Forecasting Cloud Computing for the Print Industry

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Table of Contents

Abstract

The purpose of this study was to analyze the printing industry, and evaluate how cloud computing models will help to raise sales and create new markets. This study examines the current depression within the printing market. Noting the decline in sales, production, and workforce.

The introduction of cloud computing technologies has sparked a new interest from businesses from all industries. Cloud computing is a virtual technology that offers several business and operating models. Models such as platform providers and Software as a Service has surfaced as the most popular applications. Platform providers allow companies to store massive amounts of information (data files, file content, client information) in a virtual "cloud" that is hosted over the Internet. The main benefit is to allow companies access to their files virtually whenever they need. Secondly, Software as a Service is a model that provides companies software licenses that enable them to utilize software, for example Adobe software applications, via an Internet portal. This allows companies to use needed software applications, without suffering a large financial overhead to acquire the software licensing fees.

This study used several methods of research to gain insight into how cloud computing models can help the printing industry. Through historic research, elite and specialized interviews, and content analysis, this study was able to draw some conclusions regarding how cloud computing will help raise profit margins, produce greater quality for customers, and introduce new markets for the printing industry.

Chapter One: Introduction and Purpose of Study

Since the Industrial Revolution, the ultimate goal of technology has been to improve the quality of human life. Spanning throughout the centuries, humans continue to integrate technological innovations into their everyday lives. Throughout the 19th century, farmers used oxen, mules, and horses to pull plows in order to prepare their fields for seeding. At the turn of the 20th century, internal combustion engines revolutionized the agriculture world, and tractor technology caused a major paradigm shift in the mechanization of agriculture. The transfer of information has evolved from newspapers, to radio, to presently allowing audiences to watch their favorite television shows digitally via TiVo and digital video recording (DVR) devices.

Characteristic of all technological shifts is the fulfillment of needs to improve human productivity. Cloud computing is an innovation that has the potential to exponentially increase human productivity within the printing industry. Cloud computing offers models, such as Software as a Service, that can provide customers with licensed software applications on demand. This model creates a "loaning" concept, as users pay a fee to use the desired software application at their discretion. With the concept of loaning software, business entities and everyday computer users are now able to use applications by simply accessing the Internet. Alternative models of cloud computing allow users to operate with files and databases that are located in a metaphorical "cloud." Users' files are located on a web-based server and, thereby, consumers need not store files directly on their physical devices. Hence, the title of this concept, "cloud computing." Printing and business corporations are able to store files, customer information databases, and financial management plans online, enabling their clients and employees to have access whenever and wherever the information is needed. Upon weighing the

benefits of this innovation, the question remains: How will cloud computing allow for more effective solutions in helping to alleviate current issues in the printing industry, and ultimately translate into generating higher sales and profit margins?

Cloud computing business plans allow companies to be more successful with business management, planning, and practices. Embracing this innovation allows for higher competitive advantage, print timeliness, and more unique business opportunities. As with all technological trends, a company's willingness to adapt to new technology will not be easy. However, with the printing market in decline, companies might be forced into accepting new technological disciplines.

An example of the printing industry suffering a decline can be observed with the publication market. Over the past few decades, the publication market has suffered a decline in profit margins, as well as overall production. One prominent reason is a result of publication customers having significantly decreased their annual subscriptions. With this recent decline, the printing industry is in search of new business plans to boost production. Cloud computing can greatly benefit the publication printing industry. By providing on-demand software exchange for these publication companies, the cost for production and distribution of software applications is significantly decreased. If software is hosted over the Internet, corporations are able to lower administration fees. In addition, as files and databases are accessed via the Internet, this can shorten the print job timeline by allowing for ease of accessibility and transparency of file management.

One of the major attributes of cloud computing is cost savings. Rather than having corporations purchase licenses for multiple computing devices, models such as Software as a Service (SaaS), allows users to purchase licenses on-demand. These purchases are one-time

transactions, and provide users with a temporary license to use the desired software. SaaS allows the user to access the licensed application from various computer locations. Traditionally, companies purchase a set number of computer licenses for application software packages. These licenses are computer specific, allowing users to access the software from that particular computer location. Rather than spending costly money on numerous computing licenses, SaaS allows companies to purchase a "leasing" license. In this sense, one license can be used from a variety of computers. This cuts down on the costs of software licensing tremendously. Cloud computing can also appeal to consumer ethics. For example, the cloud model is an advocate for sustainable practices, and less costly means to conduct business. Allowing clients to work from home, or any remote location via the Internet, rather than driving to the office, lowers fuel consumption and saves valuable time. These benefits enable printing companies to operate with more sustainable practices, and also allowing for new business models to alleviate the current downward trends in print sales.

The purpose of this study is to evaluate how cloud computing models will benefit the printing industry, raise sales, and create new markets. Researching current print models and marketing plans will be instrumental in analyzing whether cloud computing can have direct impacts on today's market. In addition, this study will forecast how cloud computing technology will help the printing industry reach future goals to become more profitable and deliver higher quality for customers.

Chapter Two: Literary Review

Examining the past, while maintaining an open perspective of the present, enables the possibility to glimpse into the future. In order to understand the potential of cloud computing, it is necessary to review the current state of the printing industry, and learn about the history of this new innovation. It is also critical to evaluate today's present perspectives and models of these applications.

The printing industry is an industry where innovations and paradigm shifts have created more effective and beneficial ways of conducting its practices. Reflecting upon the timeline of the printing industry, it is clear to see how innovations have continued to expand and lead the industry into new progressions. As early as 618 A.D., the Chinese were printing on paper surfaces by using wooden blocks to set ink. In approximately 1450, Johan Gutenberg successfully created a mechanization system to mass-produce prints using movable type. The 1800's spawned the inventions of the rotary printing press, embossed printing, the cylinder press, and the photogravure printing technique. By the early 1900's offset lithography became a popular trend in printing, and commercial screen printing was invented. (Bellis) By the mid 1960's, newer forms for printing took form, including the photocopier and the laser-jet printer. In the 1990's and 2000's, the print market has seen an emergence and popularity for digital printing practices. (Bellis)

Despite the ever-changing trends within printing, recent years have seen a drastic decline in print media and sales. Many professionals and economists agree that the print market has suffered severely from the present economic recession. Conducting historic research and

analyzing the current declines in print, will help draw conclusions for how the print industry will try to overcome these losses.

CNN reports the publication market has experienced this downturn in sales and productivity greatly. Stephanie Chen, CNN analyst and reporter, writes, "At least 120 newspapers in the U.S. have shut down since January 2008, according to Paper Cuts, a Web site tracking the newspaper industry. More than 21,000 jobs at 67 newspapers have vaporized in that time. The Rocky Mountain News, gone. The Seattle Post-Intelligencer, gone. The chain that owns the Los Angeles Times and the Chicago Tribune is in bankruptcy. Other papers, large and small, are teetering on the brink." (Chen) Writer, Duncan Riley, confirms this epidemic amongst the newspaper market. Riley was a writer for TechCrunch, and has since launched several online information engines such as The Blog Herald, Weblog Empire, b5media, and The Inquisitr. Riley reports, "Figures released by the Newspaper Association of America show that the decline of newspapers is more rapid than previously thought, with total print advertising revenue in 2007 plunging 9.4 percent to $42 billion compared to 2006, the biggest drop in revenue since 1950." (Riley) It is undeniable that the newspaper industry has experienced a great drop off in sales. Tim Arango, of the New York Times, reveals, "The rate of decline in print circulation at the nation's newspapers has accelerated since last fall, as industry figures show a more than 7 percent drop compared with the previous year," and, "Of the top 25 newspapers in the United States, all posted declines in circulation except for The Wall Street Journal." and several professionals admittedly confess this is worse than previously expected. Rick Edmonds is a media business analyst at the Poynter Institute, and responds to the state of the market, he answers, "The new circulation numbers are not very good, and probably a little worse than expected." He continues to suggest that he had expected an overall drop of roughly 5.5 percent.

Edmonds continues on to say, "Most of these losses are due to budget decisions we made throughout 2008 and earlier this year in response to the economic recession." (Arango)

Newspaper printing is not the only segment of the publication market that is experiencing sales drops. The Associated Press (AP) is one the highly acclaimed sources to report the world's news and information. The AP's article, simply titled "Magazine Sales Fall 6.3% at Newsstands," dispels the truth about the magazine market as it reports, "Newsstand sales of magazines fell 6.3 percent in the first half of 2008…as rising gas and food costs led consumers to cut back on nonessential spending. Most top titles, including best-selling 'Cosmopolitan' and 'O,' The Oprah Magazine, had sharp declines. Single-copy magazine sales in the six months ended June 30 fell to 44.1 million copies from 47.1 million a year ago." (The Associated Press) The Audit Bureau of Circulations (ABC) confirms this downward trend in magazine sales. The ABC is an agency that helps formulate current publication statistics and information. The agency provides credible information to the media concerning the buying and selling processes of consumers. (Audit Bureau of Circulations) In an article written by Jeff Beer, journalist at Marketing Magazine, the ABC is noted of reporting that "in the six-month period between July and December 2009, total paid and verified circulation…titles was down 3.7 percent and paid subscriptions dipped 3.25 percent, compared to the same period the year before, while single-copy sales dropped 4.34 percent." (Beer) Not only are consumers stopping to purchase magazines, but institutions are discontinuing purchase of subscriptions as well. Herman Wong is an editor and writer from the San Francisco Weekly. In a November 2009 article, Wong reports that libraries are beginning to cease purchases of magazine publications, he notes:

> In 2009, print magazines lost advertisers, readers, and now, it seems, the Main Branch of the San Francisco Public Library. This year, the branch will spend about $385,000 on

periodicals, down nearly $75,000 from the year before. A decade ago, the San Francisco Public Library system had about 15,000 print subscriptions. This year, its active collection, with at least 400 titles dropped, has fallen to fewer than 11,000, the lowest in five years." Wong's article continued to report that in 2009 "the Main Library boosted spending on its 106 databases and online resources from $750,000 to $1 million." The Main Branch Chief of the San Francisco Public Library, Kathy Lawhun describes purchasing magazine subscriptions saying, "It's kind of like being the last one at the party, seeing who will still be there." Lawhun continues about the magazine decline and suggests, "Patrons and students want fast access on their PCs at home. So spending has moved to online databases with full-text articles rather than print copies. (Wong)

The commercial print market is another large component of the printing industry that has been affected by declines in sales and expensive overheads. Research and Markets is an international organization that hosts publications, documents, and analysis reports from the leading consultants, publishers, and analysts. Research and Markets has an extensive clientele list, working with companies such as 3M, Bayer, Deloitte Consulting, Pfizer, and other industry leaders. (Research and Markets) In 2006, Research and Markets announced the "2006 Graphic Arts Market Demographic Profiles." This publication "provides snapshots of the U.S. graphic communications markets-print and prepress establishments, graphic design and production firms, and publishing companies. These snapshots include top-line demographic data [such as] estimated number of establishments, capital expenditures, and prevailing industry trends." This publication reports that as early as 2006, "there are fewer than 28,000 commercial printing and prepress establishments in the U.S., a decline of 4.1 percent from the previous year." This statistic is one that has not improved, and today's commercial print market is forcing printing

presses to consolidate and merge with other vendors. (Research and Market) This trend is verified in a report released in February 2010 concerning the nature of the commercial print market. This report was released by an organization named WhatTheyThink. This organization offers "a wide range of publications delivering unbiased, real-time market intelligence, industry news, economic and trend analysis, peer-to-peer communication, and special reports on emerging technology and critical events." (WhatTheyThink) In the report presented, WhatTheyThink announces, "[In} December 2009, commercial printing shipments were $7.26 billion, down -6.8 percent compared to 2008. It was the first December to be below $7.5 billion since 1994." It also describes the downward trends of commercial print to be on an average of "-10 percent on a year-to-year basis." (WhatTheyThink)

It is extremely alarming when reports are suggesting that this market is significantly losing costs and production. Although not conclusive, several professionals have accepted the trends of this market, and have proposed rationale for these losses. Dr Joe Webb, director of WhatTheyThink's Economics and Research Center, points out, "The most successful print businesses had specialized equipment and processes that were targeted to the exact needs of those markets." (WhatTheyThink) First Research is an analysis and consulting agency to help corporations and industry leaders transition into new models and create sources for revenue. In a report analyzing the print industry overview, it notes that small commercial printers continue to struggle to accept new forms of technology. It reports, "Printing technology is evolving rapidly. Small printers may be unable to make the investments in [such] technology." (First Research)

The publication and commercial print markets are two of the largest markets within the print industry. It is evident that these markets are suffering major losses; therefore, the print industry is beginning to lose profits, production, and employees. The United States Department

of Labor (USDL) released a publication entitled "Career Guide to Industries, 2010-2011," in which they boldly estimated the current state of the print market, stating, "Employment in printing is expected to decline rapidly. Wage and salary employment in the printing and related support activities industry is projected to decline 16 percent over the 2008–18 period, compared with 11 percent growth projected for the economy as a whole." The USDL suggests the main cause of this employment drop off is "small- and medium-size firms are consolidating in order to afford the investment in new technology and equipment." (Bureau of Labor Statistics)

The need for new technologies is now, as the printing industry continues to lose sales and close markets. To understand the significance of how cloud computing can alleviate the symptoms of the printing industry, the history of this technology must first be understood.

The history of cloud computing dates back to the 1960's. Bryan Hayes, a senior writer for *American Scientist,* describes the history of cloud computing holistically. Hayes writes:

Almost 50 years ago a similar transformation came with the creation of service bureaus and time-sharing systems that provided access to computing machinery for users who lacked a mainframe in a glass-walled room down the hall. When personal computers arrived in the 1980's, part of their appeal was the promise of "liberating" programs and data from the central computing center. Individuals were free to control their own computing environment, choosing software to suit their needs and customizing systems to their tastes. But personal computers (PC) in isolation had an obvious weakness: In many cases the "sneakernet" (transfer of electronics by manually transferring files and software via compact discs, external hard drives) was the primary means of collaboration and sharing. The [cloud computing] model introduced in the 1980's offered a central repository for shared data while personal computers and workstations replaced terminals,

allowing individuals to run programs locally. In the current trend, the locus of computation is shifting again, with functions migrating outward to distant data centers reached through the Internet. A client computer on the Internet can communicate with many servers at the same time, some of which may also be exchanging information among themselves. However, even if we are not returning to the architecture of time-sharing systems, the sudden stylishness of the cloud paradigm marks the reversal of a long-standing trend. Where end users and corporate Information Technology (IT) managers once squabbled over possession of computing resources, both sides are now willing to surrender a large measure of control to third-party service providers.

(Cloud Computing)

Eric Bruno is a professional technology consultant and author, specializing in software architecture and corporate technology strategies. Bruno reviews the history of the Software as a Service model in an article entitled "*A Model That's Right For The Times.*" He writes:

In the 1970's, [there was the introduction of] Monitor, through which journalists entered information via dumb terminals (computer terminals that can only read a limited number of computer codes) and a mainframe computer sent it out to readers. In the early 1990's, it was taking that distributed computing concept further, by building a pioneering electronic trading system, Globex, for the Chicago Mercantile Exchange (CME), drawing on a mainframe and Windows-based PC's. As Globex's costs grew with its popularity, CME moved the Globex architecture to an even more distributed model: a pair of mainframe class computers coupled with about 1,500 workstation-class servers running Unix computer operating systems." (A Model That's Right For The Times)

Although the concepts of cloud computing have proved to be around for decades, the realities of this technology has finally arrived to present day visionaries. Professionals have begun to speculate as to what the exact definitions and implications of this technology will be. According to the Industrial Technology (IT) professors at UC Berkeley, "Cloud computing [is] the long held dream of computing as a utility…[Cloud Computing] has the potential to transform a large part of the IT industry, making software even more attractive as a service and shaping the way IT hardware is designed and purchased." (Above the Clouds: A Berkeley View of Cloud Computing)

The Science Direct Organization has collected information based upon the trends and proposals of cloud computing, and has proposed the following definition:

A cloud is a type of parallel and distributed system consisting of a collection of inter-connected and virtualized computers that are dynamically provisioned and presented as one or more unified computing resources based on service-level agreements established through negotiation between the service provider and consumers. Clouds are clearly next-generation data centers with nodes "virtualized" through hypervisor technologies such as virtual memory applications, dynamically "provisioned" on-demand as a personalized resource collection to meet a specific service-level agreement, which is established through a [contract] and accessible as a composable service via Web Service technologies such as Simple Object Access Protocol (SOAP-a specification for exchanging structured information in the implementation of web services)

Although the debate over what cloud computing truly provides continues, it is more pressing to learn what is being proposed that this technology will bring. Mladen A. Vouk, a

computer science professor at the University of North Carolina State, offers his insight into the future of cloud computing. Vouk writes:

> Cloud computing builds on decades of research in virtualization, distributed computing, utility computing, and more recently networking, web and software services. It implies a service oriented architecture, reduced information technology overhead for the end-user, great flexibility, and reduced total cost of ownership, on-demand services and many other things." Vouk builds upon his idea of cyber-infrastructure, "[It] makes applications dramatically easier to develop and deploy, thus expanding the feasible scope of applications possible within budget and organizational constraints, and shifting scientist's and engineer's efforts away from information technology development and concentrating it on scientific and engineering research. Cyber-infrastructure also increases efficiency, quality, and reliability by capturing commonalities among application needs, and facilitates the efficient sharing of equipment and services.
>
> (Cloud Computing: Issues, Research and Implementations)

As with all technological advancements, Software as a Service proposes both positive and negative aspects. Dana Moore, author and editor with *InformationWeek*, writes an articled titled "*Weigh The Risks and Benefits Before Deciding*," in which she highlights the issues of Software as a Service. She lists her risks and rewards:

Vendor Lock-in:

> There is a small number of software as a service vendors today, and most have interests rooted in building a binding relationship through a comprehensive offering. Vendors, such as Microsoft, have been doing this for decades, and if the

vendor remains viable and relevant and responds to the user community, it is
generally a benefit for both parties.

Technical Immaturity:

Every cloud framework has it own interface methods, services, and costs. The
unfolding nature of the software as a service approach puts everything at risk
costs could change overnight, services could be dropped, and quality of service
could worsen. Standards bodies are just beginning to look at the market. Would
you bet a critical business application on such a new arrival?

Privacy and Control:

Vendors generally offer extensive protection methods, and it is in their interests to
offer high levels of security. Software as a service often provides a relatively
sophisticated suite of access controls. But you, not the vendor, still own the site.

Misjudging 'Flexibility versus Power:'

Generally, you want more flexibility over design, development, and deployment
for a custom system such as a new profit center – and software as a service
doesn't offer flexibility. Instead, it gives power and ready-made services. The
trade-offs are similar to the ones for outsourcing.

Testing is Deployment:

The United States Army vows to "fight like we train and train like we fight." For
development teams, that translates to test like they deploy and deploy like they
tested. Software as a service gets them very close – trying multiple machines,
different configurations, and different locations; running stress tests; and testing

compatibility, performance, and response in ways impossible in a local environment.

Dynamic Allocation:

To compete with the pace set by the like of Twitter, Facebook, and Google, modern IT teams must be able to all but flip a switch to turn up a new service or features, or test it on a small segment of customers. Before software as a service, that was unthinkable. Now business IT teams can approach the 'perpetual beta' for which Google is known.

Internal Entrepreneurship:

The biggest strategic benefit is that developing through software as a service, combined with quick deployment on infrastructure online, can empower visionaries in any part of the company. Consider creating a cloud budget, letting teams experiment with cloud computing resources, and see what they dream up."

(Weigh The Risks and Benefits Before Deciding)

Professionals continue to probe about the future of cloud computing. Regardless of the ongoing debates, one thing is for certain, cloud computing will greatly benefit the business world. With the assets that this technology brings, the printing industry to sure to see future success. This application will allow for greater sales margins, and enable printing corporations to deliver more quality products for their customers.

Chapter Three: Methods of Research for Study

The concepts of cloud computing are new to today's printing industry. The definitions of this technology are still being discussed among professionals. In order to determine the future of the printing industry with the use of this technology, it was important to employ several methods of research. This study included elite and specialized interviews, historic research, and content analysis in order to determine the benefits of cloud computing models for the printing industry.

Elite and specialized interviews is a concept established by communication theorist Lewis A. Dexter. He urges, "Interviewing persons who have specialized information about, or who have involvement with, any social or political process is different from standardized interviewing." (Dexter) Through this process, the interviewee must teach what the problem, the question, or the situation is to the interviewer. Joel D. Aberbach, a Professor at University of California Los Angeles, and Bert A. Rockman, a Professor at Ohio State University, collaborated together to host a symposium entitled, "Conducting and Coding Elite Interviews." Through this symposium, the two Professors illustrated the core significance of elite interviews in regard to developing adequate research, "…the best way to design and conduct a study is 'purpose, purpose, purpose.' Interviewing is often important if one needs to know what a set of people think, or how they interpret an event, or what they have done or are planning to do." (Aberbach, Rockman) Dr. Harvey Levenson, Professor and Department Head of Graphic Communication at California Polytechnic State University of San Luis Obispo, provides insight on reasons why elite and specialized interviewing is necessary, "[elite and specialized interviews] address issues of the human interface with technology." This is extremely important, considering the purpose of this study is to understand exactly how human interaction with these new technologies will

benefit the printing industry. Levenson continues to explain the usefulness of elite and specialized interviewing:

> In applied research there is a growing reliance on human perceptions prior to determining the need for or potential success of a product. Such perceptions are increasingly being established through interviewing methods. In the printing industry it seems reasonable to test the perceptions of consumers regarding the need for or desire for printed products of different sorts. However, much research focuses on the views of professionals and executives in the industry regarding technology needed to produce printed products faster, at higher quality, and at lower prices. (Levenson)

By using this method of research, I conducted four interviews with professionals from the printing industry, as well as professors involved with the study of printing and new technologies. It is important to evaluate how cloud computing and software as a service is being accepted and used in today's markets in order to adequately assess how this technology will benefit the printing industry.

There were several steps used in obtaining my research. There are several different markets within the printing industry from which I selected a variety of professionals to interview. The screen-printing market helped provide insight to how cloud computing is used today, and aspirations for how it can be used in the future. In order to gain insight into this market, I interviewed Mark Coudray. Coudray is a highly respected professional in the material printing market. He is the founder and owner of Coudray Serigraphics, a Managing Director at T-ShirtSuccess LLC, and a Board Member of the Cal Poly Graphic Communication Advisory Board. I also interviewed Kaitlin Jue, graphic designer at MenuClub Incorporated. This company specializes in the printing and designing of restaurant marketing collateral, such as house menus,

"PocketMenus", restaurant mailers, door hangers, and menu boards. The remaining professionals from the printing industry were professors from the Graphic Communication Department at the California Polytechnic University of San Luis Obispo. I interviewed professors Malcolm Keif and Brian Lawler. Each of these professors has experience in working within the printing industry, in addition to an outstanding awareness of the current trends of print technologies.

Conducting elite and specialized interviews suggest against the notion of compiling a list of questions to ask the interviewee. Therefore, during my interview I asked broad and open-ended questions to help extract information and guide the conversation. I asked the following questions:

- In which ways have you or do you plan to implement cloud computing in your organization?
- What do you see as being negative aspects of cloud computing models?
- What do you see as being positive aspects of cloud computing models?
- How might cloud computing models be able to benefit the printing industry specifically?

After I conducted these interviews, I needed to construct meaningful content analysis for the results that I received. From the provided responses, I built a simple table of tabulations for the answers provided by the professionals. This provided a trend of how these professionals view cloud computing models.

In addition to elite and specialized interviews, I included historic research in this study. This research included several professionals' opinions about Software as a Service and cloud computing. I reviewed publications, periodicals, books, and news releases to decipher this information. Dr. Harvey Levenson establishes the importance of this type of research:

> The historical researcher must systematically and objectively locate, evaluate, and interpret evidence available for understanding the past. From this evidence the researcher hopes to show what may be contributed by past experience to a greater understanding of present situations and what might happen in the future. (Levenson)

I used online search engines and databases to locate online publications and articles regarding the history of software as a service and cloud computing. It was important to note how these innovations started, and the initial motives for each technology. I also conducted research about the present claims about the uses for cloud computing. There are numerous professionals that have already made claims to how beneficial the uses of cloud computing model are. I surfaced these claims and interpreted how significant these changes can prove to be for the printing industry.

Cloud computing models are new innovations for the printing industry. There are corporations that have already adopted these technological changes, and have witnessed benefits. By conducting several methods of research, this study discovered these claims, and can now answer the question of how will these technologies benefit the printing industry, and bring about increases in sales and profit margins.

Chapter Four: Proclamations for Cloud Computing Models

Professionals from all industries are beginning to acknowledge the power of cloud computing models, specifically as Software as a Service provider and as a platform provider. Rebecca Lawson is the director of Worldwide Cloud Marketing at Hewlett Packard. In an article written by journalist Dana Gardner, Lawson explains the dynamic benefits of platform providing cloud computing models, she says:

> As we move forward, we see that, different vertical markets will start to have ecosystems evolve around them. These ecosystems will be a place or a dynamic that has technology-enabled services, cloud services that are accessible and sharable and help the collaboration and sharing across different constituents in that vertical market. Vertical ecosystems will serve business interests across large bodies of companies, organizations, or constituents, so that they can start to share, collaborate, and solve different kinds of issues that are germane to that industry. (Gardner)

WebHosting Unleashed is a leader in marketing, research, and education for IT hosting professionals. Its online web services host articles that offer insight into current trends of various industries. Journalist, Cindy Wexler, produced an article for WebHosting Unleashed entitled "The Benefits of Cloud Computing." In this article she highlights reasons why companies should consider utilizing this new technology. Wexler writes:

> Cloud computing is fast evolving from a futuristic technology into a commercially viable alternative for companies in search of a cost-effective storage and server solution. In fact, Gartner Inc. predicts that by 2012, 80 percent of Fortune 1000 enterprises will

pay for some cloud-computing service, while 30 percent of them will pay for cloud-computing infrastructure. (Wexler)

Wexler also lists five benefits of operating cloud computing models. She includes "scalability, easy implementation, skilled practitioners, frees up internal resources, and quality of service" as main reasons to consider cloud computing. She follows each of her qualities with brief explanations:

Scalability - IT departments that anticipate an enormous uptick in user load need not scramble to secure additional hardware and software with cloud computing. Instead, an organization can add and subtract capacity as its network load dictates. Better yet, because cloud-computing follows a utility model in which service costs are based on consumption, companies pay for only what they use.

Easy Implementation - Without the need to purchase hardware, software licenses or implementation services, a company can get its cloud-computing arrangement off the ground in record time and for a fraction of the cost of an on-premise solution.

Skilled Practitioners - When a particular technology becomes popular, it's not uncommon for a whole slew of vendors to jump on the bandwagon. In the case of cloud computing, however, vendors have typically been reputable enough to offer customers reliable service and large enough to deliver huge datacenters with endless amounts of storage and computing capacity. These vendors include industry stalwarts such as Microsoft, Google, IBM, Yahoo! Inc. and Amazon.com.

Frees Up Internal Resources - By placing storage and server needs in the hands of an outsourcer, a company essentially shifts the burden placed on its in-house IT team to a third-party provider. The result: In-house IT departments can focus on business critical tasks without having to incur additional costs in manpower and training.

Quality of Service - Network outages can send an IT department scrambling for answers. But in the case of cloud computing, it's up to a company's selected vendor to offer 24/7 customer support and an immediate response to emergency situations. (Wexler)

THINKstrategies Inc. is a consulting company that specializes in guiding companies to accept and introduce new methods of service-based models. Jeffrey M. Kaplan, managing director at THINKstrategies Inc., composed a review of cloud computing models. Kaplan describes cloud computing as being "perfectly positioned to capitalize on today's economic uncertainty." In addition, he explains why this model is tested for success, he writes:

These web-based services are also perfectly suited for a rapidly changing workplace as fewer and fewer people actually work in traditional offices. Instead, they are either working from home or on the road, and need new methods to obtain and share critical data typically hidden behind the firewall, so they can better communicate with their peers, customers and business partners. (Kaplan)

The rapid advances in broadband networking, mobile communications and web services are making all this possible, and even more affordable because of open-source technologies.

THINKstrategies Inc.'s survey research has seen customer interest and adoption of SaaS nearly double over the past year, jumping from 32 percent of survey respondents reporting they

were using SaaS solutions in 2007 to 63 percent in 2008. More importantly, more than 90 percent of these SaaS users reported they are not only satisfied with their SaaS solutions, but plan to renew and expand their services, and would recommend SaaS to their peers.

The survivors of the SaaS and cloud computing industry shakeout will be those who capitalize on the best enabling technologies and build the strongest ecosystems; fortify their market positions via a combination of organic growth and targeted acquisitions and mergers; properly target their services, and communicate the right business-oriented value propositions to decision-makers; and clearly demonstrate their tangible benefits." (Kaplan)

The Credit Suisse Group is an American financial services organization that advises and directs companies towards new business methodologies and models. It also specializes in investment and asset management in the areas for innovation and execution. (The Credit Suisse Group) Jason Maynard is an analyst for The Credit Suisse Group, and refers to the Software as a Service model as he compares, "software to electricity. Most firms don't own generators. They buy electricity from the grid." Maynard is not alone in his enthusiasm towards the SaaS model. In 2005, Bill Gates released an executive memo suggesting "the software services wave is the next sea that is upon us." (Trumba)

IDC is a global provider for "market intelligence, advisory services, and events for the information technology, telecommunications, and consumer technology markets." (IDC) IDC has also found the SaaS model of cloud computing to be a highly anticipated innovation that will help revolutionize industries worldwide. In a recent report, IDC predicts, "…worldwide spending on SaaS, which totaled $4 billion in 2004, will reach $10.7 billion by 2009. SaaScon, an organization sponsoring its second annual SaaS conference, points to recent studies that say 61

percent of North American companies with revenues over $1 billion plan to adopt one or more

SaaS applications in the next year." (Trumba)

Chapter Four: Current Models of Cloud Computing

Amazon is one of America's largest online electronic commerce corporations. While being more recognized as an online vendor for various products, Amazon has also expanded its services to accommodate cloud computing models. Specifically designed for developers and data management services, Amazon released "S3: Simple Storage Service" in the United States in 2006, and in Europe in 2007. As described on Amazon's website:

> Amazon S3 provides a simple web services interface that can be used to store and retrieve any amount of data, at any time, from anywhere on the web. It gives any developer access to the same highly scalable, reliable, fast, inexpensive data storage infrastructure that Amazon uses to run its own global network of web sites. The service aims to maximize benefits of scale and to pass those benefits on to developers.

Amazon has provided businesses and consumers with capabilities to store, transfer, and retrieve anywhere from 1 byte to 5 gigabytes of data. This form of cloud computing allows information to be stored and/or retrieved at any time and anywhere with Internet capabilities. This allows for transfer of information to be virtually instantaneous. With low cost plans for data storage, companies no longer budget for expensive on-site machines to house information. The main benefits that applications, such as S3, bring to the printing industry are "scalability, reliability, speed, low-cost, and simplicity." These are the attributes of innovative technologies that can help the print industry regain profits, and increase production. There are numerous corporations within the print industry who already use this application.

99designs is a one corporation that uses Amazon Web Services for its cloud computing model. 99designs is an online marketplace that connects thousands of graphic designers, and

hosts design content to help promote and sell designs. (99designs) Lachlan Donald, CTO of 99designs, explains, "Early on, we faced a number of infrastructure issues in our existing hosting facility that was not going to be solved without a large cash outlay and long term lock-in contract. Even if we could justify the cost of a dedicated server solution we had little confidence that the hardware provisioned for us would meet our requirements in the near future. The initial cost of launching our business on AWS was reduced by a factor of 5 when compared to conventional hosting." 99designs uses this cloud model to help store and transfer various data files. 99designs allows all registered designers to upload and download content whenever they please, and from wherever they are located. 99designs credits this platform provider model of cloud computing for its continued successes. It has been reported that "99designs is enjoying their success with a massive marketplace for crowd-sourced graphic design and have received over 3.1 Million unique design submissions from over 53,000 designers around the world." (Amazon Web Services)

DMP, otherwise known as Digital Media Partners, is a corporation that specializes in software development and creating custom solutions for other companies' and businesses' process optimization. (DMP) DMP features "The DMP FLO Suite," which is a collection of marketing and production related solutions. The Suite offers services such as web-to-print, digital asset management, online templates for Adobe InDesign platforms, content management, Software as a Service InDesign prepress operations, product management, and print on-demand solutions. Several companies and organizations have utilized these services to help boost sales while reducing costs.

Berghoff Worldwide is an appliance and kitchenware manufacturer. Due to its diverse clientele base they need to be able to provide high quality printed marketing materials versed in

several different languages. Berghoff utilizes the platform-provider cloud model that DMP FLO

Suite offers, and uses web2print applications to be able to produce its materials. According to the

DMP website, "Dealers in dozens of countries can log in to a simple web application, where they

are able to translate the marketing information. These translations are used to create the printed

catalogue of Berghoff. The translations are also sent by the DMP FLO Suite to the corporate

website." (DMP)

Source Technologies is a cloud computing corporation that provides Software as Service

models. Source Technologies help companies execute secure printing, and empower companies

to automate various services such as: "secure printing of sensitive information and negotiable

documents, bill payment, banking and retail transactions, and a variety interactive self-service

applications." (Source Technologies) Source Technologies has extended Software as a Service

models that offers secure printing solutions. Entitled "Software as a Service: For Secure Print,"

(SaaS: SP) the main goal is to "enable users to manage on-demand requests, approval, and

printing of secure documents simultaneously from multiple locations and via a pre established

security structure." This model allows users to submit secure document data to a cloud platform,

and print such documents at pre-determined locations. Source Technologies provides the

customer with custom designed templates and software applications that enables him/her to be

able to maximize efficiency and security for the printing of his/her documents. The advantage

gained through this model is cost savings. As reported by Source Technologies:

Most centralized secure document production and distribution systems, check

delivery systems being the most common, depend on costly overnight shipping   and/or

courier services for delivering documents to remote locations. SaaS: SP eliminates these

unnecessary costs by utilizing the Internet to securely request, approve, deliver and print

your documents. (Source Technologies)

Amazing Print was founded in 1997, and has since introduced web to print solutions for both consumers and businesses. Amazing Print specializes in the production of business cards and post cards. By offering a variety of Software as a Service applications, users are able to build customizable stationary, utilizing the tools and templates provided by Amazing Print via access of the Internet. Amazing Print has named its cloud computing model, "eCard Suite." This collective software suite allows users to create stationary, proof designs, view and track orders. This model allows for users to save multiple costs including software application licenses fees, as well as print and procurement fees. (Amazon Print)

Chapter Four: Elite and Specialized Interviews

Elite and specialized interviews help give an understanding of how cloud computing affects the print industry. Several professionals were interviewed about the benefits and attributes of various cloud computing models. The research proved to have varying answers; however, there is an obvious vantage point that these professionals have with regards to cloud computing.

This study interviewed with Mark Coudray, C.E.O. and founder of Coudray Serigraphics. Coudray Serigraphics is one of the industry's leading screen printing operations. Also offers custom screen printed materials including t-shirts, sweatshirts, and other various garment items. Coudray is noted for being an innovator and visionary both with his company, and with the printing industry as a whole. Coudray has published over 300 articles in professional press and technical journals. Coudray has also served as Chairman to the Academy of Screen Printing Technology. He has also been a recipient of the Specialty Graphic Imaging Association Howard Parmele Award, an honor reserved for "the ongoing commitments of a professional who has advanced specialty imaging's products, services and overall image." This award is recognized as being the highest honor in the specialty printing industry. Coudray has also acted as a consultant for various print companies around the world.

Mark Coudray has recently moved his company towards a cloud computing model. When asked how he has he implemented the technology in his organization, he replied that recently he had begun using Amazon S3 as a platform provider. With this service, he has been able to mirror his on-site data files while storing data, file content, and project schedules in a "cloud." Coudray also went into discussion of how his company is beginning to use Software as a Service models

as well, he mentioned, "We have a project right now, where the partner company in we are dealing with has accounting software that is cloud-based. It is very simple for them to enable password access level software for me, and now I am able to have visibility for order control with any of our projects." Coudray has also started to host video tutorials for clients as he acts as a consultant as well.

I asked about the negative aspects of cloud computing. To which he answered simply, "The only concern there is security." He continued to mention that privacy and security of files is going to be an ongoing issue with cloud computing. However, he remained convinced that the benefits will supercede the benefits in this case.

I asked about the positive aspects of cloud computing, and Coudray responded, "Because Coudray Serigraphics constantly deals with large file sizes and customized content, it is important for these files to be backed up on external servers, in the case of an electrical or computer crash." He also added that he is often traveling on business trips. The cloud model has allowed him to track progress of ongoing projects, download and view content, and virtually supervise all activity of his company. In conclusion to the interview, Coudray reiterated, "It is clear that this is ultimately where every industry is going to go."

When asked how he envisions cloud computing to benefit the printing industry, he simply replied, "It's the future!" He added an explanation that analyzed the current models of technology, and how the everyday customer wants enormous amounts of information and data at an instantaneous rate. This technology will allow businesses to operate at such a demand. Coudray offered his company as a case study. He recounted that cloud computing has allowed his company to operate at lower costs, and ultimately find better ways to serve the customer.

This study interviewed Kaitlin Jue, graphic designer at MenuClub Inc. Menuclub is a production company specializing in the designing and print production of marketing materials for restaurants and wineries. As a graphic designer, Jue works on numerous projects that involve customer feedback, proofing, and storing of files.

When asked how MenuClub uses cloud computing models, she responded, "We use it everyday. All of our content, like artwork, menus, past designs for projects, are all stored on an online server. There would be way too much content to store on any of our computers in the office. We also have clients proof their projects by accessing our website. They log-in using a custom password and username, and view all their previous projects in their folder." This workflow allows MenuClub to operate at lower maintenance costs, and helps save valuable time for the customer.

I asked Jue what negative aspects cloud computing has presented, as she jokingly responded, "I am not sure there are any." She later admitted that the usage of cloud computing can only work if the client is knowledgeable with computers and how to operate the Internet effectively. "There are lots of our clients who cannot use our system, so we have to go old fashioned, and print them hard copies to proof." This is the only major flaw that MenuClub experiences with their usage of its cloud computing model.

When asked what positive aspects do cloud computing present, she answered, "It's nice that you can access our designs and proofs from any computer. And you don't have to come in to our office to look at our designs. We have clients all over the world. It is easy for them to just log in and look at proofs and approve them whenever they want."

After asking how cloud computing will benefit the printing industry, Jue answered, "It makes everything about design easier. Files can be stored on the server, and can be accessed

anywhere. There is a tremendous amount of time saved, too." She continued to encourage other design firms to take advantage of the platform model of cloud computing. Especially with companies who work directly with retail clients, when time is a valuable commodity, profit margins and sales can significantly increase with an effective technological service.

This study interviewed Dr. Malcolm Keif, Associate Professor at California Polytechnic State University of San Luis Obispo, in the Graphic Communication major. Throughout Dr. Keif's educational career, he has designed curricula and provided instruction on various attributes of the printing industry such as: bindery, finishing, distribution, quality measurements and standards, estimating and pricing, and web printing technologies. Dr. Keif has also gained experience with working directly in the field of the printing industry. He has worked as a consultant with organizations such as: Agfa Corporation, Banta Corporation, Graphic Arts Technical Foundation, Printing Association of Florida. In addition, Dr. Keif was also a cost estimator for ColorGraphics based in Los Angeles, California.

When asked how he has implemented cloud computing into his works, Dr. Keif laughed and responded, "When I was a cost estimator, we didn't even have the Internet...let alone cloud computing." Despite not being able to work with cloud models, Dr. Keif admitted that cloud computing is "without a doubt the future for an industry." Although not able to take advantage of these models while being a cost estimator, Dr. Keif certainly has taken advantage of platform provider models as a professor. Dr. Keif now hosts online podcasts of his lectures for students to download. He also encourages the usage of cloud drop boxes for assignments. "I am not so sure that students' performance is increasing, but it is my goal to be able to provide means for them to learn," Dr. Keif reiterated. Cloud computing has allowed Dr. Keif more time to spend providing meaningful examples in class, rather than wasting time while instructing "textbook style"

lessons.

I asked Dr. Keif about the negative aspects of cloud computing. Dr. Keif suggested that security is a main concern. "I think the biggest thing is security. When you upload information, who is going to be the ones making sure its safe. There certainly hackers out there, and so secure information may or may not be safe," Dr. Keif answered. He also responded with a concern for the limits of bandwidth for users of cloud computing models. He issued, "I have some students who can't get my lectures because the bandwidth they have isn't large enough to be able to download the material." At the conclusion of the interview, Dr. Keif listed benefits of cloud computing to include "ease of access and large scalability." He also mentioned some concerning areas such as security of content and proper bandwidth functionality.

I asked Dr. Keif about the positive aspects of cloud computing. He commented about the ease in accessibility with cloud models. Dr. Keif mentioned, "Being able to access large amounts of data from virtually anywhere is very useful." He speculated that as an estimator it would be convenient to have access to company information, and product information stored in a cloud. This would save time, and also money for the company.

Finally, I asked Dr. Keif how he anticipates cloud computing to benefit the printing industry. He answered, "There is no question that it will be beneficial." He continued to stress the importance about accessibility. The ability for workers and customers to access files so easily is unprecedented. Dr. Keif also mentioned that it will be a big cost saver for companies to be able to store enormous amounts of data on an online server.

This study interviewed Dr. Brian Lawler, professor at California Polytechnic State University San Luis Obispo in the Graphic Communication Major. Dr. Lawler has extensive knowledge concerning the printing industry. He has founded his own printing operation, and

35

managed it for a number of years. He has since been an advisor for several world renown corporations, including Apple and IBM. He currently is a professor, and instructs courses in printing technologies and theories.

When asked how he had implemented cloud computing into his work, he remarked, "This technology was not in existence when I was an advisor. But we still tried to find ways to make the transfer of information useful."

When asked what he anticipated would be negative aspects for cloud computing models, Dr. Lawler replied, "I would imagine that security would be a big issue. And also the bandwidth at which file size can be accessed." Dr. Lawler continued to point out that several companies would not move their valuable information to an online server, simply because of the vulnerability of file corruption. This could be a major concern for platform providers as a cloud model.

When asked what positive aspects cloud computing presented, Dr. Lawler responded, "There are so many things that are great about this type of technology." One of the main things that cloud computing can provide is the means to operate and access information almost instantaneously. Dr. Lawler described his business trips, and how he would do consultations via the Internet, "We would use iChat, and transfer content via email." iChat is a social application that allows users to video conference through the means of the Internet. Although Dr. Lawler was able to share information and data, the usage of email to accomplish this task is constricting, in regards to file size and bandwidth capabilities. The uses of today's cloud computing model would eliminate dilemma that Dr. Lawler faced during his consultations.

When asked how he thought cloud computing could benefit the print industry, he answered, "Tremendously. I think this will be the next step in technology." Although there are

inherent issues regarding security and bandwidth accessibility, this technology will undoubtedly save time and cost for companies.

In an effort to better understand the ideas of the professionals whom were interviewed, I constructed a table which highlights the main concerns for each question. It can be proved that this technology has trends concerning negative and positive aspects for the applications it can provide. However, the most important thing to note is the overwhelming support for the ways in which cloud computing models can benefit the printing industry. It is evident that cloud computing has already enabled companies to pursue new markets, and help alleviate low profit margins.

Table 4.1: Analysis of Answers from Professional Interviews

Question 1: In which ways have you or do you plan to implement cloud computing in our organization?	No. of times referred to
I have implemented cloud computing models into my organization.	3
I have not implemented cloud computing models into my organization.	0
I had not the opportunity to implement cloud computing models into my organization.	2

Question 2: What do you see as being negative aspects of cloud computing models?	
Security. The idea of storing files in a cloud without the proper security, and assurance that my files will be safe.	22
Bandwidth. The concept that because the cloud allows such large files, the rate at which I will be able to process those files will be inadequate.	16
Expensive. The cost to move my operation to a cloud model will cost me too much money. The purchases of loans for Software as a Service models is too costly.	4
Technological Issues. My employees and customers will not have the ability to access these files once they are stored in a cloud. The software that is licensed will not work properly.	14

Question 3: What do you see as being positive aspects of cloud computing models?	
Saves time. The time that is saved for my employees and customers translates into money that is being saved, and time that can be spent on other projects or with other clients	24
Saves money. The cost of storing and accessing information is significantly reduced. Software applications and production of other materials is saved because of online files.	18
Ease of use. It is much simpler to be able to access files and display information for employees and customers.	14
Accessibility. The fact that information can be viewed and accessed from any computer via the Internet.	30

Question 4: How might cloud computing models be able to benefit the printing industry specifically?	
Open new markets. The timeliness for information availability will provide for new markets. The time and costs saved can be focused towards creating new markets and services for my organization.	26
Better quality service. This technology has allowed my employees to operate more effectively. The time saved has made my clients more satisfied with my organization's work.	20
Saves money. The money saved for in-house storage costs and IT specialists allows for less money spent. The time that is saved, in turn creates for higher profit margins.	34
Virtual workplace. The accessibility of this technology allows employees and customers to access information from anywhere, allowing work to be done at anytime and thereby increasing efficiency of company.	36

Chapter Five: Conclusion

Throughout human existence, the progression of life has resulted from the creation of new innovations. It is human nature for people to experiment new and innovative means to obtain profitable and meaningful results. If these attempts fail, people conduct an analysis to identify errors, and then proceed to the next attempt. By this technique, there have been several historical innovations that can be noted, i.e., the invention of flight, the light bulb, the generation of energy, the automobile, etc. Each of these innovations has forever changed people. Especially with technological innovations, there is great potential to increase efficiency and create paradigm shifts.

In recent years, the printing industry has experienced a great downfall. Sales numbers appear to be staggering, and print operations are being forced to consolidate or close down. The workforce has seen a tremendous drop in every market of the print industry. The need for new technology and methods seems apparent.

The purpose study is designed to formulate a conclusion if cloud computing models will benefit the printing industry, raise profit margins, and create new markets. Through historical and descriptive research, and elite and specialized interviews, there appears to be a concise answer to how cloud computing can fulfill these needs.

The publication market has suffered tremendously. There is an indication that new methods and technologies must be introduced to help save costs, and increase production. Professionals have pointed out that a substantial amount of the newspaper market's losses are due to financial reasons. It can be understood that current models and technologies that exist within the newspaper market are not providing profitable and efficient means to conduct

business. With more cost effective and efficient ways of conducting business, perhaps newspapers will be able to raise production rates.

Much like the newspaper market, magazine corporations are trying to balance between financial decisions and finding effective means to still sell product. The research provided confirms the decline in sales and cutbacks of production for the magazine market. Lawhun, of the San Francisco Library, revealed the truth about today's average consumer. She indicated that he/she is concerned with up to date, instantaneous information. Although more magazine titles are moving towards and online presence, the concepts of instant information availability in order fuel these services is still being developed. With new technology that can enable fast, and easy transfer of information, perhaps the magazine market will be able to reduce costs, and create new markets within their target audiences.

The printing industry is losing considerable profits, and has forced to shut down plants, cut back on production, and downsize its workforce. It is clear that new technologies must be introduced in order to generate profits, and increase production of print material. Cloud computing is one such technology that can fulfill these needs.

Cloud computing models are very appealing, especially to the print industry with its current depressed state. The needs to improve sales and generate new markets can be accomplished with the implementation and utilization of various cloud models.

Cloud computing, as a platform provider will help print companies improve profit margins. Reports concerning the publication and commercial markets have revealed that print companies are in need for more cost effective ways to conduct means of printing. Cloud computing provides a more cost effective way of storing, and accessing data information. With the abilities to transfer and store large amounts of data, companies are able to maintain costs for

in-house data backup services. No longer will companies be forced to purchase costly computer mainframes to provide data backup on files. In addition, cloud computing as a Software as a Service model will serve to reduce costs well. Software as a Service will allow for companies to purchase software at a lower cost. Rather than having to resort to the purchase of numerous software licenses for a company, the concept of "leasing" or having "on-demand" software will result in cheaper means to execute projects. Time is also a cost advantage that is gained by cloud computing solutions. It is commonly said that "time is money." This is extremely true with the print industry. The longer time it takes to finish a project, the more money it ultimately costs the company. Cloud computing models will allow for quicker speeds for every asset of the print production cycle, including: collaboration, design, proofing, prepress, printing. With the availability that the platform provider model presents, data can be accessed instantaneously. Software as a Service models allow for users to access any number of applications by simply logging onto the Internet. The benefits gained through cloud computing models have proven to help eliminate costs, and therefore increase profit margins.

Cloud computing can also provide the means to establish new markets within the print industry. As innovations with technology continue to be introduced, consumers are beginning to develop new needs and expectations. As a result, the magazine and newspaper markets are beginning to focus more with developing a presence online. Therefore, the need for data transfer, hosting, storage, and accessibility is needed. Cloud computing helps to provide these means. Virtual clouds will be able to be accessed at any point in the world, and at any time. This will allow companies to produce information for their consumers at a faster rate. Software as a Service models will also lead to the formation of new markets. By using software and templates available online, users will be able to fully customize materials and proceed to have them

printed. This presents an entirely new market that the print industry has not yet seen before. Cloud computing models will help generate new markets for the print industry. With models that promote both users and vendors the capabilities to introduce new and innovative products, new markets can be introduced to the degree that the print industry has not yet witnessed.

Today's society is riddled with technology. Televisions are growing in display size and projecting clearer definition than ever before imagined. Video technology has moved from video cassette tapes to Blu-Ray technology within a mere decade. Cell phones are now able to stream live coverage of news and sporting events. Doctors are now able to utilize instruments to virtually take a tour of the human body. It appears that everyday new innovations are being introduced. The debate continues if these technologies are actually improving the quality of human life.

In the world of the printing industry, it is very simple to debate if technologies are indeed improving the quality of the industry. The universal truth of printed materials is translated into the three components of time, quality, and cost. It is commonly said that it is nearly impossible to be able to deliver high levels of each component into a print job. However, recent cloud computing technology has made it possible for both users and vendors to share all three components. Time is maximized with the advent of platform providers that can host large amounts of data to be accessed on-demand. Quality is assured with cloud computing allowing vendors to track the progress of jobs virtually, and consumers having capabilities to view proofs of designs and projects online. Lastly, cost is maintained with cheaper means to backup information, and access software applications. By definition, cloud computing will improve the quality of the print industry.

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