By Donna L. Hoffman, Thomas P. Novak, and Alladi Venkatesh

HAS THE INTERNET BECOME INDISPENSABLE?

We seem to be in the midst of an Internet revolution and entering an era of enhanced digital connectivity. The pace of social change resulting from the diffusion of this technology, both in the U.S. and globally is, by many accounts, dramatic. In less than ten years, the Internet has become indispensable to many people in their daily lives. What are the consequences and implications of this perception? In this article, we consider the idea that the Internet is becoming increasingly essential to families and to society at large, present data supporting our contentions, and develop a conceptual model that allows for the testing of key hypotheses related to Internet indispensability.

As was empirically demonstrated in [3], "the adoption rate of the Internet has exceeded that of earlier mass communication technologies by several magnitudes," making it an "irreversible" innovation. Studies have also shown that for the generation of U.S.-based youth that grew up with the Internet, it is gradually displacing television as their main source of entertainment, communication, and education [6].

Here, we explore how the Internet has become indispensable to people in their daily lives and develop a conceptual model allowing us to address the associated research questions. The idea is that the Internet has become so embedded in the daily fabric of people's lives that they simply cannot live without it. How is the Internet indispensable and in what ways? For which groups of people is it indispensable, for what tasks, and how has

Illustration By Lisa Haney

this specifically changed their lives and society as a whole?

Internet Usage Trends in the U.S.

Table 1 summarizes the evolution in Internet user characteristics in the general U.S. population over time using data gathered from the Pew Internet and American Life Project [7]. The number of adult Americans using the Internet increased 50% from 2000 to 2003, reaching 126 million users in 2003. Most of this increase is accounted for by individuals 30 years and older, although younger users are still the most wired. The increase is recorded among both men and women equally; African-Americans show the highest increase during this period, although they still lag behind Caucasians and Hispanics.

Compared to the general population, college students are the heaviest Internet users. By 2002, 59% of all Americans had ever gone online, compared to 86% of all college students [5]. College students report that the Internet has become an integral part of their education and has actually enhanced their educational experience. It is used for managing all aspects of their academic and social life. The Internet is so pervasive in the lives of this generation it has become a natural extension of themselves; college social life has been fundamentally transformed by the Internet.

Longitudinal data gathered by one of the authors as part of the National Science Foundation-supported Projects NOAH and POINT at the Center for Research on Information Technology at the University of California at Irvine supports our contention that the Internet has become indispensable in contemporary social life.

	Year 2000	Year 2002	Year 2003
Number of U.S.-based adults online	86m		126m
Size of the online population on a typical day	52m		66m
Men users online	49%		65%
Women users online	44%		61%
Broadband connection			31%
Email use	78m		102m
Instant messaging	39m		52m
Educational use	47m		63m
Users by Race			
Caucasians		63%	64%
English-speaking Hispanics		61%	62%
African-Americans		45%	51%
Age Groups			
18–29	64%		67%
30–49	56%		67%
50–64	36%		59%
65 and over	12%		22%

Table 1. Characteristics of U.S.-based Internet users (drawn from [7]).

	Study 1 Year 2000	Study 2 Year 2003
Sample Size	**910** [a]	**1203**
Household Income		
15,000 or less	2.9%	3.0%
15,001 – 30,000	13.51%	9.32%
30,001 – 50,000	25.91%	14.8%
50,001 – 75,000	24.69%	21.3%
75,001 or more	33.01%	45.9%
Race [b]		
Caucasian	88.1%	84.66%
African-American	3.6%	4.9%
Hispanic	3.0%	3.5%
Asian	2.2%	4.56%
Other	1.5%	1.46%
Highest Education		
High School and Under	10.4%	7.6%
Bachelor's/Post High School	61.4%	56.0%
Postgraduate	28.3%	35.7%
Children in Household		
Yes	44.1%	42.4%
No	55.9%	57.6%
Computer Households with Internet Connection	77%	94%
Number of computers in use at home		
One	73%	50.3%
Two	20%	30.7%
Three computers	4.8%	11.7%
Four or more	2.5%	8.1%
(Mean number of computers per household)	(1.39)	(1.90)

[a] Number of households in sample.
[b] Race taken as the self-reported race of the head of the household.
* Center for Research on Information Technology, UC Irvine, www.crito.uci.edu.

Table 2. Characteristics of Internet households in 2000 and 2003 (drawn from projects NOAH and POINT*).

The study design included national probability samples of 906 and 1,200 American households for the years 2000 and 2003 respectively.[1] A demographic summary for the samples appears in Table 2.

In 2000, over three-quarters (77%) of computer-owning households in the sample reported having an Internet connection in the home; by 2003, this figure had jumped to 94%, supporting many other surveys suggesting the Internet has become ubiquitous. Both the 2000 and 2003 samples acknowledged the Internet to be a major source of communication and information.

Top in-home applications among regular computer users include email, games and hobbies, news and information, travel and vacation planning, online shopping, and health information seeking (see Figure 1). The biggest changes from 2000 to 2003 are in online banking (from 24% to 60%), online shopping (40% to 76%), gathering health information (46% to 76%) and travel/vacation planning. Many other uses of computers have developed in the past few years. For example, other salient applications in 2003 for which data was not available for 2000 are instant messaging, accessing government services, and participation in community activities, all via the Internet. These various developments all serve to indicate how the technology has become increasingly domesticated in the last few years.

Additional analyses (not presented) show that Internet users are increasingly satisfied with their online experiences. In 2000, slightly less than half (49%) of the users were satisfied with the ease of getting online; this rose to nearly three-quarters of all users (71%) by 2003. Users are also more satisfied with Internet

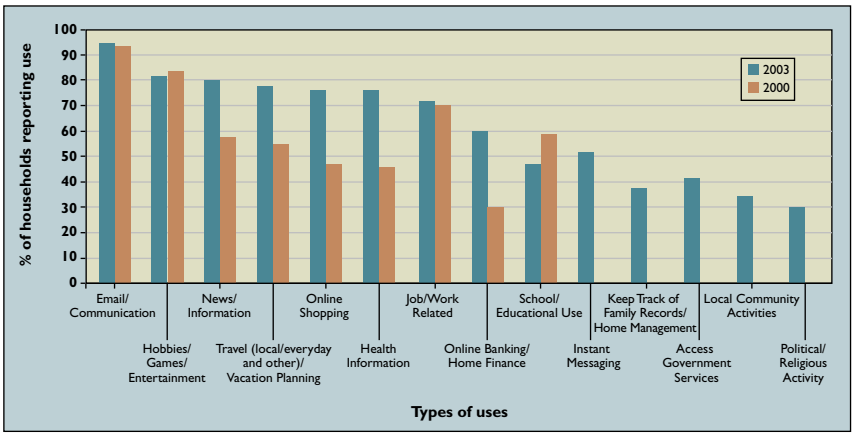
[1] A detailed description of the sampling frame and this data and the NOAH and POINT projects is available at www.critio.edu.

FOR THOSE FOR WHOM THE INTERNET IS A DAILY RITUAL, THE LACK OF INTERNET ACCESS WILL BE PERCEIVED AS A DISRUPTIVE EVENT.

	2003 Agree %	2000 Agree %	2003 Disagree %	2000 Disagree %
The computer has become part of the daily routine at home.	62	52	24	28
It would be difficult to imagine life without a computer at home.	50	44	30	42
The computer has saved time at home.	51	48	25	33
The computer is essential as any other household appliance.	51	39	29	41
The computer has changed the way we do things at home.	45	40	29	39
Households with a computer are run more efficiently than household without a computer.	22	15	46	59
Computers in the home take away from family interaction.	27	22	46	53
Computers have made it easier to organize family and social events.	34	NA	40	NA
I have more contact with friends and relatives now that I have email.	54	48	28	35
The computer has replaced the telephone as the major communication device in our home.	16	10	62	73
We watch less TV as a result of using the computer.	25	27	52	49
Computers are more useful in the office than in the home.	38	39	37	39
The computer has increased the amount of job-related work I do at home.	36	39	48	43
Computers are difficult to use.	12	16	72	59
Those who are not knowledgeable about computers are falling behind.	67	68	13	16
Computers give status to their owners.	11	14	68	65
The Internet helps me look for product information.	68	44	13	13
Having access to the Internet makes me feel much better informed.	53	43	21	21

Table 3. People's perceptions of computers and their impact on their lives (drawn from projects NOAH and POINT).

access speeds (32% in 2000 compared to 52% in 2003). Clearly, technological standards and quality are constantly improving and these technology improvements are having important, positive effects on satisfaction. Internet users' overall experiences increased in satisfaction from 64% to 76% from 2000 to 2003.



* Data for 2000 not available for the last five uses

Figure 1. Household Internet use: 2003 and 2000.

Table 3 addresses the impact of the computer on people's lives, as the computer has become virtually indistinguishable from the Internet for many people. The change from 2000 to 2003 in perceptions of computers can be interpreted, in part, as due to the increase in home Internet connectivity mentioned previously. From 2000 to 2003, more people reported that computers had become part of their daily routines (52% to 62%); facilitated increased contact with friends and relatives via email (48% to 54%); changed how they do things at home (40% to 45%); and replaced the telephone as the major communication device (10% to 16%). In somewhat broader terms, over this three-year period, more people reported that it would be to difficult imagine life at home without computers (44% to 50%), and that the computer is as essential as any other home-based technology (39% to 51%).

Taken as a whole, these results reveal important developments in Internet use. There have been changes in the inherent characteristics of the Internet that have caused Internet use to diffuse into new areas. The Internet continues to be an information and communication tool, but the types of information sought on the computer have expanded considerably. The Internet has also become a major home management tool and is now used extensively for online shopping and financial management. Cumulatively, the Internet is becoming indispensable to many daily activities.

What Does it Mean For Something to Be Indispensable?

The preceding results show that on many fronts, the Internet has made its mark on people's lives. But what does it mean for something to be indispensable? Notions similar to indispensability have been researched in consumer environments by various scholars who have used equivalent terms such as

"necessities," "essential products," or "products one cannot do without." Such indispensable products can be at one extreme very utilitarian and functional or at the other extreme very symbolic with great personal significance. Products of the opposite character—dispensable products—are deemed to be frivolous, unnecessary wasteful, hedonic luxuries, or products one can do without. The research questions in this area address consumer dispositions toward such products, the level of dependence, and the process by which products achieve the indispensability status.

We believe that something becomes indispensable if it becomes part of one's daily routine. Everyday tasks (examples include reading a newspaper, watching the news on television, checking email) often lead to ritualization of activities (for example, reading the morning paper, watching the evening news, checking one's email each day during breakfast).

This ritualization provides a sense of security and predictability. Ritualizing daily routines helps people cope with day-to-day stresses and strains. In the long run, familiar routines can even lead people to be more efficient and productive and feel more satisfied. For those for whom the Internet is a daily ritual, the lack of Internet access will be perceived as a disruptive event. Thus, it is important to note that the notion of guaranteed access is closely linked to indispensability.

Daily routines involve micro-level practices. Much of the Internet rhetoric includes grand schemes and major changes in the economy and society. While these are certainly worthy of attention, we believe the indispensability of the Internet arises not from such grand schemes but from micro-level practices. That is, it is the small things that people use the Internet for on an everyday basis that makes it so integral to people's lives.

Finally, it is well understood that some individuals are more technologically savvy than others—we consider them to possess the highest technological capital. Because they have the technological capital, they also have the social capital to go with it. The relationship between the technological knowledge of people and their social empowerment has been discussed widely in the literature [10]; the argument presented is that in a knowledge economy, knowledge becomes a critical as well as a controlling resource. The power knowledge bestows on individuals is translated into social capital. This explains why in the Internet age so much attention is paid to young people, including children, who seem to be on the forefront of technological developments with the potential to shape the future. The difference between these savvy individuals and those less savvy is one provocative way to define the digital divide. According to one estimate, the tech-savvy represent 30% of Internet users [11] and includes three subsegments: the technological sophisticates, highly educated high-socioeconomic status individuals, and college students. For these groups, the Internet is not only indispensable but a central component of their lives.

A Conceptual Model of Indispensability

We developed a conceptualization of Internet indispensability (see Figure 2) as a model to guide our investigation. This model provides a conceptual framework that allows us to address a series of important research questions, along with their individual, social, and policy consequences. We consider individual behavior to be constituted by a set of sociocultural, technological, and individual-psychological elements that operate on various levels. The sociocultural elements are generally considered to be at the macro level. The individual and psychological elements are at the micro level. Technology permeates all levels. The individual is simultaneously subject to all these forces. As we will describe, the outcome of user behavior in the Internet environment results in a series of "experienced dualities" [8], which lead to a transformation process that alters the self-identity of the individual. In this case, the

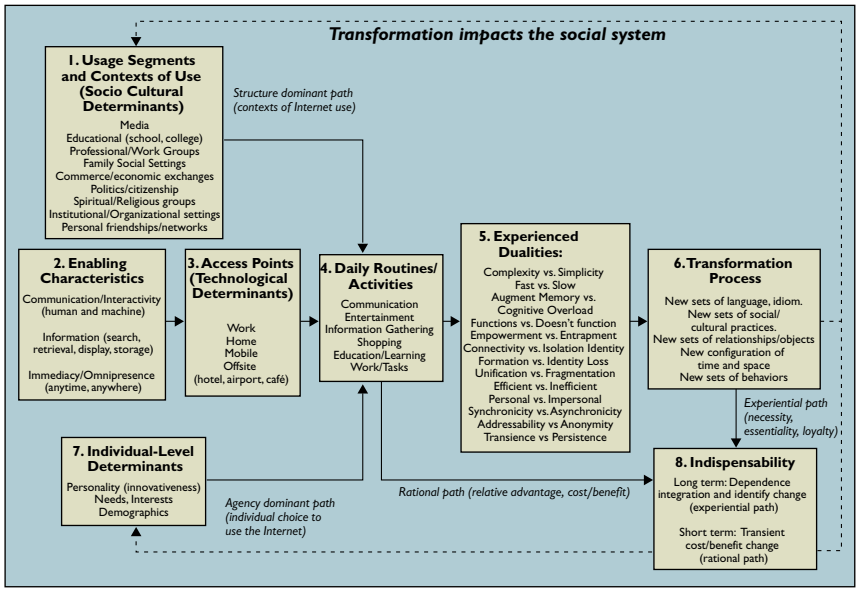


Figure 2. A conceptual model of Internet indispensability.

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nature of the change in self-identity is a conviction that the Internet is indispensable for the individual.

Conceptually, as Internet activities become part of the daily routine of individuals and social groups, the Internet becomes integrated into their lives. Formally, we state that the first set of conditions for Internet indispensability relates to its ubiquity in both sociocultural and technological contexts. We define ubiquity in terms of two major elements in the model—the different segments of the society using the Internet and the contexts of use (Figure 2, Box 1), and the access points for its use (Figure 2, Box 3). The underlying idea is that as more segments of the population use the Internet in different contexts (work, family, school), the greater its diffusion and potential impact. Similarly, the greater the number of access points to the Internet the greater its use and impact.

There are also a set of technology-related antecedents, inherent to the Internet medium itself (Figure 2, Box 2). These enabling characteristics—fundamental properties of the Internet environment—specify the power of the technology, its versatility, and its productive potential. The enabling characteristics define a computer-mediated environment that requires multiple access points to function optimally for its users. Thus, a related technological aspect is the prevalence of access points for the Internet (Figure 2, Box 3) which represents the ubiquity of the Internet, and directly impacts the nature of Internet users' daily routines and activities.

A third determinant of activities performed on the Internet is individual in nature (Figure 2, Box 7). This recognizes the fact that individual difference variables including personality characteristics, needs, and demographics are important determinants of online behavior. Together, these three categories of determinants impact the individual's daily routines and activities, affecting the way the individual uses the Internet in everyday activities (Figure 2, Box 4).

A critical intermediate consequence of our model is the nature of people's experiences as a result of their engaging in the daily routine of Internet use. We represent these experiences in terms of a set of dualities (Figure 2, Box 5). The dualities represent the limits of the Internet (positive and negative) and the general tension that the Internet creates among users [8]. A natural consequence of these experiences is the transformation process (Figure 2, Box 6) that Internet use imposes on the individual, society, and the economy.

Many of the activities individuals engage in online are the seeds for major transformational processes. In this way, the cumulative effects of micro-level phenomena can lead to social transformations on a major scale. This could include the formation of new practices and behaviors, new social relationships and transaction modes, new communication patterns and the like. Note that the overall impact of transformation will not be the same across all social groups and individuals.

Transformation means you have a new identity and sense of self. Consider email use as an example. Individuals typically start to use email for practical benefits, to communicate with friends, family, or co-workers. It is doubtful any new user would find such use immediately indispensable. As the user gains more competence, a number of dualities will be experienced. Email empowers the individual providing a capability for instantaneous communication not previously available, but as the volume of incoming email begins to increase, and the pressure to keep up with email exchanges builds, a sense of entrapment often ensues. The user must work through this empowerment/entrapment duality, and alter his or her behavior or thinking in ways that permit a successful resolution. Much of this behavioral change involves the establishment of new rituals, in this case, daily rituals for managing one's email. We noted earlier that ritualization is an important component of indispensability. Successful change is a positive experience, engendering increased confidence, more self-assurance, competence, confidence, and mastery. Such users now feel they are in control of email, rather than email controlling them.

The key outcome of this transformation process is the indispensability of the Internet (Figure 2, Box 8). In our model, indispensability can arise through two different paths: experiential or rational. As noted, dualities (tensions or conflicts) are experienced as the individual uses the Internet to perform various activities. If the dualities introduced by the use of the Internet are successfully resolved, transformation results from the resolution of the conflicts that the Internet

presents. These transformations feed back in the model to impact both the individual as well as the larger social system. Indispensability is a key individual outcome. We call this "experiential" indispensability as it represents a long-term, persistent change in the individual's feeling and inherent belief system that the Internet has become indispensable.

Additionally, we theorize that the Internet can also become indispensable on a short-term, transient basis because it allows essential activities to be conducted with a favorable cost/benefit ratio. This type of indispensability, through a rational path, is much more easily shaken by the introduction of an innovation that better meets the individual's needs. It is the more traditional view of indispensability, and does not arise from a transformation process stimulated by the resolution of an experienced duality.

Finally, the tension between structure and agency [9] is central to the notion of how indispensability is played out; Internet indispensability relies on the role played by both structure (Figure 2, Box 1) and agency (Figure 2, Box 7) in determining the various activities that individuals engage in (Figure 2, Box 4).

The Consequences of Indispensability

Some of the broader issues in Internet development concern individual and social consequences of indispensability, and their larger implications to, for example, social welfare and policy issues. At the individual/social level, the issues include but are not limited to: altering perceptions of the space-time continuum, human communication and interactions at local and global levels, blurring the boundaries between the real and the virtual, the paradoxical nature of technologies, and both positive and negative psychological consequences.

Two important policy debates include the digital divide [4, 12] and the ongoing controversy over the impact of computers on education in our schools [2]. Research shows that the Internet has not touched all segments of society equally: the lower socioeconomic levels are among those least likely to enjoy access.

Further, digital divides occur not only between the poor and the rich, but across many other segments—urban versus rural and lower-income school districts versus higher-income school districts, for example. Federally mandated programs such as universal service and the e-rate program seek to redress these imbalances, but the efforts have been highly controversial [1]. Thus, while the Internet has indisputably become an essential part of everyday life—and indispensable in many ways—for many individuals in our society, Internet access remains elusive. What price will those individuals, and society, pay?

Additional issues that we expect will continue to gain in importance in the next decade concern privacy, protection, and security. The Internet's ubiquity has a dark side, as identity theft reports mount, offensive messages persist, and there is increasing concern over the potential impact of unfiltered information available to children. This tension between the Internet's enormous potential and user expectations is likely to remain as the pace of technology continues unchecked. The conceptual framework proposed here provides a foundation that will allow us to address these issues in depth. C

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