METHODS OF COMMERCIALIZING
ENERGY SCHEMING
IN THE BPA REGION

ENERGY STUDIES IN BUILDINGS LABORATORY

CENTER FOR HOUSING INNOVATION
UNIVERSITY OF OREGON

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CONTENTS

1.0   EXECUTIVE SUMMARY

This report presents an analysis of the costs and benefits of two methods of commercializing *Energy Scheming 1.0*:
- production and distribution by the University of Oregon, and
- production and distribution by an independent software publisher.

Recommendations and Timeline

1.   Publish *Energy Scheming* in two phases.

     Phase I: One year, starting with software completion
     - University of Oregon publishes *Energy Scheming* on a trial basis for one year.
     - Focus on B.P.A. region.
     - Meantime, continue contacts with independent publishers to determine interest in and evaluation of *Energy Scheming*.
     - An additional possibility is to discuss modifications to *Sun, Wind and Light* (published by Wiley; G.Z. Brown, author) in order to market a "learning package" that includes *Energy Scheming* and additional exercises.

     Phase II: After first year
     - Evaluate sales and technical support needs based on Year One trial period. Determine strengths and weakness of Energy Scheming and University of Oregon involvement in publishing.
     - Determine whether sales and other benefits warrant choosing an independent publisher. Criteria for publisher should include: ability to reach national and international markets; broad market base; volumes or price levels sufficient to generate funds necessary for technical support; ability and willingness to take advantage of energy issues in promotion.

2.   Price categories should include individual licenses and site licenses (more than one copy of *Energy Scheming* authorized)

3. Price levels should be adjusted to be attractive to buyers, but high enough to generate .5 F.T.E. salary for technical support. Prices to students and educational institutions (including individual educators) are low enough so that all educational institutions in the B.P.A. region can purchase copies if they choose to, in order to use the program for teaching purposes. Student prices should allow students to buy individual copies, in addition to the ones that may be available to them through their educational institution.

2.0 INTRODUCTION

Background information on software publishing is presented below, which includes: a brief analysis of the differences between educational software publishing and book publishing; market characteristics; production; promotion; technical support and maintenance issues and pricing strategies. These topics are then be discussed in more detail under the costs and benefits of publishing *Energy Scheming* in two ways.

3.0 BACKGROUND

3.1 PUBLISHING SOFTWARE

Software publishing is similar to book publishing in that it involves authoring, evaluating, marketing, production, promotion, sales and royalties. Several differences between publishing books and software have prevented traditional book publishers from competing successfully with commercial software publishers. The main differences relate to authoring process, legal issues, production, distribution, buying habits and marketing.

Authoring process
Software development requires funds at the beginning of the project because both programming and specialized topic knowledge is required. In addition the program must be more or less complete before it can be evaluated by a publisher, which means that both the program and documentation are in final form - and virtually ready for production. Book publishing proceeds on an incremental basis of sample chapters and cash advances, which are advantages not offered to the

software author. In addition, most of the typesetting and editing costs are carried by the software author, rather than the publisher. High initial costs for the software developer therefore reduces the advantages of working through an independent publisher.

Legal issues

The main problems in software publishing are associated with protection of intellectual property. It is easy and quick to copy software and the resulting copy is no different from the original. Copying manuals presents more of a problem, but many users, especially experienced ones, can learn the program by other means or can get access to documentation if necessary. Another issue is that large companies or agencies buy one program and copy others for all employees.[1] Both cases are infringements of copyright law, but are extremely difficult to enforce.[2] Software licensing has developed as one way to combat this problem. A license agreement authorizes the number of copies that can be made and the computer systems on which they may be used. Site licensing agreements allow a buyer to make a specific number of copies for multiple users in the same location or for a network. Site license agreements vary considerably in both price and number of copies permitted. Both are a matter of negotiation between software author(s) and publishers or distributors.

Production

A software package can be produced by anyone with access to a computer and copy machine; compared with books, software packages are much less expensive to produce. Software manuals rarely use high quality binding or stock. They are primarily useful tools with short lives. Production schedules for software are much faster than book publishing. Typically textbooks require 8 to 10 months for production. Software requires less than 4 months - in some cases it can take as little as one day.

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[1] The general counsel for the Software Publishers Association, citing the 11th Amendment (11/07/90) verified that state governments and state agencies *are* specifically subject to the copyright laws. *Newsbytes* , Nov. 7, 1990.

[2] The Software Publishers Association estimates that software makers lose an annual $2 billion in revenue in the U.S. on account of illegally copied software. Foreign losses are triple that amount. *Wall Street Journal.* May 20, 1991. p.28.

The software package contains more "pieces" than book publishers usually deal with - manual, binding, disk, labels, mailers. Software often has several versions (professional version, educational version[s], student version, demos). Both these characteristics complicate and thus add expense to standard textbook costs. Textbook editions usually run on a four year cycle, but software modification is continuous and upgrades can be released every year. This makes it risky to stockpile a large volume and so reduces the advantage of large publishers who serve mass markets.

The pricing strategy for software is more complex than for textbooks, which usually appear in either a hardbound or paperbound edition. Software can be sold in various versions and at different prices (for example, some software comes with extra files or an additional HELP disk). Professional, educational and student (lowest price) are the most common categories. In addition, site licenses are usually available at higher prices at both professional and educational prices. Licenses vary considerably, as to price, the number of sites (authorized copies or users) and number of manuals included. Demonstration disks are usually available for a nominal price (under $10) which does not include documentation.

Software buying habits; dissemination of information about software and distribution

Software buyers cannot 'browse' software and so are more inclined to rely on reviews, information from manufacturers and demonstrations before committing to a purchase. This is accomplished through reading journals or contacting manufacturers, rather than buying from a reseller. One developer surveyed stated that traditional book marketing, through resellers, would never be successful with software because of the reliability and ease of telephone ordering directly from a manufacturer or developer. [3]

Many groups have been established to facilitate exchange of software and information. Examples of such groups are: the National Energy Software Center, Software Publishers Association, MacUsers support groups, Society for Computer Applications in Engineering, Planning and Architecture. These groups provide information to members through meetings, newsletters and computer mail;

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[3] Personal interview, Silicon Forest Software, Portland, Oregon. July, 1991.

maintaining catalogs and directories; and publishing reviews of new software, etc. The Society for Computer Applications in Engineering, for example, also publishes software authored by its members.

There are distributors for software (MacWarehouse, Tiger, MacFriends) and resellers (such as Egghead and University bookstores). Software distributors are usually not familiar with the educational market, In response, educational software vendors, such as Course Technologies and Intellimation, which is affiliated with Apple Corporation, have emerged to cater to this specialized market. This is also the market in which textbook publishers are now beginning to have some success. Textbook publishers have been involved in software publishing since the early 1980's. At that time, they were unfamiliar with the characteristics of software users, did not provide technical support, often published low quality products and usually distributed the software with textbooks.

Most textbook publishers still publish over 80% of their software to accompany textbooks, rather than selling it as a stand-alone product in the way a software publisher would. According to one publisher, the "Learning package" is the only way that traditional textbook publishers can compete in the software market. These packages include books, software,workbooks, CD ROM, or whatever is necessary to enhance the book they are selling. The cost of software thus is "free" (added to the package price); is it also not subject to normal licensing restrictions. By this means some textbook publishers can target the non-software based market with which they are familiar, rather than competing with software specialists.[4] One publisher stated that they had trained the education market to expect free software, and that they were now trying to change that expectation.[5] Some of the major publishers, such as Harper Collins, McGraw Hill and Wiley are now making a concerted effort to publish high quality "stand-alone" software at full price for the education market.

The preceding discussion provides some insight into why the small software

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[4] Personal telephone interview, Marketing Director, Harper Collins Publishers, August, 1991.

[5] Personal telephone interview, Bob Johnson, Head, Software Division, Harper Collins Publishers, August 1991.

publisher can have important advantages over large book publishers, who must make expensive modifications in their production and sales procedures in order to accommodate the differences between software and book publishing. Software authors who are knowledgeable about the market for their product have an additional advantage over independent publishers, particularly if the software is aimed at a particular niche (such as architects and architecture students). Given these advantages, and the low cost of production, authors can successfully publish their own software if they choose.

3.2 THE MARKET FOR *ENERGY SCHEMING*

Energy scheming was designed for architecture students and educators and architecture professionals as the primary users. This market is further limited to Macintosh users. An architecture school is in a unique position to reach this market because of its close connections to professionals, educators, students and alumni. Few publishers have access to all these "niches" – professionals, the educational market and software users – because book publishers tend to specialize in specific topic areas. They can operate in both professional and educational markets, but for reasons mentioned above have not yet competed successfully in reaching software users. Companies which specialize in educational software development and/or distribution, lack contacts with the professional market. This presents a major impediment to reaching the cross-disciplinary architecture market. Because *Energy Scheming* has been developed partly as an educational tool in a technical area by faculty members, the authors already have access to one of the markets for whom their software is intended.

There are a finite number of architectural schools, and within each school, only a few subject area specialists and usually less than 50 faculty members. Schools and individuals in particular subject areas maintain strong communication networks. It is through these channels that information about innovations and new software are diffused. Those in the academic community also maintain links with other specialist groups through journals, conferences, workshops, newsletters and the like. Thus the software author who is also an educator and researcher can easily publicize the software directly to the intended market with minimal promotion costs.

The National Architectural Accrediting Board (NAAB) reports that there are approximately 34,000 full-time architecture students in the U.S. (this figure includes Canadian students at NAAB-accredited schools). The American Institute of Architects (A.I.A.) reports that it has 54,000 members. The *Guide to Architectural Schools in North America*, published by the Associated Collegiate Schools of Architecture reported 85,000 licensed architects (not all are members of the A.I.A.) in the U.S. and an additional 4700 in Canada. **Potentially, then, the national market for *Energy Scheming* could be between 92,700 and 123,500.** There are no figures available which indicate how many in this group use Macintosh software.

A publisher could expect buyers of *Energy Scheming* to be individuals (professionals, faculty, students) as well architecture firms, government agencies and schools (who usually purchase site licenses). 75% of architects work in firms with fewer than 25 employees which suggests there is a large market of firms for site licenses, which give maximum returns for technical support. It is likely that many professionals would have sufficient access to *Energy Scheming* through this channel. On the other hand, the growing number of home computers and the attractiveness of working from the home make it increasingly likely that professionals will purchase individual copies for their own use. The professional market for *Energy Scheming* includes a wide variety of private and government agencies that employ architects, such as public works, health agencies and departments, building services, manufacturers, housing authorities, utility companies, etc. This group (estimated to be over 2000 by the ACSA) may or may not be registered architects, so that access to them would need to be made through their employers or trade journals.

Most students would have access to *Energy Scheming* through their schools, in a laboratory setting. Because of the restrictions on site licensing, however, a high percentage of students could be expected to purchase their own copies of *Energy Scheming* if the price was low enough ($40 is deemed to be an acceptable price by many publishers). This cost is offset by the fact that students receive a personal copy of the software manual (often only one copy is available in a lab setting) and can use the program on their personal computer at any time. Given the working

habits of students and time restrictions on lab time, owning a personal copy of an essential program is a decided advantage.

Energy Scheming has already been Beta-Tested and used in 5 different lab situations. The program was sent to over 20 Beta Testers; so far, 12 have responded. In summary, testers commented that the program is definitely needed and would easily fit in with the existing curriculum. All were positive about the potential of the program to integrate energy concerns at an early stage in the design process. Negative comments related to the "bugs" that are in the process of being corrected. System errors, which will be eliminated before the program is released, are an expected part of the testing process. Workshop attendees, many of whom are not experienced using the Macintosh, were initially deterred when they encountered program errors. Once familiar with the program however, they were quickly convinced of its value and excited by the ease with which the graphic format allowed the results of complex energy calculations to become visible in building form. One tester, Victor Olgyay, commented that there is "nothing else like it" and that it would prove to be "enormously useful." The structure of the program, he observed, is such that it will allow future development. He was especially impressed with the freedom that the graphic interface allowed, while at the same time substantially reducing the tedious takeoffs required for accurate energy analysis.[6]

The marketing of *Energy Scheming* must also address the issue of energy conservation in order to expand beyond the assured market of energy specialists in architectural education and professionals who concern themselves seriously with energy issues in design. An independent publisher should be chosen on the basis of being able to influence this broader market.

3.3   PRODUCTION: MAIL ORDER VERSUS RESELLING

Software publication is within the capabilities of individuals and certainly an educational institution with printing and publishing services. Mail order selling eliminates the importance of attractive (and usually expensive) packaging, which

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[6] As quoted by Tomoko Sekiguchi in personal telephone interview, July 1991, from Olgyay response to Beta Test questionnaire.

is a more important factor if the product is sold through a reseller, such as a bookstore.

Software buyers research carefully before purchasing, especially as the cost rises (e.g. over $40). This is because experienced software users know that to ensure the software will serve their purposes, it is necessary to have accurate information on system compatibility, and details of what the program can do. Therefore, author publishers have an advantage in marketing because of their detailed knowledge of the program and its capabilities. Resellers and distributors rarely attain more than a basic knowledge of the programs they sell, unless individual employees become familiar with it for their own use. Often, the buyer will prefer to talk directly to the manufacturer (or author, if possible) and then order directly from them rather than spending time locating the program at an outlet.

3.4   PROMOTION: ARCHITECTS VERSUS MAC USERS VERSUS EDUCATION MARKET

Information about software is disseminated through advertising and reviews in journals and magazines; direct mail to selected groups; conferences, workshops and demonstrations; and through software user-networking, including word of mouth. Satisfied users are the best advertisement and the word spreads quickly. Once again, software authors often have an advantage over independent publishers in being familiar with the potential market, particularly if it is a specialized one, such as architecture. Personal acquaintances and reputation are frequently much more convincing than sales representatives or mailers. Conferences and workshops are the primary way that both educators and professionals keep in touch with innovations and trends. Consequently, software authors frequently come in contact with the most likely buyers during the normal course of their jobs.

Independent software publishers have a decided advantage when it comes to new or expanded markets, beyond the ones familiar to authors. Author publishers are most successful when they expend most of their effort on what they know best --

research and development.[7] Software and book publishers have contacts and personnel to search out such markets and to distribute the software more efficiently and successfully than an author-publisher. Large publishers are better able to make *Energy Scheming* attractive to the less technically oriented in the educational, professional (including non-architectural) and general markets. Because the program is Macintosh based, the publisher should also be a specialist in this particular part of the software market.

3.5 TECHNICAL SUPPORT AND MAINTENANCE ISSUES

Technical support and maintenance is not always available to the software purchaser. Inexpensive high volume software rarely includes technical support in the selling price and the high cost of providing support is making this situation increasingly likely. Some software comes with a HELP disc which attempts to address the most common problems. Many manufacturers (such as Aldus) sell maintenance contracts, which allows the purchaser access to a toll-free number for a specified period of time – usually one year. Other companies use a 900 telephone exchange by which customers pay for help as needed. This method can pay for technical staff salaries (providing sales volumes are sufficient) and also gives programmers or authors direct access to information from users.

Large textbook publishers offer free technical support through their software division, whose employees are familiar with software published through the company. Depending upon the publisher's agreement with the author, customers will be referred directly to the author with technical questions which the publisher is not able to answer. Even with an independent publisher, some of the burden of technical support reverts to the author. In the case of *Energy Scheming*, this cost should be anticipated when agreements are negotiated to ensure that income from sales will provide sufficient funds for support costs in addition to royalties .

A key part of software development is the interaction that occurs between end users of the program and the programmers – it is essential for improvement of

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[7] "Part the Software Sea with These 10 Commandments of Success", InfoWorld. September 24, 1990. V.12, n.39, p. 122.

the program and future innovation. Beta Testing (testing the program in the environment in which it will be placed) is the recognized method of doing this before the product reaches the market. Beta Testing cannot bring to light all errors in a program. Many software publishers that conduct beta testing find it difficult to create and maintain a productive relationship with testers. For their part, testers sometimes feel the rewards do not match the effort testing requires.[8]

"Maintenance" is the term used to refer to the modifications that software almost inevitably requires once it has been delivered to the customer. "Maintenance now forms a major part of any software developer's budget," according to researcher Darrel Ince.[9] The need for continuing maintenance (which includes errors in programming, production as well as enhancements and refinements) is a characteristic of software, especially complex software, that is not encountered in other industries (for example, refrigerators, stoves, houses). While software authors must respond to users, this must be balanced with a concern for the cost of complex changes that users, who are non-programmers, sometimes request because they cannot know the system implications of modifications. Even programmers are wary of attempting to rectify errors if the process might disturb the rest of the system and introduce new errors. The more complex the program, the more serious this problem becomes.

Maintenance is an integral part of the software development process. If it is not provided for, the software may never be successful. Small errors can be enormously frustrating to users and they are likely to abandon the program if they believe the problem cannot be solved. Technical support also encourages the user to be patient with minor problems, in anticipation of a much-improved upgrade. **For these reasons, it is essential for software pricing to cover the cost of maintenance and technical support if the program is to be usable and successful.** The costs, however, are higher than many developers are willing to pay, particularly small firms. A Software Publishers Association financial report states that a small firm must bring $1 million in revenue in order to support a

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[8] Cheryl Currid, "Software Firms Should Praise, Not Bury, Loyal Beta Testers," *PC Week*, August 27, 1990. v.7 n.34 p.125.

[9] *Software Development. Fashioning the Baroque.* (Oxford, New York, Tokyo: Oxford University Press. 1988).

full-time support person[10] .

The consequences of inadequate (or non-existent) maintenance are revealed in a
1979 U.S. Government Accounting Office report stating that only $0.1 million
worth of software ordered by the government was used as delivered; $0.2 million
worth was used after changes were made; $2 million worth was delivered but not
used; $1.3 million worth was abandoned or reworked.[11] Ince reports another
survey which showed that an average of 48%, up to 60% of technical support staff
time was spent on maintenance, with the remaining time available for research
and development.

3.6   PRICING STRATEGIES

Various price categories for software have been developed in response to user
requirements and the need for copyright protection. Software is sold with a
license, which authorizes the buyer to make a set number of copies of the program
disk, but not the manual. An individual buyer is authorized to make only one
back-up copy of the program. **Site licensing** was created to protect copyright in
situations in which multiple copies were required, such as large organizations,
in which many employees used the same program and/or the same network, or
classes in which an instructor required each student to use a particular program.
Other variations followed from these two price categories.

The price level of software is based on demand, complexity of program, special or
unique qualities, and the need to recover the costs of development. On the other
hand, there are informal rules about pricing for different segments of the market
that must be kept in mind while developing a pricing strategy. University
bookstores in the B.P.A. region, for example, report that few students buy software
costing over $50, regardless of the the quality of the program. Prices in
educational software catalogs, such as those produced by Intellimation, Educorp
and Wm. C. Brown, confirm this opinion. It is generally agreed that educational

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[10] "Software Industry: Software Publishers 1990 Financial Report," *Edge: Work Group
Computing Report*, April 8, 1991. v I n.46 p. 2.

[11] as reported in Ince, op. cit. p. 5.

discounts are an expected part of marketing and that professionals and businesses are willing to pay the full price for desirable software.

The most common sub-category of individual pricing is the student price, which is designed to encourage this large, but limited-income group to acquire software and (and hardware). Faculty members enjoy similar benefits, particularly because their endorsement is an important influence on the student market and because of their non-profit orientation.

There are a range of prices available for site licenses also. Private firms, government agencies and educational institutions may each have a separate price category. Many institutions of higher education have very limited budgets for computer-related expenses and so both manufacturers and faculty members have had to create new and affordable ways to allow institutions to keep up to date with very rapidly changing technologies.

In the case of *Energy Scheming*, an important motivation in marketing the program is to improve the energy efficiency of buildings. The educational market is a key element in achieving this goal, since the skills students take away from college will be applied in practice. Computer-literate students who are familiar with design-energy issues as a result of using this program will become valued employees, especially to those firms that are in the process of computerizing and who wish to compete successfully in an increasingly energy-conscious market. **Site licensing for educational institutions should therefore be made available at prices which allow all architectural schools in the B.P.A. region to acquire the program for use in their curriculum. Pricing for individual student copies should be similarly favorable.**

Pricing strategies for site licensing vary widely and are apparently based as much on the negotiating skills of the software author as on attractiveness to the user. ***Energy Scheming* pricing should be set so as to pay for the technical support needed to improve and develop the program, and so as to be affordable to the desired market groups.** See Table 1 below.

| Categories | Prices in dollars | |
	Option A	Option B
Professional (full price)		
individual	175	300
site license (5 units)	400	800
Educational (discounted)		
Faculty (individual)	100	175
Site license lab pack (institutions- 10 units)	600	1000
Students	40	50

Categories and prices based on current selling prices for programs of comparable complexity. Technical support fees are usually added to selling price of commercial software. These prices include technical support component.

TABLE 1 Proposed Categories for Licenses and Pricing Options*

Royalties on software vary enormously, depending on the type of publisher. Educational software publishers mentioned the lowest rates – from 4%- 8%. Software publishers mention similar rates, but admit that each situation must be negotiated, although rates are somewhat higher than the first group. Book publishers who are moving into the software markets also vary widely in the terms they offer. Depending on the value of the software to the publisher (for example, it could enhance textbook sales or keep them up to date with competitors), royalties can be as high as 33 $1/_3$% (Harper Collins).

3.7 SUMMARY AND CONCLUSIONS

Software authors, particularly those in the academic community, can successfully publish and distribute their product because the software market is still new and dynamic. Educational software authors are very often professors or researchers and already have direct access to the market for whom the software is intended. Since a substantial amount of information about software is diffused

informally, through networking, the author can publicize the software directly to the intended audience with minimal promotion cost. Software production is not complicated; costs are low and mail-order service eliminates the expense of sales staff. The important maintenance link between author/programmer and user is direct and immediate.

Independent publishers, whether software publishers or textbook publishers working in the software market also have certain advantages. Independent publishers, for whom sales and marketing are the major expense, can offer the possibility of high sales volumes, success in the competition for distribution channels and shrinking shelf space. If a publisher could move well beyond the market familiar to the software author and thus show much higher sales volumes and royalties, then it would be worthwhile to work with such a publisher.

An independent publisher for *Energy Scheming* should have access to both professional and educational markets; offer national and preferably international marketing; and offer both a large sales volume and royalties that are large enough to pay for technical support. The point was made earlier ("Pricing Strategies") that publishers do not necessarily add technical support costs to the price. Even when they do, it does not pay for the time the author will undoubtedly spend dealing with questions that the publisher's staff cannot answer. **For that reason, if an independent publisher is chosen, the income of sales should be allocated as both royalty and technical support. Technical support, being a fixed cost, should be subtracted from this income before the royalties are allocated according to the University of Oregon formula.**

4.0 ANALYSIS OF PUBLISHING COSTS AND BENEFITS

4.1 UNIVERSITY OF OREGON PUBLISHES *ENERGY SCHEMING 1.0*

Market characteristics of BPA region

There are 5 schools of architecture within the B.P.A. region.[12] with a total of 1599 full time students and 97 full-time faculty members.[13] All have access to Macintosh computers. The American Institute of Architects reports that its membership for the region is 2684, and the National Architectural Accrediting Board reports 3970 registered architects in the region. Neither AIA nor NAAB had reliable statistics on the number of private firms, but offered 400-500 as a conservative estimate. **The total market of individuals for *Energy Scheming* in the B.P.A. region could be as high as 5666.** See Table 2.

State	# of F.T. Students	F.T. Faculty	Part-T. Faculty	AIA Members	Registered Architects
OR: Univ. of Oregon	550	28	11	785	1100
ID: Univ of Idaho	285	12	7	159	272
MT: Montana State U.	295	13	4	137	250
WA: Washington State U.	284	21	30		
Univ. of Washington	185	23		1603	2348
Totals	1599	97	52	2684*	3970*

* High degree of membership redundancy.

N.B. 1. Part-time students may equal an additional 10-20%.
     2. Faculty members are likely to be either AIA members or registered architects.
     3. There are other groups in the BPA region who would be likely buyers, for example, housing authorities and utility companies.

    Sources: A.I.A, Washington, DC
            N.A..A.B., Washington, DC

TABLE 2 Number of Student and Professional Architects in BPA Region

[12] University of Idaho, Moscow; University of Montana, Bozeman: University of Oregon, Eugene; Washington State University, Pullman; University of Washington, Seattle.

[13] *Guide to Architecture Schools in North America.* Ed. Richard McCommons, Washington, D.C.: ACSA. 1989. See Table 2.

The largest and most profitable market in this region is the professional one, since both the price of both individual and site licenses for this group provide the highest percentage of technical support per sale. Students and faculty make up 30% of the market. The selling price to this group is lower as is the percentage of technical support covered per sale. However, this latter group is a major influence on the professional market and the effects of their familiarity with *Energy Scheming* will be felt almost immediately as students join the work force. See Table 3 for a projected sales volume scenario for this region for each proposed category of license .

Buyers	Number	Estimated Purchases	
		@ 50% of max.	@ 25%
Students	1599	800	400
Faculty (educational discount)	149 1	74	37
Educational Site Licenses (lab packs of 10)	5 2	10 4	5
Individual (full rate)	3970	1485	742
Professional Site License (5 pack)	450 3	225	112

1. Full and part-time faculty.
2. Number of schools.
3. Number of firms.
4. Assuming an average of two site licenses per institution.

TABLE 3   Estimated Number of Buyers for Each Proposed License Category

Production of disks and manuals
The total cost of one software package, including postage (USA), based on a volume of 10 is estimated to be **$15.00**
Breakdown of costs:

Disk	1.10
Label	1.00
Manual, cover, binding	7.00
Mailers	1.00
Postage	2.90
Admin.	2.00
TOTAL	15.00

Bulk orders and site licenses can be expected to lower this cost.

Promotion

Energy Scheming can be promoted most efficiently and effectively by the
University of Oregon through the following means:

- direct mailings to architecture schools and AIA members in the
  B.P.A. region, (estimated 4200 mailers)
- demonstrations and poster sessions at educational and professional
  conferences (estimated 100 mailers)
- workshops held in various locations; (estimated 200 mailers)
- reviews and advertising appropriate journals,

The largest promotional expense would be the printing of mailer/order forms
(estimated 4500 mailers) and postage. Estimated costs for advertising is **$3000 -
$3700**, based on printing costs of $1800-$2500 and postage costs of $500 - $1300[14].

Attendance at conferences can be considered a normal part of academic business.
The cost of workshops would vary according to arrangements that could be made
with participating professional groups and schools, time and location.

Software reviews are widely read and influential. Both professional journals and
software magazines could be contacted, either by an author who wished to publish
a review of *Energy Scheming*, or by the University, who could send a package and
request a review from reviewer selected by the publication. Advertising in
journals and magazines is another means of promotion, but it is difficult to gauge
whether the results are worth the expense. Costs vary considerably according to
quality of publication, circulation, and size of advertisement.

Given mailing and other unforeseen costs, it is estimated that a $5.00 marketing
charge should be added to the cost of each disk unit. This would bring production
costs for each disk up to **$20**.

Technical Support and Maintenance.

The reasons for providing continuing technical support have been discussed. In
the case of *Energy Scheming* the need is all the more compelling because of the
program's potential has for enhancement and much wider use outside the

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[14] Non-profit preferred rates = $500; 1st class mailer rate = $1300.

audience originally identified. **The question is not whether technical support is required, but how much.** A .25 FTE appointment would be sufficient to deal with technical questions; however, a minimum of .5 FTE is required for both support and maintenance. It should be anticipated that, initially at least, this person could devote 45%- 60% of the time to customer service and corrections, leaving the remaining time to research and development. $43,000 will be required to support a full-time salary of $25,000 / year at the University of Oregon (includes benefits and overhead). Table 5 indicates what type and level of sales are required to generate funds for 1.0 and .5 FTE of technical support. An additional cost, not included here, could be the fees for a toll-free 800 number.

Technical support costs should be included in the calculation of the selling price for the software. Because of differential pricing categories, the percentage of the selling price allocated to technical support will vary. See Table 4 below.

Price Option A

Costs	Individual $175	Site License $400	Faculty (Indiv.) $100	Institution 10 Pack $600	Student $40
Production and Marketing	20.00	100	20	200	20
Royalty @ 30%	52.50	120	30	180	12
Total	72.50	220	50	380	32
Amount Remaining = T.S.	102.50	180	50	220	8
T.S. as % of S.P	58.50%	45%	50%	36.7%	35%

Price Option B

Costs	$300	$800	$175	$1000	$50
Production and Marketing	20	100	20.00	200	20
Royalty @ 30%	90	240	52.50	300	15
Total	110	340	72.50	500	35
Amount Remaining = T.S.	190	460	102.50	500	15
T.S. as % of S.P.	63.3%	57.5%	58.6%	50%	30%

- Two price options have been proposed for each license category.
- Given a selling price based on the current market, fixed production and marketing costs, as well as royalties were subtracted from these prices to establish amounts available for technical support for each category in both options.

TABLE 4 Selling Price Calculation

With technical support percentages calculated, it is possible to calculate now many units of varying categories will have to be sold in order to generate the funds needed for .5 FTE and 1.0 FTE of technical support. Since percentages are different for each category, two scenarios were developed, one for each price option. As the chart indicates, a modest number of sales will be sufficient to generate .5 FTE, even at the lower pricing option.

Scenario A

Category	Price	Estimated # of Sales	Gross in $	T.S. Percentage	T.S. in $
Professional Indiv.	175	100	$17,500	58.5	$10,237.50
Professional Site Lic.	400	40	16,000	45	7,200.00
Educational Faculty	100	75	7,500	50	3,750.00
Educational Institution	600	6	3,600	36.7	1,321.20
Educational Student	40	200	8,000	35	2,800.00
					$25,308.70 =.59FTE

Scenario B

Category	Price	Estimated # of Sales	Gross in $	T.S. percentage	T.S. in $
Professional Indiv.	300	100	30,000	63.3%	$18,990.00
Professional Site Lic.	800	40	24,000	57.5	13,800.00
Educational Faculty	175	75	13,125	58.6	7,691.00
Educational Institution	1000	6	6,000	50	3,000.00
Educational Student	50	200	10,000	30	3,000.00
					$46,481.00 =1.08FTE

TABLE 5 Number of sales generating .5 FTE and 1.0 FTE funds

One other alternative is to charge for technical support by charging users , either by levying a fee for each call or by selling an optional maintenance contract with a license. Professional site licensees are the most likely candidates for this option. Figures were not generated for this option due to the size of the region. An national or international market, however, might justify the cost of setting up this kind of program. However, it could be expected only to offset rather than completely cover the cost of support.

4.2 Independent Publisher

Market characteristics

There are two types of publishers that could be suitable for *Energy Scheming*:

    a)   Book publisher with software expertise

    b)   Software publisher

Book Publisher

Several publishers (Wiley, McGraw Hill and Harper Collins) have expressed interest in *Energy Scheming*, and have been sent a program package but their evaluation process will not be complete until early 1992. In the case of these and similar publishers, software is treated as a division of textbook publishing. Their specialty is the educational market, although all large companies also market to a general audience. As far as software is concerned, it is still only an aspect their main endeavor, which is selling educational products. 85% of the software sold by Harper Collins is sold with textbooks or as part of a learning package.[15]

Many publications in design and architecture appeal to students, educators and professionals. "Textbooks" in this subject area bear little resemblance to standard texts in mathematics or English, for example, so a design textbook publisher generally has a large overlap with the large and most profitable professional market. It should also be taken into account that the book publishers are more likely to be successful in appealing to those professionals who are not now enthusiastic software users but who have the potential to be.

Looking at publishing *Energy Scheming* within the BPA region does not warrant working with a large book publisher, who would deal with a national and international market. If one wishes to expand outside this region, then a large textbook publisher may very well be the best choice. As stated earlier there are 34,000 full-time architecture students in the U.S (includes Canada); 85,000 licensed architects in the U.S. and approximately 4700 in Canada. This constitutes a sizable potential market, if it can be captured, and sales volumes

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[15] Bob Johnson, Head, Software Division, Harper Collins. Telephone interview, August 1991.

could be expected to generate sufficient income to provide several years of technical support and attractive royalties.

A Gross in $	B Gross in $
17,500 16,000 7,500 3,600 8,000	30,000 24,000 13,125 6,000 10,000
$52,600 x 30% = $15,780	$83,125 x 30% = $24,935

TABLE 6 Royalties Generated by Scenarios A and B

At the University of Oregon royalties are allocated according to the following percentages:

	Scenario A	Scenario B
40% author	$6,312	$9,974.00
30% department	4,734	7,480.50
30% V.P. research	4,734	7,480.50
	$15,780	$24,935.00

TABLE 7 University of Oregon Allocation of Royalties

Software publisher

The chief advantage of software publishers is that they are very successful in selling to software users in the general market. If professional architects and firms are already Macintosh users, this type of publisher will probably reach them. There are a few specialists in the educational software market (e.g. Intellimation) but their focus on non-profit groups and the support they receive from hardware producers means that they are most interested in keeping prices as low as possible in order to promote sales. Low prices (i.e. $40) for *Energy*

Scheming would eliminate the possibility of providing technical and maintenance support unless volumes of sales were very high.

Each type of publisher has benefits but none have access to all aspects of the *Energy Scheming* market. If the widest distribution is desired to an audience that is not already confirmed Macintosh users, then textbook publishers would be the best choice. One important consideration, however, is the fact that most educational software appeals to undergraduates in the sciences or humanities and this mass audience is one reason why textbook publishers have been successful in moving into software. The sophisticated CAD (Computer Aided Design) programs that architects and designers use are generally distributed by manufacturers or large software companies. In that sense, Olgyay was quite correct in stating that "there is nothing quite like [*Energy Scheming*]." It is a complex and sophisticated program designed for use in the early stages of the design process by those who need only a basic knowledge of architecture and energy to use the program successfully. The users are not necessarily very technically or very computer-oriented. This market potentially crosses the traditional boundaries established by publishers and therefore makes the choice of an appropriate publisher a tricky matter. Income from sales (that can be allocated to technical support) , the willingness and ability of the publisher to promote the software to a mixed audience as well as on the basis of its energy conservation value are key factors in making the final choice.

Production of disks and manuals

An independent publisher undertakes to cover all costs of producing the software package. The author is expected to provide a master disk with program and necessary files as well as the documentation must be in a usable format. Final editing, formatting and packaging design is the publisher's responsibility. Depending upon the publisher, production will amount to approximately 25% of the publisher's costs, which is two or three times as much as that estimated for publishing through the University of Oregon. Mail order marketing reduces the high costs for packaging that are standard in traditional publishing.

Promotion

Publishers undertake to cover all costs of promoting the product they agree to market. They use the same techniques as the author publisher, but devote the major part of their time and energy to this aspect. This is a very competitive, expensive and time-consuming part of the process; the one in which independent publishers will be far more successful than the amateur or the company distributing just one program. From this point of view alone, an independent publisher may be a wise choice if it means that the authors thereby can avoid expending immoderate amounts of time on this task.

Technical Support and Maintenance

Discussion earlier in this report outlines the issues of support. An independent publisher will provide a basic level of technical support, but authors can expect publishers will ask them to contact customers with more difficult technical problems, which means that authors will carry the costs of both long distance charges (unless arrangements are made with the publisher) and time spent with customers.

5.0   SUMMARY OF COSTS AND BENEFITS

UNIVERSITY OF OREGON

Benefits
- Existing facilities make it possible to manufacture and produce on a small scale and on an as-ordered basis
- Authors will have direct access to users for improvements.
- Market is known and relatively easy to promote within the B.P.A. region through advertising, direct mail, workshops, conference demonstrations.
- Market is large enough to generate .5 F.T.E. + royalties.

Costs
- University of Oregon must pay start-up costs of production and promotion ($3000+).
- Technical support must be available when software published.

INDEPENDENT PUBLISHER

Benefits
- Publisher bears costs of production and promotion
- Sales volumes potentially higher because directed at North American market.

Costs
- High sales volumes needed to generate same income as self-publishing.
- Sales may not be sufficient, nor soon enough, to provide technical support.
- University of Oregon must supply technical support well before income will be received.
- Authors have little control over quality of support offered through publisher.