Product Interaction Histories as Drivers of Service Ecologies

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Abstract

The mass customization trend in product design demonstrated that two-way information flows between manufacturers and customers can support the marketing of premium products. Now a new generation of digitally augmented products, including the iPod and the TiVo, offer a different and perhaps more viable customization experience. These products are physically the same for every user, but are individualized in the process of use, through services in which the user creates an interaction history that is digitally stored and accessible to the user and the service provider. These datastreams can form the basis for entirely new types of services that allow everyday experiences to inform key decisions.

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I. Introduction

In the epilogue to his book *Emotional Design*, cognitive scientist and design consultant Don Norman considers a paradox of product design and adoption. On one hand, writes Norman, consumer product manufacturers have long tried to imbue their wares with "personal meaning…. by allowing customers to 'customize' them. What this usually means is that the purchaser can choose the color or select from a list of accessories or extra-cost features" (Norman, 2002, p. 219). On the other hand, when Norman asks his colleagues to describe products about which they feel passionate, no one mentions an item that is made to order in any way. Rather, Norman's respondents mostly describe products that became personally meaningful in the course of ownership and use (pp. 214-217).

If Norman's implication is correct, then we are at a moment in product design when once-hidden meanings are becoming evident. As more and more products are introduced that collect, store and present digital information, one is increasingly likely to own a device that carries a detailed history of one's interactions with it. The most basic mobile phone stores numbers dialed and calls received. "Smarter" phones record appointments, to-dos, and photos and videos taken. Digital music players like Apple's iPod hold not only one's music collection, but a record of what is played most often and optionally the order in which some songs get played. Compared to a purely physical product, such as a pair of jeans that shows the marks of repeated wear, a digital data device keeps a trace that is more detailed, legible and shareable between people and across space and time.

In this paper, we discuss the potential of these use traces to generate valuable, desirable knowledge. We argue that while some manufacturers and service providers have successfully used this data in their own product design, marketing, supply chain and customer relationship management, further opportunities exist to build new service ecologies based on capture and analysis of product use histories. In particular, we argue for services that allow customers—individuals or organizations—to interpret and understand their own histories.

II. The Mixed Outcomes of Mass Customization

When Norman comments that "things do not become personal because we have selected some alternatives from a catalog of choices," he is critiquing manufacturers' recent enthusiasm for mass customization (p. 220). As defined by one of its early proponents, mass customization describes processes for "producing goods and services to match individual customers' needs with near mass production efficiency" (Piller, 2003). Broekhuizen and Alsem note that for mass customization to occur, "customers must first interact with the producer, the retailer or the product (i.e. adaptive products) to configure their product" (p. 310). As both Internet electronic commerce and IT-enabled supply chain management gained ground in the 1990s, a number of consumer product manufacturers launched high-profile mass-customization initiatives. Spaulding

reports that products "from Levi's jeans, to General Mill's cereal, Reflect.com's cosmetics and Millstone's coffee" were produced with input from individual customers (2003, p. 3).

However, many of these product lines proved unsustainable for reasons including high production costs, lack of demand for a customized product, and poor elicitation of customer demand. Reflecting on such failures, Zipkin (2001) notes that a rare confluence of factors must be in place for mass customization to work: "unique operational capabilities" must exist to customize the product along certain parameters, and these parameters "must be the ones on which people's preferences differ sharply—ones that are easy to discern" (p. 82).

Even as Zipkin and others note these pitfalls, however, one company was universally credited with a mass customization success story: Dell Computer. As Kraemer et al note in their 2000 case study, "Dell's strategies of direct sales and build-to-order production have proven successful… enabling it to increase market share and achieve high returns on investment in a highly competitive industry" (p. 5). Dell's website allows any customer to have a PC built to order, choosing hardware components such as the processor, memory and hard drive and software to be installed on the computer. But the customization is not limited to manufacturing. As the case study notes, "Each PC is shipped with a [unique] service tag number on it. The customer can type that number into Dell's Web site and get a customized Web page that has all the support information for that PC" (p. 11). The customized Dell PC becomes a sort of CRM platform that allows the company to support the customer, predict what he or she will want next and market new technologies and components as they become available.

Dell's success with mass customization did not come simply because it was able to give customers lots of choices, or even because the company made it easy to make those choices. Rather, mass customization improved the experience of using a Dell PC, loading it with one's own data and enhancing it with new software—the process referred to in customization literature as "adaptive customization." With digital information products such as PCs, adaptive customization is a memorable experience that typically continues as long as the customer owns the product, and generates a unique stream of user data with potential value to multiple stakeholders. Arguably, a key factor in Dell's success with mass customization was its ability to capture and use this data over time.

III. Adaptive Customization in Information Appliances

When the Dell business model was at its peak of success, the PC was the only major consumer product that required an extended process of adaptive customization. Since then, more and more personal entertainment products have incorporated digital media recording and storage and network connectivity, affording consumers greater flexibility and choice in media content. These new products resemble PCs in that adaptive customization is an enduring part of the user experience. But where customization on the PC occurs through a wide

variety of applications, entertainment appliances such as music players support device-specific modes of interaction and customization, often by means of one dedicated service.

The iPod, launched in 2001, is the prototypical example of a product/service package in personal entertainment; as such, it demonstrates how such products change the experience and outcomes of adaptive customization. When an iPod/iTunes user plays music, the system keeps track of how frequently songs are played. The system also records information about sequences of songs the user likes to play, or playlists, and categories and genres of music in the user's collection. In short, the appliance and service maintain detailed, comprehensive interaction histories of the user's consumption of digital music.

The iPod/iTunes business model offers Apple many of the same advantages that Dell achieves through direct PC sales. For example, iTunes can inform users of newly released iPod software upgrades and its online music store markets a constantly updated collection of new music to users. Both systems offer business intelligence that can reveal problems that customers encounter and help predict what hardware and software customers will want next. A key difference, though, is that while Dell collects interaction history information and uses it internally, Apple makes particular efforts to make the use history datastream *interesting* to the user, *legible* to the user, and *shareable* by the user with others in his or her community. This openness is mainly realized through iTunes playlists, a feature that lets users to compose sequences of favorite songs or automatically generate "smart playlists" of songs filtered by genre or frequency of play. In addition, the user has the option of uploading some of this information to the Internet to be shared with other users and with Apple.

Detailed product interaction histories are not only valuable to the product manufacturer or service provider. A more recent development, the emergence of social software on the web, has created opportunities for media consumers to share their histories with the world, by displaying their rental queues or recently played music on their web pages. One of the most basic services a media company can provide a customer is the provision of the customer's own viewing or listening history, for the purpose of social display and sharing.

As these examples show, use history data derived from adaptive customization of information devices can create value for hardware makers, media and information companies and device users. However, there is another application area that has been far less fully explored: use histories as input for entirely new services. This is the area we discuss in the remaining sections of this paper.

IV. Customization as a Driver of Service Ecologies

If iPod/iTunes playlists and interaction histories were accessible only to the user and Apple, the company still could have gotten the information it needed to develop new product form factors, market music to users, and let users display

their music preferences through social software. However, because playlists are also exportable, a number of service businesses have grown up around the iPod and iTunes that leverage user data in ways that go beyond the products and services that Apple provides, and also beyond simple sharing of song lists.

Audioscrobbler (2005) is an online tool that reads metadata from iTunes about the user's music collection and ongoing listening habits, and then analyzes that data to recommend new artists and music to the user and connect her to others with similar tastes. The Audioscrobbler tool is made available on Last.fm, an online music service that streams a personalized music mix to the user based her listening history or other parameters she specifies. The Nike + iPod Sport Kit is a hardware, software and service combination that integrates an iPod user's exercise playlist with sensor data from a transmitter in her Nike shoes to provide a musical sequence "tuned" to the user's workouts, while simultaneously recording pace, duration and other information about each exercise session (Apple, 2006).

Aside from the iPod and iTunes, other consumer media applications have yielded these second-level services. For example, through a service provided by Moo.com, users of the Flickr photo sharing service can print their photos on business cards. The selection of photos is made easier because the user's photo-taking history, or "Flickr stream," determines the order in which the photos are presented (2006).

In each of these cases, an entirely new service is co-produced by the user and provider—a service that would have been too laborious to produce without the user's pre-existing interaction history. In this way, data output from adaptive customization drives service ecologies.

V. Beyond Entertainment and Media

Given that all of the examples described come from the media and entertainment industry, it is worth asking if applications in other areas are likely to emerge. In a 2003 report, "Reinventing Customization," researchers from the Institute for the Future addressed this point:

"Entertainment media is a rich area for consumers to practice customization. Engaged consumers can experiment and learn in this environment, and they will eventually have opportunities to carry those experiences into other areas of their lives. Andrea Saveri, IFTF Research Director, states, "Entertainment is a safe place to experiment and develop these kinds of practices. Over the next 3-5 years we are going to see these kinds of practices trickling into other household activities--whether it is collective problem solving for a shopping or health ecology issue, or a work place related issue." (Spalding, p. 12)

Consumer interaction histories are only one of many technologies companies have available to gather detailed information on consumers (Ibid, p. 17).

However, many of these other technologies, such as RFID tagging and biometrics, have associated privacy concerns that make them riskier propositions in the short term. Consumer readable and shareable datastreams have more manageable privacy implications, because since the consumer and the company both have the information, it is easier to design for transparency. For example, Amazon recommendations include a link that tells customers why the recommendation has been made, and providing a way to tell Amazon to disregard a particular datapoint. This feature increases consumer trust. If practices like these are followed, along with clear communication about what is being recorded, who has access to the data and how the user can control access, it should be possible to reduce the risk associated with building an interaction history.

VI. Evaluating Potential Applications

What are the success factors for a business that leverages customers' activity histories, and when should datastream visibility and openness be designed into an information product? We propose the following heuristics:

- Among the data that the product can collect, there should be a datastream that is interesting to the user, from a self-knowledge or diagnostic standpoint.
- The datastream should be collectible without any effort by the user, although the user should have the option to add detail to it if he or she is so inclined.
- The datastream should be of assistance in predicting future behaviors, interests or preferences.
- The datastream should provide useful input for decision making, either by user personally or by his or her organization.
- Privacy concerns that apply to this datastream should be able to accommodated through design.

The following table lists some ideas for services along these lines.

Datastreams from…	**Could feed a system that informs…**
In-car navigation systems	Home or business location selection
Credit card statements	Home budgeting
Utility metering	Energy savings
Personal calendar	Fitness program design / management

Product design will continue to be important to the development of services like these, because the capacity to collect activity histories has to be built into information appliances and in some cases, into the environments where they operate.

Whatever services are developed, we believe it is important to emphasize user control in all data transactions. Enterprises may have the capacity to recognize

trends and patterns in user data, but it should be up to users themselves to determine which analyses and applications of the data are worthwhile. Users may choose to derive knowledge from their data within a private, protected framework, or aggregate it with data from others, in cases where some larger objective can be accomplished.

In all cases, it will be important for the provider of the new service to explain the value proposition clearly when asking the user to upload his or her interaction history data. The user must understand not only the service he or she will get, but also the rules regarding how the service provider can use his or her data. Looking ahead, it seems clear that privacy protection and transparency in data processing are essential to both viable business models and the establishment of user trust in this service category.

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