

Changing Patterns of Media Adoption

John Carey
Gabelli School of Business
Fordham University
New York City, USA

Introduction

The principles underlying new media adoption have been researched thoroughly (Carey and Elton, 2010; deSola Pool 1983; Gladwell, 2002; Katz, 2006; Marvin, 1999; and Rogers, 1995). Important factors include price, characteristics of early and later adopters, replacement cycles for existing technologies, external and internal influences of adoption and critical mass, among other factors. These principles emerged from research about the introduction of the telephone, radio, television, fax machines, VCRs, DVDs, personal computers, cell phones, among other 19th and 20th century technologies.

In the new 21st century era of digital technologies, have some or all of these principles changed? This paper addresses the issue, in a U.S. context, and utilizes research about new media conducted by the author over the last decade as well as related academic and commercial research. It demonstrates that some principles of adoption have remained the same, e.g., successes are inevitably mixed with failures and false starts, while other principles have changed, e.g., the characteristics of early adopters.

The paper concludes with a discussion of why some principles have changed and others have not, and an agenda of research questions to be addressed.

Generally Accepted Principles on the Adoption of New Media

How do new media devices and services make their way into the hands of users? Several relevant factors are discussed here (for a more comprehensive treatment, see Carey and Elton, 2010)

External and Internal Influences, Critical Mass and Categories of Adopters

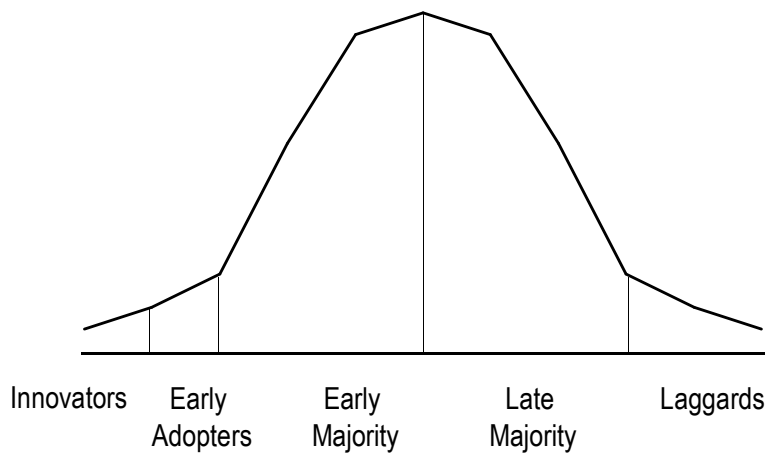
Everett Rogers was a pioneer in the study of the diffusion of innovations. In his research (1995), he points out that exposure to information about a new technology or other innovation can be direct or indirect. People can learn about it from mass media such as advertising (external influence) or by word of mouth (internal influence). Generally, both of these are present but advertising is typically a stronger force early in the rollout of a new technology, when few people own it, and word of mouth is typically stronger later when more people are likely to own it. Further, some products generate a lot of word of mouth, positive (e.g., the DVD) or negative (e.g., boomboxes), while other products sneak under the radar. This can affect the relative impact of advertising and word of mouth.

The concept of critical mass is very important in Rogers' framework. When adoption reaches critical mass, additional promotion becomes unnecessary because diffusion is propelled by the innovation's own social momentum. Many variations on this concept have emerged in the academic and popular business literature, for example take-off point, tipping point and inflection point. Clearly, attaining critical mass is a major goal of those who introduce a new technology.

For Rogers, early users and later users are often quite different, but how many categories of adopters are necessary to capture a complete picture? Figure 1 presents his model of

adopters at different stages in the process.

Fig. 1. Rogers' Categorization of Adopters



Source: Rogers

In Rogers' framework, “Innovators” are often people who are willing to take risks and accept uncertainty. They often act as gatekeepers for those who will adopt later but who are not part of the innovator group. “Early Adopters” are respected opinion leaders who give advice to others in their peer and near-peer network of contacts. They are not as daring as “Innovators” but are willing to try new products before they are widely accepted. The “Early Majority” is a large group. Those in it are deliberative, not likely to be opinion leaders and often, after waiting a while, follow the advice of early adopters. The “Late Majority” is a generally cautious group who require that the uncertainties associated with new technologies or other innovations are substantially reduced before they adopt them. “Laggards” as a group have traditional values and are reluctant to change. They take a long time to adopt new technology, if at all.

Important to the discussion here, Innovators and Early Adopters in the 20th century

were more likely to be male, had significant disposable income and were middle aged. Many had an insatiable desire for the product or loved electronic gadgets and were willing to pay a high price in order to be one of the first to own "the latest." Besides individual consumers, many of the early purchasers were businesses or schools that had a need for the product and the budget to pay for it.

Price Trends: Media Products and Services

The price of consumer electronic products has played an important role in their rate of adoption by the public and in determining the overall size of their market. Historically, new media technologies have been introduced at a high price, which declines over time. Early manufacturing of such a product is generally expensive, largely because it cannot realize the economies of scale that are possible in mass production, and demand is often unknown, which can lead companies to try to maximize revenue from the first group of purchasers who are often willing to pay a high price in order to be among the first to get it.

Table 1. shows the average prices of six media devices when they were first introduced in the U.S. (or, in the case of radios, near the point of introduction) and how the price changed over time (all are the current dollars of the day). In each case, there was a sharp decline over time.

Table 1. Average Price of Selected Electronic Products (USA, Current Dollars)

| Year | Radio Set | B&W TV | Color TV | VCR | CD | DVD |
|------|-----------|--------|----------|----------|--------|--------|
| 1925 | \$ 83 | | | | | |
| 1930 | 78 | | | | | |
| 1935 | 55 | | | | | |
| 1940 | 38 | | | | | |
| 1945 | 40 | | | | | |
| 1947 | | \$ 279 | | | | |
| 1950 | | 190 | | | | |
| 1955 | | 138 | \$ 500 | | | |
| 1960 | | 132 | 392 | | | |
| 1965 | | | 356 | | | |
| 1970 | | | 317 | | | |
| 1975 | | | 341 | \$ 1,140 | | |
| 1980 | | | | 1,122 | | |
| 1983 | | | | 572 | \$ 733 | |
| 1985 | | | | 494 | 310 | |
| 1989 | | | | 382 | 218 | |
| 1993 | | | | | 180 | |
| 1997 | | | | | | \$ 760 |
| 1999 | | | | | | 360 |
| 2001 | | | | | | 210 |
| 2003 | | | | | | 145 |

Sources: Sterling and Haight; U.S. Department of Commerce; Electronic Industry Association cited in The Wall Street Journal

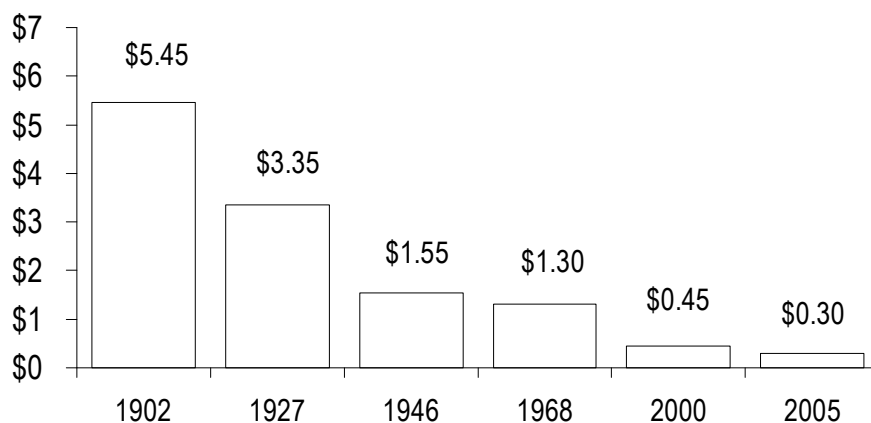
It is revealing to translate these actual price figures into a common element that spans time, for example, how many weeks of income were required to purchase the technology? Black and white TV, color TV and VCR entered the market at a cost of approximately six weeks income for an average U.S. household. When radio, black and white TV and color TV were entering half of U.S. households, they cost 1.8 or 1.9 weeks of household income. HDTV followed a similar pattern. CD and DVD players were introduced at lower costs in terms of household income (1.8 and 0.8 weeks of household income, respectively) and declined to much lower costs (0.2 and 0.1 weeks of household

income, respectively) at the point when they entered half of U.S. households.

In the case of CD and DVD players, they offered simple enhancements to competitive predecessors (audio cassettes and VCRs) which were in the marketplace for some time and had already reduced their prices. This put considerable price pressure on manufacturers of CD and DVD players.

The price of media services often drops over time, but the pattern is not as strong as in the case of media products. Telephone service provides a good example of price decline over time. The adoption of telephone service in households was linked to reductions in the cost of both basic service and long distance calls. Figure 2 shows the decline in cost of long distance service. At the beginning of the 20th century, a three-minute long distance call from New York to Chicago cost a week's wages for many U.S. households.

**Fig. 2. Pricing of Telephone Service
New York to Chicago - 3 Minute Call
(Current Dollars)**



Source: Historical Statistics of the U.S.; FCC

However, the cost of cable TV service, satellite service and satellite radio did not decline. The key variable distinguishing between the two groups is content. Where there is no content or the service provider does not have to pay for content (as when users create it), it has been possible to bring down the cost of the service. When the service provides and pays for content, the costs of talent and production increase over time. Many other factors such as regulations and competition can affect the price of a service.

Piggybacking on Replacement Cycles

Sometimes the adoption of one technology or service is linked to the purchase of another. For example, while few people in the 1980s bought a TV set or a VCR just to obtain a remote control device or stereo sound, many consumers chose these features as options when they purchased a new VCR or replaced an old TV set. Thus, replacement cycles for existing technologies (as seen in Table 2.) may provide an important opportunity to introduce new technologies. The more rapid rate of replacement for some technologies such as mobile phones has provided an opportunity for providers of new hardware and services to introduce their technologies at a more rapid pace. This is a conservative model of adoption in which new technologies piggyback on replacement cycles.

This pattern of adoption is sometimes called a Trojan Horse strategy. That is, if one technology can make its way into homes, it can open up the gates for others to follow, often building upon the first technology.

Table 2. Replacement Cycles For Electronic Products

| Product | Average Life (Years) |
|-----------------------------|-------------------------|
| Cordless Telephone | 8 |
| Color TV | 8 |
| CD Player | 6 |
| Telephone Answering Machine | 6 |
| VCR | 5 |
| Camcorder | 5 |
| Fax | 4 |
| Personal Computers | 3 |
| Mobile Phones | 2 |

Sources: Appliance; US Department of Commerce

False Starts.

Some successful new services or technologies suffer from false starts and languish for a long time with limited growth. For example, television in the U.S. was launched as a commercial service in the late 1930s, but the high price of TV sets (\$600) and the disruption caused by World War II led to a suspension of most service. The technology was reintroduced after World War II and grew rapidly. Similarly, two home video recording technologies were launched and then withdrawn in the early 1970s (the EVR system by CBS and Avco's Cartrivision system) before the modern VCR finally took hold in the mid-1970s. Fax technology wins the prize for false starts. It was invented in the 1840s and tested in the 1860s with no significant adoption, reintroduced unsuccessfully in the 1930s and the 1950s, then achieved widespread adoption in the business market during the 1980s, and finally entered a moderate numbers of households in the 1990s (Barnouw, 1968; Kuffner, 1996). Another example is the laser videodisc

which languished in the 1980s but a smaller, cheaper version of the technology with much greater capacity - the DVD - succeeded in the 1990s.

The Advantages and Pitfalls of Being First

There has been a long-running debate about the advantages and disadvantages associated with early entry into the media marketplace. The argument for early entry notes that small competitive advantages gained early often escalate over time and lead to market dominance. A technology's small early advantage over its competition may arise from chance, a favorable geographic location, or a seemingly inconsequential event such as favorable coverage in a magazine story (Arthur, 1990). Serendipity has also played a crucial role in the adoption process, from the "mom and pop" videocassette rentals shops that emerged spontaneously during the development of the VCR marketplace to the development of cybercafés by small, independent businesses that brought Internet service to millions of people worldwide who might not otherwise have experienced it.

Indeed, there are many examples of early market entry that did escalate into market dominance. AM radio preceded FM into the marketplace and dominated radio for fifty years; HBO was the first to develop a national pay-cable service and quickly dominated the market; and, the three broadcast networks that entered television in the late 1940s achieved a lock on the market that was not challenged for 30 years.

However, for each example of early entry that led to marketplace dominance there is an example of early entry that led to failure or weak market performance. These would include Japan's ill-fated development of analog HDTV in the 1980s, two-way video trials and services in the 1970s for business meetings and medical applications that were largely unsuccessful; and a broadcast pay-TV service developed by Zenith in the 1950s

which failed. And yet each of these cases was followed by technologies and services for somewhat similar purposes that did succeed. There are many reasons why early market entrants fail. In some cases the technology simply does not work properly. In other cases, the costs associated with marketing and launching a service overwhelm an early entrant: for example, several groups that planned to launch direct broadcast satellite services in the early 1980s abandoned their plans as they faced the huge costs associated with launching the services. In still other cases, an inhospitable regulatory climate can cripple an early entrant or consumers' lack of skill in using the new technology can lead to failure. Those who enter a market at a later time may, in some cases, find that their technology works better, costs are lower, consumers have improved their skills in using the technology, the regulatory climate is more hospitable, and so on.

An historical review of new media technologies suggests that early entry is an advantage in some cases and a disadvantage in others. It is an advantage when all the pieces are in place (or soon will be) to launch the technology successfully. It is a disadvantage when the technology suffers from one or more serious weaknesses or the marketplace is simply not ready for it.

Failures and Fads

Inevitably, failures are much more numerous than successes with new media as with most new products or services. There is much of value that can be learned from them. Many analysts have noted that new technologies are often created by engineers who have little knowledge about whether there is a demand for them (Mendelsohn, 1966). In this sense, new services often result from "technology push" rather than "demand pull." This practice has been correctly cited as a reason why many technologies fail. While the

criticism is correct in many cases, it would be facile to leave it at that: many of the most successful communication technologies of the past 125 years -- telephones, motion pictures, radio, phonographs, and television -- entered the marketplace as technology push, in a context of uncertain demand. Technologies do not falter simply because they represent technology push; they fail because they cannot meet the challenge of finding or creating applications that people want. Steve Jobs was famously quoted as saying that 'Apple created products that people didn't know they wanted, until they were shown.' There are many lessons to be learned from technologies that failed in the marketplace or lost ground after achieving a significant penetration of households. First, many technologies have failed because the benefit they offered was at best superficial. For example, quadraphonic sound (four-channel sound) was introduced in the 1970s but did not represent a significant advance in technology for the consumer market. Rather, it represented an attempted transfer of existing industrial technology (multitrack recording and playback) that provided a genuine benefit in an industrial setting (control of editing) to a home market in which no benefit could be demonstrated.

Smell-O-Vision is another illustrative example of failure. Smell-O-Vision was a gimmick in the 1950s to try to bring more people into movie theatres in the face of competition from television. The concept was to introduce scents into the theatre that complemented the scene in the movie, for example, the smell of the sea in a scene on an island. It was short-lived. The problem was not so much introducing the scents but getting them out of the theatre before the next scene, which may have required an entirely different scent.

In general, companies have ignored failures and the many lessons that can be derived

from them. Besides the fact that an understanding of failures can help technology start-ups to avoid making the same mistakes as in the past, there is also the possibility that, from the ashes of failure, a phoenix can arise. For example, there were many clues in the failed videotex trials of the 1970s and '80s about how online services could succeed, as indeed they did with the arrival of the World Wide Web. Unfortunately, when a technology or service fails, the company that initiated it often lays off the personnel who gained the learning and literally throws out the records of what happened, including the research.

Some seemingly successful technologies prove to be fads. We are familiar with fads in leisure products such as hula-hoops, yo-yos, tamagotchis and pet rocks. Consumer electronic technologies and services, too, may be fads or have a faddish component. A good example is citizen's band (CB) two-way radio which, in the early 1970s, had a steady but small population of approximately 200,000 users. CB became a fad in the mid-1970s and many consumers bought a CB radio for their car or home. The population of users grew to a peak of 10 million in 1976. It then declined rapidly and leveled off at a much lower base of users. Other media fads have included boom boxes, beepers for teenagers and mini-disc players.

Cyclical and Declines

Videogame consoles are an example of cyclical technology. These consoles and associated software surged in the early 1980s, collapsed in the mid-1980s, and were successfully resurrected in the late 1980s. From the 1990s onward, they have experienced cyclical growth and decline, although the fluctuations have not been as extreme as in the 1980s. These peaks and valleys are associated with the introduction of

new generations of equipment: 8, 16, 32 and 64 bit microprocessors, each of which was replaced by faster processors after a few years.

Cyclical patterns of adoption and decline can sometimes be anticipated, as in the case of console videogames. After two phases of the cyclical pattern, it could be anticipated that the pattern would continue. Cyclical phases can also be controlled in some cases. For decades, The Walt Disney Company has built cyclical phases into the distribution of its children's movies. They release a movie into movie theaters and later show it a few times on television, then withdraw it only to reintroduce it several years later when a later generation of children will perceive it as new.

When new media technologies and services are adopted, it is likely that some older, existing technologies and services will decline. There are many examples from the 20th century of technologies and services that declined as new ones were adopted. The telegraph declined as telephone service was adopted; 45 rpm records declined as LPs were adopted; over-the-air broadcasting declined as cable and satellite TV were adopted; the typewriter declined as PCs and word-processing software were adopted; and videocassettes declined as DVDs were adopted. In some cases, the decline happened because a new and better standard replaced the earlier one (as in the cases of 45 rpm records and LPs or videocassettes and DVDs). In other cases, the new technology or service was more robust or appealed to a larger audience (as in the case of broadcast evening network news and 24 hr-a-day all news cable channels).

Faced with declining sales or users, it is helpful to ask if the technology or service can be prolonged or reinvented? The "singing telegram" and "status" (e.g., the telegram retained a special status for important announcements such as births, weddings or deaths

well into the 20th century) helped prolong the telegraph for a while. The producers of broadcast evening network news programs chose to hold onto their aging audience and let ratings decline slowly rather than try to reinvent them.

Adoption in the Digital Age

How are patterns of adoption different, if at all, in the digital era of the 21st century? This paper notes some similarities and differences. However, its goal is also to begin to set an agenda of research that can provide empirical evidence about these patterns.

Social Context and Rapid Deployment of Technologies

An important starting point in examining recent adoption patterns is social and technological changes in recent years that affect adoption. From a social perspective, there are many more women in the workforce, which creates a need for them to adopt many new technologies and media services that are necessary in the workplace. The workforce generally is more educated and better able to use advanced technologies. There is also more work at home and a related need to adopt technologies that will support these activities. Also, many more people are in service jobs that require communication technologies versus many more who were in agricultural jobs in the first quarter of the 20th century and manufacturing jobs in the second and third quarters of the century.

Focusing on media use, people are spending more time with a wide range of media. The average American spends 12 hours a day exposed to media. However, this occurs within a 9 hour time frame. The extra hours of exposure are made possible by multitasking, e.g., using a smartphone while watching TV. The presence of media in so

many public locations also makes it possible to use more technology. Some of this is TVs and information kiosks in public locations but more is based on the mobile technologies that people carry with them, e.g., smartphones, tablets and laptops. Even sleep patterns are affecting media use. The average American in the first quarter of the 21st century is sleeping two hours less than people in the first quarter of the 20th century - more time to use technology!

We are also in a period of rapid technological change, which affects technology adoption, much more so than during the 20th century. Looking broadly over the 20th century, there was approximately one major technological advance per decade, for example, black and white TV in the 1950s, color TVs in the 1960s, VCRs in the 70s, personal computers in the 1980s and the Web in the 1990s. It can be argued that there have been more technological advances in the past 15 years than in the previous 60. In the beginning of the 21st century, we have seen the introduction of HDTVs, Smart TVs, 4K TVs, 3-D TVs, broadband, Wi-Fi, tablets, smartphones, wearable technologies such as smart watches, the Internet of Things and a deluge of apps and social media.

The rapid pace of change and deluge of technologies and services would seemingly make it difficult for many technologies and services to reach critical mass, since there is so much competition. However, this does not appear to be the case - many have reached critical mass. Perhaps technology use begets even more technology use. However, in the author's research (Carey and Elton, 2010) over the past 25 years, at least two other factors are at work. First, people are more tech savvy than 20 years ago and can adopt new technology with greater ease. Second, people have developed many ways to 'filter' the mass of content and information that is available to them and get just what they want

versus feeling overwhelmed with information, as were many in the 20th century. For example, apps and search engine like Google serve as important filters for people to control the information that reaches them (Herrman, 2016).

External and Internal Influences and the Role of Social Media

A key element in Rogers' (1995) diffusion of innovation model (quantified by Bass, 1969) is that early in the launch of new media, external influences such as advertising and marketing have more impact than internal influences such as word-of-mouth. Later, when many people have the technology or service, internal influences such as word-of-mouth have more impact. In the 20th century, this made complete sense. If there were 1,000 users of a new technology or service, how many people could they reach by word-of-mouth? So, advertising was likely to be more influential. However, if there were 10 million users, word-of-mouth could be very influential, more so than advertising.

In a 21st century context, social media can change things. The scale and scope of social media are immense and the chances of 1,000 active and vocal users of a new media technology or service influencing others are much greater. Whether through product reviews, Facebook posts, technology forums, group emails or other forms of social media, a relatively small number of people can reach a large audience. Further, many people who are considering the purchase of a new technology or service actively seek out reviews and comments by those who already have it.

Early Adopters and Price

A cartoon for *The New Yorker* in the 1970s, nicely captured the characteristics of early adopters of new media at that time. In it, a middle-aged man is in an electronics store and says to the clerk, "All my gadgets are old. I'd like some new gadgets." No mention is

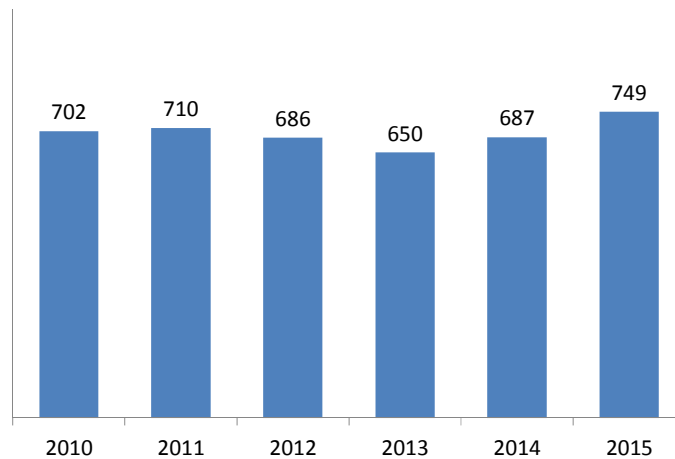
made of price. Indeed, this was typical of many early adopters: male, middle-aged, high disposable income and someone who liked technology for technology's sake.

In the 21st century, there have been important changes. The middle-aged gadget guy is still part of the mix of early adopters, but many more younger people and women are early adopters of new media. Further, many with less disposable income (or generous parents) are adopting new technology. According to the Pew Research Institute (2016), 86 percent of Americans 18-29 owned a smartphone in 2015 compared to 68 percent of all adults, and the number of males and females was roughly equal. While there are some 'gadget people' among this younger group, more use the technology for functional purposes (.e.g., to find information, the location of a restaurant, the weather, etc.) and because it is core to their lifestyles of anytime, anywhere access to media services.

In general, the pattern of introducing new media devices at a high price, then dropping the price over time to achieve a mass audience has continued into the 21st century. HDTVs, Smart TVs and 4KTVs followed this pattern. However, there are some exceptions, notably by Apple. Table 3 shows the list price of Apple iPhones over time. It did not decline. Apple does sometimes offer a cheaper, stripped down version of a product as in the case of the iPad (Pro versus Mini models).

Few people pay the full retail price of iPhones. Generally, the price is bundled with a mobile phone plan. In these cases, the mobile phone provider is subsidizing the price of the iPhone, with the cost to the provider returned from the monthly usage plan. Subsidies have also been built into the cost of some video game consoles in the expectation that the supplier will get the cost back through the sale of video game software.

Table 3. Average Retail Cost of an iPhone



Source: Apple

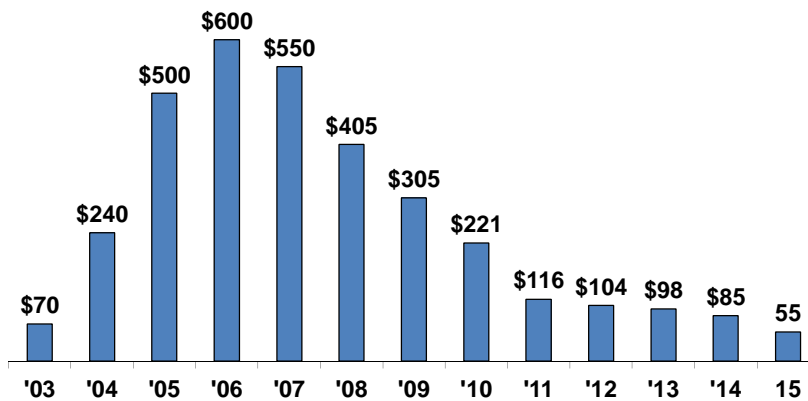
Failures, False Starts and Fads

There has been no shortage of failures, false starts and fads in the digital era. Failures and false starts can be difficult to distinguish in a first iteration of the technology or service. 3D-TV has clearly failed in the U.S. This was due to a lack of content, the reluctance of people to wear 3D glasses while watching TV and nausea experienced by some from the 3D experience. However, there are a few candidates that may turn it into a false start. Virtual Reality (VR) systems have been launched recently and they can provide a 3D video experience. 3D TV without glasses is due in a few years (it is available now on some portable video game devices) and holographic TV is less than 10 years away.

New media fads have been plentiful. Ring Tones (e.g., when downloaded software in a mobile phone plays a song chosen by the owner to indicate that there is an incoming phone call). Ring tones experienced a surge of interest for three or four years, then faded

quickly, as shown in Table 4.

**Table 4. Ring Tone/Ring Back Sales
(in Millions)**



Source: BMI, RIAA

Among social media sites, MySpace experienced a surge of popularity followed by a sharp setback and then reinvention as an entertainment site. Many apps have been fads, e.g., the video game app Angry Birds which was very popular for a while, then faded. Among the many other apps that have risen to great heights, only to fall were Peach, Meerkat, Ello and Secret.

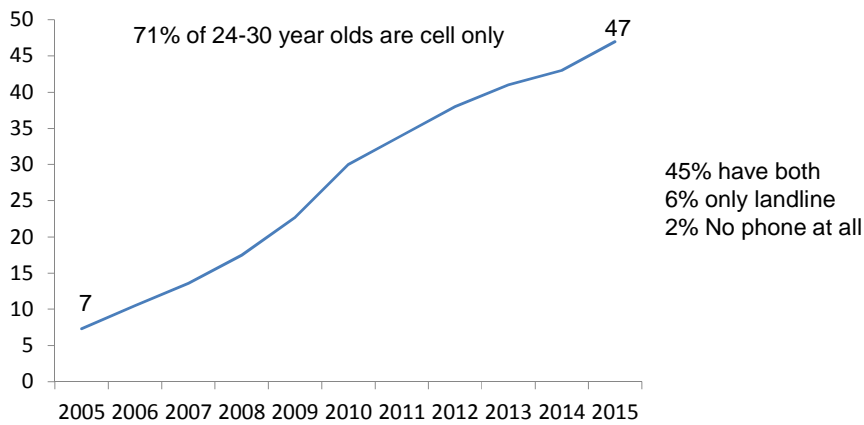
Declines

If the pace of technology introductions has accelerated, it is reasonable to expect that the pace of technology declines (devices and services being replaced by newer technologies and services) would also accelerate. This appears to be the case. Table 5 shows the pace at which landlines are declining in the U.S. as more people rely on cell phones. This is particularly true among those 24-30.

Table 6. lists both technologies and services that have declined in the past decade. The

list is not exhaustive. Depending on the time frame covered, PDAs, public phones, hotel phones and many early Web sites could be added to the list.

Table 5. Percent of US Households with a Cell Phone and No Landline



Source: Cellular Telecomm Assoc.

Table 6. What's Declining?

| Technology | Service |
|---------------------------------|--------------------------------|
| Desktop PCs | Snail Mail |
| Over-the-air Broadcasting | Buying CDs and DVDs |
| Telephone Land Lines | Traditional Phone Calls |
| Dedicated Digital Cameras | Watching Network TV News |
| DVD Players | DVD Rentals |
| Dedicated Portable Game Players | Reading Print Newspapers |
| E-Readers | Reading Print Classified Ads |
| Non-HD TVs | AOL- IM |
| Non-Smart Cell Phones | Use of Browsers on Phones |
| Print Newspapers | Print Catalogues & Directories |

Advantages and Disadvantages of Being First

The dilemma of whether to be first to market or second persists. Two examples may be cited. With VR systems, the Oculus Rift entered the market in spring 2016; Sony Playstation VR (PSVR) is expected in fall 2016; others will certainly follow in a year or two. The potential advantages of first-in are to attract media attention, social media buzz and early adopters. It may also help in striking deals with content providers who can learn first hand what the VR system can do. These advantages are mitigated by higher cost, the potential of software bugs that will receive negative publicity and a scarcity of content. A second-in VR system can probably come in at a lower cost, have more content and avoid some of the mistakes of the early entrant. As with many 20th century technologies, it is hard to predict which is the best strategy.

The Internet of Things also raises questions about the best point of entry. An early entrant could pick off the low hanging fruit, among thousands of possibilities, that seem to make a lot of sense (e.g., thermostats) and leave less likely successes (refrigerators that measure milk consumption?) to later entrants. However, a later entrant could assess the field and develop a more comprehensive strategy that is not apparent to early entrants.

Conclusions and Research Agenda

This paper has argued that a historical perspective on adoption of new media is valuable to the study of recent media adoption. It can help us measure the pace of change today in comparison to earlier periods, avoid pitfalls of earlier new media, learn positive lessons about marketing successful technologies and check in the dustbin of failed technologies for what might be a false start, with proper adjustments. There are no perfect

analogs in the past for a new technology today but there are lessons. As Mark Twain noted, "History doesn't repeat itself but it does rhyme."

We are in a period of rapid technological change and the proliferation of many new media technologies and services. At the same time, there has been a remarkable consolidation of content and applications in one device - the smartphone. There is really no historical precedent for this. The personal computer may be the closest example from the 20th century but very few PC owners in the 20th century had anywhere near the number of applications that are in smartphones today.

Social media have thrived on user-generated content. However, user-generated content will not be sufficient for many high-resolution technologies such as VR and 4K TVs.

Some existing content can be adapted (e.g., movies) but much will have to be produced.

The business model for this - cost to produce and potential revenue - is a work in progress.

Research Agenda

There are many research questions that need to be addressed with new media in the digital era. This paper has highlighted a few of them:

1. It may be time to reevaluate Rogers' categories for adopters of new media. Should it be five categories or three or seven or another number? Also, the characteristics of what Rogers called Innovators and Early Adopters needs to be adjusted as women and younger people play a more prominent role in early adoption. Also, a pejorative word such as "Laggard" seems inappropriate (although Rogers did not intend it to be so). What's more, there are fascinating changes with older people (who previously fell into the categories of Late Majority and Laggards), many of whom are adopting new media much sooner than

in the past.

2. The role of social media in changing the impacts of external (e.g., advertising) and internal (e.g., word-of-mouth) influences needs empirical investigation. It certainly appears that internal influences through social media play a more important role early in the adoption process but how much of a role? Further, while early adopters can take to social media early in the adoption process, so too can advertisers and marketers.

3. Historically, social norms of appropriate behavior in using new media have often lagged adoption. Early telephone users often went ballistic at what they thought was people shouting at them over the telephone (you had to speak loudly to get through bad connections) and early email users often flamed out at people who used all caps inappropriately in a message (Carey and Elton, 2010). Social norms did emerge but it took time. More recently, much behavior on social media has been aggressive, rude and negative. Longitudinal research could inform us if we are making progress in establishing social norms for social media behavior.

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