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Introduction

In any industry, the customer or user experience is a key element in customer satisfaction, and thus long-term business success. This experience can encompass a variety of dimensions: usability, performance, aesthetics, emotion, color, scent, balance, and even brand. For purely digital services and for intelligent digital products, elements of this experience—e.g., how quickly search results are delivered, the quality of streaming video, the responsiveness of online games—are typically impacted by the user interface and endpoint device, e.g., smartphone, tablet, digital kiosk, wearable, smart vehicle, or connected refrigerator; the quality of the back-end infrastructure, which generally requires the cloud; and the connectivity between the two.
Why worry about user experience?

User experience, including richness, relevance, and responsiveness of interactions, ties to numerous traditional financial and business metrics. Revenue and profitability are obvious ones, but there are more granular metrics than these. After all, revenue depends on price, quantity, and number of customers. Companies can charge a premium for higher quality products, where “quality” is partly defined by user experience. Customers are likely to buy more units of a product or service that they enjoy using and that delivers value. More customers will buy a product that offers an excellent experience, and fewer are likely to defect to the competition. Profitability is then enhanced through reduced churn and thus lower acquisition and retention costs coupled with higher total lifetime customer value.
A number of studies have shown the correlation between user experience and revenue. For example, A/B testing at a major search and advertising provider showed that search query response web pages that took a half second longer to load resulted in a 20% decline in click-throughs and thus a 20% decline in revenue. Results at a comparison shopping site showed that speeding page load times by a few seconds resulted in a twelve percent increase in revenues. There are several reasons for this. When pages take too long to load, website visitors go elsewhere. When they load faster, not only do shoppers tend to remain on site, they can view more pages in a given amount of time, making it more likely that they can find what they are looking for and hit “buy.” These principles are even more important for mobile users, who are more likely to be “snacking” than “surfing” and may abandon an uncompleted effort.

It’s important to recognize that “users” denotes not only customers, but also employees, partners, and other stakeholders. Employee satisfaction and labor productivity of knowledge workers is intimately linked to the responsiveness of applications and their ease of use: an application that runs 10% slower may require 10% more employees to staff. Similarly, business development initiatives, channel development, or market development with partners can be impacted by experiences such as lead registration or ability to access collateral.
User experience and the cloud

The cloud has a complex impact on user experience. Because cloud services are, by definition, remote from users, network latency is introduced as well as the potential for poor or no connectivity, which could reduce responsiveness of applications, negatively impacting the experience. However, even though devices continue to grow exponentially more powerful, so do customer expectations, and certain features will always need to reside in the cloud due to cost, performance, scalability and elasticity, or functionality reasons. For example, collaboration and multi-point video conferencing are inherently cloud-centric rather than device-centric. So are massively multiplayer online games. Massive databases, such as for web search and customer relationship management, either need to be maintained centrally, or at least have updates distributed centrally. Consequently, strategists, architects, and developers must learn to leverage the cloud to their benefit.
User experience elements and the cloud

Both functionality and performance typically depend on the cloud.

Core Features: Purely digital services—such as search, online gaming, and commerce—are delivered from the cloud. The quality of basic features and functions is thus closely tied to the cloud. Today, physical products often are inextricably linked to cloud-based services. As an example, eReaders acquire their content from the cloud; audio and video players usually do as well.

Enhanced Features: The cloud can help enhance functionality and performance. For example, upgrades and patches are downloaded from the cloud, usage is authorized, and a variety of machine learning, artificial intelligence, monitoring and data collection, and recommendations are provided by the cloud.

Richness: User experience designers must balance conflicting considerations such as aesthetics, simplicity, bandwidth and form factor vs. breadth of functionality. Rich graphics—video, images, animation, and layers—are expected today. 1080p HD is just the start: 4K “Ultra” HD is rapidly gaining traction, and some companies are working on the next wave of video with two to four times greater resolution still.
Then consider additional demands: 2D to 3D; 30 frame per second to higher refresh rates, multiple screens, and eventually bandwidth and processing-intensive “electro-holographic” displays. Such capabilities generally require cloud functionality such as content delivery / edge caching.
**Relevance:** In addition to technical performance factors, user experience is also dependent on the relevance of the interaction and relationship. An ad for heart medication might be spam, or might be a life saver for someone just diagnosed with high blood pressure. Generally, relevance requires personalization, contextualization, and location, since needs and interests differ by individual, and even a given individual’s needs shift based on where they are, the time of day, what they are doing, and which device they are using. Maximizing relevance requires enormous data sets, near-infinite processing power, and real-time information. Cloud-based services can incorporate location-based information, and the processing power of the cloud can be used to generate experiences aligned with nuanced insights into personal preferences.

**Responsiveness:** Interactivity is a hallmark of today’s intelligent products and virtual interfaces, and thus improved load times for web pages and responsiveness are important and revenue-impacting. Some techniques, such as front-end optimization, i.e., streamlining web pages, have little to do with the cloud per se, instead often relying on principles such as avoiding browser resizing of images, instead sending a correctly sized image directly from the web server. However, many elements of responsiveness do require cloud functionality. For example, reducing network latency by delivering static and dynamic content from the “edge”—i.e., close to the end user—requires a global network of high performance data centers.
Responsiveness: Latency reduction through global dispersion
Ease of Use: Ease of use is tied to responsiveness. A number of functions that we take for granted, such as autocomplete, spell checking, and autocorrect are based on cloud services but they must be near real time to be effective. More subtly, helping users achieve their goals effectively is an element of ease of use. A navigation system that helps a driver avoid congestion offers a quality user experience, but requires current information delivered via the cloud to create this value.

Scalability and Elasticity: Server-side processing performance relies on the quality of the cloud resources and infrastructure. It also depends on rapid elasticity; sudden spikes in demand can overload inelastic cloud resources, slowing responsiveness and negatively impacting the user experience.

Security: Security and privacy are also important dimensions of user experience, or, to put it another way, breaches and loss of trust can create a terrible user experience. Cloud capabilities such as directory services, identity and access management, policy management, and device management are thus necessary for a quality user experience.

Availability: Servers fail, and data centers have outages. The key is for such events to be transparent to end-users. This requires a robust and resilient infrastructure, applications written to benefit from this infrastructure, and the development and management frameworks and tools to enable the applications to run resiliently.
Process touchpoints and the cloud

A customer’s total experience with a firm and its products and services includes not just those products and services, but the touchpoints, or “moments of truth,” when the customer interfaces with the firm across multiple processes, such as learning about the product, purchasing it, acquiring it, configuring it, using it, getting help and support, billing and payments, etc. Some of these lie largely outside of the realm of technology. But many touchpoints have become tied to information technology and thus the cloud. Bills used to be paper-based, and are now online. Configuration used to be via dials, and is now based on intelligent algorithms that assess your behaviors in light of thousands or millions of other customers. Support used to be via a printed manual or call center, now it’s via virtual assistants over the web or via help buttons built into the device enabling video chat and remote device access.
Summary

In summary, user experience is an important component of customer satisfaction and thus company revenue and profitability. Today’s digital products and services can and must compete at least in part on user experience, and cloud computing is an important component in assuring that the user experience is the best that it can be.
Joe Weinman is the author of *Cloudonomics: The Business Value of Cloud Computing*, and the forthcoming book *Digital Disciplines*, which explores four business strategies to exploit emerging digital technologies such as cloud computing. He has held a variety of executive management positions at organizations such as Bell Labs, AT&T, and HP. He has been awarded 20 patents in various information and communication technologies.