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EXPLORING THE SUSTAINABILITY OF TRADITIONAL AND NEW MEDIA USING A SCENARIO MODEL

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by

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Abstract

This thesis explores the sustainability of media by using a scenario model. It focuses on current practices within traditional and new media to determine how sustainable each of these is in terms of the economic, social, and ecological aspects that constitute sustainability.

Chapter One, an overview, defines traditional and new media, traditional and new media designers, sustainability, and describes the scenario model. Chapters Two through Five discuss the sustainability of a representative technology for each quadrant of the scenario model. Included are cellular phones, an example of Unsustainable New Media in Quadrant IV; newspapers, an example of Unsustainable Traditional Media in Quadrant III; television, an example of an Sustainable Traditional Media in Quadrant II; and the Internet, an example of Sustainable New Media in Quadrant I. These chapters all use a standard format and vocabulary for comparison and for highlighting potential trends within each quadrant.

Chapter Six analyzes the two previously discussed traditional and new media. Comparisons between the current and potential sustainability trends of each technology are covered and plotted on the scenario model's two axes. The research concludes that sustainable growth requires evolving guidelines and ongoing educational development, to enable businesses and consumers to make increasingly sustainable choices.

Acknowledgements

I've been very grateful to have a considerate, thoughtful, and thought provoking committee. J, Yoshiko, and Lee- thank you for all that you have individually contributed – unique perspectives, generous time, and supportive discussions. I appreciate your encouragement and direction.

And what's school without friends? Adrianne and Mathew, thank you for giving me a home away from home, taking me to the Comet, and encouraging me to study so much. Kristin, Toby, Christy, and the whole graduate gang, thanks for laughing with me, encouraging and challenging me.

Mom, Dad, thank you for believing in me, when I didn't. You've both been so supportive praying for me. I'm particularly appreciative of the hard lessons you taught me a long time ago. They have given me the skills to do my best, without quitting.

Steve, you're a trooper. You've been my worst critic and greatest supporter. I'm so thankful to have a husband that is willing to not only delay his dreams, but to encourage me to put mine first. I want the opportunity to do that for you, with as generous an attitude as you have exemplified for me.

“You’re blessed when you’re at the end of your rope. With less of you there is more of God and his rule.

“You’re blessed when you feel you’ve lost what is most dear to you. Only then can you be embraced by the One most dear to you.

“You’re blessed when you’re content with just who you are – no more, no less. That’s the moment you find yourselves proud owners of everything that can’t be bought.

“You’re blessed when you’ve worked up a good appetite for God. He’s food and drink in the best meal you’ll ever eat.

“You’re blessed when you care. At the moment of being ‘care-full,’ you find yourselves cared for.

“You’re blessed when you get your inside world—your mind and heart—put right. Then you can see God in the outside world.

“You’re blessed when you can show people how to cooperate instead of compete or fight. That’s when you discover who you really are, and your place in Gods family.

Matthew 5:3-16

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Chapter One. Understanding Media

Introduction

Traditional media, new media and sustainability are broad topics, even when considered individually. This thesis looks specifically at two sustainable and two unsustainable scenarios as they relate to traditional media and new media. Examining traditional and new media synthesized with policies of sustainability can contribute beneficially to insights relating to the future. This research provides a brief overview of the history of mass media and then introduces working definitions of sustainability, traditional media and new media. Working with a consistent vocabulary increases the opportunity to share research and later to examine complex comparisons. The thesis then defines a general characterization of four individual quadrants, and in doing so, lays a basic groundwork for in-depth discussion of the individual scenario quadrants.

An Brief Historical Overview

The use of, access to, storage, dissemination, and file formats of media evolve daily. Evolution of media is historically seen beginning with etchings and paintings on cave walls in ancient times. This process was time-consuming, and the media was virtually impossible to transport since it was fixed on cave walls. Stone tablets, used later, proved somewhat portable, yet the media was limited, since they were fragile, heavy, and skill-intensive to produce. Issues of handling and hauling heavy stone significantly decreased with the advent of animal-hide for manuscripts and other media. Animal-

hides proved easy to transport but still required skilled craftsmen and time-intensive labor to produce, hand-letter, and illustrate. Furthermore, the number of animal hides needed for a single in-folio volume proved costly. During the Middle Ages, linen and rag paper brought further change. Rag paper superseded animal-hide paper with its reduced material costs and production time. The bubonic plague contributed to an excess of linen that fueled the plummeting cost of linen paper production. With marked reduction in paper costs hand-scribed manuscripts increased and became more available. Book ownership extended beyond the elite and books were available to larger audiences. However significant the reductions of cost, producing materials with rag paper still prohibited most middle-income and all low-income people from purchasing books. In the fifteenth century, a new technology capitalized upon the cost benefit of rag paper – the invention of the Gutenberg printing press and its moveable type. By mechanizing the drawing of individual characters on paper, the printing press increased production speeds, decreased production costs, and finally made print media affordable to the middle class.

For the first time in history, middle class citizens could tap into the power of information. The printing press enabled this. The availability of books pushed the development of modern thought forward by giving rise to scientific investigation, breaking existing class structures, and allowing middle-class intellectuals to emerge. Unlike limited-edition books, affordable books, produced with the new technology of the printing press, gave common people opportunities to learn and experience new things and to influence the world around them. In his 1986 book, Robert Logan discusses the impact of the printing press.

> The printing press "unleash[ed] a powerful new force that completely transformed Western civilization, leaving in its wake the Renaissance, the rise of science, the Reformation, individualism, democracy, nationalism, the systematic exploitation of technology, and the Industrial Revolution--in short, the modern world." (Logan, Robert p180.)[1]

Today, the printing press is just one of several traditional media technologies influencing daily life. Print, broadcast, film and television are considered traditional media, because they use an analog format for the final content deliverable and distribution. As technology continues to evolve, traditional media products and processes also evolve and even overlap with new media, with portions of their development, delivery and storage process incorporating new media techniques. For instance, high-definition television (HDTV) is changing the methods of storage and distribution for television programming from traditional analog media to digital content transmission.

New Media

Is there a technological innovation today that parallels the extraordinary advances of the printing press? Is the impact of the printing press rivaled by the impact of computers? With computers and computer networks, information availability continues to broaden as data is accessible real-time across the globe. Sending and receiving digital content is not limited to using a laptop computer or standing CPU tower. Digital content is also delivered through many other devices such as cellular phones, PDA's, and MP3 music players. It moves virtually seamlessly from one digital technology to the next and from one digital format to the next. Like the evolution of paper, moveable print,

[1] Robert K. Logan, *The Alphabet Effect: The Impact of the Phonetic Alphabet on the Development of Western Civilization*, 1st ed. (New York: Morrow, 1986).

and the printing press, new media objects exert a major influence on society. Lev Manovich, describes the historical highlights leading up to new media:

> Eventually, in the middle of the twentieth century, a modern digital computer is developed to perform calculations on numerical data more efficiently; it takes over from numerous mechanical tabulators and calculators widely employed by companies and governments since the turn of the century. In a parallel movement, we witness the rise of modern media technologies that allow the storage of images, image sequences, sounds and text using different material forms – photographic plates, film stocks, gramophone records, etc. The synthesis of these two histories? The translation of all existing media into numerical data accessible through computers. The result is new media – graphics, moving images, sounds, shapes, spaces, and texts that have become computable; that is, they comprise simply another set of computer data.[2]

Manovich qualifies technology as new media if it meets five standards. First, new media is representable numerically, with zeros and ones. Second, new media is modular, with individual elements maintaining their independence even when combined into larger objects. Third, the operations involved in creating, manipulating, and accessing the media are automatable. Fourth, new media is variable, or able to exist in nearly infinite versions. Finally, new media is less encumbered by the multitude of differing file formats, fluidly translating into other formats.[3]

The Role of Graphic and Digital Designers in New and Traditional Media

Professional new media designers come from varied backgrounds, interests and expertise yet they all share an interest in developing and formatting clear communication. Digital and graphic designers are professionals concerned with using new and traditional media communications. Their primary objective is to digest client information and format it in a way that meets and exceeds client objectives while

[2] Lev Manovich, *The Language of New Media* (Cambridge: MIT Press, 2001). Page 20.

[3] Ibid. Pages 27-49.

effectively conveying the intended message. To effectively convey a message, the product must successfully speak to the target audience. Designers are involved in the development process from appropriate selection to implementation of media formats. They make informed and effective use of a wide range of both traditional and new media. Professional designers must have a strong visual acuity, sensitivity to visual communications, and comprehensive understanding of visual and verbal language. To achieve superior results, designers must also devote time to practice the development of their skills and to the dynamics of visual aesthetic systems. Visual systems include factors such as color, balance, symmetry, asymmetry, grids, imagery, iconic form, texture and typography as individual elements, and in the context of a complex, integrated system. Successful designers must also have a fine-tuned sensitivity to emotion expressed through visual and written voice, and an ability to create communication, which simplifies complicated ideas. A designer's talent is measured by his or her ability to stimulate the audiences' desire, or invoke emotion such as whimsy, intelligence, cheer, aggression, sophistication, humor, high-tech, or earth-friendly. With increasingly commoditized and homogenized products, designers are product differentiators, and brand image becomes an increasingly powerful and prominent marketing tool, instilling desire in consumers. In the end, a designer's client expects the final product to represent the story of their product, why it is and should be the product a consumer purchases, and why it is different from the competition. Designers seek to achieve this goal by using a memorable visual and verbal voice, which best suits the target audience.

Design professionals armed with an understanding of traditional and new media make daily choices that influence the look, feel, visual and verbal voice of most products consumed. They must also be aware of the fact that production, packaging, delivery

and end-of-life disposal of media products consume a significant amount of natural resources and impact the environment. With these issues in mind, professional graphic and digital designers, have the opportunity to influence the production, packaging and delivery of media products. With the 2003 world population of over 6.2 billion people, and conservative estimates suggesting by 2050 the population will increase to at least 7.2 million people by the year 2050, understanding how to consume sustainably becomes increasingly important.[4] Statistics show, 20 percent of the world's population accounts for 86 percent of total consumption, while the poorest 20 percent of the population account for 1.3 percent of private expenditures.[5]

With a desire to share sustainable concepts with professional digital and graphic designers, a mock-up of an Internet-ready educational tool was created in conjunction with this thesis research. Using the scenario model, the tool briefly describes the sustainable and unsustainable aspects of the four technologies discussed in following chapters. Then there is a quiz to help users' understand their own sustainability personality, technology sharing facts, figures, and common vocabulary related to the topic. Screen capture examples can be seen in Figures 1 through 4. With these guidelines visualized through an Internet-accessible digital project, mainstream digital and graphic designers have access to an informative sustainability tool to use in their discipline.

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[4] *Department of Economic and Social Affairs: Population Division*, 1998 Revision [Website] (2003, accessed May 4 2003); available from http://www.un.org/esa/ population/ publications/longrange/longrange.htm.

[5] Anup Shah, *Behind Consumption and Consumerism: Human Development Report* [Website] (May 10, 2003 2003, accessed Dec 6 2003); available from http://www.globalissues.org/TradeRelated/Consumption.asp.

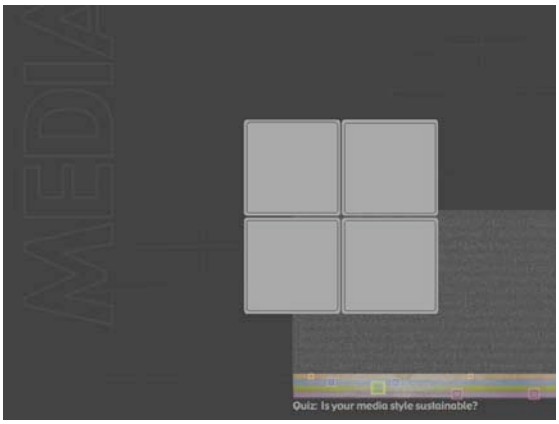

Figure 1. Initial State of Internet-Available Sustainability Tool

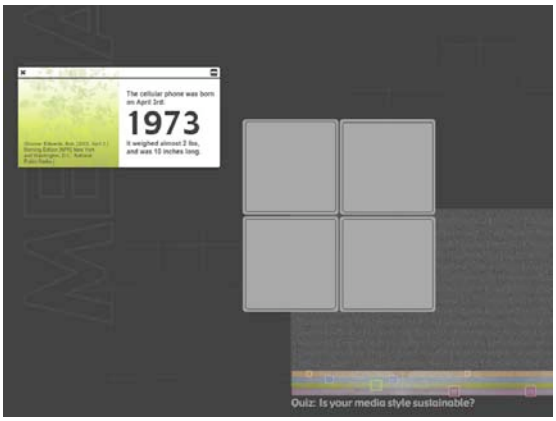

Figure 2. Fun Fact Window of Internet-Available Sustainability Tool

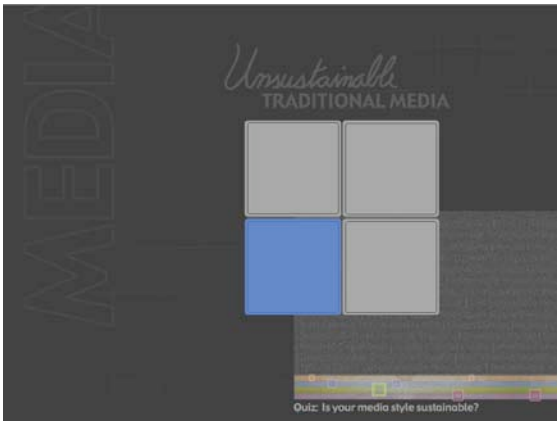

Figure 3. Unsustainable Traditional Media Quadrant Rollover Highlight

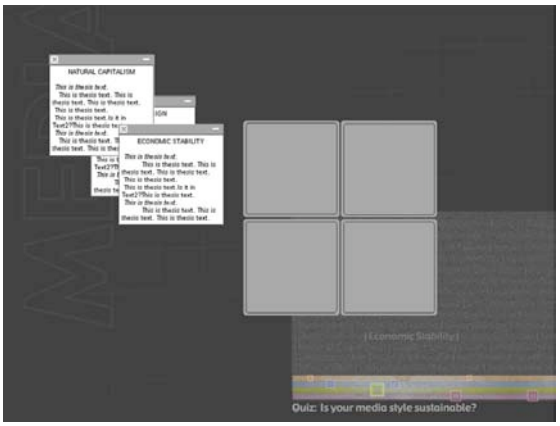

Figure 4. Vocabulary Windows for Sustainability Tool

Armed with sustainability information, designers and businesses considering the long-term benefits of implementing and using sustainable concepts have the opportunity to be in the forefront of cyclic consumption, taking a leadership role and establishing themselves as industry experts for years to come, rather than lagging behind with linear product production cycles. And, sustainable product production is not dead-ended, nor does it support the end of consumerism. Sustainability must build and contribute to the successful stabilization of the economy. This can be achieved though smart and efficient design, and by connecting with customers who are interested in the future, profitable businesses, ecology, and the welfare of all.

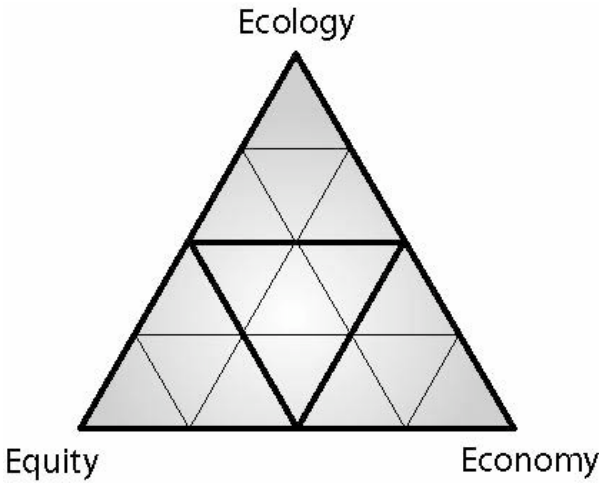

Figure 5. Sustainability Triangle, Balancing Ecology, Equity and Economy

Sustainability

Three common goals build the concept of sustainability. First, sustainability is defined as, striving to attain social equity by recognizing the needs of all people. Second, sustainability embraces ecological responsibility, wise use of natural resources and environmental protection. Third, sustainability balances the first two goals with economic viability, understanding the need to maintain a reasonable and stable, if not high, level of economic growth and employment. The current body of notable sustainability books, periodicals, websites and journals, in many respects, has a negative and unapproachable quality. Sustainability materials often endorse radical life change, as authors use guilt tactics, and employ a hard-line, condemning approach. Green or sustainable vocabulary resonates as radical liberalism and seems to suggest

communal living and a world void of luxury. These approaches tend to squelch the growth of sustainable concepts and practices and turn away mainstream support from people such as digital and graphic designers who might otherwise be drawn to sustainable considerations such as fair treatment of workers, an improved ecological future, and the economic benefits of efficient and creative design processes.

William McDonough and Michael Braungart suggest three elements can be used to measure and assess the sustainable qualities of both new and traditional media. Figure 5 formulates a visualization of the elements in this three-pronged approach.[6] It depicts economy, equity, and ecology. These three words are assigned to each on a corner of an equilateral triangle. “Economy”, located in the far right, bottom corner, addresses a corporation or business’s product or service profitability. This corner of the triangle covers the bottom-line for commercial businesses and answers the question, “Does this make money for shareholders?” If a product or service does not make money, it usually does not qualify as a good idea. Working clockwise around the triangle, the bottom left corner address the word “Equity”. When evaluating a project or service for equity, a consideration includes, “Does this service treat workers and clients or customers fairly and with respect?” and “Does this product harm users in any way?” It is a concept with social aspects. The final corner, “Ecology”, evaluates the effects of products or systems on the ecosystem, by determining how the product or service may or may not preserve ecological resources. For example, questions in the ecology corner include, “Does this product create a small ecological footprint?” and “Can further modifications reduce the ecological stress of this service?” With the values and goals of these three elements defined, one can begin to take a deeper look at their relationships. By blending the

[6] William and Michael Braungart McDonough, *Cradle to Cradle: Remaking the Way We Make Things*, 1st ed. (New York: North Point Press, 2002). Pages 150-153.

absolute values of economy, equity and ecology we move toward a center point, the three corner concepts balance each other, and an equilibrium guards against one idea moving too far in one direction or the other. Questions now become, “If this product is economically viable, but does not achieve the standards set for ecological success, how can we modify the product to meet our ecological goals?” When product evaluations are guided by these elements, hybrid concepts, derived from merging the three elements, produce more robust end results.

Figure 6. Basic Scenario Model

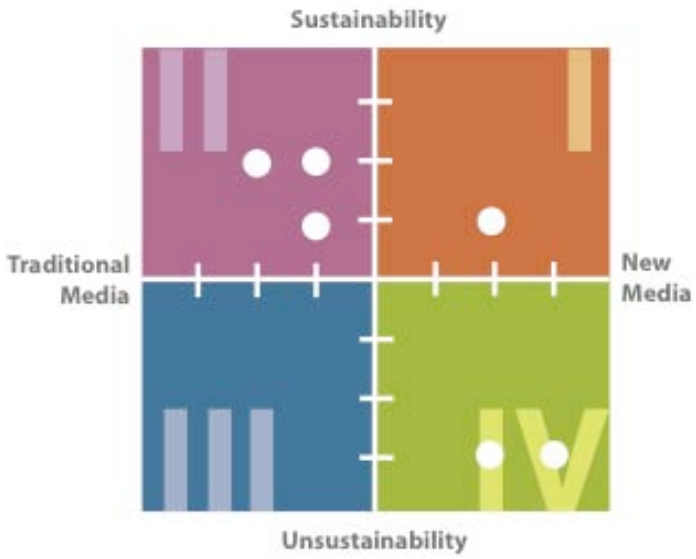

Figure 7. Scenario Model Plotting Varied Degrees of Sustainability and Types of Media

Figure 8. Scenario Model to Compare Media Technology

The Scenario Model

To visualize the scenario model quadrants, consider an X-Y axis. Sustainability is located on the top and unsustainability is located on the bottom of the vertical axis. The horizontal axis, new media is on the far right and traditional media is on the far left. Figure 6 shows how these coordinates create a four-quadrant model. This model provides the opportunity to address sustainability on an ongoing, long-term manner, and to address potential major future concerns. The individual quadrants are used to examine various aspects of media, including hardware, software, and services while assessing the ecologic, economic, and social impact of particular media. All of which deliver information and are interrelated. The model is used to systematically assess complex characteristics and trends of technology, and then illuminate possible opportunities for technology to position itself more sustainably for the future. The paradigm is viewable through two different

information perspectives. First, the content can be viewed as a whole, with each of the four quadrants representing an umbrella idea, as in Figure 8. Alternatively, the content can be viewed by varied degrees, as in Figure 7, beginning from a zero point at the center where the two axes meet, and then radiating out to the end of each axis. If the information is viewed by varied degrees, it is also possible to see and assess clusters and trends of technologies and concepts. For example, sustainability and unsustainability, along the x-axis, might show clusters of content that are neither highly sustainable nor highly unsustainable, suggesting a particular technology is not, in terms of sustainability bad, but the technology has opportunity to become more sustainable than it is currently. Furthermore, by creating a scenario to examine content, it is possible to compare differing media. A given media may be relatively sustainable in one environment under a particular set of circumstances while the same media may be unsustainably in another environment given the range of alternative and more sustainable options.

Summary of Sustainability within Traditional and New Media

Traditional and new media define the two major media categories of mass communication. Both play a key role in informing society. From primitive cave drawings to the advent of the printing press in the fifteenth century, technological advances for content storage and dissemination and for mass-audience communication have continued to evolve. The use of traditional and new media for communication is obviously not limited to use by digital and graphic design professionals. Everyday, people from all walks of life use and develop traditional and, or new media communication which filters through social, economic and ecological aspects of everyday life. As populations increase, consumer demands also increase, challenging

the development of sustainable practices with the proper use of traditional and new media. By studying traditional and new media as they relate to suitability, the scenario model of this thesis begins to address, measure, and compare the strengths of traditional and new media for a sustainable future.

Chapter Two. Scenario Model Quadrant IV: Cellular Phones

Introduction to Quadrant IV Scenario

The scenario model for Quadrant IV, an Unsustainable New Medium, addresses cellular phone technology. Three facets of cellular phones, determine how manufacturers balance economic viability, social equity, and ecological responsibility within the complete cellular phone lifecycle. By taking these three facets, previously shown in Figure 5, into account, the current trends of cellular phones can be evaluated, while highlighting potential shortcomings and opportunities for future sustainability in the cell phone business in the United States.

Examining an Unsustainable New Medium

There are four primary reasons why cell phones are classified as new media. First, cell phones operate through digital networks thus recognizing data numerically, with zeros and ones. Next, cellular phones are modular, with the individual elements of both hardware and software providing the ability to act independent of each other, regardless of whether they are activated by one personal handset, or assimilated in the whole calling network. Third, the operations involved in creating, manipulating and accessing media through cell phones are automatable, variable, and able to exist in several versions. Dialing can be enabled through voice activation. Voicemail can be retrieved remotely, without the use of a cellular phone through a landline, and text messages can be sent through the Internet to another cellular phone or email address. Fourth, cellular

phones are unencumbered by differing data formats, and can transport content and communicate in various media formats, including text messages, sound, numbers, and images.

Economic Viability

Successfully tested in New York, on April 3, 1973, the first cellular phone weighed almost 2 lbs, measured 10 inches long, and operated with analog technology.[7] Thirty years later, cellular phones have become remarkably small and have grown remarkably popular. In 2003, the average cell phone measured between 3.5 to 4 inches long, weighed about 3.5 ounces, and operated on a digital network. Statistics in 2003 showed over 128.4 million people in American alone owned cellular phones.[8]

The cellular phone industry is volatile and competitive. Cellular phone manufacturers seek to maintain economic viability by continually adding new hardware, features and service contracts. By offering a wide variety of phones, products and services, manufacturers promote sales by encouraging customers to replace old handsets while concurrently scaling up to more expensive and accessorized cellular phones and services. Based on prepaid or monthly service agreements, and a pricing structure that varies according to the amount of airtime and services a user desires, purchasing a cellular phone and a contract becomes a customizable experience. New customer retainment is largely driven by the customers' commitment to a particular providers contract, and they are drawn to these agreements because of their desire for new

[7] Bob Edwards, "Morning Edition," (USA: National Public Radio, 2003).

[8] Leo Laporte, *Leo Laporte's 2003 Technology Almanac*, Indianapolis (2003).

product hardware. New handsets are given away or sold inexpensively to attract new customers. Cellular providers purposely avoid old phone upgrade incentives to users, encouraging consumers to instead spend more for additional new product hardware and extra features. Recently, cellular providers have been charged with “stealth inflation”, made up fees, and incorrect taxation tacked onto service bills. Although cellular phone service providers deny these allegations, frequent billing errors are a familiar problem experienced by cellular phone users. A recent newspaper article in The New York Times, covering stealth inflation generated significant reader feedback and interest.[9] That reflects how the apparent dishonest billing practices have given providers a bad reputation. In an area of increased competition, cellular phone providers can distinguish themselves from their competition, and increase their economic viability, by creating a greater level of consumer trust by providing honest, straightforward services, clear billing statements, and a genuine commitment to fixing billing errors quickly and correctly.

Social Equity

In technologically advanced regions of the world, cellular phones are marketed as fashionable technology accessories. On average, each phone is used for 18 months and then upgraded by a newer model.[10] This enables users to have the latest and greatest technology and to project a prosperous, professional image. These consumers

[9] David Pogue, *State of the Art: Checking Your Bill for a New Charge Called 'Oops'* [Website] (The New York Times, 2003, accessed Dec 4 2003); available from http://www.nytimes.com/2003/12/04/technology/circuits/04stat.html?th.

[10] Anahad O'Connor, *Environmentalists Identify New Menace: Discarded Cell Phones* [Website] (New York Times, 2002, accessed Oct 26 2003); available from http://www.nytimes.com/2002/10/08/science/08PHON.html?ex=1067317200&en=5984a825ed74e202&ei=5070.

consider their cellular phone a must-have form of communication to connect them to their careers, businesses, entertainment, family, and friends. While useful and fashionable, cellular phones, just like traditional telephones, impose some limitations on communication. They eliminate communication made through body language. Cellular phones also contribute to stress by making users “on-call” to their careers, family, and friends at all times. Cellular phones also deepen the distance between people who have them, and those who do not have access to them or an understanding of digital technology. The distance between the have and have-nots is commonly described as the digital divide. The digital divide is best visualized as a ladder with rungs or levels to climb, not as a canyon needing a bridge to cross. The digital divide does not only describe a person’s physical access or lack of access to digital technology hardware, but it also relates to a person’s experience level and understanding of technology or computer literacy. Within computer literacy, there are several competency levels. Technology costs exclude potential users from accessing technology and create a socio-economic divide. But often, people have access to hardware and lack the technological competency needed to enable them to efficiently access basic levels of digital information. Because effective cellular phone use requires computer and digital skills, education has become essential to helping audiences conquer the digital divide.

Proper design of a device and its related technology can do much to enhance a user’s natural understanding how it works and their ability to use it effectively. By leveraging natural methods of human communication through careful design, utilizing tactile, auditory, and visual communication cues, designers can improve human ability to communicate with computers and with other humans through computers and begin to overcome the digital divide. Cellular phones tend to underutilize these communication design methods and generally lack well thought-out hardware and software interfaces.

For example, the number buttons are often too small for large, clumsy or unsteady fingers. A more ergonomic layout might include enlarging or rearranging the numbers and buttons to increase cell phone usability. Voice-activated calling, a tool to increase usability by avoid punching in multiple numbers, still requires the use of several buttons to program, and often simply doesn't work, even when programmed. To resolve these issues, a simple cellular phone, with only basic features for low-tech users would be advantageous. Increasing the quality and consistency of cellular phones all around, would also improve usability.

Outside developed countries, cellular phone technology raises other ideas. Industrializing countries and geographically remote areas where traditional network infrastructure has been either too costly or location prohibitive, now have the opportunity to affordably advance directly into wireless computing and communications. In some cases these advances leap over, generations of technology. In India, for example, cell phone technology is creating network infrastructures that enable farmers to monitor several crop purchasing locations to determine where to get the best return on seasonal crops while they are at their peak. In other places, wireless communication connects and facilitates stronger business partnerships by opening remote locations, and financial opportunities that were previously limited to commerce and financial growth by their remote location.[11]

[11] *Global Citizenship: HP Environment, Product Return and Recycling*, [PDF] (HP, 2003, accessed August 1, 2003); available from http://www.hp.com/hpinfo/globalcitizenship/.

Ecological Responsibility

Ecological responsibility requires consideration of the entire life cyclical of a product to include the production, delivery, consumption and disposal of each cell phone used. The Wuppertal Institute in Germany, an institute that researches the ecologic lifecycle impact of products, describes a product's lifecycle as the product's ecological backpack, measured through the material impact per service unit (MIPS). Before examining the ecological backpack of cell phones, it would be easy to mistakenly guess, that the manufacturing of these smaller products use less materials and therefore have a smaller ecological backpack. However, Wuppertal research shows, a laptop weighing 3 kilograms has an ecological backpack of about 400 KG, while a handheld device fifteen times smaller, weighing .2 kilograms has an ecological backpack of 60 kilograms, even though it is seven times smaller than the laptop.[12] These figures show the smaller product's manufacturing process generates waste weighing roughly 300 times the final product, and the larger product creates waste weighing about 133 times the final item. Although the potential to increase social equity through cellular phone technology suggests positive impacts in helping remotely located and underprivileged communities, in technologically advanced areas, contract sales increased by the demand for newer and ever changing handset features, plus smaller, and/or more fashionably styled phones increase the adverse ecological impact of a cellular phone's lifecycle.

Cellular phone providers appear concerned about the sustainability issues of their products. If improperly disposed of or recycled, cellular phones release several hazardous substances including:

[12] *Deliverable 18 (D18) DEESD Digital Europe: Ebusiness and Sustainable Development*, [PDF] (Forum for the Future, June 2003 accessed Oct 26 2003); available from http://www.digital-eu.org/ and http://www.wupperinst.org/projekte/umwelt/u36.html.

- Lead – used to solder circuits; damages the brain and peripheral nerves
- Gallium arsenide – found in microprocessors; contains poisonous arsenic
- Beryllium – used in copper alloys; can cause pulmonary disease and cancer
- Cadmium – used to make batteries; associated with lung and prostate cancer, kidney damage, emphysema and bone disease[13]

Manufacturers such as Nokia, Ericsson, and Motorola provide environmental reports on their websites that inform customers about the recycle-ability of their product materials, describe how to find cellular phone-recycling centers, and outline each corporate commitment to increasing sustainability. Nokia statistics show that from 65 to 80 percent of average phone can be recycled.[14] Specialized cellular phone recycling facilities also exist where used phones can be turned in and given to homeless, battered women, or other needy people.[15] While these cellular phones given to the needy do not include monthly talk-time services, they have 9-1-1 capabilities, with the usage charges absorbed by service providers. The Cellular Telecommunications & Internet Association also donates airtime to those in need.

Although cellular phone sustainability information is provided to customers over the Internet, over 250 million old cellular phones remain unused in America, with only one

[13] Bill Monaghan, *Disposable Cell Phones Pose Toxic Threat* [Website] (Division of Recycling and Litter Prevention, 2003, accessed Oct 26 2003); available from http://www.ohiodnr.com/recycling/pages/electronicsnewsarchive1.htm.

[14] *Environmental Report of Nokia Corporation 2002*, [Website PDF] (2003, accessed Oct 26 2003); available from http://www.nokia.com/nokia/0,8764,72,00.html.

[15] http://www.wirelessfoundation.org/DonateaPhone/index.cfm offers information on how to donate a used cellular phone for charity.

percent of the old cellular phones actually reused or recycled.[16] While these old cellular phones are not being widely reused or recycled, their negative unsustainable impact could be reversed if phone manufacturers reclaimed old handsets, recycled the 65 to 80 percent that is recyclable and refurbished old phones for resale.

While the lifecycle of cellular phone sustainability is unsustainable under current conditions, manufacturers could enhance sustainability by modifying current practices. They could possibly continue their economic viability, by fulfilling social desires for mobile communications while reducing the ecological lifecycle impact of each cellular phone. Trends in cellular technology suggest that with minimum changes and cost, there could be a sustainable future for the industry.

Trend Assessment and Analysis of the Unsustainable New Medium

Trend assessment reflects change. Change reflects evolution and revolution in economic, ecologic, and social issues in the context of the four traditional and new media technologies examined in each of the model's quadrants. Technological trends can be used to evaluate adjustments in how cellular phone hardware and software are designed. Economic trends in cellular phone technology indicate how products and services generate financial growth for cellular phone providers and manufacturers. Ecological trends evaluate change in product life-cycles, efficiency in natural resources, energy in manufacturing, use, and disposal of cellular phones. Trends in social equity indicate how society responds to and interacts with cellular phone technology.

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[16] Olga Kharif, and Alex Salkever Ed., *Where Recycled Cell Phones Ring True* [Website] (2002, accessed Oct 27 2003); available from http://www.businessweek.com/print/technology/content/jul2002/tc20020725_6433.htm?tc.

Economic Trends Concerning Cellular Phones

In 2003 cellular phone manufacturers strove to generate revenue on new phone contracts through new cellular phone sales. Yet, current research suggesting that the greatest future revenues will be in wireless networks and communication services, not necessarily in hardware turnover. Motorola has already begun a successful transition away from handset sales toward profitability in high-speed wireless networks.[17] Other companies recognizing the importance of sustainability may follow and achieve increased financial reward by basing their revenue on wireless communication services rather than hardware. Some cellular phone manufacturers have taken initial steps toward sustainability by posting sustainability documents on their websites. These documents reflect company compliance with ISO 2000, or related standards and are visually enhanced with well designed page layouts and marketing lines. While this content is extensive and covers various sustainability approaches, the literature lacks the complete data, needed by audiences to analyze and assess a true measurement of the company's commitment to sustainability. Comparisons between companies or with the company's previous sustainability record are also not possible.

To move sustainability forward and cut manufacturing costs, those companies pursuing wireless communication services can leverage the benefits of product manufacturing efficiencies, rental, and reclamation, where materials from returned or increased headsets are reused to reduce the company's raw materials costs. Furthermore, customer retention, an increasing problem for cellular phone providers today, may be reduced as companies reposition themselves as service rather than hardware

[17] George Gilder, *Gilder Technology Report*, April 10 [Website] (Forbes.com, 2002, accessed Oct 27 2003); available from http://www.forbes.com/2002/04/10/0410guruphotoessay_print.html.

providers.[18] Putting customers first would mean quality customer service with shorter hold-lines, simple phone menus, courteous staff, and understandable billing statements. With rental based hardware focused on services and customer loyalty, a manufacturer's commitment to quality customer service can be used to leverage opportunities to better understand their customers' current and future desires by delivering services that meet their clients' growing needs.

Social Trends Concerning Cellular Phones

Just as hardware devices for cellular phones evolve, so do user needs and wants. Motivated consumers can take an active role in the progress of cellular phone sustainability by demanding the implementation of sustainable practices and principles throughout the production, delivery, and disposal of the products they purchase. Recognizing the benefits of promoting cellular phone technology, manufacturers have advanced their sustainability efforts by providing some sustainability information on their website, and could increase this effort by providing customer incentive programs to increase old cellular phone recycling with participants getting rebates or special services for recycling. Today, consumers want to know the complete identity of companies with which they do business. The news media has also played a role in advancing sustainability by educating audiences about sustainability and by reporting stories on companies who, while purporting to be sustainable, actually use labor, economic, or environmental practices that do not support it. They are also turning

[18] Matt Richtel, *Cellphone Deals Sweeten in Face of New Rule on Keeping Number* [website] (2003, accessed Oct 23 2003); available from http://64.4.46.250:80/cgi-bin/linkrd?_lang=EN&lah=bf91be7317bb6cbe56e852978c57fd63&lat=1066919606&hm___action=http%3a%2f%2fwww%2enytimes%2ecom%2f2003%2f10%2f18%2ftechnology%2f18CELL%2ehtml%3fth.

toward hybrid products that combine several tools into one, such as cellular phones with PDA utilities, cameras, radios, day planners, and game consoles.

Ecological Trends Concerning Cellular Phones

From a sustainable hardware perspective, there are many potential advancements in the area of small new media devices that may also be applicable to cell phone manufacturers in the future. This section discusses just a few. One possible step toward sustainably designed cellular phones involves bacterial batteries. Dr. Loveley at the University of Massachusetts has shown that it is possible with the help of bacterial to transfer more than 80 percent of the electrons available in sugar to power small technology products. This is done with the help of micro-organisms that gain energy rapidly and flourish on electrodes as long as there is sugar fuel available to fuel them.[19] With the possibility of these microorganisms generating small amounts of power fed by sugar, a replaceable resource, traditional batteries that are harmful to landfills will no longer be required.

Progress in semiconductor designs may also advance sustainability by changing how the physical circuitry operates inside a cellular phone. Current circuitry that functions by sending digital messages through the phone to tell it how it should work, uses three circuit chips to execute a cellular phone call. The QuickSilver Technology Laboratory in California is researching ways to minimize semiconductor chip requirements. They have developed advancements in software to reconfigure the functions of semiconductor

[19] Anne Eisenberg, *A Sugar Cube, Please: I Need to Charge My Cellphone* [Website] (The New York Times, 2003, accessed Sept 18 2003); available from http://www.nytimes.com/2003/09/18/technology/circuts/18next.html?th=&pagewanted.

circuits. Instead of using three unique semiconductors for each task, they have developed a single, reconfigurable semiconductor that can automatically link to the Internet through a wireless connection, download the functions of the next semiconductor chip required to complete the task, and then reformat the operations of the existing hardware to perform the next task. This reconfiguration combines the functions of three conductors into one item. This saves material costs, expands versatility, increases the speed of processing, and reduces processing energy.[20]

Summary: Implications of the Unsustainable Traditional Medium

In America, it is easy to assume the environment has an infinite amount of natural resources available for growth and business. Some companies and the customers of their products have difficulty understanding that technology can continue to prosper and evolve, while at the same time use natural resources efficiently and effectively. Instilling sustainable ideas into the cellular phone industry is possible and will result in product redesign as well as improved social well-being. This process will be expedited when consumers take an active role in influencing the production, consumption, end-of-life disposal of cellular phones, demand sustainable practices throughout product lifecycles, and keep their phones longer.

Future economically viable cellular phone technology will be based on services, customizable features, software upgrades, better cellular services, and increased customer satisfaction. Increasing the commitment of cellular phone manufacturers' to sustainability may alter future cellular sales and technology by obsolescing current

[20] John Markoff, *Computing's Big Shift: Flexibility in the Chips* [Website] (The New York Times, June 16, 2003, accessed June 16, 2003); available from http://www.nytimes.com/2003/06/16/technology/16CHIP.html?th.

marketing models based on perpetuating consumerism and open up new opportunities to increase the sustainability of cellular phones.

Chapter Three. Scenario Quadrant III: Newspapers

Introduction to Scenario Quadrant III

Scenario model Quadrant III, Unsustainable Traditional Media addresses newspapers. In this quadrant, printed newspapers are evaluated using the three aspects of sustainability (Figure 5). All three characteristics are involved in the lifecycle of printed newspapers. They balance a publisher's need for economic viability and the audiences' need for social equity, while seeking to maintain the most ecologically responsible product lifecycle possible. By analyzing these three aspects we can evaluate printed newspapers, highlight potential shortcomings, and determine opportunities for the future of newspaper sustainability.

Examining a Unsustainable Traditional Medium

Newspapers are a traditional medium. Although portions of the production and delivery process flow through a digital infrastructure, the final deliverable, a newspaper, consists of paper and ink. Their final delivery format is not digital. Newspapers provide a fair information storage medium, but are limited because they do not lend themselves to retrieving old content at a later date. Furthermore, the high-acid substrate of newspaper is archaically unstable. Microfilms, a common alternative for storing and retrieving old newspapers are often costly, difficult, time-consuming and awkward to use and reference. Newspapers also lack easy modularity; or the ability to disassemble individual folios and stories, and then reassemble them in different but complete units while having the individual pieces perform independently of one another. A user can

cut a story out of a newspaper or remove a folio out of a paper bundle, but it is generally cumbersome and unproductive to try to return the story or folio back to its original location, or augment another newspaper with the extra content. It is also difficult to automate or vary newspaper formats. A person with a visual impairment cannot choose an ideal font size to facilitate easier reading, nor can a blind person effortlessly convert the newspaper into an audio format.

Economic Viability

During World War II, newspapers hit their highest circulation at 78 percent penetration. Many households purchased multiple newspapers.[21] Since the end of World War II, daily and weekend newspaper readership in the United States has been dropping. In 2003, newspaper readership was around 18 percent with experts expecting readership to continue decreasing. Recently, children ages 6 through 17 were asked, "What medium would you choose if you could only have one?" Only one percent of those surveyed chose newspapers, while 33 percent chose the Internet, and 26 percent chose television.[22] Younger audiences, for the most part, show limited interest in obtaining information through printed newspapers and other editorial materials. Younger audiences who do prefer printed media, tend to be more technologically literate, and still prefer to read their news from the Internet rather than through printed newspapers.[23]

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[21] Dizard Jr. and P. Wilson, *Old Media, New Media: Mass Communications in the Information Age*, 3rd ed. (New York: Addison Wesley Longman, 2000). Page 1.

[22] Laporte. Pages 98-112.

[23] *Pew Internet and American Life Project*, [Website] (Pew Charitable Trusts, accessed March 6, 2003); available from http://www.pewinternet.org/.

With the preferences of young people moving toward digitally delivered news, newspaper profitability appears to be changing. As audience interest in traditional newspapers decreases, and research, production, and delivery costs increase, newspapers are now competing directly with the Internet and face challenges maintaining profitability. Print newspapers contending with Internet newspapers demonstrate the basic differences between traditional and new media. Traditional media offer a focused informational experience with sectioned topics and pages to turn, while new media offer expanded informational experiences that provide users hyperlinks to visit past stories, related information and advertisements at completely different sites.[24] Although, the future newspapers and their profitability appears reduced, especially with younger audiences, printed newspapers have an opportunity to contribute positively to local communities, the lives of individuals, and to the overall vibrancy of a society.

Social Equity

Some characteristics of the medium of newspapers contribute positively to social equity. News articles that cover community vibrancy, the well-being of individuals, and the vibrancy of a city or town, contribute to social equity. Newspapers are very accessible, distributed through grocery stores, gas stations, newspaper stands, and through home delivery subscriptions on mornings, evenings and/or weekends. Produced at an affordable cost, quickly delivered on lightweight paper, and consisting of a highly transportable format, newspapers provide a portable, inexpensive, and socially equitable information package. Although they have a seemingly socially equitable cost

[24] Wilson. Page 1.

and high portability, statistics indicate the medium may now be decreasing in its ability to universally connect with mass audiences. Data shows that readership decreases as a reader's education, age, household income, and job responsibilities decrease.[25] Older, higher educated, financially secure people are most likely to read newspapers, thus providing a suitable means for advertisers trying to reach that market. At the same, time, this situation points out their limitation as a means for delivery of widespread public awareness information.

Newspapers have increasingly become limited when it comes to in providing diversified content. In 2003, five large conglomerates; Gannett Co. Inc., Knight Ridder, Advance Publications Inc., Times Mirror Co., and The New York Times Co. were recognized as controlling most of the newspaper industry in the United States. September 30, 1999, research showed, Gannett Co. Inc. was the highest-ranking US newspaper company with a daily circulation over 6.4 million, including 74 dailies, a Sunday circulation of nearly 5.7 million, and 59 Sunday edition newspapers.[26] With a limited field of publishers, the large news outlets often overlook opportunities to discuss diverse points of view on regional or local issues.[27] Instead, they seek to capitalize on efficiency by using articles that are applicable to large, general audiences, while reusing them in several different newspapers. This method increases the usage volume of an article, offsets research and production costs, and streamlines the process of providing news with fewer man-hours hours and less effort. Smaller local newspapers who must

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[25] *NAA: Facts About Newspapers 2000*, [Website] (Newspaper Association of America, 2000, accessed Aug 2 2003); available from http://www.naa.org/info/facts00.

[26] Ibid. Note: Data for this note reflect acquisitions and agreements through March 30, 2000.

[27] Roberta Brody, "Distant Points of View: International News Sites in English," *Online*, July-August 2002. Page 38.

compete with the large conglomerates often operate with part-time and volunteer staffs, and cannot offer the same level of volume, variety of content, research, resources and production. Although smaller publishers maintain autonomy, they normally lack the resources to effectively compete in the marketplace. With smaller, usually undiversified staff, their scope and ability to offer various sides of each issue, and thereby to challenge opinions and perspectives, is greatly reduced. However, while so limited, smaller publishers are able to effectively meet and serve their local community, where large conglomerates have difficulties.

Ecological Responsibility

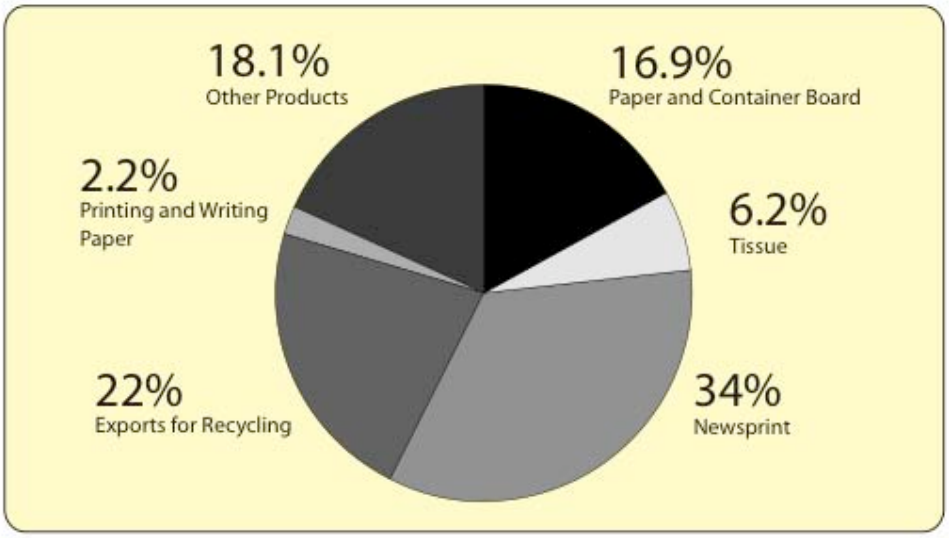

Figure 9. Use and Consumption of Paper Production in the United States

A depiction of the various influences impacting United States newspaper production is provided in Figure 9.[28] It shows that newspaper production uses 34 percent of the

[28] *NAA: Facts About Newspapers 2000*.

annual production of paper in the United States and also ranks as the highest consumer in the industry. The lifecycle of a newspaper, its production, delivery, and disposal, consumes three primary resources, energy, paper pulp and ink. Paul Hawken, Amory Lovins, and L Hunter Lovins, describe the significance of the world paper production industry and how it is commonly used.

> Paper accounts for about 2 percent of the world trade and 2.5 percent of world industrial production, its U.S. shipments, over $132 billion a year, are comparable in value to primary metals and minerals, or to 90 percent of petrochemicals. Yet much of the paper produced is used only for a short time and then discarded: only about a tenth of the global paper stream goes into "cultural memory" – long-term storage in such forms as files, records, and books.[29]

In 1999, out of a total paper supply of nearly 13 million tons, 69 percent, or more than 9 million tons of old newspapers in the United States, were recovered and recycled. Newspaper-recycling rates, which have climbing since 1988, are due to increased recycling production emphasis made by both individual consumers and the newspaper industry. In 2002, United States newsprint incorporated 28 percent recycled fibers, an increase of 18 percent from 1989 figures. The increased use of recycled newspapers and packaging products also drives and diversifies the need for newspaper recycling. Other industries use recycled newsprint, including those producing paperboard, packaging, tissues, and containerboard. Now product-packaging vendors and printers offer a choice of virgin or recycled paper or cardboard to packaging designers and engineers. Recycled material incorporated into product packaging reduces material costs, however, it also reduces the appearance of product packaging print quality, with slightly less vivid colors and a grayer, rather than bright-white substrate. However,

[29] Paul Hawken, Amory B. Lovins, and L. Hunter Lovins, *Natural Capitalism: Creating the Next Industrial Revolution*, 1st ed. (Boston: Little Brown and Co., 1999). Pages 173-174.

some companies and brands actually use this to their advantage and leverage the shortcomings of recycled materials in the packaging substrate by marketing the product and or packaging as more sustainable than competitor's products.

Trend Assessment and Analysis of the Unsustainable Traditional Medium

In assessing the trends relating to newspapers, an Unsustainable Traditional Medium, the impact of economic, ecological and social issues must be considered. While trends are sometimes revolutionary, newspaper related trends are more evolutionary, with slower changes taking place since the end of World War II. Now, the economic trends in newspaper center on corporate consolidation within the industry. Ecological trends focus on how newspapers use and recycle natural resources through the process of manufacturing to disposal. Trends in social equity address changes in how society responds to and interacts with newspapers today.

Economic Trends Concerning Newspapers

The newspaper industry is largely driven by niche media markets comprised of older, upper class, educated, and financially secure patrons who favor printed news. Advertising in newspapers such as *The New York Times* online and the printed version indicate how the two versions of newspapers are used to reach different age groups and markets with slightly more age-specific, and apparently gender specific, advertisements. Online newspapers advertise Waterford Crystal, Eddie Bauer, Beaver Creek, Dell, Smith Barney, Victoria's Secret, dating services and CitiGroup, while printed versions have some overlapping advertisers they are more conservative and oriented toward women, with advertisements for Tiffany's, high-end make-up and

fashionable clothing.

As newspaper conglomerates strengthen and grow, increasing their domination of the newspaper publishing industry, the use of reusable, general interest, national level, one-size-fits-all content will likely continue to rise, reducing costs, while also reducing job opportunities for journalists. As these conglomerates expand their footprint in society, with volume discount articles, opportunities for readers to obtain local commentary and important regional news will become an increasingly important challenge, and one that should be recognized as critical in order to connect local communities, evens, and people. Achieving an integrated information exchange between local news sources and large conglomerates, while maintaining credible journalism, may prove difficult. As big business publishers' focus on efficiency, cost reduction, generalized coverage, easy to generate, one-size-fits-all stories, it will be difficult for smaller publishers to compete because of their less profitable, specialized local content, with limited readership interest.

Social Trends Concerning Newspapers

Expanding newspaper audiences will require several changes in current print newspapers. Newspaper producers will need to recognize that they compete directly with other information delivery technologies and therefore need to either differentiate their product from competitors or assimilate themselves into the high-tech information society. In varying degrees of success, some papers are already trying to do this by duplicating their daily printed-paper on the Internet. But whether printed or digital, change must occur to improve the social equity of newspapers. For example, improving the quality of the information provided by printed newspapers, by increasing the number

and type of data sources for audiences, would diversify current limited story coverage. Adding summaries, abstracts and specific sources that enable readers to delve deeper into articles of interest would also expand the scope of content to local places and events. Providing deeper context to current coverage by incorporating back-day/-week/-month/-year resources or connecting recent stories with old story threads or multimedia coverage online would also increase the article content value. Finally, tailoring pricing schemes, introducing pay-as-you-go, and increased emphasis on customer satisfaction, might also draw in new readers, and expand current newspaper circulation.[30]

Ecological Trends Concerning Newspapers

Sustainability in the lifecycle of paper used for production of newspapers in the United States can increase. Paper makes up 40 percent of U.S. garbage, while the paper industries rank third in industry's largest energy users. Yet, paper is highly recyclable, giving it a sustainability edge over other materials with less accessible recycling processes. Paper manufacturing, using recycled content, requires less energy use than the production of virgin paper by from 60 to 70 percent, and about 55 percent less water use. With increased access to recycling methods that reduce chemical use, such as oxygen-based bleaching for paper-whitening, paper can continue to improve it's ability to be a sustainable product.[31] If employed and promoted by the paper industry and private individuals, these capabilities all become promising aspects for future ecologic

[30] Barbie Kaiser, "Expanding Your User Base," *Online Magazine*, May / June 2002.

[31] *Treecycle Recycled Paper: About Recycling*, [website] (Treecycle Inc., 2003, accessed Nov 10 2003); available from http://www.treecycle.com/recycling.html #altfiber.

sustainability. Many large companies are already employing sustainable practices to optimize manufacturing efficiencies. As paper and newspaper industries incorporate more life-cycle oriented practices and establish systems for recycling and incorporating sustainable practices and processes into their product, the responsibility for improved sustainability will increasingly shift to the hands of consumers.

Summary: Implications of the Unsustainable Traditional Medium

Prospects of sustainability exist in all its three aspects - economic, ecological and social of newspaper. To implement further sustainable life-cycle changes into newspapers requires time, money and research. Newspaper producers must consider the strengths and weaknesses of traditional printed newspapers and determine the elements that currently attract readership, if they expect to maintain their longevity. Once other considerations to broaden audience readership are established, newspaper producers must identify and target their ideal audience for the next 5 to 10 years. Understanding the differences between the availability and desirability of newspapers will help newspaper producers clearly understand their audience. After assessing what changes would improve target audience use, continued content diversification and experimentation is needed in order to compete with other popular new media technologies. Establishing a clearer and stronger niche with sophisticated, financially secure, aging audiences may also be particularly beneficial.

Chapter Four. Scenario Quadrant II: Television

Introduction to Scenario Quadrant II

Scenario model Quadrant II analyzes television, as an example of a Sustainable Traditional Medium. Within Quadrant II, three aspects of television, economic viability, social equity, and ecological responsibility are addressed. They suggest a balanced, sustainable process towards which manufacturers can strive while addressing the lifecycle of a television. By considering these three factors of Figure 5, it is possible to examine current television trends and reveal potential weaknesses and strengths for future sustainability.

Examining a Sustainable Traditional Medium

Although parts of the production and delivery of television broadcasts use digital systems, the majority of television and programming in the United States are currently a traditional medium based on analog technology. Television uses an analog signal based on an alternating current frequency and the carrier's modification of the frequency to add information to the signal.[32] These signals are represented as a series of sine waves, but not as digital information. As far as hardware is concerned, currently, television efficiently distributes audio and visual content, but does not provide for effective data storage. Because of this, television becomes more versatile when users accessorize it with special recording and viewing devices that enable them to retrieve

[32] *Whatis.Com*, [Website] (TechTarget Network of Enterprise IT Web Sites, 2003, accessed Nov 12 2003); available from http://whatis.techtarget.com/.

and reuse previously developed information. Without these additional devices, analog television lacks modularity, or the ability to assemble individual programs or information as a user wishes and in the desired format, while maintaining the individuality and independence of the others. Without adding devices, analog television also lacks capacity to automate tasks, and vary format output.

Economic Viability

In 2000, almost two thousand stations, including broadcast and cable networks, accessed more than 108.4 million, or 98 percent of U.S. households, each of which owned at least one television set.[33] These systems provide a conduit for broad information distribution to large and varied audiences. This system currently generates numerous moneymaking business opportunities. One such opportunity is that of supplementing audience viewing preferences. This is done by increasing the flexibility of when, where and how a viewer can access television based information with devices such as television set remote controls, specialized television channels, pay-per-view programming, and other such services and hardware. Audience use of this media can be significantly enhanced. One of the simplest ways of augmenting a television is by adding an antenna for improved picture quality and increased channel capacity. Usually, with a basic antenna, television set owners view programming at no extra charge.

[33] *Nielsen Media Research Estimates 108.4 Million TV Households in the U.S.*, [Website] (Nielsen, 2003, accessed Nov 17 2003); available from http://www.nielsenmedia.com/ethnicmeasure/news/news.html.

Current analog technology does not provide users the ability to store and later retrieve, previously broadcast content, without augmentation by additional devices. As versatile viewing becomes increasingly important to many, Americans choose to supplement their television hardware with cable or satellite services and auxiliary hardware. Today, approximately 67 percent of U.S. television households use cable services, thus paying the providers monthly service charges to increase reception quality and the diversity of programming.[34] The desire for these additional capabilities and services tends to move the profitability of television toward more of a service-based business, with expanded economic opportunities that are built on sales of services rather than just the manufacturing and sales of new television sets. The sustainability of television and the television set increases with its ability to enhance businesses opportunities, rather than just hardware sales and broadcast production.

Social Equity

The medium of television holds a very wide audience. Television sets are affordable and priced to reach a wide population with prices ranging from 30 dollars for a basic black and white set, to 10 thousand dollars or more for the latest flat screen, high-definition, color model. With an average lifespan of seven to ten years and reasonable price points, owning a television is possible for most Americans. Estimates from the Washington Post show 15 percent, or over 16 million American's who own television sets, rely on over-the-air broadcast signals and do not subscribe to cable or satellite

[34] *National Cable and Telecommunications Association: Industry Overview*, [Website] (National Cable and Telecommunications Association, 2003, accessed Nov 19 2003); available from http://www.ncta.com/Docs/PageContent.cfm?pageID=46.

services, while, the majority of Americans, 85 percent, subscribe to cable and or satellite services.[35]

Programming originates from centralized locations, and in turn is distributed to widely varied decentralized audiences. With wide content distribution, multiple broadcast agencies, and varied content, television provides diverse audiences with considerable access to broad information. As a favorite pastime, occupying on average of four hours of time for each American daily, television quickly and efficiently reaches a very large audience with important international, national and local information.[36] This benefits local and nationwide communities when it is necessary to share information with the public at large. These same capabilities of television are further manifested worldwide through similar networks, which exist in most communities and nations.

Learning to use a television set is relatively simple, requiring a small learning curve for user mastery of all basic functions, turning it on and off, changing channels and changing volume. Remote control devices add some complication to learning but are usually quite straightforward. They provide additional options such as the capability to remember the last channel visited; toggling between two channels and to remote control of basic volume, channel selection and on/off functions. The fact that 82 percent of American adults claim to 'fully understand' how to operate their television set, suggests that they have a high confidence level when it comes to using it.[37] Other trend

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[35] Frank Ahrens, *FCC Move to Speed Shift to Digital TV*, Aug 9, 2002 [Website] (The Washington Post Company, 2002, accessed Nov 23 2003); available from http://www.washingtonpost.com/ac2/wp-dyn/A61752-2002Aug8?language=printer.

[36] *Facts and Figures*, [PDF Brochure] (RealVision, 2000, accessed Nov 16 2003); available from www.tvturnoff.org.

[37] John Fetto, *Can You Set Your VCR?* (American Demographics, 2002).

perspectives show television sets are entering the market, with generally no memory storage capabilities, but in an increasingly wide range of sizes, including small portable sets that enable viewers the freedom of mobility.

Television viewing tends to be a socially isolating activity. The content is communicated one-way, just like newspaper, and while individual's watch television, it is difficult for them to interact with local and remote audiences in a real-time manner. Although television viewing is a socially isolating activity, it is an effective means of communication for many different types of people. For example, programming is made accessible to hearing handicapped with closed captioning, and its audio broadcast assists for the visually impaired to more easily grasp the content. Some appropriately oriented programming that targets different audiences is beginning to increase. Shows that include diverse ages, ethnic minorities, and individuals, are slowly being included in mainstream television. Much improvement can still be made in this area, but these changes have begun to give audiences more varied role models, allowing viewers the opportunity to learn about different lifestyles.

Ecological Responsibility

Ecological responsibility, one aspect of sustainability, addresses the lifecycle of a product and its impact on ecology. The consumer lifecycle of a television set is longer than most commonly used technology products in the United States. In comparison to a cell phone's 18-month lifespan, the average television set is used for seven to ten years. With a longer product life span, television sets move more slowly through their life-cycle, decreasing television manufacturers demands on natural resources and increasing the sustainability of the product.

However, at the point of disposal, a television set generates potential environmental issues. Similar to cellular phones, television sets contain several toxic and potentially hazardous substances. If disposed of improperly, many of the elements used to make a television can pollute the ground and air causing damage to the environment, animals and humans. Some of these hazardous substances included;

- Lead – neurological disorders
- Cadmium– kidney dysfunction, lung failure and bone disease
- Mercury – possible nerve damage, and carcinogenic

Disposing of a television set costs on average, five to fifteen dollars in the United States.[38] To ensure television sets are properly recycled, it may be necessary to add a disposal cost to the purchase cost of a new set. Alternatively, the disposal cost could be included in the price of a new set and the responsibility placed on the sales organization or manufacturer. Manufacturers might partially recuperate their costs by recovering valuable and reusable materials. Recycling costs, included as part of a new product could be reduced as the production of more recyclable new products increases. To date, users must pay for all disposal costs, and have no guarantee that the product will be disposed of properly. All of these ideas, with proper incentives, further techniques and procedures for provide recycling methods.

[38] *Electronics Recycling Program, University of St. Thomas*, [Website] (University of St. Thomas, accessed Oct 26 2003); available from http://www.stthomas.edu/recycle/electro.htm.

Trend Assessment and Analysis of the Sustainable Traditional Medium

Economic Trends Concerning Television

On August 8, 2002, the Federal Communications Commission, (FCC), voted to require all television manufactures to produce equipment with digital capability by 2006. This action was taken in response to the FCC's mandate that all television transmission be digital by the year 2006. With digital transmission, broadcasters will be able to:

> • Send multiple programming options at the same time over the same channel
>
> • Improve the quality of the transmission with options not yet available through analog transmission
>
> • Offer digital data services, allowing broadcasters to send out virtual newspapers and other types of services directly to your television[39]

These FCC mandates are becoming increasingly important for both manufacturers and users. Manufacturers will need to comply with them to continue to provide products that function properly with future transmission signals. Viewers will need digital television systems to access televised content, fully access new services, and other viewing possibilities that will be made available.[40] The transition from analog to digital will generate financial activity for television manufacturers and peripheral businesses. Viewers, now watching television transmitted through analog signals will need to invest in hardware conversion equipment that enables analog sets to receive digital content. In 2003, conversion equipment was priced at 400 dollars, while a new digital set ranged

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[39] *What's the Problem with Digital TV*, [Website] (EconEdLink, 2002, accessed Nov 16 2003); available from http://www.econedlink.org/lessons/index.cfm?lesson=EM189&page=teacher.

[40] Ahrens.

from 500 to 20 thousand dollars. During this transition process, cable or satellite viewers should experience uninterrupted service. Analog television users, even with a conversion box, will have limited access to digital television services, like the higher quality picture digital television will produce.

In the transition and subsequent digital era, peripheral services and businesses will continue, but under heavy competition. For instance, today cable subscribers have a large selection of channels, a wide range of programming topics, and clearer reception. This multibillion-dollar industry now primarily serves, in the United States audiences located in urban and surrounding areas, even though in 1948 at its inception, cable was supposed to offer better reception to audiences in remote areas. Only now, some 50 years later, is this original cable objective being somewhat realized in remote areas. Wiring remote areas with the appropriate lines, and providing reliable services has proved more difficult and costly than companies anticipated. In some cases competing products have provided better solutions than cable. Remote areas in the United States are still not able to rely on cable for wider variety and clearer viewing capabilities. Instead, remote audiences use satellite dishes and services to receive expanded and crisper viewing. Satellite prices vary with promotional offers but price conscientious purchasers can often obtain hardware equipment free after rebates and by signing a minimum service contract for a specific period of time. A one-year's service, in 2003, cost about 30 dollars a month.

Users desiring optimal modularity and the ability to manipulate program information continue to invest in new services and hardware. Viewers desiring the best possible capabilities independent of the fixed broadcast programming times purchase a Video Cassette Recorder (VCR), a Digital Video Recorder (DVR), or obtain expanded cable

services. The VCR is an analog television media storage device that was first marketed more than 25 years ago and which requires VHS tapes for recording purposes. These VCR systems also store and play camcorder footage, taped television programming, and other materials converted or released to VHS video. Currently, a single head VCR costs around 50 dollars and the tapes about two dollars. Worldwide estimates from the Berkeley, How Much Information Research Program, indicate 10 billion videocassettes containing original video footage are generated yearly, and 1.4 billion blank VHS tapes are produced annually for the entire world.[41] Economically priced, VCR systems are readily available to a large worldwide audience.

Pioneered in the late 1990's, and priced around 240 dollars, DVR hardware (also sold by other names including ReplayTV and TiVo) offers up to 200 hours of television recording. Monthly costs for DVR services average 13 dollars, or a lifetime service membership of 299 dollars, per hardware device. Generally DVRs do not provide as highly a portable taping device as VHS systems because they do not have removable tapes. Early DVR products were capable of forwarding taped programming to other DVRs and over the Internet to other computers. Under intense pressure from the entertainment industry that was seeking stricter entertainment laws, DVR hardware was modified to remove the DVR-to-DVR forwarding options, the capability to send recorded files over the Internet, and the pre-program option to skip commercials. These actions significantly

[41] Peter and Hal R. Varian Lyman, *How Much Information?* [Website] (Regents of the University of California, 2000, accessed Aug 8 2003); available from http://www.sims.berkeley.edu/how-much-info/[11/10/2000 2:11:17PM].

limited the ideal usefulness of DVRs.[42] While DVR hackers have found ways to circumvent these changes and are able to distribute digital data across networked computers and the Internet, this is not the norm, nor is it legal without written permission from the producer. The main benefit to general users who purchase this system is the ability to find programming just like Internet search engines such as www.goggle.com. DVR enables providers to distribute very targeted channels to a narrowly defined audience, thus enabling them to custom-tailor advertisements to user, based on their audience's search and viewing patterns.[43]

Customers who use cable, satellite, DVR, and VCR systems to augment their television viewing often find that they must master additional new skills to do initial setups and to make effective use of all functionalities. Most consumers are also willing to pay additional costs for these services. Flexible pricing gives users some opportunity to choose the type and level of services they desire. Basic cable, satellite or DVR services cost between 15 and 40 dollars a month and can vary widely depending on the user's geographic location and the types of services desired.

Social Trends Concerning Television

The social aspect of television and how it can build social capital within a community

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[42] Eric Taub, *ReplayTV's New Owners Drop Features That Riled Hollywood* [Website] (2003, accessed July 21, 2003); available from http://216.33.240.250:80/cgi-bin/linkrd?_lang=EN&lah=50c809721feeac18ea3f8f9d43303ddd&lat=1058798387&hm___action=http%3a%2f%2fwww%2enytimes%2ecom%2f2003%2f07%2f21%2ftechnology%2f21REPL%2ehtml%3fth.

[43] Frank Rose, *The Fast-Forward, on-Demand, Network-Smashing Future of Television*, Issue 11.10 [Website] (Wired, 2003, accessed Dec 6 2003); available from http://www.wired.com/wired/archive/11.10/tv_pr.html.

must not be overlooked. In one of his books, Wayne Baker aptly describes social capital:

> The ethics of social capital requires us to recognize our moral duty to consciously manage relationships. We can't evade our duty; not managing relationships is managing them. Our only choice is to take ourselves out of the equation, focusing on how we can contribute to others. For us, "using" social capital means putting our networks into action and service for others. The great paradox is that by contributing to others, we are helping in return, often far in excess of what one would expect or predict.[44]

Social capital, accumulated through group interaction, benefits communities by increasing productivity, public responsibility and encouraging outward, rather than inward self-serving groups. Local television stations stimulate the increase of social capital by providing information that increases the wellbeing of the community and promotes local events. In 2000, the Corporation for Public Broadcasting conducted research on how to make their first priority the cultivation of social capital.[45] This research conducted by Wayne Baker found that corporations who invest in local events are likely to be repaid with increased customer loyalty, positive support and be viewed as having increased value to the community. By helping to build social capital, the television industry can both support and develop their community while at the same time enjoy a strong financially secure business future.

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[44] Wayne E. Baker, *Achieving Success through Social Capital : Tapping the Hidden Resources in Your Personal and Business Networks*, 1st ed., University of Michigan Business School Management Series. (San Francisco: Jossey-Bass, 2000). Pages 40 and 199.

[45] *Social Capital and Its Implications for Public Television, [Website/PDF] (Corporation for Public Broadcasting, 2000, accessed Nov 23 2003); available from http://stations.cpb.org/tv/highlights/01social_cap.html.*

From a technology literacy perspective, very few individuals have difficulty using their television set. Their technical literacy or ability to interact with television is easily acquired. However some auxiliary television equipment complicate usability. For example, using a VCR can be tedious if you want to skip around to specific portions of the tape to try to find a specific scene from a movie, or program that was recorded in your absence. Currently, users are limited by the kind of data they can store on their VCR and DVR. For example, you cannot easily store a work presentation and a television show on your VCR or DVR. Advancements in continued content flexibility and product usability will hopefully decrease these negative aspects.

Ecological Trends Concerning Television

The FCC's ruling to transition from analog to digital television transmission by 2006, will likely create a major need for the disposal of large quantities of analog television sets and related equipment. Estimates suggest there are 265 million analog televisions in the United States alone.[46] The transition from analog to digital equipment raises the challenge of averting the possible negative ecological impact and converting it into a positive situation. For example, by significantly reducing the cost of analog to digital conversion boxes from 400 dollars might extend the lifecycle of analog television sets, and make buying a digital set unnecessary. At the same time, the 500-dollar minimum for a digital television set has caused many high-end television owners to repair their current equipment rather than buy new. It seems that the advent of the big-screen television has, for the most part, saved small television repair businesses. Users are very likely to call someone who can be there quickly to fix their expensive systems, and

[46] Ahrens, (accessed).

with the convenience of not leaving their living room.[47] There is a fine line between a fairly priced product and a product that is priced according to its impact on the environment, society and the business. By making sets expensive enough to encourage people to have them repaired rather than discarding the broken product and buying a newer one, the prices exclude other users for socio-economic reasons.

Devices that augment viewing capabilities will continue to play an important role in the future of television. Cable now offers DVR services too. These cable services could enable potential customers to avoid additional hardware purchases and setup while still offering comparable services to augment viewing experiences. Other competitive hardware is available, and customers can purchase DVRs that also effectively use and reuse a computer harddrive to record and store broadcasts. Both cable and DVR systems far outlast VHS tapes, which wear out, are susceptible to mold, and are adversely impacted by high temperatures. DVR harddrives also have far more storage capacity compared to VHS cassettes, which contain approximately nine hours of programming for an extended play cassette tapes compared with 200 hours of DVR taping time. With no physical contact with the inside of the DVR devices, they are also less likely to wear down, or require maintenance.

Of all the significant television augmenting devices and services, cable connections require the least amount of hardware. For older sets, cable requires a set top box otherwise newer sets are purchased with a cable ready configuration. Unwired houses require a one-time installation of hard-wired connectivity that links the televisions to

[47] Robert Strauss, *For a Precious TV, Mr. Fix-It Is Still There* [Website] (The New York Times, 2003, accessed June 18 2003); available from http://216.33.240.250:80/cgi-bin/linkrd?_lang=EN&lah=53a5662db2d74f5df54de9fa5048b669&lat=1055955928&hm___action=http%3a%2f%2fwww%2enytimes%2ecom%2f2003%2f06%2f12%2ftechnology%2fcircuits%2f12repa%2ehtml%3f8cir.

cable box outside the house. By providing expanded viewing services cable services are highly sustainable, and often preclude the purchase of special devices and upgrades. Throughout the lifetime of a cable-wired house, several owners often reuse the original cabling built into the house, and buried in the ground outside it, without requiring any additional hardware investment. If the connecting cable is broken or faulty, or a cable set top box becomes inoperable, it may need to be replaced, but the process involves limited or no user costs. And, if a consumer no longer needs a set top box, the product is rented, so it is returned and reused.

As with all technology products, there are still improvements that can be made in making the television and related devices more sustainable throughout the lifecycle of production, use and recycling or disposal. For example, if not properly recycled television related products can leak lead, cadmium, and mercury, while other products require ongoing hardware purchases, like VHS tapes, to maintain their functionality. During the lifespan of a VCR, a significant supply of VHS tapes is usually required.

Summary: Implications of the Sustainable Traditional Medium

Television hardware is rapidly transitioning from analog to digital transmission, storage and playback capabilities. Analog sets, by FCC mandate, will be outdated by 2006. Although many sources suggest this transition will not be complete until 2010, implementing the universal use of digital broadcasting across television equipment manufacturers, broadcast systems and individual user television sets will generate new income for manufacturers, and the service industry. It will also provide new possibilities for broadcasters and audiences, and raise ecological issues relating to product production and the disposal of a significant number of outdated equipment. To cut

costs, broadcasters will likely continue to increase in size, achieving efficiencies by covering wider markets with more generic products. Increasingly, news stations styled to appear local will actually be broadcasting from a centralized location with an anchor team that reports on smaller markets for a broad viewing area.[48] These efficiencies will cut local costs and bring news to smaller markets that might otherwise go without. However these broadcasters often will be unable to accurately address the nuances and unique needs of local communities and in turn may negatively impact the social capital needed to support viable communities.

The television hardware lifecycle reveals a future of continued opportunity for growth shifting away from analog to digital sets over the next three or more years. Small steps toward increased sustainable practices and philosophies are already evident in the lifecycle of television. They can be seen in supplemental devices that are used to augment television sets, the reduction of natural resources needed to produce equipment which has a seven to ten year long lifecycle, and the increased awareness of the need to cultivate social capital. The greatest apparent challenge remains that of the disposal of analog equipment. At the beginning of the analog to digital transition it appears that manufacturers, service industries, users and the government must work together to increase product sustainability in product manufacturing and in product recycling and disposal.

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[48] Jim and Micheline Maynard Rutenberg, *TV News That Looks Local, Even If It's Not* [Website] (The New York Times, June 2, 2003 2003, accessed June 13, 2003); available from http://216.33.240.250:80/cgi-bin/linkrd?_lang=EN&lah=397281d837facb95a3266e50688ed491&lat=1055537844&hm___action=http%3a%2f%2fwww%2enytimes%2ecom%2f2003%2f06%2f02%2fbusiness%2fmedia%2f02TUBE%2ehtml%3fth.

Chapter Five. Scenario Quadrant I: The Internet

Introduction to Scenario Quadrant I

Scenario model Quadrant I investigates the Internet, an example of a Sustainable New Media. Three aspects of the Internet, economic viability, social equity and ecological responsibility, provide a balanced perspective for assessing Internet sustainability. The quadrant model analysis also highlights how manufacturers and consumers have implemented sustainability practices, and provides suggestions for further progress within the lifecycle. Only a limited segment of the Internet lifecycle can be assessed because the Internet is still in its youth and much remains to be developed. However, existing research, and increasing Internet visibility provides adequate grounds to assess sustainability even as the Internet continues to grow. This medium reached 580.78 million people, or about eight percent of the world population in 2003.[49] Internet use continues to expand to broaden audiences, with increasingly diverse age and ethnic groups. Surprising to many is the fact that 57 percent of South Korean homes have broadband Internet access, the highest of any nation in the world. With nearly 23 percent of its homes equipped with broadband access, the United States ranks fourth in the world.[50] These statistics underscore the importance of clearly understanding the economic viability, social equity, and ecological responsibility of the Internet, while also

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[49] *NUA*, [Website] (Search Engine Strategies 2003, Conference and Expo, accessed Novmeber 12, 2003); available from http://www.nua.com/surveys/index.cgi.

[50] Ken and Matt Richtel Belson, *America's Broadband Dream Is Alive in Korea* [Newspaper article] (May 5, 2003, accessed May 5 2003); available from http://www.nytimes.com/2003/05/05/business/worldbusiness/05BROA.html?ex=1054008000&en=3ceff39044269f15&ei=5070.

establishing its current trends, and identifying important strengths and weaknesses as they relate to its sustainable future.

Examining a Sustainable New Medium

The Internet qualifies as a new media. It operates through digital networks, recognizing data numerically. The individual elements of Internet hardware and software work in combinations, either independent of one another, or when integrated into any variation of two or more objects. Internet software has the ability to display the same content in various formats, another qualification of new media that further strengthens the usefulness of the Internet. This versatile file format display ability is such an integral part of the Internet that users can fluidly send and view files or communication with much of the technical computation automated, and completely hidden. Furthermore, while varying data formats can sometimes create challenges for Internet users, more often than not, online computer software capabilities handle diverse file formats.

While the speed at which the Internet can deliver information is a major advantage, this same speed also has a downside. For example, online newspapers react quickly to news breaking events, with updates every few minutes, and almost instantaneous content. Websites covering the 9/11 terrorists attacks helped quickly connect unidentified people in hospitals to their loved ones, and allowed family and friends to quickly register missing people. However, this immediacy also generated confusion, providing inaccurate information. The war coverage provided by CNN.com and MSN.com. is another example. In some cases, while information was quickly provided, it was jumbled, confused, and inaccurate apparently because it was not processed though structured verification and editorial steps as is the case with most printed media.

So, although the Internet reduces dependency on time and location, its distribution speed and ubiquitous, instantaneous information, raises concerns about information accuracy.

Economic Viability

In 1994 annual computer sales exceeded annual television sales in the United States.[51] While computers have been increasingly popular and in demand, the computing industry, with its hardware, software and service components, remains fiercely competitive. New competitors enter the market daily, while unsuccessful businesses are also pushed out daily. Prices for all components, such as can be seen in data storage hardware, continue to drop, providing greater availability. This example dramatically illustrates how the cost for one gigabyte of data storage space has consistently dropped from nearly 12 thousand dollars in 1988 to about one dollar in 2000.[52] With these costs, and the fact that approximately 55 percent of manufactured data storage capacity is devoted to personal computers, it is clear that computers and related hardware, software and service industries must become increasingly efficient to survive.[53]

The competition between hardware manufacturers will likely continue to provide production efficiencies that hold even greater potential for increased sustainability.

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[51] Lakshmanan Chidambaram and Ilze Zigurs, *Our Virtual World: The Transformation of Work, Play, and Life Via Technology* (Hershey [Pa.]: Idea Group Pub., 2001).

[52] Lyman, (accessed). Website. Available from http://www.sims.berkeley.edu/how-much-info/charts/charts.html (5 of 8) [11/10/2000 2:11:13 PM].

[53] Ibid.(accessed).Website. Available from http://www.sims.berkeley.edu/how-much-info/magnetic.html (2 of 6) [10/24/2000 5:25:22 PM].

Service or content providers can largely avoid using extensive and expensive natural resources, thus reducing the impact on the environment. The business of selling service information clearly generates significant amounts of income. For example, Weight Watchers online, at www.weightwatchers.com, is a website that offers helpful tools and information, while building a sense of community among it's clients. The site includes free chatrooms and discussion boards on hundreds of topics of interest. The Weight Watchers Corporation provides helpful information to users in both the free forum and in the pay-per-month portion, increased tools and personalized information. Clients, who pay a monthly fee, are provided more detailed information and elaborate tools, such as access to special food journals, exercise journals, calorie counters, and receipt builders to augment weight loss. This website provides an exchange of valuable information that flows among clients, between clients and the corporation. As users build online relationships with each other, they share content about themselves, and in doing so, share personal information that supports the overall success of the website and the Weight Watchers Corporation. The experience, builds a sense of community, provides information, and leads to enhanced revenue for the corporation.

Social Equity

Because Internet based information can quickly and seemingly effortlessly conquer time and distance, our future expectations for the tool tend to go beyond the realm of the realistic. Similar situations existed at the advent of long-distance telegraph, which was touted as holding almost magical features and the possibilities to globalize and civilize the world. Telegraph lines and services quickly circled the world, creating a global network and global industries. By 1850, there were over 12 thousand miles of telegraph

lines in the United States alone.[54] Just like today's Internet, the telegraph industry, along with great economic opportunities, also gave birth to romances, scandals, thieves and robberies.

Today, Internet audiences have increased access to local and international geographies and content. For instance, users seeking the daily news may have digital newsletters from diverse sources and locations delivered to their own home or work email account. Those 30 percent of American households that read the daily news, at least once a week online, may archive the content, print a hard copy, and or download a digital copy to a PDA, cell phone or laptop. The extensive flexibility of digital content, along with the ability to add, delete or link content, shows how digital data and its supporting hardware and software have combined to meet the needs of an increasingly diverse group of users.[55]

The convenience and access to information online has both positive and negative social impacts. Audiences now have the opportunity to access sites that contextualize news, presenting, and clearly indicating differing points of view, highlighting political biases and in so doing, heighten their online media experiences. With the Internet, users can quickly tap multiple sources of information on the same subject from diverse worldwide sources, usually in their native language, English and other major languages, and thus obtain a much broader perspective on the world around them.

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[54] Tom Standage, *The Victorian Internet: The Remarkable Story of the Telegraph and the Nineteenth Century's Online Pioneers* (London: Weidenfeld & Nicolson, 1998).

[55] Lyman, (accessed). Website. Available from http://www.sims.berkeley.edu/how-much-info/charts/charts.html (6 of 8) [11/10/2000 2:11:13 PM].

On the negative side, valuable Onternet-based digital content is often access restricted and or accessible only through paid subscriptions. Other challenges result from search engines that do not understand language semantics or provide for ontological searches, with their cross-referencing capabilities. For example, without ontological capability a search engine does not know that a “film”, “movie”, “motion picture” or “flick” all represent different ways to describe the same thing.[56] Online news agencies usually do not offer free access to archives that are more than several months old. While it is easy to find current news coverage from reputable sources, finding complete and reliable news coverage that is more than several months old is seldom found except from some agencies that usually provide this service at an additional cost to users.

Full, wide spread, and effective use of the Internet is limited by other factors. Many people still do not have the money to buy a computer or to subscribe to basic Internet services. The lack of media literacy and digital literacy skills hinder some individuals from obtaining useful information on the Internet. Without adequate media literacy skills individuals are unable to interpret, evaluate and effectively use published information sources. Inadequate digital literacy skills, computer hardware and software skills, and/or a basic technology vocabulary, preclude a user from efficiently locating and exploring useful Internet information.[57] These skill sets become increasingly important as everyday-life transactions, such as banking and bill paying, continue to transition from traditional paper forms and interaction to Internet based communication and digital forms.

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[56] Katherine Adams, "The Semantic Web: Differentiating between Taxonomies and Ontologies," *Online*, August 2002. Pages 21-23.

[57] Brody. Page 41.

Ecological Responsibility

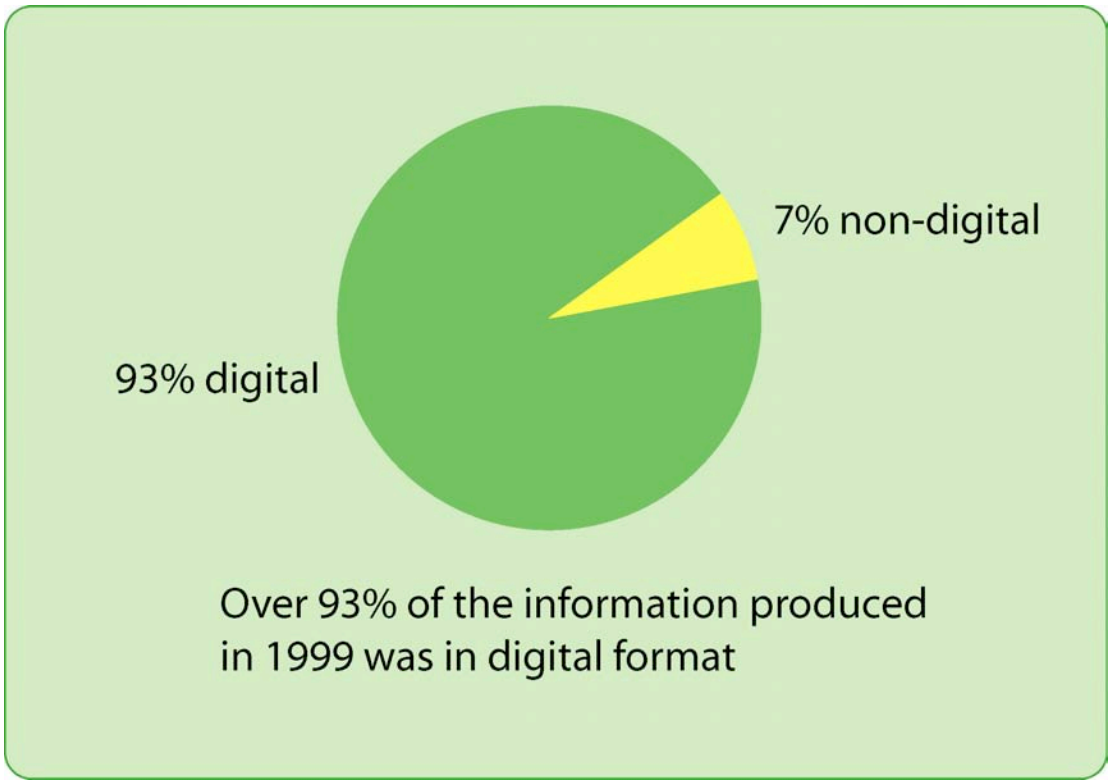

Figure 10. Digital Verses Non-Digital Information Produced in 1999

Figure 10 shows in 1999, 93 percent of new information was produced in digital format. This clearly illuminates the sustainable properties of digital content. With 93 percent of information available in digital format, methods for effectively and efficiently storing and dispersing digital content become increasingly important to ecology.[58] While production of Internet hardware requires raw materials and energy, once placed in a home or office, this equipment provides for very effective dissemination and storage, replacing the printed media lifecycle. Studies of hardware production show that the cost of making a 32-megabyte RAM microchip from raw quartz is 1.6 kilograms of fossil fuel, 72 grams of chemicals, and 32 kilograms of water. Once the technology is made and

[58] Lyman, (accessed). http://www.sims.berkeley.edu/how-much-info/charts/charts.html (1 of 8) [11/10/2000 2:11:31 PM].

distributed it continues to use natural resources for energy. In 2003, German statistics indicated that from three to four percent of its national energy consumption was used to support the Internet Infrastructure of the country.[59] Yet, the greatest amount of hazardous waste is still generated through manufacturing processes.[60] Waste generated from the production a laptop computer is estimated to be twice the weight of the final product, while the waste generated from the production of smaller handheld devices is approximately three times the weight of the final product.[61] Still, it is difficult to weigh the ecological impact of the hardware accurately, when also considering the ecological successes of using and distributing content through the Internet.

Trend Assessment and Analysis of a Sustainable New Medium

Economic Trends Concerning the Internet

After the dotcom bust many businesses both large and small, realized that they knew much less than they thought about the Internet and how it could be used to increase their economic success. During the dotcom era, and ever increasingly, Internet

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[59] Dino Pinelli, Carole Maignan and Elena Bellini, *Ebusiness and Sustainable Regional Development in Europe* [Website] (Fondazione Eni Enrico Mattei, 2003, accessed May 24, 2003); available from http://www.digital-eu.org/publications/default.asp?pubid=33 http://www.digital-eu.org/publications/default.asp?pubid=31. Page 35.

[60] *Global Citizenship: HP Environment, Product Return and Recycling*, (accessed). Page 55.

[61] Michael Kuhndt, Justus von Geibler, Volker Türk, Stephan Moll, Karl Otto Schallaböck and Sören Steger, *Virtual Dematerialisation and Factor X* [Report] (Wuppertal Institute, 2003, accessed May 24, 2003); available from http://www.digital-eu.org/publications/default.asp?pubid=32.

shopping plays an important role in the success of online storefront sales. Today, 36 percent of users shop online and appreciated the flexibility and convenience of their new shopping capabilities, as compared to shopping in brick and mortar stores.[62] Popular online products are usually easy to locate and positioned close to the site entrance to facilitate fast purchases, unlike brick and mortar stores who position popular items, like milk, eggs and butter, in the far back of the store. Internet shopping also offers 24-hour service that is particularly convenient for many. In addition to convenient access to a wide variety of products, online shopping also provides for privacy, the delivery of heavy or hard to carry items, and direct home delivery.

Successful online businesses also enable greater corporate openness or transparency. Where once corporate personnel policies on aspects such as employee harassment, wages, benefits and skill development plans were not generally available, now companies such as Hewlett-Packard offer increased corporate transparency by sharing this information through PDFs on their website.[63] Beginning in November of 2000, Hallmark began an initiative to increase their corporate transparency through an online idea exchange, where select customers were invited to participate in product development through dialogue and interaction, with other customers and Hallmark staff.[64] Their results have been remarkable, with active participation levels varying from 50 to 75 percent of the original group. Consumers speak their mind, offer suggestions, and participate in product testing, free of charge and under intellectual property

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[62] Norman H. and Lutz Erbring Nie, *Internet and Society* (Stanford: Stanford Institute for the Quantitative Study of Society, 2000), Preliminary Report.

[63] *Global Citizenship: HP Environment, Product Return and Recycling*, (accessed). Page 16.

[64] Tom Brailsford, "Leveraging Consumer Knowledge in Pursuit of Innovation," in *Braintrust International 2003, Fifth Annual Knowledge Management Conference* (San Francisco, CA: 2003).

contracts with Hallmark. These Hallmark Internet consumer consultants are particularly valuable because of their willingness to participate in product development, their history of feedback, and their long-term relationship with people in the company. Hallmark's evolving understanding of their customers, and their customers' growing needs, provide the company with valuable tools in the production and marketing of their products. Companies that seek to command a significant online presences must build similar social value structures, dematerialize executive power and operations, and allow for customer-empowerment.[65] Hallmark has realized that online clients can help them increase their opportunities for success by changing the climate of their traditional media business – printed greeting cards. This dynamic relationship in which traditional media providers use the Internet and a new media tools, blurs the line between the two media, and leads to improved business successes.

Another emerging Internet market is that of providing affordable technology services in economically underprivileged areas. Servicing very low income consumers may provide smaller profit margins, but could result in other benefits.[66] Companies such as Hewlett-Packard see philanthropic opportunities in providing technology and support to underprivileged areas as a way of increasing company innovation and branding presences while positioning themselves to take advantage of future revenue opportunities in emerging markets.[67] Recently, Hewlett-Packard set up technology kiosks in local villages of India. These technology kiosks include a personal computer, a

[65] Chidambaram and Zigurs. Page 25.

[66] *Disposable Planet*, [Website] (BBCNews, UK, 2003, accessed Dec 16 2003); available from http://news.bbc.co.uk/hi/english/static/in_depth /world/2002/disposable_planet/.

[67] *Global Citizenship: HP Environment, Product Return and Recycling*, (accessed). Page 29.

printer, scanner, and a digital camera. For a fee of 40 cents an hour, people can use the equipment they could otherwise never afford to own.[68] With more than 4 billion people worldwide who still do not have technology readily available to use, Hewlett-Packard sees a significant area in which they can provide assistance and generate potential future markets. [69] Crime has also invaded and adversely affected the Internet economy. Many people are reluctant to use the Internet or shop online, fearing they will be robbed, or cheated. These fears, while unfounded, are further developed by hyped news reports and images. In actuality, fraud, the highest-ranking crime, accounted for 5.7 percent confirmed Internet crimes in 2002.

Social Trends Concerning the Internet

One misconception about Internet users is the idea that, "if we build it, they will come." This is simply not true.[70] The Internet is based on social capital – the more people using it, the more opportunities for connection. To increase the social capital and democracy of the Internet, basic social needs must be met. For example, computer access remains limited. Factors influencing whether a person can access the Internet include the person's financial status, the perceived level of security, and privacy. However, the most dominate force in determining if a person will use the Internet is not necessarily social, racial, economic or generational, although some of these factors may influence use. Rather, a person's experience and access to technology are the most important

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[68] Ibid. Page 23.

[69] Ibid. Page 18.

[70] *Next Generation E-Learning and the Road to Human Capital Development and Management: Successes, Challenges and Lessons Learned* (Redwood Shores: Saba Software, Inc., 2001), White Paper. Page 5.

influences determining whether or not they will get online. Education, specifically college graduation and age demographics are also factors that facilitate or inhibit a person's access to the Internet.

> Ethnicity and gender, account individually for less than 5 percent change in rates of access and are statistically insignificant. By contrast, a college education boosts rates of Internet access by well over 40 percentage points compared to the least educated group, while people over 65 show a more than 40 percentage point drop in their rates of Internet access compared to those under 25. Age really reflects generational differences, and thus shows what to expect in the future.[71]

Although currently, older people are less often Internet savvy, it is likely, as younger audiences grow older, reach and surpass the age of 65, they will continue to carry on their Internet interests and skills, unaffected by age. Individuals also increase the likelihood of using the Internet if they are linked to other people who use it. For instance, having an Instant Message (IM) account setup is not very useful unless you know other people who have established accounts and frequently use the system. Knowing places to go online where people have interests similar to yours, or have some other common overlapping characteristic similarly increases a person's likelihood of using the Internet. For example, a person interested in rare Civil War books, and someone else interested in rare gardening books, share a combined interest in the topic of rare books, which may connect both people. Furthermore, people who are mentally flexible, posses an existing understanding of technology and who have a working knowledge of hierarchies and relationships between different kinds of content are better able to adapt to continuing changes in Internet and computer technology. The longer a

[71] Nie. Page 6.

person has been an Internet user, the more likely that their use and time spent on the Internet will increase.[72]

Future use of the Internet by 54 million disabled Americans and the numerous disabled around the world is uncertain.[73] To provide for the participation of the handicapped, businesses must address the industrial design of hardware, and make products that are easy to use even with visual, hearing, or motor impairments. Webpage designers must also make pages more accessible by using the guidelines developed by the World Wide Webs Consortium. Product support centers must also offer teletypewriter assistance. By employing these techniques, the Internet could enhance its ability to communicate with the handicapped and larger audiences of all types.

Ecological Trends Concerning the Internet

The Internet encompasses influences that interact in both positive and negative ways on the environment. As an information purveyor, the Internet provides some of the most remarkable, current, and easily accessible information about ecology and its relationship with technology. On the other hand, a look into the future, to the time when major numbers of Internet appliances and hardware become obsolete, raises challenging recycling and disposal issues. Already, Hewlett-Packard, IBM, and Dell have begun offering recycling for computers and related products. By 1997, the IBM Asset Recovery Center, in Edicott New York, was recovering 35 million pounds of

[72] Ibid. Page 6.

[73] *Global Citizenship: HP Environment, Product Return and Recycling*. Page 18.

computers and computer parts each year.[74] Hewlett-Packard touts an online sustainability manual that promotes their two U.S. recycling facilitates and describes their computer-recycling program, which also accepts their competitors' products.[75] Cultivating such options for customers wishing to get rid of end-of-life products tends to foster long-term relationships and establishes corporate responsibility for the complete lifecycle of their products. By educating consumers about company recycling programs, businesses raise customers' ecological awareness and identify the responsibilities, which they share with their customers.

With increased ecological awareness, Internet manufacturers, service providers, and users can play a more important role in overall sustainability. Consumers using broadband Internet connections instead of dial-up connections, will likely be more efficient, and save energy costs. Users who avoid rematerializing content (i.e. burning content to CD's or printing out online documents for use later,) also reduce the adverse ecological impacts of the Internet. Customers who take advantage of corporate ecological incentives also help manufacturers and service providers to facilitate and perpetuate a more sustainable future. With information programs, and other incentives, ecologically damaging practices can be reduced and replaced by positive ecological impacts. Furthermore, programs that promote ways to avoid the hazards of rematerializing content will increase future businesses sustainability. Hewlett-Packard's online Global Citizenship publication provides an example of corporate action being taken to fulfill their ecological responsibility. Hewlett-Packard's production is increasingly based on concepts of dematerialization, by finding ways to decrease the use of natural resource, avoid hazardous material byproducts, and improve product

[74] Hawken. Page 78.

[75] *Global Citizenship: HP Environment, Product Return and Recycling*. Page 42.

packaging. They have also engineered reductions in the amount of energy their products needed to operate, extended the useful life of their products, and designed end-of-life programs for recycling.

Summary: Implications of the Sustainable New Medium

The Internet impacts economic, social, and ecological aspects of sustainability in positive ways. In comparison to print and other hardcopy materials, the Internet provides increased opportunities for storage and dissemination of information to broad, global audiences quickly and efficiently. It incorporates and encourages economic opportunities for growth in globally remote areas by providing worldwide connections for these locations. Dematerialized Internet Information facilitates further sustainable progress by increasing the quantities of diversified content and communication that connect people where they are, with shared Internet interests. With online information retrieval less limited by time and distance than traditional media, and with distribution delivery speeds crossing thousands of miles instantaneously, the need for raw materials and energy use in the production, delivery and storage of content and products decreases. However, the Internet's use of natural resources for hardware production remains an area that deserves continued attention. Available research about ecological efficiencies of Internet hardware shows that product manufacturing requires the largest amount of natural resources, and produces hazardous waste underscoring the fact that recycling is underutilized in the lifecycle of these products.

To some, the massive amount of online information that grows by about 50 percent a year remains disconcerting. This growth, in comparison to the situation where consumers have limited time to manipulate and use the information, (Time spent grows

at 1.7 percent per year) will, presumably, hit a natural limit.[76] This situation calls for vastly improved search engines, and other new tools to find, sort out, and use accurate, genuine and timely information.

With the bulk of information produced today available in digital format, businesses are finding ways to provide increasingly inexpensive Internet access that better serves economically underprivileged, geographically remote, and diverse audiences. Cutting edge companies that see these potential opportunities, have worked to build inexpensive services and hardware such as full service Internet kiosks that provide online capabilities, printing, the use of digital cameras, email and research information. This trend in serving nontraditional audiences dramatically expands Internet access and its opportunities to vast potential markets.

[76] John Seely and Paul Duguid Brown, *The Social Life of Information* (Boston: Harvard Business School Press, 2000). Pages 35-62.

Chapter Six. Media Comparisons Visualized Through the Scenario Model

New Media Comparisons Using the Scenario Model

In the preceding four chapters, a total of four media, two traditional and two new media, are systematically assessed using a similar format and structure. The research specifically focused on current practices within these media to determine how sustainability influenced the economic, social and ecological aspects of each. The chapters discussed the sustainability of a representative technology. Included were, cellular phones, the example of an Unsustainable New Media, Quadrant IV; newspapers, an example of Unsustainable Traditional Media, Quadrant III; television, an example of Sustainable Traditional Media, Quadrant II; and the Internet, an example of a Sustainable New Media, Quadrant I. Each chapter used a consistent vocabulary to provide opportunity for comparison and the highlighting of comparable potential trends in each media. The model presented information in a comparable format, encouraged the investigation of concepts outside of familiar or comfortable decision making processes, and in doing so, broadened the understanding of the concept of sustainability.

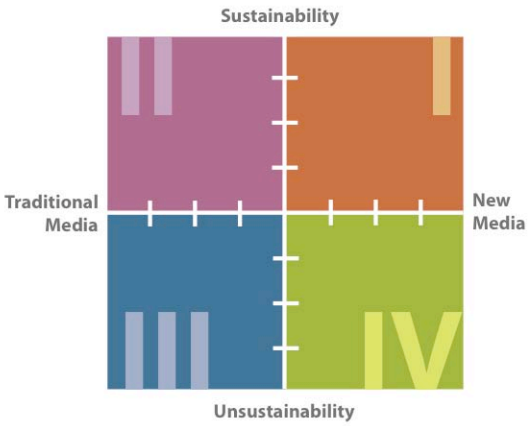


Figure 11. Visualization of Graph Used for Plotting Purposes

This chapter examines, and compares newspapers and television, examples of traditional media. Similarly, it examines

cellular phones and the Internet, examples of new media. As was done in previous chapters, this comparison is accomplished using a framework that addresses, economic, social and ecological aspects of sustainability. The location of each media is plotted on the x-axis and the y-axis to estimate the current position of each media. The y-axis, identifies sustainability above the mid-point, and unsustainability below the mid-point. A six-point scale, with three positive points and three negative points judges each technology based on the sustainability factors. The sustainability of the economic, social, and ecological aspects of each media, then establishes the positioning on the y-axis. The x-axis uses a scale with a total of ten points. Traditional media is to the left of the mid-point and new media to the right of the mid-point. On this axis, one-half of a point is awarded for each of the five criteria for traditional media and five criteria for new media. This establishes the location of each technology on a traditional to new media continuum. By plotting sustainability and the media characteristics, the current position of each technology in the model is established. The plotting process is then repeated using likely trends for the next five to ten years, to establish a potential future position for the technology. The process provides an opportunity to identify potential shifts in sustainability as well as shifts in the characteristics of each media.

Current Comparative Analysis of Sustainable and Unsustainable New Media

Cellular phones, an Unsustainable New Media, and the Internet, a Sustainable New Media both, arrived on the scene in the early 1970s. Initially, cellular phones operated on an analog system, while the Internet has always been digital. New media has not matured equally for cell phones and the Internet. The answers to five questions provide the ability to assess the maturity of new media and to make comparisons among the technologies. The questions are;

- Is the media numerically representable?
- Is it modular?
- Can it be automated?
- Is it flexible in format?
- Does it easily translate from one format to other?

The answers to these five questions establish evidence to a technology's ability to operate as a new media object in its final delivery format to the user.[77] Aspects of the development process may or may not include qualifications of new media, but the final delivery format is what is assessed to determine the media category.

From this assessment, it is clear that the Internet operates as new media. Cellular phones exhibit two particular weaknesses. First, cellular phones have difficulty allowing for variability, or the ability to exist in differing versions. For example, it is difficult to use a cellular phone to link a laptop and a business contact's phone number into the system's calendar. Second, differing file formats restrict cellular phones. For example, it is virtually impossible to play a voicemail message from it, and then later play the same voicemail on an MP3 player. On the other hand, although the Internet is not seamless in it's ability to operate as a new media, the majority of the time, it performs successfully as a new media. These weaknesses result in cellular phones being awarded an aggregate score of two positive points on the horizontal, media axis, while Internet technology is awarded two and one-half. The current maturity of these two new media is reflected in the Figure 12.

[77] Lev Manovich, *The Language of New Media* (Cambridge, Mass.: MIT Press, 2001). Pages 27-49.

Figure 12. Current Media: the Internet and Cellular Phones

Figure 13. Media Trends: The Internet and Cellular Phones

Trends in Comparative Analysis of Sustainable and Unsustainable New Media

Current trends suggest the ability of cellular phones will grow to successfully operate as new media objects. Advancements, already evident, will likely increase the variability, and content handling abilities of cellular phones. A few phones already include global positioning capabilities that provide verbal directions. This process translates digital directions into voice commands, monitors movement, and makes computations on the move to update directions. The Internet can also be expected to continue to improve its new media capabilities with software automation, and task simplification. With increasingly efficient and effective techniques that have already begun to address the weakness of their current state, both of these technologies will solidly continue to perform as new media. To that end, both technologies are awarded two and one-half

positive points as their trends suggest a future of high-end, viable new media products. This is documented in Figure 13.

Current Economic Viability of Cellular Phones and the Internet

Economic, social, and ecological aspects of both these media continue to evolve. Some are sustainable; others are not. A comparison of these two technologies further provides a tool to identify and increase the opportunity for decision makers to make sustainable decisions about the technologies that they are creating or choose to buy.

Cellular phones and the Internet are currently profitable, yet economically unsustainable, because not only services, but also hardware drive their economic success. It appears that practices, and hardware, software strategies used by manufacturers and sales agencies purposely shorten product lifecycles and perpetuate economic growth. Declining hardware prices also tend to convince consumers to buy new products and replace old products more quickly forcing early obsolescence. The average American consumer uses a cellular phone for about 18 months, and a computer, from 24 to 36 months before replacing them.[78] These increasingly shortened lifecycles negatively impact the environment as they support continued high levels of production and the adverse impact of this production is greater consumption of natural resources. Cellular phones and Internet systems are generally economically profitable, but the extensive, and continuous manufacturing, generates income in an undesirable manner, from a sustainability perspective. Therefore cellular phones and the Internet

[78] Carey Goldberg, *Where Do Computers Go When They Die?* [Website] (The New York Times, 1998, accessed Nov 16 2003); available from http://www.ce.cmu.edu/GreenDesign/comprec/nytimes98/12die.html.

are both assessed one negative point for being economically unsustainable practices, as illustrated in Figure 14.

Figure 14. Current Economic Viability: The Internet and Cellular Phones

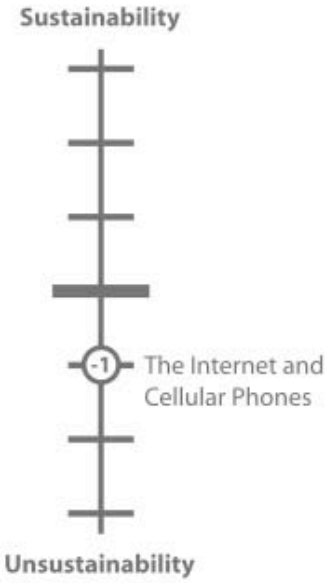
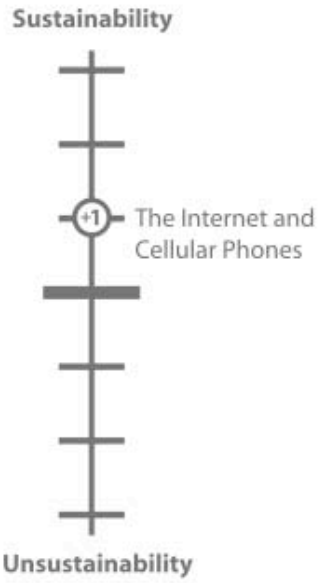


Figure 15. Trends in Economic Viability: The Internet and Cellular Phones



Trends in Economic Viability of Cellular Phones and the Internet

Future sustainability of these two technologies can be significantly improved if businesses optimize computer hardware manufacturing, and increase product lifecycle lengths. Increased sustainability within both of these media can also be achieved through production efficiencies that reduce, reuse, and recycle raw materials. Chip manufacturers in Asia have already recognized this approach and have made it financially profitable, with streamlined manufacturing processes, and manufacturing site

updates. One particular company has cut operating energy expenditures by 69 percent, and positioned themselves as strong competitors.[79]

Other businesses have turned toward service-oriented profitability. Service-based businesses enhance profitability by avoiding the cost of new material, transportation, storage, and product disposal. Service-oriented businesses that dematerialize their products, and place less emphasis on hardware sales, also enhance sustainability. The growing importance and popularity of wireless networking and communication also positions cellular technology to take advantage of service-based profitability. Since 2001, Motorola has refocused their business on high-speed wireless networks, while reducing their reliance on hardware sales. This emphasis on wireless networking, and de-emphasis on hardware, has caused investors to view Motorola as a lucrative investment opportunity.[80]

Trends in Internet and cellular phones indicate an increasing focus on improving communication capabilities by adding video, and still imaging capabilities to both cellular phones and Internet devices. Affordable, home-use video software and hardware products from Microsoft and Apple that were released in the summer of 2003, almost simultaneously, provided live audio and or video chat capabilities. These actions were monumental in the communications industry. The results, instantaneous voice communication, at one time available only through landline connections or cellular phones with monthly services, were now free after minimal initial hardware and software investments. Mainstream camera-ready cellular phones, released to the market at about the same time, also built on the strength of Internet communication by

[79] Hawken. Page 63.

[80] Gilder.

offering users the opportunity to share pictures in conjunction with normal voice communication.

Exemplifying product dematerialization, the Internet entertainment industry provides an example wherein dematerialization is used to achieved sustainable new media profitability. iTunes, a online music-purchasing store, has recently surged in popularity with sales of over 25 million songs, at 99 cents each, by using the Internet, for digital downloads, onto music players.[81] This system gives users the opportunity to preview songs, and select only the music they know they will use. In this way, manufacturers avoid the unsustainable process of producing the music on a CD or cassette tape, as well as the packaging and distribution costs. The popularity and profitability of this and similar music services has already increased the sustainability of the music industry and shows even greater potential for the future. It has also increased sales of Apple's iPod portable music player device, which plays the downloaded songs, and can be used as a portable storage device for other digitally formatted content.[82]

Size and ability to flexibly handle digital content are the two major differences between the Internet and cellular phones. While the desirability of cellular phones rest in their very high portability, computer desirability lies in its ability to easily handle widely diverse digital formats. As time progresses, the differences between cellular phones and the Internet are expected to continue to blur. Both media will push and pull communication to and from their users. Both are expected to expand their use of visual

[81] The iTunes store can be accessed at www.apple.com/itunes.

[82] *Itunes Music Store Downloads Top 25 Million Songs Over $1 Million of Itunes Gift Certificates and Allowances Purchased*, [Website] (Apple Computer, Inc., 2004, accessed January 8 2004); available from http://www.apple.com/pr/library/2003/dec/15itunes.html.

and voice enabled communication. Both media operate on digital networks, helping to facilitate service-oriented growth and product dematerialization. For these reasons, cellular phones and the Internet are awarded one positive point each for their future potential to be economically sustainable. This is documented in Figure 15.

Current Social Equity of Cellular Phones and the Internet

For 31 percent of Americans who are considered high-end technology adapters, or Technologically Elite, the Internet and cell phones are commonplace. This group is comprised of three tiers, one-fifth are Young Tech Elites, technologically advanced, averaging 22 years old, one-fifth are older Baby Boomers, averaging 52 years old, and the remaining three-fifths are Generation Xers, averaging 36 years old. A good summary of this group's technical orientation is provided on the Pew website.

> What is distinctive about them is that new electronic communications technologies come first. They would rather do without their wireline telephone than their computer…their cell phone is more important than their wireline phone, and email is as important as telephonic communication. The Internet is a regular source for daily news and an indispensable element of their entertainment experience.[83]

Within this group, the Young Tech Elites value of computers and the Internet is seen as more important than other traditional and new media. About 70 percent of them indicate, "It would be very hard for them to give up the Internet. Cellular phones are a close second, with about 60 percent saying, "It would be very hard to do without their cell phones."[84] These people rely on the Internet, computers, and cellular phones daily

[83] *Pew Internet and American Life Project*, [Website] (Pew Charitable Trusts, accessed Nov 23 2003); available from http://www.pewinternet.org/reports/toc.asp?Report=103.

[84] Ibid.

for business and personal use. Among the Young Tech Elites, women are more likely to use technology to communicate, while men seem more interested in the latest technological gear.

Many other people are less reliant on cellular phones and the Internet but still use them in varying degrees. This is a diverse group that continues to rely primarily on traditional media, television and landline telephones while using new media cellular phones and the Internet to a lesser degree. With a stronger interest in traditional technologies, 31 percent of these people felt “It would be very hard to give up their cell phones.” And, only 22 percent thought, “It would be very hard to give up the Internet.”

People who rely more on cellular phones, the Internet and other high-tech gadgets say they like the abundance of information available to them, while those who use traditional technologies, often say they feel overwhelmed with information.[85] This may be attributed to the Elite’s computer savvy, increased comfort level with new media, and their ability to sift through large quantities of information. This familiarity relates directly to digital literacy.

> Internet adoption has increased in all demographic groups, but there are still pronounced gaps in Internet use along several demographic lines. Older Americans are much less wired than younger Americans; minorities are less connected than whites, those with modest amounts of income and education are less wired than those with college educations and household incomes over $75,000, those with jobs are more likely than those without jobs to have access, parents of children under 18 living at home are more likely than non-parents to be online, and rural Americans lag behind suburban and urban Americans in the online population.

Cellular phones and the Internet provide increased but varying social sustainability. The 31 percent of Americans that highly favor technology are differentiated from other

[85] Ibid.

Americans by technology skill level, and socio-economic standing. The greatest determining factor in a person's technology preference is prior experience. Skillful users benefit from the versatility and expanded control over content, which allows them to personalize, develop, store, and distribute simple or complex digital materials. The social benefits of cellular phones include, the ability to exchange instant and time-elapsed voice, text, and image messages, while using a very mobile device. In summary, price and transportability give cellular phones positive social sustainability, powerful versatility and expanded content control, provide generally equitable sustainability equal to the characteristics of Internet devices. For these reasons, both cellular phones and the Internet are being awarded one positive point for social sustainability, as shown in Figure 16.

Figure 16. Current Social Equity: The Internet and Cellular Phones

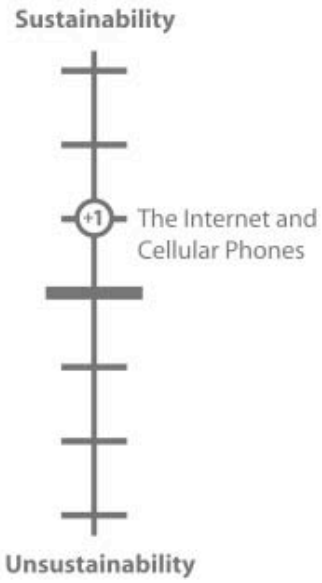
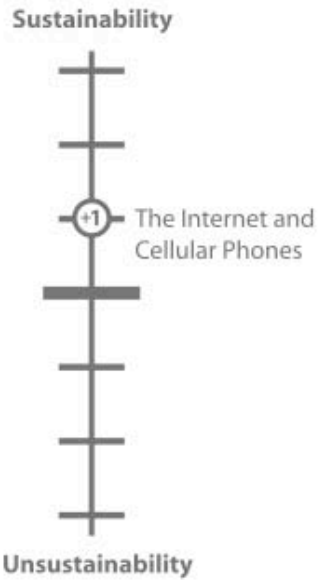


Figure 17. Trends in Social Equity: The Internet and Cellular Phones



Trends in Social Equity of Cellular Phones and the Internet

As the Tech Elites integrate new media products into their daily lives, they become increasingly reliant on cellular and Internet communications for information, shopping, data management, and research. At the same time, the divide between those using new media and those using traditional media remains. In 2003, 24 percent of Americans said [they] have never been online, and don't know many others who use the Internet. This research also showed that older, low-income women were most often excluded from new media.[86] Other than for economic reasons, this group that does not make widespread use of the Internet, may also influenced by their lack of contemporaries with similar interests using the Internet. Older adults that have difficulty finding other users with similar interests or ideas on the Internet are less likely to use new media to connect. They are also less likely to make extensive, repeated the use of the new media product.

Cellular phones and the Internet have similar social education issues that must be addressed for continued sustainable growth. Both technologies need to provide users with increased and increasingly diverse digital experiences. To do so, businesses could partner with schools to provide product and service education that would increase digital literacy and enhance new media equitability. Working with community educational agencies, manufacturers could promote increased understanding among non-users, and provide educational experiences that would support the use and purchase of their products and services. This approach would educate both technology enthusiasts and non-users, and by reaching people in increasingly different walks of life. However, it may prove difficult for businesses and schools involved in digital literacy education to achieve high levels of success because of the rapid and diverse growth

[86] Ibid.

evolution of technology, as well as growing and rapidly changing audience needs. Nevertheless, this provides a key opportunity to build brand recognition and loyalty.

It also appears that ardent young and middle-aged users become increasingly fond of new media devices, while at the same time, loose even more interest in traditional media. As younger and middle-aged new media audiences increase and technology prices fall, trends suggest social sustainability will rise. Because of these factors, both cellular phones and the Internet are awarded one positive point each, as shown in Figure 17.

Current Ecological Responsibility of Cellular Phones and the Internet

As compared to Internet technologies, cellular phones are less ecologically sustainable. Cellular phones have a shorter lifecycle than Internet devices. Consumers in the United States use a cellular phone on average 18 months, and a computer an average of 24 to 36 months before they buy a new one.[87] Cell phone hardware is not commonly, or easily upgradeable to provide increased performance. Yet, Internet-ready personal computers offer upgradeable components and users can do this on their own or return to the retailer for installation. Most computer users can also complete other performance improvements such as software upgrades. Few cellular phone users are even aware of the fact that cellular phone software can be upgraded, and very fewer users can perform this task on their own.

[87] *Ditch That Shabby Two-Year-Old PC*, [Website] (PCWorld.com, 2000, accessed January 17 2004); available from http://pcworld.shopping.yahoo.com/yahoo/article/0,aid,15122,00.asp, Goldberg, (accessed).

The processes of manufacturing cellular phones and Internet products generate hazardous and ecologically unsustainable byproducts. In comparison, is the fact that larger computers are less ecologically harmful than their smaller counterparts. The waste from the production of a laptop computer is roughly twice the weight of the final product while the production of a small handheld device, like a cellular phone, produces waste that is about three times the weight of the final product.[88] Research also shows that the manufacturing process involved in turning raw quartz into a 32MB RAM microchip chip weighing 2 grams requires 1.6k grams of fossil fuel, 72 grams of chemicals, and 32 kilograms of water.[89] Both cellular phones and Internet technologies use microchips. While the production processes used to create these products tends to be inefficient, they must be viewed in light of the benefits gained from using high-tech items, such as cellular phones and Internet devices. These benefits can be very powerful and helpful, outweighing than the total ecological damage of the manufacturing process.

> Technologies available today can save about twice as much electricity as was feasible five year ago, at only a third the real cost. That rate of progress has been consistent for the past fifteen to twenty years. Much of the continued improvement in energy efficiency is due to ever better technologies for wringing more work out of each unit of energy and resources.[90]

This concept is substantiated by Internet hardware, which has become more powerful and useful over time. This is clearly seen with Internet-enabled computers that empower users with incredible information capabilities. The Internet's capabilities to

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[88] Kuhndt.

[89] Jonathan Skillings, *Electronics Makers to Launch Recycling Study* [Website] (ZDNet UK Where Technology Means Business, 2003, accessed Nov 18 2003); available from http://news.zdnet.co.uk/hardware/emergingtech/0,39020357,2089779,00.htm.

[90] Hawken. Page 65.

catalogue, search, reference, share, and manage content, makes it far superior to cellular phones.

Compared to cellular phones, the Internet, with powerful content format flexibility has a much greater ability to move information and in so doing, reduce the amount of traditional print production. The Internet can bypass material demands, expedite distribution, efficiently produce, deliver, and store valuable content to widespread and varied audiences. Ninety-three percent of information generated today is digitally formatted. This suggests that new media provides for increased ecological sustainability. Dematerializing product also enables print-on-demand materials when paper format is preferred, thus increasing information flexibility. Cellular phones do not offer these capabilities at this time to mainstream audiences. For these reasons, cellular phones receive one negative point for ecologic sustainability, while Internet computers receive one positive point. A summary of these findings is illustrated in Figure 18.

Figure 18. Current Ecological Responsibility: The Internet and Cellular Phones

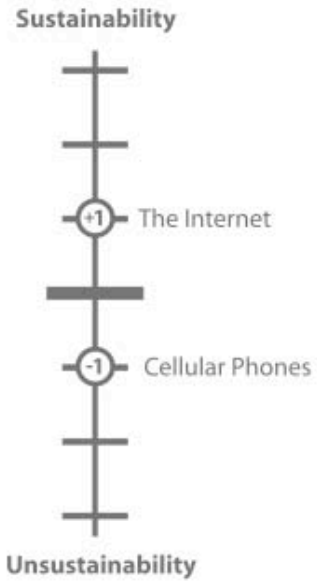
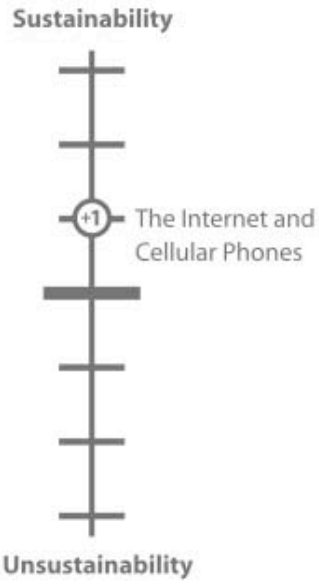


Figure 19. Trends in Ecological Responsibility: The Internet and Cellular Phones



Trends in Ecological Responsibility of Cellular Phones and the Internet

An estimated 250 million unused cell phones that were replaced by new equipment sit idle in America. Even with the sustainability information cell phone manufacturers share online, only one percent of old cell phones are actually reused or recycled, while between 65 and 80 percent of the average cell phone can be recycled. On the other hand, computer manufacturers are taking a greater interest in the proper recycling of their products. The Silicon Valley Toxics Coalition has praised Hewlett-Packard for their computer recycling efforts. Hewlett-Packard, IBM and Dell are a few of the computer manufacturers that offer recycling of their computers and related products. The IBM Asset Recovery Center, located in Edicott, New York, recovered 35 million pounds of computers and computer parts, reported in 1997.[91] Still, sales on new hardware

[91] Ibid. Page 68.

technologies such as smaller and more fashionably styled phones and faster, more powerful computers have a negative impact on the environment. In 1998, six percent of used computers were recycled.[92]

In the future, the ecologic sustainability of cellular phones and the Internet will become increasingly important. In order to serve existing and growing new media customers in a way that supports sustainability, changes in new media products, services, and altered business practices will be required. Sales agencies could incorporate sustainable incentives with new product purchases. Cellular phone or computer sellers could include a discount incentive to purchasers who bring in a used phone or computer with their purchase. Increased use of Internet computer rentals may also support further sustainability along with providing systems that have particular characteristics that best fit user needs, and provide for immediate replacement of malfunctioning systems. Innovative manufacturing approaches using renewable resources could also provide for enhanced sustainability. Advances in the use of natural, renewable resource, and energy source, will help. One such example is the use of sugar. Although sugar will not power a computer in the near future, it could power a cellular phone, leveraging its small size for ecological sustainability.

Another major cellular phone and Internet technology issue is that of growing in a way which ecologically sustains new and emerging markets. In 2003, an estimated 4 billion people are without access to personal new media. Companies such as HP see philanthropic, branding, innovation, and revenue opportunities as they begin to serve these customers. Through their installation of technology kiosks in these communities,

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[92] *Silicon Valley Toxics Coalition*, [Website] (accessed Jan 29 2004); available from http://www.ecomall.com/greenshopping/computer.htm.

Hewlett-Packard is learning how to effectively supply fewer products while providing increased services to consumers who limited funds to spend on technology. These companies could also tie recycling incentives to purchasing actions and field viable recycling centers to further lighten the ecological impact of increased new media penetration.

In summary, new media manufacturers' increasing commitment to sustainability will likely alter the future of cellular and Internet sales and services by making current marketing models that are based on perpetuating hardware consumption obsolete. Opening new opportunities to increase sustainability by such techniques as service solutions and product rental will be advantageous to future sustainability of Internet devices. Cellular phone companies also have great sustainable opportunities to recycle used phones and couple their product purchases with consumer incentives by offering upgradeable hardware and software options. Because of these future opportunities for continued sustainable ecologic growth both products are each awarded one positive point, shown in Figure 19.

Figures 20 and 21 summarize the aggregate scores of cellular phones and the Internet, and plot the position of each on the scenario model. With the Internet currently operating at two and one-half, it is highly effective as a new media and only somewhat sustainable. While cellular phones, at two operate effectively as a new media, yet they are somewhat unsustainable. In the future, both media are likely to merge toward the same position as highly sustainable, while increasing their ability to operate as highly effective new media.

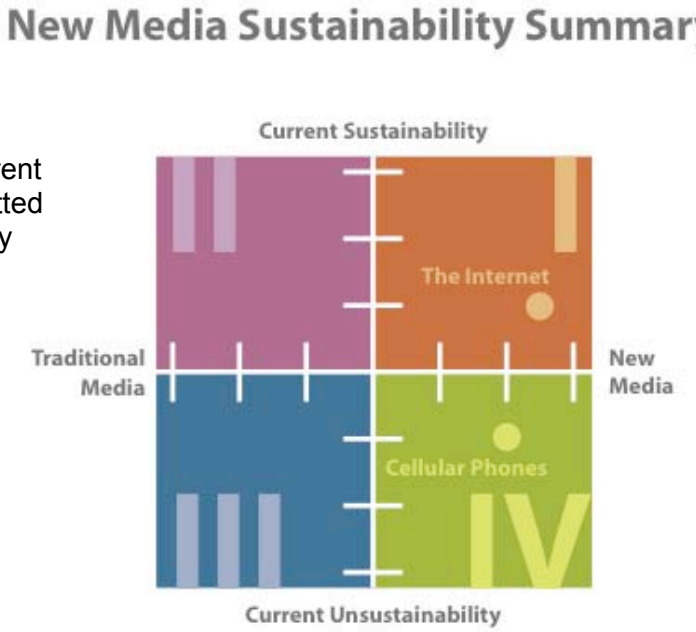


Figure 20. Current New Media Plotted for Sustainability Summary

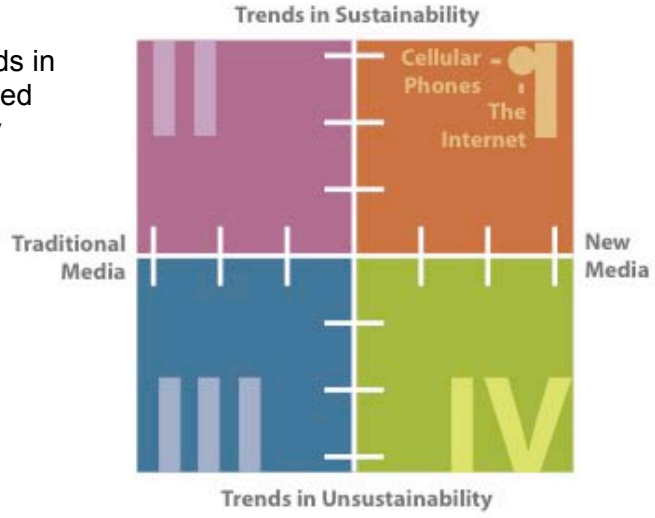


Figure 21. Trends in New Media Plotted for Sustainability Summary

Traditional Media Comparisons Using the Scenario Model

Traditional media vary in the degree to which they operate. Using a five-point scale, the x-axis depicts traditional media to the left of the mid-point, and new media to the right. On this axis, one-half of a negative point is awarded to the technology based on the degree to which it operates as a traditional based on five criteria. Although the degree to which newspapers and television perform as traditional media is measured with a negative degree, this only identifies a location on the scenario model; it does not suggest the media is inherently bad. The answers to the five questions outlined in the discussion of new media objects also suit and appropriately measure traditional media, allowing us to estimate and compare the changes that are taking place with regard to newspapers and television. These questions that measure how traditional media operate include:

- Is the final product of the media numerically representable?
- Is it modular?
- Can it be automated?
- Is it flexible in format?
- Does it easily translate from one format to other format?[93]

Current Comparative Analysis of Sustainable

and Unsustainable Traditional Media

Newspapers function as a traditional media. The line between traditional and new media for television is blurred, particularly as we move into the future. Both newspapers and television have a history of evolutionary phases in technology development, which

[93] Manovich, *The Language of New Media*. Pages 27-49.

encompass printed illustrations, one-color, and four-color printing and photography. Television has evolved, from black and white video, to color, onto enhanced color, efficiencies in product energy, and picture size variety. Newspapers have not always smoothly moved from one format to another. They do not have a flexible or modular format nor are they automateable. However, like television programming, portions of the newspaper production process have evolved to incorporate the use of new media objects. For example, computers are often used to research, write material, design paper layout, and make printing plates. However, the final newspaper product is still delivered on printed-paper, giving users virtually no format modularity, automatability, flexibility, or translateability. This situation produces an aggregate score of two and one half, in terms of its performance as a traditional media, the highest traditional media rating.

The categorization of television has become increasingly unclear and difficult to determine, Many of the aspects of the production of television programming rely heavy on new media objects, like the use of computers for research, writing, content distribution, filming, special effects and editing. Unlike newspapers the television programming delivery format is being dramatically changed. The FCC ruling mandated programming and television sets be fully digital by 2006, has blurred and intertwined the traditional and new media formats. Broadcasts on many major United States stations are already being converted to digital format, thus opening the industry to new media possibilities, with potential for content modularity, automation, format flexibility, and file translatability for viewers and content producers. These characteristics of digital television fulfill new media characteristics. Based on these characteristics, television is awarded two negative half points, for a total of one negative point, which positions it currently as a traditional media object, as shown in Figure 22. Once fully digital,

television will qualify as a new media. This future change will move television from a traditional media to a fully functioning new media, as shown in Figure 23.

Figure 22. Current Media: Newspapers and Television

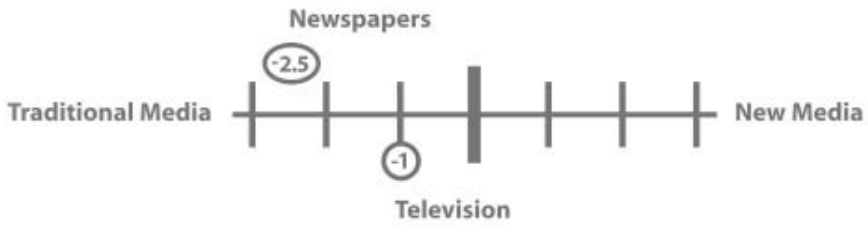
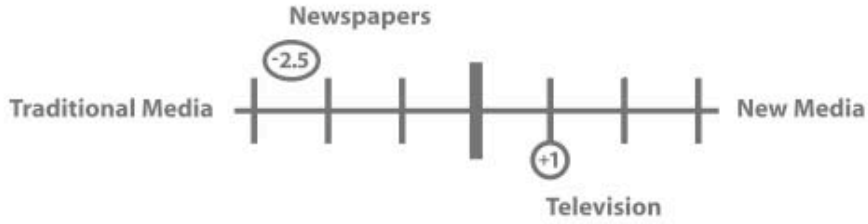


Figure 23. Media Trends: Newspapers and Television



Trends in Comparative Analysis of Sustainable and Unsustainable Traditional Media

Today, newspaper does not have capabilities of digital representation, content modularity, automateability, flexible formatting, or easy file translation. Yet, television, with common, and easy to use devices to augment it, offers some content modularity, format flexibility and file translation. Trends in traditional media suggest newspaper, in a final printed format, which lacks capabilities of new media, has a questionable future, whereas television has a more hopeful future. Television, as it transitions to digital

transmission, will increasingly operate as a new media object, if allow to do so by government mandates and industry standards.

Trends in traditional media will also increase the blurring between both new and traditional media. Individually, both media types can benefit from partnership together in order to strengthen businesses by creating a sum greater than their whole. In a printed format, the future profitability of newspaper is uncertain, unless it is clearly joined with new media to boost efficiencies and opportunities for growth and service in the future. Newspaper has begun to do this by duplicating print articles on websites, but it has not fully explored and exercised opportunities for impact and growth unique to new and traditional media partnerships. Television, as it converts to digital transmission, will broaden its current traditional media beginnings, with a more robust service oriented system and significantly increased opportunities for business growth. For example, television with digital capabilities will offer users and broadcasters the ability to push and pull content, with deeper, more accurate understanding of viewer preferences. For these reasons, Television, currently a traditional media, is awarded two half points for a total of one positive point for its future ability to transition, and operate as a new media, while newspaper, remains in its current position, at negative two and one half points, as shown in Figure 23.

Current Economic Viability of Newspapers and Television

At the apex, during World War II, newspaper circulation archived 78 percent market penetration, with many families purchasing more than one daily newspaper. Since World War II, newspaper circulation has steadily declined, causing many publishers to fight to hold their audience. Neilson Ratings, and Pew Internet and American Life

Project researchers all suggest traditional television is also losing its audience foothold. The Pew Project research on United States technology users found that 52 percent of the surveyed group felt it would be easy to do without a television. Eighty-one percent of the same group said it would be easy to do without newspapers.[94] These numbers suggest, audiences' are seeking and using information sources other than television and newspaper to get their daily information.

Newspapers and television are combating decreasing audiences in similar ways. Both are increasing their social, political, and financial influence through business conglomerations where a few large corporations own many stations and newspapers. Former exclusively hometown newspapers and television stations are now largely owned by outside companies. These conglomerates own local newspaper publishers and broadcast stations, and also control the content that flows through them. Many fear that lax media ownership laws have increased the risk of media serving themselves rather than the public. For example, conglomerates owning multiple local newspapers and broadcast stations as an efficiency measure distribute economically produced one-size-fits-all stories to all of their facilities. This gives them the opportunity to cut costs and maximize the value of an individual story by distributing it as broadly as possible, while using the same general interest information in several papers or at several different broadcast stations. Although this conglomerate practice is economically viable and while some less profitable publications and stations are kept in business, content suffers, because it is less local and more generalized.

[94] *Pew Internet and American Life Project*.

Compared with newspapers, television and its accompanying services and hardware, has a more hopeful economic future. Businesses based on augmenting television services and hardware show continued growth and audience interest, with customizable and augmented television viewing experiences increasing. Sixty-seven percent of television households in the U.S. have cable services, while another 18 percent have satellite services. Many more homes also have VCRs, DVRs and or other systems and devices to customize their television viewing. Because of newspaper's low and undiversified audience interest, and its nearly complete inability to offer customizable product options, it is awarded one negative point for their lack of economic sustainability. Television, with financial strength gained through its networks, products that leverage opportunities for personalization, content flexibility, and more diverse audience interest, is awarded one positive point for economic sustainability. These results are shown in Figure 24.

Figure 24. Current Economic Viability: Newspapers and Television

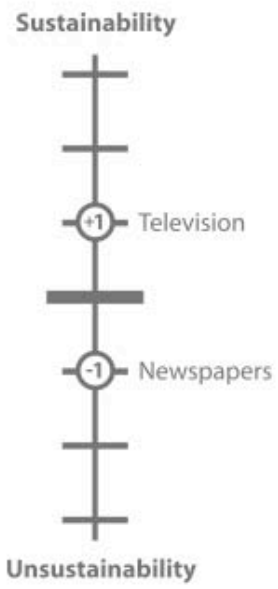
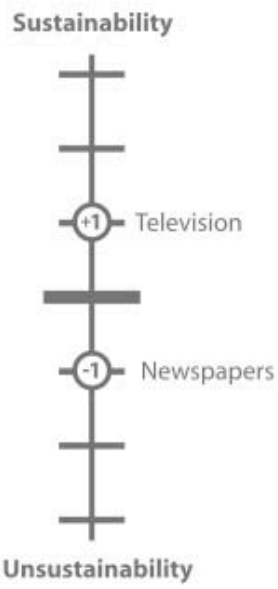


Figure 25. Trends in Economic Viability: Newspapers and Television



Trends in Economic Viability of Newspapers and Television

Today the economic sustainability of both traditional newspapers and television rely greatly on the financial, social, and political power of conglomeration. This trend continues to increase as these businesses face serious competition. Both newspapers and television will and have already used conglomerate power to influence political issues in their favor. For example, during the summer of 2003, the FCC ruled to further deregulate newspaper and television ownership. This decision permitted a company to own up to three television stations, eight radio stations, a daily newspaper and a cable service in the largest cities. It also permitted television networks to buy more stations in cities where they already owned a station.[95] Blended newspaper and television

[95] Stephen Labaton, *FCC Prepares to Loosen Rules on Media Ownership* [Newspaper article] (May 13, 2003, accessed May 13, 2003.); available from

ownership increases the likelihood of greater profitability through generalized and unspecialized news content. The television conversion from analog to digital mandated by the FCC requires audiences to purchase digitally capable televisions to fully access new services and viewing capabilities. This transition will generate financial strength in future years for television manufacturers and peripheral businesses that are prepared for these changes. However, conglomerates jeopardize reporting integrity and objectively, and in so doing can cause the loss of public interest. Newspaper and television stations using volume one-size-fits-all news coverage will likely increase and with it, local communities will suffer as local event coverage is minimized.

In summary, at the cost of social equity, it is likely that conglomerate newspapers and television will survive for several more years. The future economic sustainability of printed newspaper is awarded one negative point because of is limited audience base and inability to generate new audience interest. Television has a brighter future than newspaper. It has a decreasing yet diverse audience base, is undergoing a significant change from analog to digital, and has flexible hardware that uses supplemental devices for increased personalization and customization. For these reasons, the economic sustainability of television is awarded one positive point. Both outcomes are shown in Figure 25.

Current Social Equity of Newspapers and Television

Both newspaper and television are widely available. Ninety-eight percent of U.S. homes own at least one television. Television's long lifecycle, averaging seven to nine years,

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http://www.nytimes.com/2003/05/13/business/media/13FCC.html?ex=1054008000&en=33be6f1842d052aa&ei=5070.

and the affordable purchase prices contribute to this high ownership. Newspapers are socially sustainable even though they have a short, one-day lifecycle. They are affordably priced, and easily available by home delivery, grocery stores, gas stations, and other retail outlets. Both of these traditional media offer focused information, with clearly sectioned topics and pages or channels to change. For the most part they are easily understood by a wide audience and are socially sustainable. Yet, while affordably priced, accessible, and understandable, statistics show the mediums' ability to reach mass audiences has decreased. The popularity of newspapers and television seem to be loosing ground against new media technologies. The social aspects of how these media operate in the United States are also changing. Newspaper audiences are now generally limited to aging, upper-class, well educated and financially secure individuals. Television, which once had a strong draw for men ages 18 to 35, has experienced falling success with that audience and with their audiences in general. Still, television seems to hold significantly larger audience interest and audience attachment than newspapers.

Competition with new media has impacted television in a somewhat lesser degree than newspapers. With a long lifespan and reasonable price points, television is socially sustainable and affordable for most Americans. American audiences are committed to television as a source of information and entertainment, spending on average 4 hours watching television daily. They are far less committed, or interested in reading newspapers. Television provides an excellent means to broadly disseminate international, national, and local content quickly. Newspapers are less agile, because their production and distribution processes require more time to respond to breaking news and distribute it to broad audiences. Newspapers do store content, while television on its own is incapable of storing data. However, since television is affordable

and capable of distributing varied, efficient content to interested and diverse audiences, with clarity, its social sustainability is high. Television is therefore awarded one positive point on the sustainable, vertical axis for social equity. Although affordable, easy to understand and accessible, newspapers are less able to engage diverse audiences and provide news. Therefore newspapers are awarded one negative point for its ability to perform as a socially sustainable media. These outcomes are shown in, shown in Figure 26.

Figure 26. Current Social Equity: Newspapers and Television

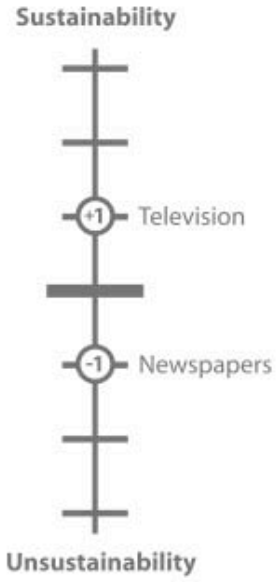
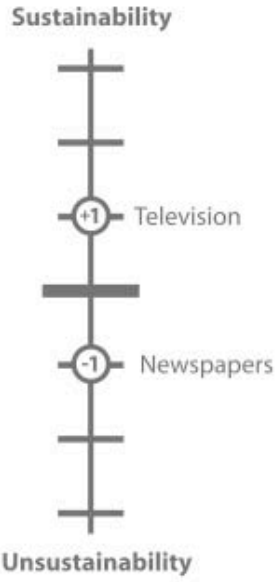


Figure 27. Trends in Social Equity: Newspapers and Television



Trends in Social Equity of Newspapers and Television

Future social sustainability of newspapers and television is uncertain. Newspapers will likely have to differentiate their product from competitors to gain a new niche, assimilate themselves into the high-tech information society, or do a combination of these to increase readership and thereby their viability. Television is making a major

commitment to digitization, which will completely revise and renovate the services they provide their audiences, while more ably providing for their audience, and anticipating its own growing technological needs. Newspapers have made some effort to become digitally integrated by placing printed news content to websites under the same name. However, most printed newspapers with a web presence have not maximized the economic potential or leveraged the benefits of partnering their printed media with other Internet sources and techniques to create more valuable products. Instead, they tend to treat their online presences as a twin extension of their paper based pages, while largely ignoring aspects that would immediately increase the content value. Such aspects include providing story summaries, and abstracts, including topic specialized sources for more in-depth articles, and increased services for regular newspaper-purchasing consumers.

The manner in which individuals' interface with their television set or newspaper can enrich or complicate their lives. As more information becomes available to newspaper and television audiences, media literacy (the ability to discern the accuracy of information) and digital literacy (the basic skills and knowledge needed to effectively use digital systems), will continue to play important roles. Digital television programming will deliver thousands of programming options to consumers. This versatility will increase storage and search capabilities, and offer the potential for better program diversity. In comparison to newspapers, digital television also has an excellent potential to provide for increased social capital. By focusing on local happenings, and by building community interaction, social capital can increase community productivity, social responsibility, and encourage and build outward looking groups, rather than inward, self-serving groups. Social capital can also be built by television station and networks

that conduct programming to rejuvenate community interaction, promote community education, build awareness of events, and people of local importance.

In summary, with the opportunity for increased social capital, better customer service, and increased programming diversity, digital television, is awarded one positive point for future social sustainability. Newspapers have a less promising future. Lagging audience interest, restricted audiences, and an underutilized partnership with the Internet and new media, printed newspapers are in jeopardy of being replaced by more effective media information sources. The continuing trend toward decreased social sustainability results in newspapers being awarded one negative point for social sustainability. These results are shown in Figure 27.

Current Ecological Responsibility of Newspapers and Television

The ecological sustainability of newspapers is greater than that of television. With U.S. newspaper demands controlling 34 percent of the paper industry, they play a significant role in the consumption of paper in the United States. Although newspapers are one of the largest paper consumers in the U.S., 1999 statistics show, that, 69 percent, or more than 9 of 13 million tons of newspapers were recycled. In comparison to the recycling of televisions, the Internet, and cellular phone equipment, these efforts are impressive. Newspaper recycling is a more mature and well-understood practice, often encouraged by municipalities who provide weekly neighborhood pickups. The paper industry has also been a committed supporter of paper recycling, as it has it has realized its profitability, and energy saving benefits. Television and related manufacturers appear less interested in exploring the benefits of recycling. The complexity of their recycling, the newness of the concept, and the enormous commitment it takes to increase

ecological sustainability, appears to have caused television manufacturers and resellers to avoid recycling initiatives.

Newspaper recycling is completed with relative ease and at low or no cost to the purchaser who usually can have them picked up on a weekly basis. The average television costs five to fifteen dollars to recycle, and usually requires it be transported at owner expense, to a recycling center. Although municipalities occasionally offer special citywide recycling pick-ups for technology products at no cost, these municipal programs help cut down on improper television disposal, and their associated hazards of leaking toxic materials into dumpsites. Devices used to augment television viewing pose ecological risks similar to those of television sets, while some technologies are less ecologically damaging than others. For example, cable television services require the installation of plastic covered cabling inside and outside the house, but homeowners can usually reuse the cabling when services or capabilities are changed. Users also rent converter equipment that is reused by the vendor when they service is terminated. While these practices are is highly sustainable, newspapers remain more ecologically sustainable because they are a contained product – operating without any devices or augmentations needed to use the product. Newspapers, although often unsightly and wasteful if disposed of improperly, are less hazardous to the environment.

The lifespan of a newspaper is dramatically different from that of a television. A newspaper is normally purchased, read, and disposed of within the same day. However, the life span of a television, which averages from, seven to ten years, greatly increases its ecological sustainability. Because of their significant lifespan, televisions postpone entering the disposal or recycling phase, and thus decrease manufacturing demands on natural resources. This is the most valuable ecological aspect of television.

With all factors considered, newspapers currently perform at a significantly more ecologically sustainable level than televisions. Newspapers have the benefit of being produced in a mature industry, out of an efficient material, and in an overall environment that supports high commitment to ecological sustainability. For these reasons, newspapers are awarded one positive point for ecological sustainability. Television sets, have many ecological weaknesses, their greatest strength is that they have an extended lifespan. Recycling televisions and related products remain complicated. An environment supportive of recycling does not exist, and manufacturers at best have been lukewarm to recycling. Therefore, television is awarded one negative point, as shown in Figure 28.

Figure 28. Current Ecological Responsibility: Newspapers and Television

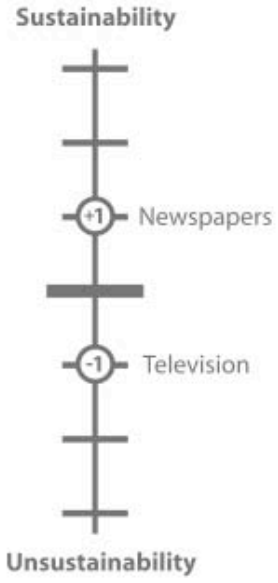
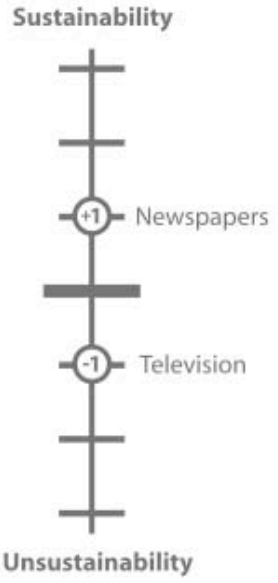


Figure 29. Trends in Ecological Responsibility: Newspapers and Television



Trends in Ecological Responsibility of Newspapers and Television

In the future, ecological manufacturing will likely continue to increase newspaper profitability. Newsprint containing recycled-content is cheaper to manufacture than virgin paper because the production process uses less energy, less water, and fewer chemicals. Television manufacturers have a more complicated ecological challenge, as they have not created any opportunity for increased profits through recycling. Flat paneled television models, which are increasingly popular, will likely replace a major amount of equipment before the end of its normal lifecycle. In December 2003, at the Consumer Electronics Show, Sony, Sharp, and Samsung all displayed new lines of portable, wireless televisions. These battery-powered, flat-panel models communicate wirelessly with a base station and enable users to freely transport the device. While these advancements will likely increase the social sustainability of television, they may also decrease product ecological sustainability. Wuppertal Research Institute shows that as the size of technology products go down, the efficiency of the manufacturing process also decreases, while increasing the amount of waste and hazardous byproducts. At the same time, increased energy saving designs offer potential for more ecologically sustainable televisions. Alternative materials and manufacturing processes hold potential to produce more ecological sets. For example, Sony is modifying the flame-retardants included in their television systems, DVD players, laptops and monitors by using new glass epoxy, multi-layered wiring boards, and alternative flame-retardants based on phosphorus and nitrogen compounds because of their ecological sustainability.[96] Furthermore, the collateral products for television, which personalize and augment program-viewing experiences, are increasingly ecologically sustainable. An example is seen in Disney's MovieBeam system that allows viewers to order movies

[96] *Sony Environment*, [Website] (2004, accessed Feb 1 2004); available from http://www.sony.co.uk/aboutSony/environment.asp.

through a television system without leaving their home, thus reducing the demand for hardcopy movies. The transmitting device used for this service is provided through equipment that comes at no cost and is returned when you cancel your service.
The FCC's directive to move to digital television transmission by 2006 signals a likely need for the disposal of large quantities of analog television sets and equipment. Estimates suggest there are 265 million analog television sets in the United States alone.[97] Ecologically, this becomes a crucial time, as the country must determine the laws, rulings, and regulations that govern the conversion. Two major environmental challenges are created as a result of this change. First, is the overall conversion process, and second, the education of viewers on using the systems in a sustainable manner. Newspapers must also continue their efforts to educate consumers on the importance of recycling newspaper, to keep recycling services convenient, and to provide incentives for continued corporate and consumer recycling. Presently, there are virtually no incentives for television users to viewers to recycle or properly dispose of old sets. The price difference between a digital converter box and a brand new digital television set (100 dollars) is most likely not enough to cause most consumers to stay with their old set and a converter, rather than buy a new set. Reducing the cost of converter boxes could possibly lighten the ecological impact of this conversion, and manufacturers or resellers who provide an incentive to recycle old systems when purchasing a new television might be also exert a more favorable ecological impact.

In summary, the implementation of universal digital broadcasting will influence the sustainability of television set manufacturing, content broadcasting, and the experience of individual home users. Trends in newspaper suggest a more certain, and ecologically sustainable future of continued recycling. For this reason, newspapers are awarded one

[97] Ahrens.

positive point. Digital televisions will generate new income for manufacturers, new possibilities for broadcasters and audiences, and new ecological issues. This growth presently shows no sign of government, manufacturer, or reseller plans for ecological ways to convert. Thus, television is awarded one negative point. These findings are shown in Figure 29. Currently, television operates as a traditional media, but is bordering on a transition to new media, while newspapers operate as a highly traditional media, and will likely continue as such. When considering all three aspects of sustainability, television is slightly more sustainable while newspapers are slightly more unsustainable. Both the current and the potential future state of these two traditional media are plotted in Figures 30 and 31.

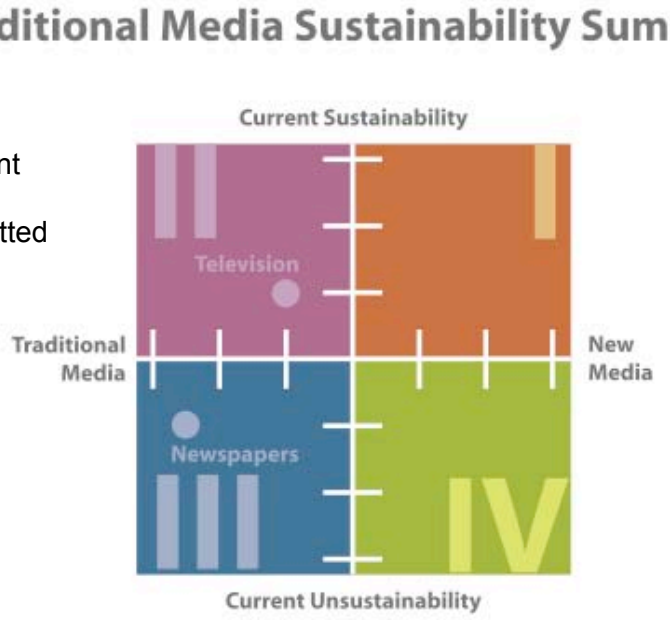


Figure 30. Current Traditional Media Sustainability Plotted for Sustainability Summary

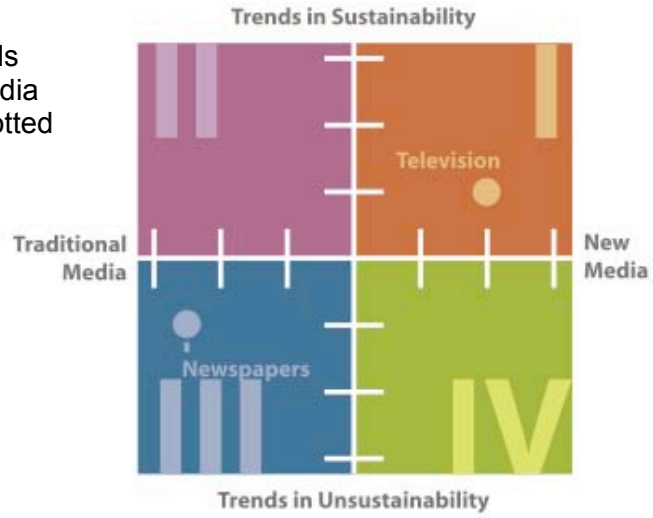


Figure 31. Trends In Traditional Media Sustainability Plotted for Sustainability Summary

Final Conclusions

With an awareness of sustainable and unsustainable aspects of traditional and new media, design professionals have the basic information needed to make more economically, socially, and ecologically sustainable choices. Sustainable instruments,

such as the mock-up of an Internet tool, developed in conjunction with this thesis research, serve to underscore the concept that sustainability is more about guidelines and helping people make the best sustainable choices in a given situation. Sustainability does not need to be a matter of hammering audiences and manufacturers with defined rules, or strict, one-sided regulations.

Designers implementing sustainable philosophies throughout the production, packaging, delivery, and end-of-life disposal of media products have the responsibility to communicate and execute the client's desired message in the final product. However, they also have an opportunity to convey a sustainable message in the approach and process they implement while working toward the client's goal. An example can be seen in the process of choosing new or traditional media to communicate a client's message. Here the designer should take a comprehensive perspective that assesses and provides for a balance of economic, social and ecological goals of the project. Designers can then encourage support for sustainability in the conceptual, production, storage, distribution, and disposal phases of their designs. In doing so, they will foster sustainable concepts for people in all walks of life, while perpetuating the advancement of sustainable information. And in the end, the influence of sustainability is most valuable when people can wisely evaluate situations and then accurately apply a well-balanced approach. With world population moving toward an estimated 7.2 million people by the year 2050, a widespread commitment to encouraging a greater understanding of sustainable consumption will become increasingly essential.[98]

[98] *Department of Economic and Social Affairs: Population Division*, (accessed).

Thus, with a desire to share sustainable concepts with professional digital and graphic designers, this Internet-ready educational tool begins the educational process of using a scenario model to assist in sustainable decision-making. It provides a quiz to help users understand their own sustainability, facts about current technologies, and use a common vocabulary to help facilitate discussions. With information and guidelines available through this Internet-accessible digital tool, mainstream digital and graphic designers will have a valuable way to assess sustainability information, practices, policies, and procedures.

Designers and businesses considering the long-term benefits of implementing and using sustainability concepts now have the opportunity to be in the forefront of cyclic consumption, making products that can be easily updated, recycled or remade into other useful products. They have the necessary information that enables them to take a leadership role and establish themselves as industry experts. Sustainability must also support and contribute to the successful stabilization of the economy. This can be achieved though prudent efficient design and by educating and supporting customers who are interested in the future, profitable businesses, ecology, and the welfare of all. Researchers such as the authors of Old Media New Media indicate that new and traditional media as a whole involve minimal sustainability issues when compared with less sustainable industries such as automobile manufacturers. Still, there are areas in which both traditional and new media under-use sustainable methods. If implemented into the industry these methods could be more ecologically and socially sustainable, while also increase economic profitability.

Current and future traditional and new media positions for all four technologies are summarized together in Figures 32 and 33. This provides one more opportunity to take

a broad look at how each of the new and traditional media operates today, while noting potential future transitions. As previously discussed, notable points of interest occur in each quadrant. And, by applying a scenario model to this research, sustainable opportunities for traditional media technologies become more apparent.

Users with a commitment to sustainability can make educated sustainability decisions about the new media products they purchase and use. Users who are uncertain about sustainability can browse through the scenario model website tool, or through the written material and determine how their traditional and new media technology decisions impact the economic, social, and ecological aspects of their world. Each user's unique needs can be addressed to varying degrees. With the sustainable strengths and weakness of these four media products now outlined, audiences can more accurately respond to their desires and needs for the future.

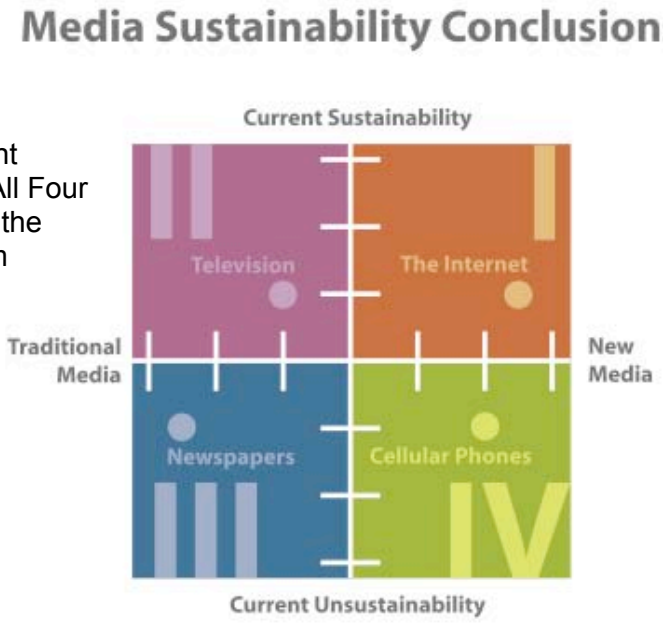


Figure 32. Current Sustainability of All Four Media Plotted on the Scenario Diagram

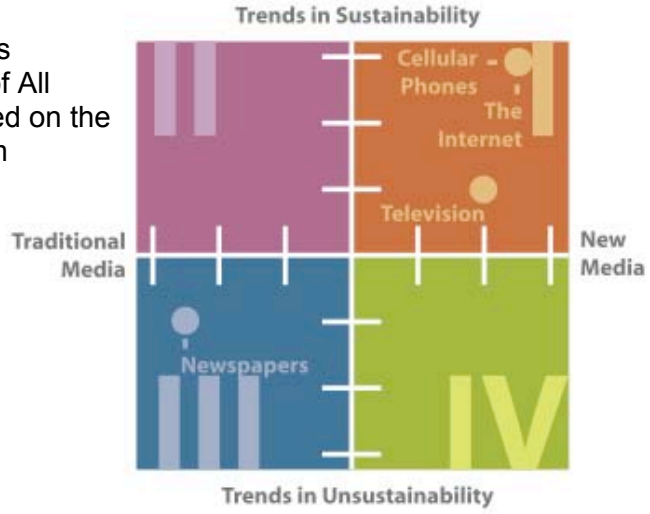


Figure 33. Trends in Sustainability of All Four Media Plotted on the Scenario Diagram

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