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Business Roundtable
Institute for Corporate Ethics

**Innovation, Ethics,
and Business**

Kirsten E. Martin

Featuring a *Thought Leader Commentary*™

With Anne M. Mulcahy, Chairman and Chief Executive Officer,
Xerox Corporation

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CONTENTS

Foreword	3
Introduction	4
Ethics of Innovation	4
Rules of Innovation	4
Case Study: Google, Inc. in China	9
<i>Background</i>	
<i>Assessment of Google, Inc. in China</i>	
How to Innovate Ethically	11
Conclusion	12
Thought Leader Commentary™ with Anne M. Mulcahy	14
About the Authors	17
End Notes	18

FOREWORD

The Business Roundtable Institute for Corporate Ethics is an independent entity established in partnership with Business Roundtable—an association of chief executive officers of leading corporations with a combined workforce of more than 10 million employees and \$4 trillion in annual revenues—and leading academics from America’s best business schools. The Institute brings together leaders from business and academia to fulfill its mission to renew and enhance the link between ethical behavior and business practice through executive education programs, practitioner-focused research, and outreach.

Institute Bridge Papers™ put the best thinking of academic and business leaders into the hands of practicing managers. Bridge Papers™ convey concepts from leading edge academic research in the field of business ethics in a format that today’s managers can integrate into their daily business decision making.

Innovation, Ethics, and Business is an Institute Bridge Paper™ based on the research of Institute Fellow Kirsten E. Martin, Ph.D., assistant professor of business and economics at The Catholic University of America. Martin’s research empowers executives to make better ethical decisions by giving them tools to recognize potential ethical conflicts with innovation.

The accompanying interview with Anne M. Mulcahy, chairman of the board and chief executive officer of Xerox Corporation, takes up some of the key issues in innovating ethically in business. This piece addresses challenges such as ensuring that inventions ‘match’ the needs of the market, monitoring and adjusting for unintended consequences of innovations, and assessing the overall impact of innovations.

INTRODUCTION

The words innovative and innovation are bantered about in the media, in business, and in our everyday lives. The words evoke a feeling of progress with technology moving us upward and forward while simultaneously pushing aside existing, soon-to-be-outdated, technology. How does business handle this disruption? How can we think about the responsibility for the innovation and the associated wake of changed beliefs, behaviors, and relationships?

...innovation includes making a match between a solution and a community.

As innovation researcher and best-selling author Harold Evans notes, “It has been said that a scientist seeks understanding and an inventor a solution, to which we might add that an innovator seeks a universal application of the solution by whatever means.”¹ For Evans, the difference between invention and innovation is profound: innovation includes making a match between a solution and a community. As with all business decisions, however, innovations carry ethical implications which must be addressed.

ETHICS OF INNOVATION

Innovation has never been without scandal. From the steamboat to the camera phone, innovations push communities to the frontier of their knowledge and their comfort zone.

Before embarking on the telegraph (itself the ire of the Pony Express), Samuel Morse was forced to defend his innovative photographic technology from an assault by the painting community. In another example, some declared the steamboat to be an abomination against God for bringing together fire and water.² Businesses that shepherd innovations are left to deal with the aftermath of their ground-breaking technologies.

The view of innovation offered here incorporates the inventiveness of the technology with the impact on the community and addresses the ethics of innovation, often overlooked when solely focusing on the technology.

As demonstrated below, viewing the innovation as a combination of technological invention within the context of a community helps frame the issues, praises, and complaints common to the process of innovation. The key rules of innovation should guide managers as they make important decisions about their innovations and help their business create innovations that are both good for their organization and good for the community. As we see through countless examples, such mutually beneficial innovations are sustainable.

RULES OF INNOVATION

1. Innovations are new to a community.

The fact that innovations are new is not a novel concept. However, it is necessary to be more precise—the newness comes from a new technology-community relationship. Innovators marry an invention with a community, thereby making an invention innovative.

Edison recognized the importance of an invention reaching the market, or a broader community, as a sign of its innovativeness.

Perhaps the Internet provides the best example. The initial development and use of DARPNet (the current Internet) was for military use. Slowly, use of DARPNet filtered over to academics within universities to work on large projects simultaneously yet across great geographic distances. The Internet as an innovation was recognized only when it reached a larger, more general, community. Historians talk about the Internet as a disruptive force or market-changing in relation to its use by the non-academic, non-military community. And the disruptive force of this technology persists as new technology-community relationships are continually innovated.

Evans refers to many innovators as democratizers—innovators who are constantly taking new inventions to more varied communities. Thomas Edison is credited with inventing the light bulb; however, Edison focused on taking inventions (created by himself or a coworker) to new communities and societies. He measured an innovation's success by its proliferation in a community: "Anything that won't sell, I don't want to invent. Its sale is proof of utility and utility is success."³ Edison recognized the importance of an invention reaching the market, or a broader community, as a sign of its innovativeness.

2. Many people are affected by and have an effect on an innovation.

We tend to focus on the user or the point of purchase when assessing a technology for market. Many more people, however, are affected by and actually affect an innovation. Sometimes, the end user is not the person making the buying decision (e.g. large organizational purchases, governmental contracts, minors with adult purchasers).

Separate from the organizational stakeholders, an innovation relies upon users, ancillary materials, technologies, and organizations to survive. When the camera phone was initially introduced in Asia, 14-year-old-girls were the assumed users. Their needs (colors, ease of use) were incorporated into the design. As the innovation was absorbed into the community, unintended uses and consequences began to emerge. Middle-aged men took hold of the innovation and began using the silent, small camera to take voyeuristic pictures of women. Camera phones were used in corporate espionage. At times, the innovation was banned at the corporate offices of the very companies that developed them. Assessing the stakeholders of the technology minimizes such damaging and unintended (yet foreseeable) consequences.

For innovative technologies, identifying the specific names and faces of stakeholders who are impacted by and impact the technology not only helps to circumvent unintended consequences and uses of the innovation, but also allows the business to create a community around the innovation that previously did not exist. This community or network of stakeholders reinforces the use of the technology and will increase the longevity of the innovation.

For example, both Linux for its operating system and Macintosh for its personal computer created strong ties between members of their user and stakeholder communities. Even with initially small market share, these innovations continue to flourish. The Internet facilitated collaborations between stakeholders and innovators through community bulletin boards, thereby supporting a sustainable innovation that fits within its community.

3. Innovations disrupt the status quo.

The goal of innovations is to upset current beliefs, behavior, relationships, and technologies for a given community. The automobile disrupted the horse and buggy system. The telegraph disrupted the Pony Express. Linux interrupted the proliferation of Windows®. As technologist Langdon Winner points out, innovations such as the tomato harvester necessitated the hardened tomato to withstand cultivation, and the bridges to Jones Beach in New York facilitated the discrimination against public transportation and its riders because they were structurally too low for buses.

Economist Joseph Schumpeter refers to this phenomenon as “creative destruction.” While Schumpeter was concerned primarily with existing technology, innovations can also destroy existing systems of technology and individuals. Jobs can be lost as was the case with both Winner’s tomato harvester and McCormick’s mechanical reaper. McCormick’s mechanical reaper was an amalgamation of existing inventions yet was particularly effective.⁴ Innovations change people’s lives with both short- and long-term impacts. The loss of jobs to the reaper and the

harvester freed labor for use in a more productive and less labor-intensive manner—sometimes literally—as in the case of slaves in the South and the indentured servitude of illegal immigrants in the West.

The implications of innovations are understood within the surrounding community. As has been well publicized over the past decade, the issues faced by Nestle with infant formula in Africa

The goal of innovations is to upset current beliefs, behavior, relationships, and technologies for a given community. The automobile disrupted the horse and buggy system. The telegraph disrupted the Pony Express.

were completely different from those faced in the United States. While the technology (supplemental feeding for infants) was identical in each location, the community-technology relationship worked in the United States but failed in Africa.

Infant formula within the United States became an integral part of parenting and allowed many who could not breastfeed adequate nourishment for their children. In Africa, however, the introduction of formula to new mothers created a continuing reliance on safe water (which was not available) and education (which was not provided). Its introduction not only dissuaded new mothers from breastfeeding but made such activity physically impossible. When

mothers did not use their breast milk, the quantity available for feeding naturally diminished.

The implications of such disruptions must be assessed within the community of the innovation. The tomato harvester, low-lying bridges, and infant formula: each innovation produced different reactions dependent upon the context of the community.

4. Innovations are a shared responsibility.

By viewing the innovative process as bringing together technology and communities, the innovation and its consequences become a shared responsibility. The community has a responsibility to use the technology within a given range of permissible behaviors and to incorporate rules and norms to support the technology. The innovating firm, however, has a responsibility to understand the community into which the innovation is being introduced.

In the case of the camera phone, acknowledging the responsibility of the organizations that introduced the camera phone for their role in allowing the technology to be used for surveillance and voyeurism does not diminish the responsibility of the spy or observer. In fact, acknowledging the shared responsibility might have led to incorporating appropriate modifications when the camera phone was later introduced into the United States. Instead, design modifications, which could have alerted people to the potential of being photographed, were never introduced.

Business involvement in Nazi Germany and Apartheid South Africa drew similar criticisms for supporting

dangerous regimes through innovative activity. While not responsible for the decisions of the government, U.S. companies who marketed their technologies drew criticism for allowing their technology to be a party to the illegitimate behavior of the respective governments.

The innovating firm, however, has a responsibility to understand the community into which the innovation is being introduced.

Alternative views place the responsibility on the *technology* by declaring the communities of users and stakeholders as beholden to the dictates of the innovation. The community is assumed to be too ignorant or incapable of modifying the new technology. Others declare, “Let the buyer beware”—usually when they are not the buyers or in the community of the novel innovation—placing sole responsibility on the community to use the innovation appropriately. This argument, however, ignores the *newness* of the innovation in the new community. Those knowledgeable (the innovators) have a shared responsibility to shepherd the innovation as it is introduced into new communities.

For example, in its efforts to take responsibility for the environmental impact of its products, Xerox has worked to achieve “chain of custody” certification for its distribution centers, whereby all products are certified as having been produced in livable working conditions and by preserving forests, wildlife, and

waterways.⁵ In doing so, Xerox has taken on a role to ensure that all parties throughout the production process meet its standards for sustainability. Not only is Xerox focused on its suppliers and distributors, but the organization “is greening its own operations, recycling its copying machines and helping its customers achieve their environmental goals.”⁶ Xerox is being proactive in sharing responsibility for the environmental impact of its products and services.

5. Successful innovations require continual modifications.

As Evans notes in his book on innovators in the United States, “Nothing works the first time.” Those innovators who have the tenacity to remain engaged with the community to both understand their needs, norms, laws, and beliefs and modify their innovations to meet the community, increase the longevity of their technology while continuing to take responsibility for their portion of the innovation.

IBM designed its marketing and pricing around this idea. When Roosevelt opened the government coffers with the introduction of the New Deal, IBM was “uniquely able to satisfy the requirements of the bureaucracy in 1935. A sold machine was out of sight, out of mind. A rented machine required IBM technicians to be on hand, repairing and updating, and inevitably they acquired an awareness of present—and future—needs. This liaison, developing into a partnership, was very much to the benefit of both sides.”⁷

Similarly, Xerox retains sociologists called workplace specialists to match the innovation to the needs of the customer and the way they work and to

avoid unintended uses (or non-uses!) of a disruptive innovation.⁸ In doing so, Xerox modified its product—in this case, paper—to make it reusable after noting that 40% of paper at a customer site is thrown away. As Xerox’s CTO Sophie Vanderbroek states, an “innovation is only innovation when the creative idea makes a difference to our customers,” and retaining a connection to the customer allows Xerox to make modifications to its product to meet its customers’ changing needs.⁹

...user needs, context, and stakeholders change over the lifespan of an innovation.

Remaining engaged allows businesses to help shape the innovation as both unintended uses and unintended consequences erupt during its continued use. In this way, innovators are able to share responsibility for the ultimate impact of their innovation. Furthermore, user needs, context, and stakeholders change over the lifespan of an innovation. Maintaining engagement in the ongoing relationship allows innovators to continue to innovate, addressing those changes as is demonstrated by IBM’s ability to meet the needs of its customers.

6. Features matter.

Finally, small design decisions make a difference in the use, consequences, and sustainability of an innovation. Many times these differences in features set apart the successful from the unsuccessful innovations.

For Otis elevators, not requiring central power for the operation of

the safety elevator acknowledged the circumstances of most building operators. For Ford and the Model T, moving the steering wheel to the left side of the automobile was a design decision that anticipated a driver's need to focus on other drivers rather than ditches on the side of the road.

And these design decisions often have moral implications—particularly for innovations where users and other stakeholders do not have the experience or knowledge to modify by definition the new technology. In previous examples, the camera phone without a warning sound allowed unsuspecting objects of photography to have their privacy violated, and the height of bridges along an overpass became a discriminatory technology.

CASE STUDY: GOOGLE, INC. IN CHINA

Background

To illustrate the importance of context in understanding innovations and technology, consider the case of China and the Internet. The introduction of search engine technology to China has not gone smoothly for any U.S. company. Yahoo! has come under fire for releasing the name of a journalist/blogger to Chinese authorities thereby providing the evidence necessary to send the dissident to a prison camp. Microsoft took down a blog at the request of Chinese authorities for this person's writings about China. Cisco Systems came under congressional inquiry during hearings for providing the technology to develop the vast Chinese Firewall by which the Chinese government monitors

and filters Internet communication.

Google, Inc. maintained a certain distance from the fracas by only developing a U.S.-based, Chinese-language version of its technology without filtering of search results or relations with Chinese authorities. After Chinese authorities, however, made Google's search technology inaccessible for Chinese users, Google, Inc. decided to look into developing a search engine within China, therefore, abiding by Chinese regulations. After a year of consultation with China-Internet experts, NGOs, and business leaders, Google, Inc. decided to deploy its own

Google, Inc. took considerable time and effort to understand how its search technology would work within China and made adjustments accordingly.

innovation within China by developing a Chinese search engine complete with filtered results to appease the censors. Additionally and substantively different from their competitors, Google, Inc. decided to maintain all personal information associated with e-mail and web logs outside Chinese territory and the jurisdiction of Chinese authorities.

For this decision, Google, Inc. received a tremendous amount of public scrutiny. Its "Do no evil" slogan has been ridiculed, and it was called before the U.S. Congress (along with Yahoo!, Cisco, and Microsoft) to defend its decision to work in concert with Chinese authorities. Many pointed out the

similarities between these U.S. Internet companies' involvement with China and previous issues in Nazi Germany and South Africa. The search technology was being used in concert with a totalitarian regime's efforts to monitor and control its citizens.

Assessment of Google, Inc. in China

Google, Inc. has come under fire for following in the footsteps of the rest of the industry. When Google's innovative search technology is assessed in light of the innovation rules discussed earlier, the differences between Google's innovation and others' innovations become clear.

First, public outcry, opinion columns, and congressional hearings demonstrate the importance of context in assessing an innovation. While the Cisco representative defended his company's actions by declaring that the technology implemented for Chinese authorities is the same as that implemented everywhere else, the defense fell on deaf ears. The routers, while commonplace within the United States, are an innovation within China and need to be assessed within their new environment. The same holds true for search technology, and Google, Inc. clearly understands this phenomenon. Google, Inc. took considerable time and effort to understand how its search technology would work within China and made adjustments accordingly. **Rule #1: Innovations are new to a community.**

Second, China's Internet system is a complex network of people and organizations that needs to be acknowledged when assessing Google's search technology. Multiple governmental agencies, cyber cafes,

cyber police, regulated content providers, regulated access providers, NGOs, reporting fellow citizens, users, users' families and friends, and even villagers without electricity impact and are impacted by Google's search technology, Google.cn.

The Chinese government has an interest in keeping dissent at a minimum and protests nonexistent. The authorities feel the impact when more and more information is traded among their citizens, therefore, increasing their regulation of Internet providers and their surveillance and arrests of citizens. NGOs and dissidents attempt to provide access to unfiltered information by developing ways around the government filters. By taking into consideration the many stakeholders of its technology,

News of SARS, contaminated rivers, AIDS, jailed dissidents, Tiananmen Square, or Tibet is no longer controlled by Chinese authorities.

Google, Inc. was able to balance its goal of providing as much unfiltered information as possible with the Chinese government's goal of filtering search results and monitoring the use of the Internet. Google, Inc. identified more than just the end user when assessing (and continuing to assess) its decision to enter China. Focusing on the market when assessing China would leave many important stakeholders out of the equation. **Rule #2: Many people are affected by and have an effect on an innovation.**

Third, the reaction of the Chinese authorities to the introduction of search technology illustrates the degree to which innovations can disrupt the status quo. The proliferation of uncontrolled, unfiltered information throughout its citizens has led Chinese authorities to invest incredible time and money into a robust Internet surveillance program consisting of over 30,000 Internet police, propaganda, monitoring technology, and regulations in an attempt to recreate the status quo. News of SARS, contaminated rivers, AIDS, jailed dissidents, Tiananmen Square, or Tibet is no longer controlled by Chinese authorities.

Rule #3: Innovations disrupt the status quo.

Fourth, as evidenced by its lengthy deliberations before the introduction of search technology into China and its public comments in its aftermath, Google, Inc. acknowledges its role in the innovative process. Google, Inc. participated in congressional hearings and was the only company to respond to Xiao Qiang, U.C. Berkeley professor and well-known China-Internet scholar, who went to investment firms to track companies and their involvement in China. Google, Inc. has remained involved in the discussion around Internet search technology and China; it has not merely thrown the technology into China and attempted to walk away.

Rule #4: Innovations are a shared responsibility.

Fifth, Google, Inc. has made it clear that its current decision is constantly under review and will be reassessed over the coming months and years. While Cisco's John Chambers stated that the company does not "see the implementation that is done by the user," Google is staying involved in the

implementation and use of its innovation. Co-founder Sergey Brin stated, "I think it's perfectly reasonable to do something different. Say, OK, let's stand by the principle against censorship and we won't actually operate there.... That's an alternative path. It's not the one we've chosen to take right now."¹⁰ Google's decision was "based on what we know today and what we see in China"¹¹ and is something that is under review.

Rule #5: Successful innovations require continual modifications.

Finally, Google, Inc. decided to develop a physical presence closer to the actual Chinese user, and thereby, is not obliged to the Chinese government's own filters sitting at the Chinese border. Google's Gmail and web logging services, however, reside outside the Chinese border where Google can best protect the identity of its users. This brings us to the sixth point: design decisions matter. The decision to split the technology into search, e-mail, and blogging with different rules and locations for each suits the context of the Internet in China. Such differentiations are not necessary in the United States. Furthermore, Google, Inc. has attempted to notify users of filtering based on governmental rules. This differs from those search engines that simply do not list the filtered results, leaving the Chinese user ignorant to the presence of filtering. **Rule #6: Features matter.**

HOW TO INNOVATE ETHICALLY

Coupling the outlined framework with the case example of Google, Inc. in China leads to questions that guide the development of ethical innovations.

- o **Community.** Innovations happen within communities possessing existing and changing norms, knowledge, relationships, technologies, and beliefs. During innovation we begin to ask the question: Are we assuming a new community will react similarly to a community currently using the technology? What are the lessons learned from the technology's current use?
- o **Stakeholders.** Users are but one stakeholder to innovations. Innovators should seek to analyze the community impacted by their innovation. How is it different from the current users of the technology? Who will be impacted by this innovation? Who will impact the use and continuing development of this innovation within the community?
- o **Disruption.** Ethical implications exist whether we acknowledge them or not. It is important to ask: Who is adversely affected by this innovation? Are we effective at achieving the given task? Are we maintaining the rights, autonomy, and dignity of the community by not treating stakeholders as mere means to the goals of the technology?
- o **Responsibility.** Responsibility is

Defining innovation as the relationship between a technology and a community accounts for the many times a technology can be innovative as it is deployed to different communities.

shared and cannot be placed solely in the hands of either the technology or the community. As innovators, we must understand our part in the ongoing use and misuse of the innovation. How can we make sure we can rectify eventual issues that arise from the innovation?

- o **Modifications.** Innovations have a lifespan, while the needs of stakeholders change. How can we design and deploy the innovation so that we stay involved with the innovation?
- o **Features.** Features matter for stakeholders, technological longevity, community impact, and innovative sustainability. How can we accommodate the many needs of the stakeholders in the design of the technology?

CONCLUSION

Innovators are matchmakers who introduce an invention previously used in another market, a lab, on a patent application, or in someone's head, to a new community. An innovation is novel to someone or some people. It is applied in reference to a community of users and other stakeholders not familiar with a technology. Defining innovation as the relationship between a technology and a community accounts for the many times a technology can be innovative as it is deployed to different communities. This focus on the relationship also highlights the shared responsibility for the consequences of the innovation.

Many may question whether acknowledging the ethics of innovation would make the technology less scientific or objective. Ignoring the moral implications of an innovation, however,

does not make the implications go away. The suggestions for developing an ethical innovation are just good business. Sustainability in the market, a goal for most innovators, requires acknowledging the relationship between technology and community with its ethical implications, shared responsibility, and mutual goals.

Business has a tremendous role in being the engine of innovation for many communities. Acknowledging that role and the responsibilities it carries will allow businesses to create value for themselves and their many stakeholders. Ethical innovation produces a sustainable competitive advantage for the organization, creating good technology-community relationships.

Business has a tremendous role in being the engine of innovation for many communities.

A THOUGHT LEADER COMMENTARY™ with Anne M. Mulcahy, Chairman and Chief Executive Officer, Xerox Corporation

Q: One unique aspect of Xerox's approach to innovation includes sending in a team of work practice specialists (psychologists, ethnographers, anthropologists, sociologists) to assess the customer's needs. How has this strategy helped to bridge the gap between invention and innovation?

Anne M. Mulcahy: That question sounds much more clinical and formulaic than what I think we actually do. We simply try our best to understand what the customer wants and needs, and we try to do so in a way that takes us and our customers beyond what they simply think they want and need. The scientific elements you reference are transitioned from scientific studies at our research centers, such as Palo Alto Research Center (PARC), and are comprehended in some of our service offerings, such as Office Assessment Services.

Ethnographers are basically anthropologists who study the current state of affairs. Rather than digging through ruins, artifacts, and documents of ancient societies, the ethnographer engages in direct, live observation of an existing society or community. In our case, that society is the customer's work environment. It gives us an opportunity to study and analyze how customers actually do their work. With the addition of some basic psychology and sociology overlays, we can map out the existing workflow and design new, smarter, and perhaps more innovative ways for the customer to work.



Anne M. Mulcahy

The bridge between invention and innovation, therefore, is understanding which of our technologies, our inventions, is the best fit for the customer's unique needs and circumstances. We can then deliver the best solution—something innovative—for the customer.

Q: How does Xerox assess the overall impact of its innovations?

Mulcahy: I think it was said best by Thomas Edison, as referenced in this paper, that the true measure of success for innovation was its acceptance and proliferation in the marketplace. When Xerox introduced photocopying to the marketplace nearly 50 years ago, the transformation of the office environment was unimaginable. Yet today, we can

scarcely imagine a world without the innovation unleashed by this invention.

As for assessing the impact beyond economic viability and success, you're basically talking about what we call corporate social responsibility (CSR) today. Well-implemented CSR trains you to look at any issue, impact, or innovation from multiple perspectives—essentially through the eyes of all stakeholders. The added nuance with innovation, however, is that none of your existing stakeholders may have the insight to imagine and anticipate unforeseen and unknown applications or misapplications of your new technology. I think the best you can do is ask yourself if there are other stakeholders not currently at the table who should be considered, including undesired stakeholders, such as those who would intentionally misuse new technology for their own gain and unintended purposes. In our situation, it's typically counterfeiters who take advantage of the quality of color printing to unlawfully reproduce currency, tickets to events, etc. We know how powerful our technology can be in this regard, so we work with government agencies like the Secret Service to help counteract counterfeiters, often catching them at their own game while ensuring we protect and maintain the privacy and confidential data of legitimate users and customers of our technology.

That's just one example of why, with any invention, you need to look at the possibilities through a wide scope and understand the desired and not-so-desired implications for all stakeholders. At the end of the day, we want Xerox innovation to help our customers do better work, making it easier, less costly, faster, and more adaptable. And we want

to do it in such a way that we continue to live our values as good corporate citizens.

Q: Rather than trading off the creativity of engineers with the needs of customers, what does Xerox do to ensure its inventions 'match' the needs of the market?

Mulcahy: Market research certainly plays a role, but consider the fact that there was no research to tell Chester Carlson to invent xerography. The brilliance of unconstrained creativity is that it often leads to inventions we never knew we wanted. Certainly Apple's iPod is a great example of that today. Xerox is currently working on self-erasable paper. Innovation is brewing in our research labs from other work we perform on paper. Then, there was an 'a-ha' moment that started transitioning the creative thoughts into invention. Xerox researchers often tell me that the vast amount of invention and innovation comes through accident. And that tells me that they need to have a certain amount of freedom to explore and to innovate so that accidents can turn into market-making inventions for which the research then has even more value.

Q: In addition to Xerox's leading practices in innovation, it has long been known for its strength in leveraging diversity. How do these two values reinforce one another?

Mulcahy: I can hardly imagine two more complementary forces. Innovation will best be maximized by foreseeing and capitalizing on as much potential as possible. You need to assess standard applications, hybrid applications,

mainstream markets, niche markets, mature businesses and customers, and evolving or developing markets. There is simply so much diversity that needs to be comprehended when bringing a new product or service to the marketplace. What better way to ensure that marketplace diversity is truly recognized, considered, and valued than building it right into your own infrastructure.

Q: This paper argues that companies have an ethical responsibility for ushering in new innovations and for monitoring and adjusting for unintended consequences. Has Xerox ever introduced a new invention that ended up having unforeseen consequences, and if so, how did you manage that issue?

Mulcahy: Well, way before my time, when the first photocopiers were introduced, some of them would occasionally catch on fire, due to the fuser that embeds the toner on the paper being so hot. A high volume of copying could cause the fuser to overheat and ignite the paper, especially if there was a paper jam in the fuser area. Xerox sent out free fire extinguishers with many of those first copiers along with appropriate warnings and labeling.

Today, photocopying, scanning, and printing have all evolved way beyond fire hazards. The output of a copy or print is so good that it rivals the original. This of course makes it susceptible to misuse, such as counterfeiting or digital alteration. We have added technology to many of our high-end color products that can detect when users are trying to scan and/or digitally alter certain original documents, such as currency, stock certificates, even car titles. If you try to photocopy a Connecticut car title,

for example, the copy looks identical to the original except for the word 'VOID' in one-inch high gray letters printed generously in the background that is not visible on the original document.

Q: Xerox's primary stream of research focuses on the nexus between the paper and digital worlds and making the transition from one to the other as seamless as possible. How does this focus create value for your customers and for your shareholders?

Mulcahy: We really focus on the document itself and the intended uses for it. Who is involved in the creation of the document? Editing? Reviewing? Reading? Actioning? Filing and storing? The document has many phases to its life. And considering all these users, we ask: Who needs it on paper versus the digital world? Our focus is manifold when it comes to the document. If you need it on paper, we ensure that each print is of the highest quality the first and every time. We ensure that paper, ink, toner, and energy are used efficiently. If you are working digitally, we help ensure that you can find the document you need when you need it. We enable effective and responsible document creation, editing, processing, and archiving. And finally, we can assess your work flows and identify when it is necessary to move between paper and digital. Helping our customers to be more productive is our business, and good business is good for our shareholders.

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Innovation, Ethics, and Business

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Thought Leader Commentary™

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