Project Descriptions

Harnessing the Benefits of CALS

CALS, put simply, is a better way of doing business in a shared data environment. CALS, or Continuous Acquisition and Life-cycle Support, represents a global approach to information management that allows the sharing, both within and across organizations, of various types of data: text, graphics, image, video, and others which may be stored in many different computers in many different locations. CALS began in the mid-1980s as a joint U.S. Department of Defense and industry initiative with an aim to reduce the paper burden that had always accompanied the acquisition of major weapon systems. CALS has since evolved into a global strategy for the life-cycle management of product information, and has been embraced by more than a dozen countries around the world.

Implementing the CALS strategy fundamentally changes the way we do business by integrating design, engineering, manufacturing, support and maintenance

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processes. While the technologies to effect these changes exist today, an organizational culture which supports a shared data environment must prevail if these changes are to show anticipated productivity gains.

A Shared Data Environment

A good example of how shared data can improve a business process comes from the U.S. helicopter manufacturer Sikorsky Aircraft. By the late 1970s Sikorsky had realized that its information management processes were severely outdated. Three separate groups within the company - *Logistics Support, Technical Publications* and *Training* - were creating and maintaining technical documents. Each group operated as a separate business unit, authoring and updating its documents independently of the others. From 25 to 50 percent of document content was common to more than one department, however, which led to waste and a redundant use of resources.

Sikorsky decided to apply a CALS strategy to reorganize its document management capabilities. The company created a central document database organized by product and arranged in a hierarchy of individual components, sub-systems and systems. Text, drawings and graphics all in CALS-compliant formats were organized as data 'modules' on each level of the integrated database which could be accessed by each of the departments. Different types of documents be they *customer training manuals, repair guides* or *internal reference notes* could be generated using data modules common to all. Updates to a module became easy to track and could be applied automatically to any document created with it.

The integrated database has also made it possible to create electronic manuals with the same ease and at about the same cost as paper manuals. In the end, Sikorsky reports that the CALS strategy allowed it to cut resources dedicated to document management by 25 percent, even as it increased output by 50 percent!

The more complex the product, the more important it is to share data. For example, when the design stage of a product is carried out electronically at multiple sites, the inability to pass usable files from site to site or to correctly interpret the data at each site can create a serious competitive disadvantage. In this case, if three different companies designing an aircraft at three different sites were unable to exchange 3-D engineering drawings produced by their respective CAD-CAM systems, the only alternative to implementing a CALS solution would be to exchange the drawings in 2-D format and back up the rest with hardcopy. This practice would be costly and time-consuming for the organizations involved.

Fulfilling the Productivity Promise of the '90s

For years, information technology (IT) has failed to keep its promises of higher productivity. The old ways of doing business have often been automated without reaping the benefits of business process improvement. Incompatible systems, unable to communicate with one another, have proliferated in organizations. As a result of these approaches, the amount of paper generated has increased exponentially, creating serious problems of access, storage and updating. In addition, errors are introduced through rekeying of data, and the time to get a product to market has been overly long. The lack of significant productivity gains from such systems has made senior managers leery of major investments in IT today, and more are demanding cost-benefit justification before committing scarce resources. Implementing CALS clearly has the potential to yield substantial benefits. The challenge to an industry manager, how-

ever, is to establish a framework within the company to identify, quantify and subsequently obtain those benefits. To that end, priority must be assigned to those areas offering the greatest opportunity. Managers in industry and government also need to determine if a given technology investment will yield a positive return on investment within a reasonable time. Forecasting and tracking returns on investment, productivity increases, and other business measures remains a major challenge for many organizations.

Cost/Benefit Justification: The Big Challenge

Identification of real cost/benefit data has been difficult to obtain. Little exists in the way of public domain data or reports on cost/benefit methods for CALS, at least in the literature, at this time. This is due in large part to the fact that it is very difficult to acquire the detailed figures needed to precisely quantify actual investments and actual benefits. Industry and government have generally been reluctant to reveal relevant figures. This can be explained in a number of ways. For private industry, cost/benefit information is regarded as highly proprietary; organizations are not looking to share their competitive advantage. In revealing cost savings, a supplier also risks having the client demand that the savings be passed on. Furthermore, in many organizations, the 'incentive system' for cost cutting is counterproductive in that it 'rewards' managers for achieving budgetary savings by cutting their budgets!

A number of other reasons have been reported to explain the scarcity of cost-benefit information. The CALS Benefits Working Group of the US Joint DoD/Industry CE/CALS Task Group identified a number of these, which were later presented by Richard G. Powell at CALS Europe '92 [2]:

- ❏ Benefits were hard to recognize, and when they are identified it was difficult to relate them to specific investments.

- ❏ On the few occasions when benefits could be traced to a particular investment, the actual benefits tended to occur in places, ways, and to degrees which had not been predicted when justifying the initial investment.

- ❏ Predicting the actual impact of an integration of processes has been exceedingly difficult, poorly understood, and not addressed by generally accepted financial management systems.

In a CALS environment, most major benefits are reaped 'down the road' - in 10 to 40 years, for example - when savings in maintenance costs become apparent. These can be significant. Many complex

systems, such as weapons programmes, generate more than 50 percent of their life cycle costs in the maintenance phase. To date, no CALS programme has existed long enough to permit a full evaluation of life cycle benefits.

Another major stumbling block to determining the costs and benefits of CALS is that organizations need to know baseline costs in order to measure the 'as is' and 'to be' situation ('business as usual' costs are not usually tracked by companies). The inherent vagueness of CALS contributes to the problem. As summarized by Paul Strassmann, „You cannot measure what is not defined. You also cannot tell whether you have improved something if you have not measured its performance." As many organizations do not separately track the specific costs and savings related to CALS, measuring them is difficult unless the organization makes simultaneous changes in its accounting and management styles. A lack of quantified metrics, cost-benefit models and measurement methods, and of a methodology which can capture and quantify alternative business processes contributes further to the problem.

Benefits: Tangible or Intangible?

Two categories of benefits have been identified: the less easily quantifiable, often referred to as intangible; and the tangible, those benefits which can be mapped into direct monetary cost savings. Examples of typical tangible benefits include:

☐ Productivity improvements;

☐ Cost savings due to reduced error rates;

☐ Savings due to lower operating and/or financing costs;

☐ Re-engineered and improved life-cycle processes;

☐ Enhanced information systems compatibility due to operation in a neutral, open-systems environment;

☐ Improved interconnection and interworking;

☐ Improved front-end product analyses;

☐ Improved product reliability, availability, maintainability (RAM) engineering; automation of product support, training and technical publications;

☐ Improved product quality;

☐ Reduced paper handling and overhead costs.

It is worth noting that intangible benefits can provide powerful reasons for investing in CALS. Goals such as customer satisfaction, internal efficiency and access to global markets can provide powerful justification to senior management for a CALS project. Non-financial bene-

fits also include improved competitiveness and market share, and reductions in overall management and technical risk. In its most extreme case, no economic justification is needed if an investment in CALS is required merely to continue doing business with a customer. If CALS is not implemented, the firm will cease to have access to its sources of revenue and will ultimately cease to exist. The EDI World Institute has been conducting a study which addresses the identification of CALS benefits and possible approaches to calculating costs and savings, and will lay the groundwork for future projects.

Building on Best Practices and Lessons Learned

The EDI World Institute aims to promote CALS on a global scale by providing education and implementation support tools. The EDI World Institute is an international, non-governmental organization whose mission is to promote the development and adoption of electronic data interchange, *the computer-to-computer exchange of structured business data and documents* in business and public organizations worldwide. The Institute fulfils its mission through research and facilitating implementation of EDI, as well as education and knowledge transfer. The Institute's CALS-related activities focus on implementation support, with an aim to build on lessons learned by and the best practices of government and industry. A lack of understanding and a lack of models and guidelines to assist in CALS implementation are barriers to its adoption. The Institute, in collaboration with government and industry participants around the world, will be designing and developing awareness tools to help public and private sector organizations assess the level of their CALS capability, as well as that of their suppliers, and to provide concrete guidance with regard to the 'next steps' in a CALS implementation. The project will address the streamlining of business processes and the application of integrated, standards-based CALS tools and approaches to the goal of improved management of business and technical information. What this project will develop is a procedure for identifying, testing and validating levels of CALS capability. It will provide a method to help organizations progress to the next level of CALS capability and organizational effectiveness.

The first step toward developing the capability model for CALS will be to generate case studies of the best CALS-related practices found in the aerospace/defence sector. This will be conducted in collaboration with researchers from Harvard's Kennedy School of Government who will be studying the electronics sec-

tor. Analysis of the results will reveal the key success and enabling factors in each sector and the benefits that have resulted. These key factors will populate the CALS capability model and contribute to the development of CALS guidelines. Issues to be addressed include the identification and evaluation of business process reengineering, program/project management and organization, organizational culture and information technology architecture and infrastructure. ·

At the same time, the EDI World Institute will conduct an analysis of CALS-related Requests For Proposals (RFPs) from around the world in order to better understand the expression and degree of CALS requirements. This analysis will validate those elements of the model relating to the types and levels of CALS capabilities, and will help fix priorities for the implementation of new capabilities. This study will benefit the CALS community by matching the real world needs of government with those of business. The overall project is intended to last two years. A high degree of international collaboration will be needed to ensure wide input and to guarantee global validation of the results.

CALS Education and Awareness Tools Available

The Institute, in collaboration with the Canadian Department of National Defence, has recently developed an automated learning and reference tool intended to introduce all the basic concepts of CALS in an easy-to-use, hypertext environment. The 'CALS Starter Kit' has already been distributed worldwide, and a more advanced version is planned. In addition, the Institute has been preparing preliminary case studies with a number of organizations around the world which serve to highlight management considerations regarding CALS implementations. Also being compiled is a quick reference guide to case studies in the literature. ■

References

[1] *US Department of Defense:* Functional Economic Analysis Guidebook, January 1993.

[2] *Powell, R.G.:* Estimating CALS Benefits - A Practical Approach to a Vexing Problem, in: Proceedings CALS Europe '92.

[3] *Strassmann, P.A.:* Information Payoff, The Transformation of Work in the Electronic Age, MacMillan 1985.

[4] US CALS/CE Benefits Working Group Report 1990-1991.

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