ALTERNATIVES TO THE SOFTWARE PRODUCT MENTALITY IN EXTENSION

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Summary. A literature review and interviews with government and commercial software developers in the Midwest of the USA were conducted between 1992 and 1994 to assess the state of the North American agricultural software market and factors affecting public sector involvement. Commercial software developers have tended to target farmer users and aimed to assist structured tasks such as accounting or record keeping. The US Cooperative Extension Service (CES) made similar assumptions about its role. It tended to see farmers as the main users of its software, and viewed success in similar terms to the commercial sector: ie. the number of its products sold or in use. The emerging limitations of the agricultural software market are forcing commercial software developers to move away from reliance on direct sales to farmers. Unconstrained by the same commercial pressures and fixated by a particular scientific reductionist view of reality, public software developers have been slow to explore new paradigms for their involvement in rural software use. A reapplication of the public education role of extension could help shift this work into more productive directions.

INTRODUCTION

There was widespread optimism in the USA in the mid 1980s that farms, as specialized small businesses, would benefit from the rapid adoption of computer technology (5). Both private and public software developers saw profitable business opportunities in agricultural software development. That optimism has faded as adoption of computers by farmers has been relatively slow (3) and their role in farm management has been found to be more complex than expected (5). Computers have been mainly used by farmers to enhance existing financial management or record-keeping operations previously done with pen and paper (3). Computer ownership may neither be necessary nor desirable for all farmers. Relatively few farmers actually use computers in their management but all farms now use products enhanced by computer technology (9), and computers are enhancing the services provided to farmers by contractors and consultants (6).

The CES has produced agricultural software since the 1960s, whereas commercial agricultural software development only expanded with the advent of personal computers in the late 1970s. The initial focus of both sectors was on enhancing farm financial operations. CES software has been developed primarily by individual campus academics, and although most software products have been small projects, some large programs such as the financial management package FINPACK from the University of Minnesota have also been produced. Despite such well publicised successes there have been repeated complaints about the lack of meaningful end-user involvement in the development of most CES software (2, 8). Many potential CES products have not made it into the marketplace because refining their technical details has been more important to researcher-developers than getting them applied (5). A lot of public funds have been put into such software development with little obvious commercial or educational benefit to show for it.

MATERIALS AND METHODS

Structured interviews and a review of international literature were used in a series of qualitative studies to clarify issues that public and private developers of agricultural software face. Several of the largest agricultural software firms in the USA are located in the Midwest. Three members of the Association of Agricultural Computer Companies representing a cross-section of the commercial agricultural software industry were interviewed. Similar semi-structured and taped interviews lasting up to an hour each were also conducted with the leaders of two large CES projects: FINPACK and PIGCHAMP, both developed at the University of Minnesota, and with 23 administrators and software developers at the University of Illinois (4)

To protect the confidentiality of commercial participants, their names and those of their companies have been altered, but not the nature of their businesses. The names of CES participants have also been altered, but not the University at which they were located. The commercial participants interviewed were:

? Andrew Barrymore, President, Mankato Business Systems, Mankato, Minnesota: This firm is one of the largest agricultural software firms in North America with over 12,000 customers, and selling mainly financial management packages to both farms and rural businesses.

? Gerry Kaye, Marketing Computer Manager, Agritech Inc, Springfield, Illinois: This large farmer cooperative has branches throughout central Illinois, sells a wide range of farm supplies and develops software to assist their 60 salespeople to deal with their resellers.

? Arnold Brandenburg, Director, Brandenburg Agservice, Edwardsville, Illinois: This small firm employs one programmer and sells a its own management packages and those of two larger firms, but sales of computer-related products comprise the bulk of the its business.

RESULTS AND DISCUSSION

The difficulties of marketing agricultural software

Agricultural software has tended to been seen as a product for individual farmer use rather than a limited part of a broad community educational process. The way that the CES has positioned itself in relation to software has led to problems in delivery, and lost educational opportunities.

The CES initially saw significant market potential in developing software for farmers. As Dr Dan Blake, a senior CES administrator at the University of Illinois put it: *The graduate college at this university is firmly committed to the entrepreneurial professorship, so our software policy was written to parallel that of textbooks for private sale...There were professors who felt they would make at least a million dollars, and if they couldn't make that money directly, the wanted to be able to direct how that money was going to be spent.* As a consequence the CES followed a commercial pattern of developing software for farmers, but this paradigm has led to many commercial failures, and some major conflicts with the private sector.

Sound scientific content is no guarantee of commercial software success. For instance, in the USA as well as in Australia, significant public resources have been put into developing crop models. However, Arnold Brandenburg said he saw no market for crop models in Illinois since they didn't sell as well as financial management software. Andrew Barrymore also found most of his sales were in financial and farm record keeping software. He claims that: *The main value in crop management software is the interest it generates in our other products at trade fairs and the like. Crop model software works well but it doesn't sell well.* Crop models have been perceived as a commodity for farmers to use, but there is little demand for them, and the CES has not had the resources or skills to change that perception.

The CES does a poor job of marketing its agricultural software. All commercial agricultural software developers commented on the poor software marketing of the public sector. As Gerry Kaye of Agritech said: *If the universities do anything poorly it is that they don't market.* He claimed they were inherently limited in their ability to support their products because: *what they didn't have was the distribution arm to get it through the country.* Andrew Barrymore of Mankato Business Systems added, *There have been few successful products developed by the universities. A lot of their stuff is poor and they don't have to face competition. They don't have the need to change.* Universities are not well equipped to devise or market successful products, and even where they have had success, the nature of their institutions can count against them.

Commercially successful agricultural software can bring the CES into conflict with the private sector. For instance, the PIGCHAMP program developed at the University of Minnesota became a standard throughout the North American pig industry partly because of its pricing. The disruption this caused

private companies led to legal action by them against the University which forced it to change to its pricing and control of PIGCHAMP's distribution.

Commercial firms tended to see the CES as an unfair competitor. Arnold Brandenburg felt that the CES needed to reassess its role: *It seems that in the area of software they think they have to develop their own products and are reluctant to recommend commercial products that are already out there. I think the university needs to get into the same position on software as it is in with herbicides or insecticides or fertilizers. They don't manufacture atrazine or Basagran or any of those other products but they do the testing on them to make recommendations.* The assumption continues to be with the development of products rather than with enhancing an educational process. This desire for public institutions to promote private products could be because of the fragile state of the commercial agricultural software market.

Many agricultural software firms are too small to risk developing innovative product lines, most products are relatively simple and development teams are small. The nature of their market restricts their options. As Arnold Brandenburg stated: *It's difficult to make sense of developing software for less than 2% of the population.* Mankato Business Systems has found it difficult to survive on the farm market alone. Only 40% of their business is with farmers, and 60% is with small urban businesses. Pressures from resellers has meant that their software for both markets is very similar. As Andrew Barrymore said: *A lot of the software we'd like to produce is too specialized to be economic for us to develop.* Pressure from clients can also make products less relevant to a broad market. Arnold Brandenburg said that the first buyers of one of their major software products were: *bigger farmers and those that recognized a need for it. Their requirements turned it into a bigger and more sophisticated program than we'd originally envisaged.* This confirms research that much farm software is designed to respond to the needs of larger, more educated clients thus restricting its accessibility to others (1).

Marketing agricultural software to farmers is difficult even for commercial firms concerned about their markets. CES software development has been science-driven, rather than market-led, and has resulted in few successes. Gerry Kaye claimed that Agritech put a lot of effort into market research before developing new software products and its market research has kept Agritech out of direct software sales to farmers altogether. A similar reevaluation of its motivations for software development and role in agriculture could lead the CES to similar conclusions.

Education in complex issues

The CES has a long history of providing educational programming to the rural community, but the development of agricultural software in the CES has lost this focus. Software development has been shaped been more by commercial rather than educational perceptions, the priorities of campus-based researchers rather than field-based educators, and a reductionist philosophy of science more suited to understanding physical phenomena rather than social phenomena. This has led to a preoccupation with understanding physical processes on the farm and less interest in the social complexities of farm decision making

There are many alternative approaches for using computers in agriculture. For instance, several professions including agricultural extension have long relied on case studies to communicate complex social truths, and recent innovations in computer technology provide richer ways of presenting and exploring such cases. Farm walks and newspaper stories can provide agricultural case studies, and training in other professions such as law is based around case studies. The development of hypertext allows case studies to be presented in non-prescriptive formats so that users can explore them in diverse ways. Case studies presented in textual and graphical formats can be explored in ways, and for reasons that the software developers didn't envisage. This can provide a richer learning experience than a newspaper article, a better record of a long decision making process than a single farm walk and encourages users to have more control over their learning processes. It can improve learning, particularly amongst those who are no longer novices but not yet experts (7).

The relatively slow adoption of computers by farmers and the failure of many publicly funded attempts to develop saleable software for farmers suggests a need to reevaluate approaches to the use of computers in extension.

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