

Case 10 Eastman Kodak's Quest for a Digital Future

On January 19, 2012, the Eastman Kodak Company declared bankruptcy—it entered “voluntary Chapter 11 business reorganization.” Its two-decade journey of transition from traditional photography into digital imaging was effectively over. In 1990, Kodak had launched its Photo CD system for storing photographic images; in 1991, it had introduced its first digital camera and, in 1994, its new CEO, George Fisher, had declared: “We are not in the photographic business . . . we are in the picture business.”

With senior executives recruited from Motorola, Apple, General Electric, Silicon Graphics, and Hewlett-Packard, Kodak's digital imaging efforts had established some notable successes. In digital cameras, Kodak was US market leader for most of 2004–10; globally, it ranked third after Canon and Sony. It was a technological leader in megapixel image sensors. It was global leader in retail printing kiosks and digital minilabs.

Financial performance was a different story. In 1991, Eastman Kodak was America's 18th-biggest company by revenues; by 2011, it had fallen to 334th: over the same period its employment had shrunk from 133,200 to 17,100. During 2000–11, its operating losses totaled \$5.2 billion.

As Antonio Perez prepared for his new role under the supervision of Kodak's chief restructuring officer, James Mesterharm, he reflected on Kodak's two decades of decline. How could a company that had been a pioneer of digital imaging and had invested so heavily in building digital capabilities and launching new digital imaging products have failed so miserably to profit from its efforts? And what could he have done differently to have avoided this fate?

These same questions haunted the CEOs of other companies: if one of America's most successful companies could be destroyed by new technology, what did the future hold for their own businesses?

Kodak's History, 1901–93

George Eastman transformed photography from a professional, studio-based activity into an everyday consumer hobby. His key innovations were silver halide roll film and the first fully portable camera. The Eastman Kodak Company established in Rochester, New York, in 1901 offered a full range of products and services for the amateur photographer: “You push the button, we do the rest” was its first advertising slogan. By the time George Eastman died in 1932, Eastman Kodak was one of the world's leading multinational corporations with production, distribution, and processing facilities throughout the world and with one of the world's most recognizable brand names.

After the Second World War, Kodak entered a new growth phase with an expanding core business and diversification into chemicals (its subsidiary, Eastman Chemical, exploited its polymer technology) and healthcare (Eastman Pharmaceutical was established in 1986). Kodak also faced major competitive challenges. In cameras, Japanese companies came to dominate the world market; in film, Fuji Photo Film Company embarked on an aggressive international expansion. In addition, new imaging technologies were emerging: Polaroid pioneered instant photography; Xerox led the new field of electrostatic plain-paper copying; while the advent of the personal computer ushered in new image management and printing technologies.

Kodak was alert to the emergence of digital technology and introduced several products that embodied new imaging technologies:

- The world's first megapixel electronic image sensor (1986), followed by a number of new products for scanning and electronic image capture.
- Computer-assisted image storage and retrieval systems for storing, retrieving, and editing graphical and microfilm images.
- Data storage products included floppy disks (Verbatim was acquired in 1985) and 14-inch optical disks (1986).
- Plain-paper office copiers (Kodak acquired IBM's copier business in 1988).
- The Photo CD system (1990) allowed digitized photographic images to be stored on a compact disk, which could then be viewed and manipulated on a personal computer.
- Kodak's first digital camera, the 1.3 megapixel DCS-100, priced at \$13,000, launched in 1991.

Committing to a Digital Future

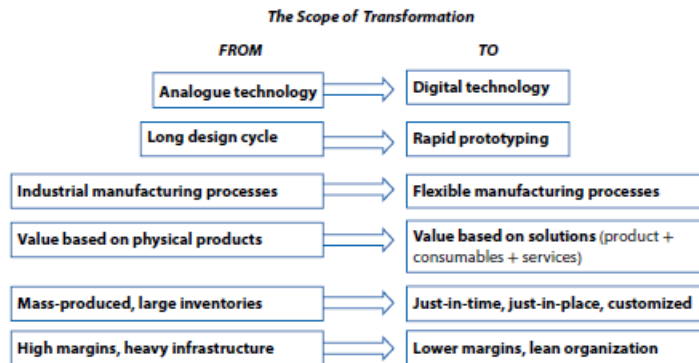
Kodak's commitment to a digital imaging strategy was sealed with the appointment of George Fisher as CEO. Fisher had a doctorate in applied mathematics, 10 years of R & D experience at Bell Labs, and had led strategic transformation at Motorola. To focus Kodak's efforts on the digital challenge, Fisher's first moves were to divest Eastman Chemical Company and most of Kodak's healthcare businesses (other than medical imaging) and to create a single digital imaging division headed by newly hired Carl Gustin (previously with Apple and Digital Equipment).

Kodak's Digital Strategy

Under three successive CEOs—George Fisher (1993–99), Dan Carp (2000–05), and Antonio Perez (2005–12)—Kodak developed a digital strategy intended to transform Kodak from a traditional photographic company to a leader in the emerging field of digital imaging. The scale and scope of this transformation was outlined by Antonio Perez in terms of the “fundamental challenges” that Kodak was engaged in (Figure 1).

During 1993–2011, Kodak's strategy embodied four major themes:

- an incremental approach to managing the transition to digital imaging;
- different strategies for the consumer market and for the professional and commercial markets;

FIGURE 1 Eastman Kodak's "fundamental challenges"

Source: Based upon Bob Brust, "Completing the Kodak Transformation," Presentation, Eastman Kodak Company, September 2005. © Kodak. Used with permission.

- external sourcing of knowledge through hiring, alliances, and acquisitions;
- an emphasis on printed images;
- harvesting the traditional photography business.

An Incremental Approach

"The future is not some harebrained scheme of the digital information highway or something. It is a step-by-step progression of enhancing photography using digital technology," declared Fisher in 1995.² This recognition that digital imaging was an evolutionary rather than a revolutionary change would be the key to Kodak's ability to build a strong position in digital technology. If photography was to switch rapidly from the traditional chemical-based technology to a wholly digital technology where customers took digital pictures, downloaded them onto their computers, edited them, and transmitted them through the Internet to be viewed electronically, Kodak would face an extremely difficult time. Not only would the new digital value chain make redundant most of Kodak's core competitive advantages (its silver halide technology and its global network of retail outlets and processing facilities): most of this digital value chain was already in the hands of computer hardware and software companies.

Fortunately for Kodak, during the 1990s, digital technology made only selective incursions into traditional photographic imaging. As late as 2000, digital cameras had achieved limited market penetration; the vast majority of photographic images were still captured on traditional film.

Hence, central to Kodak's strategy, was a hybrid approach where Kodak introduced those aspects of digital imaging that could offer truly enhanced functionality for users. Thus, in the consumer market, Kodak recognized that image capture would continue to be dominated by traditional film for some time (digital cameras offered inferior resolution compared with conventional photography). However, digital imaging offered immediate potential for image manipulation and transmission.

If consumers continued to use conventional film while seeking the advantages of digitization for editing and emailing their pictures, this offered a valuable opportunity

for Kodak's vast retail network. Kodak had installed its first self-service facility for digitizing, editing, and printing images from conventional photographs in 1988. In 1994, Kodak launched its Picture Maker, a self-service kiosk located in retail stores where customers could edit and print digital images from a variety of digital inputs, or from digital scans of conventional photo prints. Picture Maker allowed customers to edit their images (zoom, crop, eliminate red-eye, and add text) and print them in a variety of formats. George Fisher emphasized the central role of retail kiosks in Kodak's digital strategy:

Four years ago, when we talked about the possibilities of digital photography, people laughed. Today, the high-tech world is stampeding to get a piece of the action, calling digital imaging perhaps the greatest growth opportunity in the computer world. And it may be. We surely see it as the greatest future enabler for people to truly "Take Pictures. Further." We start at retail, our distribution stronghold ... We believe the widespread photo-retailing infrastructure will continue to be the principal avenue by which people obtain their pictures. Our strategy is to build on and extend this existing market strength which is available to us, and at the same time be prepared to serve the rapidly growing, but relatively small, pure digital market that is developing. Kodak will network its rapidly expanding installed base of Image Magic stations and kiosks, essentially turning these into nodes on a massive, global network. The company will allow retailers to use these workstations to bring digital capability to the average snap-shooter, extending the value of these images for the consumers and retailers alike, while creating a lucrative consumable business for Kodak.³

Despite growing ownership of inkjet printers, a very large proportion of consumers continued to use photo-print facilities in retail stores. By the beginning of 2004, Kodak was the clear leader in self-service digital printing kiosks, with 24,000 installed Kodak Picture Makers in the United States and over 55,000 worldwide.

Kodak also used digital technology to enhance the services offered by photofinishers. Thus, the Kodak I.Lab system offered a digital infrastructure to photofinishers that digitized every film negative and offered better pictures by fixing common problems in consumer photographs.

Despite the inferior resolution of digital cameras, Fisher recognized their potential and pushed Kodak to establish itself in this highly competitive market. In addition to high-priced digital single reflex lens cameras for professional use, Kodak developed the QuickTake camera for Apple: at \$75 it was the cheapest digital camera available in 1994. In March 1995, Kodak introduced the first full-featured digital camera priced at under \$1000.

The Consumer Market: Emphasizing Simplicity and Ease of Use

Kodak pursued different approaches to consumer and professional/commercial markets. While the commercial and professional market offered the test-bed for Kodak's advanced digital technologies, the emphasis in the consumer segment was to maintain Kodak's position as mass-market leader by providing simplicity, quality, and value. Kodak's incremental strategy was most evident in the consumer market, providing an easy pathway for customers to transition to digital photography while exploiting Kodak's core brand and distribution strengths. This transition path was guided by Kodak's original vision of "You push the button, we do the rest." Kodak envisaged itself

as the mass-market leader in digital imaging, providing security, reliability, and simplicity for customers bewildered by the pace of technological change.

Simplicity and mass-market leadership implied that Kodak provided the fully integrated set of products and services needed for digital photography. "For Kodak, digital photography is all about ease of use and helping people get prints—in other words, getting the same experience they're used to from their film cameras," noted Martin Coyne, head of Kodak's Photographic Group.⁴ A systems approach recognized that most consumers had neither the time nor the patience to read instructions and to integrate different devices and software. Kodak believed that its integrated system approach would have particular appeal to women, who made up the major part of the consumer market.

The result was Kodak's EasyShare system, launched in 2001. According to Willy Shih, head of digital and applied imaging, EasyShare's intention was to:

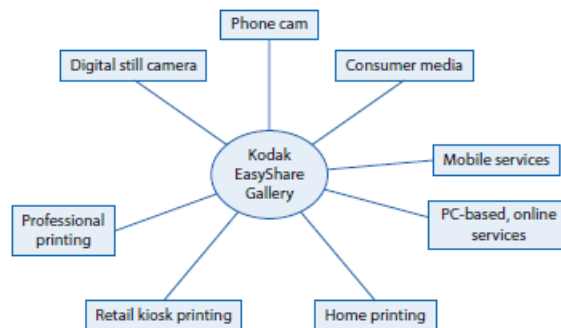
provide consumers with the first easy-to-use digital photography experience ... Digital photography is just the first step ... People need to get their pictures to their PCs and then want to share by printing or e-mail. So we developed a system that made the full experience as easy as possible.⁵

Figure 2 shows Kodak's conceptualization of its EasyShare system.

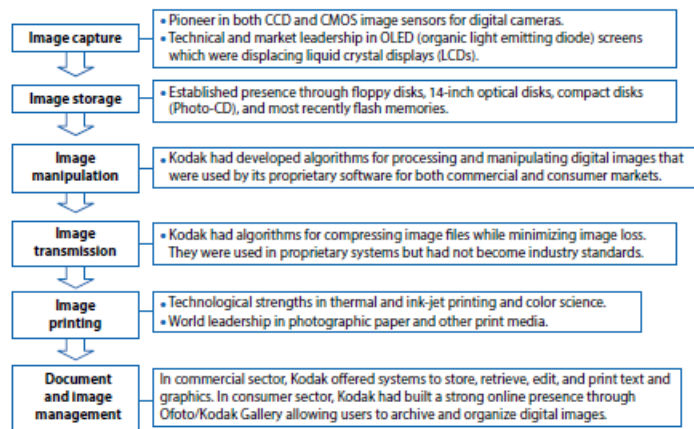
By 2005, most of the main elements of the EasyShare system were in place:

- Kodak's range of EasyShare digital cameras had carved out a strong position in a crowded market.
- EasyShare software allowed the downloading, organization, editing, and emailing of images and the ordering of online prints. EasyShare software was bundled with Kodak's cameras as well as being available for downloading for free from Kodak's website.
- The EasyShare printer dock introduced in 2003 was the first printer that incorporated a camera dock allowing the "one touch simple" thermal-dye printing direct from a camera. Antonio Perez's arrival in 2003 reinforced Kodak's push

FIGURE 2 Kodak's easyShare network: "Your pictures—anytime, anywhere"



Source: Based upon Bob Brust, "Completing the Kodak Transformation," Presentation, Eastman Kodak Company, September 2005. © Kodak. Used with permission.

FIGURE 3 Kodak's technological position within the digital imaging chain

into printers: "If a company wants to be a leader in digital imaging, it necessarily has to participate in digital output."⁶

- **Online digital imaging services:** Kodak had been quick to recognize the potential of the Internet for allowing consumers to transmit and store their photographs and order prints. Kodak's Picture Network, launched in 1997, allowed consumers to have their conventional photographs digitized by a retail photo store, then uploaded to a personal Internet account on Kodak's Picture Network. In 1998, Kodak launched its online printing service, *PhotoNet*, enabling consumers to upload their digital images and order prints. Kodak also partnered with AOL to offer *You've Got Pictures*. By acquiring Ofoto in 2001, Kodak became the leader in online photofinishing and online image storage. In January 2005, Kodak renamed Ofoto "Kodak EasyShare Gallery."

By 2005, therefore, Kodak was present across the entire digital value chain—this integrated presence was underpinned by proprietary technology at each of these stages (Figure 3).

Professional, Commercial, and Healthcare Markets

The commercial and professional markets were important to Kodak for two reasons. First, they were lead customers for many of Kodak's cutting-edge digital technologies: news photographers were early adopters of digital cameras; the US Department of Defense pioneered digital imaging for satellite imaging, weather forecasting, and surveillance activities; NASA used Kodak cameras and imaging equipment for its space missions and satellites. For commercial applications ranging from real estate brokerage to security systems, digital imaging offered image transmission and linkage with IT management systems for image storage and retrieval. The huge price premium of commercial consumer products made it attractive to focus R & D on these leading-edge users in the anticipation of trickle-down to the consumer market.

In commercial printing and publishing (which became the Graphic Communications Group in 2005), Kodak assembled a strong position in commercial scanning, formatting, and printing systems for the publishing, packaging, and data processing industries. Kodak's opportunity was to exploit the transition from traditional offset printing to digital, full-color, variable printing. This opportunity built on two key strengths: first, Kodak's proprietary inkjet technology (including its technically superior inks) and, second, its leadership in variable-data printing—printing that permitted individually customized output (as in personalized sales catalogues or bills). Kodak built its commercial printing business on both internally developed technologies and acquisitions—notably Heidelberg's Nexpress and Digimaster businesses, and Scitex, supplier of Versamark high-speed inkjet printers. Kodak also built a presence in pre-press and workflow systems used by commercial printers.

In medical imaging, Kodak also faced the decline of its sales of X-ray film and in related chemicals and accessories. Through a series of acquisitions and internal developments, Kodak established a portfolio of products for digital X-rays, laser imaging, picture archiving and communications systems—including systems for digitizing and storing conventional X-rays. Kodak also built up a strong position in dental imaging systems comprising hardware, software, and consumables. Kodak sold its Health Group to Onex Healthcare Holdings in 2007 for \$2.55 billion.

Kodak's capability in creating integrated imaging and information solutions was of particular value in certain public sector projects. Kodak's digital scanning and document management systems were used in national censuses in the United States, the United Kingdom, France, Australia, and Brazil. At the German post office, a Kodak team achieved a world record, creating digitized copies of 1.7 million documents in 24 hours.

Hiring, Alliances, and Acquisitions

Kodak's business system had been based upon vertical integration and self-sufficiency: at its Rochester base, Kodak developed its own technology, produced its own products, and supplied them worldwide through its vast global network. In digital imaging, not only did Kodak lack much of the expertise needed to build a digital imaging business but also the pace of technological change was too rapid to rely on in-house development. Hence, as Kodak transformed its capability base from chemical to digital imaging, it looked outside for the knowledge it required.

Kodak recruited executives and technical specialists it needed for its new digital strategy. Key executives who relocated from a variety of technology-intensive companies including Silicon Graphics, IBM, Xerox, Hewlett-Packard, Lexmark, Apple, GE Medical Electronics, Olympus Optical, and Lockheed Martin. Table 1 shows the backgrounds of Kodak's top management team.

Kodak acknowledged that the digital imaging chain already included companies that were well established, sometimes dominant, in particular activities. For example, Adobe Systems dominated image-formatting software; Hewlett-Packard, Epson, and Canon were leaders in inkjet printers; and Microsoft dominated PC operating systems. Willy Shih, head of Kodak's digital imaging products from 1997 to 2003, observed: "We have to pick where we add value and commoditize where we can't."⁷

In many cases, this meant partnering with companies that were already leaders in digital technologies. Kodak forged alliances with Canon, AOL, Intel, Hewlett-Packard, Olympus, and IBM.

Kodak made acquisitions where it believed that a strong proprietary position was essential to its strategy and in technologies where it needed to complement its own expertise. Its major acquisitions over the period are shown in Table 2.

TABLE 1 Eastman Kodak's senior management team, April 2012

Name	Position	Joined Kodak	Prior company experience
Robert L. Berman	Senior Vice President	1982	Kodak veteran
Philip J. Faraci	President and COO	2004	Phogenix Imaging, Gemplus
Stephen Green	Director, Business Development, Asia-Pacific	2005	Creo Inc.
Pradeep Jotwani	President, Consumer Business	2010	Hewlett-Packard
Brad W. Kruchten	President Film and Photo-finishing Systems Group	1982	Kodak veteran
Antoinette McCorvey	CFO and Senior Vice President	1999	Monsanto/Solutia
Gustavo Oviedo	Chief Customer Officer	2006	Schneider Electric
Antonio M. Perez	Chairman and CEO	2003	Hewlett-Packard
Laura G. Quatela	General Counsel and Chief Intellectual Property Officer	1999	Clover Capital Management, Inc., SASIB Railway GRS, and Bausch & Lomb Inc.
Isidre Rosello	General Manager, Digital Printing Solutions	2005	Hewlett-Packard
Eric H. Samuels	Chief Accounting Officer and Corporate Controller	2004	KPMG, Ernst & Young
Patrick M. Sheller	Chief Administrative Officer, General Counsel and Secretary	1993	McKenna, Long & Aldridge, Federal Trade Commission
Terry R. Taber	Vice President	1980	Kodak veteran

Note:

Includes corporate officers, senior vice presidents, and division heads.

Source: www.kodak.com. © Kodak. Used with permission.

Emphasis on Printed Images

A consistent feature of Kodak's digital strategy from 1993 to 2012 was the belief that digital technology would not eliminate printed images. Kodak's emphasis on printed images was reinforced by its own capabilities: the printing of photographic and other images onto paper and other media lay at the heart of Kodak's traditional chemical and chromatic know-how. Under Perez, the impetus behind photographic printers for the consumer market intensified, reflecting Perez's own background as former head of Hewlett-Packard's printer division.

This effort to build Kodak's presence in the market for consumer inkjet printers has been the most widely criticized of all Kodak's digital imaging initiatives. Even with Kodak's "treasure trove" of inkjet technologies and its tweaking of the traditional "razors-and-blades" model by charging low prices for ink and higher prices for printers, establishing Kodak in such a mature, intensely competitive market would be a struggle. By 2011, Kodak held just 6% of the US market, compared to 60% for Hewlett-Packard.

TABLE 2 Kodak's major acquisitions, 1994–2011

Date	Company	Description
1994	Qualex, Inc.	Provider of photo-finishing services; acquired to complement Kodak's online photofinishing service
1997	Wang Laboratories	Acquisition of Wang's software unit
1997	Chinon Industries	Japanese camera producer; majority stake acquired; outstanding shares purchased in 2004
1998	PictureVision, Inc.	Provider of PhotoNet online digital imaging services and retail solutions; complement to Kodak's Picture Network business
1998	Shantou Era Photo Material, Xiamen Fuda Photographic Materials	Strengthened Kodak's position in photographic film in China
1999	Imation	Supplier of medical imaging products and services
2000	Lumisys, Inc.	Provider of desktop computed radiography systems and X-ray film digitizers
2001	Bell & Howell	Imaging businesses only acquired
2001	Ofoto, Inc.	Leading US online photofinisher
2001	Encad, Inc.	Wide-format commercial inkjet printers
2003	PracticeWorks	Digital dental imaging and dental practice management software
2003	Algotec Systems Ltd.	Developer of picture archiving systems
2003	Lucky Film Co., Ltd.	Acquisition of 20% of China's leading photographic film supplier
2003	LaserPacific Media Corporation	Provider of postproduction services for filmmakers
2004	NexPress	Acquired Heidelberg's 50% of this joint venture, which supplied high-end, on-demand color printing systems and black-and-white variable-data printing systems
2004	Scitex Digital Printing	A leader in high-speed variable data inkjet printing (renamed Kodak Versamark, Inc.)
2004	National Semiconductor	Acquisition of National's imaging sensor business
2005	Kodak Polychrome Graphics LLC	Kodak acquires Sun Chemical's 50% stake in the joint venture, which is a leader in graphic communication
2005	Creo Inc.	Leading supplier of prepress and workflow systems used by commercial printers
2008	Design2Launch	Developer of collaborative end-to-end digital workflow solutions for transactional printing
2008	Intermate A/S	Danish supplier of Intelligent Print Data Stream software for managing high speed printers
2009	Böwe Bell & Howell	Acquisition of document scanner division
2011	Tokyo Ohka Kogyo Co., Ltd.	Acquisition of TOK's relief printing plates business

Source: Eastman Kodak 10-K reports, various years.

Harvesting the Traditional Photography Business

On the basis that the transition to digital photography would be gradual, Kodak believed that the transition period would give it the opportunity to generate cash flows from its legacy film business while investing in digital imaging technologies and products. Kodak's prediction was initially correct. Through the 1990s, film sales continued to grow in the United States, reaching a peak of 800 million rolls in 1999. However, by 2004, sales had halved to under 400 million and by 2011 were below 100,000.

Kodak's forecasts proved wrong in relation to emerging market demand. Kodak's acquisitions of Chinese photographic film producers were based on the assumption that sales of roll film would continue to increase into the 21st century. In reality, the transition to digital imaging occurred at much the same pace in emerging markets as in the mature industrialized countries.

During 2011 and 2012, Kodak withdrew several film products, including film for slides. It also withdrew from other unprofitable markets (including cameras) and sold other businesses, including its Kodak EasyShare Gallery to rival Shutterfly.

Eastman Kodak in 2012

Eastman Kodak's business was organized around three business segments. Exhibit 1 describes each of these segments.

EXHIBIT 1

Eastman Kodak's business segments

CONSUMER DIGITAL IMAGING GROUP ("CDG") SEGMENT

CDG's mission is to enhance people's lives and social interactions through the capabilities of digital imaging and printing technology. CDG's strategy is to drive profitable revenue growth by leveraging a powerful brand, a deep knowledge of the consumer, and extensive digital imaging and materials science intellectual property.

- ◆ **Digital Capture and Devices** includes digital still and pocket video cameras, digital picture frames, accessories, and branded licensed products. These products are sold directly to retailers or distributors, and are also available to customers through the Internet . . . As announced on February 9, 2012, the

company plans to phase out its dedicated capture devices business. . .

- ◆ **Retail Systems Solutions'** product and service offerings to retailers include kiosks and consumables, Adaptive Picture Exchange ("APEX") drylab systems and consumables, and after sale service and support . . . Kodak has the largest installed base of retail photo kiosks in the world.
- ◆ **Consumer Inkjet Systems** encompasses Kodak All-in-One desktop inkjet printers, ink cartridges, and media . . .
- ◆ **Consumer Imaging Services:** Kodak Gallery is a leading online merchandise and photo sharing service . . .

GRAPHIC COMMUNICATIONS GROUP ("GCG") SEGMENT

GCG's strategy is to transform large graphics markets with revolutionary technologies and customized services that grow our customers' businesses and Kodak's business with them.

- ◆ **Prepress Solutions** is comprised of digital and traditional consumables, including plates, chemistry, and media, prepress output device equipment and related services, and proofing solutions. Prepress solutions also include flexographic packaging solutions, which is one of Kodak's four digital growth initiative businesses.
- ◆ **Digital Printing Solutions** includes high-speed, high-volume commercial inkjet printing equipment, consumables, and related services, as well as color and black-and-white electrophotographic printing equipment...
- ◆ **The Business Services and Solutions** group's product and service offerings are composed of high-speed production and workgroup document scanners, related services, and digital controllers for driving digital output devices, and workflow software and solutions. Workflow software and solutions, which includes consulting and professional business process services, can enable new opportunities for our customers to transform from a print service provider to a marketing service provider...

FILM, PHOTOFINISHING AND ENTERTAINMENT GROUP ("FPEG") SEGMENT

FPEG provides consumers, professionals, and the entertainment industry with film and paper for imaging and photography. Although the markets... are in decline... due to digital substitution, FPEG maintains leading market positions for these products. The strategy of FPEG is to provide sustainable cash generation by extending our materials science assets in traditional and new markets.

- ◆ **Entertaining Imaging** includes origination, intermediate, and color print motion picture films, special effects services, and other digital products and services for the entertainment industry.
- ◆ **Traditional Photofinishing** includes color negative photographic paper, photochemicals, professional output systems, and event imaging services.
- ◆ **Industrial Materials** encompasses aerial and industrial film products, film for the production of printed circuit boards, and specialty chemicals, and represents a key component of FPEG's strategy of extending and repurposing our materials science assets.
- ◆ **Film Capture** includes consumer and professional photographic film and one-time-use cameras.

Source: Eastman Kodak 10-K report, 2011: pp. 5–8. Reproduced by permission of Eastman Kodak Company.

Competition

In most of the markets where it competed, Kodak was subject to intense competition. In digital cameras, phones incorporating cameras had decimated all but the quality segment of the market. Online photographic services were also ferociously competitive: Kodak's Gallery was the market leader, but it competed with a host of other online competitors, including: Shutterfly, Snapfish, Walmart.com's Photo Center, Fujifilmnet.com, Yahoo Photos, and Sears.com.

Kodak's highest margins were earned on consumables, notably photographic paper. However, Kodak faced strong competition, mainly from Xerox, Hewlett-Packard, 3M, and Oji, as well as from many minor brands. Its attempts to differentiate itself through superior technology, particularly in inkjet printing paper, were only partially successful

in resisting the tide of commoditization and, across all markets, Kodak was suffered the growing trend for consumers to view their photographs on screens rather than in printed form.

In commercial markets, competitive price pressures were less severe than in the consumer sector, in particular the opportunity for Kodak to differentiate its offering through packaging hardware, software, and services into customized “user solutions.”

Kodak's Resources and Capabilities

Digital imaging was a classic “disruptive technology.”⁸ For traditional photographic companies, it was “competence destroying”⁹—digital technology undermined the usefulness of many of their resources and capabilities. Yet, as late as 2011, Kodak still possessed some potentially valuable resources and capabilities.

- **Brand and distribution:** Kodak's traditional resource strengths had been its brand and its global distribution presence. Two decades of decline and wrenching technological changes had weakened both. Despite Kodak's brand recognition, it was unclear whether it added value and market appeal to Kodak's consumer and commercial products.
- **Technology:** For two decades Kodak had maintained one of the world's biggest research efforts in imaging. During 2000–05, its research labs in the United States, the United Kingdom, France, Japan, China, and Australia had employed more than 5000 engineers and scientists, including more than 600 PhDs. Between 1975 and 2011, Kodak had been issued 16,760 patents. Table 3 identifies some of Kodak's principal areas of technological strength.
- **New Product Development:** Despite Kodak's strengths in basic and applied research and its long history of successful new product launches, the company had struggled to move away from its traditional long and meticulous product development process to embrace the fast-cycle world of electronics.

Table 4 shows financial data for Eastman Kodak, while Table 5 shows data for its business segments.

Reflections

As Perez reflected upon Kodak's two decades of digital transformation, he was struck by the paradox of Kodak's progress. In terms of adapting to a highly disruptive technological revolution, Kodak had been surprisingly successful. For a company that had dominated its traditional market for so long and so thoroughly as Kodak had, to survive the annihilation of its core technology, and to build the capabilities needed to become a significant player in a radically different area of technology was unusual. Yet, in terms of financial performance, Kodak had failed: for all of Kodak's technical and market achievements, Perez and his two predecessors, Dan Carp and George Fisher, had been unable to build a financially viable digital imaging business. Where had they gone wrong?

- It was difficult to argue that Kodak had been too slow or that it had failed to recognize the digital threat—as early as 1979 Kodak produced a remarkably

TABLE 3 Kodak's technical capabilities

Area of technology	Kodak capabilities
Color science	Kodak is a leader in the production, control, measurement, specification, and visual perception of color, essential to predicting the performance of image-capture devices and imaging systems. Kodak has pioneered <i>colorimetry</i> —measuring and quantifying visual response to a stimulus of light.
Image processing	Includes technologies to control image sharpness, noise, and color reproduction. It is used to maximize the information content of images and to compress data for economical storage and rapid transmission. Kodak is a leader in image processing algorithms for automatic color balancing, object and text recognition, and image enhancement and manipulation. These are especially important in digital photo-finishing for image enhancement, including adjustments for scene reflectance, lighting conditions, sharpness, and a host of other conditions.
Imaging systems analysis	Provides techniques to measure the characteristics of imaging systems and components. Predictive system modeling is especially important in Kodak's new product development, where it can predict the impact of individual components on the performance of the entire system.
Sensors	A world leader in image sensor technology, with 30 years' experience in the design and manufacture of both CCD and CMOS electronic image sensors used in cameras, machine vision products, and satellite and medical imaging.
Ink technology	A world leader in dyes and pigments for color printing. Pioneer of micro-milling technology (originally invented for drug delivery systems). It has advanced knowledge of humectants (which keep print-head nozzles from clogging), and surface tension and viscosity modifiers (which control ink flows).
Inkjet technology	Innovations in the electronic and thermal control of inkjet heads coupled with innovation in inks have given Kodak technological advantages in inkjet printing. In commercial printing, Kodak's continuous inkjet technology has permitted the flexibility of inkjet printing to be matched with substantial improvements in resolution and color fidelity.
Microfluidics	Microfluidics, the study of miniature devices that handle very small quantities of liquids, is relevant to film coating, fluid mixing, chemical sensing, and liquid ink-jet printing.
Print media	A leader in applying polymer science and chemical engineering to ink-receiving materials. Expertise in specially constructed inkjet media in which layers of organic/inorganic polymers are coated onto paper or clear film and multilayer coated structures of hydrogels and inorganic oxides.
Electronic display technology	Through its joint venture with Sanyo, Kodak pioneered organic light-emitting diode (OLED) technology for self-luminous flat panel displays. Kodak's OLED display panels extended from small-screen devices to larger displays.
Software	EasyShare software focused on ease of image manipulation, printing, and storage (even without a computer). Commercial software leads in workflow solutions (Kodak EMS Business Software), scanning software (Perfect Page), and printing software (Kodak Professional Digital Print Production Software); strengths in control software and printing algorithms that overcome technical limitations of inkjet printing and optimize color and tone reproduction (e.g., the Kodak One Touch Printing System).

Source: www.kodak.com.

TABLE 4 Eastman Kodak: Selected financial data, 2006–2011 (\$million)

	2011	2010	2009	2008	2007	2006
From income statement						
Sales	6022	7167	7609	9416	10,301	10,568
Cost of goods sold	5135	5221	5850	7247	7757	8159
Selling, general, and admin.	1159	1275	1298	1606	1802	1950
R & D costs	274	318	351	478	525	578
Operating earnings	(600)	(336)	(28)	(821)	(230)	(476)
Interest expense	156	149	119	108	113	172
Other income (charges)	(2)	26	30	55	86	65
Restructuring costs	121	70	226	140	543	416
Income taxes	9	114	115	(147)	(51)	221
Net earnings	(764)	(687)	(210)	(442)	676	(601)
From balance sheet						
Total current assets including	2703	3786	4303	5004	6053	5557
Cash	861	1624	2024	2154	2947	1496
Receivables	1103	1196	1395	1716	1939	2072
Inventories	607	746	679	948	943	1001
Property, plant, and equipment	895	1037	1254	1551	1811	2602
Other long-term assets	803	1109	1227	1728	4138	3509
Total assets	4678	6226	7691	9179	13,659	14,320
Total current liabilities including	2150	2820	2896	3438	4446	4554
Payables	706	959	2811	3267	3794	3712
Short-term borrowings other liabilities	152	50	62	51	308	64
Long-term borrowings	1363	1195	1129	1252	1289	2714
Postemployment liabilities	3053	2661	2694	2382	3444	3934
Other long-term liabilities	462	625	1005	1119	1451	1690
Total liabilities	7028	7301	7724	8191	10,630	12,932
Shareholders' equity	(2350)	(1075)	(33)	988	3029	1388
From cash flow statement						
Net cash from operating activities	(998)	(219)	(136)	168	328	956
Net cash used in investing activities	(25)	(112)	(22)	(188)	2408	(225)
Net cash flows from financing activities	246	(74)	33	(746)	(1294)	(947)
Number of employees	17,100	18,800	20,250	24,400	26,900	40,900

Source: Eastman Kodak annual reports.

TABLE 5 Eastman Kodak: Results by business segments, 2007–2011 (\$million)

	2011	2010	2009	2008	2007
Net sales from continuing operations					
Consumer Digital Imaging Group	1739	2731	2626	3088	3247
Film, Photofinishing, and Entertainment Group	1547	1762	2262	2987	3632
Graphic Communications Group	2736	2674	2718	3334	3413
All other	—	—	3	7	9
Consolidated total	6022	7167	7609	9416	10,301
Earnings (losses) from continuing operations before interest and taxes					
Consumer Digital Imaging Group	(349)	278	(10)	(177)	(17)
Graphic Communications Group	(191)	(95)	(107)	31	104
Film, Photofinishing, and Entertainment Group	34	91	187	196	281
All other	—	(1)	(16)	(17)	(25)
Total of segments	(506)	273	54	33	343
Segment total assets:					
Consumer Digital Imaging Group	929	1126	1198	1647	2442
Graphic Communications Group	1459	1566	1734	2190	3723
Film, Photofinishing, and Entertainment Group	913	1090	1991	2563	3778
All other	—	1	—	8	17
Total of segments	3301	3782	4923	6408	9960

Source: Eastman Kodak 10-K reports.

accurate forecast of the evolution of digital imaging and it had been a pioneer of digital cameras.¹⁰

- It was also difficult to argue that Kodak had failed in implementing its digital strategy in terms of being a laggard in developing the capabilities needed to compete in digital imaging. Kodak's market leadership in digital cameras pointed to its ability to build technological know-how, apply that know-how to develop attractive new products, and market those products in fiercely competitive digital markets.
- Perhaps Kodak's emphasis had been on the wrong markets and wrong products? Kodak's biggest losses had been in the consumer market, Kodak's traditional stronghold. Was this market simply too unattractive because of intense competition? Had Perez's emphasis on printing been misplaced? Might Kodak's scarce resources been better spent on other parts of the digital value chain (such as image capture through cameras and sensors and displays)?
- A further possibility was that Kodak's vision of establishing itself as a leader in digital imaging was misconceived. In 2000, Kodak had announced its intention to be at the center of the \$225 billion "infoimaging" industry. But did this

“infoimaging” industry really exist? Or was digital imaging part of the overall computing and communication sector?

Finally, Perez wondered as to what lessons could be drawn from the comparative success of Fujifilm. For all of Fuji’s similarities to Kodak, its performance had been radically different: its revenues had grown (in terms of US dollars), and it had been consistently profitable (Exhibit 2).

EXHIBIT 2

Fujifilm Holdings Corporation

	1992			2011		
	Sales (\$million)	Net income (\$million)	Employees	Sales (\$million)	Net income (\$million)	Employees
Fujifilm Holdings ^a	9126	593	24,868	27,440	1412	35,274
Eastman Kodak ^b	20,577	1146	132,600	6022	(764)	17,100

Notes:

^a2011 data are for financial year to March 31, 2012.

^b2011 data are for year ended December 31, 2011.

Despite the strong similarities between Fujifilm and Kodak—both companies were heavily dependent on film during the early 1990s and both had diversified into other imaging technologies (Fujifilm had a major position in plain-paper copiers through its Fuji/Xerox joint venture)—the two companies responded to the digital revolution with different strategies which led to very different financial results.

Like Kodak, Fujifilm recognized the implications of digital imaging for its core business and struggled to adapt its strategy. However, a key difference was Fuji’s recognition that digital imaging alone would be unlikely to support the business of a large company, hence its emphasis on diversification. Under its chief executive, Shigetaka Komori, Fujifilm underwent a major restructuring between 2000 and 2010 (especially during 2005/6 and 2009/10) involving business closures, employee layoffs, and financial write-downs.

Comparing Fujifilm and Kodak in 2012, the most obvious difference is Fujifilm’s business diversity. Its three business segments comprise a variety of different businesses:

Imaging solutions (14.8% of total sales) included traditional photo imaging products (photographic paper, film, and supplies) and electronic imaging (mainly digital cameras).

Information solutions (40.5% of total sales) included medical systems, pharmaceuticals, cosmetics, flat panel display materials, graphic arts materials, data storage tapes, industrial X-rays, and optical devices.

Document solutions (44.8% of total sales) comprised office supplies, office printers, and document product services.

Fujifilm’s diversification has combined selective acquisitions (since 2000, \$9 billion has been spent on 40 acquisitions) and internal development based upon

Fujifilm's existing technical capabilities. In particular, it has built upon its chemical and coatings expertise to diversify into cosmetics, pharmaceuticals (especially drug delivery systems), components for LCD panels, and a variety of plastics products. The quest to exploit technical capabilities in "functional compound molecular design, chemical reaction control, and organic synthesis technologies" resulted in several discoveries. For example, human skin was observed to be similar to photographic

film: it contained collagen and was about the same thickness. Fujifilm discovered that many of the antioxidants used to preserve photographic film could be used for skin care products.

Sources: www.fujifilm.com; "The last Kodak moment?" *Economist*, January 14, 2012; Stefan Kohn, "Disruptive innovations applied: A review of the imaging industry," <http://www.iande.info/wp-content/uploads/2011/03/StefanKohnDisruptiveInnovationsFujifilm.pdf>, accessed September 20, 2012.

Notes

1. "Eastman Kodak Company and its U.S. Subsidiaries Commence Voluntary Chapter 11 Business Reorganization," Press Release (January 19, 2012).
2. "Kodak's New Focus," *Business Week* (January 30, 1995): 62–68.
3. Eastman Kodak Company, "Kodak Leaders Outline Road Ahead to get Kodak 'Back on Track'," press release (November 11, 1997).
4. Eastman Kodak Company, "The Big Picture: Kodak and Digital Photography," www.Kodak.com/US/en/corp/presscenter/presentations/020520mediaforum3.shtml. Website no longer available.
5. See www.Kodak.com/US/en/corp/presscenter/presentations/020520mediaforum3.shtml, accessed October 29, 2009. Website no longer available.
6. Interview with Antonio Perez, President and COO, Kodak, *PMA Magazine* (February 2004).
7. "Why Kodak Still Isn't Fixed," *Fortune* (May 11, 1998).
8. J. L. Bower and C. M. Christensen, "Disruptive Technologies: Catching the Wave," *Harvard Business Review* (January/February 1995).
9. M. Tushman, and P. Anderson, "Technological Discontinuities and Organizational Environments," *Administrative Science Quarterly* 31 (1986): 439–465.
10. Andrew Hill of the *Financial Times* observed: "In 1979, the company put together a graphic timeline laying out roughly when Kodak's customers would make the transition to digital imaging, starting with government clients, moving through graphic businesses and ending, in about 2010, with retail consumers. In 1991, the group drew up a digital strategy ... Even the potential threat from camera-enabled mobile phones was 'war-gamed' by Kodak executives in the early 2000s." ("A Victim of Its Own Success," *Financial Times*, April 2, 2012.)