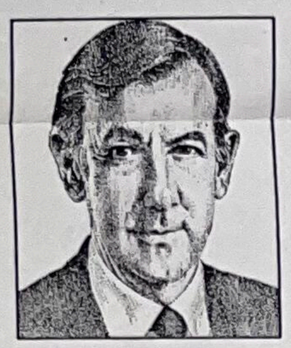
APPLIED INTELLIGENCE

The Key to Success with CASE Is Integration



JAMES MARTIN

In this first of six articles on integrated computer-aided software engineering, or I-CASE, tools, James Martin discusses the strategic importance of I-CASE technology.

Much has been written about what is wrong with data processing today. There are backlogs of several years. It takes too long to build systems and the cost is too high. The difficulties of maintenance are outrageous. Management can't get information from computers when needed. Tape and disk libraries are a mess of redundant, chaotic data. Many programs are fragile spaghetti code.

When management needs to change business procedures or introduce new products and services, data processing frequently cannot make the required modifications.

Today, computers are assuming more important roles in business, government and the military. We have entered the age when computing and information systems are strategic weapons, not backroom overhead. The terms "mission-critical" and "strategic systems" have become popular.

There are many examples of corporations that have grown faster than their competitors because they had better information systems. In some cases, corporations have been put out of business by competitors with better computing resources. As computing becomes critical to competitive thrusts, it is vital to both develop and modify applications quickly.

Many of today's competitive business thrusts require application software far more integrated and complex than in the past. It's necessary to build—in a short time and without excessive cost—applications that are highly complex, of high quality and that truly meet the needs of end users. These applications must be easy and quick to modify and maintain.

It's important for executives to realize that there are solutions for software-development problems.

A sweeping revolution has begun in the methodologies of putting computers to work. This revolution depends on power tools. The methodologies of the past used pencils and templates; the methodologies of the future use design automation techniques linked to code generators, along with computer-aided planning and analysis.

It would not be possible to build today's cities or microchips or jet aircraft without power tools. Our civilization depends on power tools; yet, the application of computing power to corporate systems is done by hand methods.

Design of the interlocking computer applications of a modern enterprise is no less complex than the design of a microchip or a jet aircraft. To attempt this design by hand methods is to ask for trouble.

The use of power tools changes the methods of construction. Now that such tools exist, it's desirable that the entire application-development process be reexamined and improved. Advanced power tools rise to the need for an engineeringlike discipline.

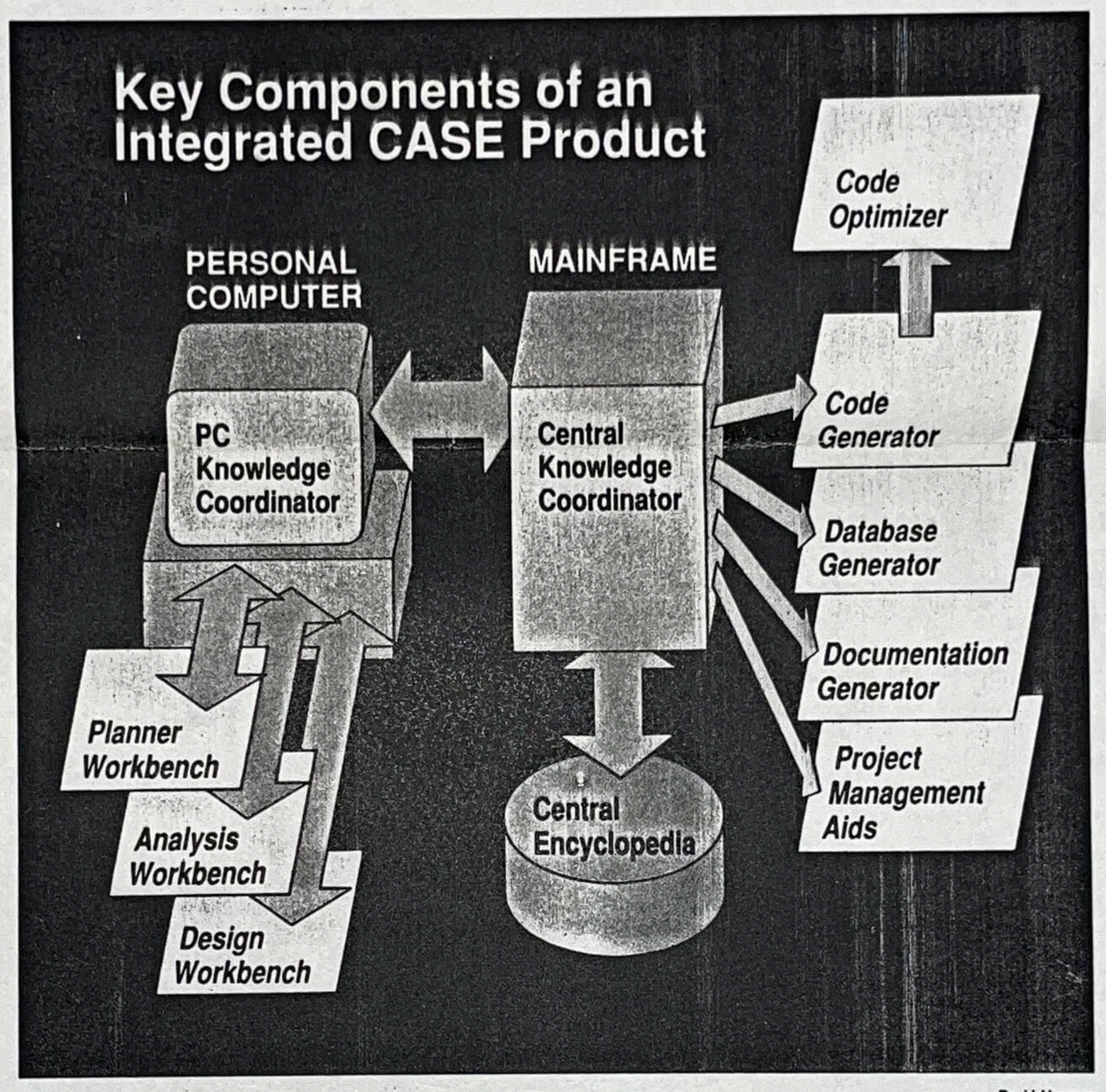
From the business point of view, it is vital that power tools change what can be constructed.

To stay competitive in the future, corporations will depend on being able to create effective computer applications quickly. In addition to the use of tools for designing and building programs, methodologies are needed to take advantage of these tools and harness the knowledge and creativity of computer users. Along with the revolution in power tools, we are likely to see a revolution in development methodology.

These changes need to be understood by management at every level. Making the changes is a business-critical success factor. Top management needs to ensure that its information-systems organization is adopting the new solutions as quickly as possible.

The term CASE has become popular for describing the new generation of power tools. The term I-CASE is used to describe a workbench environment integrating tools for all aspects of the software-development life cycle. These tools include computer-aided planning and modeling, computer-aided design linked to code generation, documentation generation and project-management aids.

I-CASE represents one of the most important changes in the software-development process to date. The technology overcomes many of the limitations that prevented the widespread acceptance of fourth-generation language (4GL) tools. A primary limitation of 4GL tools is that they do not cover the entire life-cycle process. In other words, they don't adequately support the analysis and design phases. In addition, 4GL tools do not produce code that runs as fast as hand-generated code. For many applications, 4GLs do not provide adequate run-time performance.



David Harnum

In addition to the tools themselves, CASE requires a methodology to harness the creativity and knowledge of users.

I-CASE tools overcome these limitations by supporting all phases of the life-cycle process and by generating highly efficient code. Front-end components of I-CASE tools provide the ability to specify applications in diagram form, using an integrated set of planning, analysis and design tools.

As shown in the accompanying figure, a tightly integrated back-end code generator produces program code that runs efficiently.

Additional automated tools support database and documentation generation and project-management aids. I-CASE tools offer the best of both worlds—support for the entire life-cycle process and efficient run-time performance.

The systems analyst interacts with a CASE design workbench tool by means of diagrams. Diagrams are used to represent planning information, an overview of systems, data models and data flows, detailed designs and program structures. A principle of CASE is that, whenever possible, diagrams are used as an aid to clear thinking.

A critical characteristic of an I-CASE tool (as opposed to CASE) is that it generates executable programs. A code generator is driven by design information stored in a central design repository. The design information in the repository is created via interaction with front-end workbenches. The use of a common repository ensures that the code is generated directly from information developed by the front-end design tool. The tight integration of the planning, analysis and design tools with a code generator gives much higher productivity than the use of tools that are not closely coupled.

Benefits of I-CASE Technology

I-CASE tools use automated techniques to reduce the cost and time to develop and maintain programs. Due to the use of automated analysis techniques, program quality is substantially improved. Potentially, I-CASE can accelerate development, drastically reduce maintenance costs; simplify development techniques; free developers to focus on the creative aspects of development; facilitate end-user involvement; improve software quality; and improve software portability.

The use of I-CASE technology provides a wide range of additional benefits. It enforces discipline; enforces good structuring of data and code and promotes rigor in design; catches most design and coding errors; enables design modifications to be made quickly and consequences checked for validity; automates documentation; creates standards for diagrams, techniques and documentation; accommodates an encyclopedia, which is essential for building a fully computerized organization; and aids project management and control.

Today, business, government and the military need highly complex and integrated computer applications. The size and complexity of these applications are too great for there to be any hope of accurate diagramming without the aid of a computer. The magnitude of the diagrammatic requirements for information engineering dictates that automated tools be used.

Next week, I'll look at the techniques that are used to convert specifications in diagram form directly into operational code. ■

The James Martin Productivity Series, an information service updated quarterly, is available through High Productivity Software Inc., of Marblehead, Mass. (800) 242-1240. For information on seminars, please contact Technology Transfer Institute, 741 10th St., Santa Monica, Calif. 90402 (213) 394-8305. In Europe, contact Savant, 2 New St., Carnforth, Lancs., LA5 9BX United Kingdom (0524) 734 505.