunities and expectations, how can service designers best support the creative experience and performance of the individual customer? While service designers can focus on functionality and

usability without understanding the underlying psychology of motivation and creativity, this added knowledge might contribute to the design of more effective technology-based self-services. This under-utilized theoretical perspective can help to explore what supports creativity online and how outcomes vary across customers and products.

In this paper, we take a step towards formalizing a set of design principles to support the creative experience and performance offered by Web-based customization self-services. We draw from research concerned with supporting individual creativity in the fields of psychology and human-computer interaction (HCI) and from cases of how service designers have approached the design of existing Web-based customization self-services. The paper is organized into four sections. The introduction sets the stage for this work, including a history of self-service technologies, the evolution of the customers' role in product creation, and research on customer satisfaction with Web-based services. The second section lays out our approach to understanding issues of motivating and sustaining creativity. The third section outlines nine design principles, each including a description, supporting research, and examples from existing Web-based customization self-services. In the final section, we

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*Corresponding Author: egerber@northwestern.edu

discuss the broader implications of this work, including what it means to actively manage customers' online experiences, and potential future efforts to generalize these design principles to a wider range of task-specific Web self-services.

Self-service Technologies

Self-service technologies are technological interfaces that enable customers to produce a service independent of direct employee involvement (Meuter et al., 2000). These were originally placed at the location of service, allowing customers to withdraw money from ATMs outside their local bank, pay for gas at pump terminals, and check out from hotels at kiosks in the lobby. As Internet access became ubiquitous, a new category of self-service technology emerged off site. These *Web-based self-services* are Internet-supported interfaces that enable customers' access wherever and whenever they have Web access, still without the need for a direct service representative.

Benefits for the customer include increased autonomy and a wider choice of services. On their own and on their own time, customers can enact online bank transactions, shop for new clothing, and sign up for a gym membership. They have access to information without having to wait for a call or email reply from the organization. They are no longer limited to doing their banking at an institution within driving distance or shopping at a local store; instead, they can access banks and retail shops throughout the world (Meuter et al., 2000). Concurrently, companies are attracted to self-service technologies for their potential cost savings (Meuter, Bitner, Ostrom, & Brown, 2005; Parasuraman & Zinkhan, 2002).

Customization and Self-services

In the Western world, mass production advanced during the industrial revolution, as new machines produced products in large volumes at a low cost per unit. Rather than commissioning a customized product from a local artisan or creating it themselves, consumers began to depend on manufacturers and design professionals to design and produce products in large volumes that appealed to the masses. While mass production allowed more people to consume more products from more companies, the individual customer became less involved in the process.

In the late 1980s, with the rise of personal computers, software manufacturers provided consumers with increasing opportunities to customize their software experience without any prior knowledge of coding. For example, people were able to choose the font, borders, colors, and shapes used in their Unix operating system (Mackay, 1991). Computer hardware and

software development continued this trend, allowing people to customize such things as their own graphics for visual presentations or electronic music with low-cost recording equipment. The emergence of the Web further expanded access to and affordability of such customization services, plus added ease of communication (Piller & Kumar, 2006). As a result, a wide range of manufacturers and service providers now enable users to define their own online experiences. Online configurator software creates virtual studios for customers to create or modify customized products and services to individual specifications (Piller & Kumar, 2006). While some scholars argue that customization merely increases consumers' choice in alternatives and that such work does not demand extensive creativity (Schifferstein, Mugge, & Hekkert, 2004), it has been found that customers perceive customization work as creative work (Piller & Kumar, 2006). In this paper, we begin with this customer perception and question how we can better support creative possibilities inherent in the process of customization. Possible online co-creations include: *online experiences*, such as the customization of game play features in online multiplayer gaming; *services*, including the customization of online banking preferences; and *tangible products*, where the designed artifact is rendered as an actual object. To narrow our focus and allow for easier comparison of features, this paper is specifically oriented around these Web-based customization self-services that result in a tangible object, although we suspect that the principles could be applied to those with more experiential or service-related outcomes.

Benefits and Trade-offs

The model of online mass customization has been described as the new frontier of business competition for the product and service industry, promoting the fulfillment of the wants and needs of individual customers without sacrificing efficiency, effectiveness, and low costs (Pine, 1993). While this may be true, customization introduces additional factors to the balance of benefits and tradeoffs in the model of customer and company within self-service technologies.

On the business side, customizing products reduces capital commitment and overproduction, increases knowledge of customer needs, increases product attachment, or the emotional bond a consumer experiences with a product, and loyalty to the brand (Piller & Kumar, 2006; Schifferstein et al., 2004). Technology-based interactions, such as those in self-service technologies, are believed to be a key criterion for long-term business success (Parasuraman & Zinkhan, 2002). Direct-to-consumer business transactions constituted 44.6% of all consumer sales in 2010, and customization is one way in which companies attract additional sales online (Bureau, 2010). Revenue from NikeiD, Nike's online custom shoe design service, surpassed \$100 million in 2010 (Brohan, 2010). According to Forrester research, 81% of people are willing to pay more for customized products (Johnson, 2006).

The benefits and tradeoffs for the customer are more nuanced. Customers are often promised enhanced autonomy and choice through customization. Users are motivated to customize

Professor **Elizabeth Gerber** directs the Creative Action Lab in the Segal Design Institute in the McCormick School of Engineering at Northwestern University. Her primary appointment is in Mechanical Engineering with courtesy appointments in Management Science and Industrial Engineering, the Kellogg School of Management, and the School of Education and Social Policy.

Caitlin K. Martin is a Research Program Director at Stanford University in the area of technology and learning and works as a research consultant at Northwestern University.

to both express themselves creatively and create a unique product (Fiore, Lee, & Kunz, 2004). The current reality is that the degree of actual creative input and how it relates to output varies from service to service and changes depending on the content and product. Further, the assessment of creativity is subjective and based on experience (Amabile, 1996) and thus perception of creativity required for customization may also be subjective. The shoe configurator toolkit on miAdidas allows customers to choose from a set of predetermined fabrics and models and then visualizes results on the screen. The photo book configurator on Shutterfly mimics page layout programs used by professional book designers, with a high level of product manipulation available to the customer. Technically, Shutterfly offers more creativity support tools, but based on prior experience and interests, one customer may perceive Adidas as demanding more creativity.

Another substantial issue that is important, especially if we are considering customization a creative pursuit is that of ownership and autonomy. Despite paying more for customized products, in many cases, companies maintain copyright and ownership of customer designs. Companies also collect detailed data on customers' personal design preferences. Often, neither of these issues is apparent to the customer.

In summary, customers find customization enjoyable and companies find them profitable. Consequently, the number of new web-based customization self-service technologies is increasing. With the proliferation of customization services and low barriers to switching services, customers can make choices, including choosing self-services that optimize their creative experience and perceived performance (Johnson, Bellmen, & Lohse, 2003). Inherent in the benefits are tradeoffs for the customer, including issues of design copyright, privacy, and creative expectations. For this reason, guidelines for effective, creative, and pleasurable customization experiences online may help to balance the benefits for both companies and customers, resulting in customer creativity and enhanced products alongside companies maintaining a competitive edge in today's market place.

Customer Use and Satisfaction with Web Services

Because the financial benefits possible from online services are only realized if customers readily adopt them and return, many scholars have investigated online interactions and the critical impact that they have on customer use and satisfaction (Dabholkar, 1996; Schneider & Bowen, 1995). They have found that customer interactions with technology affect their evaluations of the business and their online behavior. Customer loyalty to an online business or product is directly related to their satisfaction with their Web experience (Gummerus, Liljander, Pura, & van Riel, 2006; Koufaris, 2002).

While some factors influencing customer intention to use and to return to a site are individual (i.e. previous experience, need for human interaction, technology anxiety, and Web skills), many include contextual elements of the site (i.e. clear communication of responsibilities, support, presentation of online challenges, and use of efficient search mechanisms) (Fiore et al.,

2004; Koufaris, 2002; Meuter et al., 2005). Though the contextual elements are the aspects of an online presence a company can more easily adjust according to their users, current research shows room for improvement in the design of Web-based customization self-services. A recent survey of customization configurators found a lack of basic HCI principles (Walcher & Piller, 2010). One-third of the sites reviewed did not provide a visualization of the final product. Two-thirds did not provide users with any guidance through the process, and only 4% had a progress bar. Seventy-three percent of the sites did not allow users to save and come back to a creation (Walcher & Piller, 2010). This research indicates both the benefits of purposefully designing contextual elements of the online co-production experience and underscores the need for such an approach in existing website designs.

Motivating and Sustaining Creativity

Though the importance of context is apparent, few psychological researchers concerned with creativity have investigated the ubiquity and use of technologies as contexts that people use to perform creative work. To better understand both creativity and technological tools to support creativity, we looked to existing research on motivating and sustaining creativity in fields of psychology and HCI. For the last fifty years, researchers concerned with fostering creativity have studied individual and group creative processes and have found certain characteristics of work environments that are supportive of creativity (e.g. Amabile, Conti, Coon, Lazenby, & Herron, 1996; Ford, 1996). In the past decade, HCI researchers have been concerned with creating technologies to engage more people in creative activity (Shneiderman, 2009). We believe these established bodies of research are relevant and applicable to Web-based customization self-services, as customers work to complete a creative task in a technology-based environment. Especially influential to the ideas presented in this paper are the KEYS conceptual model for assessing the climate for creativity (Amabile et al., 1996) and HCI principles for creativity support tools (Resnick et al., 2005; Shneiderman, 2007).

Contextual Factors

Scholarship suggests that all people are able to produce moderately creative work and that the work environment (in this case, the online co-production experience) can influence the level and frequency of creativity (Amabile et al., 1996; Shalley, Zhou, & Oldham, 2004). While people who have broad interests, high energy, independence of judgment, creative self-identity, attraction to complexity, tolerance for ambiguity, and self-confidence are more apt to be creative (Barron & Harrington, 1981; Gough, 1979), scholars find that creativity is not due to personal characteristics alone. Also important are expertise (technical, procedural, and intellectual knowledge), creative thinking skills (how flexibly and imaginatively people approach problems), and task motivation (Amabile, 1996; Oldham & Cummings, 1996). Because personal characteristics are relatively stable, and expertise and creative thinking skills develop over time through training (Basudur,

Wakabayashi, & Graen, 1990) and extended use of creativity support tools (Hewett, 2005; Shneiderman et al., 2006) scholars find that task motivation is the most easily manipulated through contextual factors in the short term to support creativity (Amabile & Mueller, 2007; Oldham & Cummings, 1996).

Specific contextual factors have been found to support creativity (Amabile, 1996; Shalley, 1991). Through interviews with R&D scientists and managers around creative projects, Amabile and colleagues established a set of factors in the workplace that were perceived to motivate creativity: organizational encouragement (including encouragement of risk taking and idea generation), supervisory encouragement (including setting clear goals), work group supports, freedom, sufficient resources, and challenging work. Specifically, these factors support intrinsic motivation, i.e. the motivation to do something because it is personally interesting, positively challenging and engaging as opposed to externally rewarded (Amabile & Mueller, 2007).

The ability to influence task motivation through contextual factors parallels findings regarding the importance of contextual factors in customer satisfaction with Web-services, and the focus on the short term is a good fit with the relatively short period of time people engage with Web-based self-service technologies. When intrinsically motivated, people are not only more creative but also more apt to experiment with new self-service technologies (Meuter et al., 2005) and prefer an active role in the production of a service (Dabholkar, 1996).

Task-specific Self-efficacy

Feelings of self-efficacy around a particular task have been found to influence an individual's effort and persistence with that task (Bandura, 1997). Within Web-based creative self-services, this is relevant both to the technological and the creative components of the task. Because self-service technologies often require new behaviors, consumers must be convinced of their ability to enact these new behaviors (Meuter et al., 2005). In one study, customers who were new to online investment trading became regular users when researchers increased their feelings of task-specific self-efficacy through role engagement, thereby increasing customers' financial performance perceptions, service value evaluations, and future usage intentions (van Beuningen, Ruyter, Wetzels, & Streukens, 2009). For creative work, both receptivity beliefs (the extent to which one believes their ideas will be received) and capability beliefs (the extent to which they believe they are capable of completing a task) contribute to creative performance (Ford, 1996). This has been referred to as *creative self-efficacy* (Tierney & Farmer, 2002).

Open-ended Creative Technologies

Inspired by creativity researchers such as Csikszentmihalyi (1996) and Sternberg (1999), HCI designers and researchers have developed a range of creativity support tools to support the cognitive processing necessary for creativity within open-ended design tasks (Shneiderman, 2000; Shneiderman, 2009;

Shneiderman et al., 2006). Creativity support tools, ranging from collaborative brainstorming platforms to individual music development software, support increased access to information (collect), ability to connect this information more widely (relate), creation of new information (create), and dissemination of this information (donate) (Shneiderman, 2000). Based on this cognitive process, HCI researchers established principles to guide the development of new creativity support tools (Resnick et al., 2005; Shneiderman, 2007). What distinguishes these principles from other user interface principles is that they emphasize creativity related processes such as easy exploration and rapid experimentation. This area of research offers guidelines about supporting creativity in the context of interface technologies and also suggests ways to encourage the user to feel both safe and confident in the creative environment, enhancing creative self-efficacy with the tools and tasks. Contextual principles for creative support tools include supporting exploratory search, enabling collaboration, keeping historical records of actions and ideas across users, and designing to allow successful outcomes for a range of users across time, in their words, designing with "low thresholds, high ceilings, and wide walls" (Shneiderman, 2007).

Study Rationale

To develop and illustrate theoretically grounded principles to guide designers in the design of web-based customization self-services, we conducted an extensive literature review in psychological and human computer interaction research and examined popular Web-based customization self-services. The study was framed with a broad research question: *How can Web-based customization self-services support creativity?* We examined pertinent literature to understand theoretical mechanisms found to motivate creative performance (ex. Amabile & Mueller, 2007), the use of self-service technologies (ex. Meuter et al. 2005), and related phenomena. These mechanisms were then clustered into larger conceptual categories.

Concurrently, we investigated the most popular Web-based customization self-services, popularity being based on page visitors (www.alexa.com). To focus the study, we examined 50 self-services that included configurator software and resulted in a tangible artifact. The sample represented the four most popular genres of online customization self-services (Walcher & Piller, 2010): t-shirts (ex. Spreadshirt: www.spreadshirt.com); dress apparel (ex. Selve: www.selve.co.uk/, Lands' End: www.landsend.com, Blank Label: www.blanklabel.com); photos, prints and cards (ex. Shutterfly: www.shutterfly.com, Tiny Prints: www.tinyprints.com); and food (ex. Muesli: uk.mymuesli.com, Chocri: www.createmychocolate.com), and also the areas of shoes (ex. Reebok: www.reebok.comUS/custom-shoes/, Adidas: www.miadidas.com), and cars (ex. BMW: www.bmwusa.com).

We went back and forth between the larger conceptual categories of mechanisms and the self-services to develop principles to best fit the constraints and opportunities of the co-production experience of Web-based customization self-services.

We refined our list until nine principles emerged as tied to our research framework, identifiable in the existing sites, and unique enough to be separately described. Although the paper lays out nine distinct principles, it should be apparent through the descriptions and interwoven research that they are actually tightly interconnected.

Design Principles

These nine design principles are intended to support customer creativity in Web-based customization self-services, motivating potential users to individually begin and sustain their creative task online and encouraging a belief in their creative ability in the context of Web-based customization self-services. The intended outcomes include better-supported creative experiences for the customer and, in turn, customers continued use of the services over time. Table 1 summarizes the design principles.

For each principle, we present the underlying motivational mechanism and ground these theoretical concepts in real-world application with examples from existing Web-based customization self-services. It is important to note that though the examples are intended to clarify some of the ideas that are discussed; they are not intended to be perfect models of the principle. Within the same site, we often observed simultaneous support for creativity and self-service technology use and lack thereof. There are also plenty of examples that may hint at one of the principles, but the design or intention is more to emphasize user customization or use of the technology rather than creativity. These examples are intended to both describe what we did find but also to question what we did not — a call to service designers to rethink these existing approaches with an eye toward supporting creative action.

1. Provide an Optimal Challenge

The challenge of a task should be appropriately set to stretch people enough that they do not get bored but not so much that they feel intimidated or confused. Dependent on the user's experience, an activity pathway should be clearly mapped out and users should be prepared at each step to move on to the next. With experience, users can more quickly progress through the tasks, being presented with more challenging activities to match their current skill level. We imagine future self-services being aware of the previous difficulty to tasks attempted and modifying the sites' offerings based on frequency and success of previous attempts. To continue to engage the user, the system needs to be adaptive to the user.

Background: This principle is based on the idea that work that is simultaneously challenging and complex, yet well-understood has been found to motivate creativity (Amabile, 1988). One way to achieve this is to present a complex task as a series of smaller tasks, allowing novice users to more easily enter the creative process (Plass et al., 2007). If each small step is measured and accessible, the user is more likely to feel they can successfully complete the entire task. An example of this work is programmable LEGO Bricks, created to help children develop skills to engage in creative problem solving (Resnick, 1993; Resnick, Martin, Sargent, & Silverman, 1996). Based on constructivist learning theory (Papert, 1980), children complete increasingly difficult programming tasks that build knowledge at each level and prepare them to successfully complete the next step. At the same time, the overarching creative activity of building robotic creatures, interactive sculptures, and musical instruments, is clear and motivates them to learn to use the tool. Both the overall vision and the scaffolded steps combine to make the process possible.

Table 1. Summary of design principles for supporting creativity within Web-based self-services.

Motivational Mechanism	Design Principle	Examples
Challenging work	1. Provide an optimal challenge	<ul style="list-style-type: none"> • Step-by-step tasks with increasing challenge • Different points of entry depending on experience
Autonomy	2. Provide autonomy	<ul style="list-style-type: none"> • Multiple pathways to achieving a task • Access to exploration through tools
Community support	3. Provide a community	<ul style="list-style-type: none"> • Online user chat rooms • Galleries of user-created artifacts
Permission to take risks	4. Give permission to take risks	<ul style="list-style-type: none"> • Taglines that encourage experimentation • Real-time help creating a safe environment
Goal setting	5. Facilitate goal setting	<ul style="list-style-type: none"> • Images and words to illustrate product outcome • Progress bar to indicate status within task
Positive affect	6. Support positive affect	<ul style="list-style-type: none"> • Photos of attractive people • Use of positive colors and imagery
Mastery experience	7. Encourage mastery experiences	<ul style="list-style-type: none"> • Formative feedback on progress • Direct manipulation of tools
Sufficient resources	8. Provide resources	<ul style="list-style-type: none"> • "How-to" tutorial videos • Help menu
Encouragement	9. Provide encouragement	<ul style="list-style-type: none"> • Suggest ability to complete task • Use of creation language and processes in task

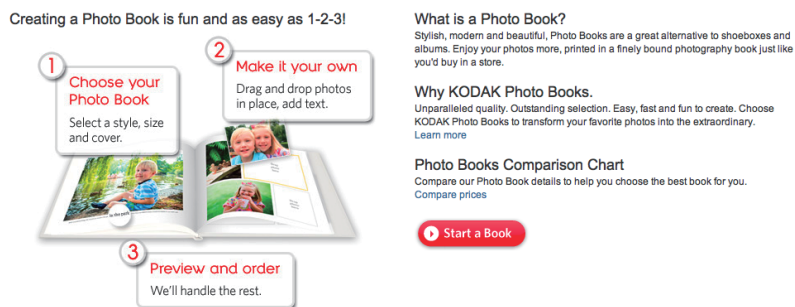


Figure 1. Example of laying out an understandable creative task (Kodak).

Examples: Kodak Gallery (www.kodakgallery.com), an online photography self-service, presents a numbered step-by-step process on the initial photo book activity page. Right away, users can see the breakdown of a series of stages, all of which appear manageable and would be familiar to users with basic computer knowledge: choose from a set of predesigned options, drag and drop photos and type in text, preview and order (see Figure 1).

On Blank Label, a shirt customization site for men, the first step of the customization process involves choosing a fabric for the shirt. The website leads the consumer to pick their favorite color as a way of choosing a fabric. To begin the process with a simple and recognizable question of preference which the consumer can answer easily positions the user to confidently move on to the next step in the larger complex activity of customizing a shirt.

While both of these examples offer manageable and clear steps of production, neither necessarily uses a scaffolded progress to encourage understanding and learning. Can these sorts of pathways be customizable and adaptive to challenge customers as they spend more time on the site and design different types of products?

2. Provide Autonomy

Consumers should be able to choose their own pathway through the self-service, looking for information and making decisions as they are necessary in the creative task. For novice consumers, encouraging a feeling of control may mean allowing little room for error. For more experienced consumers, control may mean the ability to gather and arrange their data and information in the

way they want. This will serve to support both the attraction of new consumers and the retaining of existing consumers. Access to information (see Principle 6) and extensive manipulation of tools are two ways to expand autonomous possibilities for the consumer.

Research: This principle is linked to the idea that creativity is fostered when people feel they have freedom, ownership and control over their work process and their ideas (West & Farr, 1990). In a study of preschool children, those who were allowed to choose their materials among a constrained set of choices were found to be more creative than those who were given materials by the experimenter (Amabile & Gitomer, 1984). In another study of a tool designed to enhance the exploratory search practice, it was found that designers preferred the version of the tool which allowed them to identify common properties between each resource rather than having the tool doing the task for them (Nakajoji, Ohira, & Yamamoto, 2000). Similarly, researchers in psychology (Nickerson, 1999) and HCI (Shneiderman et al., 2006) suggest providing vast opportunities for choice to encourage creativity, supporting the varied and unpredictable paths and styles of the individual for defining and representing the self

Examples: Shutterfly, another online photography self-service, offers two separate entry points for consumers to choose their own path: *Simple* for consumers who want more of a guided experience through the customization process, and *Custom* where the consumer has more control over the development of their photo book (see Figure 2). This is also another example of providing optimal challenge for the consumer (see Principle 1), though the consumer is gauging their own experience point rather than the software itself.

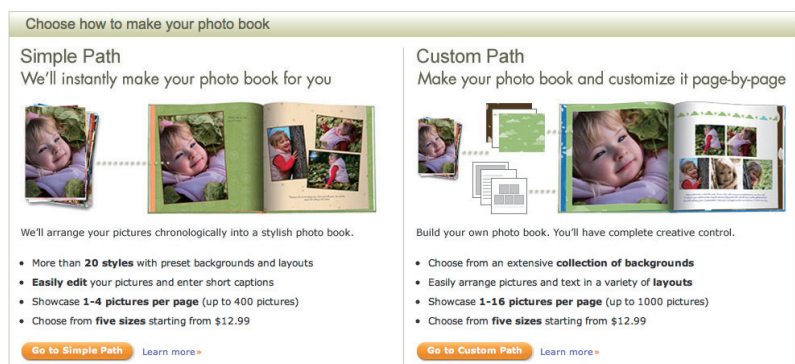


Figure 2. Example of offering autonomy through choice of development pathway (Shutterfly).

Selve, a luxury shoe customization site, emphasizes autonomy in the introduction to the Web service: “Choose from our masses of suede and leathers to create a shoe that’s unique to you” (Selve). The consumer is then asked to choose a template from hundreds of possible shoe designs. Like the children who were given the choice of materials by which to create their collage, the consumer has a choice of template tools, reinforcing perceived autonomy.

While these examples seem to offer the customer a choice of entry point into the experience, it is not clear if they actually choose their own path and their own materials in a way that is meaningful for the creative process and the outcome of the product. Could an inviting marketing entry point be thoughtfully redesigned to encourage users to creatively customize a product?

3. Provide a Community

Online social networking tools can be used to form communities of users around a topic of interest who are sharing, creating, and learning together. Web-based customization self-services can utilize this feature to support consumer learning and encourage ongoing creativity and site participation. It changes the model of interaction from an individual consumer purchasing an individual item to a collective of consumers who are developing and sharing together in order to make meaningful artifacts that reflect their creative visions. Further, a library of creative work collected within such a community provides ideas for future work, space for consumers to reflect on their own work and ability and that of others, and a historical record of work and progress for a group of consumers around a collective interest. Access to a growing database of possible ideas from other users also enhances the autonomy of the user (Principle 2), providing them with new tools and ideas to use and make sense of.

Research: Membership in what has been called online “cultures of participation” encourage new members to lurk and learn and experts to share and grow, allowing everyone to contribute when and how they feel most comfortable (Jenkins, 2009). People have been found to perform creativity when supported by a community of individuals who provide diverse perspectives (Shneiderman, 2007). Community support can motivate creativity by providing inspiration for ideas, encouragement, constructive feedback, and shared commitment to a goal (Amabile, 1996; Parnes & Noller, 1972), and has been suggested as a way to encourage consumers to learn from others and increase motivation to use a new self-service technology (Meuter et al., 2005). HCI researchers advocate keeping historical records of actions and ideas across users, and enabling collaboration in a safe environment (Shneiderman, 2007).

Examples: On the Reebok online custom shoe service, consumers are encouraged to “Get inspired” by viewing recent customized shoes created by other users (Reebok). Similar user interests are emphasized in this process, such as when the consumer makes an initial color choice and shoes from other consumers that use related colors are showcased (see Figure 3). They can actually build on the template of others. Once the

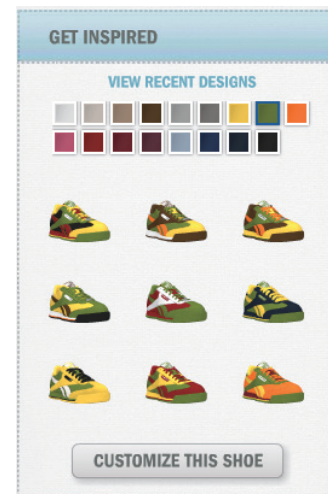


Figure 3. Example of encouraging a community of users through sharing user designs (Reebok).

customization process has begun, consumers are encouraged to “share” their customized design back into the community.

Shutterfly, the online photography service, provides an extensive library of customer photo books, allowing a community space for consumers to develop a profile, post their photo book work, develop narratives about their projects, receive feedback from other consumers, and critique other photo books posted to the space. In this example, the consumer has more autonomy in the process of showcasing and sharing their work.

While Shutterfly photo books are posted by the consumers who created them, linked to that specific consumer profile, and comments are directed to that consumer, the Reebok site asks consumers to donate their customized designs and then takes on the role of managing and sharing them. This minimizes the benefits of the creative community if the individuals are not linked to their designs and are not actually visible to other users. The model of sharing designs without identifying users is an example of the problematic issue of unclear user design rights and recognition discussed earlier in the paper.

4. Give Permission to Take Risks

Sites should encourage people to go beyond what they have done before or the existing design templates that are offered. Straying from a preconceived path should be positioned as a possible learning opportunity as opposed to a possible failure—in other words; there should be no wrong approach to a design solution. In the context of creative Web-based self-services, consumers can take direct cues from a website that acts as a coach through the creative process. Self-services can create a safe space for consumers new to the creative experience offered and also a feeling of possibility and space to those who are ready to flex their creative abilities.

Research: This principle is related to the idea that people are more likely to produce unusual and useful ideas if given license to do so by explicit instructions (Amabile, 1996; Parnes, 1964; Parnes & Meadow, 1959). Similarly, people have been found to



Figures 4a. and 4b. Examples exhibiting the encouragement of risk-taking within a safe environment (Blank Label).

learn more when in environments that promote psychology safety or an atmosphere in which experimentation is viewed as a means to learning rather than failure (Edmondson, 1999).

Examples: Blank Label, the shirt customization service for men, encourages consumers to “Dive into Design” using an image of a man wearing a dress shirt literally falling into the customization tool featured on the site (Blank Label, see Figure 4a). This extreme sense of experimentation is still set within the range of safety and support by the existence of a pop-up chat box asking consumers to “ping me if you need anything” (Blank Label, see Figure 4b).

An online cereal customization service, MiMuesli.com, mitigates the risk of failure associated with making a choice, “Choose the base of your muesli. We’ve tried out all of the mixes and they are very tasty” (Muesli). On both websites, progress bars can be manipulated to ensure that a consumer is able to return to earlier stages in order to modify a choice.

Both of these examples could be interpreted as simply technical support for the configurator software or an invitation to begin a consumer experience. A designer who is mindful of such risks could design similar features to create a framework of risk-taking, providing guided encouragement helping the customer to venture beyond what they have done before, to think about their product and to craft what they imagine within a safe online experience.

5. Facilitate Goal Setting

Web-based customization self-services can establish purpose by framing information about participation according to knowledge of potential consumers and the customized artifact. Goals surrounding participation should be specific and attainable. Specific features can include establishing milestone tasks and time expectations to help the consumer set appropriate goals. At the completion of the task, the consumer should clearly recognize their successful endpoint in the process, identifying when they have reached short term and long-term goals, and potentially receiving some feedback or evaluation of their work. Proving a community (Principle 3) that can comment on each other’s work is a possible internal mechanism for this type of formative and summative feedback.

Research: People are most creative when faced with a task that is personally important, enriching, and meaningful (Amabile, 1996). As such, psychologists suggest that teachers of creativity establish purpose and intention of student tasks to motivate creative action (Nickerson, 1999). Goal setting and

clarity is critical to creative problem solving (Csikszentmihalyi & Getzels, 1976), representing challenges that enhance intrinsic motivation to perform. Clear and attainable goals at each level can direct attention to particular facets of a task that facilitate information acquisition that positively influences cognitive activities necessary for creativity (Shalley, 1995). Research has shown that people who are given creativity goals and work under expected evaluation, tend to perform more creatively than those who do not set goals or expect evaluation (Shalley, 1995) and that while unrealistic goals exert pressure on the creator and reduces creative performance (Amabile, 1997), a “do-your best” creativity goal has a positive effect on creative behavior (Shalley, 1991). To recognize the achievement of creative performance confirms competence and supports future creative action (Amabile, 1988). Applied to the Internet, recognizing achievement confirms competence with the Web (Meuter et al., 2005). The importance of clear goal setting is tied to providing the consumer optimal challenge by promoting understanding the overarching activity and result (see Principle 1).

Examples: Shutterfly offers overarching creative goals to the customer. The site suggests reasons for the consumer to undertake the task of creating a photo book on the site based on knowledge of and expectations about the intended consumers, “Photo books are the best way to preserve and share memories” (Shutterfly). Chocri, a chocolate customization site visualizes the process from creation to delivery on their home page, “Pick your base and favorite toppings, give your bar a personalized name, enjoy organic fair trade chocolate from Belgium delivered to your doorstep” (Chocri, see Figure 5). The goal and final deliverable are clear for the consumer before they begin the creation task.

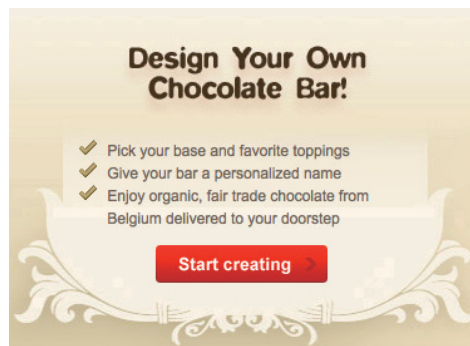


Figure 5. Example of a list of tasks to help the consumer set clear goals (Chocri).

Tiny Prints, a card customization service emphasizes the ease at which the goal may be reached, “It’s as easy as 1-2-3” (Tiny Prints). Lands’ End Custom Dress Shirt service similarly set a clear goal and a path to achieving that goal, “You’re just three simple steps from the shirt of your dreams” (Lands’ End). In both cases, the goal is the creative product, not the purchase. There is no obligation to commit to a purchase throughout the creative process.

Though these examples provide milestones upfront, they are not necessarily engaging the consumer in the process of creation. Progress bars on self-service sites are often used to communicate progress through a task, and there are occasionally other methods of feedback, such as Shutterfly supplementing the progress bar with verbal encouragement, “You’re almost there!” (Shutterfly). This may encourage the user to know where they are in the spectrum of work, but does this actually provide creative support or simply guide the users to the final purchase page? Can service designers better imagine providing milestones and goal setting through the process, perhaps encouraging quality and process through community feedback or other formative assessments of the work?

6. Support Positive Affect

Brick-and-mortar service providers know that good moods support purchases, and consumers are greeted with a smile. In the case of customization Web-services, positive affect may support both purchase intent and creative performance. Like store owners,

websites can use a variety of methods, such as employing images, sounds, and video, to put the consumer in a positive state of mind, allowing them to produce ideas and persist in their work.

Research: Psychology scholars identify affect as a factor that can influence the number of possible solutions and elements people use during a creative task (Isen, 1999). Isen, Daubman and Nowicki (1987) experimentally induced a state of positive affect that improved performance on creative ingenuity tasks by giving participants a small bag of candy or showing them clip from a comedy movie. Fredrickson (1998) proposes that positive emotions (such as joy, contentment, interest, and love) broaden a person’s scope of attention and cognition, increasing the number of available cognitive elements and breadth of those elements relevant to the problem. Additionally positive affect may provide a physiological response that increases feelings of creative efficacy, or belief in ability to complete creative tasks (Amabile et al., 1996, Farmer & Tierney, 2002). Similarly, HCI researchers find that positive affect laden images embedded in tutorials can influence subsequent creative performance using the technology (Lewis, Dontcheva, & Gerber, 2011).

Example: Photography-related customization self-services are naturally designed to support positive affect through the use of photographs. Shutterfly includes abundant pictures of happy children and families. In Figure 6, photographs are used as motivation, placing photographs of happy children alongside text suggesting the idea of creating a holiday card as a way to preserve memories to a customer base that includes many women of a parenting age.



Figure 6. Use of photographs as an example of inducing positive affect (Shutterfly).



Figure 7. Use of symbols as an example of inducing positive affect (Spreadshirt).

Positive imagery may be used as well. Spreadshirt, an apparel customization service, encourages consumers to create a personalized t-shirt by showing an example featuring a prominent heart shape (see Figure 7).

It would be interesting to see these very obvious strategies of providing hearts and pictures of happy children can be replaced by more subtle or uniquely personal ways of inducing the positive state of customers engaged in various stages of the creative task. Are there ways to manipulate the pathway itself, or use multiple modes of media such as language, sound, or pattern?

7. Encourage Mastery Experiences

In order to build their confidence with the environment and the task, consumers should be quickly involved in successful experiences that are easy to attribute to their own actions. Opportunities online for realization of the consumer as a critical creative participant are tightly linked to the input and output features of a Web experience. Some examples include direct manipulation and formative feedback. As the consumer creates online, the services can lead the consumer along a linear path, suggesting little room for meaningful consumer action, or can ask formative questions about creative decisions and can specify congratulations for project completion, specifically attributing the authorship of the customized product to the customer.

Research: Mastery experiences involve engaging in a successful experience oneself. When people see effects of their actions, they strengthen beliefs about their ability to take future actions (Bandura, 1997). This idea is similar to the design principle advocated by Gee (2004) for digital games and learning, where game play encourages the consumer to feel that they have a hand in developing the experiences within the game. To feel a part of the process is to feel successful. Within Web-based customization self-services, it is not only the experience the consumer sees as a result of their input, but an actual outcome—the product itself.

Examples: Many companies summarize the idea of mastery experience in their taglines prominently featured on their websites. Spreadshirt's tag line is "Create, Buy, and Sell your own apparel with designs, photos, and texts," suggesting the immediate value of products created (Spreadshirt). At the completion of the car customization process on the BMW website (www.bmwusa.com), the site asserts, "You've built your Ultimate Driving Machine. Where to next?" emphasizing the creative autonomy of the consumer without the constraint of having to figure out how to manufacture the object (BMW). These promises of mastery experiences are frequently found, but are not necessarily reflected in the activity itself. Shutterfly offers the user more hands-on work that illustrates this principle in the actual task of the customization process.

In the creation of a photo book using the Shutterfly online service, consumers can drag and drop their photographs into different spaces or can rearrange the available layout of the spaces themselves. This example features the direct manipulation of screen elements by the consumer, which clearly results in the final product. In it is also apparent opportunities for exploration and autonomy for the consumer (see Principle 2) and, in mimicking professional layout studios, it clearly identifies the website as a space for creativity.

Research: Access to informational and support resources has been found to have a direct positive impact creativity level (Cohen & Levinthal, 1990; Tushman & Nelson, 1990) and a person's perception of adequate resources may affect their belief about the intrinsic value of the projects they have undertaken (Amabile et al., 1996). Similarly, researchers of creativity support tools advocate for including multiple and innovative ways of sorting and searching information and exploring alternatives (Shneiderman et al., 2006).

8. Provide Resources

Information and support should be available and easily visible as needed for the consumer at all stages of the creative process. The information should not overwhelm the consumer, who needs to see the task as clear and attainable, but should be available to them at any time throughout the customization process. Examples of information include a help menu, clickable paths to advanced explanations, and access to tutorials. Mapping of consumer placement in the task process is another form of support, allowing the consumer to see where they are in the activity, and how they are doing at every step of the way (see Principle 5).

Examples: Shutterfly uses a model of tabbed browsing in the photo book section of their website. Here the consumer has

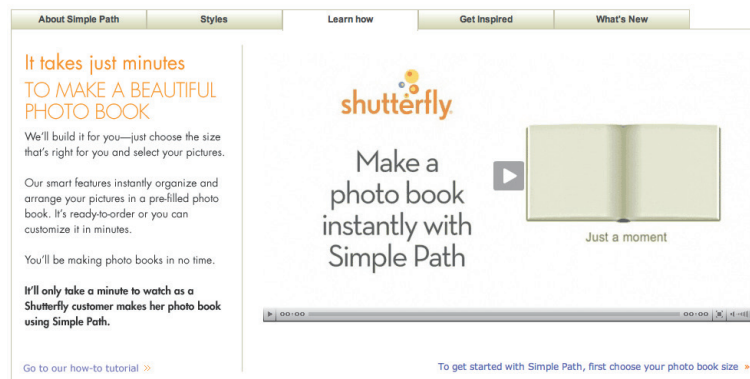


Figure 8. An example of allowing access to multiple types of information using tabs (Shutterfly).

quick access to a number of informative tabs, including “Learn how” which embeds a video tutorial, and “About simple path” which includes further context about the customization process for the photo book task (Shutterfly, see Figure 8).

Blank Label offers personal support to the consumer through instant messaging (example used in Principle 4; giving permission to take risks, see Figure 4b). If the owners are available, a text box appears on the screen stating, “Believe it or not, I’m actually here to help. Ping me if you need anything” (Blank Label). Here the consumer tackles the customization project with the feeling that there is a coach in the background supporting their work.

Resources need not be limited to instructions and help options, but can be expanded to creative toolsets that do not assume what the user will need and when they will need it but rather offering tools, information, and ways of sorting and searching both that are available to the user at various points in the process and allows them to find their own connections and patterns within the configurator framework.

9. Provide Encouragement

This approach encourages consumers to view themselves as capable of engaging in a creative task and to become comfortable with the idea of growing and learning within it. The voice of the company may persuade the customer or they may rely on the existing community of consumers to persuade new consumers of their ability. The use of language related to creative process can encourage the consumer to learn about the process and feel a part of it, as they are given opportunities not only to “create” but to solicit and offer feedback, reflect, and revise. With the use of creative process language, new customers are gently introduced into the realm of creative work, and the returning consumers recognize a space in which they can be creative.

Research: When people are persuaded that they can complete a task, they are more likely to believe they can accomplish a task, are willing to take on more challenging work, have greater intrinsic motivation to complete a task, persist in the face of challenges, and expend more effort in the task (Bandura, 1969, 1997; Deci & Ryan, 1985; Schunk, 1984). The incorporation of contextual language can contribute to a learner becoming part of a new context or situation (Gumperz, 1982; Yinger, 1987).

Examples: MiAdidas, a shoe customization site offers what we might call a pep talk to the customer before they begin: “Every foot is different. Even your own two feet are not alike. So instead of making your feet fit into some average shoes, why not make the shoes fit your feet?” (Adidas: www.miadidas.com). Words used in professional creative process can also be used to invite the customer to different parts of the site or the task. Shutterfly encourages customers to “storyboard” their ideas (Shutterfly). NikeiD, a shoe customization service, shows a progress bar labeled “design process” suggesting that customers are proceeding through a design process while customizing their shoe (Nike: nikeid.nike.com).

Encouraging users to be creative co-designers is linked to managing expectations of what sorts of results are possible. A way that some sites have addressed this is to have a community of user-designers (Principle 3) who share what they have created on the site with each other, letting them see what is possible from a collection of their peers. Meta-data for users and products such as time and/or virtual badges representing values of quantity or quality on the site gives the users further comparative information and motivation to continue their participation on the site.

A Closing Suggestion: Offer Transparency

As technology motivates new behaviors we must be concerned with how customers understand the implications of their new behaviors. Copyright, or permission granted to the creator of an original work, is a particular area for concern. Earlier in this paper, we noted the issues surrounding ownership and recognition of consumer designs within Web-based customization self-services. Customers may upload unique content when customizing a product online and unknowingly relinquish exclusive use of this content. When 35mm film was the primary tool for casual photographers, the customer maintained the prints, negatives, and copyright. Contemporary processing of digital photograph online, meanwhile, most often requires the user to agree to certain terms. Snapfish’s service agreement reads, “You hereby grant Snapfish a perpetual, universal, non-exclusive, royalty-free right to copy, display, modify, transmit, make derivative works of and distribute your Content...” (Snapfish: www.snapfish.com). We suspect that all consumers do not read the fine print agreements prior to using

these services. As customers increasingly engage in self-services, we must simultaneously encourage participation and educate about the legalities in a way that is enjoyable and non-threatening for the consumer. Further, companies may collect detailed data on customers' personal product preferences and process. Like the copyright issue, this issue is not always apparent to the customer and education to consumers about this process is needed. We suspect expectations for transparency will increase and companies may change policy due to customer demand.

In light of this, we offer one final suggestion to service designers to provide the customer with transparency of information. This principle does not stem from the research in psychology and HCI but rather from our analysis of the current models of Web-based self-services and from the questions posed by reviewers of this paper who recognized the importance of this issue. A level of transparency on the part of both parties may promote a level of design professionalism that goes beyond the examples above of simply using design terms and mimicking design tools. If the company is clear about contributions from the consumer and how these contributions generate a number and spectrum of ideas not possible by the company alone, this could feed back into the consumers' confidence and awareness of the service and the product. One potential model is found in online multi-player gaming communities, where open-source code allows participating gamers to build on the existing game experience and spaces for trade allow these gamers to be credited and paid for their new features. Web-based customization self-services have started to explore these areas by developing galleries to share and recognize customer work and template libraries allowing customers to build upon one another's content (see Principle 3).

Summary and Discussion

Web-based customization self-services allow consumers to customize products, often promising consumers the ability to create exactly what they want, when they want it. As such, consumers engage in creative work online, customizing products such as shoes, cereals, and photo books. As the responsibilities of the consumer shift, so do those of the manufacturer. With the implementation of online configurator software, manufacturing companies are, in effect, transformed into service companies. Manufacturing companies must examine how they deliver quality service. We suggest that supporting creative experience through motivational mechanisms shown to be responsive to contextual elements during short-term use may increase customer satisfaction in their experience and their product. Though it will always be the case that the individual customer will be approaching the service from a specific vantage point of interest and prior experience, and that different services and products will react in different ways, we believe that thoughtful design with an eye toward these principles may serve to better align customer expectations with experience. We also believe the call is important to encourage service designers to be mindful of supporting creativity while they guide users through their customized purchase, perhaps reframing their own idea of what their service can provide to their customers.

To make sense of how to best support creative performance when using Web-based customization self-services we blend theories of creativity from research in psychology and human computer interaction to develop nine design principles. The integrated set of theoretically grounded principles is intended to serve as a useful guide to HCI designers, service providers, and design researchers in an interdisciplinary field where no evidence-based design framework exists. As disciplines blend, so must the principles that practitioners follow. Historically, principles of design have been concerned with enhancing functionality, usability, influencing perception, and increasing appeal (Lidwell, Holden, & Butler, 2010; Norman, 1988). With the aim of enhancing creativity, we take an important, yet underutilized theoretical perspective on design. The motivational perspective allows us to explain how people initiate, continue, stop, or avoid service designs and how performance varies with intensity.

As technology shapes people's everyday lives, as researchers and designers we must not only be concerned with what a technology can do, but how the technology motivates specific behavior and influences people's perception of ability. Increasingly, information and communication technology (ICT) designers advocate for designing interactions to motivate use, designing systems to fulfill a consumer's physiological, psychological, and social needs to foster attention, engagement, enjoyment, and desire (Jung, Schneider, & Valacich, 2010; Zhang, 2008). HCI designers are advocating for tools that track people's behavior and encourage reflection at specific times to enhance self-realization during creative tasks (Burlinson, 2005). When people design and purchase a new sneaker, for instance, they may choose to customize their own shoe because the shoes will protect their feet when walking down the street and look and feel the way they want them to, but also because the process of creation influences the way they relate to the object and their understanding of their ability to influence the world in which they live.

The work shared in this paper is part of a larger research project aimed at understanding how designers can build upon the extensive history of psychology to embed primes into technologies to encourage particular behavior. Just as psychologists have perfected the art of priming individuals in the laboratory to elicit particular behavior (Higgins, 2006) and organizational scholars have intensely studied how managers can elicit desired behavior in their workers, we suspect that designers can embed such primes in designed objects and services in such a way that enhances the intended result, thus potentially benefiting both the consumer and the provider. As an example, we recently designed a startup screen for a successful graphic design software tool that included positive imagery. The imagery elicited positive affect and led designers to generate more and better quality ideas using the software. Given that all interactions with technologies prime behavior in some way, we look to how we may increase productivity by intentionally.

Configurator software and other accelerating technological developments can support new innovations in self-services. Given the relative ease with which self-service interfaces and configurator software may be designed, sustained innovation

is imperative. Web-based service providers must optimize their service delivery to actively compete for and retain customers. Increasingly, websites are not only being designed for performance and usability, but also for affectability, supporting an overall pleasant experience for users (Zeng, Proctor, & Salvendy, 2009). Researchers are calling for innovative customers to generate new service ideas in a technology-based service setting (Matthing, Kristensson, Gustafsson, & Parasuraman, 2006).

Service designers are catching up. Service design principles were originally developed from an operation's perspective rather than from a customer's perspective. By the 1980s Shostack (1984) proposed service blueprinting as a means for capturing the "dynamic dance" (Mager & Evenson, 2008) that occurs between the backstage and front stage operations (Glushko & Tabas, 2009). In the early 1990s the field of service design emerged to consider services from both the production and consumption perspective, or from the provider and the consumer's perspective (Maffei, Mager, & Sangiorgi, 2005). In an attempt to design the service experience as it unfolds over time, Spraragen and colleagues (2009) propose expressing service blueprinting as a way of producing a visualization of customers' interactions and behaviors as they link with sequence of events in a service. The goal is to chart the emotional experiences of the consumer with the sequence of events of a service and "proactively prevent downturns in the client's perception of the service." As an example, Spraragen outlines the emotive experience of a New Energy Meter company delivering a new meter. When the new meter arrives, the client may feel skeptical and uncertain, while the provider feels hopeful and driven. The goal is to optimize positive experiences rather than optimize performance.

While this paper is concerned with developing design principles for Web-based customization self-services with the goal of increasing satisfaction by aligning creative performance and output expectations with perceived performance, we believe that these same ideas can be used to develop design principles for other popular Web services with different sorts of intended outcomes. We can envision applying theories of creativity to services not traditionally perceived as creative such as banking. Turkey's Garanti Bank offers customers the opportunity to customize banking products, such as a visa card, revealing the possibility of the customer not only customizing a product but also customizing the tools to deliver the service.

We also see the possibility of using similar research ideas to develop design principles for services related to other types of behavior, such as encouraging dieting or saving money. In the past, principles of service design have focused on the interplay between the provider and the consumer (Mager & Evenson, 2008), but less so on the type of service that the consumer was co-creating. By researching empirically grounded theories of behavioral modification, we can imagine developing design principles for optimizing non-routine co-creation experiences such as decision-making.

Research suggests that understanding how customization self-services affect customers and the products they create are both critical for evaluating the efficacy of the service. This paper takes a unique approach of drawing on research from psychology and

HCI to present principles of Web-based customization self-service design. While the principles are based in empirically tested theory and illustrated using actual examples of Web-based self-services, future qualitative and quantitative research is needed to validate the principles and mechanisms as they apply to customization services. While we draw from existing Web-services to illustrate the principles because we believe that their existence and success is a result of the experience they provide customers, the service may be successful in spite of the service design. It is possible that the novelty of customization self-services and customer lock-in allows the companies to provide sub-optimal service interactions. We suspect that as the number of and diversity of customization services increases, consumers' expectations will increase. We also see a need to further explore the relationship between these principles and customer expectation and actual and perceived task performance. For example, if the consumer is continuously encouraged about their ability and promised three clear and easy steps to a perfect product, do they have higher expectations for their outcome?

Another possible area of future research is to explore the potential of creativity pathways within Web-based self-services. In this paper, we have addressed self-services that support personal creativity that informs everyday actions rather than revolutionary creativity that leads to such things as cures for cancer (Shneiderman, 2000). With attention to design principles and content possibilities, are there connections, or can there be, to more powerful forms of innovation and creativity through the easily accessed route of Web-based self-services? Can customization be a gateway to such forms?

Conclusion

As consumers engage in new service offerings, the landscape of expectations and skills needed changes. As designers and researchers, we must draw on existing theory and build new theory to understand how best to design service interactions to meet customers' expectations.

Accordingly, this paper responds to two grand challenges recently posed to scholars of human-computer interaction and service design. The first being to improve and extend creativity support tools to more effectively support creativity for more people (Shneiderman, 2009). The second being to design Web-based self-service tools that support task-specific self-efficacy (van Beuningen et al., 2009). While designers optimize the functionality and usability of their designs to improve the consumer experience, limited attention has been directed towards how designs may be optimized to change people's beliefs in themselves and their creations. Specifically, we have a limited understanding of how to design self-services in ways that make people more confident in their abilities and as a result positively impact perceptions of and actual performance. The paper draws from psychology and empirical studies to develop design principles that support these goals. The paper specifically addresses the design of Web-based self-service tools and explores how these tools might be optimized to support customers' creativity.

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