Does COBOL Have a Future?

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Abstract

This paper will describe the results from a survey taken of professional business and industry employers who are using COBOL in their information systems. A discussion of the IS Manager's view of the future of COBOL is presented. Almost 90 percent of IS Mangers surveyed indicated that COBOL should continue to be offered in college curriculums, and also nearly 90 percent indicate that both object-oriented and web–based features of the COBOL language should be integrated into COBOL instruction in college curriculums. It is hoped that these results will help academia to design their curriculums to meet the expanding need for IS people over the next five years.

Keywords: COBOL, Software Engineering, curriculum design, OO-COBOL

1.   INTRODUCTION

Many educators are currently being challenged today concerning the content and scope of their curriculums in order to successfully market graduates from their information systems (IS) programs (Carr, 1996) Meanwhile, business and industry information systems managers have similar concerns about the continued need to maintain the large inventory of 'legacy' code while at the same time developing new systems. There are some in academia and industry who have forecasted the demise of the COBOL language in the development of 'modern' business applications for many years. Meanwhile, COBOL applications and mainframe computing continues to dominant a large segment of the business community where major applications are still driven by conventional data and transaction processing requirements. (McKendrick, 2000) It has been estimated that between 150 to 200 billion lines of COBOL code are used in today's

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business applications with several billion lines of new COBOL application code added annually**.** (Stern, 2000) The requirement to maintain existing COBOL applications necessitates continued demand for new replacement COBOL programmers.   Complimenting these facts is the required resolution of the Year 2000 (Y2K) problem in legacy applications that created a great resurgence in the demand for COBOL programmers.

The Y2K issue is now somewhat a part of history. New application demands associated with e-commerce will necessitate application development and the 'linkage' of existing mainframe IS applications to new Internet based technologies that will occupy most IS activity for the foreseeable future. Paul Paetz, vice president of strategic marketing of Netron, Inc of Toronto, Canada believes that because of the time spent dealing with the Y2K problem, that many organization are now trying to play caught-up. "Wanting to add value today draws people back to legacy code," says Paetz. "E-Business is the fastest way to leverage how you use legacy code. It can be easily adapted. You can wrap it,

put a Java front-end on it. Adapting is easier that planning a new architecture from scratch." (Software Magazine, Dec. 99) This will once again augur a new demand for IS staffs with knowledge of the business rules and mainframe processes. One of the primary lessons shown by Y2K was the continued pre-eminence of COBOL-based applications. Steve Curd, Senior VP of United HealthCare, recently said: "COBOL applications will continue to be found powering the hearts of most large companies – a fact that is likely to remain constant far into the future." (www.aboutlegacycoding.com) There are about two million COBOL programmers in the world - more than twice the number of JAVA programmers. (McKendrick, 2000) Who better to provide this resource than the COBOL programmer? Given these facts and this new development environment what is going to happen to the demand for COBOL programmers? How should academic IS programs respond to this new environment? In an effort to provide some clear answers for academicians a current research survey was conducted. It is hoped that the results of analyzing this survey data may assist in providing a clearer vision as to what IS managers are planning and the knowledge and skill set that they will require of future IS graduates over the next five to ten years. It is anticipated that the tasks of curriculum planning and implementation of College and university IS programs can then be accomplished in a manner that will produce graduates who meet the business and industry needs.
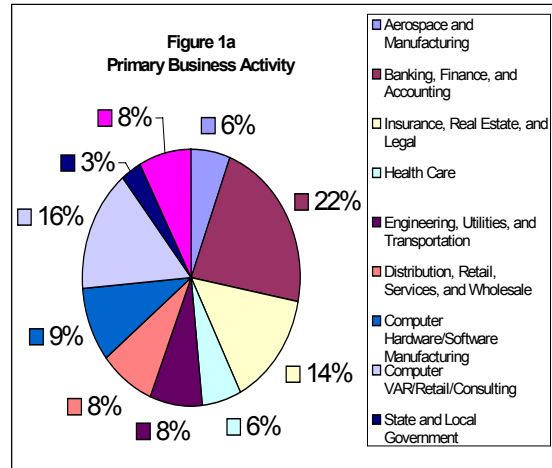
2. RESEARCH METHODOLOGY

The major hypothesis examined in this research is to determine to what extent will the COBOL language continue as a major programming language for business applications over the next 10 years. A corollary hypothesis is to examine the extent to which the new capabilities and technology associated with object-oriented and Internet technology now incorporated in many COBOL compilers will be utilized in future COBOL application development.

The present research consisted of mail and Internet survey questionnaires being sent to business and industry employers who currently use COBOL applications in their information systems. The business and industry questionnaire was sent (and made available on the Internet) to approximately 5,000 current business and potential business customers in the United States contained in a Merant-Micro Focus database. The questionnaire for this group was directed to IS directors or managers who over-see information resources within their organizations[11].

This questionnaire contained a series of questions, which captured the demographic background data unique to this group. The next category of questions attempted to capture data relevant to their computer applications and information system functions. The

questionnaire also contained questions pertinent to the existing status as well as questions about perceptions regarding the future status of educational programs or

**Figure 1a
Primary Business Activity**

- Aerospace and Manufacturing
- Banking, Finance, and Accounting
- Insurance, Real Estate, and Legal
- Health Care
- Engineering, Utilities, and Transportation
- Distribution, Retail, Services, and Wholesale
- Computer Hardware/Software Manufacturing
- Computer VAR/Retail/Consulting
- State and Local Government

information system functions. Each questionnaire attempted to capture longitudinal (time-oriented) as well as latitudinal (cross-section) data.
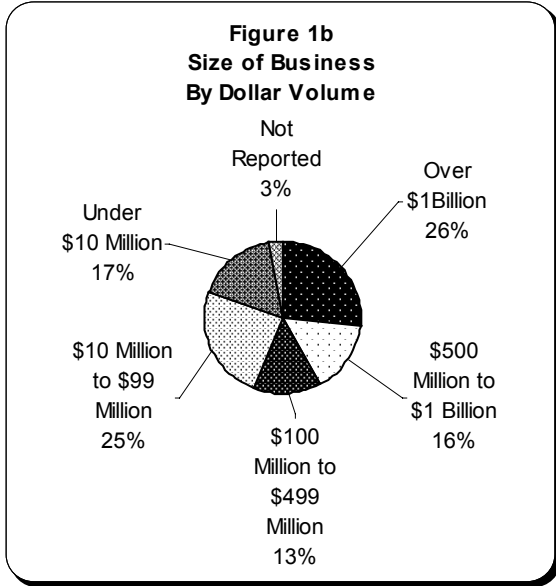
Responses were received from 142 business and industry organizations. The response rate was 2.8 percent from this business and industry group.

3. DEMOGRAPHICS

Demographic information about the business and industry respondents is displayed in **Figures 1a**, **1b**, and **1c**. **Figure 1a** shows the distribution of respondents by primary business activity while **Figure 1b** shows the size of business by gross dollar volume either in budget (for non-profit), revenue, or sales. And **Figure 1c** indicates size of the organization in terms of number of employees.

Business responses were received uniformly from all regions of the United States. As would be anticipated the banking, finance, accounting, insurance, and real estate segments of business activity account for more than 35 percent of the respondents. Another 15 percent of respondents indicated that computer VAR/retailer and consulting services was their primary business activity. The low state and local government activity (2.9%) appears to be misrepresented in the sample. More than 25 percent of businesses reported operations in 10 or more different sites with more than 75 percent indicating multi-state operations and slightly more than 40 percent indicating multi-national operations. Nearly 35 percent of the businesses reported 5,000 or more employees with more than 60 percent reporting 500 or more employees.
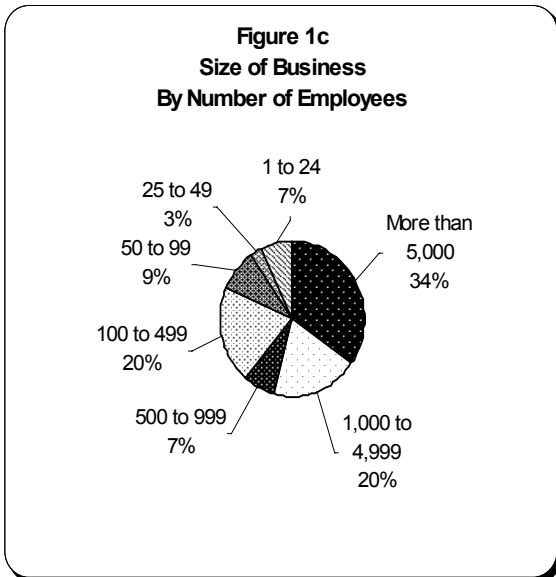
Further demographic information of interest is the number of IS professionals employed within the organization as displayed in **Figure 2**. Fifty percent of the businesses reported IS operations employing 100 or more IS professionals. Nearly 25 percent reported 1,000

**Figure 1b
Size of Business
By Dollar Volume**

- Not Reported 3%
- Over $1 Billion 26%
- Under $10 Million 17%
- $10 Million to $99 Million 25%
- $100 Million to $499 Million 13%
- $500 Million to $1 Billion 16%

or more professional IS employees. More than 50 percent of the respondents reported that their major job function was either senior or middle IS/MIS/DP management or application project management.

4. CONTINUED RELEVANCE OF COBOL

The major hypothesis of this research was to examine the question "Will the COBOL language continue to be a major language utilized in future business software application development?" The following is a summary of observations from the respondents. A more exhaustive statistical report is forthcoming by the authors in later research using the data obtained from the survey.

**Figure 1c
Size of Business
By Number of Employees**

- 1 to 24 7%
- 25 to 49 3%
- 50 to 99 9%
- 100 to 499 20%
- 500 to 999 7%
- More than 5,000 34%
- 1,000 to 4,999 20%

In regard to the code and COBOL applications, the survey results showed that more than 87 percent of the businesses responding are currently developing and maintaining code written in the COBOL language. Nearly 60 percent of these businesses reported COBOL application code inventories exceeding 5 million lines of code while over 25 percent reported maintaining 20 or more million lines of COBOL code. More than 50 percent of programming effort is expended solely in maintaining current 'legacy' COBOL applications. Another 20 percent of programming effort is expended in developing new applications utilizing the COBOL language. About 30 percent of the programming resources are expended in a mixture of new application development and application maintenance. Embedded SQL is utilized with COBOL applications by nearly 70 percent of the respondents.

In a recent actual application the information services staff at AAFES migrated its existing COBOL-based mainframe system to a state-of-the-art web-based sales operations in less than three months. The AAFES is the eight-largest retailer in the world. This conversion was made possible by using a product called Net-Express. There was no need to change the operations of the business. There was no need to write a new billing system. The web was looked upon as a new interface with the existing system. There was no need to worry about populating any database. Two programmers took between 30 to 60 days in creating the legacy link. AAFES initially thought that it would do 3% of its business over the Internet, but far surpassed that to a 10% level. (Todd, 1999)

From a personnel side the survey results showed that fifty percent of the business organizations reported 25 or more COBOL programmers currently on there IS staffs while 25 percent reported employing 100 or more COBOL programmers. Ten percent of the businesses responding to the survey hire 500 or more COBOL programmers. In the hiring of new entry level programmers more than 50 percent indicate a desire that the applicant have two semesters of COBOL. Another 22 percent indicated a need for a one-semester requirement and 15 percent stated a need for a three-semester requirement. Only 10 percent of IS managers stated that COBOL education was not an employment requirement. This translates into the fact that more than 70 percent of IS manager respondents think that a minimum of one semester of COBOL should be required in IS curriculums.

5. IS Managers View of the Future?

With respect to recent technological developments in the COBOL language to implement object-oriented as well as web-based capabilities more than 50 percent of these IS managers have only reviewed literature or attended limited seminars that briefly reviewed these capabilities. Slightly less than 25 percent of these

managers indicated that their organization was planning or had taken action to integrate object-oriented or web-based features of the COBOL language along with existing COBOL applications. However, nearly 70 percent of the respondents indicated that it would be beneficial for IS graduates to have education in both object-oriented and web-based COBOL facilities.

More than 45 percent of IS manager responses stated that COBOL would continue to be used over the next 10 years at the existing level while less than 15 percent indicated that COBOL would be eliminated or replaced in the organization. Slightly more than 30 percent of the respondents indicated that COBOL would decline in importance of use in application development. However, about 5 percent said that use of COBOL would actually increase over the next 10 years.

Nearly 20 percent of IS managers indicated that object-oriented COBOL would be used to wrap existing COBOL applications in the development of new applications. More than 30 percent of respondents indicated that they are implementing COBOL web-based facilities to enable migration of legacy COBOL applications to the Internet. Also, more than 30 percent of IS managers stated that they will be using another computer language development environment to eventually replace COBOL.

The responses from IS managers regarding continued placement of COBOL in CIS/IS curriculums is an important observation for educators. Almost 90 percent indicate that COBOL should continue to be offered in college curriculums, and also nearly 90 percent indicate that both object-oriented and web–

Figure 2
Size of Organization
By Number of IS Professionals

based features of the COBOL language should be integrated into COBOL instruction in college curriculums. When asked if object-oriented COBOL will replace current structured COBOL or compliment

current structured COBOL nearly 90 percent responded that the object-oriented capabilities would compliment the current structured code inventory. With the fact that there are scarce teaching resources available in higher-education IS programs and the assumption that only two semesters of the CIS/IS curriculum can be devoted to learning a computer language, IS managers are about evenly split as to whether students should take two separate computer languages or learn one computer language thoroughly over a two semester required course sequence. **Table 1** displays IS managers perception and thought concerning different object-oriented methodological scenarios. More than 25 percent of the respondents believe that object-oriented methodology will become the standard for future application development while more than 60 percent indicate the belief that object-oriented methodology will become popular but will not totally replace existing structured methodology.

6. CONCLUSIONS

The data gathered in this survey was extensive and only a partial set of preliminary conclusions and findings can be presented at this time. However, the accumulation of information presented above should show the reader a consistent and unified 'picture' of what IS managers will be expecting of IS graduates in the near future (10 years). It is now up to academia to plan and implement IS curricula so that graduates can meet these needs.

The large inventory of legacy COBOL code utilized in current business applications is well known and substantiated by IS managers in the current research. This fact coupled with recent large re-investment to modify the existing code base to resolve Y2K issues will necessitate continued future demand over the next 10 years for IS graduates who have good knowledge of the COBOL language. Since more than 50 percent of programming resources are expended solely in application maintenance these newly graduated COBOL programmers will most likely be initially utilized to maintain existing COBOL based applications.

Many COBOL vendors have integrated object-orientation and web-based technologies and capabilities into their COBOL compiler/workbench products. While most IS managers are aware of these new technological developments in COBOL compiler design, they do not have sufficient knowledge of these new object-oriented and web-based capabilities that are evolving in the COBOL standard to initiate deployment or integration into their existing applications. However, it is important for educators to note that most of these managers (90 percent) expressed the need for students to have a working knowledge and the skill-set associated with both object-oriented and web-based COBOL capabilities upon graduation.
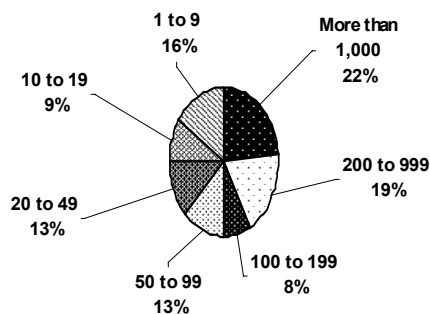
IS managers' viewpoint regarding continued placement of COBOL in CIS/IS curriculums is an important observation for educators. These managers overwhelming (nearly 90 percent) stated the need to retain COBOL education as a requirement in CIS/IS curriculums. It is of interest to note that the educator's view on this same subject was not significantly different from their IS manager counterparts in business. (Carr, 2000) In a similar vein, educators and IS managers find it extremely difficult to gather sufficient funding or the time to obtain the necessary education and training to obtain new knowledge with respect to the rapidly increasing technological change associated with the COBOL language.

It seems fairly evident that the results obtained from the present research positively rejects the null hypothesis. The COBOL language will continue to be widely used in business application development over the next 10 years. Neither business nor academia can deny this analysis of the data as interpreted by the authors. Gartner Group advises executives via their web site that " COBOL will play a vital role in the e-commerce revolution by providing the support systems that are required by all businesses, and by providing it now, not later." (www.aboutlegacycoding.com)

7. REFERENCES

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Table 1.
IS Managers Perception
about Use of Object-Oriented Methodologies

	Percent
O-O will become the standard for future program development	25.7
O-O is a fad and will not be seriously implemented	2.1
O-O will be popular as a structured form but will not replace Structured methodology	62.9
O-O development is too risky to implement at present	2.9
Other	6.4
Total	100.0