

BUSINESS GRAPHICS

WHERE ARE THE STUDENTS?

One of the biggest problems faced by the software developers across the United States is the lack of qualified programmers. When I was Chairman of the Chicago Software Association's Educational Committee, the academic representatives from the major computer sciences schools in the midwest reported that one of their biggest problems was getting students interested in their programs. This is also a national problem. Students were asked about their lack of interest, and their response was that there is "too much math" involved in computer sciences and therefore it is too difficult.

It was not surprising, therefore, when two highly regarded professors in international and management accounting identified the same problem with accounting students. For many years, accounting schools have had the pick of the best and brightest students but not any more. One of the primary reasons is the difficulty in becoming an accountant. Another reason is that students do not see accountants at the leading edge of technology. We cannot make accounting easy, but we can enhance it with state-of-the-art technological features.

COMPUTER GAME DEVELOPERS CONFERENCE

For the past five years at the end of March, I have attended this conference, but for an unexpected reason: to see the new accounting system. Although there are no accounting systems displayed at that show, I see accounting systems in the sophisticated interactive games where the *system is involved in the action*; in the highly sophisticated use of advanced multimedia technology; in the most sophisticated use of artificial intelligence systems that learn how you play the game and then beat you at your own game. I see one of the fastest growing industries called *edutainment* that has impact on how more and more of today's children are learning math. And I see the potential new accountants who expect their systems to use the same technology.

The point to be made is that young people are being influenced by computer games, and they expect their workaday systems to incorporate similar technology. They expect the quality and applicability of the graphic systems to be as relevant to business systems as they are in games. Each year the quality of the graphics, the challenge of the action, and the interactivity of the game are improving. Accounting systems have just started using graphics, but poorly.

COMMUNICATIONS

When Bill Gates introduced Windows '95 (Microsoft), the world of communications changed. He firmly believes that humans all over the world can and will communicate more effectively and efficiently by using the multimedia potential of Windows '95. Microsoft's comprehensive commitment to the computer game industry defines their belief in the future of interactive multimedia.

IBM and Lotus are also in the communication business. Look closely at their ads and you will see the word *communication* everywhere. In one memorable Lotus TV commercial, a man and a woman are walking in a crowd. The woman asks,

“How did the presentation go?” The man responds with anger, “We lost badly, our marketing figures were not updated.” The woman convinces him that they should be using Lotus Notes to keep everyone up to date at the same time. He responds with “So now the left hand will know what the right hand is doing?” “Yes,” she replies, “Now we are talking the same language!” (By the way, they were talking Japanese, and English subtitles appeared at the bottom of the screen.)

Microsoft, IBM, and Lotus all define *multimedia* as the way to enhance an individuals’ ability to communicate worldwide business information. Newer and more powerful electronic media appear every year to help businesspersons communicate with their peers anywhere commerce occurs.

Accountants still maintain the primary responsibility of communicating the financial position and results of business operations. This position may change rapidly as the use of media becomes an integral part of the message and multimedia skills become a standard requirement for communicating business information. Marshall McLuhan said it all in the title of his celebrated book *The Medium is the Message* (1). As of today, I know of only one accounting text that requires accounting students to exhibit a competency in financial graphics (2).

It is not just the computer and software companies that think human communication via computers is important—the American Institute of Certified Public Accountants, the professional accountants association (AICPA) agrees. In a press release dated March 27, 1995, the AICPA announced the “Top 15 Technologies.” This document included a description of how accountants can utilize the following eight of the top 15 technologies:

3. Area networks
4. Cooperative and client/server computing
5. Communications technologies
7. Collaborative computing and groupware
8. Business process reengineering
9. Expert systems
14. Database applications
15. Executive information systems

COMPUTERS AND ACCOUNTING EDUCATION

Most accounting departments use computer-based accounting systems and computer courses to teach accounting. The current accounting systems are far from being a full-featured, interactive, multimedia, business communication system purposely designed to activate emotional and intellectual responses like the computer games.

Simply using computers does not represent a significant advancement in the teaching of accounting in universities. Not only are there no rewards for using information technology, but we are so early in the learning curve for instructional technology that frequent failures or difficulties can be expected. Several faculty members interviewed expressed this frustration. One at the University of Washington said he stopped using Internet access in his classes because the connection so often failed to work. Susan Hughes (3), an accounting professor at Butler University, likes computers being available in class but “too much time is wasted fixing things.”

Developing and using courseware creates even more problems and initial failures. Keeping current with technology, often an expensive proposition, is one way to ensure greater reliability. Another option is designing systems like Harvard University’s intranet for ease of use and upgrade (4).

OPEN-BOOK REVOLUTION

The potential technology impact grows when we couple the multimedia revolution with another revolution described by John Case in his new book, *Open-Book Management: The Coming Business Revolution* (5). Mr. Case documents what may prove to be “the single most important” business management concept to emerge from this century. Here is an all too brief summary of his description of open-book management in a recent *Inc.* magazine article:

More and more CEOs discovered what was missing from all the past decade’s management cures—and have invented a new way of running a company that overturns a hundred years of managerial thinking. The new system gets every employee to think and act like a business person—to compete—and it gets astonishing results.

He then describes how small to large companies achieved such phenomenal success (comments added):

Every employee sees—and learns to understand—the company’s financials, along with all the other numbers that are critical to tracking the business’s performance. [That’s why it is called *open book*.]

Employees learn that, whatever else they do, part of their job is to move those numbers in the right direction.

Employees have a direct stake in the company’s success. [Each employee gets a bonus based on how well they have moved the numbers toward profitability.]

Mr. Case notes that the financial reports are the basis of measuring and understanding the business. He describes how some of the companies distribute the financial reports throughout the company and the training sessions they hold. He also emphasizes how critical it is to show employees financial information about the areas of the business they know about and how their performance directly impacts the bottom line.

One of the most critical success factors in communicating operating results is to get the information to the employees soon after the events occur. When the events that created the numbers are fresh in the mind of the recipient, the information becomes more relevant.

The good news is that what may be “the single most important” business management concept to emerge in this century depends on a clear presentation of the financial results. The open-book revolution offers accountants the opportunity to be the information professionals in the twenty-first century, the information century. We can take advantage of this opportunity only if we learn how to use the multimedia power of current and future computers to present the financial results clearly so everyone in an organization can see and understand them. Unfortunately, financial statements are not known for their clear presentation or ease of understanding.

Accountants have the knowledge to explain clearly what the numbers mean. The computers and the tools to show peo-

ple what the numbers mean are available. But accountants do not have the training nor the standards to use the power of multimedia graphics.

SUGGESTED STANDARDS—FINANCIAL GRAPHICS

If accounting is going to be the profession the information users continue to use, there are many changes to be made. First, to stem the flow of students away from the accounting profession it must be proved to the student pool that accountants are equipped with multimedia technology. They must be convinced that presenting financial statements and annual reports in a full multimedia environment is practicable and appropriate. Second, the appropriate graphical user interface (GUI), multimedia-based computer environment must be provided to all professionals. Third, academic, field-based research programs must be sponsored to expand the knowledge base to include how the new communication devices can be effectively enabled in accounting standards. Fourth, the graphic and multimedia *standards* that are used to present financial statements must be set. Fifth, this needs to be done now. Financial reporting standards cannot be left to the graphic artists. Unfortunately, accountants generally are not trained in the computer-generated, multimedia, graphic arts.

The Illinois Certified Public Accountant Society (ILCPA) is pioneering in calling for the establishment of financial graphic standards (6). In 1993, The Canadian Institute of Chartered Accountants (CICA) built on the work started by the ILCPA (7). Both associations agreed on the need, both associations agreed on the proposed standards, and both associations called for action by the profession.

MULTIMEDIA

If there ever was a single word that describes the mental state or the perspective of the computer industry, it is *multimedia*. It is impossible to imagine a new personal computer being announced without multimedia capability. Few retail sales of personal computers are made today without the minimum multimedia capabilities. There are at least two types of multimedia: emotional and intellectual.

Emotional Multimedia

Emotional multimedia concentrates on those media that activate the emotional characteristics of the brain. The most recognizable use of emotional multimedia is the motion picture. Films utilize graphics, movement, human or humanoids, sound, light, and trick photography to involve the passive viewer in an emotional roller coaster. *Speed* is a movie that grabs the viewer from the opening scene and does not let go until the final moment. The emotional swings are expansive and often. You may not learn anything, but you are entertained and exhausted. This is not the skill set from which accountants should draw their designs.

Intellectual Multimedia Defined

*Intellectual Multimedia*¹ (IMM) is defined as “a concentrated and specific effort to use the appropriate media to activate all four parts of the brain to receive a set of information in a way that results in understanding.” (8). The media are data for

the upper left portion of the brain; words for the lower left portion of the brain; graphics for the upper right portion of the brain; and voice or sound for the lower right portion of the brain. This is the skill set from which we will draw our designs.

IMM must present data in tables supported by a graphic form that is an exact replica of the mathematical relationships described in the data table. The system must provide a detailed written analysis compiled by an expert system that describes the implications of the numbers. The computer-generated report must allow the accountants, managers, supervisors, etc., to edit the text and record their voice message to support the critical meanings of the numbers. The result is a more effective and relevant understanding of the information and, eventually, learning.

To meet the stringent requirement that the graphics are an exact replica of financial data, the graphics are selected from *The Financial Graphic Alphabet*² (TFGA), as proposed by the ILCPA and the CICA. The remaining media are organized so the same information gets into all four parts of the brain quickly and at the same time.

Intellectual Multimedia—Components. Intellectual Multimedia is a highly structured computer system that consists of several critical components. The easiest way to define IMM is by the output, a briefing book. A briefing book is a series of pages that taken together define the business’ performance from the corporate level to the lowest level of operating components. For example, one eight-page briefing book describes the overall corporate performance for a month, a quarter, or a year (see Fig. 1 in the Appendix). A three-page briefing book could be a “shift” report, describing the results of the 6:00 A.M. to 3:30 P.M. shift for a manufacturing production line or a fast food restaurant. The briefing book always depicts a set of time-sensitive data that describe performance.

The briefing book is defined by a *Visual Business Model*³ (VBM). The VBM consists of the specific formalization required to describe the data set on each page. For example, the financial statement VBM could be eight pages and the shift VBM three pages. There can be as many VBMs as there are business functions with measurable tasks and/or results. Operating results can be analyzed and presented through IMM, such as analyzing production mix formulas using heat, pressure, materials mix, etc. In any data case, the briefing book must be available soon after the events occur for distribution throughout the organization.

Each set of numbers contains a column headed “current actual” and a column for performance. The analysis is computed by matching the current actual data column to the comparable data column. The complete data set can be current actual compared to last year’s actual; current actual compared to current budget or forecast; or current actual compared to industry standards.

¹ *Intellectual Multimedia* is the trademark of Irwin M. Jarett. All rights reserved. Copyright Irwin M. Jarett, all rights reserved.

² *The Financial Graphic Alphabet* is the registered trademark of Irwin M. Jarett, all rights reserved. Copyright Irwin M. Jarett, all rights reserved.

³ *Virtual Business Model* is the trademark of Sensorium Software, Inc., all rights reserved.

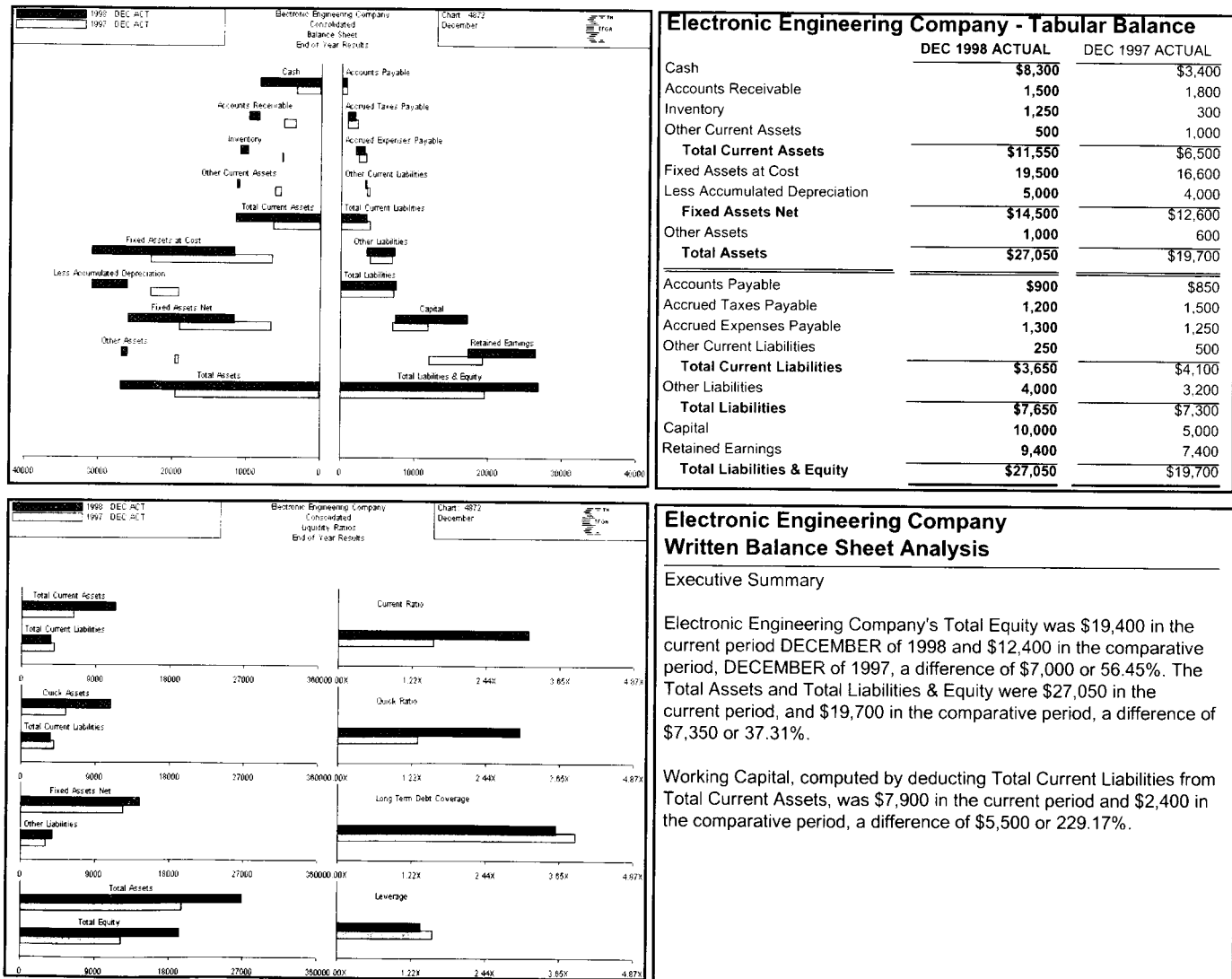


Figure 1. Page design, patent pending, Sensorium Software, Inc., all rights reserved.

The pages are highly structured and follow a strict set of standards that ensure an effective and efficient communication of the results. The basic standards are included in the Appendix and refer to the VBM included with this article.

The VBM shown in this article was designed to analyze the financial statements for a generalized business model. The VBM is called the Financial Statement VBM—Annual. The VBM compares actual data for the current year with current data from the previous year.

This article presents the standards for financial graphics and the printed briefing books but there are a large number of other multimedia options available to the accountant. The result of a VBM computation can be sent to the client as a presentation file that reflects the original data and words as edited by the user. The presentation can be sent to the client by diskette or electronically (using local- or wide-area networks or the Internet). If the presentation media is the computer, a voice message can be attached to each page to help direct the client to the critical performance areas.

Building the VBMs. A VBM is built when a consistent set of performance data is used and there is a knowledge base surrounding the data. When people use data queries to see what the data might yield, the numbers returned do not have a general knowledge base independent of the query user. If, however, the numbers are formalized into repetitive statements (e.g., the financial statements) or reports (i.e., the sales mix analysis reports and the standard cost variance reports), a body of knowledge accrues around the reports, consisting of common and company-specific intelligence. The VBMs capture the corporate intelligence surrounding the various report types. The more company specific the VBM is, the more useful the analysis.

For example, a large fast-food franchising company could build a set of company-specific VBMs designed so each franchisee gets a consistent and timely evaluation of his or her performance at every level of operations. The company might develop a set of daily and monthly financial statement VBMs for each reporting unit. The VBMs could be designed to help

the shift manager at each store reconcile the actual cash, inventory, and supplies with expected values based on the actual sales mix. Similar reporting processes would support the managers through their career paths, starting with the shift reports and ending with the board's financial statements. The IMM reporting process supports personnel growth through the management ranks like a personal tutor who is fully knowledgeable about corporate expectations.

Corporate intelligence is used to populate the inference engine that analyzes the data and reports the results. The inference engine code can be built by defining every possible case situation, creating fact statements to define the case and detailed analytical statements activated with various levels of triggers set for each case. For example, a case could be total assets increased, total current assets increased, or the current ratio increased. One trigger could be set so that an increase in the current ratio of 0.15 would trigger an analytical statement about what that size move may indicate. Alternatively, the VBM could be written so that it is generic and reports the critical facts that break confidence barriers without extended written interpretations.

A set of VBMs can be built for any company within any industry. For example, the fast food or trucking industry might use industry data rather than last year, budget, or forecast. When the actual data are analyzed, they would be compared to the industry averages.

Bottom Line. The bottom line is an improvement in productivity seldom experienced by accountants. For example, a 16 to 18 page printed briefing book can be ready to send to the client in *less than two hours* (using the Financial Statement—Annual VBM with manual data entry). Here is a brief analysis of the time:

1. The time it takes the accountant (or staff) to enter the data is 5 to 10 min. If the system is set up to import data, the time is minimal, less than a minute.
2. The time it takes the accountant to edit the written analysis before it is printed is 20 to 30 min.
3. The time it takes to print the report is strictly dependent on the speed of the printer for 20 min to an hour.
4. Once the briefing book is printed, it will take another 15 to 20 min to perform the final edit before the briefing book is ready for distribution.

The real productivity comes from the understanding that the accountants, both public and private, provide their clients:

- The accountant provides his or her clients with a set of detailed briefing book analyses a few hours after the numbers are available, which previously could take several days or weeks. Such productivity dramatically changes the economics of financial reporting.
- The clients learn and understand the financial aspects of their business better than ever before. In short, the accountants become more valuable to the clients.
- The accountant helps his or her company capture the corporate knowledge surrounding the operating numbers from the lowest operating unit to the highest level consolidation. Such a corporate-wide set of VBMs helps ev-

eryone in the company see and understand how their efforts impact the bottom line.

It is no surprise that this procedure is similar to the explanation of how to produce the open book revolution.

CONCLUSION

Intellectual Multimedia is only the first step toward integrating computer graphics into the accounting standards. Once we have a foundation in both practice and academia, the next step will be to move toward three-dimensional representations of the accounting, financial, and operating data. Such systems are only a generation away. Is the accounting profession prepared to make the commitment?

APPENDIX

Here are the standards for the IMM shown in Fig. 1.

1. Each page has four portions, two for the left side of the brain and two for the right side. The portions are linked horizontally, top and bottom, so that the page design best fits the scientific research on how people see and bring the information into the brain.
2. The top half of the page makes up the data transfer portion of the page. The purpose of the top half is to get the data set into the viewer's brain. The two portions must be strictly related.
 - a. The top left portion, a chart, is seen best by the left eye. The left eye gets the information to the top right part of the brain, the visual part of the brain.
 - b. The top right portion, the data, is seen best by the right eye. The right eye gets the information to the top left part of the brain, the number-crunching part of the brain.
 - c. The top right portion presents a highly stylized tabular version of the financial or operating data to be communicated within a page. Research proves that the average human can only work with a limited number of variables. The most often quoted limitation is seven (7) variables. My research indicates that through the proper use of TFGA imbedded in IMM presentations, the number of data variables that can be seen and understood increases to 10. The 10 variables can be doubled to 20 by selecting either the Component or Twin chart from TFGA for the top left portion.
 - d. The top left side of the page contains a chart selected from TFGA to replicate the data set. The chart selected must be an *exact representation* of the financial statement or other number sets presented in the top right portion of the page. For example, if the data show $(\text{cash}) + (\text{accounts receivable}) + (\text{inventory}) + (\text{other current assets}) = (\text{total current assets})$, then the chart must show the identical relationships. It is critical that both parts of the brain see the same *data patterns*; otherwise communication is blocked. If these requirements are to be met by accountants from all over the world, there must be a set of finan-

Balance Sheet Analysis for Electronic Engineering Company
<p>Executive Summary</p> <p>Electronic Engineering Company's Total Equity was \$19,400 in the current period DECEMBER of 1998 and \$12,400 in the comparative period, DECEMBER of 1997, a difference of \$7,000 or 56.45%. The Total Assets and Total Liabilities & Equity were \$27,050 in the current period, and \$19,700 in the comparative period, a difference of \$7,350 or 37.31%.</p> <p>Working Capital, computed by deducting Total Current Liabilities from Total Current Assets, was \$7,900 in the current period and \$2,400 in the comparative period, a difference of \$5,500 or 229.17%.</p> <p>Net Changes—Total Assets and Total Liabilities & Equity</p> <p>Electronic Engineering Company's Total Assets and Total Liabilities & Equity increased from \$19,700 in 1997 to \$27,050 in 1998, a \$7,350 or 37.31% increase. A 37.31% increase is an aggressive growth rate. Such growth puts substantial pressures on management to maintain a sustainable return on assets. Growth this large requires careful planning and execution by everyone in the company.</p> <p>Current Ratio</p> <p>The Current Ratio is a primary indicator of liquidity and is computed by dividing Total Current Assets by Total Current Liabilities. The Current Ratio for the year ended 1997 was 1.59 and was 3.16 for the year ended 1998, an increase of 1.58 or 99.60%. This ratio shows that for the year ended ...</p>

Figure 2. Sample analysis from annual VBM.

cial graphic standards we all agree to. The financial graphic standards are taken directly from Ref. 9.

3. The bottom two portions make up the data analysis portion of the page. Their purpose is to help the brain understand what the data patterns show.
 - a. The chart in the bottom left portion can be any chart that helps the user analyze and understand the relationships shown on the page. In most instances, the bottom chart will be a "ratio" chart.
 - b. The lower right portion contains a written analysis of the results. In this example, the results were analyzed and presented by The Fingraph® Analyst™ software. The inference engine analyzes the change between the two sets of data presented in the financial statements and prepares a written report describing the results. If the written report requires more space than the lower right portion, the system inserts a global summary in the portion and carries the full text over to a separate page or pages (Fig. 2).

BIBLIOGRAPHY

1. M. McLuhan, *The Medium is the Message*, New York: Random House, 1967.
2. B. Needles, Jr. and Marian Powers, *Financial Accounting*, Boston: Houghton Mifflin, 1998.
3. S. Hughes, private communication. e-mail: hughes@butler.edu

4. B. H. Hogan, *Transforming Higher Education Using Information Technology*, Microsoft in Higher Education [Online], 1995. Available www: <http://www.microsoft.com/education/hed/vision.htm>
5. J. Cage, *Open-Book Management: The Coming Business Revolution*, New York: Harper, 1995.
6. Illinois Certified Public Accountant Society, *Financial Graphics—Communication for the 1990s: The Need for Financial Graphic Standards*, Chicago: ILCPA, 1988.
7. Canadian Institute of Chartered Accountants, *Using Ratios and Graphics in Financial Reporting*, Toronto: CICA, 1993.
8. I. M. Jarett, *Financial Reporting Using Computer Graphics*, Supplement, New York: Wiley, 1998.
9. I. M. Jarett, *Financial Reporting Using Computer Graphics*, New York: Wiley, 1981, 1988, 1993, and Supplements, 1994–1998.

IRWIN M. JARETT
Sensorium Software

BUSINESS INFORMATION SYSTEMS. See **MANAGEMENT INFORMATION SYSTEMS.**