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Exhibit Q

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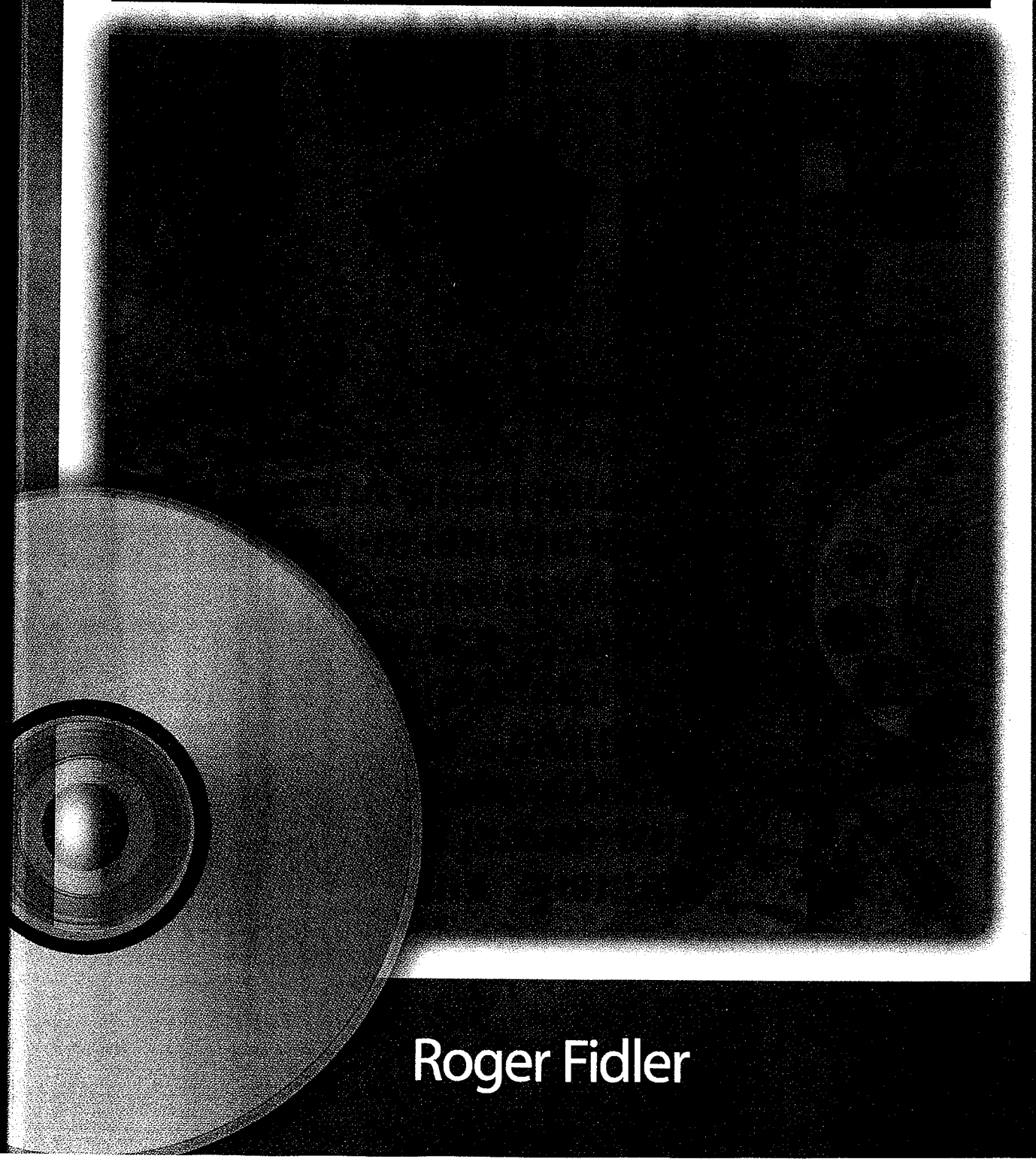
MEDIAMORPHOSIS

Understanding New Media



Roger Fidler

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the function and importance of newspapers within societies extend well beyond the utilitarian role of information provider or database.

In this chapter, we explore an offline vision of digital publishing that builds upon and retains the familiar attributes of traditional print media, such as portability, portrait orientation, and branded packaging, while incorporating some of the more compelling traits of the interpersonal and broadcast forms.

I have focused this chapter on newspapers because in my view they represent the most complex as well as the most immediately challenged form within the document domain. It should be understood, however, that the concepts and technologies discussed are just as applicable to magazines, books, and nearly all other document forms.

A chronology of major technological developments that have influenced the transformation of newspapers in the past two centuries and that are likely to affect their ultimate transition to digital publishing systems early in the twenty-first century is found in Exhibit 9.1.

Scenario for 2010. *The mobile digital document reader*

As Deborah awakens, her body tells her the time should be about 7 A.M., but the digital clock next to her bed argues that it's precisely 4:17 A.M., Tuesday, September 21, 2010. Memory returns slowly. Finally, she recalls that this is San Diego, California, and that she arrived late last night from New York to speak at a conference this morning. There's no chance of falling back to sleep now, so she goes to the microkitchen to start the coffeemaker. Then she picks up her **tablet** and prepares to gather her morning newspapers.

This hotel has equipped its rooms with the latest high-tech amenities. In addition to the microkitchen, Deborah's room has a wall-mounted flat-screen display, a color fax machine that also functions as a printer and copier, and a teledock. With the teledock, Deborah can choose the television programs she wants to watch and then set the time and sequence she prefers. She can also use the teledock to purchase current electronic editions of newspapers, magazines, and books.

About a year ago, she finally decided to buy a tablet to use in her work. The tablet is about the size and shape of a standard printed magazine and weighs about a pound. She can attach a keyboard, but mostly

she interacts by touching or writing on the screen. With an electronic pen, she can highlight items, append notes, and work the crossword puzzle, as well as quickly locate items. If she chooses, she can also interact with the tablet by using a selection of voice commands.

Tablets have been on the market for about a decade, but she didn't see their value until there was an extensive selection of material available for reading on tablets. Now she can read the latest editions of her favorite publications almost anywhere and anytime that's convenient for her. Electronic newsstands and teledocks have already been installed in many airports, train stations, hotels, and book stores. Television controllers in homes and offices have also been adapted to provide easy access to digital print media.

Customers continue to have a choice of subscribing or purchasing single copies. Prices are about the same as they are for printed versions, although electronic editions contain more information and provide extra services. With a subscription to an electronic edition, delivery is no longer tied to a single home or office address. This gives subscribers the freedom to access their publications at the office or from any teledock or electronic newsstand. The system works in much the same way as the banks' automatic teller machines (ATMs).

To access the latest edition of the *New York Times,* Deborah inserts her *NYT* card into her room's teledock. These **memory cards** are supplied by newspapers and magazines when customers subscribe to their electronic editions. They are similar in size and shape to credit cards but are thicker and can be used anywhere for as long as the subscription remains active. Each card contains personal data, such as the subscriber's name and address, subscription codes, and preferences, as well as enough storage to hold a complete edition and a personal file of items that the subscriber has "clipped and saved."

On the teledock's touch screen, Deborah enters her personal identification number just as she would at an ATM. In less than a minute, the current edition of the *New York Times* is loaded onto her card. She removes the card and repeats the procedure for the *Financial Times.* To buy a single copy of the local newspaper, which in San Diego is the *Union-Tribune,* she inserts a card that allows her to purchase any electronic publication. This card contains her personal data and digital cash to pay for purchases. After entering her password, the teledock displays a menu of available newspapers. As soon as she touches the *Union-Tribune* option and confirms her selection, the edition is loaded and the fee is automatically debited.

The coffee is ready, so she pours a cup and takes it to the bedside table along with her tablet and newspaper cards. She could use the wall-mounted, flat-screen television in her room to display the newspapers, but she prefers using the tablet to read in the comfort of her bed.

As soon as she inserts the *NYT* card into her tablet, she is told that 14 stories in this edition contain topics included in her personal profile. She is particularly interested in astronomy and space exploration and in news from several South American countries. She has the option of going directly to those stories or just browsing. Since she has plenty of time this morning, she chooses to browse first. She starts with the front page.

The page displayed on her tablet bears a strong resemblance to the front page of the printed edition of the *New York Times*. The only obvious difference is the page size. To preserve the information density of a full-sized printed paper, items that appear on the browsing pages of tablet editions are actually abstracts, or brief summaries. The combination of headlines, abstracts, and graphics organized on newspaperlike pages makes scanning and assessing content quick and easy.

For most stories, the abstracts provide enough information to satisfy Deborah's interests. But when she wants more, all she needs to do is touch the abstract. In an instant, the front page is replaced by the actual story, which can be as long as it needs to be. The story pages appear more like the pages of a book to facilitate reading. These pages can also include images and graphics as well as background and explanatory information.

With printed newspapers, readers often complain that the text is too small. With a tablet edition that is not a problem. If the standard text is difficult for Deborah to read, she can enlarge it to whatever size feels comfortable. If she is too tired to read or she needs to concentrate on some other activity, such as driving a car or preparing a meal, she can also have the tablet "speak" stories to her. She often uses this feature to create her own custom "radio" news reports that she listens to when she's driving to and from her office. With simple voice commands, she can skip to the next story, repeat a segment, or locate another story.

Each electronic edition contains sets of browsing pages organized in sections much as they are in the printed edition. After scanning the front page, Deborah can turn to the next page by touching the page-turning icon or go to another section by touching the appropriate section icon.

As she browses the *Times'* business section, she finds a story about the latest federal surtax. A graphic offers her the opportunity to see how she will be affected. By using the pen to enter her estimated salary and

a few other details, the graphic immediately computes and displays the amount of her surtax and shows her how she compares with other taxpayers. She'd like to print the story and graphic later, so she touches the Clip option on the screen. This puts the page in her memory card's personal file. She can also transfer items she has "clipped" from the newspaper to her office computer or send annotated copies to other people by using the tablet's electronic mail feature.

Another story in the business section refers to a news event that occurred last week. She apparently missed the story when it was originally published, so she touches the Library icon. This retrieves the headlines and abstracts for all stories published on this subject by the *Times* in the past month. She discovers that the earlier story was published last Wednesday. The abstract is useful, but she would like to see the full story. By touching the abstract, she is told it will cost 50 cents to retrieve this item from the newspaper's electronic library. That's fine, so she touches the OK button. The tablet's wireless communicator autodials the newspaper and sends the necessary instructions to retrieve her selection from the library's central computer. Within a few seconds the complete story is added to her memory card's personal file.

The lead story in the science section is about the multinational exploration of Mars. By touching an image of the planet, Deborah can watch a 20-second video segment showing views sent only a few hours ago by the robot vehicle as it roved the surface of the planet. Video news clips are now becoming a common feature of tablet newspapers. When touched, some photographs become full-motion video clips with sound, so she can watch and listen to news events as well as read about them. If she missed something, she can replay the clip or freeze an image.

As she "turns" pages, she also encounters a variety of advertisements. Ads in tablet newspapers are juxtaposed with editorial content on most pages just as they are in printed editions. If she is not interested in an ad, she simply "turns" the page.

Advertisers are fully exploiting the opportunities afforded by these digital editions. If she requests it, some ads will speak to her; others display their merchandise with short video clips and animations. More importantly, advertisers are able to deliver a variety of targeted messages that can be matched to each personal profile. With the tablet's wireless communicator, customers can also conveniently order advertised products, request additional information, or take advantage of coupons.

For example, an airline offering discount fares and package deals to South America entices her to explore the possibilities alluded to in its ad.

She is planning to take some vacation time in Peru this winter, so she touches the ad to get more information. The haunting sound of an Andean flute plays in the background as she peruses the spectacular images of Machu Picchu and Nasca. She sees that this is the last day these low fares will be available, so she decides to act on the offer. With the communicator, she can make her reservations immediately from the tablet. Her agent's e-mail address and her credit card numbers and other essential data are maintained in her personal profile. All she has to do is write in the dates and times that she wants to travel and touch the reservation button on the screen. Her personal information is encrypted as well as password protected, so there is no risk of someone else placing orders with her tablet and memory cards.

Deborah will be staying in San Diego for two more nights, so she checks the *Union-Tribune's* Guide section to see what's going on. All articles about upcoming events as well as listings and reviews of restaurants, movies, concerts, books, and so on are always available to tablet newspaper subscribers in these supplemental guide sections. Guides are a blend of newspaper entertainment sections and local telephone yellow pages. She can easily select categories of interest and in some cases even see and hear a sampling of events, places, and productions. As with the airline advertisement, many of the ads in these sections offer reservation and ticket purchasing services by way of the tablet's communicator.

Her presentation is at 8:30, so she decides to take a break from the news to review her speech and check her e-mail. Tablets are used for many purposes, not just for reading newspapers and magazines. She has brought with her several electronic editions of books and scientific journals stored on memory cards. On one of her personal cards she has stored a copy of her speech and supporting graphics. Using the electronic pen, she can make changes in her speech right up to the last minute. At the rostrum, the tablet will serve as her personal prompter. As soon as her presentation is completed, she can easily provide participants and reporters with electronic or printed copies of the final version.

Gutenberg's legacy

The development of digital publishing systems, such as I have described in this scenario, should *not* be interpreted as foretelling the death of print media. On the contrary, it suggests that print can be transformed into an even more versatile and popular medium for

Mediated knowledge stores. Although newspaper Web sites are generally regarded as electronic supplements and are seen by most publishers primarily as a means to protect their franchises and build circulation for their printed editions, they may evolve into something quite different. Some publishers are wisely attempting to address the aforementioned problems by adapting their online content and services to the inherent strengths of the Web, which derive from a blend of interpersonal and document traits. Instead of merely replicating their daily newspaper editions online, they have turned their Web sites into community forums and mediated knowledge "stores." These sites offer readers the opportunity to express their opinions and engage the paper's staff and community leaders in interactive discussions. They also provide their customers with a wealth of useful and timely community information that has been validated by journalists and offer convenient connections to other sites and services that may be of special interest.

By becoming the focal points on the Web for people who have an interest in the communities they serve, newspapers may be able to operate reasonably profitable knowledge stores in cyberspace. And even if online publishing does not prove to be a great financial success for established publishers, it could serve as the bridge to a more suitable *offline* form of digital print media.

Digital print media and portable tablets

To function as a practical alternative to mechanical printing and pulp paper, digital print media will require underlying technologies that are quite different from present-day personal computers and consumer online networks. First of all, they will need to be highly portable and simple enough for anyone to use without having to read a manual. As with traditional print media, digital forms must be comfortable and convenient to read while lying in bed, riding on a subway, dining in a restaurant, or sitting on a park bench. They will also need to integrate some of the more compelling elements of cyber media, such as interactivity, hypertext, and audio/video clips, *without* sacrificing the readability and ease of using paper.

Personal computers are bound to become more portable in the next decade but, contrary to popular wisdom, increased processing power and expanded storage capacity will not make them significantly easier to use or more suitable for reading digital editions of

mainstream publications and books. The solution, I believe, lies in the development of a new class of digital devices that will enhance and extend the dominant traits of the document domain. These devices, which I have described in the scenario as *tablets,* in a way take document technologies almost full circle back to their presumed origins in the soft clay of Sumer and Mesopotamia (see Exhibit 9.3).

A new Renaissance. Instead of completely discarding more than 500 years of accumulated printing and publishing knowledge, digital print media developed for portable tablets could lead to a new Renaissance in typographic and visual communication. In this next stage of the third great mediamorphosis, newspapers, magazines, and books will routinely merge the written word and still images with full-motion video and sound in engaging and aesthetically pleasing formats.

Moreover, publications designed for this new document-based digital medium will be capable of retaining their familiar print characteristics and branded identities while adding greater depth and transactional services. Despite the present fascination with the apparently limitless amounts of information that can be found in cyberspace, I am convinced that manageable, branded packages of information that provide an editorial context and have a clear beginning and end will continue to be preferred by most people.

Tablet publications can be just as personal and nearly as interactive as online media without eliminating the judgments and creativity of professional editors and designers. Readers should be able to use intuitive tools built into the tablet editions to quickly locate stories of potential interest. Even though tablet editions will be designed for reading primarily *offline,* wireless communication will make it possible for readers to go online whenever they want or need to.

The first portable digital newspapers. While affordable tablets with high-resolution, magazine-size displays may not be commercially available until the beginning of the next decade, smaller pocketbook-sized information and communication appliances, such as the Apple Newton and Sharp Zaurus, are already finding market niches. Despite the small size of their displays, these handheld devices, which average about $500, are more powerful and have a greater

Exhibit 9.3 Tablet mockup.

Source: Courtesy of Kent State University News Service.

storage capacity than a typical PC had in the early 1980s. Nearly all include modems for both wired and wireless communications.

Although these devices are limited in their ability to display formatted pages, they are considered adequate for reading small amounts of text and possess two essential document traits—portability and simplicity. The importance of these traits was not over-

looked by the *Mainichi Shimbun,* Japan's third largest national newspaper. Early in 1996, it became the world's first publisher to begin distributing daily editions specifically designed for reading on a portable electronic display. The digital editions are updated twice a day, five days a week, or more frequently when there are major breaking events. The handheld Zaurus, which is the recommended device, can store up to 18 stories for offline reading. It is also capable of receiving and displaying photos and graphics. The newspaper reportedly expects to reach its goal of 50,000 paying subscribers in 1997.

Other newspapers are also beginning to experiment with the delivery of content to larger portable digital devices. *El Periódico,* a newspaper published in Barcelona, Spain, launched the first market trial of a tablet edition in 1996 using devices called NewsPads developed by Acorn, a British electronics company. Even though the prototype tablets are bulkier and heavier than they would prefer for commercial versions, the newspaper and manufacturer still expect to learn a great deal about consumer acceptance of tablet publishing systems from this experiment.

Flat-panel technology

The idea that people will be leisurely reading documents on portable tablets by the year 2010 may seem unrealistic given the present state of computer and display technologies, but it is no more fantastic than was the 1980 vision of people routinely using mobile cell phones, fax machines, and CD players. While the timing may be off by a few years either way, most executives of computer and consumer electronics companies are now reasonably confident that tablets suitable for displaying and interacting with digital print media will become ubiquitous in the next decade.

The Dynabook. The vision of thin, lightweight displays that can be used as portable information and communication media has been around for some time. However, the credit for conceiving the first portable information appliance is usually given to Alan Kay.

As a young computer scientist at the Xerox Palo Alto Research Center (PARC) in 1972, Kay created a cardboard model of a device that bore little resemblance to the huge mainframes and terminals most people then knew as computers. He called it a Dynabook and

described it as a "dynamic media for creative thought."[7] According to Kay, it was to be a personal "self-contained knowledge manipulator in a portable package the size and shape of an ordinary notebook." It would have "enough power to outrace your senses of sight and hearing" as well as "enough capacity to store for later retrieval thousands of page-equivalents of reference materials, poems, letters, recipes, records, drawings, animations, musical scores, waveforms, dynamic simulations, and anything else you would like to remember and change."[8]

The Dynabook idea had been gestating in Kay's mind since the late 1960s when he was a graduate student at the University of Utah. So when he was invited to join the distinguished team of scientists who were forming Xerox PARC, he saw it as an opportunity to develop a working version of his dream. But despite his best efforts, Kay failed to win management support. Instead, the PARC team decided to pursue a project that would lead to the development of what became the world's first desktop personal computer—the Alto. More than two decades would pass before lightweight portable computers that could function as Kay originally envisioned became an "overnight success"—demonstrating once again the delayed adoption principle of mediamorphosis that transforming technologies always take longer than expected to become commercial successes.

Liquid-crystal displays. The development of the transforming technology considered most significant to the creation of portable computers and tablets—the liquid-crystal display (LCD)—also conformed to this principle. In 1964, George Heilmeier, a researcher at RCA's laboratories, accidentally discovered that images could be formed by applying an electric current to liquid crystals. Normally, this curious organic material is opaque and reflects light. But when a small electric current is applied, the crystals realign in such a way that they appear transparent.

Heilmeier immediately saw a number of practical applications for his invention and proceeded to build simple liquid-crystal devices

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[7]Douglas K. Smith and Robert C. Alexander, *Fumbling the Future: How Xerox Invented, Then Ignored, the First Personal Computer.* New York: Morrow, 1988, pp. 84–85.

[8]Ibid.

that could display letters and numbers. Today, LCDs are found in watches and pocket calculators, automobile dashpanels and kitchen appliances, scales and exercise equipment, stereos and cameras, and thousands of other products. They have also become the best-selling display technology for laptop and handheld computers.

In the past 15 years, however, nearly all development efforts have focused on achieving high resolution at high power to compete with CRTs. Even though flat-panel displays are certain to eventually replace picture tubes, TV sets have not been the largest or most lucrative market. Worldwide demand for lightweight, flat-panel displays has been driven almost entirely by a need to create, read, and interact with text-based documents while traveling or telecommuting. Unfortunately, the qualities that make displays suitable for full-motion video have not been entirely compatible with those needs. For example, screen **resolution,** or sharpness of the image, is not a critical issue for viewing moving images, but it is crucial for reading text. Consumer acceptance of a digital display medium for reading documents will depend on the development of portable displays with a contrast and resolution near that of ink on paper.

Digital ink on plastic paper. Technologies that could meet this standard are under development at a number of institutions and enterprises. One of the most promising is based on a material developed at Kent State University's Liquid Crystal Institute in Ohio, called cholesteric liquid crystals. As with ordinary liquid crystals, cholesteric crystals change their state from opaque to transparent when an electric current is applied. But unlike the liquid crystals used in current-generation displays, cholesteric crystals hold their state. In other words, they do not require constant refreshing or power to maintain an image on a screen. They also have several other advantages over other forms of liquid crystals. These crystals do not require polarizing filters[9] or backlighting. This gives displays made with cholesteric crystals the potential to match the contrast of ink on paper in ordinary light without consuming excessive amounts of power. Other advantages include the ability to use lighter weight

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[9]Polarizing filters are used with all contemporary LCDs to organize the light that passes through the liquid crystals. This significantly reduces the viewing angle and the amount of reflected light we can see on the display's surface.

and more durable plastic instead of glass and lower-cost manufacturing processes. If this emerging form of digital ink on plastic "paper" lives up to its promise, it could make low-cost tablets possible by the end of this decade.

Practical applications of tablets. Tablets will have a vast number of practical applications early in the twenty-first century beyond displaying digital editions of newspapers, magazines, and books. They are likely to be used by students and teachers to read and interact with course materials; by factory workers as electronic clipboards and manuals; by executives for viewing and distributing memos and reports; by salespersons for presentations and order entry; by attorneys to utilize depositions and documents in court; by repair persons and installers to access up-to-the-minute schematics and instructions; by public speakers as prompters and notepads; by stock brokers and commodities traders to process orders; and in nearly every other situation where paper is used today for storing, displaying, capturing, and distributing frequently changing, timely information.

Just as people don't think about the computer chips in their instant cameras when they take pictures, owners of tablets will not give much thought to the microprocessors behind their displays when they read and interact with digital documents. And instead of having to wrestle with the confusing proprietary technologies typical of computer systems, customers are likely to make their buying decisions for tablets based on the manufacturer's brand-name reputation, functionality, price, and other common variables. Tablets will probably be sold in consumer electronics stores along with digital TV sets, compact disc players, and minicams. While the initial price might be more than a thousand dollars at the end of this decade, by the year 2010 the range of prices will probably be comparable to other common consumer electronics, such as portable TV sets and mobile CD players.

Memory cards and offline publishing

Unlike the current generation of Internet and consumer online services, customers will not have to remain connected to a communication network in order to read and interact with digital documents on their tablets. As soon as a publication has been captured and stored, customers would be free to move about. They will be able to