

## Computers (Electronic and Human) and Professionalism

by Steve Revay



The main article in this issue deals with the use of new computer technology as a management tool for contractors as well as for designers and manufacturers (CAD/CAM). Back in 1974, when the Canadian Construction Association published the results of a RAL conducted national survey; relatively few contractors in Canada used computers for anything other than

payroll and other accounting functions. These users were mainly major firms who could afford the outlay. Today, as recounted by Brent Hoiden, the lower cost of microcomputers and the increased availability of software packages have placed this tool in the financial grasp of virtually all contractors, large or small. Moreover, their use is becoming essential in order for them to retain a competitive position.

The human brain remains of course the most prevalent computer. In construction there has been historically a deliberate grouping of practitioners' expertise and experience (i.e. the co-ordinated use of human computers) in project management and construction teams to execute the work. Similarly, when

the industry in its various aspects has desired to achieve goals of a general nature, the procedure followed has been to organise Associations or Societies so that the human computers and other resources can be pooled to maximise the aggregate effect.

Those involved in the management of such activities have established professional standards by which ability can be assessed. The Project Management Institute, for example, has launched a professional certification program and the Institute of Association Executives has designated successful candidates for the past decade as "Certified Association Executives". These developments are touched on in shorter articles by Regula Brunies and Don Chutter.

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## Computers and the Competitive Edge in Construction

by Brent Hoiden RIA President RMS Management Systems Inc., Montreal

Managers, engineers and contractors in the construction industry know that the computer is as essential as the other specialized tools and equipment used on the job. It is obviously unrealistic to expect to improve productivity or remain competitive without the computer. The reason for this is the immediate and efficient processing and communication of key information.

The computerization of job and contract oriented industries is accelerating rapidly. In 1974, 74% of Canadian contractors surveyed "would never consider using a computer for cost control". By 1980, only 11 % -considered computerized cost control unimportant. Similarly, interest in computerization for estimating rose by 60%. There is now a universal awareness among contractors that computers are indis-

pensable to their operations. Armed with the right information at the right time, they plan more effectively, make better decisions and respond to unexpected problems rapidly.

Now, a breakthrough in the availability of industry specific software is underway. Certainly, general accounting and payroll packages will continue to serve their purpose, but what is truly exciting is the application of the computer to the operations side of construction. The new software supports key functions such as estimating, budgeting, planning, scheduling, progress and cost control. Where once the computer was limited to after-the-fact functions such as cost distribution or general ledger, now, before-the-fact information can be produced to solve immediately management problems such as determining final cost, pin-

pointing completion dates and comparing the fastest and/or cheapest plans of action.

When a computer system provides quick and accurate answers to situations posed by the user, there is ample time to explore alternatives and eliminate guesswork. As a result, management decision-making power is enhanced for the benefit of the organization as a whole and significant increases in overall productivity are achieved. The advantages thus gained in a highly competitive field such as the construction industry are obvious.

### BETTER, CHEAPER

Industry specific software has emerged in response to the accelerating trend toward computerization in construction, and

will, in turn, generate even greater interest. The initial impetus for this breakthrough was one of price. When, in the early 60's, mainframe computers became available, only the largest contractors could afford them. The price dropped considerably when the minicomputers appeared in the 70's, but was still considered prohibitive by most. The 80's, however, is the era of the microcomputer, and not only is the price within the range of even the smallest contractor, but there are enhanced capabilities. The micro is the desktop, job-site computer with a memory capacity comparable to the mini.

While these changes to the computer and its price were taking place, contractors were being exposed to the benefits of computerization and their interest in suitable software packages grew. Now, in fact, a brand new industry has emerged consisting of construction professionals who are designing specialized software packages specifically for the construction industry. The resulting first generation of industry specific microsoftware not only rivals, but in most cases surpasses, the performance of the more expensive previous products.

## **SOFTWARE FIRST**

It is the software itself which is the decisive factor in computerization. When the contractor decides to automate, the first step is to locate a suitable, existing software package. It should have been designed by people with practical construction experience. It takes considerable expertise, time and money to develop good specialized software, but when the development cost is spread over its numerous users, the price tag is ultimately lowered. A further advantage is that the selected system can be delivered and implemented immediately.

The selection process involves the same common sense business judgement applied to all decision-making. The system will be demonstrated prior to purchase, and its applicability and performance capabilities assessed. Facility of

operation need not be a concern if, as the new ones do, the system offers a simple menu structure, a fill-in-the-blanks approach, the use of function keys, and an on-line help feature.

The best software is flexible and expandable, allowing the user to adapt to changing circumstances. Some jobs require a very simple coding structure while others need a more complex one, so the system that imposes a fixed coding structure should be avoided. In addition, it should be a multi-functional system. It should support budgeting as well as progress and cost control, for example. Finally, the functions supported by the system should be fully integrated. If it produces schedule and cost projections, they should both be based on the same set of conditions. Integration of this nature makes for accurate and consistent information.

Only after the software has been determined to be satisfactory, will it be necessary to address the problem of the computer equipment itself. The selection of the hardware is secondary, and even the best available will still be impractical if the software is not suitable to the needs of the contractor. For a first computer purchase a turnkey system should be selected. When the computer equipment, software, and installation assistance all come from a single source the buyer is not caught in the middle should anything go wrong.

## **INTEGRATED FUNCTIONS**

The CT4 Productivity Control System is an example of the new industry specific software designed by and for the construction firm. It is a modern day tool for effective workforce management, and it supports, on a fully integrated basis, these management functions: estimating/budgeting, planning, scheduling, cost and progress control. Like all good construction management systems, it has been designed to complement construction expertise and not to replace it.

Features which make CT4 a powerful construction tool include the flexibility of the system which enables it to be

used in a variety of ways at any one time. The reports and schedules it produces may be prepared at various levels of detail and in different sequences. Coding structures can vary per contract depending on its complexity. There is a built-in user manual and special function keys for ease of use, and it has a multi-user and function capability. As a turnkey system, it includes hardware (IBM PC-XT or others), expert start-up assistance, and on-going support.

The operating concept is to allow the user to first build a plan for a given job. As the system is integrated, plan, in this case, means both a cost projection and a schedule. The variables which the system allows the user to enter a re, quantity of work, calendar of work, start date, crew make up, and productivity rate. The user can modify these variables at will, either individually or in combination, and see the impact of changes that were made. There is nothing new in these exercises. They are the same basic steps that are essential to sound budgeting and scheduling. The significant difference, however, is the speed, efficiency and flexibility that the system provides.

Once a budget and planned schedule are created, the contractor is able to track actual job progress and cost. All data previously created remains intact and the user simply changes the contract status from planning to active. At this point, processes for entering progress and timesheet information are available to record actual against their respective budgets and schedules. The system will continue to allow the user to compare period costs and to-date costs against budget and provide a reforecast of final cost and completion date.

## **PRODUCTIVITY TOOL**

All this instantaneous information can be used to the contractor's advantage in various ways. Productivity problems are quickly pinpointed. The user is provided with comparative budget and actual information for total cost, unit cost, hours of work, average cost per hour, crew size and productivity rate. Schedule changes

are immediately apparent. The user is provided with a comparison between planned and anticipated completion dates. Cost and time alternatives can be easily explored and guesswork eliminated. How much will the cost increase if the work is delayed? Is it better to work overtime or change crew size? What will happen if a second shift is worked? If the quantity of work increases, how much more will it cost and when will it be completed?

Obviously, having this type of information capability allows the contractor to make faster and better

decisions as well as pinpoint problems that require corrective action. In addition, well-designed software will provide cost data to quantify entitlements to additional compensation should a claim situation ever arise. Meanwhile, possible claim areas would be located soon enough to prevent or reduce their impact.

The biggest advantage of a microsoftware system such as CT4 is its price, and, properly implemented, it should quickly pay for itself through improved productivity. A contractor employing an average of 25 workers

could realize the purchase cost of the system in less than one year.

Clearly, the enthusiasm and interest surrounding the developing computerization of the construction industry are fully justified by affordability, efficiency and increased productivity. Moreover the new industry specific software is not only meeting the requirements of the user-contractors but also achieving high performance standards. Computers are here to stay. Contractors must use this new management tool to keep or to obtain their competitive edge.

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## Retrospective PMI Focus on Professionalism

by Regula Brunies

Looking backwards over the past five years spent on the Board of Directors of the Project Management Institute, the most gratifying feature of its program has been the heavy emphasis on the promotion of professionalism and education.

Indeed, this has dominated the past three years:

- a Certification Program for project managers was launched in October 1984.
- the first accredited graduate degree program in Project Management is being set up at a North American university (Western Carolina). More will follow.
- a Code of Ethics for project managers has been adopted,

following a three-year study of ethics, standards and accreditation in the project management field.

As a Canadian, it has been a particular source of satisfaction to see how our membership strength has grown in this international professional body. The PMI has over 5,000 members from all six continents, of which over 800 are in Canada. There are now five Canadian chapters (based in Montreal, Toronto, Calgary, Edmonton and Vancouver) and a sixth is being formed in Ottawa.

Moreover, during the last few years several Canadians have been elected as officers of the Institute. There are many Canadian authors of articles appearing in the Project Management

Journal and Canadian centres have been chosen for several of the annual PMI Seminar/Symposia - the next will be in Montreal in 1986.

PMI is dedicated to advancing the state-of-the-art in the profession of project management and of providing a forum for its practitioners from a wide variety of industries ranging from aerospace to electronics and from petrochemicals to pharmaceuticals. The construction/engineering/architecture/development group has been predominant in its operations. Education, law, insurance, government, medical research and heavy industry are also well represented.

The address of the PMI headquarters is P.O. Box 43, Drexel Hill, Pennsylvania 19026 (2151622-1796). Membership is recommended to all engaged in project management work.

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### HAT TRICK

RAL President Steve Revay has recently prepared papers on Techniques for the Measurement of Construction Productivity for three international conferences.

The first was presented in Paris last November at a Conference on Innovating Technology in Building sponsored by le Centre scientifique de technologie du batiment and the

Conseil international du batiment (CIB).

The next presentation was in Montreal on June 26th at the 8th International Cost Engineering Congress and the 28th Annual Meeting of the American Association of Cost Engineers. On July 20th he was the leadoff speaker at the special session in Ottawa on Assessing and Measuring Productivity during the three-day 3rd International

Symposium on Building Economics, sponsored by the CIB and organized by the National Research Council of Canada.

Long an advocate of practical techniques to measure productivity in construction operations, he recommends a "micro" approach on identifiable tasks, factored by such conditions as location and project type and size.



**W. BRENT HOLDEN**

President of RMS Management Systems Inc., Brent Holden is a professional management accountant whose career has spanned nineteen years in the construction industry. He has held a wide variety of financial and administrative functions during that time, working with trade and general contractors, developers, engineers, and construction managers. Brent has lectured to engineering and construction groups on the impact of computerization on workforce management. Working under his direction, a team of

computer and construction experts have built the CT4 system referred to in his article. CT4 is receiving worldwide attention and is rapidly becoming recognized as the leading microcomputer system for workforce management not only in construction but also in shipbuilding, manufacturing and service industries.

*RMS Management Systems Inc. is an associated company of RAL with offices at the same address in Montreal.*

## **RAL PROFILE**



**REGULA A. BRUNIES**

RAL Vice-President Regula Brunies has three arrows in her professional quiver. In 1967 she completed her studies in architecture at the Swiss Federal University of Technology in Zurich, subsequently she qualified as a quantity surveyor in Canada; and

has been designated as a Certified Cost Consultant by the American Association of Cost Engineers.

She joined RAL in 1970 and has since been involved in a broad variety of consulting assignments including the preparation or evaluation of construction claims, project management services, major international contract negotiations, research projects, expert assistance to legal counsel and seminar discussion leader.

One round-the-clock grind occurred when she was called in during the late, critical months of the construction of the Olympic Facilities in Montreal in 1976 to provide short-cycle scheduling and monitoring of the acceleration programme. A recent task (which she hopes won't be repeated) involved. The emergency mopping up after bomb damage to a

Montreal high-rise building, directing the structural assessment, various design disciplines, reconstruction and insurance claims.

Regula is a past-president of the Montreal Chapter of the Project Management Institute and went on to serve as President and then Chairperson of the international body. She was named PMI "Person of the Year" in 1982 and was made a Fellow of the Institute in 1984.

Currently she is a member of the Advisory Board of the Master of Science in Project Management program at Western Carolina University and is editor-in-chief of the Journal of the Swiss-Canadian Chamber of Commerce (Montreal) Inc.

## **NEW PROFESSIONALISM IN ASSOCIATION OPERATIONS**

*by Don Chutter*

Not so many years ago the typical association in the construction sector was largely a social organization, operating on a shoestring budget with its business activities carried out by a small core of dedicated members. The Secretary was frequently someone who had retired and was not expected to be an initiator. There were exceptions, of course, but the above was the norm.

Today the social aspect of Associations is still important, but

essentially they are operated as businesses by industry leaders who apply the same principles, procedures and performance tests as in their own companies. Financing may well continue to be a problem, but the annual budgets are often substantial, with a number running to seven figures. The association work programs are such that sizeable full-time staffs are required to implement and administer them. Association Management has become a highly specialised occupation whose Institute

has established its own professional standards. (The letters "C.A.E." stand for -Certified Association Executive-).

This development has evolved because of the increasing complexities of modern society and the steady growth of government at all levels. This has led to a chicken and egg situation. All sectors in the economy have found it imperative to organize so that their voice is heard by governments. Moreover, they must be widely representative in order

to be listened to. Governments, on the other hand, find it impossible to govern effectively without receiving inputs from interested parties. "Consultation" is a current watchcry. Governments obviously cannot consult with large numbers of individuals, associations have accordingly become an essential factor in the government process.

Associations are assigning more resources to Government Relations in recognition of the fact that, if consultations are to be worthwhile, they must provide more facts and viewpoints that were previously available to the governments. It is not enough to criticise to be constructive the associations have to be "professional" and present viable alternatives.

## **RAL and Associations**

Revay and Associates Limited is a firm believer in and supporter of Associations. It maintains memberships in over twenty local, provincial, national and international associations and professional societies. Moreover, a number of RAL Associates hold or have held Association offices:

- President Steve Revay is chairman of the Construction Division of the Canadian Society for Civil Engineering. He is also a Director and Past Labour Relations Committee Chairman of the Canadian Construction Association.
- Vice President Regula Brunies has recently completed terms as President and then Chairman of the Project Management Institute, the second Canadian to head up this international body.
- Ottawa Bureau Chief Don Chutter, C.A.E. is a Director and

Education Committee Chairman of the Ottawa Construction Association was Ottawa Director for PMI, 1981-84, and was General Manager of the Canadian Construction Association.

- Toronto Branch Manager Mark Doyle is a past chairman of two CCA national committees dealing with Construction Safety and alternative forms of contract and is a past member and course author of the Educational & Training Committee of the Ontario General Contractors Association.

This experience has contributed to RAL having received assignments from over a dozen associations, ranging from sales tax to seminars and from studies to manuals. These projects have in turn served to increase still further RAL's familiarity with the special roles, needs and problems of associations

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## **CSCE-WA Project**

The development of a series of portable construction productivity measurement standards; more economical construction

contracting/procurement practices; and viable on-site scheduling technology are three research studies in a Cost Effectiveness Improvement

program now being jointly sponsored by the Canadian Society for Civil Engineering and the Canadian Construction Association.

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