Evolution of the Software Reuse Business

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Abstract

Efforts at reuse as a business started earlier than most people suspect. We discuss one historic effort and examine the lessons that can be learned from its unsuccessful outcome. We then examine the trends that encourage and enable reuse and present a survey on the levels of reuse implementation in North America and Europe. Finally, we discuss the types of organizations involved in reuse products and services.

The Raytheon Experience

The reuse efforts at the Raytheon Missiles Systems Division in the mid-1970's have been well-publicized in numerous articles as an early example of reuse success. Raytheon had conducted a study of over five thousand COBOL production programs in their division and showed that the programs could all be classified into a few functional categories, and that 40-60% of the code in these programs were repetitive. They then developed a system which included standardized logic structures, an index system, a centralized library and reusable design, and coding standards. Use of this system by their programmers resulted in substantial savings for Raytheon.

A little known fact is that Raytheon was a pioneer in the software reuse field in more ways than one. In 1981, Raytheon capitalized on its competence in reuse through the Raytheon Computer Services arm by marketing its reusable software system as ReadyCode. Raytheon then spun off its reusable software product line by forming a company in 1984, called MasterSoftware, which billed itself as "the world's first fully reusable software company", and renamed its product Programaster. Clients included corporations such as Houghton-Mifflin and Security Pacific Bank. MasterSoftware seemed primed for success...but where is MasterSoftware today?

Although the reusable software system was clearly a success within Raytheon, efforts at commercializing this technology did not succeed externally. MasterSoftware folded in less than three years and no longer exists today. In fact, from 1981 to 1984, Raytheon managed to sell only 20 copies of the ReadyCode package.

What can we learn from the Raytheon experience? The first lesson is that reuse within a corporation differs from reuse as an external business. Specifically, greater emphasis on marketing is required to understand the target markets, and to identify a product or service line to fill the needs of the market. The second lesson is to take into consideration the life cycle stage of the technology. In the case of Raytheon, reuse was still new to the market such that potential clients had to be educated on its benefits. So not only did MasterSoftware face the difficulties that came with launching a new business but they also needed to educate clients as well. MasterSoftware executives echoed this sentiment when in retrospect, they observed that "ReadyCode's lack of success was attributed to poor marketing and a misunderstanding of a new technology by users." [Gill]

Trends that Encourage and Enable Reuse

The past decade has revealed trends in both non-technological and technological areas encouraging and enabling reuse. In particular, firms have discovered that mass customization and the capture and reuse of intellectual capital [Stew] are especially conducive for software reuse. Mass customization provides a product or service that is "constantly changing in response to what each customer wants and needs" through the interaction of "relatively autonomous...processes or tasks" [Pine]. These collective trends have resulted in reuse programs being established in diverse sectors such as aerospace, banking, insurance and utilities.

CSC Index surveys of executives from both North America and Europe [Vita92-94] in the years 1992 - 1994, show that implementation of reusable modules has increased significantly. The mix of companies in the various stages of deployment (research, initiative,
pilot, and implementation) over the three years indicate a sustained level of interest and activity. In North America, implementation has grown from 32% of the companies in 1992 to 44% in 1994. In Europe, 45% of the companies in 1992 indicated they had implemented reusable modules compared with 48% in 1994. CSC Index notes that "reuse is a broader phenomenon than object-oriented development environments, as more companies report implementation of software reuse than object-oriented tools." [Vita94] In addition, executives polled in the 1994 survey "agreed that reuse...is a critical development strategy for the future." [Vita94] Eighty-nine percent in North America and eighty-eight percent in Europe concur that reuse of assets (e.g. designs, code modules, documentation) will be a key development approach.

**Organizations Involved in Reuse Products and Services**

These trends have brought about three types of organizations involved in reuse.

- Organizations dedicated to internal reuse programs (e.g. Motorola, AT&T)
- Organizations that offer reuse products and services both internally and externally (e.g. IBM, Hewlett Packard);
- Organizations that offer reuse products and services externally (e.g. The Reuse Group, The Software Engineering Guild, Reuse, Inc., ASSET)

As an external reuse supplier, we believe that the market potential for reuse products and services is growing and currently has low market penetration. As evidenced by the positive trends shown in CSC Index surveys as well as our collective experiences in The Reuse Group, both internal and external customers are much more aware of and much better educated regarding the potential of software reuse than in MasterSoftware days. Because the market is relatively large compared to the number of organizations offering products and services, our group of consultants actively seek business partners in collaborative relationships to pursue reuse needs and opportunities. We have consultants in four offices (Boston, Charlotte, San Francisco, and Tampa) and our clients have been in diverse industries such as investment banking, insurance, telecommunications and electronics.

**Conclusion**

We feel that there will be continued growth in the market as reuse increases in scope from intra-company to intercompany and at the national and international levels. Raytheon's experience in launching a reuse business shows the importance of educating customers and knowing and meeting their needs. Efforts at the former have been fairly successful; efforts in the latter endeavor are ongoing. Collaboration among the handful of reuse businesses, both internal and external, will help accelerate reuse as a successful technology.

**References**


**Biography:**

Wayne C. Lim specializes and consults in the strategic planning, economic, organizational, and metric issues of software reuse. His involvement in software reuse began in 1983 as a member of the Ford Aerospace Reuse Group researching reuse library issues. Mr. Lim completed his MBA degree at Harvard University, graduate engineering coursework at Stanford University, and an undergraduate degree in mathematics from Pomona College. He is the author of a forthcoming book, Managing Software Reuse, to be published by Prentice-Hall. He may be reached at wlim@reuse.com.