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# Who's in charge here?

In the world of digital convergence, it's the end user

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Electronics



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# Who's in charge here?

In the world of digital convergence, it's the end user

*For decades, the consumer has been the beneficiary of many technologies originally vetted in the enterprise marketplace. But the tide has turned. In today's emerging world of digital convergence, the consumer marketplace often serves as the proving ground for innovations that eventually end up in the workplace. We believe that it is now individuals – not businesses – that ultimately determine which innovations succeed.*

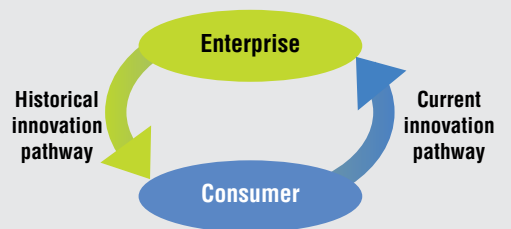
## Introduction

Since the advent of information technology, the typical flow of innovation has been from the enterprise to the consumer. Corporate mainframes, databases and word processing applications paved the way for PCs and personal productivity software. Routers and hubs that were used to connect office workers eventually emerged in home networks, providing wireless connectivity throughout the house and down the street. Computer security and backup solutions pioneered in business settings are now available to consumers as well.

But as digital content and Internet protocol (IP) networks have become more accessible and affordable to the public, technology-inspired innovation has now started flowing in the opposite direction, proving its worth with consumers first (see Figure 1). Enthusiasm in the consumer space regularly carries over into enterprise buying decisions.

FIGURE 1.

**Innovation is now flowing in a different direction – from the consumer to the enterprise market.**



Source: IBM Institute for Business Value analysis.

Instant messaging (IM) is a prime example. Just a few years ago, IM was an entertaining teenage pastime; but now, it's a critical business communication tool with usage that often rivals e-mail and phones. Here at IBM, for example, employees send approximately 4 million instant messages a day.

The stories evolving around social networking and wikis are even more spectacular. Thirty percent of the entire South Korean population uses at least one personal home page service, and during May 2006, nearly 30 percent of all Internet users in the United States accessed a MySpace page.<sup>1</sup> Perhaps more interesting, over half of the people visiting MySpace pages are over the age of 35.<sup>2</sup> Wikipedia – the popular, publicly maintained encyclopedia – has over 2 million articles that have been created or refined by some 350,000 contributors.<sup>3</sup>

People are obviously eager to collaborate and create on a massive, worldwide scale. And progressive businesses are riding that wave of enthusiasm. They are adopting similar tools to tackle one of their thorniest challenges: knowledge management. How do you get employees to contribute insights? How do you maintain and disseminate that knowledge so that people trust and use it? Businesses are finding that, when equipped with familiar tools, employees naturally group themselves into strong communities of interest, where they are intrinsically motivated to collaborate and create. The resulting content is often far superior to what is collected through traditional, centralized knowledge management efforts.

Examples like these signal a change in direction – one we should not underestimate. Just as the PC put computing power in the hands of the consumer, today's pervasive digital infrastructure is enabling people to collaborate and create as never before. In the words of media mogul, Rupert Murdoch: "Power is moving away from the old elite" into the hands of "a new generation of media consumers."<sup>4</sup> As we move into the era of digital convergence, we believe it is now individuals – not businesses – that dictate the fate of new products, services and markets.

But simply acknowledging this trend will not be enough. Solution providers must *act* on this insight. It will affect not only the types of solutions offered, but also their fundamental design. Based on extensive digital convergence analysis, we have identified a confluence of factors that are critical to the end-user experience. We're sharing this research and experience in hopes that it can help us all better satisfy the individual who is really in charge.

# Who's in charge here?

*In the world of digital convergence, it's the end user*

**As content becomes more digital, and networks more connected, a digital fabric is blanketing the world in which we live.**

## What is facilitating this change of direction?

The content related to people's everyday communications, business transactions and entertainment is steadily becoming more digital. At the same time, as networks around the world adopt Internet protocol (IP) standards, it is creating a universal network of sorts, where wireless, broadband and even plant floor networks are all interconnected. Together, pervasive digital content and interconnected IP networks have woven a *digital fabric* that is changing how the world works.

Today, information sharing can happen in realtime. Take something as simple as sharing a vacation report. Instead of mailing a canned picture postcard – which usually arrives a week after returning home – a traveler can take a real-life photo with her mobile phone, add a comment and send it to her blog, allowing friends and family to follow along with her experiences as they happen.

This digital fabric also makes it easier to combine content from various sources and share information among many stakeholders.

For example, when a surgeon is examining a patient and discussing a potential operation, he can access x-rays taken earlier at the urgent care facility and view the patient's past medical history online. If surgery is indicated, the physician can schedule the anesthesiologist and operating facilities and file an insurance reimbursement request – all before he leaves the room.

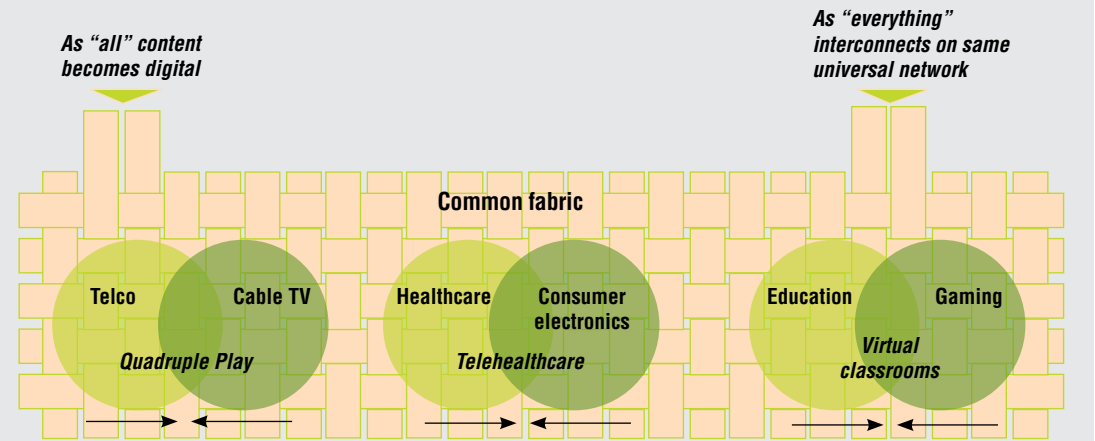
Already, virtual worlds are approximating their physical counterparts, improving people's ability to collaborate remotely. Using an application called Second Life, my IBM colleagues from different parts of the world can all "walk" into the same meeting room, watch presentations together, draw on the board and even "pin" flip charts to the walls. It's not the same as face-to-face encounters, but it's close.

## Growth found in areas of digital convergence

This ubiquitous digital fabric is bringing together complementary industries to create new kinds of value. When we use the phrase *digital convergence* in this paper, we are referring to these emerging industry overlaps (see Figure 2).

FIGURE 2.

**Digital convergence occurs as a common digital fabric brings complementary industries together.**



Source: IBM Institute for Business Value analysis.

### How serious can online games be?

On its own, online gaming is a fast-growing industry with more than US\$2 billion in subscription revenue worldwide as of 2005, and nearly US\$7 billion expected by 2011.<sup>5</sup> However, the industry's impact is spreading even further as it merges with other functions and industries beyond entertainment.

Convergence with education is producing virtual classrooms, while, with business, it is prompting virtual meeting rooms. The intersection of online games with retail and real estate is leading to virtual worlds complete with stores and neighborhoods where virtual goods and property are bought and sold with real money.

These areas of digital convergence are also attracting a different kind of user. Though traditional online gamers are male teenagers, half of all users of Second Life (a virtual world application) are female, and its users' median age is 36.<sup>6</sup>

The telecommunications industry plays a unique dual role in digital convergence. As an industry, it is converging with the cable industry to create new markets for quadruple-play services bundles of fixed line phone, mobile phone, cable television and broadband. But its other role – as provider of the network – is enabling digital convergence in virtually every industry. The industry's once closed, proprietary voice infrastructure has now become "IP everywhere." And specialized telecom know-how is no longer required to deliver services over the network – most can be built with generally available IT skills present in almost any company.

By definition, digital convergence is diversification. It creates growth through new products in new markets. In fact, we believe digital convergence solutions create the greatest growth opportunities when they produce what we call *meta-value*. Meta-value involves combining

**Entirely new kinds of customer value are being created through digital convergence.**

solution elements – not just to create something greater than the sum of the parts – but to conceive something *totally different*.

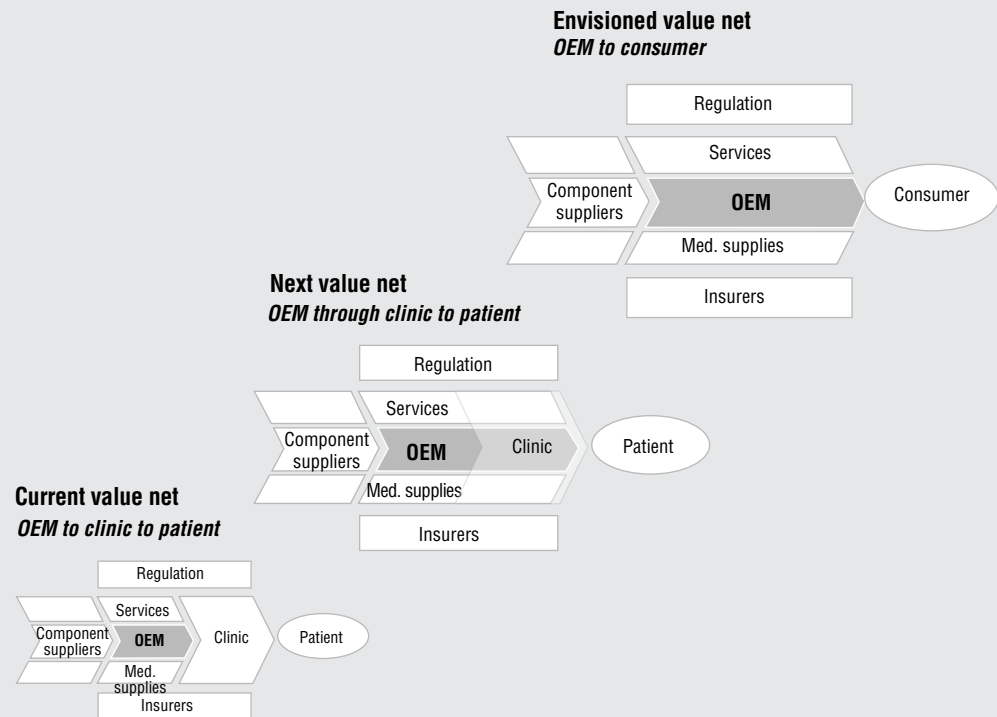
Telehealthcare offers a prime example of meta-value. It brings together the healthcare and consumer electronics industries to allow remote delivery of medical care – a new kind of value for the end user. In these scenarios, electronic devices monitor vital indicators, such as heart rate or glucose levels, and report them to medical facilities in another location.

Telehealthcare’s potential impact on society is huge: such solutions obviously benefit the millions of chronically ill patients in the world today – but, from a wellness perspective, they can also help keep billions more people healthy. As the world’s population ages,

telehealthcare could make it possible for the elderly to live independently much longer. Solutions are already being piloted today, and we expect to see widespread deployment over the next five years.

This area of convergence has strategic implications for healthcare device manufacturers, primarily related to the changing relationship between device makers and end consumers. For example, their value net is changing (see Figure 3). Today, manufacturers typically sell devices, services and supplies to *clinics* (for use with patients) – but one day they could be selling directly to *consumers*. This, in turn, introduces even more strategic considerations like the manufacturer’s brand image in the consumer space.

FIGURE 3.  
**The evolving value net of healthcare device manufacturers is moving closer to the patient/consumer.**



Source: IBM Institute for Business Value analysis.

## A benchmark for end-user experience

So if individuals are the ultimate arbiters, what do they expect from digital convergence solutions?

It's a defining question – one which will likely determine the success, or failure, of many digital convergence products and services, and the return, or not, on those investments. As a solution provider ourselves, we have spent a considerable amount of time and effort investigating this query. Through our research and the findings presented here, we hope to provide valuable – more importantly, reusable – insight about what people expect from a digital convergence user experience.

Most providers would agree that “user experience” is a moving target. Just think about how it has changed over the last few years (see Figure 4). One thing is clear: just because a particular technological solution is feasible and much hyped, that does not necessarily mean it's attractive to users. Consider the response to mobile phone TV in Germany: Although more than 78 percent of those over age 20 know about mobile phone TV, less than

11 percent are interested. Even among those under 20 years of age, 86 percent are aware of it, but only 38 percent indicate interest.<sup>7</sup>

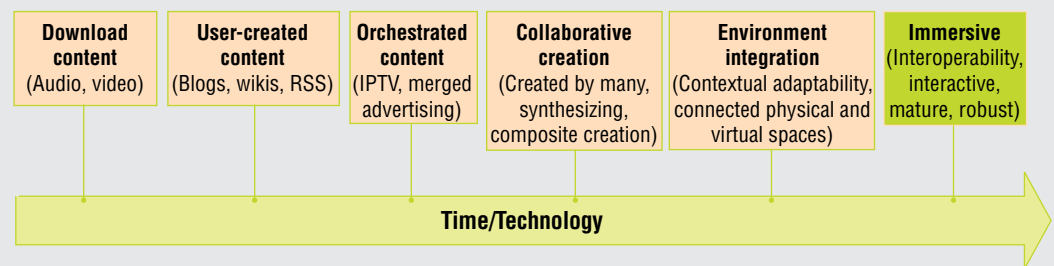
Our analysis suggests that several different dimensions conspire to create an engaging digital convergence experience. Individually, each is important. But the real step-change in user experiences emerges when they are all combined (see Figure 5).

It is important to note that each of these dimensions is predicated on the use of open standards. Standards are particularly beneficial to the end user because they facilitate rapid innovation among related service providers – and help users avoid being locked into a proprietary solution. In the world of digital convergence, creating more value for users means enabling them to easily combine and interconnect different components. The seven dimensions of user experience that sit on top of this foundation of standards include:

### **Natural human interfaces**

To make users more comfortable with the virtual world, it must look, sound, feel and respond like the physical one. This means extensive use of high-definition, three-dimen-

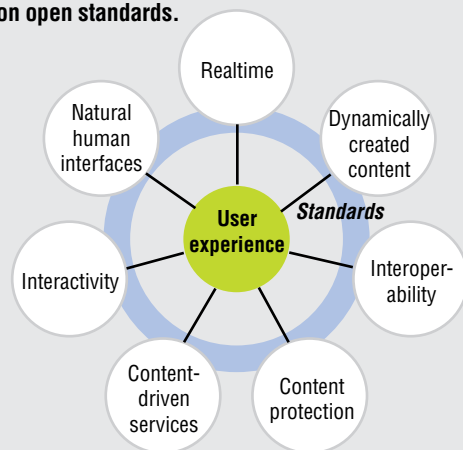
FIGURE 4.  
**Devices and user interfaces are steadily migrating to a far richer and more immersive experience.**



Source: IBM Institute for Business Value analysis.

**In a world where consumer-driven innovation is preeminent, understanding end-user experience is crucial.**

FIGURE 5.  
**The seven dimensions of user experience, all built on open standards.**



Source: IBM Institute for Business Value analysis.

sional graphics, sophisticated audio and sensors that detect movements and recognize facial expressions and gestures. Experiences must mimic the dynamics of the natural world: virtual bodies must move like human ones, virtual wind must have the same effect as a real breeze.

### **Realtime**

When users interact with the digital world, they expect realtime response. And that response often entails a host of behind-the-scenes events. For instance, when a Spaniard travels to China and makes a mobile phone call, billing information should flow among all the parties involved, in realtime, transparent to the caller. Account confirmation of roaming devices should happen instantly – without user involvement.

### **Dynamically created content**

Instead of simply relaying prearranged information, digital convergence solutions will need to combine different types of content from various sources in realtime as they are streaming the merged result to the user. For example, cable companies might insert personalized advertisements into television programming before delivering to a particular viewer. Those virtual ads that we now see on soccer fields when watching the World Cup could eventually be tailored for a specific individual. In healthcare, dynamically created content might merge realtime imagery from medical devices with static information and stored images from various databases.

### **Interoperability**

Device-dependent transformation of content has to be transparent to the end user; the same content experienced through different devices should basically be the same (except for size adjustments). If a user does not have access to a game console, he should still be able to play the game using a television with a remote control.

### **Invisible content protection**

To date, the focus in this area has been on protecting the rights of the content supplier; but to gain widespread acceptance, solutions must shift their focus to the end user. Solutions must be capable of protecting content created by end users, not just studios – and solutions must prioritize usability above protection. Basically, protection needs to cover all and be invisible.

### ***Content-driven services***

In digital convergence solutions, the contents of the content itself should influence how a service works. For example, when you are searching digital content, the search can not be limited to text that describes photos and audio files – it must be capable of looking “into” the content itself to spot words in the actual images and vocal recordings. Satisfying this experience element has profound implications for IT: Instead of network communication *transactions*, it requires network communication *sessions*. Phone calls over the Internet depend on transactions. With the way the Internet is built today, each piece of the communication session must be captured separately because no fixed connection between the parties exists – individual data packets are transmitted back and forth on constantly changing routes. An extra protocol – the session-initiated protocol – is required to solve this problem. This becomes an even greater constraint in a virtual environment. The static view offered by a series of individual data transmissions is simply not sufficient to convey the full experience. When you walk into a room in Second Life, for example, the status of other participants in the same room must be known, so that their movements can be shown. This sort of experience depends on network communications being *session-based*, not transaction-based.

### ***Interactivity***

Interaction among groups of end users is an important component of digital convergence solutions. Already, online social networks

are being used for collaboration, sales lead generation and routine social interaction. Although individual interaction is beneficial, it is the group itself that is perhaps most valuable. In his book, *The Wisdom of Crowds*, James Surowiecki highlights the surprising accuracy of large groups of independent decision makers.<sup>8</sup> This collective intelligence has led to several trends in the digital world, such as the host of reputation and trust systems which now recommend doctors, toys and books, and self-police online marketplaces. Group wisdom can also assist in finding, filtering and organizing information. For example, folksonomy is an emerging method for labeling Internet content that allows the actual users of the information – instead of just the authors – to collaboratively categorize and “tag” content, making extensive bodies of information much easier to search and navigate.

### **Are you swimming with – or against – the current?**

The pervasiveness of digital content and IP networks have created a worldwide digital fabric that is uniting businesses and individuals alike. Given this unifying force, it's not surprising that decades-old delineations between industries are disappearing. These points of digital convergence create tremendous potential for new products and services and entirely new markets.

The pursuit of these opportunities will likely require strategic change – different business designs for individual firms and new kinds of value nets. Simply put, digital convergence is a strategic business issue, not just a technical design one.

**Digital convergence  
– whether it appears  
as opportunity or threat  
– is a strategic issue that  
warrants the attention of  
business executives in  
virtually every industry.**

Here are some questions that can help your firm assess its readiness to capitalize on digital convergence opportunities:

- As a company, are you aware of all the content and interconnectivity available to you and your current value net?
- How likely would it be for your current strategic planning approach to reveal digital convergence opportunities and to identify roles you might play in other (new) value nets?
- Do you understand the industries you serve well enough to anticipate where digital convergence could impact each of them?
- Is your organizational structure so entrenched in current industry views that you might overlook convergence opportunities? Or does your silo structure inhibit your ability to deliver converged solutions?
- Do your solutions – current and planned – actually create *meta-value*?

- Even if your target customers are enterprises, are you observing and learning from the consumer space? Have you ever held a meeting in a “virtual world” like Second Life?
- How are you connecting with individual end users to drive innovation?

After years of being the passive recipient of corporate-driven innovation, individuals are now in control. Today’s digital fabric has made it possible – if not inevitable – for end users to influence not only which innovations succeed in the consumer market, but also in the enterprise space. By addressing the key dimensions of the end user experience, solution providers are acknowledging who is really in charge, and positioning their companies to capture the tremendous growth opportunity presented by digital convergence.

## About the author

Dr. Hagen Wenzek has worked in the business consulting field for over 11 years, focusing on the impact of technology on business strategy. As an Associate Partner within IBM Global Business Services, he has worked across various industries in consulting, business development and business strategy research roles. His primary focus has been the electronics industry, which was also the area of study for his PhD. He has published numerous articles on electronics industry strategies and tactics, lectured at the ETH Zurich, MIT Sloan and other universities and recently co-authored the Prentice Hall book "Irresistible! Markets, Models, and Meta-Value in Consumer Electronics." Hagen is currently a member of the Corporate Strategy organization at IBM Corporate Headquarters. He can be contacted at [wenzek@de.ibm.com](mailto:wenzek@de.ibm.com).

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This paper is based on a project that explored the fundamental aspects of Digital Convergence. Together with the author, the following individuals led that effort and have made significant contributions to this publication:

Neil Katz is a Distinguished Engineer responsible for emerging markets within IBM Sales and Distribution.

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Scott Winters is a Distinguished Engineer and Director of the Worldwide Solution Labs within the IBM Software Group.

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