UNITED STATES
NUCLEAR REGULATORY COMMISSION
ADVISORY COMMITTEE ON REACTOR SAFEGUARDS
ADVISORY COMMITTEE ON NUCLEAR WASTE
WASHINGTON, D.C. 20555

October 15, 1993

OFFICE OF
ACRS/ACNW

MEMORANDUM FOR: ACNW and ACRS Members

FROM: Mark E. Stella
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SUBJECT: ELECTRONIC DOCUMENTS FOR COMMITTEE REVIEW

Attached find a copy of an article "Acrobat vs. Common Ground"[1] describing two applications programs that support the creation and review of electronic documents. These programs provide computerized access to documents assembled from individual elements obtained from a variety of original media, assembled from integral paper-media documents (e.g., SSARs for ALWRs), or created by concatenating computerized databases of different types. Non-computerized elements of a document would be loaded by use of a scanner or other conversion device.

The Adobe Acrobat applications program was earlier identified by IRM as one possible means of implementing the AIMS functional requirement for preparation of computerized review packages for Committee use. The Acrobat software package includes several different applications software modules: one supports creation, another document production using a variety of output devices, and a third provides the capability for document review. The review module is installed on user machines, and is available for both DOS/Windows and Mac computers.

Enclosure: as stated

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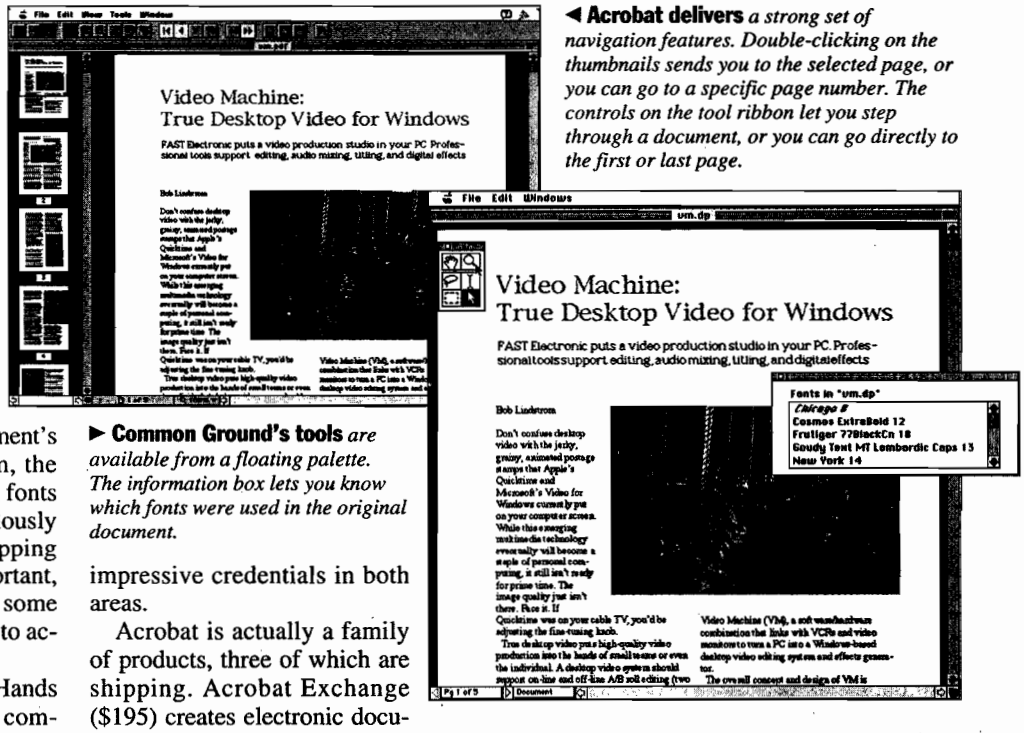
[1] BYTE, Vol. 18, No.11, October 1993; pp 133-136.

Acrobat vs. Common Ground

Adobe Systems and No Hands Software offer two different ways to distribute electronic documents

STANFORD DIEHL



◄ **Acrobat delivers** *a strong set of navigation features. Double-clicking on the thumbnails sends you to the selected page, or you can go to a specific page number. The controls on the tool ribbon let you step through a document, or you can go directly to the first or last page.*

► **Common Ground's tools** *are available from a floating palette. The information box lets you know which fonts were used in the original document.*

Consider it a pothole in the digital highway. Amid the promise of electronic-information delivery, we still don't have a reliable and efficient medium for communicating via formatted electronic documents.

We could continue to send unformatted ASCII text back and forth, but the style and layout of a document offers more than just a distinctive look. A document's design helps a reader better understand the information. But unless the document's recipient shares the same platform, the same applications, and the identical fonts as the document's creator, a meticulously designed report can fall apart, dropping its page formatting and, more important, some of its information content. In some cases, the recipient may not be able to access the document at all.

Enter Adobe's Acrobat and No Hands Software's Common Ground, two competing technologies for creating cross-platform, application-independent documents. Both technologies are compelling and workable. Each has clear advantages and disadvantages. Both show the potential power of a cross-platform document format. And both need some work.

Applications for document distribution are vast. With portable documents, corporations can electronically distribute telephone lists, manuals, or company newsletters throughout the organization.

The PostScript Solution

To provide a format for electronic-document distribution, a technology must retain the layout, the graphics, and the distinctive look of the original document. The digital document must be compatible with a wide range of output devices and, ideally, available to the widest possible audience. Acrobat and Common Ground take different approaches to this same end.

Adobe Systems has leveraged its experience on two fronts, PostScript and fonts, to devise a portable-document strategy. As the creator of PostScript and an industry leader in font technology, Adobe has impressive credentials in both areas.

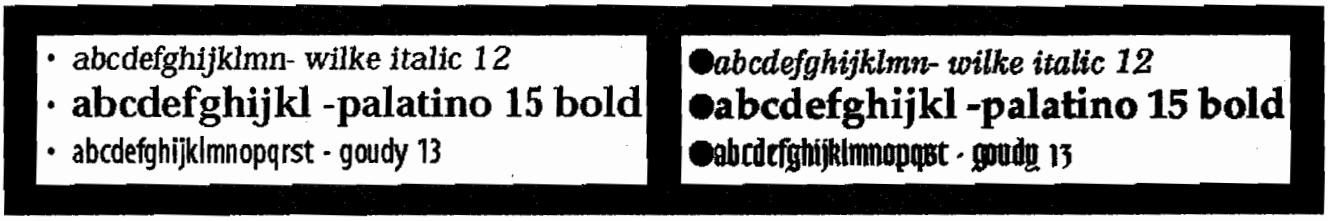
Acrobat is actually a family of products, three of which are shipping. Acrobat Exchange ($195) creates electronic documents through the printer-driver mechanism on a Mac or on a Windows-based PC. You can then view the document, search it for individual words, print it, or embellish it with annotations and hypertext links. Acrobat Reader sells in bundles of 50 ($50 per user), 100 ($40 per user), or 500 ($35 per user). Acrobat Reader lets you view, navigate, or print Acrobat documents, but you can't create them. Acrobat Distiller ($695) takes raw EPS (Encapsulated PostScript) files and converts them to portable documents.

Acrobat's PDF (Portable Document Format) uses PostScript to describe the text, graphics, and images in a file. Because it uses PostScript, a PDF file is device- and resolution-independent, so it will reproduce at the highest resolution that your output device supports. You can view a page on a high-resolution display system at multiple magnification levels, and you can print to any device, from a 300-dpi laser printer to a Linotronic image setter. Adobe has published PDF as an open standard, allowing developers to support the format in third-party applications.

To reproduce a document's fonts, Acrobat comes bundled with ATM (Adobe Type Manager) and its font-substitution technology. If a font is missing from a document, ATM substitutes one of two multiple-master fonts (serif or sans serif) to match the general style of the missing font. The substituted font will also duplicate the missing font's metrics. For basic fonts, this technology works well. The substituted font retains the weight and width of the original font. However, the distinctiveness of ornate fonts is lost, because ATM substitutes only a basic serif or sans serif outline and cannot replicate the actual font design. But by retaining the metrics of fonts on the page, ATM ensures that all lines break properly and that the page layout is duplicated exactly, even when complex fonts are unavailable.

Building DigitalPaper

Common Ground from No Hands Software sells for $189.95 and creates documents via the printer-driver mechanism on the Mac. A Windows version should be available by the time you read this. Instead of PostScript, Common Ground uses a proprietary format called DigitalPaper



To retain the distinctive look of a page, *a portable document technology must handle fonts that are not available on a recipient's system. Acrobat's font-substitution method retains the metrics of a font and thus retains proper page layout, but it often loses the decorative design of more ornate fonts such as Goudy. Common Ground's proprietary technology precisely mimics the font's appearance (right).*

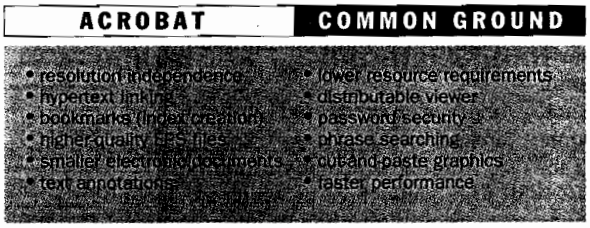
for creating and displaying its electronic documents. Embedded graphics are rendered by using the host-imaging system (QuickDraw on the Mac, and the Windows Graphical Device Interface, or GDI, when the Windows version ships) to build a scalable image. Using the host-imaging system saves memory overhead, because it does not require an additional imaging component.

Acrobat Exchange requires 2 MB of application RAM on the Mac; Adobe recommends 4 MB. Common Ground requires only 700 KB, but the company recommends about 1.2 MB.

Common Ground's font description is the proprietary part of Digital-Paper. The characters are not embedded outlines or bit maps (a common misunderstanding about Common Ground). To a first approximation, Common Ground sprays rectangles across the page and describes the contents of each rectangle in vector format. The first time a unique character is encountered, it is described and stored. When the same character occurs again, only location information is stored, with a reference to the original description of the character. The vector information tells Common Ground how to rebuild characters at fixed resolutions (72 and 100 dpi for screen display, 200 dpi for faxing, and 300 dpi for printing) with pixel-for-pixel fidelity. Although No Hands Software plans to increase the available resolutions in future versions, Common Ground will always be less flexible than the resolution-independent technology of Acrobat.

Perhaps Common Ground's greatest asset (in addition to small memory requirements) is its ability to attach a mini-viewer to an electronic document. With this run-time viewer attached, the recipient requires no additional software to view the document. The mini-viewer offers no searching and only basic navigation features, but it is freely distributable (up to 100 copies for each document).

Acrobat's lack of a run-time viewer could be a serious pitfall. If you want to establish a universal format for document transfer, you shouldn't expect everyone to buy a $50 reader program. On the other hand, Adobe may be more effective in establishing a standard than No Hands Software because of its preeminent presence in the market. If Adobe can attract licensees in the same way it did for ATM—in effect, letting vendors evangelize the product by shipping an Acrobat reader with shrink-wrapped software—or if it really gets aggressive and ships an Acrobat viewer with ATM, the company could establish Acrobat by brute marketing strength.



Common Ground (left) and Acrobat Exchange (middle) *create electronic documents by servicing print calls from the application. Using this method, both technologies process the low-resolution preview image of an embedded EPS graphic. Acrobat Distiller converts EPS files directly,*

The Feature Set

When it comes to current features, a general theme comes clear: If you could somehow combine the functionality of Acrobat and Common Ground into a single application, you would end up with a well-rounded solution.

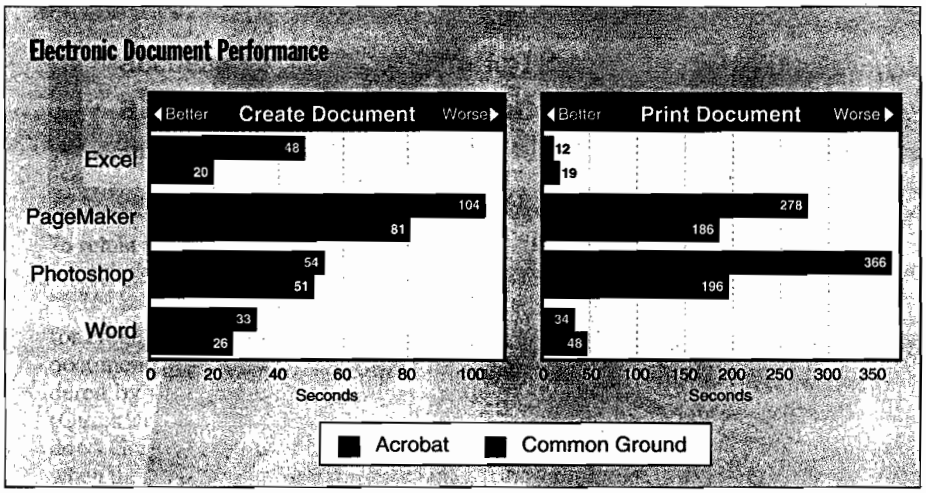
Common Ground includes security features (e.g., password protection for a document) that Acrobat should have. In addition, Common Ground lets you search for phrases, expanding on Acrobat's limit of single-word searches. However, Common Ground lacks Acrobat's hypertext linking, which lets you link to a specific view or magnification level. It also lacks any annotation features, while Acrobat lets you annotate a document with "sticky" notes. All told, Acrobat's interface is more fully featured.

The two products support thumbnail views of a document. Acrobat places the thumbnails to the left of the current page view, so you can conveniently turn to a specific page by double-clicking on the thumbnail. You can create bookmarks in an Acrobat document to quickly build a table of contents or an index of a document. Common Ground does not support a bookmarking facility. Acrobat supports magnification levels of from 12 percent to 800 percent in 1 percent increments; Common Ground's magnification levels are preset to 25 percent, 50 percent, 100 percent, 200 percent, and 400 percent.

Common Ground uses an I-beam for text selection, the standard method for selecting text in a graphical document, and captures graphics in bit-map or PICT format. With Acrobat, you draw a rectangle around text to select it. This method is a bit more cumbersome, and you can select only complete lines, not selected phrases within a line. In addition, you can't cut and paste graphics with Acrobat.

Testing the Technologies

To test out these two technologies, I generated an assortment of documents with a wide range of Mac software (e.g., Adobe



Common Ground *consistently outperformed Acrobat on the Macintosh. Acrobat's on-the-fly file compression slows performance but results in significantly smaller electronic documents.*

lustrator, Adobe Photoshop, Aldus PageMaker, Claris FileMaker Pro, Claris MacWrite, Informix Software Wingz, Microsoft Excel, Microsoft Word, and QuarkXPress). I transported the Acrobat files back and forth between a Mac and a PC running Windows.

On Windows, I tested Acrobat with PageMaker 4.2 and 5.0, Word for Windows, WordPerfect for Windows, Lotus 1-2-3 release 4, Excel, Photoshop, Picture Publisher, and CorelDraw. I used a system with a minimum configuration (a 16-MHz Mac SE/30 with 5 MB of RAM or a 25-MHz Dell 486SX with 4 MB of RAM), as well as a higher-end system (a 25-MHz Mac Quadra 800 with 8 MB of RAM or a 66-MHz Gateway 2000 486DX2 with 16 MB of RAM).

I ended up with electronic documents incorporating elements from all this software, but not without running into quirks. I created some PostScript files under Windows that the Mac version of Acrobat Distiller couldn't handle. An image embedded in a Word document displayed fine from the Mac version of Acrobat Exchange but didn't display on the Windows version. Adobe acknowledges some problems in its release notes, but a problem such as "canceling printing from PageMaker may cause a crash" is no less disconcerting just because it's documented.

Both products have some basic limitations. On low-end machines, I could process only simple documents, and graphics performance was slow. In general, lack of available memory was a persistent problem. And if your original document includes hyphenated words, neither product will be able to find the hyphenated occurrence but still a problematic one.

As you might expect, the Acrobat technology handles EPS files more efficiently than Common Ground does. Both products create documents by accepting application calls to the printer driver, so the low-resolution preview image of the EPS file is processed. Acrobat Distiller converts EPS files directly, resulting in higher-quality images. In fact, in its release notes for Acrobat, Adobe suggests using Acrobat Distiller if you run into problems with the PDF Writer.

Common Ground was faster than Acrobat at creating a portable document and printing it. The Acrobat files are smaller, though, thanks to various compression schemes, including LZW (Lempel-Ziv-Welch), RLE, CCITT Group 3 and 4, and JPEG.

Common Ground documents are approximately the same size as the original file. For simple documents, this is sufficient, but when I put together a PageMaker document with multiple 24-bit images, file sizes became a significant factor. The Acrobat file was about 4 MB in size, while the Common Ground file ballooned to over 20 MB. You can control the size of a DigitalPaper file by reducing the bit depth of your monitor to match the intended output. If you need only black-and-white output, you can set your monitor to 1 bit and decrease again, Common Ground's approach is less flexible than Acrobat's.

A Portable Format for the Future

Clearly, the time has come for a cross-platform standard for electronic documents. Now that the Acrobat and Common Ground technologies are in place, we can expect that future software releases will improve the performance and address some of the shortcomings of the current offerings.

If you're looking for today's best solution for corporatewide document distribution (e.g., memos, telephone lists, reports, and simple manuals), Common Ground is it. Your low-end machines will not be left out of the mix, and with the distributable viewer, you can send electronic documents off-site. It's a solution for simple correspondence and communication. Documents with large 24-bit images will be too big until DigitalPaper incorporates a good compression scheme.

Adobe is going to have trouble migrating Acrobat down to low-end systems. Based on PostScript and ATM font substitution, the Acrobat technology will require resources above and beyond the capacity of today's low-end systems. You'll have to decide if the requirement of a 4-MB or, preferably, an 8-MB system is too high for your organization.

I think the resource requirements will keep Acrobat from becoming a wide-spread standard in the short run. But as mainstream systems become more substantial, Adobe has what it takes to build a long-term standard: a proven technology, strong partnerships, an open standard, and a formidable market presence. The company has already announced technology partnerships to make future versions of Acrobat compatible with popular style sheets and style codes such as SGML (Standard Generalized Markup Language). The current proliferation of ATM also helps. In the long run, Acrobat will be the standard to beat. ■

About the Products

Acrobat Distiller $695
Acrobat Exchange $195
Acrobat Reader.....$50
Unlimited users $2495
(volume discounts available for Exchange and Reader)

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