

# Team player

Research into the engineering profession reveals increasing use of multidisciplinary teams to get certain projects done. Engineers continue to lead these teams but other players—and skill sets—are making their presence felt. What does the evolving engineering team hold for the profession in general?

By Michael Mastromatteo



Among the less publicized items found in the recent National Survey of the Canadian Engineering and Technology Professions (*Engineering Dimensions*, January/February 2004) were references to the growing team aspect of engineering work.

The survey, co-sponsored by the Canadian Council of Professional Engineers (CCPE) and the federal government, emphasized the high level of job satisfaction among engineers coast to coast in Canada. It also discussed changing demographics, such as an aging engineering workforce, and the need for professional engineers to acquire new skills to maximize success in a constantly evolving profession.

While these findings have direct relevance to practically every Canadian P.Eng., the survey provided only glimpses of the work team model and its impact on the profession. But as regulators respond to engineers' expressed interest in licensing, enforcement and public protection issues, they must also pay heed to the challenges imposed by the team model as it gains an increasingly prominent place in engineering practice.

The CCPE survey reported that since 1999, 80 per cent of engineer-respondents have been involved in work teams brought together to achieve a common goal. "Eight in 10 reported that they have worked on teams in the past few years," the survey revealed. "There is a greater propensity for engineers and geoscientists to work on teams compared with technicians and technologists."

Karen Martinson, P.Eng., manager of research and evaluation for CCPE, said the survey results confirm knowledge about the profession gained from earlier studies done with engineering employers. She said the CCPE will continue to disseminate survey results to member organizations. The council has also incorporated the survey findings into a three-year research work plan aimed at overcoming knowledge gaps about the profession.

Martinson said that while much of the work team-related survey results did not come as a surprise to CCPE, there still were some significant findings.

"It is clear from the survey that the role of engineers has shifted into more of a

management function in a variety of organizations or work environments," said Martinson. "From other studies and research done by CCPE, it is clear that with all of the changes in the workplace due to advances in information technology, technologists—in particular—are able to do some of the work that was done by professional engineers in the past."

The survey found that about 69 per cent of technicians and technologists have been involved in team-centred projects over the past five years.

### Team makeup

The engineering survey had more to say on the evolution of the team. It broke its study of the work team into smaller components, with some examination of the incidence and type of teamwork involved in the profession. Specifically, it noted that self-employed engineers and those involved in contractual work arrangements are less likely to be working on teams. In addition, some 60 per cent of teams tend to be led by engineers, and only one in 20 teams is headed up by a non-technical person.

An additional factor affecting the use of engineering teams is the size of the employer organization. Companies with more than 1000 employees, for example, are more likely to adopt a team approach to certain projects. As well, engineers with multiple memberships, and those with a licence to practise in the United States, have a greater likelihood of working on multidisciplinary teams.

The survey also noted an occupational component to engineering team formation. "Based on occupation, members working in environmental or petroleum engineering are more apt to work in teams, as are chemical engineers," the report noted. "Those working in software, mechanical or mining engineering are least apt to work in teams. The same pattern exists based on educational discipline of the member."

In over 70 per cent of cases, teams were created on a project-by-project basis. This contrasts to about 28 per cent of engineering teams that were considered continuing or ongoing. Younger engineers were more likely to be included in ongoing teams, as were those whose under-

graduate degree was obtained outside Canada. The survey suggested it was "not surprising" that contract and self-employed engineers reported a greater propensity to be working on teams formed for individual, or one-time, projects.

Not all the work undertaken by these teams is strictly within the realm of engineering. The survey noted that the amount of engineering content on working teams averages about 60 per cent. Only five per cent of teams had no engineering focus, while some 17 per cent reported a low engineering content (25 per cent or less). About one in five teams indicated between 25 and 50 per cent of the team's work was engineering in scope, 50 per cent reported a heavy engineering content (50 per cent or greater), with one in six teams showing an exclusive engineering focus.

"The amount of engineering done in teamwork environments is higher among younger members, those who are educated abroad, and those working in other countries (particularly outside of Canada, the U.S. and Europe)," the survey noted. "Teams in larger companies tend to report lower engineering content than smaller companies. For example, members working for employers with more than 10,000 employees report an average engineering focus of 50 per cent, whereas those working in organizations with fewer than 100



Karen Martinson, P.Eng., of the CCPE believes defining engineering work is key in examining the team aspect.

employers report an average content of 75 per cent.”

Carolyn Adams, P.Eng., an environmental engineer with Marshall, Macklin, Monaghan in Thornhill, Ontario, told *Engineering Dimensions* that in her experience, work teams can comprise a variety of professional expertise. “A lot of my work is in a team and that varies from engineering teams to scientific teams and in between,” Adams said. “Most of the team members are professionals or en route to being professionals.”

### P.Engs predominate

In terms of team composition, the CCPE report found that engineers continue to predominate as team leaders. Nearly 60 per cent of teams were led by a P.Eng., while just one in seven, or 14 per cent, were led by what is described as a project manager. “Only one in 10 or fewer [teams] are led by a non-technical person, including those in human resources, sales, finance and purely administrative roles,” said the survey.

Large companies, however, are less likely to have an engineer as a team leader. “The fact that team leaders in larger corporations are not always engineers is not

a technician or technologist and 25 per cent include a non-engineering technical person.

In terms of occupational patterns, the survey found that those working in civil, electrical, mechanical/industrial, or metallurgical engineering tend to report the greatest concentration of engineering staff (P.Engs, technologists, technicians) on their teams. Those in engineering management and manufacturing engineering reported higher concentrations of non-engineering staff than the national average.

Individual engineers contacted by *Engineering Dimensions* suggested that the team aspect is becoming a fact of life in engineering work. John Gamble, P.Eng., president, Consulting Engineers of Ontario, suggested that the use of teams is nothing new to the engineering profession. “It’s not a new phenomenon,” Gamble said, “in fact I’d suggest they [teams] are a source of strength. They can bring all kinds of talent from other professions and para-professions to the task at hand.” Gamble also said it’s important for professional engineers not to view their work “in isolation” but to apply their engineering expertise in an envi-

technologists, technicians, engineers-in-training, and other non-licensed individuals working together on a global scale,” Neate said.

### Diversity of skills

Martinson of the CCPE believes the increasingly global nature of engineering work continues to abet the work team model. She suggested that teams introduce more diverse skill sets to certain projects, over and above what engineers can bring. “Those with an understanding of business practices in other countries and information technology are key to some engineering team work now,” she said. “In addition, there is the need for engineers and technologists to continue to work with scientists in areas such as biotechnology and leading-edge software/hardware design as products are researched, developed and brought to the marketplace.”

However the survey is interpreted, there is a strong possibility that the rise of engineering work teams will have licensing and regulatory implications. “Any blurring of the roles between engineers and technologists or technicians makes it harder to define what is truly engineering work and what isn’t,” noted Martinson. “It is maybe not that different from other professions though. The role of nurses in relation to doctors has changed somewhat in the last 10 years due to the use of more advanced technology and medical diagnostics. Ultimately, it needs to be clear what the definition of engineering work is—and that is something the engineering profession continues to work on.”

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**Karen Martinson, P.Eng.**

surprising,” Martinson said. “In other research conducted by the CCPE, employers often emphasized the need for engineers to enhance their non-technical or business-type skills. Some of the leadership roles in the larger organizations are being held by those with other management type backgrounds, and are not going to engineers for some of these reasons.”

Overall though, engineers make up 69 per cent of team membership, but one in two teams (46 per cent) includes

ronment that recognizes the contributions of other disciplines.

Professional engineers also recognize that teams can bring a diversity of skills and resources to any technical project. Jennifer Neate, P.Eng., of Griffith Laboratories in Toronto, said the team approach may force professional engineering to emerge from its “traditionally closed community” to reach out to other disciplines. “The engineering team will be re-defined to include engineering





## El owe: Team leaders need soft skills

By Joyce Rowlands

**T**oday's stereotypical "nerd" may have more social cachet than geeks of a generation ago. But in the wake of the dot.com fizzle, many employers of engineers and techy types are shunning the nerds and looking for professionals who possess a range of soft skills, including what is now known as "emotional intelligence" (EI).

John Oesch, assistant professor of organizational behaviour, Joseph L. Rotman School of Management, University of Toronto, teaches a course in EI to MBA students—40 per cent of whom are engineers. It's the first course of its kind in Canada, says Oesch, and among a handful in North America. And ever since Oesch talked about it on CBC radio, his phone has been ringing off the hook with corporate leaders looking for a quickie seminar for employees.

Emotional intelligence isn't a fad or buzzword, Oesch insists. It's a solid psychological construct that can be measured and learned. Most people learn the skills required for EI while they are very young then develop and refine the skills throughout their lives. EI boils down to two things: awareness of one's own emotions and recognition of other people's. Awareness alone is not enough, however. Emotionally intelligent people are cognizant of their emotions on a *conscious* level, can track feelings back to their cause and are able to "regulate" them. Conversely, they respond appropriately to the moods and feelings of others.

EI differentiates people very clearly, says Oesch: "If you look at a homogeneous group—all intelligent, hard-working and motivated, with roughly the same educational attainment—those who score well on performance tests for EI are better leaders, more empathetic and get better productivity from their employees. It's been tested and tested and tested. The data is there."

Echoing this view is psychologist Stephen Stein, founder of Multi-Health Systems Inc., a Toronto company that publishes psychological tests, and works with corporations on issues of recruitment, retention and employee satisfaction.

Stein has studied engineers and information technologists, among other professionals. Both groups scored somewhat below the population average of 100 on EQ or emotional quotient (a measure of EI). Information technology specialists averaged 97.5, engineers 98—in the same range as surgeons at 98 and in-house counsel at 97.

Among engineers, several factors distinguish star performers, says Stein: They love what they do; they're friendly, outgoing, optimistic and read others well. This is in sharp contrast to the stereotypical nerd,

whom Stein describes as self-absorbed non-conformists, immersed in their own little world, who don't fit in well. "They're less communicative, less interactive, less sharing [of information and ideas] and tend not to be team players," he says.

Corporations used to compete for them. Not any more—at least not for career track jobs, according to John O'Grady, a labour market analyst with Prism Economics and Analysis in Toronto. He studied hiring practices in the biotechnology, software and information technology sectors for the Canadian Council of Professional Engineers to try to discover why engineers weren't being hired in the numbers one might expect. His findings were telling.

Employers in leading edge industries look for key business skills such as project management, basic financial analysis and business case writing. They also look for communications skills and team-building skills. O'Grady's study reported that employers found that many engineers were deficient in both the key business skills and the "soft" skills.

Professor Oesch's course doesn't provide individual EI training. Rather it raises understanding of the role emotions play in the workplace and helps students become better managers. "It's definitely a set of skills you can learn about, practise and get better at," he says. Reflection and self-awareness are the first steps.

Individual EI training (improving emotional skills) is time-consuming and costly. It involves learning to read facial expressions and body language—going through hundreds of slides one-on-one with a coach or in small group sessions over a period of weeks or months.

Professor Brian Baetz, P.Eng., head of the Engineering and Society Program, McMaster University, Hamilton, is angling to include an EI course or module in a new master's program on engineering and public policy. A couple of years ago, Baetz introduced what he called "ice-breakers"—discussion topics at the start of tutorials—to engage students on non-technical topics. They included "life skills" discussions on things like shaking hands, remembering names, looking people in the eye and empathy. They were a big hit, he says.

"If we just keep cranking out engineers with the same skill set, if they don't know how to deal with people, they're not going to be successful. We want to generate the next set of leaders—the deputy ministers, the CEOs," says Baetz.

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