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# **Barriers to Digital Convergence**

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## Preface

This report attempts to portray the dynamics underlying the convergence of computing, communications, and content into their digital future. We are looking for the barriers – the problems and issues that are retarding this evolution. We hope that by seeking the barriers we can be part of the process of eliminating them, and thus enhance the convergence that holds so much promise for the future.

This project was initiated for two basic reasons. First, Kubota and Associates came up with an intriguing proposal for a multimedia creativity center as a solution to the problems inhibiting digital convergence. In a real-life version of the Jeopardy Game, we asked, “If a multimedia creativity center is the answer, what is the question?” So we set out to study the barriers to digital convergence and see which, if any, could be addressed by a multimedia creativity center.

The second reason stems from thinking we are undertaking to understand why traditional marketing-research methods have not been very effective when applied to radically new products. Our first review of the field indicated that the methods worked fine when applied in the proper context. This stands to reason since, if they didn’t work the methods would most likely not have been published. The mistakes came, we believe, from asking the wrong questions regarding radically new products. Anything radically new introduces at least one new dimension (perhaps many more) into a user’s mental map. How can a “user” properly judge the value or importance of attributes or alternatives when the frame of reference itself is changing? Christensen (1997) cites numerous examples of how good companies that listen carefully to their best customers and allocate resources aggressively still get blind-sided by radical innovations that ultimately usurp their markets. So we first took a step backward and tried to develop a more robust framework for planning for radically new products (cf. Cooper, 1998). The part of that process we use here is simply an extensive environmental analysis. What are the political, behavioral, economic, sociological, and technological contexts that surround the converging areas of computing, communications, and content? We believe that a broad understanding of the problems in a field is a necessary precursor to strategic insight. So again we were motivated to broadly study the barriers to digital convergence.

The product of this inquiry is organized into six sections. First we briefly address the issue of what is digital convergence. We then use four sections to report our findings from field interviews and the literature that we organize into broad areas of Legal and Political Issues, Technology Issues, the behavioral, economic, sociological issues are reorganized into sections on Supply-side Issues and Demand-side Issues. From this base we develop a strategy for reducing the barriers to digital convergence, and report the findings from our interviews that elaborate on this topic.

The many individuals who agreed to be interviewed aided our investigation. We want to thank in particular:

Gisselle Acevedo-Franco, Communications Director, MediaOne

Gray Ainsworth, Vice President, Technical Services, MGM Worldwide Distribution

Paul Berberian, President, Vstream

Richard Bernacchi, Senior Partner, Irell & Manella LLP

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Eve Coquillard, Partner, c2c Media

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Erica Gruen, President and CEO, The Food Network  
David L. Hankin, Vice President of Business Affairs, Sony Online Entertainment Inc.  
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NTT  
John Hughes, President, Rhythm & Hues Studios  
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Masahiro Igarashi, Senior Manager, Systems Services Department, Business Communications  
Headquarters, NTT  
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Guy Langvardt, Director, Entertainment, Media, & Sports, Compaq Computer Corporation  
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Roy V. Messineo, Client Manager, Jeskell, Inc. – IBM Business Partner  
Lloyd Pentecost, NtrActv  
Sebastian Olier, Deputy Trade Attaché, Audiovisual, French Trade Commission  
Noriyoshi Osumi, Ph.D., Senior Manager, Project Development, Multimedia Communications  
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Howard Rudzki, Kids Universe Toys and Software  
Joshua D.J. Sharfman, Chief Executive Officer, Digital Lava, Inc.  
Akira Shimaya, Ph.D., Manager and Senior Engineer, Video Communications Service Department,  
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Charles S. Swartz, Andersen Consulting LLP  
Professor Robert B. Trelease, Department of Pathology & Laboratory Sciences, UCLA School of  
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Sherman Tuan, COO & CEO, AboveNet Communications, Inc.  
Susan Worthman, Executive Director, MDG.org

We also wish to acknowledge the support from NTT and Kubota and Associates, and grants from Intel Corporation.

Digital convergence is a global issue. But following the modern management mandate to think global and act local, many of the implications of this investigation are considered from our point of view in the west side of Los Angeles. We sit physically close to the entertainment capital of the world, on the eastern rim of the Pacific Basin, in a major technology center, and 400 miles south of Silicon Valley. We try to think about what problems we can solve in isolation, which require physical proximity, and where digital proximity is needed.

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## What is Digital Convergence?

The technological, behavioral, and economic merging of computing, communications, and content as digitally driven industries or business ecosystems is what is called digital convergence. Digital convergence is an evolving reality, not a future pipe dream. It has been widely heralded and discussed by distinguished authors (c.f., Cairncross 1997, Greenberger 1990, 1992, 1994, Hoffman, Novak and Chatterjee 1995, Hoffman and Novak 1996, Tapscott 1996, Tapscott, Lowy, and Ticoll 1997, Yoffie 1997). It is a business reality for numerous firms whose future depends on partners they can not directly control – all being driven on by larger forces.

The forces driving digital convergence are also known. First, the amazing advances in computational capability forecasted by Moore's Law and made into reality by semiconductor manufacturers are the primary engine. Second, "network externalities" comprise the notion that the more end-users a network has the more valuable the network becomes to the users. Metcalf's Law, named after the founder of 3Com and father of Ethernet, states that the potential value of a network is proportional to the square of the number of connections (i.e., the potential value of  $N$  connections equals  $N^2$ ). Network externalities drive progress in transmission networks as well as the value of many digital products. The value of many software applications grows with increases in the installed base. While it is obviously true for application software such as word processors for documents that have to be shared, it is equally true for the groups of applications programmers facing the choice of around which operating system they do their development. And third is the tumbling of vertical companies. As pointed out by Grove (1996), Tapscott (1997) and others, the computer industry used to be organized with vertical companies. IBM supplied chips, CPUs, operating systems, applications software, sales, distribution, service, and training for mainframes. DEC did the same for minicomputers. Now industries are organized horizontally, with Intel, Motorola, and others doing chips; Compaq, Dell, Packard Bell, Hewlett-Packard, IBM, and others as Original Equipment Manufacturers (OEMs); Windows, OS/2, Mac, Unix, and others as operating systems, scores of independent software vendors (ISVs), value added resellers (VARs), retail channels, and the like. In this non-vertical, network structure, companies do what they do best and look for implicit or explicit strategic partners to build whole products for the end users. Into this structure it is much easier to piece components for computers, communications, and content, than it was when companies were expected to stand alone. A new kind of network externality is created across companies participating in the process of digital convergence.

Our focus is, as mentioned in the Preface, on the barriers to digital convergence. This is analogous to *gap analysis* in new-product development in which researchers develop a product perceptual map and look at the gaps as new-product opportunities. Our map is of a broad domain that cuts across the three converging mega-areas. The *gaps* we seek are the problems that are resisting or blocking the forces driving digital convergence. What we find is a litany of gaps. Many gaps are issues that require discussions among the stakeholders with both common and competitive interests – the setting of standards around which common goals can be achieved. Others require lobbying of governments for or against regulatory actions. Yet others will only be addressed through innovations and the application of those innovations to the revealed barriers. We end by outlining a strategy for an organization that supports focussed discussion of the issues, translates those issues into an agenda for innovation, aids participants to acquire the new skills and strategies needed to succeed in the new playing field, and helps incubate and shape those innovations to dissolve the barriers to digital convergence.



## Legal and Political Issues

### **Overview**

As digital convergence pushes media content into new, uncharted areas, the pattern of the established legal and regulatory practices will often be inappropriate. When these laws and standard practices were developed, media content was mostly physical, tangible works with distribution limited by geographic spread and physical burden. However, the advent of digital technology and Internet connectivity has dramatically changed the legal landscape. Information, including creative works, can be easily accessed, copied, and distributed. Furthermore, the rapid growth of various types of communications networks requires a reexamination of the traditional regulatory model for communications. The manner by which laws, practices, and regulation are adapted to the digital, wired age will strongly affect the adoption and growth of convergence areas.

### ***Breakdown of political and geographic borders***

One of the radical changes caused by advances in communications networks, such as the Internet, is the breakdown of political and geographic borders. Decreased communication costs and powerful connectivity has dramatically reduced the restrictions of distance and time. The ability to access remote regions worldwide while circumventing physical and administrative barriers has driven the globalization of markets. An information-based economy has emerged and will supplement the traditional industrial model.

The impact of globalization has numerous economic and social implications. Since providers of goods have access to larger markets, they can benefit from economies of scale in production, research, and service. These economies will in turn benefit the growth of markets by encouraging investment. Competition among nations can be greatly altered due to a new economic model. Countries lacking natural resources may still be able to compete in an information economy. Many Asian countries are investing heavily in technology and new media in response to this new opportunity. For example, Malaysia has funded a Multimedia Super Corridor to incubate technology firms or attract foreign companies to enter the Pacific Rim through a combination of infrastructure, business incentives, and access to a high-growth market. Such endeavors, greater connectivity, and technological progress have spawned growth in new media. An information-based economy may have unlimited growth potential because ideas are not scarce like physical materials.

In order to be successful in the global economy, companies will need the vision to see beyond physical, cultural, and language barriers. Unfamiliar markets will require new methods of acquiring and retaining customers. According to PricewaterhouseCoopers, successfully entering emerging markets requires those areas to have political stability, the availability of a skilled work force, and the availability of a telecommunications infrastructure, including reliable data and voice transmission and seamless global capability so that all users receive the same features.<sup>2</sup> An important social policy issue for global markets is the extent to which all nations and segments of society have access to and benefit from a global, information economy.

The digital economy has the potential for seamless global business – Bill Gate’s (1995) image of “friction-free capitalism.” Cooperation and integration among nations and numerous suppliers are critical to achieving that potential. Nations, regions, and even cities have different laws, practices,

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<sup>2</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse, p. 7.

and standards that could inhibit growth across borders. Also, companies must rely on others to provide compatible goods and spread enormous infrastructure investment costs. In order to ensure that different practices and objectives are channeled into a synthesized, efficient direction, stakeholders need to develop standards and provide an open-systems architecture. Also, according to Richard Bernacchi of Irell & Manella LLP, the personal agendas of different jurisdictions need to be managed.<sup>3</sup> New laws and procedures need to be established regarding trade, tax jurisdiction, enforcement, and other issues. For example, the World Trade Organization has supported free-trade practices. Since it is vital that the legal and regulatory environment be predictable in order to encourage private investment, it would be valuable to draft international policy papers to facilitate mutual agreement.

### ***International Logistics***

Globalization of markets due to growth and innovation in the communication, technology, information and entertainment industries has a profound effect on product logistics. Physical goods can be sold easier across borders. In addition, the distribution potential of intangible goods, such as creative works, will greatly exceed most people's expectations from only a few years ago. The ability to deliver in a timely manner is critical to success. According to the Organization for Economic Co-Operation and Development, on-line consumers recently reported that they value ease of delivery highest. 96% of those surveyed would buy again if delivery was timely.<sup>4</sup> Therefore, the ability to overcome international obstacles will determine global economic growth.

Distribution of physical goods is extremely costly, especially across international borders. Regulatory structure affects the ability of corporations to achieve logistical economies of scale. Governments can encourage global economic growth by enacting non-restrictive laws that spans different modes of distribution, including electronic. Governments should also limit their role in order to encourage the private development of an open standard.

An important trade hurdle for distributors is the multitude of customs and administrative fees. Often, these fees are required for multiple steps along the supply chain, adding time and administrative hassle to the distribution process. A potential solution is to consolidate the collection of fees. Merchants can be required to obtain all fees up front, acting a single collection interface and pre-clearer of shipments. Also, paperwork could be filed electronically to speed the process. The thresholds of tax-free and duty-free shipments can be expanded to minimize delays and costs to low-value shipments. Alternatively, responsibility for the collection of taxes and duties for low-value shipments can be placed on private industry, enabling a new network of facilitating firms to emerge. These issues become much more complicated when dealing with intangible goods, such as digital media. Tracking of trade is extremely difficult, yet may be less necessary because of the lack of externalities due to trade. Governments can handle the difficulty by either eliminating custom fees on intangible goods or requiring either suppliers or intermediaries to execute administrative tasks.

### ***Commercial Codes***

The application of existing commercial codes to the digital economy will result in business impediments and conflicts. In addition to problems with digital goods, the emergence of global markets will expose those trying to conduct business internationally to inconsistent commercial

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<sup>3</sup> Richard Bernacchi, Irell & Manella LLP, Interview, August 7, 1998.

<sup>4</sup> "Dismantling the Barriers to Global Economic Commerce," Organization for Economic Co-Operation and Development, p. 23.

codes. Responsibility for various transactions in a global, electronic economy must be established, whether it be with consumers, suppliers, or some form of intermediaries. In order to reduce complications involving commercial transactions, the laws and practices of individual countries, regions, and cities must be meshed into an international, unified commercial-code framework.

One area of commercial codes that needs to be integrated involves contracting and administration. The manner in which contracts are formed, validated, and enforced will need to adjust to electronic contracts. Relevant questions include what constitutes a contractual relationship in an electronic transaction, which jurisdictions have control over issues between parties, for example litigation, who ought to bear the burden of a transaction gone awry, and who should take responsibility for products that do not work or people who get injured.<sup>5</sup> Other commercial administrative filings must allow for electronic documentation. A critical enabler of both electronic, commercial contract and administration acceptance involves the recognition of electronic signatures as legally binding. Other rules that need to be coordinated include those regarding commercial pricing and communications, including advertising and direct marketing.<sup>6</sup>

## **Taxation**

The taxation of trade is another legal hurdle in moving to a digital economy. Tax legislators are increasingly concerned about how to electronic commerce relates to existing tax laws and requires the legislation of new ones. Currently, the volume of electronic commerce is too low to mandate sweeping tax changes. But “...(w)atching Internet commerce expand by an estimated 700% over the past five years, it’s easy to see why some of the 30,000 taxing jurisdictions in the U.S. might salivate over a potential new revenue gold mine.”<sup>7</sup> Once governments begin to lose revenues from more traditional sources, pressure for taxation will grow. Therefore, the objective will be how to best protect the tax revenue base without restricting the growth of electronic commerce. Until this point, little effort has been made to tax electronic commerce so as not to impede its growth or the development of the Internet.

According to Gary Ghaiey of The City of Los Angeles, digital media should not be constrained by taxation because it is extremely mobile, lucrative, and efficient while not generating any negative externalities such as pollution.<sup>8</sup> The only exception that Ghaiey states is if a lack of government involvement allows an environment where competition is restricted. It would also be very difficult to determine how much should be taxed. Since access and transaction fees are nearly non-existent, a different type of economic analysis would be required. The theoretical argument would be that the government restriction produces prices above what a purely competitive market would support. Some proportion of the increased rents should arguably be returned to the people through taxes on the entities acquiring those rents. Using a poor tax formulation, certain types of legislation that helps one group could easily make electronic commerce uneconomic for others. In addition, Richard Bernacchi of Irell and Manella LLP believes that since legislators interact with lobbyists, they are prone to receiving misrepresented information, resulting in an inaccurate understanding of the issues involved.<sup>9</sup>

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<sup>5</sup> Richard Bernacchi, Irell & Manella LLP, Interview, August 7, 1998.

<sup>6</sup> “Dismantling the Barriers to Global Economic Commerce,” Organization for Economic Co-Operation and Development, p. 21.

<sup>7</sup> Dow Jones Newswires -- September 8, 1998, “Internet Cos. Want U.S. Congress to Halt Internet Taxes.”

<sup>8</sup> Gary Ghaiey, City of Los Angeles, Interview, July 13, 1998.

<sup>9</sup> Richard Bernacchi, Irell & Manella LLP, Interview, August 7, 1998.

In addition to the economic effects of taxation, problems exist with the ability of governments to track and collect taxes in a digital economy. Concealed trade is made possible by cryptographic tools. In addition, governments will have difficulty establishing tax jurisdiction because physical location of transacting parties is no longer clearly defined in electronic commerce. Source and residence definitions could be constituted as the location of a transaction server or of a web site, as opposed to people or businesses. Also, a transaction could pass through multiple jurisdictions. Thus, a method of linking Internet identities with physical identities and IP addresses must be established. For taxes that depend upon the location of the supplier, such as value-added taxes, the tax burden may need to shift to the consumer. Another reason that establishing jurisdiction is crucial is the right of individuals not to be taxed by governments for which they do not possess representation. Cries against taxation without representation have rallied Americans since colonial times. Classification of taxes also needs to be addressed. Whether income is characterized as a product or a service, will affect jurisdiction.

Taxation tracking is mostly a state and national concern. Governments must consider when taxing electronic commerce that international competition has shifted to a more equal platform. By overtaxing electronic trade, a nation may expose itself to undercutting competition coming from nations with more liberal tax policies. Therefore, there is a possibility for nationalistic, protectionist policies to arise.

These issues will not be settled if countries individually address taxation policy. A common, standard framework for taxation across nations will be needed to facilitate international commerce. One way to encourage international cooperation is to suspend new tax initiatives to avoid increasing the differences among national policies. A valuable method for dealing with the taxation jurisdiction problem is the emergence of independent resources and tools. A jurisdiction-certification authority could be established to inform buyers and sellers of the appropriate taxation jurisdiction.<sup>10</sup> Also, private business can help by developing technological solutions for identification and administration.

### ***Role of the Government as an IT User***

The government is not only a third party to electronic transactions, it is also a user of information technology. Governments can provide the public access to public information including consumer, educational, and health-care information.<sup>11</sup> The cost of providing services will decrease with electronic distribution as long as cooperation and coordination of services can be achieved. Citizens also benefit by not having to deal with long lines or bureaucratic people and processes. Government services can also be enhanced by using electronic delivery to increase the speed of interaction, accountability, productivity, citizen involvement, and to reduce fraud. Government usage also can be an important signaler of confidence in electronic information systems through a demonstration effect.

### ***Encouraging Economic Development in Convergence***

Investment in the network of convergence industries increases with an attractive, or at least stable, economic outlook. A strong component of future expected returns to convergence investment is the support of federal, state, and local governments. At minimum, one should ask how could

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<sup>10</sup> "Dismantling the Barriers to Global Economic Commerce," Organization for Economic Co-Operation and Development, p. 19.

<sup>11</sup> Information Technology Outlook 1997, Organization for Economic Co-Operation and Development, p. 105.

governments avoid impeding economic development. New media and the related sectors and the public sector would mutually benefit from a climate conducive to the economic growth of convergence. Due to the increasing returns from an economic-network environment, it is important for governments to remove information-exchange barriers. The competitive model changes due to the reduction in distance and time. Restricting resources and information will threaten the economic prosperity of a nation, state, or city as others reap the benefits of free exchange. Therefore, governments should attempt to remove any walls that keep information and resources from leaving or entering their domain. Greater openness among nations, regions, and cities raises the issue of cooperation and integration. In the Los Angeles area, technology, entertainment, and communications companies are dispersed across a number of local municipalities. Also, these firms should have access to businesses in other regions, such as Silicon Valley, and other nations, such as in the Pacific Rim. Different bodies govern these areas, each with different governmental objectives and convergence-related incentives. Therefore, convergence industries need some uniformity in regulatory and tax treatment for new media to thrive. In the Los Angeles area, local municipalities must create a degree of commonality for consistent economic incentives.

Federal, state, and local legislation can encourage economic development. Local and state governments can facilitate regional growth through tax incentives and simplified administration, even, for example, in acquiring permits. In the Los Angeles area, the City of Los Angeles and its surrounding municipalities have taken important steps to encourage new-media development. Early acceptance and encouragement of new media by local government is vital because of the potential economic impact on the region. David L. Hankin of Sony Online Entertainment states that if new media converge with the television, film, and record industries, a significant portion of the economic base of the Los Angeles region will change.<sup>12</sup> Local government must realize that if the more mobile new media were to leave the region, the local economy would be severely harmed.

In response, local government has taken steps to help establish new media in the Los Angeles area. The Digital Coast Round Table and its individual initiatives are generated directly out of support by the City of Los Angeles and the Mayor's office. City Hall has also assigned personnel to be dedicated to the growth of new media. Gary Ghaiey was named the Director of Multimedia & Television Partnerships and Projects and five other people (a deputy mayor, an assistant deputy mayor, and economic development personnel) have been assigned to encourage the local prosperity of new media. According to Ghaiey, the city also passed the Multimedia Tax Reduction bill, reducing the industry's tax rate from one of the area's highest to the lowest possible by reclassifying the industry's outdated definition.<sup>13</sup>

At the federal level, immigration legislation affects the availability of the new media labor pool. Opposition to immigration by political parties, special-interest groups, and high-technology labor organizations, such as engineering organizations, squeezes the pool of skilled and talented people, particularly for digital artists. According to John Hughes of Rhythm and Hues Studios, new media companies are unable to access and retain foreign workers despite a shortage of domestic talent.<sup>14</sup> Acquiring talent depends on their ability to obtain a high-technology visa and subsequent permanent residency from the Immigration and Naturalization Service. A proposed senate bill would change the permanent-residency qualifications so that migrant workers that work for three months per year

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<sup>12</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>13</sup> Gary Ghaiey, City of Los Angeles, Interview, July 13, 1998.

<sup>14</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998.

for four consecutive years in the United States will be eligible for permanent residency. Regarding retaining talent, once someone obtains a high-technology visa, they can typically stay for six years, after which they must seek permanent residency.

### ***Law Enforcement***

While tracking activity in a global, electronic environment is made difficult and cooperation among nations becomes critical, similar issues arise in the area of law enforcement. Due to differences in national laws and practices and the potential for criminal activity across nations on the Internet, international cooperation should be sought to ensure legal and fair practices by individuals and businesses. International agreements are needed to determine issues such as enforcement jurisdiction based on the definition of criminal location origin. Legislation may also be needed to back self-regulation in areas such as child protection, personal privacy, and data protection.

### ***Establishing Low Cost Access to the Public***

The government will have some important decisions to make concerning their level of involvement in enabling the general public to access the information through media such as the Internet. Since the emergence of the Internet has created an explosion in the ability acquire and send information, those with access to such information media gain tremendous power, educationally and economically. The world has the potential to be separated into the “Internet have’s” and “Internet have-not’s.” Therefore, ensuring access to information by all groups of society will be an important issue for governments to consider. It is unclear whether private industry will have the funds or inclination to subsidize societal groups with less access. Larry Kubota of Kubota and Associates believes that India and some third-world countries will make great leaps forward through government subsidizing.<sup>15</sup>

An important requirement for government involvement in providing public access is the ability to do so at a low cost. If the cost of access is high, only advantaged societal groups will have the resources to obtain access. The issue manifests itself most in regions with great dichotomy of classes. For example, the United States has greater dichotomy than Japan, so initiatives need to be targeted to a range of classes. Governments around the world have taken important steps to reduce the cost of access through deregulation, particularly of the communications industry. In addition, open access facilities can benefit population groups. As a result, it is important for the location of such facilities to be chosen with the greatest overall public benefit in mind. Another public access initiative has occurred in New York City where the city government has provided electronically-wired kiosks to be used for public services. There are six monitors per kiosk which allow the public to avoid lines and government bureaucrats. These kiosks could contain information that replicates basic information found at libraries, such as a list of businesses within a square mile of the kiosk. The value of these kiosks increases with the geographic spread of a city or region. For that reason, the City of Los Angeles, which is very dispersed, would benefit greatly from this type of initiative.

Another area of government focus concerning public access is the school system. President Clinton has publicly declared his desire to see every school in the United States wired to the Internet. Many parties debate the merit of providing full access in schools. Some believe that schools should be a place to learn the fundamentals of social interaction. They claim that students should use software as

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<sup>15</sup> Larry Kubota, Kubota & Associates, Interview, July 10, 1998.

a presentation tool rather than educational software, which threatens to replace, rather than supplement, the learning process.

### **Consumer Protection Policies**

Digital convergence enables businesses to reach more consumers with a more personalized message at a lower cost per consumer. As companies become capable of serving markets anonymously from a distance, questions arise about the ability of consumers to defend themselves from unfair business practices. Efforts by governments to control transactions are generally regarded as detrimental to commerce. The Internet itself represents the ultimate in free market trade. However, the opportunity to exploit the public through electronic commerce still exists. One way to protect electronic consumers is to support industry self-regulation with a degree of governmental input with simple legal tools. In this liberal approach to e-trade, consumer-protection policies should not favor any one technology in order to allow the optimal standard to emerge privately. Regardless of the degree of involvement by the public sector, international cooperation by businesses and governments will still be necessary to provide complete and consistent protection policies.

Private industry has the potential to provide its own form of consumer protection. Pure competition among providers, including online services and Internet-service providers, will create a market in which the value-added service of consumer protection will be a competitive advantage. TRUSTe provides Trustmarks™ that differentiate websites that allow no exchange of personal information, only one-to-one exchange, or third party exchange of personal information. The Platform for Privacy Preferences (P3) is another industry effort to confront the privacy issues and the standards that might address consumers' concerns (cf. Dyson 1997, 202ff). According to the Organization for Economic Co-Operation and Development, private financial intermediaries could also arbitrate disputes between parties and have the power to reverse transaction charges<sup>16</sup>.

Privacy legislation is one area that simplified government regulation may be necessary. The Internet offers tremendous opportunities for personalized marketing. Companies can gather information about their customers' tastes, preferences, and even personal lives and change their product positioning or offering to match. Many firms exist for the purpose of creating and selling large databases of the public's tastes. Companies can store text information about consumers' Internet movements in hidden locations on their computer known as cookies. The public must decide how much privacy they are willing to trade for increased personalization. The government may need to help clarify that decision for them. Other areas in which government standards could supplement private practice include truth and fairness in advertising, labeling and other disclosure agreements such as warranties, guarantees, product standards and specifications, refund mechanisms, and merchant qualification.<sup>17</sup> It is more difficult to apply redress mechanisms to intangible exchanges, such as new-media products, because they can be consumed upon download. Standards and procedures that protect both parties will be necessary for these types of goods.

Governments could help consumers protect themselves through public education. Educational electronic-mail messages could be sent to consumer in order to explain to them their rights. Consumers could also be notified of the proper jurisdiction, whether private or public, for handling

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<sup>16</sup> "Dismantling the Barriers to Global Economic Commerce," Organization for Economic Co-Operation and Development, p. 15.

<sup>17</sup> "Dismantling the Barriers to Global Economic Commerce," Organization for Economic Co-Operation and Development, p. 14.

disputes. Another consumer protection area that the government is likely to monitor is communication with children by businesses. As today's children are more adept at exploring online, they are targets for direct sales, or even fraud, for which they are clearly unable to protect themselves. Some rules already exist regarding how companies can interact with children online. Andy Rifkin of Mattel Media states that toy and game companies cannot create any Internet activity that can be construed as trying to sell product.<sup>18</sup> In an effort not to violate children's rights, they conduct product research through focus groups instead of online questionnaires.

## **Security**

Similarly to the consumer protection issues, security of transactions must be effective and well accepted by the public and businesses. If an environment cannot exist, where active participation is expected to be stable and protected, online convergence activities such as electronic transactions will fail. A critical success factor to achieving secure transactions is the establishment of common procedures across systems and service providers. Familiarity and simplicity can be achieved by establishing standards. Private industry has the ability and incentive to provide its own security. Intel is beginning to build security primitives into hardware platforms to accelerate this process.<sup>19</sup> Competing services, vying for business by offering the most effective systems, will be motivated to develop systems with a range of security levels depending on user needs and willingness to pay. Security services can generate a competitive advantage by personalizing their security packages to the user.

Security initiatives will be greatly enhanced by the development of advance cryptography. This type of software code allows the transmission of data between parties, access to stored information by approved parties while preventing access to outsiders. Also, cryptography can verify the authenticity of an information source. Security tools like electronic signatures will be valuable to verify authorized users. According to the Organization for Economic Co-Operation and Development, security levels can also be verified by conducting periodic security audits.<sup>20</sup> Other security breaches such as fraud can be detected using datamining programs to detect unusual transaction patterns. One danger of establishing security systems is that access tools, such as passwords, will be lost. Security provider should offer a type of "spare key" backup system in the event that there is a problem with the primary access tool. Additionally, governments have sought to restrict many types of cryptography so that they are still able to track communications. Only very recently has the U.S. government moved to drop the requirement that it be given "spare keys" for certain levels of exported encryption software.<sup>21</sup>

Public education will play a critical role in creating a secure online environment. While competitive markets will drive security-provider development, the public must be instilled with a sense of value for security and educated on the various system offerings. Also, businesses should be encouraged to help foster ethical business practices among their employees and partners.

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<sup>18</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

<sup>19</sup> Intel Developers Forum, September, 1998.

<sup>20</sup> "Dismantling the Barriers to Global Economic Commerce," Organization for Economic Co-Operation and Development, p. 10.

<sup>21</sup> Wall Street Journal, September 17, 1998.



## **Regulation**

The Internet and digital convergence are transforming the global economy into one based on information exchange. As more users gain access to information networks and growth opportunities emerge, it is important to consider the role of government in guiding Internet development. Governments will need to determine to what extent will they be involved in the planning and operating of the Internet. Until now, governments have tried to minimize Internet regulation to give it a chance to grow. Richard Bernacchi of Irell & Manella LLP believes that they are likely to become more involved as the Internet grows. Once extensive electronic commerce emerges, the government will seek to address issues, such as fraud or online gambling.<sup>22</sup>

Regulation of communications networks will strongly affect the growth of digital convergence. The objective of government regulation has shifted from price setting to maximizing competition among communications providers. Governments have realized the need to encourage infrastructure development and the value of the industry to economies. In 1997, the World Trade Organization member countries, representing over ninety percent of international telecommunications markets, agreed to open communications markets to competition.<sup>23</sup> The Telecommunications Act of 1996 in the United States, representing thirty percent of global telecommunications markets, opened restrictions on competition across communications sectors.

While the expectations of rapid, enormous change were overestimated, the effect of deregulation has been to open up communications markets to competition. Consumers have benefited by rapid growth in the number of local access types, including cable, telephony, utilities, satellite, and cellular. Communication firms compete in each other's segments, enabling new service to be provided. As a result, consumers can "one-stop shop" for communications by acquiring multiple services from a single provider. Communications providers will need to be more flexible and responsive to customer needs to compete. Also, competition will compel expansion into new geographic markets, which will offer economies of scale and benefit underdeveloped regions by providing the infrastructure for growth. Entrance into new markets and segments will require new skills and will often motivate new mergers and alliances. New competition will lower communications access prices. PricewaterhouseCoopers suggests that price connections may become equal, regardless of distance, much like the current Internet model.<sup>24</sup> Flat-rate pricing may become more common in order to bring down unit costs by maximizing traffic over communications systems.

Infrastructure capacity development, network convergence, and low-cost, local-loop access are critical to enabling digital-convergence applications.<sup>25</sup> These applications require high-speed, high-bandwidth information transfers. Therefore, competition among communications providers will enable infrastructure development and, consequently, digital convergence. Making networks more compatible, which would allow data to be transmitted across more paths, can also expand the network capacity. Competition among local communications providers will also facilitate convergence by lowering prices and increasing transmission speed. A reduction in local-loop tariffs, which comprises sixty percent of the cost of an Internet call, would greatly reduce pricing. Any

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<sup>22</sup> Richard Bernacchi, Irell & Manella LLP, Interview, August 7, 1998.

<sup>23</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>24</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>25</sup> "Dismantling the Barriers to Global Economic Commerce," Organization for Economic Co-Operation and Development, p. 6.

efforts to increase competition among local providers must overcome the barriers to entry created by already installed lines.

The emergence of new distribution formats, such as digital television, raises the importance of regulation among communications providers and distribution rights for telephone, broadcast, and satellite markets. The Federal Communications Commission (FCC) has allocated to broadcasters an additional six megahertz of spectrum for over-the-air broadcasting and free licenses to provide digital television.<sup>26</sup> Thus, U.S. television stations can broadcast programs in both digital and analog formats until acceptance and scale emerge for digital programming. At that point, the government will likely auction the old, analog spectrum to raise revenue.

### ***Political Engagement***

The mandate that comes out of the many issues in this section calls for intensifying engagement of the individual firms and consortia in the political and policy-formulation process. Governments at all levels are trying to understand the implications of digital convergence for trade (intercity, interstate, and international trade), intellectual property, security, revenues, regulation, education and access. They confront new questions of fairness and equity. Many indicators point to governmental willingness to figure the issues out together.

At times in the past technology companies have isolated themselves, asserting that only they know their own destiny; communications companies have bureaucratized themselves in the face of regulation, and while celebrities have greatly aided many causes célèbres, entertainment companies have often used the cheers of an adoring public to insulate themselves from governments. Now is a time to seek to educate themselves, the public, and government at all levels, about the new digital environment.

## **Technological Issues**

### ***Overview***

The digital convergence has begun to revolutionize entertainment and information access by changing the supply-chain landscape. Traditionally, suppliers and customers have been separated great distances, requiring considerable time and money to reach. However, today distribution and content are becoming increasingly linked in powerful ways. Content is increasingly being produced or converted to digital formats and transmitted over digital delivery mechanisms. Developments in information technology, including the Internet and desktop-computing power, enable rapid and cost-effective distribution of content to a wider audience. In addition, the content itself can be enhanced using new technologies and new delivery channels. In order to rely on digital distribution, content producers must be able to reach the mainstream. Therefore, ubiquitous access must be achieved. Therefore, the technological infrastructure must overcome issues involving bandwidth, common standards, cost effectiveness, functionality, security, and user friendliness. Craig Barrett emphasized the strategic importance of three of these issues (ease of use, security, and bandwidth) in his keynote address to the Intel Developers Forum.<sup>27</sup> While technological developments are a critical component of digital convergence, it is important to remember that technology should remain in

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<sup>26</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>27</sup> September 15, 1998.

service of the story or information to be shared. According to Frank Duto of Silicon Studio, technology is not an end goal in itself and its significance is based in what one creates by using it.<sup>28</sup>

### **Communications Networks**

One of the most significant developments for the advancement of digital convergence is the breakdown in specialization among communications networks. Traditionally, a particular type of information that needed to be transmitted somewhere had to use a dedicated communications pipe. Telephone calls and faxes were sent over dial-up analog lines, data were sent over the Internet, closed networks, and IP networks, television was delivered by cable or broadcast, videoconferencing was transmitted by dial-up digital lines, cellular communications used wireless delivery in a particular spectrum range. However, the radical convergence of communications networks is allowing information to be sent across multiple pipes. The same content can be received using cable, wireless cellular and satellites, packet-switched IP networks, or circuit-switched networks.

One driving factor of the communication-network convergence is deregulation of the communications markets throughout the world. These industries, which in the past were thought to require monopolies due to the needs for infrastructure, have been opened to competition. In order to survive this transition, these communications firms require new skills and strategies. PricewaterhouseCoopers states that as they move away from the monopoly model, the challenge for communications companies is to leverage core competencies and develop new skills.<sup>29</sup> They must develop new value-creating ideas, have the competence to translate ideas into applications, form alliances to acquire skills, and flatten the organization to speed and localize decision-making. Competition among providers will force expansion into new international markets. Also, they will need to offer new services. Therefore, there will be considerable overlap of regions and services among providers. They will need to focus on customer loyalty and provide value through service, simplicity, and affordability.<sup>30</sup> Providers must structure their systems and processes based on customer service. Also, those companies that can offer “one-stop shopping” for communications products and services will retain customers better than those that specialize. Customer loyalty translates into greater market share and profitability. Spending resources on retaining customers is less expensive and has a greater long-term payback than finding new customers.

As a result of deregulation, the communications market has become very fragmented. One of the benefits of this fragmentation is that communications providers are offering more services and are consolidating them into packaged services. Howard Rudzki of Kids Universe states that providers will offer all services, from Internet to cable access, together.<sup>31</sup> Therefore, consumers can receive local dial tone, long distance, Internet, satellite, cable, and cellular access from the same source. Rudzki states that one will soon be able use mobile services to access e-mail accounts and the Internet when away from a cable-connected computer. Marianna Danilovic of KPMG Peat Marwick believes that a competitive communications market will also help the entertainment community.<sup>32</sup> Content companies will be able to acquire financing from the communications companies that are seeking content to be distributed through their infrastructure. Communications providers will need

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<sup>28</sup> Frank Duto, Silicon Studio – Los Angeles, August 18, 1998

<sup>29</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>30</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>31</sup> Howard Rudzki, Kids Universe Toys and Software, Interview, August, 1998.

<sup>32</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

to find people who understand content, how to license it, and how to distribute it through their infrastructure.

One of the potential problems with a fragmented communications market is a potential lack of integration and cooperation among providers. Since communications providers do not yet offer all services or all markets, consumers must use multiple companies to handle their needs. According to John Hughes of Rhythm and Hues, since Pacific Bell or MediaOne cover only medium-sized regions, transmitting information across longer distances requires dealing with another provider.<sup>33</sup> The ability and willingness of communications providers to cooperate and integrate their services will be a driving force of digital delivery of content. The fragmentation of the market and the resulting objective of offering more markets and services necessitate great infrastructure investments. The rate of such investments has failed to meet expectations due to its tremendous costs. Many communication providers have tried to expand their service by renting infrastructure from other firms. For instance, long-distance companies often rent or purchase local access instead of spending time and money to build their own infrastructure.

## **Consumer Access Channels**

### **Overview to Consumer Access Channels**

A critical link in the communications chain for supplying digital media is the connection directly to consumers. This segment is often referred to as the “last mile” to the consumer because it connects homes and offices to local communications networks. A variety of access types are available, including cable, telephony, utilities, wireless, and others. Also, a wide range of access speeds and corresponding prices exist. The functionality of the medium depends on the type of usage expected. Digital-media applications, such as entertainment, will likely require a very large amount of inbound bandwidth and a certain degree of interactivity. Interactive use will require two-way, high-speed, easy transmission of data, voice, and video. Most home consumers of entertainment and information will require a large amount of bandwidth of inbound files and some outbound bandwidth, though considerably less. The public will receive content such as digital movies, but are not likely to send that content back out of their house. Any outbound files will be the result of interactive use and will most likely be a small file, such as an e-mail. This type of bandwidth requirement is frequently referred to a “wide in, narrow out.” Some users will require more outbound bandwidth, such as those working from home needing to send large data files, engage in on-line gaming and videophone.

Communications providers are competing intensely for the chance to connect directly with consumers and all have the ability to deliver digital content. However, the public seeks to restrict the number of providers because too many physical connections are cumbersome and dealing with multiple companies for service is confusing and time-consuming. Therefore, the type of last-mile access that offers the best combination of bandwidth, low-cost, transparent delivery, user-friendliness, flexibility, and service will emerge as the consumer-access medium of choice.

### **Telephony**

The most commonly used last-mile medium is twisted-pair copper telephone wire. Generally, these copper wires are connected to the local loop, with the local loops being interconnected with high-

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<sup>33</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998.

speed optical fibers capable of sending up to 10 terabits per second. However, the cost deters direct fiber-optic connections, so bandwidth is somewhat limited. Some local providers are upgrading their connections to a hybrid fiber-coaxial cable to offer broadband communications, yet progress will be slow because it is also costly. According to PricewaterhouseCoopers, switched wireline services over phone networks use either analog lines with modems, Integrated Services Digital Network (ISDN), High-speed Digital Subscriber Line (HDSL), Asymmetrical Digital Subscriber Line (ADSL), or Asynchronous Transfer Mode (ATM) technologies.<sup>34</sup>

Modems have been used for years to convert digital data into analog signals to be transmitted over telephone networks and then converted back to digital data upon receipt. Although modem speed has grown tremendously, it still lacks the bandwidth needed for advanced digital media and the rate of speed growth has slowed in recent generations. The high-end modems theoretically transmit at 56kb per second, but this speed is not often realized due to compatibility problems between the sending and receiving modem.

ISDN offers a greater transmission speed by using the existing copper phone networks with slight infrastructure upgrades. ISDN offers circuit-switched digital channels from end-to-end at up to 128kb per second. Users can also utilize one 64kb per second channel while using the remaining channel for voice communications. Also, ISDN offers faster connection times than analog dial-up modems, about one to two seconds compared to 20 seconds.<sup>35</sup> ISDN requires a digital connection to the telephone network and an ISDN adapter. It provides full two-way transmission and can provide low to medium-level digital media and interactive applications, but lacks the speed for higher-end entertainment applications.

ADSL and HDSL dramatically increase bandwidth using existing copper pairs at costs that are reasonable, until the time that fiber-optic cable connections become widely available, and more economical than T1 or E1 (T1's European equivalent) lines. This ability enables telecommunications companies to leverage their installed base of twisted-pair copper telephone lines. HDSL is a two-way technology and ADSL provides wide in, narrow out access. Inbound transmissions are ten times faster than outbound.<sup>36</sup> The downstream channel can deliver television, video-on-demand, and computer network connectivity. ADSL offers the functionality of a VCR, allowing users to pause, fast-forward, and rewind content. However, ADSL is untested as a large scale, full service network.<sup>37</sup> Intel is looking to ADSL modems to provide continuous home connectivity to the Internet by 2001. This will provide, for example, videophone capability at 30 frames per second and near TV resolution.<sup>38</sup>

ATM will bring broadband communication for interactive and high-end, digital-media transmission. ATM enables multiple data types, including data, voice, and video, to share the same communications medium, consumes only the bandwidth that is needed by an application, and offers two-way communication.<sup>39</sup> The ability to share bandwidth is similar to packet-switched technology in which data is separated into smaller pieces for transmission and reassembled on the other end. Since ATM packets are small and a fixed length of 53 bytes each, they can easily be switched. Their

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<sup>34</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>35</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>36</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>37</sup> "ADSL: High Bandwidth for the Installed Local Loop?," by Jerrid Hamann.

<sup>38</sup> Craig Barrett, Intel Developers Forum, September 15, 1998.

<sup>39</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

transmission produces minimal delays and theoretically constant time intervals among cells. These characteristics offer near-seamless real-time video and audio transmission. Roy Messineo of Jeskell, Inc., an IBM business partner, states that Pacific Bell formed an ATM initiative in the State of California in 1994 in which they offered areas free ATM access with a fiber-optic network for two years with the intention of developing user acceptance of and reliance on this technology.<sup>40</sup>

Telephone will continue to be the best available last-mile medium for the next few years because of its excellent two-way transmission capability and already installed infrastructure. Other connection types, such as cable, still require phone access for outgoing data transmissions. Telecommunications companies are faced with two traffic sources competing for use of the same infrastructure. Voice traffic has traditionally filled telephone lines. However, data traffic has grown at 30% per year compared to 3% for voice. Utilization of telephone lines by data has surpassed 50% and is expected to reach 75% by 2000. Since data calls are less expensive, the profitability of long-distance providers is in danger of shrinking. Telephone infrastructure providers are faced with the paradox of needing to offer more capacity for voice traffic, yet capacity increases will increase demand for data transmissions and increase the traffic problems for voice. In addition to other communication types, telecommunications companies face competition from other telecommunications companies as firms seek to expand their services and territories and long-distance and local companies move into each other's areas. According to PricewaterhouseCoopers, telecommunications companies must find ways to develop low-cost, low-revenue, high-volume products.<sup>41</sup> An advantage that telecommunications companies have is that they are experienced and skilled at offering a variety of services.

## Cable

Cable television service is already available to millions of homes. Cable providers are trying to take advantage of their existing consumer access to offer more services. Cable modems enable consumers to access computing networks and the Internet through the same physical coaxial-cable lines that carry television content into the home. Since there is great bandwidth available using cable modems, up to 27mb per second, consumers will have greater high-speed access and ability to download large content files than with phone modems, ISDN, or ASDL.<sup>42</sup> Also, one can send data back to the system at up to 10mb per second, enabling quality interactive use. However, cable bandwidth must be shared among users, which limits the potential and reliability of bandwidth availability to each individual. Also, most cable systems are not two-way. Cable providers are forced to rely on telecommunications companies to provide upstream service. Any serious effort to offer interactivity by cable companies, especially with the emergence of digital television, requires that they themselves offer two-way transmission. This will require the existing cable infrastructure to be upgraded. Also, they must provide greater reliability and a non-distilled transmission path. In addition to pure computing activities, traditional cable service can be enhanced by overlaying menus and providing deeper content relating to the actual television programming.<sup>43</sup> As cable-infrastructure companies seek to expand their offering, they will seek to buy or partner with content producers in order to have entertainment and information that will attract and retain customers. They will need content-oriented personnel with insights into production and management personnel with insights

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<sup>40</sup> Roy V. Messineo, Jeskell, Inc. – IBM Business Partner, Interview, July 28, 1998.

<sup>41</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>42</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>43</sup> Marianna Danilovic, KPMG Peat Marwick, Interview, August 27, 1998.

into how to integrate the entertainment business model with their more bureaucratic, static, subscriber model.

## Utilities

Utility companies have also realized the value of their lines already installed in consumer homes. Electricity, gas, water, and other utility industries are deregulating and growing at a rapid pace. While sending information over utility lines has long been theorized, it was not until recently that engineer Paul Brown invented a method of sending phone and data services over electricity lines.<sup>44</sup> Similarly to wireless technologies, the system uses multiple frequencies for different packets. A signaling system manages the traffic of all packets. Not only does using electricity offer an installed base, but it also speeds access up to one Mb per second, making it faster than phone modems and ISDN, but slower than cable modems. Another advantage over phone service is that no dial-up is needed to connect. A system with the type of scale needed for the mass market requires switching at the systems substation and a high-speed fiber network between the substation and the Internet. The largest threat that faces utility companies entering the information delivery industry is that, since they are required to build the necessary infrastructure, they will be outpaced by other media.

## Wireless Transmission

The proliferation of physical lines entering homes has caused concern by consumers about the bulkiness and complexity of managing the many lines. Also, Guy Langvardt of Compaq Computer Corporation states that high-speed, physical connections are costly.<sup>45</sup> Wireless technologies offer the freedom to access information anywhere in the world. The key technologies that enable wireless communication include cellular and satellite technology, as well as battery technology for handheld units.<sup>46</sup> In addition to use outside their home, consumers can connect to voice, video, and data networks in regions to which most services previously did not extend. Rapid growth will continue since new markets are more easily entered using wireless technologies than by building physical infrastructures. Beneficiaries of such expansion are people previously without access, current customers who gain wider coverage and connectivity to more people, and wireless-service providers by expanding into new markets and increasing volume due to more available connection points. According to PricewaterhouseCoopers, four out of ten consumers surveyed want more wireless-communications products.<sup>47</sup> Consumers also seek a greater number of and more consolidated service offerings, including a single phone with multiple numbers so they can easily be reached, yet differentiate among incoming calls. The public also wants to have caller identification on mobile phones, centralized voice mail, and home phones that can convert into cellular phones and have adjustable billing to reflect usage type.

Wireless communications such as cellular and personal communications services (PCS) have grown to a multi-billion dollar business by reducing the need for distance, especially among business customers. While the main benefit of cellular services is mobility, wireless services still lags terrestrial networks in capacity, data-transmission quality, and cost per call.<sup>48</sup> Also, such services do not offer two-way transmission of data, video, and voice, limiting the possibilities for interactivity. While

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<sup>44</sup> "Ringing Innovation," Guatam Naik, Wall Street Journal, June 29, 1998.

<sup>45</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

<sup>46</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>47</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>48</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

wireless providers will make improvements in these areas in the near future, it is important to determine when they will make significant improvements and whether they can do so fast enough.

Commercial demand for satellite technology has been limited in the past due to high equipment, maintenance, and control costs.<sup>49</sup> However, recently there has been enormous growth in the use of low-cost, global-satellite distribution systems. Satellite systems offer portable access to consumers accustomed to limited range, global access to new markets and audiences further breaking down geographic and cultural barriers, and instant infrastructure and connectivity. User can receive voice, video, data, and computer network information using a variety of receivers, including handheld phones, fax machines, and computers. Satellite communications will establish connection with wired technologies, such as phone networks, to provide improved, integrated service.

While satellites create tremendous opportunity for the delivery of high-end digital content, according to PricewaterhouseCoopers, the fastest growing satellite-communications sector is Mobile Satellite Services (MSS), the delivery of telephone and low-speed data services such as fax, e-mail, and paging.<sup>50</sup> MSS providers, the main for being Globalstar, ICO, Iridium, and Odyssey, focus on offering three main services. First, portability for business executives is a key business made possible by small, low-powered, handheld receivers. The main advantages of satellite systems over cellular and terrestrial services are a single, compatible service with one standard and the unlimited range of available service. Business executive value having multiple lines integrated into one number while maintaining the ability to distinguish among them. Second, data transmission service enables computers to connect to Internet using broadband connections with high capacity, low cost per bit, high potential channel size, minimal transmission delays, and wider access range.<sup>51</sup> The third service concerns global markets. Satellite-service providers can extend communications services, such as phone access, to underdeveloped regions. They offer universal coverage and faster access to new markets than available by building a physical infrastructure.

The demand for satellite communications demonstrates that a strong market exists and that those that can build cost-effective systems will be at a competitive advantage. Cost, including initial setup and user charges per minute, must be reduced to encourage wider public use. The production of equipment and the launch of satellites are very costly and uncertain investments. Building and launching a satellite costs tens of millions of dollars and one-in-ten launches fail due to launch-vehicle malfunctions.<sup>52</sup> One way to accomplish cost efficiencies is producing receivers on a larger scale. Satellites range in distance from earth, falling into three major categories, Geo-synchronous Earth-Orbit (22,300 miles above equator), Middle-Earth-Orbit (6,500 miles above), and Low-Earth-Orbit (1,600 miles above) satellites. Greater satellite altitude creates a wider coverage area, longer life due to less gravitational stress, longer signal-transmission delays between satellite and land-based users, and greater power requirements to send signals. While high-altitude satellites can offer worldwide coverage with fewer satellites and geo-stationarity (i.e., permanently matched with a region), the transmission delays restrict applications mostly to broadcasting. Other consumer and business services require lower-altitude satellites. They must use more satellites to cover the same area and have complex tracking and coordination systems because they do not orbit evenly with the Earth.

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<sup>49</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>50</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>51</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>52</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.



Wireless communication must also address regulatory issues. As with most communications technologies, governments may require that wireless communications providers ensure that content distributed through their networks is not in any way objectionable. Satellite service providers are faced with growing congestion of the frequency band. According to PricewaterhouseCoopers, they need to find more effective ways of using spectrum to deliver service.<sup>53</sup> They must receive spectrum frequency allocation and orbital assignments with global cooperation. The International Telecommunications Union (ITU), an United Nations agency, provides a forum for countries to assign frequency bands, match technology with compatible spectrum uses, and establish spectrum access priorities. However, the ITU has no enforcement power, leaving control with the individual member country agency, such as the FCC.

From a content provider perspective, wireless communication offers a more direct connection to consumers by eliminating the need for intermediaries that formerly provided the connection. After an initial high-investment cost, wireless services are the cheapest and easiest way of sending digital information. By combining the broadband coverage of high-altitude satellites with the minimal transmission delays of low-altitude satellites, providers can offer access to more choice of entertainment and information. Like telecommunications, cable, and utility companies, wireless service companies are likely to seek content providers as partners or buy-out candidates.

The regulatory environment is changing rapidly. The FCC just cleared the way for wireless-communications companies to provide high-speed Internet access and other services to and from homes and businesses. Because of prior restrictions, most of the nation's 250 wireless-communications companies, which serve one million customers, have opted to provide only cable-TV service. But the FCC's action now makes high-speed Internet access a much more attractive business to wireless-communications companies. The FCC's action means companies can offer speeds up to 100 times faster than traditional dial-up modems using antennas on the roof or outside a window and a cable modem. The FCC also took the first step toward making more frequencies available for companies to beam TV, data and other services directly into people's homes via satellite. The FCC proposed making 550 Mhz of the public airwaves available for use in 2007.<sup>54</sup>

### **Physical Distribution: DVD and CD-ROM**

An alternative to accessing digital content through a physical or wireless transmission medium is distribution on a physical device such as DVD or CD-ROM. These media substitute for dealing with bandwidth problems in transmission of data. However, each medium requires an installed base of equipment among consumers and businesses. Also, the cost, speed, and wide availability of Internet access cannot be met through any physically distributed medium.

CD-ROM's offer a storage capacity of 650mb, allowing rich video, audio and data applications. According to Lloyd Pentecost of IntrActv, the CD-ROM is still an extremely viable and proven form for delivering content, communications, business information, education, and entertainment.<sup>55</sup> Mass distribution of detailed information content through CD-ROM reduces the need for printing and sending documents. However, distribution is limited by the need for CD-ROM drives among all recipients. Since the availability capacity on a double-sided DVD is 8.5gb, greatly exceeding CD-

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<sup>53</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>54</sup> Associated Press, September 17, 1998.

<sup>55</sup> Lloyd Pentecost, IntrActv, Interview, August 7, 1998.

ROM, DVD allows producers to deliver high-quality digital content. DVD applications include home-theatre video, DVD-ROM for television, and computer applications, such as educational, business, and entertainment software. The impact of DVD-RAM and the Divx format is still an open question.

### **Network Infrastructure**

While there is tremendous potential for digital distribution of content, the large volume of high-end digital files and the requirement for varying degrees of interactivity mandate a network infrastructure with universal and common accessibility, robustness for reliability, and enormous capacity. The most critical and discussed infrastructure characteristic is sufficient bandwidth, the amount of data that can be sent through a dedicated transmission circuit, for digital-media applications. Paul Berberian of VStream believes the issue is whether the growth and availability of bandwidth will keep pace with the increasing power of the digital message.<sup>56</sup> The congestion of communications networks is a function of the number and size of the data packets being sent and the capacity, or bandwidth, of the infrastructure. There has been both a quantitative and qualitative increase in usage that increases the importance of bandwidth. The number of Internet users over the age of 16 in the U.S. and Canada reached 79 million in June, 1998, while the number of people buying products and services via the Web hit 20 million according to a recent Nielsen Media Research and CommerceNet study on Internet commerce.<sup>57</sup> Internet-user growth is approximately 36 percent annually, and data traffic growth in general equals 30 percent annually, compared to 3% for phone traffic. Data traffic's proportion of telecommunication utilization has surpassed 50 percent and will reach 75 percent by 2000.<sup>58</sup> This trend is supported by the fact that, as more people move online, the value to entering increases – Metcalf's Law. In addition, the quality of use increases with the shift toward digital-media applications, further increasing bandwidth requirements.

The network-computing environment has seen explosive growth, particularly for internal and external business applications. Network computing has separated individual-user desktops, or clients, into interfaces that deal with application servers and data servers.<sup>59</sup> Many believe that the World Wide Web has replaced the PC as the engine and the source of value. Since the distributed client-server network is centrally managed, it offers greater security and reliability, lower maintenance costs, frequently 40% of the total cost of ownership, and easier upgrades and switching. E-commerce and digital-media applications require large Internet servers and network consolidation. Java technology, an object-oriented code, allows developers to create software code once and deploy it across multiple operating systems, reducing porting costs and time. Jini technology allows people to use networked devices and services as simply as using a phone.<sup>60</sup> Jini dramatically simplifies network interaction and further extends the definition of networks.

Many believe that bandwidth fulfillment will naturally occur due to the obvious demand. Access to multimedia applications will necessitate capacity improvements. For instance, a two-hour non-compressed digital movie requires 1.28 terabytes of memory. Multiple requests within a given area for digital media will quickly take up all available capacity. Examples of the evolution of high digital-speed access include improvements in last-mile access, Internet backbones increasing from OC12 to

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<sup>56</sup> Paul Berberian, VStream, Interview, August 21, 1998.

<sup>57</sup> [www.commercenet.com/news/press/19980824b.html](http://www.commercenet.com/news/press/19980824b.html).

<sup>58</sup> *Blueprint to the Digital Economy*, by Don Tapscott, Alex Lowy, and David Ticoll.

<sup>59</sup> *Blueprint to the Digital Economy*, by Don Tapscott, Alex Lowy, and David Ticoll.

<sup>60</sup> Java Technology, Sun Microsystems, Website.

OC48 to OC96, and the emergence of IP2 (the new Internet protocol). Connection speeds increase with faster backbones, which must have tremendous bandwidth because they carry all communications. Messages are sent by routers to a backbone, typically on a fiber-optic line, and often cross over backbones. High-speed backbones include OC3, with a transmission speed of 130Mb per second, up to OC192, with 8.3Gb per second. However, the cost of directly accessing fiber-optic lines usually prohibits direct access. Instead, most access the backbones through a slower, less expensive medium such as T1 lines or telephone modems. The current international infrastructure lacks quality, affordability, and availability. Therefore, the United States backbone handles the majority of international communications traffic. As expansion of usage continues, the U.S. backbone will have difficulty managing the load. Infrastructure improvements throughout the world must occur to reduce this strain. Conversely, the trans-Pacific communications infrastructure capacity has, so far, outpaced demand with 100% annual growth.

Routers, 90% of which are supplied by Cisco to ISPs, select the most efficient path for each information packet. According to the Internet Performance Measurement and Analysis Project, a partnership between the University of Michigan and Merit Network, routers have additional pressure placed upon them as the number of routes grow, leading to degradation of service, including lost packets, latency, and service interruptions.<sup>61</sup> Dropped packets require retransmission of packets and rerouting, further adding to congestion.<sup>62</sup> A potential remedy for this problem is to separate router functions to increase utilization. Many methods exist or being developed for managing such traffic problems. ATM-type cell-switching technology and compression techniques improve the availability of digital media. Packet switching offers a more efficient packet-management approach by separating applications with high- and low-bandwidth requirements. ATM technology applies to all types of data networks, ATM headers require less information, a higher quality of service is available, and billing is simpler. However, ATM also becomes problematic with increased and unpredictable traffic, needs high-memory switches to send full messages, and fixed cell length creates a high overhead rate.<sup>63</sup> Bandwidth utilization can be improved through prioritization or reservation technologies. RSVP allows the differentiation of bandwidth requirements by application on an as-needed basis by signaling in the header protocol. Ipv6 creates a tunnel in which packets can be sent along the same path. Point-to-point communications can be accelerated with infrared diodes. Mbone reduces backbone traffic by sending the same message once to a region. Users can access the stored version from local storage. Similarly, static web sites can be cached locally to reduce the need for repeated access. Ethernet technology also quickens network traffic. Compression techniques will be critical to enabling high-end digital-media distribution. In addition, Internet2 developments have the potential to dramatically increase access speed and to offer more considerably more capacity.

The number of network access points, where backbones intersect to reroute packets, is increasing. According to Alexis Geranios of AboveNet, the benefits of Internet-service exchanges are peering, the linking networks together, into essentially all networks, international Internet-service providers can access networks easier, the network is centralized versus requiring multiple networks to located near distributed users, and has low latency.<sup>64</sup>

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<sup>61</sup> Internet Performance Measurement and Analysis, Merit Network, Website.

<sup>62</sup> Information Technology Outlook 1997, Organization for Economic Co-Operation and Development.

<sup>63</sup> Pacific Bell, Website.

<sup>64</sup> Alexis Geranios, AboveNet, Interview, August 14, 1998.

Network management is a critical function to provide support for the evolving infrastructure. Network managers must integrate complex architectures. They must also measure system performance and respond to problems with appropriate traffic management and routing. Bottleneck sources throughout the chain (e.g., slow PCs, excessive simultaneous local ISP accesses, congestion at the router, and an overloaded backbone) are very difficult to identify.<sup>65</sup> We need to develop better monitoring systems that search for, detect, and display errors. Also a public effort or industry consortium is needed to evaluate Internet bottleneck issues. According to Mark K. Maruyama of IBM, the objective is to optimize the network for high-volume digital-media use.<sup>66</sup> This task requires a prioritization system to ensure that resources are properly devoted, including managing various file sizes and time dependencies, and managing the hierarchy of access frequency, such as which areas require more resources. They must manage digital-media accessibility by deciding if the organization should distribute media locally to each machine or store centrally, and possibly stream to the user. Infrastructure management requires monitoring load volume and managing peaks. According to Josh Sharfman of Digital Lava, a technology that reduces streaming bandwidth needs is *indirection*, which uses a resource broker to determine the closest server containing the media.<sup>67</sup>

Maruyama states that network managers must also ensure system back up, redundancy, back-end tools (e.g., storage and digital-library-files tools), low latency, and some form of end-user help desk.<sup>68</sup> Security must be provided that combines protection with ease of use and portability. Intel is responding to this need by building security into future hardware.<sup>69</sup> Gateway services protect organizational boundaries and ensure secure transactions. These systems include firewalls, filtering routers, public-key cryptography, digital signatures, and smart cards. Platform security requires securing network components and communications. Security management involves establishing a policy and hierarchy for authorization and monitoring. The key decisions are who gets access, how do they interact with the system, and with what can they interact. Network managers must also help in the digitization of content, known as *telecine*, by converting content to digital form and loading digital content into the system.

According to Professor Robert B. Trelease of the UCLA School of Medicine, webmasters are critical to support and design websites.<sup>70</sup> They receive requests for services on the server and must decide how they can be supported, which server they should be supported on, and how much service and resources can be allotted. They must design sites that balance computer organizational sense with virtual organizational sense and ensure sensible and simple site navigation.

Digital-content production also requires extensive network bandwidth. A technique to reduce the processing requirements of a single machine, called load sharing, balances production workload across multiple processors, such as Silicon Graphics machines. A parallel operating system interconnected by fiber-optic lines optimizes processor use, yet places a strain on network bandwidth. According to Rimas Juchnevicius, a freelance special-effects engineer, too much time is required to send and re-render high-resolution images.<sup>71</sup> A high-end special effect requires great bandwidth not only because of the enormous number of pixels, but also because of the math

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<sup>65</sup> Information Technology Outlook 1997, Organization for Economic Co-Operation and Development.

<sup>66</sup> Mark K. Maruyama, IBM, July 28, 1998.

<sup>67</sup> Josh Sharfman, Digital Lava, Inc., Interview, August 19, 1998.

<sup>68</sup> Mark K. Maruyama, IBM, July 28, 1998.

<sup>69</sup> Craig Barrett, Keynote Address, Intel Developers Forum, September 15, 1998.

<sup>70</sup> Professor Robert B. Trelease, Interview, August 10, 1998.

<sup>71</sup> Rimas Juchnevicius, Freelance Special-effects Engineer, Interview, August 24, 1998.

involved. To chart the course of a moving target shifts to when seen from a moving point of view requires solving a cubic differential equation. This math is required for each moving pixel in the frame.

## **End-User Tools**

Since one of the main goals of digital convergence is to improve the distribution of content, it is important to ensure that end-users, whether consumers or businesses, have access to the tools necessary to take advantage of potential of the digital age. These digital consumers must have available access and skills for managing technology. These tools should aid the end-user in identifying what kind of information is available, how to find it, and how to leverage its power for one's purposes. Jun Kinebuchi of the Ignite Group states that technologies need to be developed that expand the capabilities of users or help them interface more easily with networks.<sup>72</sup>

Interfaces are a key enabler of successfully reaching end-users because they are the mechanism by which users operate. David L. Hankin of Sony Online Entertainment believes that device manufacturers and content creators must come up with consumer interfaces that are intuitive, simple, comfortable, and flexible. Flexibility should allow both passive and active experiences and should balance a range of skills through a hierarchy of skill levels.<sup>73</sup> An example of the need for complex activities to be simplified is offering people a way to manage the number of television channels in the digital-television age. Clearly, a tool such as a new remote control or on-screen navigation system will be needed to allow people to sift through the volumes of information. Currently, most interfaces are slow, choppy, and one directional. Digital-media applications will force the development of interfaces that seamlessly integrate content and have two-way communication for interactivity. Web browsers should also be consistent. Browser providers, particularly Netscape and Microsoft, in trying to differentiate their product offering, have created a number of browser versions. Suzanne Biegel of Internal External Communications states that this proliferation of versions complicates operation by end-users and the hampers cost-effective development by software companies.<sup>74</sup> As a result, developers must make versions that address slightly different technologies across browser types and different generational versions within browser types. They must test for many combinations of browsers as opposed to one version, consuming time and money that could be spent on improving their product. Biegel suggests that a single browser standard would benefit both developers and end users.

End-users must be able to search through the tremendous amount of available information to find exactly what they are looking for. Search tools need to be enhanced that enable people to navigate through systems and quickly and easily access valuable information. Roy V. Messineo of Jeskell Inc., an IBM business partner, states that the key to search processes is separating valuable information from the rest.<sup>75</sup> A search must balance accuracy and complexity. Therefore, systems managers must decide how this balance should be struck. Messineo states that ISPs, for example, do not filter anything. They offer full freedom, but searching can be cumbersome. Navigation within websites is generally guided by a nesting and treeing process. He suggests that systems require a more language-based structure. Metadata within digital-media content can be used to easier locate information and

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<sup>72</sup> Jun Kinebuchi, Ignite Group, Interview, August 14, 1998.

<sup>73</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>74</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>75</sup> Roy V. Messineo, Jeskell, Inc. – IBM Business Partner, Interview, July 28, 1998.

entertainment files. In addition, users must be educated on effective search skills. They can greatly reduce their search time and success rate by better understanding basic fundamentals.

Sophisticated presentation software must be developed and upgraded to offer easier use and more functionality. Josh Sharfman of Digital Lava believes that such software should be able to seamlessly integrate media.<sup>76</sup> For instance, the user should be able to place auxiliary information, such as notes, within video or any other continuous media. Digital content-recognition tools can recognize video scene changes. New equipment, such as smart cameras, are being developed that can identify information at the time of capture as opposed to after the fact. Time codes can be collected where an interesting visual event occurs by measuring the number of pixels changing per unit area or time. New file-format and compression-architecture standards, such as MPEG7, allow descriptors to be coded within video, audio, or some form of digitized screen information. Tools can read that information to provide descriptors and applications that read, and change if asked, those descriptors to reference the original content. An important function of presentation software is the combination of multiple media and tools. Users should be able to synchronize media within an application, such as a presentation, including slides, notes, and web-browser functions. The value that such a process allows is the true creation of the content upon consumption as opposed to pre-packaged productions.

Users must also have access to collaboration tools. Video-conferencing is an important tool for communicating when parties separated by distance must cooperate on a project. PricewaterhouseCoopers measures the value of video-conferencing by comparing it to the business-travel industry.<sup>77</sup> Video streaming can also be used for training and communication. A valuable application of digital communication is e-publishing, which supports the needs of content providers and consumers by organizing and channeling large volumes of data. The objective is to publish once and deploy many times, using different formats and media. Collaborators also benefit by having some form of online editing tool. Also, documentation and tracking of recent changes enables simplified and timely communication. For example, referencing, known as bookmarking, of segments to be edited allows people to communicate during the editing process. Bookmarks can be sent as a separate component than the entire content file, possibly through e-mail, and re-aggregated with a content file on the other end.

## **Platforms**

Common platforms among converging technologies are needed so that people have consistent access to digital-media technologies. Suzanne Biegel of Internal External Communications explains that consistent access, whether at home, school, or at work, is valuable.<sup>78</sup> An example of an important platform standard involves High-Definition Television (HDTV). The FCC allocated an additional six megahertz of spectrum, enabling broadcasters to offer either one analog channel and one extremely rich digital channel or multiple digital channels. Digital signals resist the interference and degradation that disrupt and distort analog broadcast, such as “ghosting.”<sup>79</sup>

Digital television enables HDTV, which has a wider screen and sharper resolution, increasing scan lines from 525 to 1125, to closer resemble movie-theatre quality. With a greater spectrum,

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<sup>76</sup> Josh Sharfman, Digital Lava, Inc., Interview, August 19, 1998.

<sup>77</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>78</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>79</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

broadcasters can offer a network that previously was unable to reach consumers. According Marianna Danilovic of KPMG Peat Marwick, broadcasters can consequently engage in niche programming as opposed to mass-market programming. Digital television also enables interactive television, which allows viewers to order programs, engage in multi-user games, and buy products through the television.<sup>80</sup> A new programming model mandates that broadcasters decide on the optimal combination of types of programming for their allocated spectrum.

The FCC decision is critical to platform acceptance because it allows the public time to transition their home equipment as soon as they perceive a value to doing so. For instance, they must be convinced to purchase televisions with a wider aspect ratio. Any new platform must persuade the public that higher-quality audio or video is valuable enough to merit a higher price or switching costs. Also, it allows broadcasters to make necessary investments in digital production and broadcasting equipment, including new cameras, editing equipment, and studio infrastructure. Chuck Dages of Warner Bros. believes that traditional broadcasters view digital television as an additional cost, but should see the opportunity it offers.<sup>81</sup> It is difficult to convince them that they should commit capital expenditures when their current business is strong and the consumer base to receive digital TV is too small to achieve profitability.

While technological innovation drives efficiency and growth, a sufficient platform installed base is needed to take advantage of new technology or entertainment content. Andy Rifkin of Mattel Media states that one often has to wait for the convergence of the technology and the installed base for products to be widely successful.<sup>82</sup> Often, this limitation mandates that suppliers restrict their product offering to aim it at more mainstream, low-end platforms. Rifkin warns that they are caught in between because if they create products for insufficient platforms or reduce the functionality of the digital content, the experience will not be engaging enough and their brand, or characters in some cases, will be devalued. Some other platform standards relate to browser and security tools. Compression platforms should also be standardized for common access. The MPEG standards for digital video compression, for example, allow multiple digital channels to be sent over the same spectrum as a single channel. While MPEG2 is a powerful standard, it is not widely used because of the processing power required to decode MPEG2, the bandwidth needed for large files, and local storage limitations. Also, digital-audio compression such as Dolby AC-3 enables the transmission of high-quality sound files.

Transmission technologies are needed to provide wide, cost-effective, and timely access and standards for common access. Streaming audio and video technology consist of an applet or proprietary application running off the desktop that displays the media without permanent local storage. Scott Fishkind of Red Ant Media Group notes that an alternative that reduces bandwidth requirements is hybrid applications that pre-cache existing elements on a CD-ROM or desktop and use streaming only to update elements.<sup>83</sup> Push technologies, for information such as news, automatically update users when new information becomes available.

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<sup>80</sup> *Entertainment Media and Communications Technology Forecast: 1998*, Price Waterhouse.

<sup>81</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>82</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

<sup>83</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.

## **Desktop Computing**

Digital media use complex, high-quality, high-volume applications. As a result, desktop computers need enough power to run programs such as quality digital video. A lack of processing power would force applications to be reduced in quality and richness. The length of computer purchase cycles by the business community causes this type of problem for digital-media applications. While home consumers are more likely to have high-end equipment (because they bought more recently), commercial users typically have more scaled down versions that fit a small range of functions, such as basic word processing, spreadsheet use, and database processing. So business users tend to have older equipment tied to LANs that provide better bandwidth, while home users tend to have more recent equipment, but worse connectivity. Both digital-content producers and technology providers have to address the business-computer lifecycle when targeting new products. From a digital-content-creator perspective, screen updates of work in progress take an extremely long time.

Display technology is also important to digital-media applications. The value of the content depends on the end-user experience, which can be enhanced or harmed based on the display technology. An important issue relates to the installed base of television sets. Future screens may be more visually appealing than television screens in their current form due a more theater-like aspect ratios. From a digital-content-creator perspective, when the screen of a creator does not match the resolution of the actual medium, they lack the ability to see exactly what the content will look like.<sup>84</sup>

## **Creator Tools**

Creators require the tools and knowledge to create quality digital content. Scott Fishkind of Red Ant Media Group states that any application tool should be based on what the content is and what the creator wants to achieve.<sup>85</sup> This objective should be addressed by having creators either find or design a custom tool that works for that purpose. Therefore, proprietary applications, extending beyond applications such as Real Video, custom built for specific needs are required.

Improved animation-authoring software and digital- and linear-video editing systems for desktop production are needed. Professor Robert B. Trelease of the UCLA School of Medicine states that these improvements are necessary to speed the development process, offer more attractive quality, and increase functionality.<sup>86</sup> Display technology of content creators also must be improved because it falls short of the medium for which they produce.

## **Supply-side Issues**

### ***Impact of Digital Convergence on Organizations***

Digital convergence dramatically alters the orientation of organizations. Information technology provides tools that replace traditional forms of interaction with customers, partners, and suppliers. It also transforms internal communication mechanisms for training, information sharing, collaboration, or another interaction type. The greatest effect created by digital convergence is the potential to deliver a message, whether for information or entertainment, through a medium that enriches the message, reaches a wider audience, and is cost effective. Since this powerful tool impacts interaction in so many ways, organizational strategy, structure, and economic models will

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<sup>84</sup> Rimas Juchnevičius, Freelance Special-effects Engineer, Interview, August 24, 1998.

<sup>85</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.

<sup>86</sup> Professor Robert B. Trelease, Interview, August 10, 1998.



need to change to support it. The removal of time and distance barriers to communications will change the relationship of organization and its customers. Transaction costs, time, and errors will shrink in significance. Customers will be empowered due to greater access to suppliers and wider availability of information that levels bargaining power. Organizations that no longer are limited by problems with physical supply or communicating with customers can compete, enabling the disaggregation and specialization of product and service offerings. According to Tapscott, Lowy and Ticoll (1998), markets will experience a redefinition of value driven by the breakdown of industry definitions.<sup>87</sup> The key to success in the digital age, characterized by rapid change and growth, is having the flexibility, speed, and innovativeness to discover and act upon new and fleeting opportunities.

Investment in information technology should not be expected to show a direct return by old metrics. The value of commitment to IT lies in leveraging organizational goals. Therefore, product strategy and IT strategy should be closely coordinated, so that organizational objectives drive infrastructure needs. One of the greater impacts of digital convergence is the impact on the relationship between businesses and their customers. Organizations can interact much more closely with their customers because they have a cost-effective method of reaching a much wider audience. Since suppliers know much more about their customers, the dynamic of transactions so that downstream demand controls the supply chain much more directly than ever possible. Suppliers will have enough feedback through more direct contact with customers to change their product or service offering. A new era of customized mass production in which, according to Howard Rudzki of Kids Universe, the main players will be those who control and utilize information about customers.<sup>88</sup>

The competitive landscape also substantially changes due to digital convergence and the faster pace of innovation. Lower transaction costs create a market that is closer to perfect competition. Armed with much more complete information and easy access to many suppliers, customers will find and purchase from organizations with better value propositions. Differentiation by aesthetic means in the online environment becomes less possible – except for owners of unique content – and price emerges as the main point of differentiation. As a result, organizations must achieve operational efficiencies in order to remain competitive because customers' switching costs approach zero. Process management must be streamlined to focus on key supply-chain processes. Organizations with lower transaction cost with suppliers and partners must work more closely to respond to customer demand in a timely and cost-effective manner. Supply-chain cooperation can greatly reduce product-stock requirements. Networked organizations are able to outsource activities outside of their core capabilities. Specialization will increase to achieve efficiencies in cost, innovation, enhancement, and customization.<sup>89</sup> Non-value providing intermediaries will be replaced with a more direct distribution channel. There are lower barriers to entry because startups can get their products to market without having to build large physical facilities. Specialization may extend to intra-organizational processes, creating a climate of healthy, internal competition.

Organizational forms will become more complex, facilitating emergent behavior, to seize on opportunities. The organizational model will shift toward an ecosystem structure. This emerging business model consists of a community of suppliers, distributors, e-commerce providers, and

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<sup>87</sup> [Blueprint to the Digital Economy](#), by Don Tapscott, Alex Lowy, and David Ticoll.

<sup>88</sup> Howard Rudzki, Kids Universe Toys and Software, Interview, August, 1998.

<sup>89</sup> [Blueprint to the Digital Economy](#), by Don Tapscott, Alex Lowy, and David Ticoll.

customers connected on a digital network.<sup>90</sup> Reduced transaction costs and time create an environment in which firms trade information, skills, and products, supply is determined more directly by demand. By focusing on core competencies, only value-creating functions at each step of the supply chain survive.

Digital convergence creates a dynamic, innovative business setting, success will depend on the ability of an organization to identify opportunities and quickly act upon them. However, according to Paul Berberian of VStream, most businesses are slow to embrace new technology and upgrade their equipment on a much slower cycle than consumers.<sup>91</sup> One reason business avoid reliance on network communications is the fear that a systems crash will expose them to an enormous financial risk. Startup companies will frequently surpass larger organizations because of their agility and entrepreneurial strategies. Businesses must learn that the economics of digital knowledge offer increasing returns and, therefore, early entry confers an advantage.

Interactive digital media benefit businesses by making commercial tools more effective and decreasing communications costs. According to SkillsNet, business applications are one of the fastest growing applications of interactive digital media.<sup>92</sup> The expansion of Intranets, as well as the Internet, has enabled organizations to offer valuable information both inside and outside company walls. Also, a corporate presence on the Internet is expected as part of an overall corporate-communications strategy. Interactive digital media combines communication, information, and training in a richer manner than traditional approaches. According to Suzanne Biegel of Internal External Communications, people learn and retain more from a richer media experience.<sup>93</sup> Corporations can also distribute to a larger, geographically dispersed audience with lower costs than other distribution media, such as pamphlets, videotapes, and CD-ROMs. In addition, information can be updated and redistributed easily because the content is in a centrally location, rather than in physical versions that are too numerous to track and became quickly outdated. Finally, Biegel states that the message can be customized to different kinds of learners or communicators. Since people learn in different ways, including visually, textually, orally, and kinesthetically, multiple media experiences appeal to a broader range of learning styles.

Berberian states that any type of communications that has inherent value should be communicated digitally in order to leverage its worth.<sup>94</sup> He believes that the most likely target market for high-quality digital media by businesses in the next couple years will be home consumers because they have the higher-end equipment. As businesses acquire better technology, the market for business-to-business digital media will emerge second, followed by internal communications use.

### ***Internal Business Communications***

The growth rate of web-enabled Intranets is estimated to exceed the growth rate of the Internet. Communications between and within departments over high-speed telecommunications lines grants timely, simple, and secure access to valuable information. Suzanne Biegel of Internal External Communications notes that most companies think, because employees work for them, they do not

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<sup>90</sup> *Blueprint to the Digital Economy*, by Don Tapscott, Alex Lowy, and David Ticoll.

<sup>91</sup> Paul Berberian, VStream, Interview, August 21, 1998.

<sup>92</sup> SkillsNet, Website.

<sup>93</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>94</sup> Paul Berberian, VStream, Interview, August 21, 1998.

need to invest resources into improving internal communications.<sup>95</sup> However, in reality, an internal audience is an important audience for controlling and directing organizational behavior. Behavior can be changed easier and information can be shared better by treating employees like an audience. Information and knowledge only have value if they are distributed throughout the organization.

Training programs can be improved with digital media because engaging presentation of material generates better understanding and retention. Consequently, retention and focused direction creates a higher return on investment for training or communications resources. Organizations realize cost efficiencies from digital training over traditional forms. Corporate downsizing actually leads to an increased demand for digital-media communications applications because companies need to communicate and train with smaller training staffs.<sup>96</sup> Time and distance constraints are lifted as workers can receive training at any time and at any place. Employees can be offered access to forums, worldwide expert knowledge, and collaborative programs. Digital media keep employees current by updating information centrally, as it becomes available. Also, the individual needs of workers can be effectively met by customizing training material to learning styles or desired content. Communication is not limited to down the hierarchy. Employees can not only receive information, they can also communicate back. They often have valuable information that rarely is accessed and utilized. Therefore, an interactive communications exchange with employees empowers the entire organization.

Employees can also be supported in their job function with digital-media communications. For instance, sales support improves with the ability to distribute critical information to a geographically diverse sales force. Information, such as new-product information or product updates, can be received by salespeople at the precise moment that it is needed. Information is acquired more easily digitally, than by sending them a stack of paper. With many systems the sender has the ability to check to see who has accessed the new material or ask questions to ensure recipients understand it.

### ***Business-to-Business Applications***

Business-to-business applications have been extremely successful in using Internet and e-commerce capabilities in the early stages. Communications and transactions among firms change extraordinarily through the elimination of non-value-added costs and time. Electronic transactions are a derivative of Electronic Data Interchange (EDI), a widely used protocol for sending and receiving paperless information between computer systems of multiple organizations, including price and cost information, purchase orders, order status information, shipping advisories, invoices, statements and payment via electronic fund transfers. Philip Cross of PricewaterhouseCoopers states that organizations can no longer afford to waste time and money by sending physical invoices and printing out reports that can be electronically transferred.<sup>97</sup> Electronic transactions reduce data-entry time and duplication, paper flow, and transactions costs while improving accuracy, customer service, shipping, receiving, and cargo tracking and cash-flow management.

Translating EDI to the Internet involves more than changing text into HTML code. Currently the Internet is a computer-to-eyeballs medium. EDI works on a computer-to-computer model. Embedding business meaning into special fields that enable transactions is a goal of setting XLM standards to supersede HTML. This will enable many opportunities for business efficiency, greatly

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<sup>95</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998

<sup>96</sup> SkillsNet, Website.

<sup>97</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

promote the ability to create media-rich on-line product catalogs, and corresponding enrich the ability of buying agents to search product offerings. The Open Buying on the Internet (OBI) standard was developed to provide an easy-to-use, open, standards-based purchasing solution for the procurement of high-volume, low-dollar indirect goods and services. XML, the Extensible Markup Language, adds structure, intelligence, and inter operability to information on the Web or Inter/Intranet. The OBI standard is part of an effort that will greatly enhance both business-to-business and business-to-consumer e-commerce.

The exchange of formerly closely guarded or non-accessible information between organizations' networks occurs either by granting special Wide Area Network (WAN) access to outsiders or linking systems through a Virtual Private Network (VPN) or the Internet. Cross warns that in order to allow access to outside parties, organizations must update or re-engineer their legacy systems for security, privacy, content availability, tracking, billing, and payment.<sup>98</sup>

Organizations can coordinate activities closely by allowing outside parties to access their systems. For instance, an order by a connected customer can trigger an automated process that integrates the transaction with the supply chain. Supply-chain management promotes a system that more closely fulfills downstream demand through reduced communication barriers throughout the supply chain. Organizations can function in essentially a Just-In-Time (JIT) production setting in which stock requirements are greatly reduced. In order to do so and still acquire necessary materials in a timely manner when needed, organizations must also work closely with their suppliers.

The ability to communicate more frequently with other organizations solidifies relationships. Outsides parties will be more tied to firms that provide a stream of valuable communication. If another company has a question, problem, feedback, or request, they can more easily communicate them. Organizations can also provide an open mechanism for receiving communications back. Valuable ideas for business improvements often come from business partners. Companies can perform research or conduct surveys for valuable information, for example about new products or product improvements. These relationship advantages create a competitive advantage over companies that do not communicate as well.

Businesses can also improve conference and speaker support through digital media. According to SkillsNet, slide presentations from a projector are no longer considered advanced.<sup>99</sup> Audiences are now more sophisticated and expect interactive digital presentations at shareholder meetings, sales conferences, product launches, and seminars. Other business interfaces that would be enhanced through digital media include trade show-kiosks, product demonstrations, and point-of-sale displays. Interactive presentations are flexible enough to be easily customized for multiple uses with limited time and effort.

Integration of organizations is critical to facilitate cooperation. Digital convergence will encourage entertainment, communications, and technology companies to seek out new partnerships and alliances. Since they are expanding the scope of their domains, organizations will need to acquire new skill sets. Ensuring the integration of cultures requires planning and commitment. Outside expertise, such as consultants, may be required to help identify acquisition and partnership targets, manage the transaction process, and integrate the organizations. Greater cooperation can be

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<sup>98</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

<sup>99</sup> SkillsNet, Website.

encourage through collaboration initiatives, information sharing, and joint branding. It is crucial for cooperating organizations to achieve trust and mutual respect. Security and privacy of information exchange must be established and communicated. Large-scale cooperation may require the establishment of a leadership body. Rules and enforcement standards, which are objective and related to strategic goals, must be known and accepted by all parties.<sup>100</sup> Leadership must decide how much control members will be given, whether rules will be created formally or informally, and whether compliance will be mandatory or voluntary.

### ***Business-to-Consumer Applications***

Digital convergence changes the relationship between organizations and their customers. Reduced transaction costs, time, and effort contribute to bring suppliers and customers closer together. Electronic commerce brings the market closer to perfect competition. Consumers, armed with full information and minimal transaction costs, can now access more suppliers and the best price-performance combination. As a result, price becomes the primary point of differentiation.<sup>101</sup> Companies operating online are faced with extremely low margins and must achieve operational efficiencies to be successful. And the stakes are getting higher. According to a recent Nielsen Media Research and CommerceNet study on Internet commerce the number of Web shoppers – people checking out or comparing products and services on the Web – is now 48 million, having doubled in the nine months preceding the June 1998 data collection.<sup>102</sup>

New forms of value-added service must be provided to differentiate oneself among numerous suppliers. One of these services is customization. The availability of more information about customer needs and preferences enables businesses to directly respond and organize supply around such information. As a result, tremendous power is shifted to customers. Consumer marketing and transactions become more personalized using any available information. Also, product offerings can be customized. For example, entertainment products can be customized to the preferences of the consumer. Philip Cross of PricewaterhouseCoopers states that customization changes the supply medium of such products from broadcast to narrowcast.<sup>103</sup> Customization can also confer power to those who offer products to a smaller demographic group. Companies that offer niche products or products in niche markets benefit by selling online because they can still narrow the target of their product, yet by reaching a wider geographic audience, maintain high sales levels.

Customization requires a complex process for suppliers. Companies that manage this process the best to offer custom products in a cost-effective manner will gain a competitive advantage over mass-product suppliers. First, the organizations must be able to gather customer information, requiring customer feedback through methods such as registration and purchase records. Secondly, organizations must be able to make assumptions about consumer preferences. A common method involves using datamining to identify purchase patterns or to conduct customer profiling. They also want to determine what motivates customers and what keeps them loyal. The next step is to store preferences for later use with technology such as data warehousing. Since consumers often interact with companies in many ways and in many locations, organizations must be able to integrate multiple customer data sources to provide maximize potential customization. Next, they must identify people as previous customers and match them to the stored preferences. For example,

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<sup>100</sup> *Blueprint to the Digital Economy*, by Don Tapscott, Alex Lowy, and David Ticoll.

<sup>101</sup> LawNMower E-Commerce Panel Discussion, July 29, 1998

<sup>102</sup> [www.commercenet.com/news/press/19980824b.html](http://www.commercenet.com/news/press/19980824b.html)

<sup>103</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

digital methods should enable customer-service personnel to recall all past interactions of a customer, regardless of where in the organization those interactions took place. Finally, companies should tailor product offering to match those preferences. They can also offer additional services based on comparing them to a standard consumer profile.

PricewaterhouseCoopers states that the value of customization can be measured for its impact on customer service levels and its return on investment.<sup>104</sup> The most direct method is through measuring customer retention rates. Secondary methods are also needed to measure payback. Revenue increases with repeat purchases and referrals and costs decline with lower customer-acquisition costs and service efficiencies from dealing with experienced customers. Also, employee retention improves because job satisfaction and pride increase, creating a self-reinforcing loop. An extreme application of customization is to link the homes of consumers to a purchase center.<sup>105</sup> At the end of each month, one can press a button to show what was consumed and another to order replacement items directly from a store.

The most direct gain from of digital interaction between businesses and consumers is in direct selling. Electronic commerce facilitates transactions in a rapid, cost-effective manner to a larger, more diverse group of consumers by removing traditional barriers. From the business perspective, one of the motivating reasons to offer products online should be to increase the value proposition of one's product or service offering. Typically, the value-added services that e-commerce offers are convenience, personalization, and information access. Businesses also sell online to reach a larger market that was previously unavailable due to time and distance constraints. In the early stages of e-commerce, another motivating reason to sell online is the first-mover advantage, in which early entrants to the medium gain a stronghold on the market from effects such as customer loyalty and the ability to sell at a lower price through digital efficiencies. The characteristic of products that are best suited for e-commerce are those that have a large amount of detail information, or metadata. Also, products with vital information, to which consumers traditionally do not have access, translate well to the online environment because consumers seek to balance asymmetric information, for instance when car buying.<sup>106</sup> Product lines with a wide variety of goods also are well suited for e-commerce.

A wide variety of payment offerings exist, with criteria such as basing payment on the size of the transaction, having open, a variety of services, or closed transactions, a direct purpose, offering a range of consumer anonymity, offering different levels of security, and allowing a range of payment timings.

Companies that control their own e-commerce site have an advantage over those that outsource the function because they maintain control over their brand, eliminating the potential conflict of having other misrepresent one's valuable brand.<sup>107</sup> Control also allows more flexibility and scalability of investment. In addition, control over the performance of the e-commerce system can be maintained to ensure consistent service. Finally, it allows businesses to closely manage security. Businesses do not want others using and selling personal information about their customers.

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<sup>104</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>105</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>106</sup> LawNMoweR E-Commerce Panel Discussion, July 29, 1998

<sup>107</sup> LawNMoweR E-Commerce Panel Discussion, July 29, 1998

Other than transaction dollars, online retailers can generate revenue through advertising. Frequently, web sites will contain strategically placed banners, visual and sometimes audible advertising, from non-competing companies. These banners are most successful when they highlight related goods and can be customized to fit a consumer profile. However, a problem with banners is their purpose is to lure consumers away from one's own web site, taking away potential sales. Secondly, the commercialization and flashiness added to one's site can distract consumers and reduce the impact of one's message. A revenue source that can be translated, in a conceptual sense, from physical retailing to online retailing is the stocking fees charged to manufacturers for carrying their goods.

The primary costs of online selling involve maintenance, technological equipment, personnel to manage the system, which currently command a high salary. E-commerce technology needs consist of significant investment in hardware, including servers. Also, software programs to run e-commerce applications including databases, HTML programs, and a packed e-commerce application. Many web sites use high-end features like digital media as added advertising. System maintenance and links to internal processes are also critical systems requirements. E-commerce system design properties should be cross-platform, allow intuitive navigation, and tailored for different access speeds. Systems investment can be controlled by scaling the system in increments based upon return on investment, preventing the under-utilization of highly expensive equipment while still being able to meet unexpected demand surges. Corresponding internal processes can also be scaled with the same investment criteria.<sup>108</sup>

Consumer marketing and customer service also change in the digital environment, especially with the use of e-mail and customer service web sites. The costs of servicing a diverse group of consumers are greatly reduced and the payback of retained customers justifies these expenses. SkillsNet notes that digital communication offers the convenience of responding to customer needs outside of regular business hours.<sup>109</sup> Questions formerly asked by directly contacting a customer service representative can now be satisfied by connecting to a company's "Frequently Asked Questions" web page.

### **Technology Supply Issues**

Technological advances have reshaped the distribution of information and entertainment. Using digital media, content producers can reach a wider and large consumer base faster and cheaper per person than ever imagined. While technology is an enormous industry, the value of its products and services are to facilitate easier use of other activities, such as workplace functions. Technology also serves the media and communications industries by enabling improved distribution and even enhancing the content itself. Therefore, it is critical that technology and its role in digital convergence be viewed with proper perspective. It is not an end product with inherent value alone. Instead, it is the enabling and strengthening force for digital content. Suppliers of technology must clarify their role in providing tools for digital media and expand their understanding of the true end product, digital media.

The cost of technology has consistently decreased while its performance capabilities improve. Consumers and businesses have grown to expect this rapidly improving price-performance ratio for hardware, software, and communications products and services. The cost of communications halves

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<sup>108</sup> LawNMower E-Commerce Panel Discussion, July 29, 1998

<sup>109</sup> SkillsNet, Web Site.

every three years.<sup>110</sup> The ability to access technological tools with better performance for a lower price enables the delivery of complex, digital media applications and is a key driver of ubiquitous public access. Client equipment and mobile appliances need to continue to disaggregate computing systems and improve price and user-friendliness. System components can be downloaded as needed, creating a competitive market to meet customized user needs as opposed to requiring large capital investment for a standard package. In addition to individual user equipment, network servers also need to deliver greater performance at lower costs. Improvements in server processing and system architecture include flexible and dynamic allocation of resources like computing cycles, memory, input/output, and storage bandwidth in response to individual user requirements and changing system loads.<sup>111</sup> Also, the communications price-performance ratio must also continue to improve to provide low-cost availability of bandwidth for digital media transmission. Competition among consumer access, or “the last mile”, suppliers will greatly intensify due to a wider range of options than merely telephony, including cable, wireless, and utilities. Prices should be driven down by competition enough to offer affordable digital media access to the homes and businesses.

Digital-media applications are a significant force in increasing the demand for bandwidth. Exceptional bandwidth demand by businesses and consumers mandates the convergence of technology and communications. Infrastructure investment to provide capacity is widely expected because its demand is so evident and, therefore, those that can supply bandwidth efficiently and inexpensively and can establish a communications standard will capture a large market. However, investors in capacity development face an interesting paradox. The availability of appealing content generates usage of communications networks. Widespread network use motivates investment in infrastructure to meet capacity requirements. However, latent demand for communications services exists as consumers wait for bandwidth to improve, so network capacity stimulates usage. Therefore, infrastructure development and use of communications networks drive each other.

Communications-infrastructure investors must consider how much to invest and when considering the reinforcing effect of capacity. Telecommunications companies must also make decisions about infrastructure investment because they balance two consumer models, information and phone usage. The growth of data network communications has rapidly surpassed phone communications. As data users take up more capacity, telecommunications companies seek to expand service for phone customers. However, telecommunications supply has the externality of motivating data communications within the latent demand. Since the revenue streams from Internet communications is much less than that of phone use, telecommunications firms must establish a model for gaining a return on investment from investment in infrastructure.

Digital convergence requires a great deal of cooperation within and across industry sectors. The fundamental characteristic of the digital convergence environment is the integration of formerly disparate function and tools. Therefore, businesses and industries that operate with an insular approach will need to open themselves up to a more collaborative business model. While the technology industry faces economic and social integration issues for dealing with industries, such as the entertainment industry, it is important to examine the existence of and need for inter-firm cooperation within the technology. The technology industry has historically been quite successful at operating with a combination of a competitive and cooperative model. The need for specialized tools to fit within an overall technological system mandates cooperation among individual suppliers.

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<sup>110</sup> [Blueprint to the Digital Economy](#), by Don Tapscott, Alex Lowy, and David Ticoll.

<sup>111</sup> [Blueprint to the Digital Economy](#), by Don Tapscott, Alex Lowy, and David Ticoll.



The benefits of offering an integrated system offering, while reducing the number of standards for which to develop, exceeds the risk of revealing valuable internal information. According to Roy Messineo of Jeskell, Inc., an IBM business partner, technology suppliers have learned from the Japanese how efficiencies can be achieved by cooperating with partners and suppliers.<sup>112</sup> Messineo also states that the United States Government has traditionally permitted cooperation within the technology industry, though the Sherman Antitrust Act and the Clayton Act prohibit it, because the public has benefited and not been hurt by non-competitive behavior. However, recent developments involving antitrust litigation with Microsoft and Intel may threaten this model.

### ***Inter-Industry Cohesion***

Digital convergence is characterized by the integration of traditionally independent domains. Combining entertainment, technology, and communications into a coherent product and service offering requires a collaborative business model – more of a value network than a traditional value chain. However, the industries and parties involved have diverse cultures, business models, and perceptions of the objective of digital convergence. Success of digital convergence depends on the ability of all key parties to overcome these differences.

Digital convergence offers great potential for providing entertainment content in new and more efficient ways. However, there remains an extensive cultural, economic, and behavior gap between the entertainment and technology industries. Frank Dutro of Silicon Studio states that the entertainment and technology industries lack of deep understanding of each other's needs.<sup>113</sup> Poor understanding of the inner workings by the other industry causes their credibility to be lost. David L. Hankin of Sony Online Entertainment believes that past failures of cooperative ventures creates a reluctance to work together.<sup>114</sup> As a result, many entertainment companies either reduce their technological activities or seek to develop their own technological presence. Likewise, technology companies, such as Microsoft and Intel, have tried to create and grow a creative presence.

The technology and entertainment industries also have different perceptions of what convergence really means and what the target market is, according to Chuck Dages of Warner Bros.<sup>115</sup> Hankin states that each side views itself as the key driver of the process.<sup>116</sup> Technologists tend to look at it based on the technology itself. They value and have interest in technology in itself, seeking to create smaller, lighter, and faster products. Entertainment people are focused on content. It is critical for the emergence of digital convergence for the entertainment population to understand what technology is and what it can do for them. They do not need to be interested in technological innovations, rather the applications of technology for content. There is a wide range of understanding among entertainment executives, especially film-studio executives, of the applications of technology for content. Some studios, such as Disney and Sony are led with a visionary approach to digital-media applications. Others are more focused on the financial bottom line and short-term issues. Scott Fishkind of Red Ant Media Group states that studio executives do not understand the value of Internet content programming.<sup>117</sup> They are content to remain in their traditional arena, one that they clearly understand, and wait for a proven revenue model before investing in new media

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<sup>112</sup> Roy V. Messineo, Jeskell, Inc. – IBM Business Partner, Interview, July 28, 1998.

<sup>113</sup> Frank Dutro, Silicon Studio – Los Angeles, August 18, 1998

<sup>114</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>115</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>116</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>117</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.

forms. Fishkind believes that television executives have a more advance understanding of its power. Visionary, out-of-the box approaches are needed to establish a reason to commit capital expenditures to an undeveloped and unproven market. Entertainment executives must be able to comprehend what the opportunity is.

Entertainment and technology business models are also very different. Marianna Danilovic of KPMG Peat Marwick states that entertainment and media models are very different from hardware and even different from software. Technology companies do not really understand what the entertainment and media models are, how they are financed, or their cultures.<sup>118</sup> Entertainment, especially film, is built around a project structure. A virtual organization exists with most personnel hired on a temporary basis for individual projects. Chuck Dages believes that it is very difficult for a traditional corporation with a very solid product line and structure to understand and manage a project model.<sup>119</sup> He believes the problem lies not in dealing with creative people, but in dealing with the process itself, how the process is actually created and the instability that is inherent in the process that permits success.

Getting the relevant people together and achieving infrastructure deals very difficult. Richard Bernacchi of Irell and Manella LLP states that, since their economic models are so different, people come to the table with different expectations and it is difficult to get them to speak in a common language.<sup>120</sup> For example, a record company moving into Web applications is accustomed to compensation models that do not fit in the World Wide Web arena. Education and time are needed to create a rational economic model for a deal. Bernacchi also states that entertainment companies are often also not equipped to handle the speed with which activities occur in the technology industry. Technology people interacting with entertainment companies are used to rapid change and tight deadlines. For instance, special-effects companies must meet tight deadlines to be used in a film and interactive-game makers have short windows of opportunity for their products to enter the market, due to either seasonal sales periods or an attempt to beat a competitive game to market. Bernacchi states that traditional entertainment areas evolve very slowly over time. They are accustomed to weeks or even months determining what a deal looks like. It is difficult for entertainment executives to accept that they must strike a deal and get started within a couple weeks.

Digital convergence also faces different pressures from city or regional orientations. While the San Francisco Bay Area, including Silicon Valley, is dedicated to technological tools, Los Angeles is focused and centered on entertainment. Between these different perspectives is a gap that is widened by their geographic distance, creating an “us versus them” mentality. Even within Los Angeles, there is tremendous diversity in perspectives toward digital convergence. The Hollywood and San Fernando Valley areas possess a studio perspective, while the South Bay area has view dominated by TRW and Hughes. Also, new-media technology interests are spread out throughout the area, including Santa Monica, Pasadena, and the Ventura Corridor. A less ego-filled environment should be established to reconcile these differences of perspective.

According to Eve Coquillard and Kimberly Caccavo of C2C Media, we must combine and get a sensibility of both the entertainment and technology industries.<sup>121</sup> Integration of these two groups

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<sup>118</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>119</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>120</sup> Richard Bernacchi, Irell & Manella LLP, Interview, August 7, 1998

<sup>121</sup> Eve Coquillard and Kimberly Caccavo, C2C Media, Interview, August 12, 1998.

will not come easily as synergistic opportunities are usually greatly overestimated. Both sides must recognize and handle differences in values, objectives, styles, and business models. Coquillard and Caccavo believe that large organizations will have trouble putting together different types of models. Visionaries like Barry Diller who can acquire and integrate traditional media and technology, such as Web and television models, are needed to prove the value of integration. Chuck Dages suggests that entertainment companies involve technology personnel during the creative process rather than after the fact. They should be presented with the creative plan and be involved in deciding how technology can help serve the creative goal.<sup>122</sup>

The telecommunication industry also faces difficulty in cooperating within digital convergence. According to Chuck Dages of Warner Bros., telecommunications moves even slower than the entertainment industry.<sup>123</sup> Speed is essential to involvement in digital media. If an organization takes a long time to make a strategic decision, they will miss the opportunity and the mainstream market will have shifted away from their target.

This difference becomes magnified when international cultural issues are involved. For instance, the Japanese decision-making procedure tends to differ from that of business in the United States. According to Ed Ifshin of Digital Artists Agency, it consists of a lengthy process of information gathering and a focus on interpersonal relationships.<sup>124</sup> Ifshin states that this model is effective for Japanese companies in a contained economy or an adaptive manufacturing economy, but participation in digital-media initiatives requires great agility. Sue Worthman of MDG.org states that the interactive-communications environment is not for the risk averse.<sup>125</sup> Therefore, organizations entering into the sphere of digital media must understand the cultural, economic, and behavior differences involved with the field itself and among its diverse participants.

## ***Entertainment Industry Supply Issues***

### **Entertainment and Changing Technology**

Technological advances have the potential to advance entertainment creation and delivery to new levels. The two fields have a long history during which technology has attempted to enhance the creative value of entertainment content. However, entertainment has generally resisted extensive technological innovation. Digital entertainment is the most significant technological development in the way that entertainment is created and delivered since sound. Yet sound was resisted by entertainment because it was considered unnecessary. They believed that audiences had no interest in hearing actors speak. This perspective is representative of the fact that entertainment focuses strictly on content and that most technological change emerges from outside the main content-producing firms. Frank Dutro of Silicon Studio states that most often the advocates of technological innovation are directors, such as Robert Zemeckis and James Cameron.<sup>126</sup> However, signs of change are starting to be seen. Advances in DVD, digital television, and electronic cinema are beginning to spring from within powerful content producers. LucasFilm is a film studio that leads in digital innovation, primarily because George Lucas has both creative and financial control. DreamWorks is another example of an aggressive studio approach toward innovation. Disney has diversified into

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<sup>122</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>123</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>124</sup> Ed Ifshin, Digital Artists Agency, Inc., Interview, August 14, 1998.

<sup>125</sup> Sue Worthman, MDG.org, Interview, August 14, 1998.

<sup>126</sup> Frank Dutro, Silicon Studio – Los Angeles, August 18, 1998

many areas of new media, including DisneyQuest, an interactive, urban theme park. Their progressive philosophy is fostered by strong executive support and tremendous investment resources.

The primary inhibitor of technological acceptance among entertainment providers is the inability to perceive where technology will take the industry. According to Chuck Dages of Warner Bros., most entertainment companies have not determined why they should change the essence of what they are doing today to something new.<sup>127</sup> As a result, most technological use in the film industry has been limited to special effects. Many entertainment leaders are hesitant to commit new technologies because of past failures. Patrick Kearney of MediaOne states that, given their massive investment in and the lukewarm public reception of DVD, many industry leaders are not ready to dive headlong into another delivery channel.<sup>128</sup> Also, many companies that had failed interactive television trials are taking a more conservative approach.

Entertainment producers and their technology departments exhibit a wide range of expertise, acceptance and aggressiveness with respect to innovation. Guy Langvardt of Compaq Computer Corporation states technology departments vary based on the particular needs of the mission that they have and the philosophies, approaches, and cultural environment of their companies.<sup>129</sup> Entertainment executives have a diverse range of vision for technology. Marianna Danilovic of KPMG Peat Marwick states that too many models focus on current user patterns, for instance on television or the narrowband Internet.<sup>130</sup> She adds that they need to look ahead to see exactly how new technological initiatives will be funded. Scott Fishkind of Red Ant Media Group expects that a new wave of studio executives who see a model for the medium will emerge.<sup>131</sup> Cautious leaders will make the necessary changes as soon as revenues from and demand for digital media surpasses that of traditional media. The question remains whether that point will be too late for their organizations to catch the competition.

Entertainment companies need to embrace the era that we are in, according to Guy Langvardt.<sup>132</sup> Technological change will increase rather than slow down. Langvardt states that the entertainment industry must take advantage of opportunities that technology presents. Speed is essential in the digital-media age. By waiting to commit, the threat by competition magnifies and slow progressing initiatives will lag demand by the mainstream market. Digital media and interactive communications are not arenas for the risk averse. Despite uncertain outcomes, one must be willing to invest in multiple technologies in order to be positioned for the winning technology without knowing which one will emerge.

## Economics of Transition to New Media

Traditional media companies will transition into the digital media when the value becomes apparent. Entertainment executives that today lack the vision or aggressiveness to commit to digital media will make changes when demand for technology-driven entertainment grows and threatens their

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<sup>127</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>128</sup> Patrick Kearney, MediaOne, Interview, September 2, 1998.

<sup>129</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

<sup>130</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>131</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998

<sup>132</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

traditional media base. Kimberly Caccavo and Eve Coquillard of C2C Media believe that it only takes one success story for a specific type of business model to open the doors and everyone will rush toward it.<sup>133</sup> Since technology programs require tremendous capital expenditures, technological initiatives require improved evaluations of the return on various investments. Currently, the cost-benefit ratio is not favorable enough to justify full-scale deployment of programs, such as video-on-demand. Firms must have the vision to consider how technology can help reach a wider base of consumers with richer creative content for a lower cost per consumer. Investments should be based in the premise that technology serves the creative vision, not vice versa.

Firms must also consider what the risk of not being positioned correctly for a new age of entertainment. Content producers do not want to be left standing without a foothold in the future. Lloyd Pentecost of IntrActv warns that companies must realize that there will not be a quick investment.<sup>134</sup> He notes that successful, skilled, and well-intentioned people quickly entered digital-media production early and created poor products. They did not understand that one has to develop a product line, for instance. Pentecost states that product lines require time to establish a name in the marketplace and need to be nurtured and developed over a period of time, especially with an inexperienced production team. Most major studios, publishers, broadcasters, game companies, and software companies started an interactive division, but many discontinued these divisions. Entertainment companies should not rush to market and should instead create a solid, focused product. The product cycle has to be realistic to make good decisions. Gary Ghaiey of the City of Los Angeles expects to see a shakeout of digital-media companies with traditional media companies buying out small new-media companies to establish a place in the market.<sup>135</sup> Startup companies have strong potential to surpass media giants because digital media success requires agility and an entrepreneurial approach.

Up until now, the primary use of the Internet by entertainment companies has been as a secondary marketing tool. It is critical to the growth of digital convergence that a revenue model for entertainment on the Internet is established. One business model consists of film and television properties being transferred over to the Internet environment. Scott Fishkind states that the revenue sources would be in advertising to potentially limitless audience, product placement, and the licensing of individual online shows and brands back into the film and television markets.<sup>136</sup> Another model combines traditional programming, the Internet, and transactions. Revenue sources include advertising, transaction revenue, and license fees toward cable operators. Kimberly Caccavo and Eve Coquillard foresee that syndication would progress from licensing a show for a certain number of major network runs, followed by broadcasting on cable networks, and finally to an Internet run.<sup>137</sup>

The shift to a transactional-revenue environment is significant change in the entertainment business model. Traditional revenue models were based on advertising, subscription fees, or some form of event fee, such as a movie ticket. Transactions offer the potential for another source of revenue. Most entertainment companies have not invested a lot of time and money into programs with a transaction offering due to strong competition in their current arena. Only a few select industry leaders, such as Barry Diller, have recognized and pursued the transaction model. QVC and the

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<sup>133</sup> Eve Coquillard and Kimberly Caccavo, C2C Media, Interview, August 12, 1998.

<sup>134</sup> Lloyd Pentecost, IntrActv: Designer and Producer of Interactive New Media, Interview, August 3, 1998.

<sup>135</sup> Gary Ghaiey, City of Los Angeles, Interview, July 13, 1998.

<sup>136</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.

<sup>137</sup> Eve Coquillard and Kimberly Caccavo, C2C Media, Interview, August 12, 1998.

Home Shopping Network are examples of broadcasters that are trying to integrate transactions into their business model. Caccavo and Coquillard believe that transaction revenue will eclipse advertising revenue by a large amount in the near future.<sup>138</sup> They state that, as the audience of a type of content increases, people will begin to think of these places when they want to buy related goods.

### **Economic Value of Interactive Media**

Entertainment companies have the potential to use interactive media in their creative content. The value of interactivity for entertainment depends on the return on its investment and how interactivity serves creative objectives. There is no direct, linear relationship between interactivity and its value. Content does not always improve with more interactivity. Unrealistic expectations of what interactive media is and what it can do have been a problem that has plagued interactive-media producers. They must address such difficulties as how to measure return on interactive investment versus other projects that resources can be used on. For instance, if a project can be produced for \$1 million and with interactivity for \$2 million, they must determine whether the value of interactivity justifies the extra expense.

Businesses have tremendous opportunities to serve their customers better using interactive media. Customers can become more excited about the product, and the message is more likely to be ingrained in their minds. Businesses considering using interactive media should fulfill certain requirements. Pentecost states that content producers' main considerations are the business objectives, the target audience, the subject of the program, the scope.<sup>139</sup> The media form that will best present these goals should be pursued.

### **Entertainment Business and Marketing Trends**

Digital convergence enables certain trends in the entertainment industry to be capitalized upon. In some cases, the trends themselves were initiated due to advances in digital media. Entertainment content has evolved from a stand-alone product to become more of a brand franchise. Convergence has taken on an additional meaning as entertainment forms and outlets have converged. For instance, films have become more of a franchise with wider distribution opportunities, including video, television, computers, and hybrid devices. Also, themes and characters now transcend content forms. Entertainment works, especially those that have strong digital content in its original form, cross over from film to computer games, computer screen savers, web sites, television series, merchandise, retail stores, and theme parks. Brand extension can also happen in the opposite direction. For instance, Teenage Mutant Ninja Turtles was a successful video game that was then developed as a television animated series, and finally was produced as a live-action motion picture. The percentage of the revenues for an entertainment product that comes from its original form is shrinking and ancillary markets are becoming more lucrative.

There is also an increase in the reuse of entertainment material for multiple work and multiple marketing media. Digital media has enabled rapid and inexpensive repurposing of content. Special-effects and post-production companies facing ever-increasing costs are able to quickly and economically use some components of already used material. Also, digital content, including characters and scenes, can be used to efficiently produce marketing materials.

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<sup>138</sup> Eve Coquillard and Kimberly Caccavo, C2C Media, Interview, August 12, 1998.

<sup>139</sup> Lloyd Pentecost, IntrActv: Designer and Producer of Interactive New Media, Interview, August 3, 1998.

Efficiencies in production and increases in the number of outlets allows the entertainment industry to provide more niche content as opposed to concentrated, mass-oriented, material. Key distribution channels, including the Internet and digital television, have the low-cost and broadband capabilities. Another enabler of the targeted entertainment trend is greater access to individual customer information. Howard Rudzki of Kids Universe states that those companies that can control information about consumers will be the main players.<sup>140</sup> The entertainment industry is much more in contact with their customers. In the past, broadcast or film companies reached their consumers solely through intermediaries, such as theatres. Today, there is greater one-to-one relations. New initiatives by Intel (Digital Transmission Control Protection) are aimed at insuring that copyright and other aspects of intellectual property can be protected even in this one-to-one conveyance of digital content.<sup>141</sup>

A negative consequence of convergence results from the proliferation of new entertainment options and new technologies. Philip Cross of PricewaterhouseCoopers states that these new options have fragmented the consumer market and weakened the ability of the traditional media for cost-effective deliver to mass audiences.<sup>142</sup>

### Effect on Content Presentation Formats

Entertainment companies seek as many paths to the consumer as possible. Digital convergence and the migration to a digital-content platform create a potential for many new presentation channels for the same production. Currently, the main media are theatres, television, and video. Digital technology has created growth opportunities for new formats including DVD, video-on-demand, interactive media, and digital television sets. For publishers, digital content changes the economic model on the fulfillment side by speeding delivery, which reduces costs and increases margins, allowing efficient material updates, and enabling customized, component-based material.<sup>143</sup> Success of new digital formats depends on the ability of technologists to explain it in terms that the entertainment and business people can actually embrace. Therefore, technology should be positioned as servicing the creative process and providing a somewhat measurable return on investment.

According to Chuck Dages of Warner Bros., digital technology extends the life of brand franchises by enabling studios to resell existing copyright material, or intellectual property, to multiple outlets.<sup>144</sup> Dages adds that movie studios did not always view new mediums in this manner. Many once feared that cable, video, and television would destroy the film market. They let their film libraries languish in the 1960's and 1970's and actually destroyed some film because their vaults were full. However, many people now believe that video and television now actually increase film demand. David Hankin of Sony Online Entertainment asserts that stale intellectual property can be revived through new distribution formats.<sup>145</sup> Intellectual property outlet management also generates additional revenue through licensing. By tracking definitions of outlets, such as distinguishing between premium and standard cable channels, content producers, which usually only license

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<sup>140</sup> Howard Rudzki, Kids Universe Toys and Software, Interview, August, 1998.

<sup>141</sup> Intel Developers Forum, September, 1998.

<sup>142</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

<sup>143</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>144</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>145</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

content to one outlet type in a region, can sell to additional worldwide outlets and avoid conflicts. They can also charge an appropriate licensing fee based on the definition of the channel.

Platform technologies including the Internet, satellite transmission, digital television, and set-top boxes bring information to a larger, more diverse, international audience. This ability facilitates the targeting of messages for micro-marketing. Distribution over the Internet possesses a different economic model than traditional media distribution, such as films. Currently, movies are distributed to theatres, followed by pay-per-view television, video, and eventually a hierarchy of television programming. Entertainment leaders must consider how Internet distribution of content will change the timing of the licensing and distribution cycle. Additionally, Internet bandwidth still must be increased to allow large-scale distribution of high-quality entertainment content.

### Effect on Entertainment Marketing Initiatives

The availability of digital content dramatically impacts the marketing functions. One of the most valuable uses of digital media for marketing purposes is the repurposing of scenes, characters, and themes. A full-scale marketing campaign can be created on computers using content already completed for the original production. For example, a movie poster can be easily created to have a certain look without having to spend money and the valuable time of talent on a special photography shoot. Gray Ainsworth of MGM Worldwide Distribution states that technologies such as frame-capturing software from a digital-motion component provide the tools to reuse and modify existing creative material for marketing programs.<sup>146</sup> Ainsworth adds that material can be used for research or supporting clips on new projects. Entertainment companies can also customize marketing materials, including targeting advertising to fit diverse international markets. Repurposing also extends the life of content by transforming it into a dynamic work.

Digital convergence also provides entertainment with an additional advertising medium. This application of technology is the most prominent model today. For instance, Scott Fishkind of Red Ant Media Group notes that most entertainment-based Internet platforms are aimed at marketing stars, television programs, or films.<sup>147</sup> In most cases, it is a secondary advertising tool for another product or medium, rather than a product in itself. Offering digital media programs as part of a larger media mix is a powerful form of advertising that uses cross-selling and gives consumers a “personal portal” to the intellectual property. Proof of the growth of digital advertising can be seen in the expectation of a Web presence for films or other entertainment forms. David Hankin notes that no conclusive evidence has been provided that an online presence creates a marked increase in ticket sales or viewership, or vice versa.<sup>148</sup> Entertainment companies draw consumers to their Web presence with interesting content, links to other sites, contests, prizes, discounts, and free downloadable software.<sup>149</sup>

One of the goal of these web sites are to promote existing businesses and products through crossover branding. Another objective is to increase brand awareness and customer loyalty. Content producers can create a virtual online community using interactive games, interaction with stars, plot updates, and additional information about their favorite entertainment. Film studios rely on their

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<sup>146</sup> Gray Ainsworth, MGM Worldwide Distribution, August 10, 1998.

<sup>147</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998

<sup>148</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>149</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.



online presence for pre- and post-movie publicity.<sup>150</sup> They use audio, video, and animation and interactive activities to produce a high-concept, thematic site. In addition, they offer links to other sites for additional information or cross-branding. Movie studios are also venturing into transactional activities, such as selling related merchandise. They can directly support the original work by displaying the nearest theatre to the consumer and even sell tickets online.

Music companies utilize web sites similar to those of movie studios to promote their music material. Online applications such as audio clips and online concerts revive the concept of the single promoting an album.<sup>151</sup> Newspapers and magazines use digital media to reach a wider audience for their publications. They attract customers through ease of distribution, online discounts, and offering more information than in the print publication. Publications even advertise in print, referring people to their web site for more information. Broadcast companies also promote shows with features, entertainment, and information that complement their broadcast schedule. Sites dedicated to specific shows or to larger media groups offer clips, online chats, access to stars, more information, and breaking news.<sup>152</sup>

Digital media for marketing also provides entertainment companies with valuable early experience in developing marketing and promotional content in new-media formats. They are able to learn about the cooperative requirements within a marketing organization and what types of marketing works well in this medium and what types do not. This experience includes learning the right balance of media, how often to update, and what types of content are best suited to be translated into a digital environment. Another marketing use for digital content by entertainment companies is the reduction customer-service costs. They can also demonstrate new products, for example, by building up new stars or material through online event publicity. Content producers can also obtain feedback, and conduct market and competitive research.<sup>153</sup>

Distribution efficiencies enable content providers to expand their geographic reach and market to diverse audiences. This marketing potential is valuable because the greatest percentage of new Internet users will come from international markets. David Hankin states that entertainment companies can market better because they are more in touch with who their customers are.<sup>154</sup> Through processes such as registration, they can use data to market directly to consumers. However, Erica Gruen of The Food Network warns that some studies indicate that registration can cut down on online traffic by as much as 70 percent.<sup>155</sup>

Hankin adds that digital marketing can keep a brand fresh. For instance, when Jurassic Park was being made into a sequel, they used theme parks and digital-media applications to maintain the public's excitement for the franchise during the interim. A danger that all entertainment companies face when operating online is the easy theft of intellectual property. Content providers must perform a cost-benefit analysis of placing content online, balancing the value of greater exposure through advertising and marketing versus the risk of lost intellectual property.

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<sup>150</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>151</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>152</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>153</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>154</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>155</sup> Erica Gruen, TV Food Network, Interview, August 25, 1998.

A third use of digital media for marketing functions is the extension of a work's brand franchise to new products and ancillary markets. Philip Cross of PricewaterhouseCoopers states that this strategy is particularly effective when there exists synergy between business units, such as publishing and studios, sports teams and cable networks, and animation properties and theme parks.<sup>156</sup> While film and television properties often extend to other products, the process can also work in reverse. Lloyd Pentecoste of IntrActv recalls that Fox Hunt was a CD-ROM interactive story game that had its rights sold to a movie and later received a television series deal.

Finally, entertainment personnel can use digital media to market themselves. Pentecoste gave the example of a CD-ROM produced by the Screen Actors Guild that was essentially an advertisement for actors and actresses. Producers could reference a performer and find any information about the actor, see a clip of their work, and place them on a layout with other actors that they are considering for the project to see how they look together.

### Digital Distribution to Public

Placing creative content in the digital format greatly reduces the physical burden of storage and distribution. Distribution to the public and to intermediaries can be achieved more widely, quickly, and inexpensively compared to physical distribution. Technologies such as satellite transmission, Internet applications, and others enable digital content to be stored and transmitted electronically. Alternatively, digital content can be stored on a physical medium such as a CD-ROM or DVD disk. Frank Dutro of Silicon Studio states that film studios would like to distribute digital files to theatres in an easier, cheaper, and quicker manner.<sup>157</sup> The replication of content would also be simpler, as opposed to creating many film prints. PricewaterhouseCoopers estimates that annual print and distribution costs exceed \$100 million for major studios. However, theatre operators are not likely to switch over to extremely expensive digital equipment until there is a proven market demand for the digital presentation experience. Ubiquitous access to digital television by the public will be required for entertainment companies to aggressively pursue a new production and distribution system. Though the distribution model changes a lot due to digital media, entertainment companies still seek intermediaries with the greatest return on investment.

### Digital-asset management

As applications increase for digital formatting of entertainment works, control and use of digital media process grows in importance. Activities including the production, manipulation, marketing, storage, and distribution of digital media are frequently referred to as digital-asset management, or sometimes media-asset management. The terminology of these phrases indicates that entertainment sectors, including film studios, radio and television broadcasters, and book, newspaper and magazine publishers, have begun to realize the business value of digital processes. A key objective of digital-asset management systems is to maximize economic return from creative content by locating, preparing, tracking, marketing, billing, and receiving compensation for entertainment products.

Digital content and digital-asset management reshape the creative production process by making possible its disaggregation into smaller component parts. Greater value becomes attached to the pieces of content production. In recent years, the entertainment industry has increasingly distributed its activities outside the main producer. Digital-asset management further extends production from a concentrated to a global, virtual process. Outsourcing of processes has become much more

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<sup>156</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

<sup>157</sup> Frank Dutro, Silicon Studio – Los Angeles, August 18, 1998

common as technological advances allow producers to access talented people worldwide in a cost-effective and timely fashion. Highly complex, skilled activities can be contracted on a temporary, project-oriented basis to specialists, such as special-effects or interactive-media companies. Chuck Dages of states that experience at Warner Bros. has shown that capital and talent-intensive activities are better handled in the venture capital, freelance market than within a large, structured organization.<sup>158</sup> He adds that change is so rapid that the value of equipment and talent fluctuate greatly, so outsourcing spares the risk of investment. An added value to entertainment companies is that they can focus on their core strengths. In essence, they become information hubs, connecting business units. Producers and directors maintain full creative control to ensure the excellence of the overall production and integrate parts. Future production may consist of sitting at a computer and combining disparate elements into a coherent work.

Another substantial ability enabled by digital media and digital-asset-management capabilities is the modification of content for new uses. Creative content gains an extended life by opening its use to multiple projects. Entertainment components can be used multiple times to save on production time and costs. In an environment where post-production and special-effects demands are increasing and schedules are shortening, effects, or partial effects, can be re-used and scenes can be created that simulate a location. By reducing the need for expensive location shots or re-shots due to creative or technical issues, production location time and associated costs can be saved. Also, the creative process can actually be enhanced because more attainable effects and locations permit the realization of a previously impractical creative vision. Content can also be repurposed for marketing use to support the original production.

Through the combined power of a distributed production process and repurposing of content, the entertainment industry faces an unparalleled potential for collaboration. The creative process can involve multiple people and organizations using the same material for multiple purposes. Production has become increasingly modularized with content separated into parts that are worked on separately, such as sound and special effects, and later integrated into a whole work. Guy Langvardt of Compaq Computer Corporation states that major entertainment-development products are more frequently done in multiple locations all over the world.<sup>159</sup> He gives the example of Disney using animators worldwide to build a feature-length animation. Collaboration opens access to specialized or less expensive talent anywhere in the world. Production can move outside of expensive areas, such as Hollywood, to more favorable markets, for instance, where fewer labor-union problems exist.<sup>160</sup> This ability reduces the need for entertainment companies to spend enormous amounts of money to attract talented people to move near them, such as to the Los Angeles area.

Gray Ainsworth of MGM Worldwide Distribution states that the entertainment's virtual enterprise can be supported by their ability to closely monitor the production process from headquarters.<sup>161</sup> For instance, studios can view film dailies and provide feedback more frequently and quickly. He believes that film studios will eventually be able to view production live on their computers. Collaboration technological tools are needed to ease the integration of separate components and distributed workers. Videoconferencing and online editing, such as shared sketch notes, of digital

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<sup>158</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>159</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

<sup>160</sup> "Media-asset management: How Computers are Transforming the Entertainment Industry," Hollywood Reporter Whitepaper – Sponsored by Sun Microsystems.

<sup>161</sup> Gray Ainsworth, MGM Worldwide Distribution, August 10, 1998.

content allow parties separated by thousands of miles to share creative vision and communicate effectively. Frame-capturing software can be used to acquire stills for discussing scenes. Time codes and metadata can mark areas for discussion and include notes for review. Langvardt adds that collaboration has enormous infrastructure requirements. It is critical to protect the high standards of the intellectual value of the project being worked upon.

The extension of production caused by collaboration to an international setting requires a communications infrastructure with high-speed connections. John Hughes of Rhythm and Hues Studios states that most international communications involving entertainment collaboration currently uses telephone modems that transmit at 56kb per second at best.<sup>162</sup> He adds that most international modems are slower than those in the United States. Since most entertainment companies currently lack their own high-speed connections and need a method to quickly transmit creative works, they should obtain a point of departure with access to high-speed, low-cost transmission. Reaching foreign talent requires an open-networked, international facility. In addition to domestic content producers reaching foreign markets, foreign companies that operate in the United States require a link back to their base country. For instance, Japanese companies frequently shoot commercials in the United States. They need access to a communication network linked to Japan and facilities that are accommodating to Japanese activity.

In addition to the need for large amounts of bandwidth to send enormously large content files, there are other significant obstacles to overcome to realize efficient collaboration. A lack of standard platforms and components makes integration of distributed content difficult. Also, cultural and language barriers increase as entertainment enterprises extend beyond their regional borders. Scheduling difficulties are more likely to be a problem when multiple organizations and individuals are involved.<sup>163</sup>

Digital-asset management also speeds the time to market of entertainment products. The cycle time of production is greatly reduced as processes are separated and recombined efficiently. Frank Dutro of Silicon Studio notes that completing projects and capturing revenue faster is extremely valuable considering the time value of money and the enormous interest payments due from project financing.<sup>164</sup> Also, since creative works are perishable products, meaning their value depends upon current events and styles and the ability to reach the audiences before similar competitive content does, release timing is crucial. Specialization of content components not only leads to better quality, but faster production. Collaboration speeds the process by enabling instant approval of content usage type or material edits. Also, problems can be quickly discovered and overcome. Ainsworth gives an example of a technical problem with a copy of a title sent out to a channel. They can identify the problem quickly and send a corrected replacement copy. Paperwork and delivery delays are reduced. Changes to content can be made all the way up to the point of release. Finally, delays are removed because monitoring and feedback are more frequent and timely. An important consideration is that the ability to speed entertainment products to market places even more pressure on entertainment companies in a competitive environment. Also, shrinking production schedules may sacrifice the

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<sup>162</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998.

<sup>163</sup> "Media-asset management: How Computers are Transforming the Entertainment Industry," Hollywood Reporter Whitepaper – Sponsored by Sun Microsystems.

<sup>164</sup> Frank Dutro, Silicon Studio – Los Angeles, August 18, 1998

time for creative reflection by the creator.<sup>165</sup> However, this issue will vary in importance depending on the power of the creative talent involved.

Fundamental to the use of digital content is the technology to create digital versions of entertainment. Telecine is the process of converting film to digital video. Telecine transfer is a capital and labor-intensive process. The cost of placing a 90-minute film on magnetic tape is about \$5,000 to \$50,000 and \$15,000 to \$100,000 for HDTV tape.<sup>166</sup> Also, a skilled technician and editor are needed to manage the complex process. The creative worth of the material can be affected by the skill of a colorist in fixing a scanned image that has lost resolution. Their decisions made regarding the image position and color of each scene can restore or redefine the creative vision. Video, audio, and text cost less to transfer into digital form, but still do require scanning and proofing. Based on the tremendous cost and risk involved in digitizing material, entertainment companies are prohibited from converting their entire asset libraries. However, since digital assets provide great opportunities, they must make decisions on how much and what content should be digitized. A thorough analysis of individual and aggregate return on investment from digitization should be performed.

If collaborative entertainment creation is to be realized, entertainment companies need to have systems for storing, managing, and securing their valuable creative content, both comprehensive and completed works and component and unfinished works. Large volumes of material must be stored in an easily accessible content library. These systems are increasingly available due to the decreasing cost of storage servers and the availability of databases and advanced search and retrieval systems. Content producers must also have an efficient and cost-effective system for loading materials into the storage system. The storage server must be linked to a high-speed, wide-area network that enables wide access to centralized storage.<sup>167</sup> Storing material in a concentrated location reduces costs from storing at and serving multiple locations and inventory and distribution costs. In addition, the costs of storage and distribution can be reduced by using the server and distribution network for more multiple purposes.

Referencing digitized material mandates that a system be established that indexes content for later recall. When someone needs creative material for a specific purpose, they must have the ability to easily search for and retrieve content that matches their vision. Therefore, all stored content should have detailed information, often referred to as metadata, stored in a system that links directly to the content file. Such information includes the location of the asset, a description of the material, and contractual information to speed the navigation of legal issues. Descriptions of material should include specific such as percentage of color, composition, pattern, texture, or shape.<sup>168</sup> To ensure accurate logging of metadata, content creators should have direct responsibility for cataloging material upon completion. In addition to new material, edited content requires further indexing and the generation of multiple versions of content, reflecting any manipulation of the work. Standardization of indexing systems is critical to successfully tracking and retrieving stored content. Users must have a compatible interface and search application and indexing style and language must

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<sup>165</sup> “Media-asset management: How Computers are Transforming the Entertainment Industry,” Hollywood Reporter Whitepaper – Sponsored by Sun Microsystems.

<sup>166</sup> “Media-asset management: How Computers are Transforming the Entertainment Industry,” Hollywood Reporter Whitepaper – Sponsored by Sun Microsystems.

<sup>167</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>168</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

be standardized. Search engines must efficiently use logic and keywords to sift through large volumes of content.

Due to the disaggregation of the production process, tracking of digital content must be performed on a greater number of and small-sized component elements. Numerous versions must be tracked and identified easily. The approval process for editing material or using content for new purposes should be sped with an efficient tracking system. In addition, integration of component parts requires detailed logs to communicate project status. The use of material across projects should also be tracked and coordinated so that entertainment companies do not duplicate work.

PricewaterhouseCoopers states that open standards are needed to foster inter-operating pieces with the goal of a seamless production organization.<sup>169</sup>

If entertainment companies are to leverage the opportunities offered by digital-asset management, they must allow wider access to valuable content. Inherent in increasing such availability is the risk of theft of an entire asset or its intellectual property. Although digital storage has the potential to be more secure than other forms, digital content can be distributed instantly worldwide, instantly destroying its innate value. Demonstrating the danger of asset theft, the majority of Fortune 1000 companies have had a break-in to their systems with 60% incurring losses of greater than \$200,000 per break-in.<sup>170</sup> Authority of use and distribution of digital content must be established, communicated, and enforced. Gray Ainsworth states that firms must control who has access to content in order to gain its full revenue potential.<sup>171</sup> Tracking and reporting systems are needed to ensure that royalties match contract and revenue-sharing agreement terms.

Authorization and security tools must be available to simultaneously offer easy access to authorized users and stop theft of creative material. Security should be customized to fit only the authorized activities of each user. Allowing a common access to all authorized parties, regardless of usage type, exposes companies by allowing access to people that far exceeds their specific needs. Password protection tools should grant different access rights based on authorized uses only. A process called digital fingerprinting creates a security record of which people accessed the file, what files were accessed, and how long they used it for including file check-in and check-out times. Tampering with creative content can be tracked by requiring that asset changes be checked and approved by an authority before the original is replaced. Digital watermarking is a process of placing non-visible digital bits within the actual content file that details ownership. The watermarking can be referenced to prove the proper and legal use of creative materials. Exposure to digital-asset theft can be reduced by offering only limited use of material, rather than the complete work, when needs are minimal. The use of a thumbnail, a lower quality, less detailed version of creative work, can be offered while maintaining the original material in a secure location.

Rights tracking of intellectual property must be systematized. Typically, a contract for a creative work is written granting intellectual property rights for the main medium. Some clauses are also written for ancillary mediums. Richard Bernacchi of Irell and Manella LLP states that a determination must be made whether the scope of rights that was granted allows one to use content

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<sup>169</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>170</sup> "Media-asset management: How Computers are Transforming the Entertainment Industry," Hollywood Reporter Whitepaper – Sponsored by Sun Microsystems.

<sup>171</sup> Gray Ainsworth, MGM Worldwide Distribution, August 10, 1998.

for other purposes, for instance transferring from film to television or television to video.<sup>172</sup> He states that a fact-based analysis should be performed based on what the contract provided and what the parties intended. Another rights issue involves conflicts between the use of material and contract limitations, such as with talent. The use of talent becomes more complicated as more uses for content become available.<sup>173</sup> Bernacchi notes that if one has a sophisticated method of dividing up assets, it can be used for more purposes, thereby creating more conflict. John Capano of William Morris Agency explains that when talent agencies strike a deal, they have clauses in the contracts that say it can be used in certain markets for certain periods of time.<sup>174</sup> Similarly, digital uses are another way to divide up revenues. Capano adds that future deals will address distribution forms when compensating talent. Improper use of material may cause legal action or ill will on the part of talent. These restrictions limit the ability of content producers to use their material for multiple purposes including customization, in international markets, and using different formats. Digital-asset-management systems should be designed to compare any content changes against a rights approval database. Also, the industry should look into restructuring talent contracts to allow greater flexibility, yet this may be resisted due to the greater income potential for talent.

### Combined Media Experiences

Digital-media applications create opportunities for multiple levels of interaction between content providers and the public. Kimberly Caccavo and Eve Coquillard of C2C Media foresee the emergence of a combined media experience.<sup>175</sup> Digital convergence presents an opportunity to use a mass market, such as a cable or broadcast channel, and combine it with the power of the Internet. New content providers will combine traditional entertainment, with Internet-based information, and a transactional element. Marianna Danilovic of KPMG Peat Marwick notes that this new media form is not interactive entertainment. Instead, it is interactive information and communication with a source of entertainment.<sup>176</sup> She adds that entertainment forms are not being taken away from the public or replaced under this model. Rather, a service is added that is an additional utility that the consumer never had before.

Caccavo and Coquillard add that one can enjoy entertainment as it is or dig deeper and interact at some level, whether that be pointing and clicking on a character to find more information, asking about topics discussed in the program, or purchasing goods referenced on the show. The extreme of this last transactional environment consists of entertainment for which everything is for sale, similar to the depiction in the movie, “The Truman Show.” Danilovic provides the example of watching a basketball game and deciding to buy tickets for an upcoming game on the spot, as opposed to getting up and leaving the game to make a call or forgetting to do it later on. The opposite of this entertainment-driven search for information and purchases is a database of information that allows a search for entertainment sources dealing in related subject matter.

The component parts of an organization offering a combined media experience would be a traditional broadcast-network base, a typical production company, and transaction-based firms such as the TicketMaster or the Home Shopping Network. The range of offerings could be as simple as

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<sup>172</sup> Richard Bernacchi, Irell & Manella LLP, Interview, August 7, 1998.

<sup>173</sup> Gray Ainsworth, MGM Worldwide Distribution, August 10, 1998.

<sup>174</sup> John Capano, William Morris Agency Inc, Interview, August, 1998.

<sup>175</sup> Eve Coquillard and Kimberly Caccavo, C2C Media, August 12, 1998.

<sup>176</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

niche programming with minimal interactivity in the digital-television space or as complex as broadband networks that allow consumers to have simultaneous use of television and the Internet. The types of programming that best make the transition are information intensive and allow multiple levels of interaction for a deeper, richer experience. For instance, programming in which audiences can consume entertainment, follow it up with additional information searches, and e-mail or have discussion groups with others about the subject. Caccavo and Coquillard add that short-form entertainment, such as music videos, are also better suited than long form, narrative storytelling. Also, more customized or targeted entertainment, such as news or sports, will transfer well to the combined media arena. They state that such specific programming, such as E! and Home & Garden Television, which targets a specific demographic mix, creates a reciprocal relationship between broadcasters and the audience. Audiences will seek out specific programming based on a need. They believe that broad broadcasting organizations, such as the major networks, will not translate as well because the reason for interaction by the public is too diffused. Branded programming allows programmers to know exactly who their audience is. Patrick Kearney of MediaOne adds that those content providers that can integrate media in a seamless manner will be most successful.<sup>177</sup>

Skeptics of the combined media experience contend that it has more of an intellectual appeal than a base in consumer behavior. Erica Gruen of the Food Network believes that there is no proof that people will watch longer or more often based on a mixed media.<sup>178</sup> Since the business must be measured against these two standards, proof must be established to justify investment and departure from an already successful model. A proven and lucrative revenue model must be established for such a shift to occur.

### Original Content Production for the Internet

Due to low-cost distribution and increasing availability of bandwidth, there have been many predictions of a future of original content production directly for the Internet. Scott Fishkind of Red Ant Media Group states that the argument is that for a low cost, starting at \$100,000, one can create an engaging show on the Internet using an applet or a proprietary application running off the desktop computer that streams media.<sup>179</sup> This ability would enable content producers to launch programming brands and to test shows, products, and brands online with very little pre-production and overhead costs. Fishkind believes the Internet offers tremendous opportunities to brand programming, create new properties, and offer unique delivery systems. Slow progress has been made to date because the budgets and investment resources that are available for network television are not yet available of Internet programming. Original online programming does not have as much media exposure as other online applications. Fishkind notes that most online entertainment is a secondary advertising medium.

The key success factor for realizing original online programming is the creation of strong story delivery. Fishkind explains that it cannot be based in the hype of being online. Online programming will only when the technology and the Internet are no longer the focus. By comparison, people are no longer conscious of film technology when they are in the theatre, yet streaming technologies such as Shockwave and QuickTime have gained more attention than the stories that they transmit.

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<sup>177</sup> Patrick Kearney, MediaOne, Interview, September 2, 1998.

<sup>178</sup> Erica Gruen, TV Food Network, Interview, August 25, 1998.

<sup>179</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.



## Customized Creative Content

In addition to customizing marketing materials using completed digital assets, creative content can be personalized to fit the preferences of diverse consumer groups. Today, entertainment companies have a much deeper understanding of their customers, which enables them to customize their content for a more direct, more meaningful entertainment experience. PricewaterhouseCoopers states that, in order to overcome information overload, a new form of value-added service can be achieved through sourcing, gathering, analyzing, and packaging information.<sup>180</sup> These services can target content to audiences, for example by using focus groups to discover what types of entertainment people want.

Entertainment companies also realize that there are different tastes that sell a movie or television show in different regions. According to Chuck Dages of Warner Bros., an example of such content customization is done with audio.<sup>181</sup> Since audiences in the United States enjoy rich sound effects while other regions want the dialogue and music to be overwhelming, audio customization enhances diverse audiences' value of entertainment works.

Games that are customized also create a more meaningful and more directed entertainment experience. Andy Rifkin of Mattel Media states that there is great demand for entertainment products that remember tastes and can return a personalized experience.<sup>182</sup> This effect can be achieved by addressing the user by name, knowing what they like and do not like, and knowing things about their personal lives, such as what holidays they celebrate. Rifkin states that personalization puts the user in control and the experience becomes modified to fit the user's needs.

## Digital-Media Theme Parks

On the surface, digital media and theme parks seem to be an unnatural fit. At traditional theme parks, every customer is supposed to have the same experience. The model is built around control and consistency of entertainment. Digital-media theme parks are being conceived and built with the goal of entertaining people with a personalized, interactive, computer-enhanced experience. Guy Langvardt of Compaq Computer Corporation believes that eventually digital-media theme parks will surpass the revenue of traditional theme parks.<sup>183</sup> Traditional theme parks are running out of physical places to locate enormous facilities such as Disneyland. Such facilities are also costly to build, maintain, and enhance. Finally, customers tend to go to traditional theme parks, at most, once or twice per year. Digital-media theme parks are smaller facilities that are located in metropolitan areas, requiring less overhead. Also, for the same reason, more of these type of parks can be built. Also, Langvardt states that they will be designed to encourage frequent visits and to spend more time when they are there.

Examples of digital media theme parks are arising rapidly, including Dave & Buster's and DisneyQuest. DisneyQuest is a family regional-entertainment concept that symbolizes digital convergence by combining interactivity and Internet technology with entertainment storytelling and

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<sup>180</sup> *Entertainment Media and Communications Technology Forecast: 1998*, Price Waterhouse.

<sup>181</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>182</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

<sup>183</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

branding. The strategic vision is to embrace the changing entertainment environment and look for new, value-enhancing opportunities. Companies, such as Disney, will be successful through experience and a reputation in multiple media areas. The public can consume rich entertainment by realizing fantasy-like experiences, including rides and educational activities, all within a compact time frame.<sup>184</sup> In addition to digital-media technology, Compaq helped build supporting technology for DisneyQuest including an Internet browser-like application for interactive entertainment and a money debit card on which the value of admission to rides can be stored.<sup>185</sup>

## Production and Storage Economic Issues

Digital convergence and the emergence of digital media have raised questions about the economics of entertainment production and storage. The entertainment industry faces the dilemma of comparing the benefits of advanced digital technologies with the conversion costs and potential for lost quality in the conversion process. The heart of the problem for the industry lies in their dual objective of creating rich, creative art forms while obtaining a lucrative revenue stream for their investment.

When deciding in what format to produce and store content, expectations of future technological capabilities must be considered. According to Gray Ainsworth of MGM Worldwide Distribution, entertainment firms are reluctant to invest heavily in new presentation and storage technology within a dynamic environment.<sup>186</sup> If the technological format conditions are unpredictable, a potential manner of addressing such uncertainty is to produce and store content in a format that acts as a lowest-common denominator, meaning it is the most efficient and cost-effective format for converting large libraries into many possible emergent formats.

Investment in technological innovation is extremely costly. Frank Dutro of Silicon Studio states that advanced technological initiatives rarely come from within major entertainment companies.<sup>187</sup> They are too conservative and outside the core of technological insight to be able to commit to changing all of their production and storage processes. Content producers with massive libraries must spend too much on digitizing and storing their works to be unsure about the future of digital media and the possibility of new technologies. Gray Ainsworth states that since MGM's film library totals 4000 titles and even more in television tape, any conversion process must have clear and predictable objectives. Also, the cost of digital equipment is prohibitive until a proven demand can be established. In order to achieve comparable quality to film, high-end digital equipment is required. Also, theatre presentation equipment costs \$80,000-\$100,000 and necessitates enough space for two sets of equipment until digital becomes the standard. However, theatre owners are not willing to commit to digital presentation equipment until a competitive advantage can be achieved. The central dilemma is that the public and theatre owners will wait for the best titles to become available in digital form, but content will not likely be widely produced until enough consumers or theatre owners possess digital presentation equipment.

Digital media represents a technological change that offers tremendous potential including digital-asset-management processes. Guy Langvardt of Compaq Computer Corporation states that the entertainment industry must be encouraged to look at rapid change in terms of the opportunities

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<sup>184</sup> The Walt Disney Company, Website.

<sup>185</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

<sup>186</sup> Gray Ainsworth, MGM Worldwide Distribution, August 10, 1998.

<sup>187</sup> Frank Dutro, Silicon Studio – Los Angeles, August 18, 1998

available rather than looking back and setting standards at a point in time that will never last.<sup>188</sup> An opposing point of view to that of producing and storing in the most efficient conversion format, or the lowest-common denominator, believes that the optimal format should be the one that offers the richest entertainment experience. If one produces for the most efficient format to convert from, a producer is limited to things that do not take advantage of the full opportunities that other formats can offer. For example, seven-inch, black-and-white television may be an efficient presentation medium, but the public no longer finds it to be a satisfying experience. Similarly, digital television has the potential to make the regular television experience no longer satisfying enough.

The entertainment industry is facing the issue of whether content should be produced in film and video and then convert everything to digital formatting or vice versa. Even if a decision is made in this area, the economics of production and storage require firms to make tough choices on exactly how much and which content should exist in multiple formats. Chuck Dages of Warner Bros. notes that film production offers excellent resolution, preservation, and transfers best to international markets, while video cannot make a clean transfer.<sup>189</sup> However, if the content is merely topical or has no international market, they often shoot in video because it is less expensive. Dages continues that they consider 35-millimeter film to be future-proof because it has the highest resolution of any sort of acquisition or production media. It has 4,000-pixel resolution per line versus 1,920 for high definition and 640 a VGA computer. Therefore, they archive, produce, and transfer content to 35-millimeter film based on the high quality of the format. The future of digital cameras as a solution to conversion depends on the perception of its quality. Dages adds that there is an increasing perception by production companies that the product that goes to television is the storage product of record. One reason for this opinion is that content distributed theatrically can be re-edited and the story lines can be changed when transferred to video. Secondly, most people will actually view the content with a non-theatrical, video medium, including home video, network and cable television, video on demand, and pay-per-view. Gray Ainsworth adds that it is safest to store content uncompressed. However, this causes logistical problems because it is bulky and requires multiple compressions for its various uses.

Interactive-media production offers the potential for rich, engaging experiences with an organic quality to the content's life. Consumption of interactive media can be done over a longer period because the experience can differ each time, extending the life of the product. Lloyd Pentecoste of IntrActv states that there are two schools of thought regarding interactive-media stories. One school believes there should be one core story with limited branching paths that parallel the main story. The other school believes that one should have many core stories, for example multiple endings.<sup>190</sup> However, entertainment companies must determine whether it is economically feasible to be producing interactive-media products. Due to the user-guided nature of interactive media, many options must be available to the consumer, necessitating considerably more production than a linear program. A determination must be made as to whether the extra content available to facilitate interactivity can be justified by additional demand for the product.

Another production issue involves programming for enhanced television. Production cost in this space will fall dramatically – though mostly through the swapping of lower insistence on production values for a higher focus on tailored content. It costs between \$5,000 and \$50,000 to produce a half-

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<sup>188</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

<sup>189</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>190</sup> Lloyd Pentecost, IntrActv, Interview, August 3, 1998

hour special for cable versus the \$1-2 million range for network television. Marianna Danilovic of KPMG Peat Marwick states that, since production costs in the enhanced television environment become less than even these cable-production costs, the business proposition changes.<sup>191</sup> One result is that content providers can offer niche programming.

## Infrastructure Development Economics and Organizational Structure

Technological advances have forced and enabled changes in the main processes of entertainment companies. Content producers must make decisions about how best to structure the organization to manage the combining forces within digital convergence. They must also decide what is the level of long-term investment in the organizational infrastructure. Entertainment companies must decide whether to invest in an infrastructure to support a technology and apply it to their productions or to outsource technology and technological expertise as needed. The second approach uses a production company's project orientation to commit only those resources needed for the task at hand, avoiding long-term commitment. Another benefit of this approach is that they can customize their technological resources to the specific needs of the project rather than attempting to inefficiently use technology across multiple projects.

Some background on various production-economics models across various entertainment sectors would be a helpful starting point. According to Chuck Dages of Warner Bros., television networks operate with a manufacturing plant mentality.<sup>192</sup> They manage raw materials, unit costs, and wafer-thin margins with the opportunity for a huge marginal return after breakeven. Their production consists of a continuous-flow process. There are no discrete steps in its production with twenty-four hours of programming that goes out to its affiliated stations. Television companies usually hire business people to operate their organizations, creative people to report to the business people, and technology people to support them. By contrast, a film studio's production processes are customized to each project. Resources for a project are brought together to focus on that project for a period of time, after which they disband. Internet and online services are also continuous flow products, but they must be able to get the best and freshest talent. In this arena, the core people are technology-based, not entertainment people.

Entertainment companies must accommodate technology by reaching a compromise with its organizational structure. Dages explains that a core of technologists assimilate themselves into the organization, each in a specific area. Expertise fields include feature production, television networks, television production, home video, and international television. Full-time experts get involved with the creative development process by listening to objectives and suggesting how technology can best serve the objective. Just as with creative resources, entertainment companies hire technology resources on a project-basis. They will hire the right people for a specific production and when the project ends, they move on. They may or may not be rehired for another project. Dages explains that outsourcing reduces their capital-expenditure investment and allows them to focus on their expertise.

## Digital Animation and Digital Effects

Though it is apparent that the demand has increased for animation and digital effects to be incorporated partially or wholly into an entertainment project for films, television, and commercials, it is difficult to precisely measure demand. SkillsNet suggest that these subsectors are growing at an

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<sup>191</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>192</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

even faster rate than entertainment as a whole.<sup>193</sup> Evidence of their success can be seen by looking at four of the top-grossing films in history, “Titanic,” “Jurassic Park,” “The Lion King,” and “Independence Day,” all of which used animation and/or digital visual effects extensively in production. These successes demonstrated the power of these digital technologies to create entertainment experiences never before imagined. The film, “Who Framed Roger Rabbit,” set the early standard for the genre by combining live action footage with animation. “Toy Story” was the first movie to be entirely created by a computer and generated industry excitement by becoming an enormous box-office hit.

According to SkillsNet, the proportion of a total production budget currently allocated for digital effects usually reaches fifteen percent and is growing.<sup>194</sup> Large action films use a growing number of digital sequences, approaching \$20-30 million budgets. Digital effects are used to make slight modifications to films for creative, aesthetic, or economic reasons and are increasingly becoming transparent to audiences. PricewaterhouseCoopers states that, in the future, producers may be able to create new, digitized characters or actors.<sup>195</sup> “Virtual digital talent” will be based in pure imagination or on the features of real people. These properties will be owned by content producers, eliminating residual payments, contract issues, creative differences, and problems with agents.

Animation has a strong presence on television where nearly 200 cartoon shows, not including specials, aired in the fall of 1996.<sup>196</sup> Cable networks dominate the market, although broadcast channels are starting to catch up. The emergence of the adult animation segment, exemplified by “The Simpsons,” “Beavis and Butthead,” and “Dr. Katz,” opens doors to new segments and outlets. Commercials also use digital effects and animation to help sell products and services, according to John Hughes of Rhythm and Hues Studios.<sup>197</sup> Advertising agencies employ digital-effects companies to create digital effects and digital animation alone or combined with live action sequences.

The diversity of these business segments creates an overlap in skills for digital artists and digital-production houses, smoothing out the demand for their services. The digital-creation industry consists of a variety of producer types, consisting of several large media conglomerates and many small to medium-sized firms, including independents, subsidiaries, and corporate divisions. A wave of mergers and acquisitions has taken place in recent years driven by the desire for greater vertical and horizontal integration. Many outsiders are investing in content, including consumer electronics, computer, and telecommunications companies. Those firms that have chosen to pursue content through acquisition approach digital convergence with an internally focused, independent strategy. An example of such firms is Microsoft, which formed MSNBC and Microsoft Multimedia Productions, as well as recommitting itself to the Microsoft Network. The industry is highly networked with production being performed by combinations of contract or project-based employees and various-sized contractors. Contracting depends on the availability and flow of information, talent, and skills.<sup>198</sup>

Costs decrease for digital effects, yet the demand of the public for new and better effects eliminates this advantage. Therefore, established digital technologies have no shelf life because they are no

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<sup>193</sup> SkillsNet, Website.

<sup>194</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998

<sup>195</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>196</sup> SkillsNet, Website.

<sup>197</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998

<sup>198</sup> SkillsNet, Website.

longer state-of-the-art. Marianna Danilovic of KPMG Peat Marwick notes that every year the cost of blockbuster movies increases, and the advertising budget of these films must also exceed traditional movies.<sup>199</sup> Consequently, the risk of failure increases.

Major studios that are involved in digital effects and animation production combine a variety of production and marketing capabilities. They are complex structures, often owned by media giants, in which entertainment is only part of their products and services. Economies of scale and strong capitalization enable them to undertake highly expensive and complex productions and invest in state-of-the-art equipment, full-time workers, and training. By contrast, entrepreneurs and freelancers are able to compete in digital effects and animation production because the degree of capital and expertise involved mandates that much work is done on an outsourced, project basis. They compete primarily on the basis of talent and experience, and can survive on minimal capital requirements.<sup>200</sup> Mid-sized companies may be squeezed out because small companies have the low overhead to be cost-competitive and large companies have the capital and capacity to handle complex projects. Some of these mid-sized companies will emerge as mini-majors.

When work is contracted on a project basis, special-effects companies bid on these projects. Rimas Juchnevicius, a freelance special-effects engineer, states that their bidding process is flawed because they are pitted against each other without an accurate understanding of their own costs.<sup>201</sup> They do not know definitively that they can produce the new effect beforehand. Since bids are given to those that graphically innovate, requiring the most current equipment, the useful life of their equipment is extremely short. They cannot scale their existing technology, rather they must buy all new equipment for each new breakthrough effect. Although the cost of this equipment is enormous, they only have a short period of time to recoup their investment, often failing to do so.

## Interactive Digital Media

Interactive media redefines the entertainment consumption experience by placing control in the hands of the audience rather than the producer or director. In addition to entertainment, the applications for interactive digital media include education, business, and software tools.

There are numerous models for interactive media, any combination of which can also be used as a hybrid interactive offering. One approach discussed by David Hankin of Sony Online Entertainment is the extension of a traditional media story line into an online setting, creating a new entertainment experience for audiences.<sup>202</sup> Interactive media can also be used as a simulation for education, a simulation for sales and marketing, a resource for information, whether communicative or educational use, and a collection of information sources. Such a collection would have a theme or personality. For example, it could consist of a collection of writings or a resource for a specific field, like the way that E! Online covers entertainment. Another approach is episodic content produced for online consumption where the audience follows the actors, finds out what they are thinking, gets multiple perspectives, and chooses different outcomes. Entertainment in the form of a story or game is another application of interactive media. Successful producers start by basing the program in the story. They hire writers over HTML programmers and special effects people and target a very narrow target market.

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<sup>199</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>200</sup> SkillsNet, Website.

<sup>201</sup> Rimas Juchnevicius, Freelance Special Effects Engineer, Interview, August 24, 1998

<sup>202</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

Four elements that must be combined to achieve successful interactivity are content, technology, interface design, and a creative approach that understands user behavior. Lloyd Pentecost of IntrActv states that interactive media creates an entertaining experience through immersion.<sup>203</sup> The experience is very focused and involves some motor and other physical capabilities. The audience is able to change or become part of the activity or story and is able to set the emotional tone of the communication process through one's actions and the program's responses to them. Pentecost cites the entertainment program "Myst" as an example of a comprehensive story that immerses the audience by letting them discover what the story is, rather than presenting it to them. He states that opinions on interactivity are often linked to perceptions of "play." Educational and business people often view playing as not productive. They believe it can be distracting and diverting from the objective. Others believe that playing engages people, lowers barriers, makes material more accessible, and puts the material into structures that are more familiar to audiences.

Csikszentmihalyi (1997) discusses the stages that put someone into a *flow* state. Pentecost thinks that flow can be applied to any kind of interactive digital-media program.<sup>204</sup> He states that in the first few minutes a program opens, one has a captive audience that can be maintained for even longer if they can be reached during that time. Thus, an attractive opening and setup that tells them what they are about to experience can be a powerful tool. Pentecost also states that, in order to bring audiences to a new level of interest and involvement, one must present a challenge to them that they feel is worth doing and will have a payoff of some form. Digital-media applications fail when they ask audiences to tag along and only ask them questions periodically, making them feel acknowledged only in a token sense.

Material, whether for education, information, or entertainment, must be updated frequently to maintain the impression of freshness. This requires an infrastructure that can manage refreshing content. Scott Fishkind of Red Ant Media Group states that, once technology enables live events with streaming media over satellite feeds, what you can do interactively becomes unlimited.<sup>205</sup>

There has been an important shift in interactive digital media from producing CD-ROM's to creating Web-based products. The advantages of Web distribution are the speed and low cost that can be achieved with distribution due to the breakdown of physical and geographic barriers. There are no shelf space or logistical problems to handle. In addition, content can be updated as needed on the Web. However, constraints in Internet bandwidth limit the ability to incorporate sophisticated graphics and other capabilities into Web products. A compromise response is the development of hybrid CD-ROM's that have the graphic and data capabilities of CD-ROM's with the ability to update information on the Web. New technologies have enabled consumers to use interactive media easier, including streaming video and audio, Java programming that makes interactive products compatible with user operating systems, and push technologies or intelligent software agents that search through available information and send only what the consumer has indicated is of interest.

Degrees of interactivity vary with purpose. Low-end interactivity uses limited branching to allow users to create a path through information mostly for business purposes. Also, communications and educational programs have also been successful with low-end interactivity. Ease of use is extremely

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<sup>203</sup> Lloyd Pentecost, IntrActv, Interview, August 3, 1998.

<sup>204</sup> Novak, Hoffman, and Yung (1998) actually develop a method for measuring *flow* in on-line environments.

<sup>205</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.

important for this type of basic searching to create a pleasant environment, requiring logical links and easy navigation. More complex interactivity includes deeper communication exchanges with the program, approaching an actual conversation, or control by the user over story creation. An example of successful high-end interactivity is use for educational purposes to simulate a real-life situation. Better understanding can be achieved through involvement. Users can change aspects of the situation and see what effects result, rather than reading or being told about the situation.

The importance of interactivity is not a direct, linear relationship. Suzanne Biegel of Internal External Communications states that this assumption is equivalent to using as many fonts as possible in a desktop publishing program merely because one can.<sup>206</sup> Biegel states that for purposes such as communication and training, producers must decide what they want the target audience to accomplish or the experience that they want them to have. Once the objective is established, it should drive the user interface, including degree of interactivity. From an entertainment perspective, Biegel believes that sometimes people just want to be entertained passively or they want an emotional experience. The one exception that she offers is games, for which she states more interactivity usually leads to a better experience.

Interactive games are some of the most advanced and innovative applications of interactivity. SkillsNet notes that game developers are constantly pushed to achieve more because users have an insatiable desire for bigger, faster, and cooler games.<sup>207</sup> The segment has not found as broad consumer appeal as expected, rather it has become more of a successful niche market. The game market is highly competitive, creative, and market-driven, requiring a high level of artistic and technological innovation. Games have been the driving force behind many of the technological and artistic improvements that have led to the overall success of the interactive digital-media industry.<sup>208</sup> Many entertainment companies have created interactive product division to capitalize on their properties. This strategy has often worked because games are usually more successful when they feature a character that has been established in a film or television show, especially those that appeal to children. Online gaming, in which players compete with others playing the same game over the Internet or a proprietary network, has been a dominant trend in interactive media. Online gaming differs from the underlying concepts behind the appeal of a computer game, the ability to compete against the computer. Also, online gaming is limited in appeal due to current bandwidth constraints that restrict the fast exchange of game-play data. Pentecoste also notes problems of relying on others to be able to play an entire game and, when winning records are kept, ensuring that a player does not quit when they expect to lose to protect their record.

### Entertainment Inter-firm Cooperation

It has been established that digital convergence mandates cooperation among entertainment, technology, and communications parties. Companies cannot have separate relationships with players in each industry due to the difficulty and confusion caused by too many independent contacts. Therefore, companies within the same industry must, at minimum, coexist in the same virtual or physical space to communicate with firms from other industries and possibly, cooperate with each other. The entertainment industry is faced with the dilemma of entering a collaborative environment, yet being reluctant to share information with each other. Entertainment companies

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<sup>206</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>207</sup> SkillsNet, Website.

<sup>208</sup> SkillsNet, Website.



have not traditionally been as willing to share information and partner on initiatives as the technology industry.

The possibility for collaboration among entertainment firms does have some potential if discussions do not reveal critical, proprietary information. This caveat seems likely if collaboration is limited to the use of technology for the advancement of entertainment initiatives. The pace of change is so rapid in the digital-convergence environment that many entertainment companies realize that they cannot afford to be inactive. However, more strategic information is not likely to be shared among others. In the interactive media production area, cooperation is also needed. Most producers lack a clear agreement of how to approach the field because production teams are made up a variety of disciplines. People with different specialties including video, audio, and film-production areas, will have completely different perspectives.

## Venture Capital for Digital Media

A critical requirement for digital convergence is the emergence of new businesses in digital-media applications and enabling technologies. Since innovative businesses need to be incubated, venture-capital funding must be accessible to finance startups. However, according to Marianna Danilovic of KPMG Peat Marwick, the venture-capital community lacks an understanding of entertainment and media business models.<sup>209</sup> Therefore, it is difficult to convince venture capitalists to consider Internet-based media and content companies.

Also, regional differences contribute to difficulty in obtaining venture-capital funding. The San Francisco Bay Area has established entrepreneurial and venture-capital communities for high technology. The Los Angeles Area lacks venture funding for digital media. According to Philip Cross of PricewaterhouseCoopers, Los Angeles has difficulty attracting venture-capital money because it lacks a history of spawning companies and a proven management pool because the project-oriented structure of management fees in the region are less likely to encourage growing a company.<sup>210</sup> The primary reason for these difficulties is the project-driven, ad hoc business history of the Los Angeles area, mostly driven by the entertainment industry. Cross adds that the region lacks local role models as entrepreneurial successes in the area of digital media, like Intel and Microsoft are for their region. However, Earthlink and GeoCities have the potential to provide such a role model.

## Issues Facing Users

### ***Behavioral and Social Impacts of Digital Convergence***

It would be difficult to underestimate the social and behavioral effect that digital convergence has on the public. The dynamics by which people interact with each other and with business markets are transformed due to new communication channels and new access to information and entertainment. One can distribute various data types, which are richer than previously achievable, to a larger, more diverse audience at a lower cost. This ability dramatically changes the process of exchanging products and services. Consumers of any type of product or service will be newly empowered in their relationship with suppliers. The increased shift toward electronic commerce is expected to cause significant changes in consumer and business purchasing habits. They will be able to find

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<sup>209</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>210</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

information on, browse for, and acquire products from their chosen location. People may choose to engage suppliers from home, their office, or anywhere else using mobile technology. John Capano of the William Morris Agency states that this behavior change in consumption is similar to that experience with the advent of radio.<sup>211</sup> Although many believe television was one of the most radical inventions in terms of social effect, radio was the first device that allowed people to enjoy live entertainment at home rather than attend public performances. People will be less likely to engage in personal interaction with businesses, for instance with local storeowners. Also, the shopping experience has a social value to many people that will be reduced in a physical sense. However, social value in the virtual sense emerges.

The development of electronic commerce is significant because of the behavior change involved, as well as the social effect it creates. Digital convergence dramatically alters the patterns of our lives and work. Opinions of the outcome of social changes caused by digital convergence differ. Some people contend that digital communication replaces the reality of social interaction with simulation. Technological innovations produce transparent communication, making such simulation more appealing. Critics fear that simulated social interaction leads to fragmentation and alienation. Jun Kinebuchi of Ignite Group compares technology to an addictive drug. He adds that one can become trapped by it and lose sight of other things.<sup>212</sup>

Others believe that digital interaction creates communication, participation, deeper connections, and community. Online communication offers a greater volume and scope of interactions with others, as well as easier access. Kinebuchi notes that Internet, Intranet, and e-mail can expand your relationships. Given today's hectic lifestyle, people have a limited time in which they can connect with others. Mark Maruyama of IBM states that technology can help bring people together because tools like e-mail enable a greater volume of, though low-quality, interactions. These more frequent connections maintain contact with people so that traditional, personal interactions, which are much less frequent, have more value. Distributed relationships, such as distributed families, can interact more frequently. Also, people can choose the extent that they connect with others. For example, they can choose to minimize personal interaction with bank and government workers and increase interaction with close friends. Kinebuchi states that great potential still remains to improve the quality of connections, such as through enhanced video capabilities.

An important social implication of digital interactions is the effect on how connected cultures become. The breakdown in barriers from distance and time open new cultures to learn about and explore. Some people think that all cultures will run together into a homogeneous form. Others predict that cultures will be more diversified because a diversity of newly available viewpoints will be valued. PricewaterhouseCoopers states that cultures will be preserved by opening their uniqueness to the world.<sup>213</sup> Also, a culture can reach out to a segment of their group in other areas.

Social interaction takes on a new form with the emergence of individual interaction based on groups. Scott Fishkind of Red Ant Media Group notes that, while people may usually be alone when they go online, they will be able to participate in group activities, such as online games, chat groups, or a sporting event that can be watched together in a virtual sense.<sup>214</sup> Architect Jeff Daniels mentions

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<sup>211</sup> John Capano, William Morris Agency Inc, Interview, August, 1998.

<sup>212</sup> Jun Kinebuchi, Ignite Group, Interview, August 14, 1998.

<sup>213</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>214</sup> Scott Fishkind, Red Ant Media Group, Interview, August 12, 1998.

the computer-based "rave" parties that are rising in popularity. Participants are not attracted by computer use alone, but by the fact that they are all together in the same place.<sup>215</sup> They still want the human interaction of being in the room and seeing each other. Similarly, Andy Rifkin of Mattel Media states that parents and children can bond through the sharing of the child's digital work.<sup>216</sup>

The creation of a digital community has its roots in these online interactions. Digital communities breakdown property and territory borders. Any form of community must provide relevance, social engagement, and participation. One joins a community for self-affirmation and satisfaction (Tapscott, Lowy, and Ticoll, 1998, also see Hagel and Armstrong 1997). Communication among community members and active engagement to help shape the community are necessary conditions for the establishment of a community. Businesses will have the opportunity to help create an online community by organizing activities around their product and service offerings, such as chat groups about entertainment works. Some critics of commerce state that corporations have a responsibility to contribute to the public well being. Such an environment will at least offer the potential for shared space, values, language, experience, and purpose. The extent to which people utilize the opportunity will vary. Careful consideration must be taken by community "leaders" to permit the balance of expression and heterogeneity of cultures. Digital communities must also deal with problems caused by anonymous interaction, such as fraud and "cyber-stalking."

### ***Some Factors Affecting User Demand for Technology***

Since digital convergence establishes more direct connections, the degree to which opportunities for more efficient interaction are leveraged depends on the motivation of people and businesses to enter the digital space. A strong driver of demand for individual people and businesses is the network externality behind Metcalfe's Law. On the user side, the presence of and access to others motivates demand. On the business (vendor side) the more vendors that are present the more presence becomes a necessity of doing business. As the user or vendor base increases, this effect could dampen due to congestion. For Metcalfe's Law to work access to technology should be affordable, reliable, instantly available, secure, simple, widespread, and location independent – requiring mobile access.

The importance of reaching a favorable price-performance ratio for acquiring new users is clear. Philip Cross of PricewaterhouseCoopers states that suppliers of digital-related products must achieve price thresholds of affordability.<sup>217</sup> Up until now, the primary motivating reason for home purchase of technology has been personal use – mostly entertainment and e-mail. In order to reach the next level of home use, work and study needs should motivate purchase. Paul Berberian of VStream states that behavioral reasons should drive demand.<sup>218</sup> Examples of certain behaviors that are expected today and were not expected even in the recent past include the use of presentation software and LCD panels for presentations and tools that check spelling of word-processing documents. To penetrate the pragmatist and mainstream consumer markets these consumers must feel *compelled* to use more advanced tools or to create complex digital-media messages.

Demand of digital products and services requires a sense of a secure environment. A fear of the digital age, often fueled by the media and film and television stories, still exists. Public education can

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<sup>215</sup> Jeff Daniels, Architect, Interview, August 11, 1998.

<sup>216</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

<sup>217</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

<sup>218</sup> Paul Berberian, VStream, Interview, August 21, 1998.

demonstrate the reality of the situation. For instance, electronic commerce can be encouraged by explaining that secured servers are safer to use than bank-teller (ATM) networks, which are widely accepted.<sup>219</sup> Demand can be increased by highlighting that the benefits of involvement in digital activities, including productivity and ease of use, exceed the risks. Users entering the digital space must be clear on the tradeoff of their personal data for benefits such as personalized service and better prices. Security technologies and assurances, such as guaranteed credit-card-theft coverage, will also facilitate public confidence.

Further public education should clear up consumer confusion over what convergence really is. Patrick Kearney of MediaOne states that terms like WebTV, digital set-top boxes, and HDTV are thrown around under the realm of convergence.<sup>220</sup> PricewaterhouseCoopers adds that people cannot accurately say that they want a product or service if they cannot even imagine what that service is.<sup>221</sup> It is important to recognize that it takes longer for the mainstream consumers than early adopters to understand the capability of the medium. Suppliers of digital products and services need to demonstrate examples of the power of technology and provide a compelling reason to buy. Suzanne Biegel of Internal External Communications states that people are needed that can teach how to effectively get the most out of technology.<sup>222</sup> She adds that consumers are tainted by past exposure to lower-quality work. Companies have rushed to market with sub-standard products, and audiences have made assumptions about quality based on these experiences. Biegel believes that suppliers must acknowledge that it takes time to develop a higher-quality product. This effect would be reinforcing since people would see better quality and want to see more.

Another motivating reason to purchase digital products and services is the availability of compelling content or a powerful application, also referred to as a *killer app*. Berberian adds states that if you provide consumers a reason a buy, all the supply barriers such as inadequate bandwidth will get resolved.<sup>223</sup> E-mail use took off rapidly because it was such a compelling, powerful message. Thus, it forced everyone to figure out how to get it. Modem growth exploded because demand drove its development. Berberian states that digital media can offer a powerful message that has the same effect. The power of a message is reinforced by the network effect because if one cannot receive the message loses value and the would-be receiver loses power. Lloyd Pentecoste of IntrActv states that compelling content will be the type that gains the involvement of the audience.<sup>224</sup> Andy Rifkin of Mattel Media believes real-time communication, making people appear to be next door to each other, will create tremendous demand.<sup>225</sup> Real-time communications applications include playing games, communicating, and watching special events such as sports. Sports has the potential to drive demand for digital television programming due to wider angles and more realistic action from higher-quality audio and video.

The demand for digital products and services is also an important issue to optimal use of the communications infrastructure. Consumer behavior is strongly affected by product pricing structure. Therefore, consumers of digital products and services can be influenced by pricing mechanisms to use networks and the Internet more efficiently to handle traffic overload. Flat-rate fees have been a

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<sup>219</sup> Professor Robert B. Trelease, Interview, August 10, 1998.

<sup>220</sup> Patrick Kearney, MediaOne, Interview, September 2, 1998.

<sup>221</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse.

<sup>222</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>223</sup> Paul Berberian, VStream, Interview, August 21, 1998.

<sup>224</sup> Lloyd Pentecost, IntrActv, Interview, August 3, 1998.

<sup>225</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

bad incentive regarding network use that has continued due to extreme competition among ISPs and the tradition of local phone flat rates in the United States. Congestion pricing can be utilized to internalize costs for consumers of network use. Pricing factors that force the public to signal their demand level could include capacity, volume, time, and priority.<sup>226</sup> Priority for transmission can be purchased and communicated in the header protocol of the message. Additionally, middlenets, which offer regional access to networks, should continue to be established to reduce long-distance traffic.

### **Demographic Groups and Technology**

The recent emergence and pace of change of computer technology naturally place younger generations at an advantage. Daniel Tapscott refers to the current younger generation, aged 2-22 in 1999, as the Net-Gen (Tapscott, Lowy, and Ticoll, 1998). This generation has a different culture and psychology, fueled by a different approach to learning, consuming, working, and playing. They realize the potential for productivity and entertainment that technology offers. Philip Cross of PricewaterhouseCoopers states that digital media, the Internet, and e-commerce have become fundamental parts of the lives of young people.<sup>227</sup> In fact, they have no previous habits to overcome because they are accustomed to using technology and have fewer obstacles to overcome. Those people that grew up with computers will have greater willingness and motivation to enter the digital age. They also have less fear of and greater access to technology. Andy Rifkin of Mattel Media states that children that have been raised with exposure to technology do not perceive any barriers. Technology is a natural extension of their lives.<sup>228</sup> These children have a greater skill base. Rifkin recalls seeing three-year-old children using mice effectively and five-to-seven-year-olds that are totally computer literate and can transfer files.

The grasp that the younger generation has on digital technology threatens to create a gap between generations as older groups lag behind. Efforts must be made to overcome the older generation's resistance to change and fear of technology. Suzanne Biegel of Internal External Communications notes that their problems can be reinforcing because the more one feels out of touch, the more intimidating it can be to get started.<sup>229</sup> Rifkin mentions that Mattel Media makes an effort to bridge the generation gap by creating software toys with cross-generational appeal. For instance, grandparents have a close bond with their grandchildren and often buy computer equipment to e-mail with them. Rifkin believes that senior citizens need to be taught how to use technology for entertainment and research purposes. He suggests that software targeted toward children, which also appeals to older generations enough to get parents and grandparents to sit and engage with their children, can help bridge the generation gap.

In addition to younger people, some other demographic groups have greater access to technology than other groups. This difference in access divides these groups in access to powerful information. Access to technology is a function of income, location, price, and skills. The Organization for Economic Co-Operation and Development states that income is the strongest factor in the United States, with a every \$10,000 in income equating to a 7% increase in the likelihood of owning a computer.<sup>230</sup> Age and family type also are important with households containing teenagers being

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<sup>226</sup> Information Technology Outlook 1997, Organization for Economic Co-Operation and Development.

<sup>227</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

<sup>228</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

<sup>229</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>230</sup> Information Technology Outlook 1997, Organization for Economic Co-Operation and Development.

most likely to have access. Location affects access with urban areas more likely to connect than rural. White-collar jobs, education, and other income related factors also make access more likely. Hoffman, Novak, and Venkatesh (1997) also report that important differences in Net and Web usage between African-Americans and whites persist (even after proper statistical adjustment), and these cannot be explained by differences in age, education, gender or student status. Their analysis of "Internet Churn" found that African Americans and Hispanics are much more likely than whites or Asian-Americans to stop using the Internet.

### **Entertainment Consumption**

Digital convergence enables the delivery of entertainment products and services in new forms and over new mediums. The behavioral aspect of entertainment consumption will change significantly in the digital arena. The place and manner that people experience entertainment differs from that of computing. The convergence of these forms can create great conflict due to clashing consumption models.

Entertainment has traditionally been presented in a linear fashion to audiences that enjoy it passively. Many entertainment leaders expect that people, to some degree, will always want to sit back, be entertained and have a story told to them in a linear fashion. Marianna Danilovic of KPMG Peat Marwick states that film entertainment is a social event or experience that is not available on television, computer, or other home devices, as we know them today.<sup>231</sup> Erica Gruen of the Food Network contends that television viewers want a passive viewing experience.<sup>232</sup> She adds that its passive nature is the whole essence of television and is what makes people like and become addicted to it. When people come home from a long day, they do not want work for their entertainment. She argues that the Time Warner trials in Orlando or any other study has not proven that people seek interactive television. Warner Communications experiments with the interactive Qube system in Cincinnati during the late 1970s came to similar conclusions. This is quite different from on-line users who pursue information and entertainment in a very active and individual sense. Eve Coquillard and Kimberly Coccavo of C2C Media add that the Internet is much more service oriented than entertainment oriented.<sup>233</sup>

The outcome of digital entertainment will depend on how these differences in consumption models can be reconciled. This problem is compounded by the fact that each consumption form may enter consumer homes through one pipe and one information appliance. David Hankin of Sony Online Entertainment states that one approach to this issue is to adapt the computing environment to that of the living room where passive, entertainment consumption typically takes place. Alternatively, the living-room environment can be adapted to be more interactive.<sup>234</sup> If a combination of models cannot be achieved, pipes into homes may need to be split into two separate home centers. An opportunity may emerge for those infrastructure providers that can learn how to control the stream of entertainment.

User interfaces can help manage the conflict by having the flexibility to allow audience to choose their level of interactivity. For example, people can enjoy a passive entertainment experience and then decide that they would like to dig deeper to find more information or enjoy a richer, more

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<sup>231</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>232</sup> Erica Gruen, TV Food Network, Interview, August 25, 1998.

<sup>233</sup> Eve Coquillard and Kimberly Coccavo, C2C Media, Interview, August 12, 1998.

<sup>234</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

engaging experience. The interface could be adaptable enough to allow them to shift into a more interactive mode. The conflicting consumption models can also be dealt with by offering separate types and sources of content. The separated content, both interactive and passive, can be tied together with an overlapping theme. Erica Gruen of the Food Network is skeptical that these two models can be married on the same device.<sup>235</sup> She adds that there is no evidence that the existence of one model can contribute to the demand for the other model.

Another conflict between the models involves the time of consumption. Entertainment products, especially television and films, have been traditionally presented to the public at a fixed time while interactive models allow consumption whenever desired. In dealing with this problem, the entertainment industry must consider the value of viewing anytime versus the excitement and market potential generated by first-run showings. The emerging model will also have a great effect on advertising, which relies on entertainment premiers to reach an expected audience. The advertising model may change from serving the mass market to a more personalized approach, resembling direct mailing.

An important difference in consumption models involves who controls the composition of the information or entertainment. Traditional entertainment is presented in a linear format. Josh Sharfman of Digital Lava states that an entertainment director wants to control what the audience sees, when they see it, and how they feel when they see it.<sup>236</sup> On the other hand, the job of an interactive content producer is to give the audience all the tools that they need to craft the experience of their choice. They should create a rich environment where the consumer has the option of being just a consumer or becoming the producers themselves and creating a derivative work. The essence of the difference is a difference in the modality of communications. The conceptual creation of the work can be done in a pre-packaged manner or done upon consumption by the audience, which can be recreated each time. An example of the power of user creation is object-oriented programming. The producer creates components that the consumer will use, enabling them to arrange the pieces into their own package and become the producer.

The fundamental building blocks of information and entertainment also differ for the two consumption models. Traditional Internet services are separated into units of information. Internet information is easily disaggregated and reaggregated. Alternatively, digital media often has stories as its lowest common denominator. Components of entertainment works can be created to some degree, allowing modularity for audiences to create their own experience. A character is another type of entertainment component. Audiences can search for them and focus on their experiences. For instance, "The Spot," an online show, offered the ability to follow a character around, listen to their conversations, and read their personal letters. Packaging of entertainment and information into more consumable forms can be an important value-added service.

Content producers must be able to reach their target audiences in the most effective manner. Lloyd Pentecoste believes this ability is hampered over the Internet because it is a more individualized environment.<sup>237</sup> Entertainment companies must be able to identify and reach solo entities and give them a sense of ownership. He argues that front-end web-site design dictates whether or not a target audience can find you. Consumers usually either find web sites through this front-end design or

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<sup>235</sup> Erica Gruen, TV Food Network, Interview, August 25, 1998.

<sup>236</sup> Josh Sharfman, Digital Lava, Inc., Interview, August 19, 1998.

<sup>237</sup> Lloyd Pentecoste, IntrActv, Interview, August 3, 1998.

through advertising in portals, links from other sites, television, or print. Therefore, a consumer's search criteria must be optimized by front-end web design to enable them to find exactly what they want. According to Eve Coquillard and Kimberly Coccavo of C2C Media, search can be initiated when audiences consumer entertainment and then search for a deeper experience or when they are in an information-based, possibly interactive, mode and are shown different sources of entertainment that fit a keyword.<sup>238</sup>

## **Labor Issues**

### **General Labor Force**

The impact that digital convergence has upon businesses and their relationships with consumers and other businesses extends to their employees. Businesses must find new ways to educate the labor force about digital content and interaction and to retrain them on the appropriate skills. The digital environment demands new qualities of employees. They must have a variety of new qualifications, attributes, and behavioral characteristics. First, they must have the ability to adapt. Digital convergence creates a dynamic environment that requires flexibility. Even updated skills and behaviors must be discarded in favor of yet newer ones. Employees must also have broader scientific and mathematical skills and the ability to understand complex relationships. Laborers in the digital age should also be able to acquire and evaluate information better and work with a variety of sources and resources. In addition, they must be able to use a range of technologies. Since employees will have greater power to act in the digital environment, they must take greater responsibility and show initiative.

As these new skills become required, the labor composition will change. The occupational mix will shift from blue-collar to white-collar workers. Also, general skills will be emphasized over job-specific skills. Corporate training performs a vital employee development function, but training needs to be modified to include approaches to prepare both new and old workers for the dynamic, digital environment. The EC2 Annenberg Center at USC offers intranet-based and highly interactive courses in management skills, including leadership, negotiations, performance appraisal, and evaluation.<sup>239</sup> Also, labor policies that slow reorganization may hinder necessary changes. Labor groups should permit freedom of discretion in changing the organizational model and its relationship with employees to some degree.

### **Digital Media**

Creation of digital media requires not only enterprises, but also people, with creative, technological, and business abilities. The key to the development of digital convergence is the availability of content producers, according to Professor Robert Trelease of the UCLA School of Medicine.<sup>240</sup> He adds that technology businesses and personnel will be available, but access to creative people that can produce for the digital environment may be a concern. Digital media creators with both technological and creative skills are needed to produce digital media content and programs.

Technology acts as the enabling mechanism by which new art forms are created and must be appreciated for its power as much as creativity. According to Larry Kubota of Kubota and

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<sup>238</sup> Eve Coquillard and Kimberly Coccavo, C2C Media, Interview, August 12, 1998.

<sup>239</sup> Jon Goodman, EC2 Annenberg Center, Interview, August 11, 1998.

<sup>240</sup> Professor Robert B. Trelease, Interview, August 10, 1998.



Associates, technological talent exists mostly from the science fields, but these people usually lack artistic and aesthetic skills.<sup>241</sup> Conversely, there is a shortage of digital artists with the understanding of and ability to apply computer graphics. Chuck Dages of Warner Bros. notes that creative people may not have the inclination to understand the disciplines that come with technology and business. Artists need to view the computer as an extension of themselves. Dages argues that there is no better way for someone to get into the entertainment business than digital-art creation. Marianna Danilovic of KPMG Peat Marwick adds that the potential for expanded content distribution will benefit creative people, who previously were controlled by consolidated media powers, because they will have opportunities to showcase their abilities and capture audiences on their own merit.<sup>242</sup>

The largest complaint of digital-media companies is the shortage of talent for digital art, according to Gary Ghaiey of the City of Los Angeles.<sup>243</sup> Content production is costly and it is difficult to retain people. According to Trelease, they are frequently pirated away by firms that are extremely productive and can offer higher salaries. Also, digital artists have great opportunities to start new businesses. Patrick Kearney of Media One notes that digital media is one of the few remaining professions where a garage operation can outshine multi-million-dollar productions. Smaller bands of people can make topnotch products as long as they can survive the early development stages. Traditional education does not offer a packaged exposure to multiple areas, according to Kubota. In particular, the United States educational system does not provide people with both creative and technological skills in sufficient numbers. Digital-media companies, including production houses and entertainment technical departments, are asking the cooperation of local, state, and national governments in finding people with the broad skills needed for digital art. Since about half of qualified people are born outside the United States, digital production companies try to recruit from foreign countries, but they are frustrated with the immigration process. As a result, they are seeking special exemption for digital artists. However, the shortage is not limited to the United States. Larry Kubota notes that, though Asian countries are transforming their economies to enter the information age, they also have a scarcity of people with both creative and technical skills. Digital-media companies and governments also need to learn how to encourage creative people to be interested in understanding what technology can add to their creative skills.

Suzanne Biegel of Internal External Communications believes that there is not enough of an appreciation of where digital creators come from.<sup>244</sup> She cites as an example people who are hired for web design because they know basic web applications, like Front Page. Instead, companies should be seeking people with an understanding of behavioral psychology, how people interface with computers. Philip Cross of PricewaterhouseCoopers adds that programming is no longer a process consisting of coding a pre-determined product.<sup>245</sup> Instead, it is more iterative and requires creative and intuitive skills and the ability to learn and adapt. Programmers must now manage the creative process from concept to applications. Paul Berberian of VStream states that digital applications require someone who realizes that researching and modifying a product is just as important as the original concept and has an artistic sensibility or perspective.<sup>246</sup>

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<sup>241</sup> Larry Kubota, Kubota & Associates, Interview, July 10, 1998

<sup>242</sup> Marianna Danilovic, KPMG, Interview, August 27, 1998.

<sup>243</sup> Gary Ghaiey, City of Los Angeles, Interview, July 13, 1998.

<sup>244</sup> Suzanne Biegel, Internal External Communications, Interview, August 12, 1998.

<sup>245</sup> Philip Cross, PricewaterhouseCoopers, Interview, August 25, 1998.

<sup>246</sup> Paul Berberian, VStream, Interview, August 21, 1998.

Therefore, digital artists require a combination of programming, creative, critical, analytical, and team skills. Biegel adds that they must have expertise in synthesis and analysis to evaluate the value of content components and concentrate on those that fit the purpose the best. They must have skills in information design, including organizing and accessing information. Also, disciplines of research and writing good copy. Biegel believes that, while technology is the facilitator, success hinges on communication skills. According to PricewaterhouseCoopers, "look developers" are needed to integrate a wide variety of art forms and determine the visual effects, styles, and techniques that could be combined to create the "right look."<sup>247</sup> Another valuable skill involves compression and knowing how to optimize content delivery in order to enable greater flexibility.

More organizational integration is also required since these disciplines usually exist in separate functions in an organization. A cross-disciplinary approach, including technology, creativity, communications, and advertising, is essential. Workers need team skills to manage this cross-disciplinary environment. Workers seeking work in digital media need to be linked early on to practical experience with the flexibility to crossover market segments. Retraining must occur for the older work force and for those seeking to change careers and lack either creative or technical experiences. New workers will be more likely to possess both creative and technical skills since new generations have more exposure to tools, such as graphic artists knowing Photo Shop software.

Andy Rifkin of Mattel Media states that many talented people will be drawn out of other industries, including aerospace, medicine, toys, and traditional media fields. These new entrants will bring skill sets that enable them to bridge the gap and transfer their knowledge into digital media.<sup>248</sup> However, David Hankin of Sony Online Entertainment contends that digital media has traditionally resisted entrants from other industries, considering them as outsiders to their inner circle.<sup>249</sup>

Training must be created to develop more people with the broad range of skills needed to produce digital media. Public education of this form currently exists at Art Colleges and continuing-education programs such as UCLA Extension. However, the shortage of labor with the aforementioned skill base is partially caused by deficient university training, according to Philip Cross. Universities typically offer specialized fields, so that one must choose between an art or technology focus. John Hughes of Rhythm and Hues Studios argues that it is virtually impossible to have a dual specialization in art and technology.<sup>250</sup> He adds that, outside the United States, a specialty in one of these fields will also confer enough of an understanding of the other field.

Hughes notes that pre-university education in the United States does not integrate technology and art despite the fact that studies show that if art is integrated into the curriculum, one ends up with a better overall education. Art has been virtually eliminated from many schools in the United States because of significant cutbacks in educational funding. For instance, Hughes points out that Los Angeles schools have almost no art education because Proposition 13, by cutting property taxes, reduced education funding. If one does not live in a wealthy district, art generally is not available.<sup>251</sup>

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<sup>247</sup> Entertainment Media and Communications Technology Forecast: 1998, Price Waterhouse

<sup>248</sup> Andy Rifkin, Mattel Media, Inc., Interview, August 19, 1998.

<sup>249</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>250</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998.

<sup>251</sup> John Hughes, Rhythm and Hues Studios, Interview, August 3, 1998.

Therefore, many digital-media leaders believe that there needs to be a stronger link between teaching and digital-media industry needs. They argue that educational institutions need to respond to this new and growing industry by developing digital-media studies and hiring digital-media professors. However, Larry Kubota believes that universities are slow to make curricular changes, especially to digital media. He adds that they are not geared to serve international markets, though areas such as Asia require much help. Also, major universities lag behind state and smaller colleges, potentially due to their lack of flexibility. In addition to university and pre-university educational programs, continuing education programs and other professional training programs must retrain workers to instill the range of required skills.

The barriers to developing a comprehensive public education mandate that private industry must play an important role in training and retraining workers for digital-media areas. Professionals can provide value to education on the latest issues that most faculty, particularly research-oriented professors, cannot. Digital media is multidisciplinary by nature. Private industry has helped integrate fields, such as engineering and cinema, in ways that universities cannot due to their traditionally discipline-based structure. Many digital-media programs at the university level have languished because departments were unable or unwilling to cooperate. Jon Goodman of the EC2 Annenberg Center at USC states, since the intellectual resources of university faculty is still needed, private businesses can manage the process and hire out discipline-based knowledge such as university research as needed.<sup>252</sup> Thus, an organization can be created with access to a talent base with initiatives being project driven, rather than politically driven. However, Mark Maruyama of IBM warns that training must have a clear objective.<sup>253</sup> Trainers should ask themselves whether they are in the business of creating or facilitating the educational process. Therefore, they must maintain their links with art schools and universities to build on their strengths. Chuck Dages of Warner Bros. adds that the entertainment industry can help facilitate the process through its established networking system. Those people with technical skills can network with creative people, and vice versa.<sup>254</sup>

Training in digital media should focus on serving digital artists, system administrators and engineers, and business executives. Creative talent must develop digital technological skills for digital-media authoring. Fundamental base skills should be emphasized over specific skills because most production companies utilize proprietary software. Artistically-skilled people need to develop computer-application skills in order to breakdown the barrier between themselves and the computer. They must view technology as an extension of the artist. Some of the other skills that creative people must acquire include math, problem-solving, team-dynamics, collaboration, and critical-thinking skills. Technical core skills should include the following: camera mechanics, exposure sheets, basic software literacy including word processing, databases, spreadsheets, web browsers, high-end digital-creation software packages, operating systems, programming-interface drivers, and communications protocols.

They must learn to use digital-creation equipment and understand computer systems to some degree. Software packages, such as Alias/Wavefront and Lightwave, help create 3-D animation and visual effects for environments such as entertainment, games, location-based entertainment, and industrial styling.<sup>255</sup> In the realm of entertainment, artists can create digital imagery and special

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<sup>252</sup> Jon Goodman, EC2 Annenberg Center, Interview, August 11, 1998.

<sup>253</sup> Mark K. Maruyama, IBM, July 28, 1998

<sup>254</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>255</sup> Frank Dutro, Silicon Studio – Los Angeles, August 18, 1998

effects for feature films, broadcast television, and post-production. Silicon Graphics, Indigo, and Indy workstations and new high-end machines using Windows NT and Macintosh operating systems, which have strong graphics capabilities and playback monitors, are standards for digital-media production. Additional system components include audio and editing tools, full video decks that can input and output to tapes, servers, projection systems, and high-speed communications access. Required technological skills include creative 2-D imaging, 2-D painting, 3-D modeling and animation, video editing, and compositing, which ranges from adjusting the brightness or color of images to an extensive process of combining numerous elements from a variety of sources into a seamless final image. They must also have the ability to integrate multiple applications and platforms, produce for different mediums, and synthesize effects and animation into live action material. Also, game creators must learn how to create a game by storyboarding a concept, using computer graphics to visualize a story, and building digital components for the gaming environment.<sup>256</sup>

Systems administrators and engineers must be skilled in designing and supporting systems for digital-content creation. They should be responsible for optimizing the creative environment through programming, networking, and storage support for digital artists.<sup>257</sup> First, network and system administration requires managing system-maintenance requests and ensuring that machines run at maximum speed. Secondly, they should create an application-programming interface to be an environment for developing portable and interactive, 2-D and 3-D graphics applications. The environment should make applications available to multiple computer platforms for wide deployment and speed development of applications by incorporating a broad set of rendering, texture mapping, special effects, and other powerful visualization functions. Finally, they should support digital-media tools by troubleshooting software bugs, loading software, and working with digital file, including creation, storage, conversion, and backup.

Business executives and project managers must manage both the creative and technical aspects of the digital media. Therefore, they need insights to aid in making decisions that balances creativity and technology. Managers should be trained to understand the capabilities and interrelationships of processes and tools. They need to understand why computer graphics are used and for what purposes. Managers must be able to translate digital effects and animation into a measurement of staff time and dollars for accurate billing and scheduling. They must also manage their human-resource departments to support digital production.<sup>258</sup>

Training programs range in duration from a few weeks to multi-year academic programs. They should emphasize the role of technology in service of the creative process. The objective of any training program should be to increase the productivity, efficiency, and creativity of the digital-media field. Input should be obtained from production and post-production companies, studios, and special-effects houses. Training must have a clear return on investment for all parties involved. For instance, Gray Ainsworth of MGM Worldwide Distribution notes that studios would only want to train directors on technical skills if they are under contract.<sup>259</sup> Training formats should immerse students in digital-media topics, using interactive and hands-on styles. Trainees must have time to practice their skills and applications, potentially in a lab environment. State-of-the-art classrooms

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<sup>256</sup> Silicon Studio, Web Site.

<sup>257</sup> Silicon Studio, Web Site.

<sup>258</sup> Silicon Studio, Web Site.

<sup>259</sup> Gray Ainsworth, MGM Worldwide Distribution, August 10, 1998.

and demonstration media theatres could also be part of the educational-delivery process. They should have access to top industry professionals with the most up-to-date knowledge, either in the form of teachers or periodic speakers.

Producers of digital content who have had experience in producing for traditional media will find new opportunities for using their skills in a landscape that is much freer. They will need to understand how people are entertained and how to create content that is entertaining, exciting, and compelling to audiences. They must also understand the technology in production and delivery of content. Digital production requires many disciplines, including engaging story lines, graphic, characters, copy. To create interactivity in digital content requires even more time and resources. Eve Coquillard of C2C Media adds that merely having an idea is not enough. Producers must be able to execute the vision.<sup>260</sup>

Colorists for telecine, transferring content to digital video, are another digital-media skill group in great demand. When content is changed for electronic distribution, options emerge to alter the *look and feel* of scenes and characters. Chuck Dages of Warner Bros. says these skilled workers are valuable because they know how talent wants to look on screen and how they already look on film.<sup>261</sup> Colorists are treated and paid like talent, because they must understand both the product and peoples tastes in order to achieve the right look on screen.

Demand for digital content fluctuates greatly due to its episodic, *ad-hoc* nature. Demand is primarily driven by evidence of recent successful projects. As a result, production houses use freelance personnel to smooth fluctuations in their project-oriented business. Rimas Juchnevicius, a freelance special-effects engineer, states that most hiring for digital content is relationship-based.<sup>262</sup> Thus, an important consideration for attracting creative talent by digital-media companies overcoming the feeling that it's "who you know" that determines you hiring prospects.

Since much production software is proprietary to each individual production firm, skills that are sought tend to be basic user skills and competencies. Also, recruits should have the ability to synthesize and analyze content to recognize what adds value. General skill areas include teamwork, communication, problem solving, understanding of the production process, creativity and innovation, organizational aptitude, and enthusiasm for lifelong learning. A digital artist should have a demo reel, which is a portfolio of their work, to demonstrate their creativity. They must also be able to prove their knowledge of basic programs. Juchnevicius states that rotoscoping skills are an important skill in the screening process of new hires. He adds that the initial hiring is a proving ground for workers to demonstrate that they have strong learning capabilities and applications skills. Production companies only invest specific training in those that prove themselves in this stage. Once a worker proves his ability and worth, a high level of on-the-job training is conferred. There is a pattern of career development linked to job families. For instance, one is expected to develop their skills in storyboarding, character animation, and background. The rigidity of this model depends on the creator's talent and temperament and the practices of the firm.

The nature of the production process dictates that all members of a production team have input into the creative process, including technical programmers. Changes often occur during the course of a

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<sup>260</sup> Eve Coquillard and Kimberly Coccavo, C2C Media, Interview, August 12, 1998.

<sup>261</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

<sup>262</sup> Rimas Juchnevicius, Freelance Special Effects Engineer, Interview, August 24, 1998.

project, despite up front detailed artistic and technical specifications. Artists' ideas often change midstream, affecting the enabling technology, and new technological innovations often allow for creative improvements. Therefore, a production team and all of its members must be responsive and adaptive.<sup>263</sup>

Digital convergence facilitates its own growth by enabling access to digital artists worldwide. Production companies seeking talented artists will be able to employ a virtual organizational model, much like studios do. They will be able to hire digital-media professionals around the world. For instance, animation producers can hire less expensive labor overseas, such as in Asia, for their labor-intensive processes. Digital convergence enables production companies to review portfolios remotely and exchange files with workers inexpensively and almost instantly.<sup>264</sup>

## **Education**

Traditional educational models of students gathering around an expert using a Socratic teaching method have existed for thousands of years. The need for people to learn and grow is a fundamental element of human character. Two of the largest barriers in the quest of knowledge have been time and distance. Digital convergence changes the entire educational landscape by nearly eliminating time and distance obstacles.

Education has already begun a transformation in its format and audience. The amount of knowledge and the number of its sources are growing rapidly. At the same time, educational institutions must ensure cost containment in the face of the exploding market. The number of people seeking education is increasing, and the composition of these students is shifting. The demographics of students are more diversified and part-timers constitute a larger proportion of the student population. Hectic lifestyles have force students to seek flexible schedules and off-campus learning.

Students are beginning to take a consumer approach to education (Tapscott, Lowy, and Ticoll, 1998). They are taking a more active role in their education by learning how to learn better in order to develop multi-disciplinary skills for the dynamic economy. Also, students desire to have more personalized education to fit their individual learning styles. Due to the rapidly changing world and individual needs for self-actualization, people increasingly are seeking lifelong-learning models. Occupational fields are changing rapidly, people are switching fields more often, and information has become more important to work, as we shift from a manufacturing economy through an information-based economy to a knowledge-based economy. Consequently, training and education are more important, yet the model for education has not changed dramatically. There is a greater demand for education on technological skills and applications, according to Mark Maruyama of IBM.<sup>265</sup> He adds that this also is a consumer-based issue. Students want to begin to acquire technological literacy or further develop their existing skills.

Digital convergence as enabled the emergence of online education and the virtual classroom. Roy Messineo of Jeskell, Inc., an IBM Business Partner, asserts that the marriage of computing, communications, and advanced end-user functionality has the most impact on education, even more than entertainment.<sup>266</sup> The learning environment can be both enriched and enabled by digital

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<sup>263</sup> SkillsNet, Web Site.

<sup>264</sup> SkillsNet, Web Site.

<sup>265</sup> Mark K. Maruyama, IBM, July 28, 1998.

<sup>266</sup> Roy V. Messineo, Jeskell, Inc. – IBM Business Partner, Interview, July 28, 1998.

convergence. By combining different learning and presentation formats, educators can reach people with a variety of learning styles. Also, appealing to multiple senses provides a more fruitful, engaging, and impactful learning experience. Lloyd Pentecoste of IntraActv states that, when students are immersed and involved in the educational experience, they forget about everything else and focus on the learning and their retention increases.<sup>267</sup> Expression differentiates educators by making material more interesting, exciting, and comprehensible. Teachers can use story telling to communicate complex issues and combine video, audio, and text to improve the quality of the presentation to fit the higher expectations of today's students. However, the teaching process does become complicated for instructors because integrating digital media and communicating in new ways requires new skills.

Digital convergence also changes the learning environment by removing the barriers of time and distance. Messineo states that education can reach a wider audience due to the reduced need for proximity, which enables distance learning. Messineo states that it should actually be called close learning because education is brought closer to the public. Independence from time and distance creates a new learning model where specialized faculty can be reached worldwide and students can participate from wherever they are. Worldwide discussion groups about a specific topic can take place. Students can also learn whenever they want. Lectures, assignments, and even exams no longer depend on faculty schedules. Students can design their own educational experience by combining elements from different educational sources into an integrated experience. Lifelong learning becomes a greater possibility because people can remain updated on the latest developments in dynamic fields. Also, people can integrate their personal education at home with their occupational training at work.

Teachers also are impacted by the removal of time and distance constraints. They can lecture to wider audiences by reaching students worldwide and those that have scheduling conflicts and need to consume the lesson later. Educators also can create a rich, comprehensive lecture one time and disseminate it multiple times, instead of offering the same material repeatedly. The increased attention placed on a single lecture encourages educators to approach lectures like productions that combine information and entertainment. According to Professor Robert Trelease of the UCLA School of Medicine, teachers can engage in much more frequent and widespread interaction with students through digital communication, including e-mail conversations and discussion groups, than requiring individual interactions.<sup>268</sup> They also can construct a lesson from a variety of sources using knowledge from all over the world. Previously, this high volume of information was impossible to discover and sort through, but digital access to worldwide educational servers and sophisticated search mechanisms make this process possible.

However, some critics state that digital education lacks real interactivity between the student and the mentor. Trelease notes that most distance-learning programs lack hands-on learning. An effort must be made to provide an educational experience that offers practical experience. The power of digital education to educate anytime and anywhere will enable the emergence of more suppliers of educational programs. Comparable courses to those offered by physical educational institutions will emerge in the virtual space, without the need for a traditional campus environment. Maruyama offers the University of Phoenix as an example of an accredited institution that offers programs in the absence of a traditional campus. In addition to virtual universities, corporations and vocational

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<sup>267</sup> Lloyd Pentecost, IntraActv, Interview, August 3, 1998.

<sup>268</sup> Professor Robert B. Trelease, Interview, August 10, 1998.

programs also are better able to compete in the digital arena. Educational institutions must address this new, explosively growing form of competition. The competitive threat also endangers the campus experience, which has important social value to students. Also, Trelease states that they must develop methods of protecting their intellectual property from pirating through control of their copyrights. Changes in the dynamics of education production may create the danger of powerful organizations, such as software companies, consolidating knowledge sources or content control.<sup>269</sup>

Interactive-media companies serve two educational markets: curriculum-based products designed for in-school and home-schooling use, generally sold to K-12 schools, and "edutainment" products designed for home use which provide educational content in a more entertaining format.<sup>270</sup> Initially, the focus was on the school market. However, many interactive-media companies have found this market difficult to penetrate due to resistance from teachers not comfortable with computer use and deficient computer resources and miniscule budgets. As a result, interactive-media companies target the more progressive home market. Schools are beginning to adopt interactive media for educational purposes as school districts recognize the value of interactive learning and adjust their budgets and curricula to incorporate the use of computers and technology products. The educational segment for interactive media is somewhat constrained by the static nature of its content in comparison to entertainment. Schools and parents will purchase interactive educational products once for a subject. Incremental updates are often executed through Web-based CD-ROM hybrids.

In the face of the changing educational model and increased competition from alternative sources of learning, educational institutions must take steps to maintain their position as the primary source for instruction. They must research the new educational environment thoroughly and determine their new roles regarding content and process (Tapscott, Lowy, and Ticoll, 1998). In order to create a climate for change, they must communicate a need for a clear vision and infrastructure development and gain new competencies to fit the vision. Educational suppliers will have opportunities to access new sources of knowledge and new skills. Therefore, they need to work with new partners and acquire skills for managing these new relationships. Since educational suppliers must direct all their resources toward on the new vision, they must manage the changing roles of their faculty, technology, and physical facilities. The gap between the function organization of educational institutions and the multi-disciplinary needs of digital media may require changing their degree structure to fit the appropriate skills.

Faculty that lag students in technological skills may feel threatened because, to some degree, they are no longer the center of knowledge. Messineo believes that, while this must be addressed, teachers will still be experts in their field and technological knowledge only applies to the tool, not the subject. Faculty may also be concerned about being replaced since educational access is so much easier. They may fear placing their core of knowledge in the digital space because they may lose their personal intellectual value. In a free market for education, educators could become commodities with job security mechanisms such as tenure becoming obsolete. On the other hand, convergence may free faculty to spend more time on the creation of new knowledge. Job security would derive from research and the translation of new knowledge into digital content. This is close to the original plan for faculty of the research universities in the United States.

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<sup>269</sup> Information Technology Outlook 1997, Organization for Economic Co-Operation and Development.

<sup>270</sup> SkillsNet, Web Site.



Existing educational institutions are still best positioned for supplying educational programs because they have the best knowledge assets. Maruyama states that they must use a business model. They need to perform a market assessment and discover what their needs are. The issue is no longer how to teach, but how do students want to learn. Therefore, institutions must take a more consumer-oriented approach and offer non-traditional experiences, a broader range of disciplines, and more teamwork integrated into their programs. They must overcome resistance and inflexibility by tenured faculty.

The use of technology in teaching requires asking what is the goal of the use of technology and in what environment should be it be used. Some learning requires engaging, real-time interactivity while other learning environments require less. Maruyama adds that education should focus on the technology tools that provide the most value to the public, particularly for business purposes. It must be easier to integrate technology into courses and entire programs. When creating a new digital course, faculty must create it from scratch or use components to construct a new offering. Faculty will not want to use entire off-the-shelf packages. Therefore, ease of modularity in course design and standards for such modularity are crucial. Howard Rudzki of Kids Universe states that the unbundling of knowledge by educational sources can facilitate customized content.<sup>271</sup> Modularity allows educational suppliers to focus on their core competencies. The establishment of open, interoperable standards will facilitate supplier communication.

For educational institutions to remain competitive in the context of digital convergence, they must develop a technological infrastructure centered on the Internet that empowers them to transmit knowledge to wide audiences in a quick and inexpensive manner (Tapscott, Lowy, and Ticoll, 1998). They must have broadband access and a stable, user-friendly environment. Tools that will deal with the bandwidth problem and enable them to serve markets better include data push technologies, hybrid CD-ROM/Web applications, compression technologies, broadband wiring, ADSL, satellite, and cable connections and high-speed modems or ISDN penetration. Maruyama states that institutions should develop more Web-deliverable products that leverage browser interfaces, as opposed to physical distribution mediums like CD-ROM. He adds that they must improve their price-performance ratio, though it will improve with infrastructure development.

Educational suppliers will be motivated by a new economic model that encourages specialization and economies of scale. Interoperability will force streamlined production and an expanded product range. Economies of scale from larger student markets will be needed to generate low marginal-distribution costs and offset large initial-production costs. As a result, a larger base of people can be educated by an institution.

Education accreditation will remain important and be a source of competitive advantage for institutions. Credibility of an educational sources is vital because traditional universities have a reputation and can signal what a degree from them means. Other sources of accreditation can come from academic and private agencies. Also, academic credit banks and broker services can mediate supplier-student relations.

Governments can help facilitate digital education by deregulating education. It may be difficult for governments to disentangle themselves from education, but the growth of a modular, digital supply requires market incentives. Since the scope of education is expanding, governments should replace

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<sup>271</sup> Howard Rudzki, Kids Universe Toys and Software, Interview, August, 1998.

local and state regulation with national and global frameworks. They must also establish jurisdiction rules for the settlement of intellectual property and export issues. The criteria for student financing should be changed to be based more in demand for courses and programs than per-capita allotments. Some additional funding may be necessary for under-demanded areas that are in the public interest (Tapscott, Lowy, and Ticoll, 1998). Governments should also consider how the economies of campus towns hurt by new competitors in the digital age will be effected and whether they need public support.

It is also important to note that educational institutions provide important social interaction among people. People with similar interests and similar levels of aspiration can meet in a virtual or physical sense, exchange ideas, reinforce concepts, and support each other's efforts. Also, the campus environment provides an important socialization process, particularly for children and young adults. In addition to the danger of replacing this physical environment, educators operating in the digital space must also avoid viewing technology as a goal, rather than a tool. Educational software and other tools should supplement, not replace, the learning process. The emergence of digital education mandates that emerging or evolving suppliers should consider the value of these social functions offered by education.

## **A Strategy for Digital Convergence**

Has this litany of issues facing the three converging mega-areas provided any insight into what needs to be done to advance digital convergence? We think so. The network of organizations in this evolving business ecosystem has a systemic gap. To understand that organizational gap we must digress briefly in the theory of technology life cycle.

Geoffrey Moore (1995, 1995, and 1998) articulates a theory of high-technology marketing strategy centered on his view of the technology-adoption life cycle. Standard diffusion-of-innovation theory articulates five phases or segments: innovators (this segment does not create the new fashion or technology, but are the very first to try it out – like the very first kids in school to wear a new fashion), early adopters (the ones who spot new trends early and jump on board), early majority (the first mass audience that turns a novelty into a fad), late majority (the one who adopt a fashion so they don't look old fashioned), and laggards (the ones who would just as soon look old fashioned, but may buy if there is nothing else in the store).

Moore's adaptation differs from standard diffusion-of-innovation theory by postulating different dynamics between phases or segments. The innovators are equated to the technology enthusiasts who adopt technology based on its "coolness" or power and are willing to patch together workable solutions from whatever pieces are available. The early adopters are business visionaries, who foresee an opportunity to establish high visibility and competitive advantage by jumping early onto product bandwagons that may not yet be ready for mass markets. In the major departure from standard diffusion theory, Moore asserts that the pragmatists of the early market are not influenced by the technology enthusiasts or the business visionaries. Pragmatists listen only to other pragmatists. The conservatives of the late majority wait until technology is commoditized before buying. The laggards are skeptics who may never join the digital revolution of their own volition.

Between the early adopters and the early majority lies the *chasm* that is the major focus of Moore's first book. The evolutionary edge of digital convergence, however, is between the technological enthusiasts and the business visionaries. The central issue is how do new technologies get shaped to

address business problems. We find no organization that currently facilitates this crucial transition. It is in bridging between these segments that a new organization could be established with interrelated strategic roles to play: incubator, playground, showcase, classroom, tactical-problems forum, and strategic-issues forum. Each of these roles has a virtual and physical presence.

The incubator is place for spawning of discontinuous innovations. Once ideas are incubated into products or prototypes (inside or outside this organization) they can enter the playground. Much like children getting ready for schooling these products or prototypes have only to demonstrate that they can play peacefully with the other products in the playground before being released. In this physical and virtual arena technological enthusiasts can test out the latest innovations, figure out how to break things, put them together, and combine them with other components to make whole products. The showcase is where business leaders can view the products that have survived the playground, seeking the raw technologies that can be shaped to particular business needs. The transformation of innovative technologies to business solutions is a problem-identification and solving stage designed to take place in the tactical-problems forum. The creators of new technologies gain from having a place where their products can be tested, tried and showcased, and where the problems standing between them and the early adopters can be addressed. The technological enthusiasts gain a place to play with new technology and the opportunity to consult on making whole products from the raw technologies. Business visionaries gain from exposure to breakthrough technologies and the expertise to adapt these technologies to their needs. The strategic issues that remain unsolved form the basis for ongoing discussions between business visionaries as well as the basis for setting priorities for the incubator.

The infrastructure needs for this environment include: a network that can anticipate the bandwidth of the future and the scalable server structure to support diverse technologies and media-asset management, incubators where new solutions can be created, classrooms for training technological enthusiasts in use of innovations, infrastructure for distance learning, playgrounds that facilitate the man-machine interaction of technological enthusiasts and new technology, consultative spaces where technical problems can be resolved, the forum for discussing strategic issues and setting the incubation priorities for the future, and multi-format presentation and screening facilities for experiencing digital productions.

While an organization filling these roles would be valuable in many geographic locations, Los Angeles is particularly suited as a site. The entertainment sector is centered there and is probably the most geocentric of three sectors involved. With respect to the entertainment sector the role of business visionaries is probably being played the directors (at least within the film sector). These leaders of temporary systems (film projects) are the ones most likely to see strategic advantage in very early adoption of new digital technology. They are also the ones that have the clout to convince, first, their producers and then the pragmatists at the studios to support the process (although true adoption would happen later in the technology-adoption life cycle).

The diversity of issues cited in this report underscores the need for getting participants together to address common problems. Many such meetings are occurring regularly. Of course these need to continue. However, something more is needed. Organizations with the roles articulated above not previously existed. Why are they needed now? The answer we believe lies in the change in the structure of the business ecosystem. We referred earlier to the days when the industry was vertically organized. The large organizations that dominated this former business ecosystem allocated their own resources to research and development and shaped those R & D efforts to serve long-term

organizational goals. This is much less the rule than it used to be. A.T. Kearney estimates that less than one percent of real domestic growth in the Fortune 20 companies comes through internal innovation (as opposed to globalization). And even this figure includes innovation through acquisition. While innovation abounds in the network of entrepreneurial firms, what has been lost is the organizational control that used to come with firms owning the R & D effort. In the downsizing craze of the 1980s and early 90s we experienced a *de facto* out-sourcing of R & D. While R & D budgets have been increasing in the last three years, (to 4.5% of the operating budgets of the S & P 500 companies), far more innovation is being funded by venture capital than ever before. High-tech companies alone attracted more than \$5.9 billion through the first three quarters of 1997. Communications attracted \$2 billion in the same time period.<sup>272</sup> Overall venture capital in 1997 was on course to outpace the records set in 1996. So, in part, the goals of venture capitalists are being substituted for the prior R & D priorities of major firms.

The strategic roles envisioned for this organization in effect provide a loose system of transorganizational managerial controls for what historically were firms' internal controls over R & D efforts. The sections that follow elaborate the concept and bring in the perspectives on such a digital media center from our filed interviews.

### **Gathering of Convergence Parties**

The overlap of disciplines created by digital convergence and the requisite collaboration among relevant companies creates a strong incentive to assemble entertainment, technology, and communications parties. Cooperate initiatives require the close interaction of companies across and within these industries. The general objective of such a gathering place, whether virtual or physical, should be the advancement of digital media and the facilitation of a dialogue among parties. Assuming a physical facility is founded, it should be a place that speeds the general acceptance of new digital products and technologies and accelerates the adoption of new thought patterns and new expectations. Essentially, a digital-media center should both provide access to and create information. The fundamental components of the center would consist of people, tools, and infrastructure. This center should be a knowledge transfer center globally and across industries.

### **Location**

A strong argument can be made for establishing such a gathering place in the Los Angeles area. The center should be located near the primary source of entertainment and creativity. One must maintain the perspective that artistic content is the product while technology and communications are tools. Product focus should on the application of these tools. Creative people are less able to travel away from their base and be separated from their critical networking connections for extended period of time. Networking is so important to entertainment that other regions have not been able to approach the level of entertainment clout that Los Angeles has. Chuck Dages of Warner Bros. states that from the entertainment industry perspective, if something does not exist within 30 miles of the intersection of La Cienega and Beverly, it does not exist.<sup>273</sup> Technology and communications companies can be easily brought to the area because they are more mobile by nature.

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<sup>272</sup> "Venture Capital Hits New Heights In 3Q," by Gabrielle Jonas, *TechInvestor*, November 20, 1997.

<sup>273</sup> Chuck Dages, Warner Bros., Interview, August 20, 1998.

Los Angeles would receive great value if such a gathering was situated locally. It would signify Los Angeles as a place for business and resources to locate. The area could become the focal point of synergy of industries and parties, idea sharing, and the facilitation of alliance development. The Digital Coast initiatives to gain recognition as a center for digital media, a version of Silicon Valley with entertainment, would be greatly served by a center. The attraction of businesses and resources to the greater Los Angeles area would have a regional effect as positive economic externalities reach over and return back over city borders.

The advantage of locating a facility in Los Angeles would be the creation of a point of entry to its resources and raw materials. Dages states that Los Angeles has the strongest balance of entertainment and technology. Los Angeles is the world capital of entertainment. According to David Hankin of Sony Online, the region can produce better digital content than other technology-oriented regions and has established itself in the digital effects and animation segments of the motion-picture industry.<sup>274</sup> The area is technology rich with an already strong presence in digital media. The residues of the aerospace industry that exist in the L.A. Basin can take Silicon Valley technology and translate it to the entertainment industry, similar to their other conversions of military applications. Los Angeles also has strong business markets and a well-established service industries, including major law and accounting firms and talent agencies – all with divisions devoted to digital media. The area has many universities that have digital-media programs and are regarded as among the most prestigious in the world. Southern California will be able to attract people and businesses because of its well-known, pleasant climate and abundance of outdoor activities. Los Angeles also has a strong international nature, including a powerful connection to the Pacific Rim.

However, a digital-media center located in the Los Angeles area would have some obstacles to overcome. Technology, entertainment, and communications, and related companies in Southern California are very spread geographically making cooperation difficult. Technology companies reside from Northern San Diego County to Santa Barbara – a span of over 200 miles. Within the entertainment industry, there are many small companies in digital media that can emerge in many localities because they do not require much infrastructure. There are strong digital-media congregations in Pasadena, Burbank, Santa Monica, and Ventura. It would be difficult to choose a location that is central to all these groups. Also, the different regions are governed by different municipalities with different governmental objectives. Uniformity in treatment of digital media by these municipalities must be reached. The spread and diversity of the region lacks the synergy as seen in Silicon Valley. There must be some factor of cohesiveness that bonds these geographically and functionally diverse companies and the location of a facility should reflect such synergy. Guy Langvardt of Compaq Computer Corporation wonders whether technology companies will be willing to promote Los Angeles as a center for development. These firms are global and would have to choose among scarce resources when selecting a city. The primary motivating factor for technology firms should be to better serve their clients in entertainment, media, consumer products, aerospace, and defense.<sup>275</sup> Hankin adds that the cost of living in the Los Angeles is higher than most other possible sites (other than San Francisco and New York) and will discourage businesses and people from entering the region.

Another factor that should be considered when deciding on Los Angeles for a gathering place for digital media is the telecommunications infrastructure of the region. The region has tremendous

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<sup>274</sup> David L. Hankin, Sony Online Entertainment Inc., Interview, August 19, 1998.

<sup>275</sup> Guy Langvardt, Compaq Computer Corporation, Interview, August 11, 1998.

market development and infrastructure development, yet it must overcome the geographic dispersion of its companies. Entertainment companies must be connected through high-speed channels to technology firms and production companies to ease collaboration. Local and state governments will play an important role in encouraging the development of a center in Los Angeles. As previously discussed, the City of Los Angeles has shown tremendous support for such an initiative. They have offered tax incentives and will facilitate the granting of permits. Direct fiscal support would likely be limited. Governments would respond with greater support if they were given tangible evidence of progress in the development of a center for digital media.

### **Center Infrastructure and Facilities**

A center supporting digital media must have an enabling infrastructure to support collaborative work and represent the power of digital media distribution. The facility should be wired for high-speed communication and transmission of digital files. The connections would extend to regional headquarters for business partners and other centers worldwide. The center should be global in nature to connect local businesses and resources to other regions. The initiative would be integrated into a worldwide development of digital-media centers for business and educational purposes. The center would provide a portal to the global community to help them find partners and projects and participate in international forums. Also, when foreign parties come to the United States, there must be a facility where they can see what the area has to offer.

Production facilities should be available for testing and collaboration. These facilities would also be made available to smaller companies that cannot afford their own facilities, including sound stages and post-production facilities. State-of-the-art equipment would be used to remain on the cutting edge and to symbolize the vision of digital media. Alternatively, a program could be set up that pools resources to share in the rental of equipment or a technology consortia could be established to offer discounted prices on technology purchases. The two advantages to these approaches are the reduced financial commitment for equipment with extremely short life cycles and the ability to include companies from wider geographic regions in the group.

### **Center Activities**

A fundamental objective of the center is to encourage collaboration among entertainment, technology, and communications firms. A center should facilitate communication and cooperation among these companies by overcoming geographic, cultural, and communicative barriers. These companies have different objectives with some overlap. Collaboration initiatives would bring more cohesiveness and synergy to digital media. A center would help nurture relationships and partnerships and provide a meeting place for planning among partners. Teaming should be strategically arranged to encourage multiple viewpoints and should be encouraged by panels and roundtables. A gathering place would create a sense of community, promote member companies, and generate new ideas. Information sharing on digital-media initiatives, which are non-proprietary in nature, will benefit all members.

The concept of information sharing and meeting of the minds exists in an *ad-hoc* form with current industry associations such as Los Angeles New Media Roundtable (LawNMower) and the Venice Interactive Community (VIC). However, a facility would have more permanence, occur at a high, connected organizational level, and extend beyond promotional and social functions. Members should have a presence at the facility in the model of a satellite from their own headquarters, maintaining strong ties with the rest of the organization as well. Cooperation would be facilitated by the availability of sophisticated collaboration tools and infrastructure. The physical layout of the

center would encourage teamwork with open spaces, meeting facilities, and equipment for testing and experimenting. The center could be linked to a larger convention facility where people would expect to go for seminars and conferences. Also, the center would have a scholar-in-residence component to offer temporary exposure to visiting experts, similar to the Aspen Institute model. A center would also allow companies to showcase new products and technologies. Showcasing performs a marketing function by enticing people until the time that the product is ready so they are primed to want it. Also, startup companies can stimulate interest in their firm while still in development. Showcasing educates the industry on the latest technologies and research. Companies can find out how to apply new technologies to their work and how fast will they arrive. Both technology and content companies would seek to demonstrate their offering, including service, appliances, software, and creative concepts. Most digital-media centers focus more on technology companies and accomplishments. A new center in Los Angeles should also show off talent in media and entertainment content. Showcasing would also extend beyond digital-media companies as a target audience to educate the consumer marketplace and the creative entertainment community about the power of digital media.

A digital-media center should also provide training and retraining for industry people. The center would attract both professional educators and leading members of industry to teach courses on a visiting basis. The facility should provide the environment, motivation, and tools for a broad-based training. Personnel segments that would be best served by training would be digital artists, network administrators, and business executive in the field of digital media. Training should not be meant to compete with universities or art schools. In fact, they should solicit the support of educational institutions in course and training format development. The proposed training center would not be the sole center for digital media or in competition with other providers. Instead, it would represent and serve a region with a strong presence in digital-convergence fields and would be part of a consortium of linked training centers. Other regions including Asia, which also lacks personnel skilled in digital media, would be able to connect to the facility for distance learning.

Once a body of talent builds up, new businesses will emerge. The encouragement of digital-media entrepreneurs is important to facilitate a networked industry, which provides requisite products and services. In addition to creating new businesses, such collaboration will help incubate new technologies, relationships, and ideas by acting as part catalyst and part infrastructure source. Startups can take advantage of the state-of-the-art infrastructure for testing and development that they do not have the resources to acquire. Jon Goodman of the EC2 Annenberg Center states that incubators require tremendous financial resources to keep the equipment on the cutting edge.<sup>276</sup> In addition to equipment, an incubator must have an enormous pipe to transmit digital files. Since incubation requires access to capital, new businesses should have access to venture-capital markets and possibly the establishment of an affiliated venture fund. Incubators should also have access to talent. The density of talent and networking ability at a physical facility will greatly aid startups because they will constantly need assistance from potential business partners, venture capitalists, accountants, and lawyers. Access to talent that has a similar vision will spawn new relationships and facilitate new startups. Jun Kinebuchi of Ignite Group states the center can act as a hub since each participant will have connections to other incubation sites.<sup>277</sup>

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<sup>276</sup> Jon Goodman, EC2 Annenberg Center, Interview, August 11, 1998

<sup>277</sup> Jun Kinebuchi, Ignite Group, Interview, August 14, 1998.

## Center Design

The architectural design of the center will also play a role in the representing digital media. Physical buildings and towns are merging with technology. For example, as e-commerce develops shopping malls and cyber-shopping will converge. One must consider how will media play a role in physical space and what are the consequences of the potential merger of physical and virtual space. As new towns are built, we should consider how technology adds to theme. Physical space can tell a story, exemplified by cathedrals of old for religion and Japanese garden paths for tales. Digital media has even played an important role in building new cities and complexes through simulated layouts and design. The use of space and facility layout would represent both innovative achievement, progressive thought, and collaborative behavior. The design of a center can support the idea of community and the importance of personal relationships to business. The existence and design of a center will have a tremendous psychological impact by stating that the commitment to digital media is genuine. In addition, the aesthetic value of a center will appeal to creative people. The attraction of creative talent rests on the ability to convince them that they will value the work environment, in addition to the opportunities. Creative people will tend to appreciate the sense of warmth and community of a complex and will, therefore, be attracted to a center that offers such a sensation.

## Center Organization and Strategy

The organization of the center should be agile and entrepreneurial in order to recognize and act quickly on opportunities. Flexibility can be supported by sub-contracting resources such as professors for intellectual disciplines, technological resources, and training on a visitation basis.

A center needs a strategic vision, not a tactical approach. It cannot be viewed as a cost center or a short-run profit division. The objective for the center and for each one of its members should be to cultivate the long-term potential of digital media, which will in turn benefit each of its members in a manner that is mutually supportive rather than mutually exclusive. Far from a vague or altruistic goal, each partner must know upon joining what it wants to accomplish and how the objectives benefit them directly within their sphere of control, furthering their needs and their funding sources.

Members should manage the tradeoff between the cost and risk of joining versus their return on investment. Each party's self-interests should be identified and compared to what they expect to achieve by participating. They should be given a convincing reason to participate. Demand for digital-media solutions may be so great that individual interests clearly converge. Multiple interests ensure that a more objective vision is secured. Facilities that have the greatest benefit to the largest number of people are those that represent the largest group of constituents that can solve the problem. Centers that represent one perspective or demonstrate a specific company's solutions will be limited in value in the network-based digital media economy.

We believe that digital convergence is inevitable. The question for us is how much of the energy that goes into convergence is transformed into friction and entropy rather than creative output. The transformation of historically vertical industries into the horizontal, networked structures has helped spawn the innovation that drives convergence. But this transformation has also left out some of the historical mechanisms that can help guide and shape convergence. We hope that the issues highlighted in this report and the recommendations for establishing a center can help dissolve the barriers to digital convergence.



## References

- Arthur, W. Brian (1994), *Increasing Return and Path Dependence in the Economy*, Ann Arbor: University of Michigan Press.
- Bower, Joseph L. and Clayton M. Christensen (1995), "Disruptive Technologies: Catching the Wave," *Harvard Business Review*, January-February, 44-53.
- Cairncross, Frances (1997), *The Death of Distance*, Boston: HBS Press.
- Christensen, Clayton M. (1997), *The Innovators Dilemma: When New Technologies Cause Great Firms to Fail*, Boston: Harvard Business School Press.
- Cooper, Lee G. (1998), "Strategic Marketing Planning for Radically New Products," Working paper, Center for Marketing Studies, Anderson School at UCLA, (revised August 31).
- Csikszentmihalyi, Mihaly (1997), *Finding Flow: The Psychology of Engagement with Everyday Life*, New York: Basic Books, A Division of HarperCollins Publishers, Inc.
- Dyson, Esther (1997), *Release 2.0: A Design for Living in the Digital Age*, New York: Broadway Books.
- Gates, Bill (1995), *The Road Ahead*, New York: Viking.
- Greenberger, Martin (editor) (1990), *On Multimedia*, Santa Monica: Voyager.
- Greenberger, Martin (editor) (1992), *Multimedia in Review*, Santa Monica: Voyager.
- Greenberger, Martin (editor) (1994), *Content and Communication*, Santa Monica: Council for Technology and the Individual.
- Grove, Andrew S. (1996), *Only the Paranoid Survive*, New York: Currency.
- Hagel, John III and Arthur G. Armstrong (1997), *Net Gain: Expanding Markets through Virtual Communities*, Boston: Harvard Business School Press.
- Hauser, John R. and Don Clausing (1988), "House of Quality," *Harvard Business Review*, May-June, 63-73 (Reprint No. 88307).
- Hoffman, Donna L. and Thomas P. Novak (1996), "Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations," *Journal of Marketing*, 60 (July), 50-68.
- Hoffman, Donna L., Thomas P. Novak, and P. Chatterjee (1995), "Commercial Scenarios for the Web: Opportunities and Challenges," *Journal of Computer-Mediated Communication*, Special Issue on Electronic Commerce, 1(3).
- Hoffman, Donna L., Thomas P. Novak, and Alladi Venkatesh (1997), "Diversity On The Internet: The Relationship Of Race To Access And Usage," Paper prepared for the Aspen Institute's Forum on Diversity and the Media, Queenstown, Maryland, November 5-7.
- Iansiti, Marco and Jonathan West (1997), "Technology Integration: Turning Great Research into Great Products," *Harvard Business Review*, May-June, 69-79 (Reprint No. 97304).
- Iansiti, Marco (1993), "Real World R&D: Jumping the Product Generation Gap," *Harvard Business Review*, May-June, 138-147 (Reprint No. 93307).
- Kaplan, Jerry (1995), *Start Up: A Silicon Valley Adventure*, Boston: Houghton Mifflin.
- Markides, Constantinos (1998), "Strategic Innovations in Established Companies," *Sloan Management Review*, Spring, 31-42.
- McGrath, Michael E. (1995), *Product Strategy for High-Technology Companies*, New York: McGraw Hill.
- Moore, Geoffrey. (1994), *Crossing the Chasm*, New York: Harper Business.
- Moore, Geoffrey. (1995), *Inside the Tornado*, New York: Harper Business.
- Moore, Geoffrey., Johnson, and Kippola (1998), *The Gorilla Game*, New York: Harper Business.
- Moore, J. (1996), *The Death of Competition: Leadership & Strategy in the Age of Business Ecosystems*, New York: Harper Business.
- Novak, Thomas P., Donna L. Hoffman, and Y.F. Yung (1998), "Measuring the Flow Construct in Online Environments: A Structural Modeling Approach," Working Paper, Owen School of Business, Vanderbilt University.

Tapscott, Don (1996), *The Digital Economy: Promise and Peril in the Age of Networked Intelligence*, New York: McGraw Hill.

Tapscott, Don, Alex Lowy, and David Ticoll (editors) (1998), *Blueprint to the Digital Economy*, New York: McGraw Hill.

Yoffie, David B. (Editor) (1997), *Competing in the Age of Digital Convergence*, Boston: Harvard Business School Press.