Engineering and Technology Labour Market Study

2007 Engineering and Technology **Employer Survey**

Engineers Canada
and
Canadian Council of Technicians and Technologists

November 2008

Funded by the Government of Canada's Sector Council Program.

Canada

Prism Economics and Analysis
Suite 404
160 Eglinton Avenue East
Toronto, ON
M4P 3B5
Tel: (416)-484-6996
Fax: (416)-484-4147
website: www.prismeconomics.com

John O'Grady
Partner, Prism Economics and Analysis
Direct Phone: (416)-652-0456
Direct Fax: (416)-652-3083
Email: ogrady@ca.inter.net
website: www.ogrady.on.ca

About Engineers Canada

Established in 1936, Engineers Canada is the national organization of the 12 provincial and territorial associations and ordre that regulate the practice of engineering in Canada and license the country's more than 160,000 professional engineers. Engineers Canada serves the associations and ordre, which are its constituent and sole members, by delivering national programs that ensure the highest standards of engineering education, professional qualifications and professional practice.

About the Canadian Council of Technicians and Technologists

The Canadian Council of Technicians and Technologists (CCTT) establishes and maintains national competency standards for certifying members with a 'quality seal of approval' in 14 applied science and engineering technology disciplines: bioscience, industrial, building, instrumentation, chemical, mechanical, civil, mining, electrical, petroleum, electronics, geomatics, forestry, and information technology. CCTT's provincial associations are responsible for issuing these highly regarded credentials, which are recognized by provincial statute in many Canadian provinces.

Contents

Engineering and Technology Labour Market Study

2007 Engineering and Technology Employer Survey

Executive Summary

Employment Functions

- *Technical functions are the predominant function of almost half of all engineers and technologists. For technicians, production control and service roles predominate.*
- *Managerial responsibilities are the predominant function of 29% of engineers.* For technologists and technicians, this proportion is lower: 20% and 10% respectively. These differences confirm that advancement into managerial responsibilities is more widespread among engineers and that this advancement may occur earlier in a career than for technologists or technicians. The contrasts, however, should not be over-stated. Fully one-fifth of technologists, according to the survey, are principally engaged in managerial functions. *While movement into the managerial ranks is less widespread among technologists, it is nevertheless a significant occurrence.*

Figure No. S-1
Technologists and Technicians: Predominant Function by Cluster
(Sample Re-weighted to Employment by Industry in 2001 Census)

	Engineers	Technologists	Technicians
Technical: Consulting and Design and/or Research and Development	47%	49%	33%
Managerial: General Management, Planning and Project Management	29%	20%	10%
Production Control: Production/ Process/ Quality Control	14%	8%	27%
Service: Service and Support, Supply and Install, Technical Sales	7%	19%	25%
Inspection	3%	4%	5%

Hiring Intentions

- *Survey results indicate significantly greater intended hiring rates for technologists and technicians, compared to engineers.* This is consistent with other trends that suggest substitution of technologists and technicians for engineers in some functions.

Figure No. S-2
Intended Hiring Rates – Next 12 Months, by Industry

Industry	Engineers	Technologists	Technicians
Scientific & Professional Services	2.3%	8.5%	12.2%
Manufacturing	2.8%	13.3%	6.2%
Utilities (excl. Telecom)	1.2%	8.1%	3.0%
Government	sample too small	sample too small	sample too small
Resources (Oil & Gas, Mining, Pipeline)	4.6%	9.7%	21.1%
Construction	4.2%	6.9%	3.9%
Information and Culture (incl. Telecom)	sample too small	sample too small	sample too small
All Other or Not Specified	3.2%	9.1%	10.9%
Total	2.6%	9.1%	8.7%

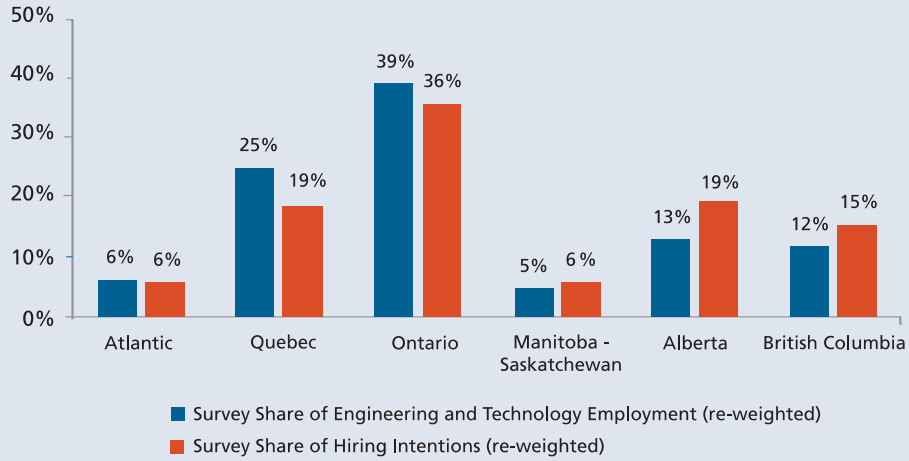
- *Civil engineering and technology (along with building and structural) dominate hiring intentions over the next twelve months, accounting for 26% of intended hires of engineers, 31% of technologists and 32% of technicians.* Hiring in the electronics and computer engineering/ computer systems fields did not register in the survey for engineers. For technicians, this field accounts for approximately 10% of intended hires. *Approximately 50% of intended hires in the computer technology field are persons with a science background other than engineering or technology.*

Figure No. S-3
Share of Intended Hires by Technical Field – Next 12 Months

Technical Field	Engineers	Technologists	Technicians
Civil	20%	24%	27%
Mechanical	18%	12%	17%
Electrical	13%	12%	8%
Chemical	6%	8%	-
Building, Structural	6%	7%	5%
Environmental	5%	5%	7%
Transportation	4%	24%	4%
Petroleum, Natural Gas	3%	1%	8%
Municipal	3%	4%	4%
Industrial, Manufacturing	-	2%	-
Electronics	-	2%	6%
Geological	-	2%	-
Computer Systems	-	-	4%
Other	21%	21%	10%
Total	100%	100%	100%

- In the consulting sector, which is the largest employer of engineers, technologists and technicians, the location of a work assignment can differ from the permanent location of the engineer or technologist/technician. As a result, *in engineering and technology occupations, perhaps more than in other occupations, there is a significant spill-over of the employment effect of capital spending in one region into employment in other regions.* The hiring intentions reported in the survey confirm the importance of the spill-over effect. As would be expected, western Canada accounts for a disproportionate share of intended hires: 40% of intended hires versus 30% of engineering and technology employment. However, the surge of capital spending in western Canada has also buoyed up hiring in central and eastern Canada. In particular, the spill-over effect appears to have cushioned the impact of declining demand in the manufacturing sector.

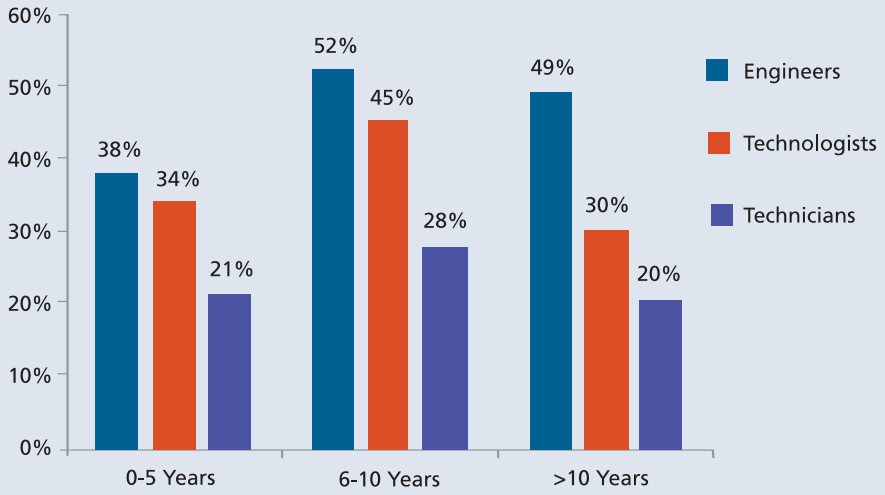
Figure No. S-4
Regional Share of Intended Hiring – All Engineering and Technology Occupations



Recruitment Difficulty and Recruitment Channels

- Employers anticipate markedly greater difficulties recruiting engineers than technologists or technicians. These greater expected recruitment difficulties are reported by employers notwithstanding that expected hiring rates for engineers are significantly lower than for technologists and technicians. The survey findings suggest, therefore, that employers find the supply of technologists and technicians more elastic (i.e., more responsive to increased demand) than the supply of engineers. This may reflect the interaction between the immigration system and the system of professional licensure for engineers. Owing to the absence of licensing requirements for technologists and technicians, immigration is more efficient in supplying persons for these occupations than for engineering occupations. The easier recruitment environment for technologists and technicians also may encourage substitution of technologists for engineers where this is feasible.

Figure No. S-5
Percent of Survey Respondents that Intend to Hire in the Next 12 Months *and* Anticipate Difficulty in Recruiting or Retaining Engineers, Technologists and Technicians by Different Levels of Experience



- *National and international recruiting play a more important role in hiring engineers than in hiring technologists and technicians.* For engineers with more than 10 years of experience, 39% of employers report that they recruit through national and international channels. The comparable figure for technologists and technicians is 24%. *These recruitment patterns underscore the importance of portability of professional qualifications,* especially in engineering, though the role of national and international recruiting is sufficiently important in hiring technologists and technicians to make qualification portability also relevant for these occupations.

Figure No. S-6
Percent of Employers utilizing Local, Provincial, National or International Sourcing for Hires with >10 Years Experience

	Local		Provincial		National		International	
	Engineers	Techs	Engineers	Techs	Engineers	Techs	Engineers	Techs
Atlantic	34%	42%	30%	33%	26%	21%	11%	5%
Quebec	42%	54%	27%	31%	18%	12%	13%	3%
Ontario	42%	50%	27%	31%	21%	14%	10%	5%
Manitoba-Saskatchewan	26%	35%	29%	34%	32%	23%	13%	8%
Alberta	31%	39%	25%	32%	25%	19%	20%	10%
British Columbia	26%	42%	24%	33%	33%	19%	17%	6%
National Average	35%	44%	27%	32%	25%	18%	14%	6%

Licensure and Certification

- Approximately half of the survey participants declined to answer questions on licensure and certification. This may indicate a reluctance on the part of employers to respond to survey questions on this topic, especially when the survey is sponsored by professional associations with a stake in the system of licensure and certification.
- *By far the most important reason for policies that require or encourage licensure and certification is to "encourage professionalism".*
- Approximately 15% of survey respondents that require licensure for engineers do so only to meet regulatory requirements.
- Restricting ability to hire is reason most often cited by those survey respondents that do not have policies that require or encourage licensure and certification.

Figure No. S-7
Employer Policy respecting Licensure and Certification

	Engineers	Technologists	Technicians
Require licensure or certification	17%	8%	6%
Prefer licensure or certification	20%	19%	13%
No policy or preference concerning licensure or certification	6%	16%	17%
Require licensure/certification for some, prefer licensure/certification for others	7%	2%	1%
Require licensure/certification for some, no policy/preference for others	4%	1%	1%
Other	1%	-	-
No Response to Survey Questions	45%	53%	62%
Total	100%	100%	100%

Continuing Professional Development

- The survey results suggest three clusters of respondents:

Figure No. S-8
Employer Support for Continuing Professional Development – Three Clusters

Employers that provide no formal support for continuing professional development	approx. 38%
Employers that support continuing professional development, but generally leave training to employee initiative	approx. 30%
Employers that actively encourage training through training plans or allocated training days	approx. 32%

- *There is a significant correlation between employer support for Continuing Professional Development and employer support for licensure or certification.* Among employers that require or prefer licensure of their engineers, only 31% do not have a formal Continuing Professional Development policy. By contrast, among employers that have no policy on licensure, the proportion that also have no policy on Continuing Professional Development rises to 53%. Employer support for licensure also correlates strongly with employer support for membership in technical associations: 69% of employers that require or prefer licensure also encourage membership in technical associations. Among employers with no policy on licensure, the proportion that encourage membership in technical associations is only 20%.
- *Employer size is an important factor influencing employer policies on Continuing Professional Development for engineering and technology staff.* Small employers (under 50 employees) are almost three times as likely as large employers (>500 employees) to have no formal policies on Continuing Professional Development.
- The survey indicates important complexities around the introduction or administration of continuing professional development policies. A significant proportion of engineers, technologists and technicians work for employers that have no formal policies to support continuing professional development. Mandated continuing professional development might lead some of these employers to adopt supportive policies. However, for a significant number of engineers, technologists and technicians compliance with continuing professional development requirements would likely entail personal costs and possibly some difficulty in actually attending courses or seminars. At the other end of the spectrum are engineers, technologists and technicians who work for employers that have active staff training and development policies. Association policies would need to be congruent with these policies.

Employers' Perceptions of Skill Requirements

- *Employers' expressed a high level of satisfaction with the science-based skills of new hires, but a lower level of satisfaction with non-technical skills.*

Figure No. S-9
Employers' Reported Satisfaction with Science-Based and Non-Technical Skills of New Hires

0-5 Years Experience		
	Satisfied?	
Science-based Skills	Yes	No
Engineers	87%	13%
Technologists	89%	11%
Technicians	84%	16%
Non-Technical Skills		
Engineers	64%	36%
Technologists	70%	30%
Technicians	69%	31%

- *As an engineer progresses in his or her career, the importance of non-technical skills increases. This pattern also holds with technologists and technicians, but is less marked and the breadth of non-technical skills sought is narrower.*

Diversity Policies and Internationally Educated Professionals

- *By far the preponderance of employers do not have any formal policies or goals.* Governments and utilities reported the highest incidence of formal policies or goals.
- Approximately half of survey participants reported difficulty in evaluating the education, professional qualifications or experience of internationally educated engineers, technologists and technicians. *Language and communication skills rank as the most important impediments to hiring, along with report writing skills.* However, 40-50% of survey respondents also expressed concerns about 'knowledge of statutes, regulations and codes', along with 'technical skills'.

1. Survey Sample

The 2007 Engineering and Technology Employer Survey was a web-based survey on engineering and technology intensive employers. The survey was operational from July 2007 to January 2008. The goals of the survey were to identify employment patterns by technical field and by function, hiring intentions, recruitment channels and related issues, and policies regarding licensure and certification, continuing professional development, and the promotion of diversity in the engineering and technology labour force.

A total of 701 valid responses were received, which is consistent with the target of 700 employer responses. Of these respondents, 339 (48%) conducted operations in more than one province.

In total, the respondents to the survey reported that they employed 23,367 engineers, 10,285 technologists, and 8,276 technicians. Based on the 2006 Census, the respondents to the survey accounted for approximately 11.6% of the total estimated employment of engineers and 7.1% of technicians and technologists. Subject to the sampling biases discussed below, this represents a statistically significant sampling of employers in the engineering and technology field.

Figure No. 1-1 shows the distribution of the *head office* locations of survey respondents.

Figure No. 1-1
Distribution of Survey Respondents by Location of Head Office

	Frequency	Percent
Newfoundland and Labrador	26	4%
Nova Scotia	11	2%
New Brunswick	15	2%
Prince Edward Island	8	1%
Quebec	161	23%
Ontario	209	30%
Manitoba	40	6%
Saskatchewan	60	9%
Alberta	104	15%
British Columbia	51	7%
Territories	7	1%
Unspecified	9	1%
Total	701	100%

Many respondents reported on behalf of multiple locations. Often these multiple locations covered more than one province or territory. Consequently it is not possible to estimate precisely the provincial and territorial distribution of the employment represented by the responses. However, based on the distribution of head offices, the sample under-represents Ontario and British Columbia and over-represents Saskatchewan. Where it is relevant to interpretation of the data, the results are therefore reported both unweighted *(i.e.*, "as is") and also re-weighted to reflect the Census distribution of engineering and technology employment across provinces and territories.

Figure No. 1-2 summarizes the distribution of survey respondents by major industry, regardless of the size of their engineering and technology work force.

Figure No. 1-2
Distribution of Survey Respondents by Primary Industry

	Frequency	Percent
Professional and Scientific Services (Consulting)	266	38%
Manufacturing	147	21%
Utilities (excl. Telecom)	27	4%
Government	30	4%
Resources (Oil & Gas, Mining, Pipeline)	75	11%
Construction	50	7%
Information and Culture (incl. Telecom)	14	2%
Wholesale & Retail Trade	7	1%
Waste Management & Remediation	5	1%
All Other	66	9%
Not Specified	14	2%
Total	701	100%

Figure No. 1-3 shows the industry distribution of the engineering and technology employment represented by the survey respondents and compares this distribution with engineering and technology employment in the 2006 Census.

Figure No. 1-3
Distribution of Employment Represented by Respondents' Primary Industry compared to 2006 Census

	Survey Sample		2006 Census
	Frequency	Percent	Percent
Scientific & Professional Services	20,131	46%	26%
Manufacturing	6,777	16%	25%
Utilities (excl. Telecom)	5,682	13%	11%
Government	603	1%	9%
Resources (Oil & Gas, Mining, Pipeline)	3,226	7%	5%
Construction	3604	8%	7%
Information and Culture (incl. Telecom)	131	<1%	3%
All Other or Not Specified	3,332	8%	14%
Total	43,486	100%	100%

As can be seen from Figure No. 1-3, the survey sample significantly over-represents the consulting industry and significantly under-represents manufacturing and government. When relevant to data interpretation, the results are reported both unweighted (*i.e.*, "as is") and also re-weighted to reflect the Census distribution of employment across industries.

For certain topics, *e.g.*, policies with respect to licensure and certification, there was a significant non-response rate among the survey participants. Where it is appropriate, we have reported relative frequency distributions both with and without the non-responses.

For most questions, the survey distinguished three occupational categories: engineers, technologists and technicians. For some questions, technologists and technicians were conflated. Differences in the response patterns between technologists and technicians are difficult to interpret. Focus groups and interviews undertaken as other components of the Engineering and Technology Labour Market Study (of which this survey is also a component) suggest strongly that *industry practice and industry nomenclature do not reflect with any consistency the distinctions between technologists and technicians that inform certifying policy on the part of provincial and territorial associations or distinctions made by the post-secondary system.* Many employers use the terms technologist and technician interchangeably. Others use the terms for distinct categories of technical employees, but the distinctions are different from those that are the basis for the certifying policies of the provincial and territorial associations. Survey data are reported separately for technologists and technicians, where these data are available. However, caution should be exercised when interpreting apparent differences between technologists and technicians.

This survey would not have been possible without the co-operation and commitment of time of the participating employers. We take this opportunity to express our appreciation for their support. We also express our appreciation to the provincial and territorial licensing and certifying bodies and to technical associations for their assistance in bringing this survey to the attention of relevant employers.

The survey was sponsored by Engineers Canada and the Canadian Council of Technicians and Technologists as part of the Engineering and Technology Labour Market Study. Additional information on the study and reports emanating from the study are available at:
http://www.engineerscanada.ca/etlms/index.cfm

2. Employment by Predominant Function

Response Rate

Of the 701 survey participants, 74.2% provided information on employment by predominant function.

Engineers

Survey respondents were asked to categorize their engineering employees by their *predominant* function. Figure No. 2-1 summarizes these data for engineers.

Figure No. 2-1
Engineers: Predominant Function

Function	Unweighted	Weighted*
Consulting (i.e., not operational)	20%	19%
Design and/or Research and Development	26%	27%
Inspection	3%	3%
Management	13%	14%
Planning	3%	3%
Production or Process Control	14%	10%
Project Management	12%	12%
Quality Control	3%	4%
Service and Support	5%	5%
Supply and Install	<1%	1%
Technical Sales	1%	1%
Total	100%	100%

* Weighted estimates re-weight the survey responses to accord with the industry distribution of employment in the 2006 Census

There is relatively little difference between the weighted and unweighted results. Only 'production or process control' is significantly sensitive to re-weighting the survey results in line with the industry distribution of employment in the Census.

The 11 employment functions can be regrouped into five clusters:

- technical
- managerial
- production control
- service, and
- inspection

Figure No. 2-2 shows the predominant function by cluster. *It is noteworthy that for engineers, the technical cluster accounts for the predominant function of 47% of the employees represented by the employers in the survey.* Stated conversely, for a majority of engineers, their predominant function is other than technical consulting, design or research and development.

Figure No. 2-2
Engineers: Predominant Function by Cluster (re-weighted)

Technical: Consulting, Design and/or Research and Development	47%
Managerial: General Management, Planning and Project Management	29%
Production Control: Production/Process/Quality Control	14%
Service: Service and Support, Supply and Install, Technical Sales	7%
Inspection	3%

Technologists and Technicians

Figure 2-3 summarizes employment by major function for technologists and technicians. As noted in Chapter 1, caution should be exercised in interpreting differences between technologists and technicians, as there is no common employer practice across industries and across regions in distinguishing between technologists and technicians.

Figure No. 2-3
Technologists and Technicians: Predominant Function

	Technologists		Technicians	
Function	Unweighted	Weighted*	Unweighted	Weighted*
Consulting (i.e., not operational)	25%	21%	14%	9%
Design and/or Research and Development	34%	28%	31%	24%
Inspection	4%	4%	7%	5%
Management	6%	7%	4%	3%
Planning	4%	4%	3%	3%
Production or Process Control	4%	5%	18%	23%
Project Management	6%	9%	2%	4%
Quality Control	3%	3%	3%	4%
Service and Support	9%	15%	14%	21%
Supply and Install	3%	2%	3%	3%
Technical Sales	2%	2%	1%	1%
Total	100%	100%	100%	100%

* Weighted estimates re-weight the survey responses to accord with the industry distribution of employment in the 2006 Census

Figure No. 2-4 re-organizes these results into five clusters.

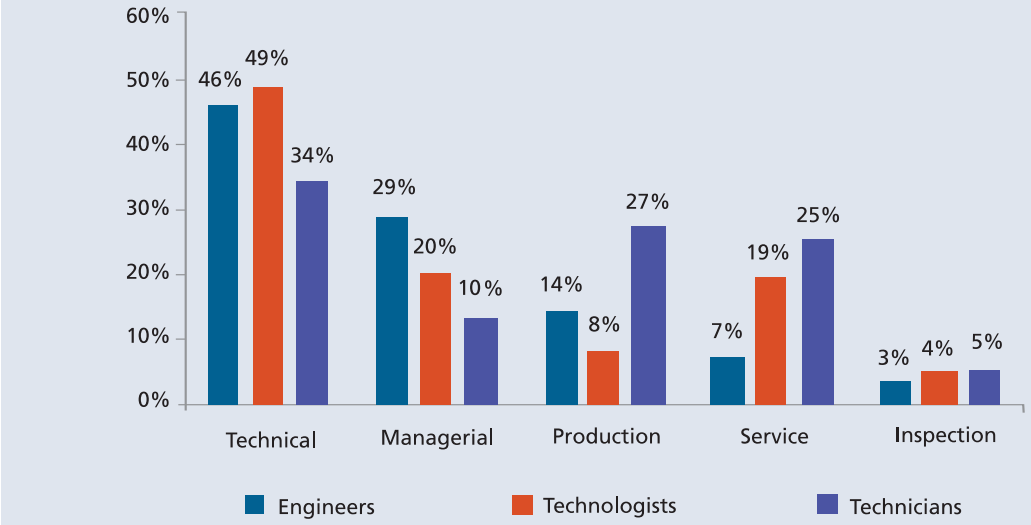
Figure No. 2-4
Technologists and Technicians: Predominant Function by Cluster
(re-weighted)

	Technologists	Technicians
Technical: Consulting and Design and/or Research and Development	49%	34%
Managerial: General Management, Planning and Project Management	20%	13%
Production Control: Production/Process/Quality Control	8%	27%
Service: Service and Support, Supply and Install, Technical Sales	19%	25%
Inspection	4%	5%

Comparison

There are notable similarities as well as notable differences in the functional distribution of employment between engineers and technicians/technologists. Figure No. 2-5 summarizes this comparison.

Figure No. 2-5
Comparison of Predominant Functions (Clusters) of Engineers, Technologists and Technicians (Industry Employment Re-weighted to 2006 Census)



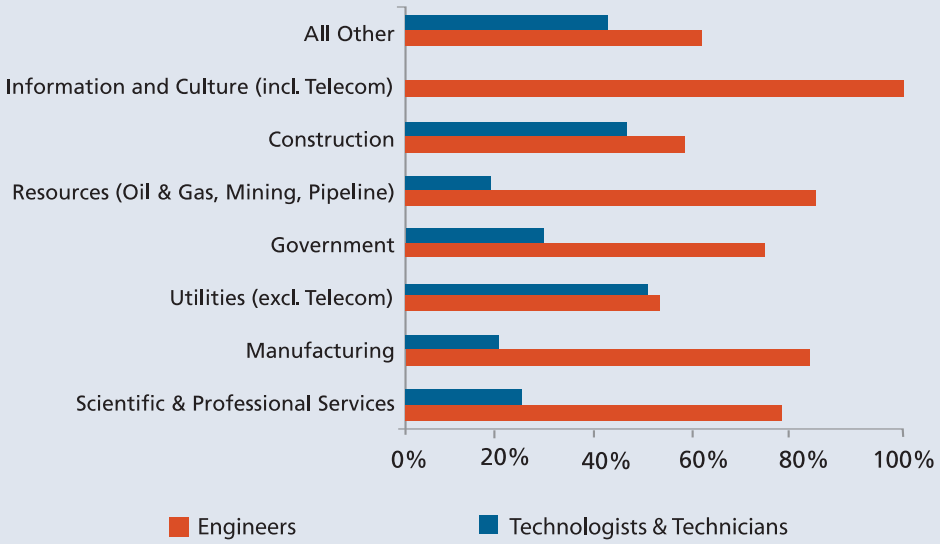
As can be seen in Figure No. 2-5, *the technical cluster of employment functions predominates among both engineers and technologists.* There is undoubtedly differentiation within this cluster, based on differences in the training and education of engineers and technologists. Nevertheless, *the high proportion of employment functions accounted for by the technical cluster also suggest that there is scope in the workplace for substitution and overlap of roles.* Focus group discussions support this hypothesis.

Equally striking is the difference in the importance of the production and the service clusters. Production is notably more important for technicians, while service is significantly more important for both technologists and technicians.

The difference in the importance of the managerial cluster of employment functions should also be noted. The managerial cluster of functions accounts for the predominant function of 29% of engineers. For technologists and technicians, this proportion is markedly lower: 20% and 13% respectively. These differences suggest that the career paths of engineers and technologists/technicians are different. However, these career path differences should not be over-stated. One-fifth of technologists, according to the survey, are principally performing managerial functions. *While movement into the managerial stratum may not be as widespread among technologists as among engineers, it is nevertheless a significant occurrence.*

Figure No. 2-6 shows that with respect to 'general management functions' (which is the most unambiguous of the three functions in the managerial cluster), there are differences across industries in the ratio of these functions exercised by engineers or by technicians and technologists.

Figure No. 2-6
Ratio of General Management Functions by Industry:
Engineers compared to Technologists /Technicians



As can be seen in Figure No. 2-6, the technologist/technician share of 'general management functions' is greatest in utilities (excluding telecom), construction and in the 'all others' category of industries. Their share is lowest in telecom, resources and scientific and professional services (*i.e.*, consulting).

3. Hiring Intentions (as Sampled from July 2007 to January 2008)

Over all, *56% of survey respondents indicated that they intend to hire engineering or technology staff in the next 12 months*. Figure No. 3-1 summarizes the proportion of respondents by region that reported an intention to hire.

Figure No. 3-1
Percent of Survey Respondents Intending to Hire Engineers, Technicians or Technologists in the Next 12 Months – by Region

Region	Percent Intending to Hire in the Next 12 Months
Atlantic	58%
Quebec	45%
Ontario	56%
Manitoba-Saskatchewan	56%
Alberta	63%
British Columbia	69%
Total Sample	56%

Figure No. 3-2 shows intention to hire by industry.

Figure No. 3-2
Percent of Survey Respondents Intending to Hire Engineers, Technicians or Technologists in the Next 12 Months – by Industry

Region	Percent Intending to Hire in the Next 12 Months
Scientific & Professional Services	62%
Manufacturing	57%
Utilities (excl. Telecom)	59%
Government	47%
Resources (Oil & Gas, Mining, Pipeline)	58%
Construction	59%
Information and Culture (incl. Telecom)	43%
All Other or Not Specified	43%
Total Sample	56%

Engineers

Survey respondents reported 12-month hiring intentions equivalent to approximately 2.6% of their current engineering employment. Figure 3-3 summarizes intentions by industry:

Figure No. 3-3
Intended Hiring Rate of Engineers – Next 12 Months, by Industry

Industry	Hiring Rate
Scientific & Professional Services	2.3%
Manufacturing	2.8%
Utilities (excl. Telecom)	1.2%
Government	sample too small
Resources (Oil & Gas, Mining, Pipeline)	4.6%
Construction	4.2%
Information and Culture (incl. Telecom)	sample too small
All Other or Not Specified	3.2%
Total	2.6%

It should be noted that the majority of survey responses preceded the downturn in the manufacturing sector. The 2.8% intended hiring rate for this sector may have been overtaken by economic developments.

Figure No. 3-4 shows the technical fields which predominate in the expected hiring of engineers. Technical fields, it should be noted, do not readily correspond to particular industries. For example, the consulting industry employs virtually all types of engineers. Similarly, the employment of civil engineers is not confined to the construction industry. The oil and gas industry recruits both chemical engineers and petroleum engineers.

Figure No. 3-4
Share of Technical Fields in Intended Hiring of Engineers – Next 12 Months

Technical Field	Share of Expected Engineering Hires
Mechanical	20%
Civil	18%
Electrical	13%
Chemical	6%
Building, Structural	6%
Environmental	5%
Transportation	4%
Petroleum, Natural Gas	3%
Municipal	3%
All Other	21%
Total	100%

Technologists

Survey respondents reported an expected hiring rate for technologists of 9.1%. This is a significantly greater intended hiring rate than for engineers. The higher rate is evident in every industry. The same caveat, as expressed earlier, applies to the reported hiring intentions in the manufacturing sector.

Figure 3-5 summarizes hiring intentions by industry for technologists. *The intended hiring rate suggested by the survey is significantly higher than the hiring rate reported for engineers. This pattern cuts across industries and suggests that there may a significant substitution occurring where the roles of engineers and technologists overlap.*

Figure No. 3-5
Intended Hiring Rate of Technologists – Next 12 Months, by Industry

Industry	Hiring Rate
Scientific & Professional Services	8.5%
Manufacturing	13.3%
Utilities (excl. Telecom)	8.1%
Government	sample too small
Resources (Oil & Gas, Mining, Pipeline)	9.7%
Construction	6.9%
Information and Culture (incl. Telecom)	sample too small
All Other or Not Specified	9.1%
Total	9.1%

Figure No. 3-6 shows the technical fields that will dominate the expected hiring of technologists. There are notable differences in the fields which the survey indicates will dominate hiring intentions. Civil technology, for example, accounts for 24% of intended hires of technologists, but only 18% of intended hires of engineers. By contrast, chemical represents 6% of intended engineering hires, but does not even register in the survey as a technical field for intended hires of technologists.

Figure No. 3-6
Share of Technical Fields in Intended Hiring of Technologists – Next 12 Months

Technical Field	Share of Expected Technologist Hires
Civil	24%
Mechanical	12%
Electrical	12%
Building, Structural	8%
Environmental	7%
Transportation	5%
Municipal	4%
Industrial, Manufacturing	2%
Electronics	2%
Geological	2%
Petroleum, Natural Gas	1%
Other	21%
Total	100%

Technicians

Survey respondents reported an expected hiring rate for technicians of 8.7%. This is close to the intended hiring rate for technologists. In light of differences in industry and regional practice in regard to classifying employees as technicians or technologists, the reported expected hiring rates should be interpreted as essentially comparable. As noted above, timing factors may have invalidated the reported hiring rate for the manufacturing sector.

Figure 3-7 summarizes hiring intentions by industry for technicians.

Figure No. 3-7
Intended Hiring Rate of Technicians – Next 12 Months, by Industry

Industry	Hiring Rate
Scientific & Professional Services	12.2%
Manufacturing	6.2%
Utilities (excl. Telecom)	3.0%
Government	sample too small
Resources (Oil & Gas, Mining, Pipeline)	21.1%
Construction	3.9%
Information and Culture (incl. Telecom)	sample too small
All Other or Not Specified	10.9%
Total	8.7%

Figure No. 3-8 shows the technical fields that will dominate the expected hiring of technicians. Again, civil dominates. 'Computer systems' also registers as a technical field of note in the survey for intended hiring of technicians (4%). Related fields (e.g., computer engineering) do not register as a technical field in demand for engineers. This suggests that there may be substitution away from engineers in this field.

Figure No. 3-8
Share of Technical Fields in Intended Hiring of Technicians – Next 12 Months

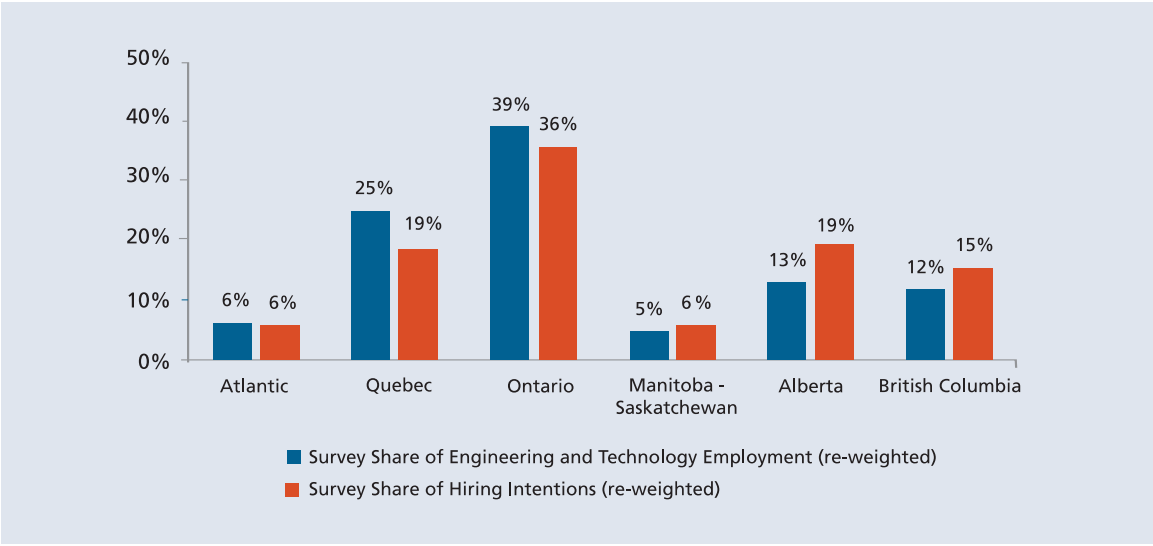
Technical Field	Share of Expected Technician Hires
Civil	27%
Mechanical	17%
Petroleum, Natural Gas	8%
Electrical	8%
Environmental	7%
Electronics	6%
Building, Structural	5%
Municipal	4%
Computer Systems	4%
Transportation	4%
Other	10%
Total	100%

Regional Patterns of Hiring Intentions

In assessing regional patterns of hiring intentions, it is important to take account of an important aspect of engineering and technology employment. A large share of this employment is in the consulting sector (approximately 27%). *A feature of the consulting industry is that the location of an assignment often differs from the permanent location of the job related to that work*. For example, consulting firms in eastern Canada may recruit staff in eastern Canada, but assign those staff to work on projects in western Canada. In light of labour market shortages in western Canada, this is probably quite common. Focus group discussions confirm that, for many engineering consultancies, work in western Canada occupies a significant share of their project portfolio, notwithstanding that the office and staff who work on these projects are located outside western Canada. It would be an error, therefore, to infer that the employment effects of the high levels of capital spending in western Canada are confined to western Canada. *On the contrary, in engineering and technology occupations, perhaps more than in other occupations, there is a significant spill-over of the employment effect into other regions.*

Figure No. 3-9 reports the regional share of intended hiring for all engineering and technology occupations and compares this to the share of engineering and technology employment. The survey data were re-weighted to be consistent with the 2001 Census distribution of engineering and technology employment.

Figure No. 3-9
Regional Share of Intended Hiring – All Engineering and Technology Occupations



As noted earlier, the survey may over-state hiring intentions in the manufacturing sector, owing to the downturn in that sector in the last quarter of 2007 which is partially, but not fully reflected in the survey results. This would over-state hiring intentions in Quebec and Ontario. As would be expected, the survey results show that Alberta and British Columbia's share of hiring intentions exceeds their share of total engineering and technology employment. Alberta and British Columbia account for 34% of hiring intentions in the survey, compared to 25% of overall engineering and technology employment. *The survey results are consistent with the view that spill-over employment effects from western Canada to central Canada have buoyed up engineering and technology hiring in central Canada, notwithstanding the downturn in manufacturing*. This is especially the case in the consulting sector which accounts for approximately 26% of engineering and technology employment.

Persons with Other Science-based Qualifications

Persons with other science-based qualifications do not figure prominently in hiring intentions of the employers who participated in the survey. Overall, only persons with other science-based qualifications account for only 6% of intended hires. These hires are chiefly in the computer systems and environmental field. *In the computer systems field, persons with other science-based qualifications account for 50% of intended hires. In the environmental field, persons with other science-based qualifications account for 26% of intended hires.*

4. Recruitment Difficulty and Recruitment Channels

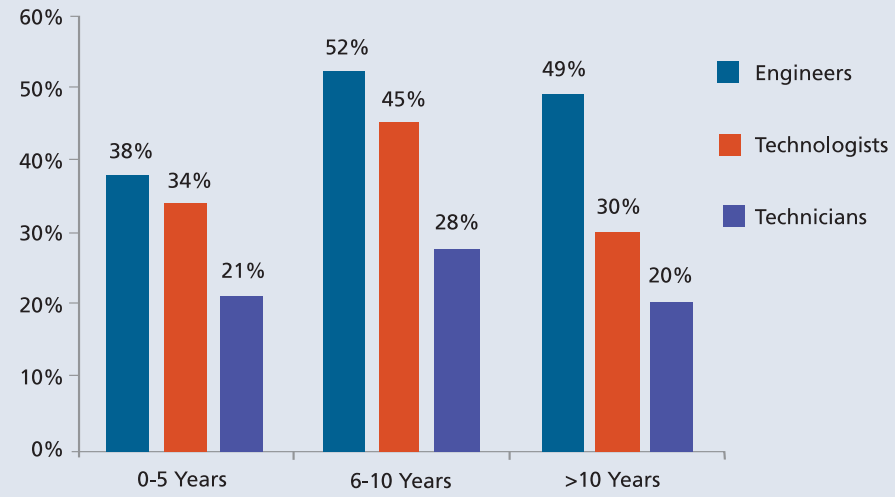
Response Rate

Sixty-two percent of respondents provided information as to whether they anticipated recruitment or retention difficulties. (It should be noted that while the question also addressed retention difficulties, respondents may have been more focused on recruitment challenges. It will be recalled from the previous chapter that 56% of respondents reported an intention to hire.) Two-thirds (65.6%) of all respondents provided information on recruitment channels.

Recruitment and Retention Difficulty

Figure No. 4-1 summarizes the proportion of survey respondents that intend to hire in the next 12 months *and* that anticipate recruitment or retention difficulties. The survey data are separated in terms of the years of employment experience of intended hires.

Figure No. 4-1
Percent of Survey Respondents that Intend to Hire in the Next 12 Months and Anticipate Difficulty in Recruiting or Retaining Engineers, Technologists and Technicians by Different Levels of Experience



As can be seen in Figure No. 4-1, *there is a consistent pattern across the three occupational categories: employers anticipate the greatest difficulty in recruiting or retaining engineers and less difficulty in recruiting or retaining technologists or technicians, but especially technicians*. The contrast is particularly evident in the over 10 years experience category.

It will be recalled from the previous chapter that the intended hiring rate for technologists and technicians is substantially higher than the intended hiring rate for engineers (engineers: 2.6%, technologists: 9.1%, and technicians: 8.7%). One might have anticipated that the more buoyant intended hiring rates for technologists and technicians would be accompanied by greater expected

difficulty, not less expected difficulty. *Immigration may explain why a buoyant intended hiring rate for technologists and technicians is not accompanied by commensurate expectations of difficulty in recruiting for these occupations.* Many persons who were qualified as engineers in their country of origin do not meet the requirements for licensure in Canada (or have chosen not to pursue licensure). As a result, many of these individuals seek employment as technologists or technicians. Immigration, therefore, may make the supply of technologists and technicians more elastic (*i.e.*, more responsive to demand), than the supply of engineers. As well, employers may be more willing to recruit immigrant professionals into technician and technologists occupations than into engineering occupations. It is also possible that the easier recruitment environment for technologists and technicians may encourage substitution away from engineers where this is feasible.

There are notable differences across regions in the proportion of employers that anticipate difficulty in recruiting and retraining engineering and technology staff. Figure No. 4-2 summarizes expected difficulty by region among those survey respondents that reported an intention to hire. In general, *employers in western Canada anticipate significantly greater challenges in recruitment and retention, especially for engineers*, than employers in other regions. However, there are notable divergences from this pattern. For example, in Atlantic Canada, employers anticipate difficulty in hiring engineers with more than 10 years of experience.

Figure No. 4-2
Percent of Survey Respondents that Intend to Hire in the Next 12 Months and Anticipate Difficulty in Recruiting or Retaining Engineers, Technologists and Technicians by Different Levels of Experience – by Region

Engineers			
	Years of Experience		
Region	0-5 Years	6-10 Years	>10 Years
Atlantic	30%	38%	51%
Quebec	25%	37%	34%
Ontario	35%	53%	49%
Manitoba-Saskatchewan	53%	56%	49%
Alberta	46%	63%	65%
British Columbia	44%	67%	50%

Technologists			
	Years of Experience		
Region	0-5 Years	6-10 Years	>10 Years
Atlantic	19%	41%	35%
Quebec	27%	37%	24%
Ontario	33%	42%	19%
Manitoba-Saskatchewan	40%	53%	47%
Alberta	43%	48%	35%
British Columbia	47%	56%	39%

Figure No. 4-2 continues on next page

Technicians			
	Years of Experience		
Region	0-5 Years	6-10 Years	>10 Years
Atlantic	19%	35%	27%
Quebec	20%	31%	24%
Ontario	20%	22%	13%
Manitoba-Saskatchewan	22%	27%	27%
Alberta	18%	25%	18%
British Columbia	31%	36%	22%

Survey respondents were markedly more likely to anticipate recruitment difficulty when asked about the technical field in which they would be recruiting. While approximately 40-50% of employers intending to hire engineers anticipate recruitment difficulty, this proportion increases significantly in the questions relating to technical field. Of those employers intending to hire in a particular technical field, more than three-quarters anticipate difficulty. For example, 128 respondents indicated that they intend to hire in the mechanical engineering field. Seventy-four percent of these respondents anticipate difficulty in recruitment. *This pattern in which the predominant majority of employers intending to hire in a field anticipate difficulty holds for all technical fields except for software, engineering science, computer systems, bio-systems, and forestry/wood engineering*. Anticipated difficulty in chemical, electrical and industrial/manufacturing engineering was somewhat lower but still in the area of two-thirds of those respondents who intend to hire in these fields.

Recruitment Methods and Channels

Figure No. 4-3 summarizes the proportion of respondents who report using various recruitment channels for hiring engineers and technologists/technicians. The data are segregated by three experience categories: 0-5 years, 6-10 years, and > 10 years.

In the 0-5 years of experience category, campus recruiting was used by approximately one-third of survey respondents.

Internet based recruiting – through company websites, professional or technical associations, or internet job boards – are used by approximately 30% of responding employers, with these channels being somewhat more important for recruiting employees in the 0-5 years and 6-10 years experience categories.

Professional search firms, as would be expected, are used more for recruiting employees with 10 or more years of experience. It is noteworthy, however, that 10-15% of responding employers also use search firms when recruiting more junior staff. This is consistent with survey results suggesting a moderate degree of difficulty in recruiting in some technical fields and in regions where demand is high.

Figure No. 4-3
Recruitment Channels by Years of Experience

	0-5 Years Experience	
	Engineers	Technologists & Technicians
Campus-based Recruitment	32%	25%
Informal Channels (e.g. Word of Mouth)	30%	26%
Company Website	29%	25%
References by Current Employees	25%	24%
Newspaper Ads	23%	24%
Internet Job Board	20%	18%
Unsolicited Applications	18%	16%
Professional Association Listings	15%	12%
Professional Search Firms	10%	8%
Canada Employment Centre Listing	8%	10%
Technical Association Listings	8%	10%
Other	4%	4%

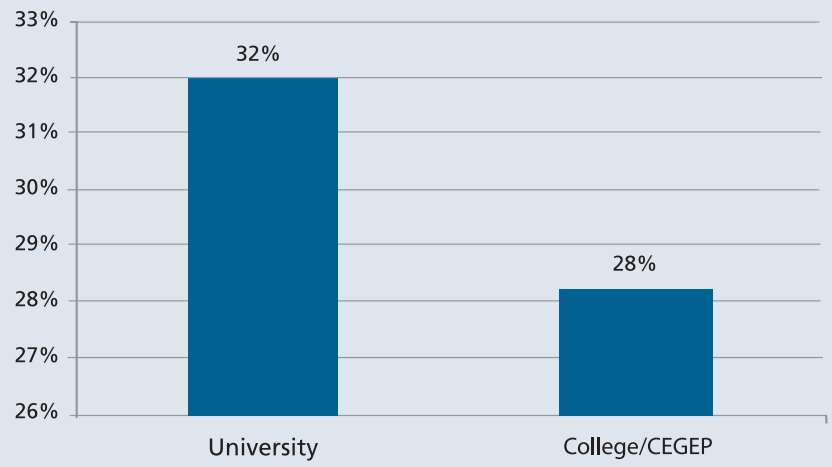
	6-10 Years Experience	
	Engineers	Technologists & Technicians
Informal Channels (e.g. Word of Mouth)	28%	24%
Company Website	27%	23%
References by Current Employees	23%	21%
Newspaper Ads	23%	22%
Internet Job Board	19%	16%
Professional Association Listings	17%	11%
Professional Search Firms	15%	9%
Unsolicited Applications	15%	13%
Technical Association Listings	8%	9%
Canada Employment Centre Listing	6%	6%
Other	3%	3%
Campus-based Recruitment	3%	2%

Figure No. 4-3 continues on next page

	>10 Years Experience	
	Engineers	Technologists & Technicians
Informal Channels (e.g. Word of Mouth)	25%	20%
Company Website	24%	20%
References by Current Employees	21%	18%
Newspaper Ads	19%	17%
Professional Search Firms	18%	11%
Internet Job Board	16%	13%
Professional Association Listings	13%	9%
Unsolicited Applications	12%	11%
Technical Association Listings	6%	7%
Canada Employment Centre Listing	4%	4%
Other	3%	3%
Campus-based Recruitment	2%	1%

Figure No. 4-4 shows that *just under one-third of survey respondents reported that they participate in both university and college/CEGEP co-op and internship programs.*

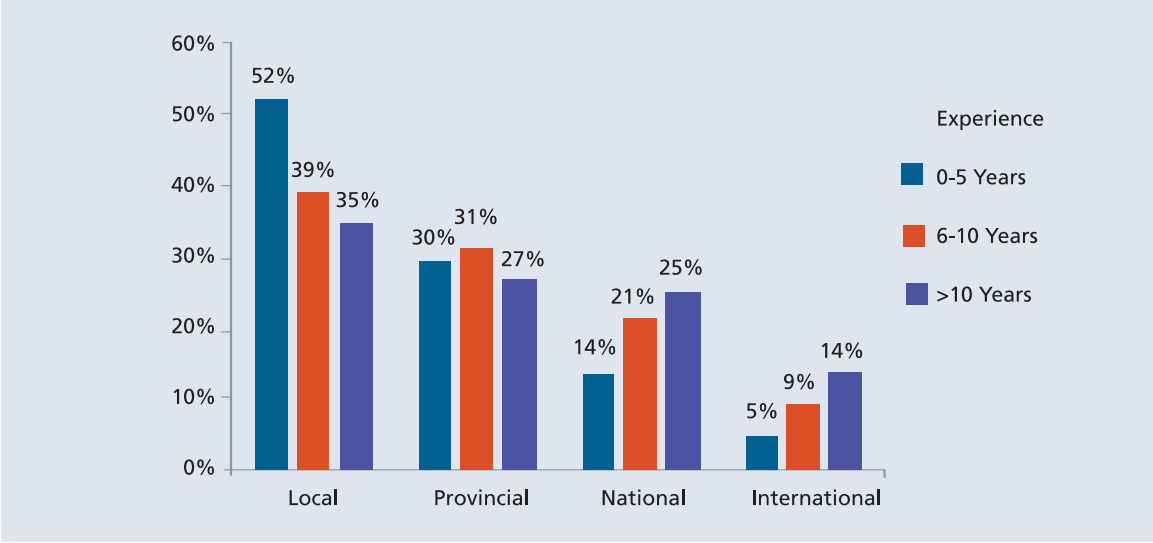
Figure No. 4-4
Percent of Employers Participating in Co-op and Internship Programmes



Employers that participated in co-op or internship programmes reported hiring 1,961 engineers on average per year and 1,012 technicians or technologists from these programs.

Figure No. 4-5 shows the spatial scope of recruitment for new engineering hires, based on experience requirements. As would be expected, as experience requirements increase, a greater proportion of employers turn to national and international sourcing channels.

Figure No. 4-5
Percent of Employers utilizing Local, Provincial, National or International Sourcing for New Engineering Hires, based on Experience Requirements



It is noteworthy that 25% of employers recruit nationally and 14% recruit internationally for engineers with more than 10 years experience. Even for engineers in the 6-10 years of experience category, the percentage of employers recruiting nationally or internationally is still significant – 21% nationally and 9% internationally. As would be expected, the propensity to recruit nationally or internationally is more evident in western Canada, owing to current economic conditions. The regional pattern of spatial recruitment channels is summarized in Figure No. 4-6.

Figure No. 4-6
Percent of Employers utilizing Local, Provincial, National or International Sourcing for New Engineering Hires with >10 Years Experience

	Local	Provincial	National	International	Total
Atlantic	34%	30%	26%	11%	100%
Quebec	42%	27%	18%	13%	100%
Ontario	42%	27%	21%	10%	100%
Manitoba-Saskatchewan	26%	29%	32%	13%	100%
Alberta	31%	25%	25%	20%	100%
British Columbia	26%	24%	33%	17%	100%

The role of national and international recruiting underscores the importance of portability mechanisms for professional licensure. Continued employer confidence in the system of professional licensure would be put at risk if this system were unresponsive to national and international recruiting patterns.

The prominence of national and international recruiting is also important in interpreting supply and demand projections. Regional shortages can be alleviated by recruiting through national or international channels.

Figure No. 4-7 summarizes the spatial pattern of recruitment channels for technologists and technicians.

Figure No. 4-7
Percent of Employers utilizing Local, Provincial, National or International Sourcing for New Technologist/Technician Hires, based on Experience Requirements

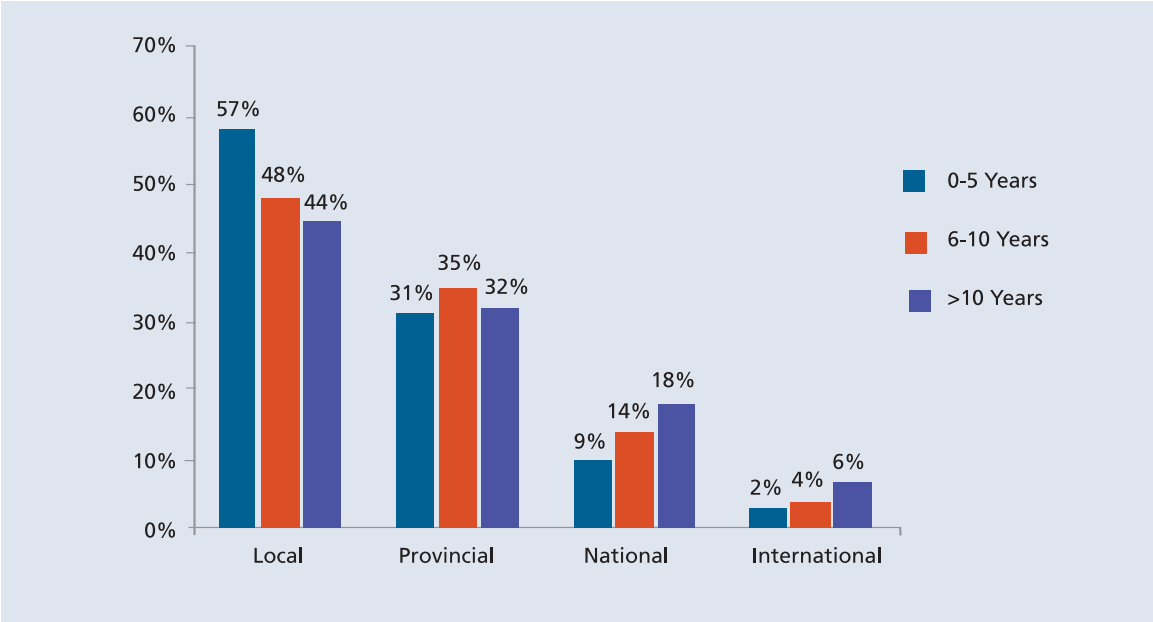


Figure No. 4-8 summarizes the regional pattern of spatial recruitment channels for technologists and technicians with more than 10 years of experience.

Figure No. 4-8
Percent of Employers utilizing Local, Provincial, National or International Sourcing for New Technologist/Technician Hires with >10 Years Experience

	Local	Provincial	National	International	Total
Atlantic	42%	33%	21%	5%	100%
Quebec	54%	31%	12%	3%	100%
Ontario	50%	31%	14%	5%	100%
Manitoba-Saskatchewan	35%	34%	23%	8%	100%
Alberta	39%	32%	19%	10%	100%
British Columbia	42%	33%	19%	6%	100%

In general, local and provincial labour markets play a more important role in the recruitment of technologists and technicians than the national and international labour market. However, the national and international labour market are still important considerations for some employers. This is evident in Figure No. 4-8 which shows that *in some regions, more than a quarter of recruitment for technologists or technicians with more than 10 years of experience relies on national or international channels. Again, this points to the importance of portability of professional certifications.*

Nevertheless, there are important differences in the spatial dimension of recruitment for engineers and for technologists/technicians. This is particularly evident for hires in the 6-10 years of experience category. *The survey suggests that for engineers with 6-10 years of experience, employers plan to recruit 39% locally, but for technologists and technicians with the same experience, employers expect to recruit 72% locally.* For technologists and technicians, this implies that to be hired, most must go where the jobs are, whereas for engineers, there is a greater likelihood of being recruited through a national posting.

5. Licensure and Certification: Employer Attitudes and Policies

Response Rate

The survey data on licensure and certification must be interpreted with caution. In this survey, only 55% of respondents provided information on their policies or attitudes toward licensure, while 62% declined to provide information on policies or attitudes towards certification. It is often a valid analytical procedure to omit non-respondents, provided that the non-response is not potentially indicative of a relevant attitude to the question under consideration. In the case of licensure and certification, a non-respondent may be electing not to reveal attitudes or policies which are believed to be contrary to the policies of the survey's sponsors. Employers that are either non-compliant with a regulatory requirement or non-supportive of licensure or certification may decline to answer survey questions dealing with these topics. This is especially likely in this survey which was sponsored by the national federations of the regulatory and certifying bodies and was supported financially by the federal government.

Reporting only the results of those that responded to the questions on licensure and certification risks misinterpreting the survey results. For this reason, the tables in this chapter also report the non-respondents.

It should also be noted that some employers were responding for more than one jurisdiction. The policies or attitudes they report may or may not be consistent with regulatory requirements in a particular jurisdiction. Further more, a respondent to the survey may or may not have been correctly informed as to either the regulatory requirements in a jurisdiction or the employer's policy in that particular jurisdiction. As well, some engineers or technicians/technologists may be working in areas which are not covered by regulatory requirements for licensure or association guidelines for certification.

On a regional basis, the highest employer non-response rate was in Quebec (66%). The lowest non-response rate was in New Brunswick (27%). On an industry basis, the highest non-response rate was in the telecoms sector (79%). Figure No. 5-1 shows the non-response rates by jurisdiction and by industry.

Figure No. 5-1
Non-Response Rates to Licensure Questions by Province or Territory and by Industry

	Percent of Employers Declining to Respond
Newfoundland	46%
Nova Scotia	45%
New Brunswick	27%
Prince Edward Island	38%
Quebec	66%
Ontario	33%
Manitoba	38%
Saskatchewan	50%
Alberta	42%
British Columbia	31%
Territories	57%
Total Sample	45%

	Percent of Employers Declining to Respond
Information and Culture (incl. Telecom)	79%
Construction	67%
All Other	57%
Resources (Oil & Gas, Mining, Pipeline)	47%
Manufacturing	44%
Government	40%
Waste Management & Remediation	40%
Professional and Scientific Services (Consulting)	37%
Utilities (excl. Telecom)	30%
Wholesale & Retail Trade	29%
Total Sample	45%

Engineers

Figure No. 5-2 summarizes respondents' policies with respect to professional licensure/registration of engineers in their employ.

Figure No. 5-2
Employer Policy respecting Licensure/Registration of Engineers

	Frequency	Percent
Require licensure	121	17%
Prefer licensure	137	20%
No policy or preference concerning licensure	45	6%
Require licensure for some, prefer licensure for others	46	7%
Require licensure for some, no policy/preference for others	31	4%
Other	7	1%
No Response	314	45%
Total	701	100%

Figure No. 5-3 provides the same data at the provincial and territorial level. In several instances, the number of respondents at the provincial level is insufficient to support any conclusions.

Figure No. 5-3
Employer Policy respecting Licensure/Registration of Engineers – Provincial Data

	Require Licensure	Prefer Licensure	No policy or preference	Require licensure for some, prefer licensure for others	Require licensure for some, no policy/ preference for others	Other	No Response	Total
Newfoundland	5	5	1	2	0	1	12	26
Nova Scotia	2	2	1	1	0	0	5	11
New Brunswick	8	3	0	0	0	0	4	15
Prince Edward Island	1	1	1	1	1	0	3	8
Quebec	15	17	10	6	5	1	107	161
Ontario	36	47	20	17	16	3	70	209
Manitoba	8	9	3	2	3	0	15	40
Saskatchewan	11	11	3	3	1	1	30	60
Alberta	21	23	5	10	1	0	44	104
British Columbia	12	17	0	3	3	0	16	51
Territories	1	1	1	0	0	0	4	7
Not Identified								9
Total								701

Of the employers that responded to questions about licensure, 90% indicated that they have not changed their policy in the past five years. Of those that have changed their policy (5.5% of the total sample, 10% of respondents to the question), three-quarters adopted a stronger policy, e.g., a movement from 'no policy' to a preference or requirement for licensure/registration or a movement from a preference to a requirement. There was no geographic pattern evident among the respondents that reported a change in policy.

Half of survey respondents (382) provided reasons for having policies that require or encourage licensure/registration of engineers. Respondents could provide more than one reason. Figure

No. 5-4 summarizes the reasons given. As can be seen, "*encourages sound professional attitudes and conduct" ranked above all other reasons for having a policy that requires or encourages licensure/registration.*

Of those respondents citing legal obligations (188), 30% gave this as the only reason for requiring or encouraging licensure/registration. *This suggests that around 15% of employers that currently require or encourage licensure/registration do so only for compliance reasons and might abandon or weaken their policy if regulatory requirements were to be diminished.*

Figure No. 5-4
Reasons for Requiring or Preferring Licensure/Registration among Employers with Policies Requiring or Preferring Licensure/Registration

	Frequency*	Percent of Respondents to Question*
Encourages professionalism	211	61%
Meet legal obligations	188	55%
Licensure is a competitive advantage	150	44%
Other reasons	34	10%

*Multiple answers permitted

Ninety-one survey respondents that do not require or prefer licensure/registration provided reasons for their policy. Concerns about restricting the ability to recruit non-licensed engineers ranked highest.

Figure No. 5-5
Reasons for Not Requiring or Preferring Licensure/Registration among Employers with Policies of Not Requiring or Preferring Licensure/Registration

	Frequency*	Percent of Respondents to Question*
Licensure would restrict ability to hire Canadian engineering graduates who elect not to be licensed	47	52%
Licensure would restrict ability to hire internationally educated engineering graduates who do not qualify for a Canadian license	24	26%
Wish to avoid legal liabilities associated with licensure	5	5%
Philosophically opposed to licensure	1	1%
See no discernible advantage to professional licensure	20	22%
Other reasons	20	22%

*Multiple answers permitted

The survey also asked about various types of employer support for licensure/registration. Overall 321 survey respondents (46%) indicated that they provided some form of support; 56 respondents indicated that they provided no formal support; and 377 survey respondents did not answer this question. Figure No. 5-6 summarizes the types of support provided by those that provide formal support. Multiple answers were permitted. Support for licensure application fees and annual dues predominate. It is also noteworthy that half of the employers that provide formal support designate a mentor or advisor to assist a recent graduate on the path to licensure/registration.

Figure No. 5-6
Types of Formal Support Provided for Licensure/Registration

	Frequency*	Percent of Respondents to Question*
Subsidize annual association dues	263	82%
Subsidize licence application fees	201	63%
Provide time off to prepare for examinations	144	45%
Assign a mentor or advisor who is already licensed	168	52%

*Multiple answers permitted

Technologists and Technicians

Figure No. 5-7 summarizes respondents policies with respect to professional licensure/registration of technologists and technicians in their employ.

Figure No. 5-7
Employer Policy respecting Certification of Technologists and Technicians

	Technologists		Technicians	
	Frequency	Percent	Frequency	Percent
Require certification	59	8%	42	6%
Prefer certification	135	19%	90	13%
No policy or preference concerning certification	112	16%	116	17%
Require certification for some, prefer certification for others	17	2%	9	1%
Require certification for some, no policy/preference for others	9	1%	9	1%
No Response	369	53%	435	62%
Total	701	100%	701	100%

Figure No. 5-8 provides the same data at the provincial and territorial level. In most instances, the number of respondents at the provincial level is insufficient to support any conclusions.

Figure No. 5-8
Employer Policy respecting Certification of Technologists and Technicians - Provincial Data

Technologists

	Require Certification	Prefer Certification	No policy or preference	Require certification for some, prefer certification for others	Require certification for some, no policy/ preference for others	No Response	Total
Newfoundland	3	7	1			15	26
Nova Scotia	1	5	1			4	11
New Bruswick	3	4	2			6	15
Prince Edward Island	0	1	2			5	8
Quebec	9	12	29	4	1	106	161
Ontario	17	34	43	6	2	107	209
Manitoba	3	7	9	1	2	18	40
Saskatchewan	8	15	8	1	2	26	60
Alberta	11	27	8	4	1	53	104
British Columbia	4	19	6	1		21	51
Territories		3				4	7
Not identified							9
Total							701

Technicians

	Require Certification	Prefer Certification	No policy or preference	Require certification for some, prefer certification for others	Require certification for some, no policy/ preference for others	No Response	Total
Newfoundland	3	6	1			16	26
Nova Scotia	1	2	1			7	11
New Brunswick	2	5	2			6	15
Prince Edward Island	1	2	2			3	8
Quebec	5	12	28		1	115	161
Ontario	15	24	45	3	2	120	209
Manitoba	4	4	7	1	2	22	40
Saskatchewan	3	7	5	1	2	42	60
Alberta	5	14	12	2	1	70	104
British Columbia	3	13	10	2		23	51
Territories		1				6	7
Not identified							9
Total							701

Of the employers that responded to questions about licensure, 90% indicated that they have not changed their policy in the past five years. Of those that have changed their policy (5.2% of the total sample, 10% of respondents to the question), four-fifths adopted a stronger policy, e.g., a movement from 'no policy' to a preference or requirement for certification or a movement from a

preference to a requirement. There was no geographic pattern evident among the respondents that reported a change in policy.

Approximately 38% of survey respondents (269) provided reasons for having policies that require or encourage certification of technologists or technicians. Respondents could provide more than one reason. Figure No. 5-9 summarizes the reasons given. As can be seen, "*encourages sound professional attitudes and conduct" ranked above all other reasons for requiring or encouraging certification.* This is similar to the finding for engineers.

Figure No. 5-9
Reasons for Requiring or Preferring Certification among Employers with Policies Requiring or Preferring Certification of Technologists or Technicians

	Frequency*	Percent of Respondents to Question*
Encourages professionalism	192	71%
Certification is a competitive advantage	127	47%
Other reasons	45	17%

*Multiple answers permitted

168 survey respondents that do not require or prefer certification provided reasons for their policy. This was a notably higher proportion of respondents than who answered the comparable question regarding licensure/registration. *Concerns about restricting the ability to recruit non-certified technicians and technologists ranked highest, followed by the perception of no discernible advantage.*

Figure No. 5-10
Reasons for Not Requiring or Preferring Certification among Employers with Policies of Not Requiring or Preferring Licensure/Registration

	Frequency*	Percent of Respondents to Question*
Certification would restrict ability to hire Canadian engineering graduates who elect not to be certified.	96	57%
Certification would restrict ability to hire internationally educated engineering graduates who do not qualify for a Canadian certification	37	22%
Philosophically opposed to certification	3	2%
See no discernible advantage to professional certification	62	37%
Other reasons	21	13%

*Multiple answers permitted

The survey asked about various types of employer support for certification. Overall, 37% of survey respondents indicated that they provided some form of support; 14% reported that they provided no formal support; and 49% did not answer this question. Figure No. 5-11 summarizes the types of support made available by those that provide formal support. Multiple answers were permitted. Support for licensure application fees and annual dues predominate. It is also noteworthy that around one-third of the employers that provide formal support designate a mentor or advisor to assist a recent graduate on the path to licensure/registration.

Figure No. 5-11
Types of Formal Support Provided for Licensure/Registration

	Frequency*	Percent of Respondents to Question*
Subsidize annual association dues	225	87%
Subsidize licence application fees	166	64%
Provide time off to prepare for examinations	101	39%
Assign a mentor or advisor who is already licensed	89	34%

*Multiple answers permitted

6. Continuing Professional Development

Response Rate

Of the 701 respondents to the survey, 237 (34%) elected not to answer questions on continuing professional development (CPD). It is possible that some employers may have regarded questions on continuing professional development as unduly intrusive. There was no strong correlation between employer size and propensity to answer questions on continuing professional development.

Omitting these non-responses potentially over-estimates employer participation in continuing professional development. On the other hand treating all of the non-responses as equivalent to having no continuing professional development may under-estimate actual involvement.

Figure No. 6-1 summarizes employer support for various types continuing professional development.

Figure No. 6-1
Types of Continuing Professional Development

	Frequency*	Percent of All Responses	Percent of Respondents to this Question*
We have no formal professional development training or policies. We rely entirely, or almost entirely, on informal training.	177	25%	38%
Every member of our engineering staff has a training program.	70	10%	15%
We maintain record of our engineering staff's participation in professional development training.	205	29%	44%
Our engineering staff have an allocated number of days each year which they may use for approved professional development.	50	7%	11%
We provide in-house, structured training to all or most members of our engineering staff.	137	20%	30%
We reimburse our engineering staff for the cost of approved professional development training.	336	48%	72%
We encourage and support members of our engineering staff to belong to technical associations and to attend professional development training offered by those associations.	276	39%	59%
We support members of our engineering staff who wish to take off-site professional development training.	289	41%	62%
We support members of our engineering staff who wish to take additional college or university training.	247	35%	53%
Other	18	3%	4%
Did not respond to question	237	34%	omitted

*Multiple answers permitted

The survey results suggest that there are three clusters of respondents. The first cluster comprises employers that provide no formal support for continuing professional development. This cluster represents up to 38% of survey respondents (See Figure 6-1). The second cluster comprises employers that support training, but generally leave this training to employee initiative. This cluster comprises approximately 30% of employers. The third cluster comprises employers that actively encourage training through training plans or allocated training days. This cluster represents around 32% of employers.

Employer size correlated strongly with some answers on continuing professional development, but not with others:

- the absence of any formal continuing professional development policy was reported by 38% of employers with fewer than 50 employees, but only 14% of employers with more than 500 employees. Approximately 22-23% of employers between these two size categories reported having no formal continuing professional development policy.
- Employers with more than 500 employees were less likely (34%) to encourage their engineering and technology staff to belong to technical associations and attend continuing professional development training offered by those associations than other employers (46%).
- There was no significant correlation to employer size among employers that provide a specified number of training days per year.

Of the 287 respondents that reported support for continuing professional development, 245 provided usable answers on average expenditure per engineering employee. These data are summarized in Figure No. 6-2.

Figure No. 6-2
Average Expenditure per Employee on Continuing Professional Development (based on Respondents only)

Average Expenditure per Engineering Employee	Frequency	Percent
<$1,000	49	20%
$1,000 to $2,500	143	58%
$2,501 to $5,000	41	17%
>$5,000	12	5%
Total	245	100%
Mean Average	$2,217	
Median	$1,500	

There is a significant correlation between employer support for Continuing Professional Development and employer support for licensure or certification. Figure No. 6-3 shows the differences between those employers that require or prefer licensure and those employers that have no policy on licensure.

Figure No. 6-3
Continuing Professional Development Polices: Comparison of Employers that Require or Prefer Licensure with Employers that have No Policy on Licensure (based on Respondents only)

	Require or Prefer Licensure	No Policy on Licensure
We have no formal professional development training or policies. We rely entirely, or almost entirely, on informal training.	31%	53%
Every member of our engineering staff has a training program.	16%	9%
We maintain record of our engineering staff's participation in professional development training.	50%	20%
Our engineering staff have an allocated number of days each year which they may use for approved professional development.	12%	4%
We provide in-house, structured training to all or most members of our engineering staff.	32%	9%
We reimburse our engineering staff for the cost of approved professional development training.	80%	36%
We encourage and support members of our engineering staff to belong to technical associations and to attend professional development training offered by those associations.	64%	20%
We support members of our engineering staff who wish to take off-site professional development training.	69%	31%
We support members of our engineering staff who wish to take additional college or university training.	60%	33%

It is particularly notable that somewhat more than half of the employers that have no policy on licensure are also likely to have no formal policies on Continuing Professional Development. Similarly, 64% of employers that require or prefer licensure also encourage their engineering staff to belong to technical associations and to attend professional development training offered by those associations. Among employers that have no policy on licensure, support for participation in technical associations is only 20%.

Overall the survey findings suggest important complexities around the introduction or administration of continuing professional development policies by licensing and certifying bodies. A significant proportion of engineers, technologists and technicians work for employers that do not have formal policies to support continuing professional development. Mandated continuing professional development might lead some of these employers to adopt supportive policies. However, for a significant number of engineers, technologists and technicians compliance with continuing professional development requirements would likely entail personal costs and possibly some difficulty in actually attending courses or seminars. At the other end of the spectrum are engineers, technologists and technicians who work for employers that have active staff training and development policies. These employers allocate training days, have training budgets, maintain records on completed training, and often provide in-house structured training. Association policies would need to take account of these policies so as to be congruent with these policies. This may have implications for subject matter focus as well as channels of delivery and training duration.

7. Employers' Perceptions of Skill Requirements

Satisfaction with Skills of New Hires

Employers' expressed a high level of satisfaction with the science-based skills of new hires, but a lower level of satisfaction with non-technical skills. Figure No. 7-1 summarizes these data.

Figure No. 7-1
Employers' Reported Satisfaction with Science-Based and Non-Technical Skills of New Hires

0-5 Years Experience		
	Satisfied?	
Science-based Skills	Yes	No
Engineers	87%	13%
Technologists	89%	11%
Technicians	84%	16%
Non-Technical Skills		
Engineers	64%	36%
Technologists	70%	30%
Technicians	69%	31%

>5 Years Experience		
	Satisfied?	
Science-based Skills	Yes	No
Engineers	95%	5%
Technologists	96%	4%
Technicians	95%	5%
Non-Technical Skills		
Engineers	78%	22%
Technologists	82%	18%
Technicians	79%	21%

For recent engineering school graduates with less than five years of experience, the satisfaction level was 87%. For recent technologist and technician graduates, the satisfaction levels were 89% and 84% respectively. Dissatisfaction with the science-based skills of new hires falls to 5% or less for recruits with more than five years of experience. (As noted earlier, employers do not consistently use the terms 'technologist' and 'technician' in the same manner as the certifying bodies, nor in the same manner as the post-secondary system.)

For non-technical skills, dissatisfaction levels are consistently higher. Roughly one-third of employers in the survey sample are not satisfied with the non-technical skills of recent graduates. This dissatisfaction was reported by 30% of employers for technologists, 31% for technicians and 36%

for engineers. These dissatisfaction levels decline by about one-third for recruits with more than 5 years of experience, but still remain notably high.

Non-Technical Skills - Engineers

Figure No. 7-2 shows how employers ranked the relative importance of various non-technical skills on a four-category ranking where '1 = essential' and '4 = unimportant'. Separate tables show employers' rankings for recent graduates (i.e., engineers with five or fewer years of experience) and more experienced engineers (i.e., engineers with more than five years of experience).

Figure No. 7-2
Employers' Average Ranking of the Importance of Various Non-Technical Skills for Engineers

1 = Essential
2 = Very Important, But Not Essential
3 = Moderately Important
4 = Unimportant

	0-5 Years
General Communication Skills	1.49
Inter-Personal Skills	1.53
Team Working Skills	1.57
Working with Non-Technical Staff	1.80
Report Writing Skills	1.93
Ability to deal with Cultural and Gender Diversity	2.13
Project Management	2.20
Knowledge of Statutes, Regulations and Codes	2.21
Change Management	2.30
Professional Presentation Skills	2.33
Leadership Skills	2.36
Knowledge of Quality Assurance Systems	2.40
Risk Management	2.54
Contract Administration	2.55
Personnel Management	2.66
Asset Management	2.71
Developing a Business Case	2.73
Financial Analysis Skills	2.79
Average:	2.23

Figure No. 7-2 continues on next page

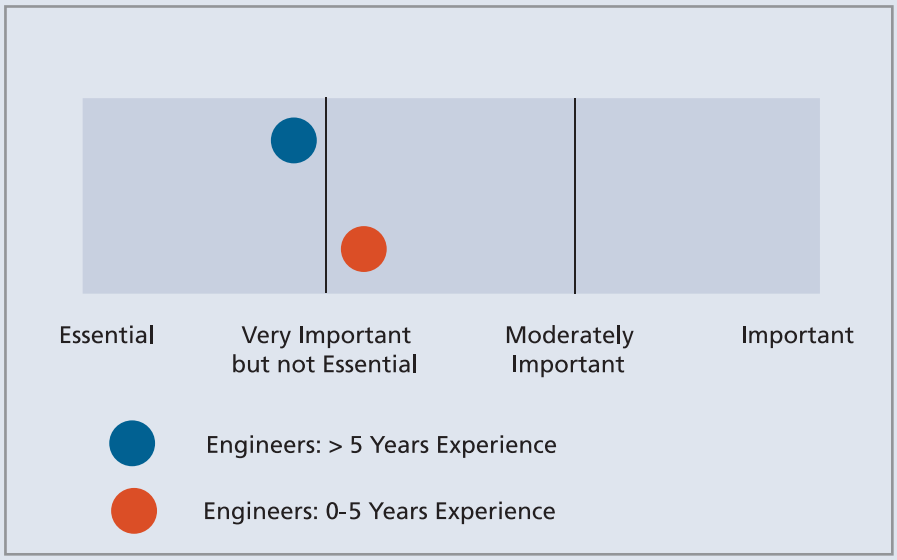
	>5 Years
General Communications Skills	1.26
Inter-Personal Skills	1.34
Team Working Skills	1.36
Report Writing Skills	1.49
Project Management	1.51
Working with Non-Technical Staff	1.55
Leadership Skills	1.58
Knowledge of Statutes, Regulations and Codes	1.65
Professional Presentation Skills	1.77
Change Management	1.87
Ability to deal with Cultural and Gender Diversity	1.89
Risk Management	1.89
Personnel Management	1.92
Contract Administration	1.93
Knowledge of Quality Assurance Systems	1.97
Developing a Business Case	2.05
Financial Analysis Skills	2.15
Asset Management	2.29
Average:	1.75

The first observation of note is the importance that employers assign to non-technical skills:

- *For recent engineering graduates, 'general communication skills', 'inter-personal skills', and 'team-working skills' are viewed as 'essential' by more than half of all employers in the survey sample.*
- *For intermediate and senior engineers, 'general communication skills', 'inter-personal skills', and 'team-working skills' are viewed as 'essential' by approximately three-quarters of employers in the survey sample. As well, more than half of employers identified 'project management', 'report writing', 'knowledge of statutes, regulations and codes', and 'leadership skills' as essential.*

The second observation of note is that as an engineer progresses in his or her career, the importance of non-technical skills increases. In the survey, using a four-point scale, the average ranking of non-technical skills for junior engineers was somewhat less than "very important, but not essential" (2.23 on the 4-point scale). For engineers with more than five years experience, the average importance ranking was intermediate between "essential" and "very important, but not essential" (1.75 on the 4-point scale). This change in the relative importance of non-technical skills over the course of an engineering career is illustrated in Figure No. 7-3

Figure No. 7-3
Employers' Average Ranking of the Importance of All Non-Technical Skills for Engineers of 0-5 Years Experience and >5 Years Experience



Non-Technical Skills – Technologists and Technicians

Figure No. 7-4 shows how employers ranked the relative importance of various non-technical skills on a four-category ranking where '1 = essential' and '4 = unimportant' for technologists and technicians. Separate tables show employers' rankings for technologists and technicians with five or fewer years of experience versus more than five years of experience.

Figure No. 7-4
Employers' Average Ranking of the Importance of Various Non-Technical Skills for Technologists and Technicians

1 = Essential
2 = Very Important, But Not Essential
3 = Moderately Important
4 = Unimportant

	0-5 Years
Inter-Personal Skills	1.60
Team Working Skills	1.62
General Communications Skills	1.68
Working with Non-Technical Staff	1.86
Ability to deal with Cultural and Gender Diversity	2.16
Report Writing Skills	2.30
Knowledge of Statutes, Regulations and Codes	2.39
Knowledge of Quality Assurance Systems	2.49
Project Management	2.54
Change Management	2.55
Leadership Skills	2.57
Professional Presentation Skills	2.69
Contract Administration	2.78
Personnel Management	2.84
Risk Management	2.85
Asset management	2.93
Developing a Business Case	3.07
Financial Analysis Skills	3.13
Average:	2.45

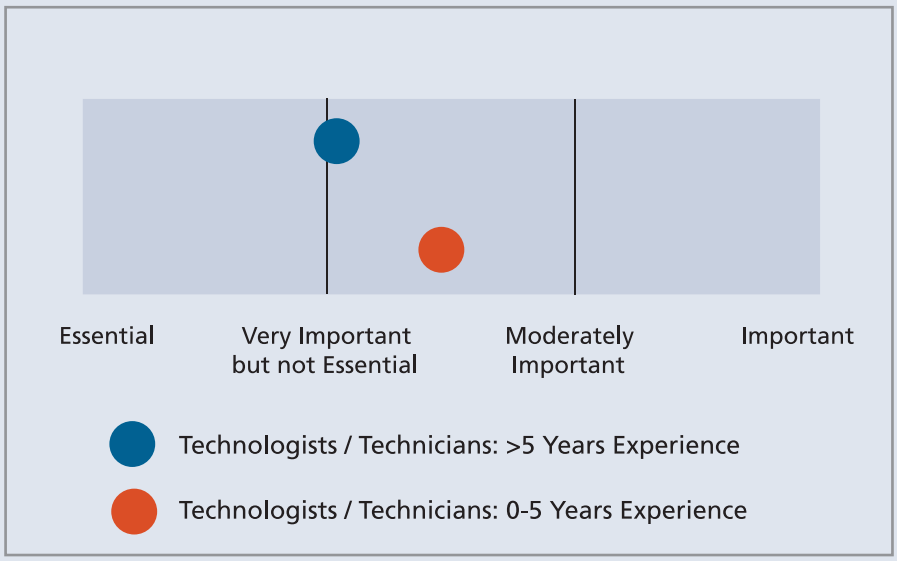
	>5 Years
Inter-Personal Skills	1.38
General Communications Skills	1.41
Team Working Skills	1.42
Working with Non-Technical Staff	1.61
Knowledge of Statutes, Regulations and Codes	1.85
Report Writing Skills	1.87
Leadership Skills	1.88
Project Management	1.89
Ability to deal with Cultural and Gender Diversity	1.92
Knowledge of Quality Assurance Systems	2.00
Professional Presentation Skills	2.12
Change Management	2.15
Personnel Management	2.23
Contract Administration	2.24
Risk Management	2.30
Asset management	2.52
Financial Analysis Skills	2.59
Developing a Business Case	2.60
Average:	2.00

A similar pattern is evident for technologists and technicians in the importance assigned by employers to non-technical skills. However, in general, it should be noted, *employers assign somewhat less importance to non-technical skills for technologists and technicians than they do for engineers.* This may reflect an expectation that a greater proportion of engineers will move into managerial roles, while a greater proportion of technologists and technicians may be expected to continue in technical roles.

- For recent technology/technician graduates, 'general communication skills', 'interpersonal skills', and 'team-working skills' are viewed as 'essential' by half of all employers in the survey sample. These are the same skills prioritized by employer for recent engineering graduates.
- For intermediate and senior engineers, 'general communication skills', 'inter-personal skills', and 'team-working skills' are *viewed as 'essential' by approximately two-thirds of employers in the survey sample.* As well, "working with non-technical" staff was ranked as essential by more than half of employers.
- There were certain skills which a majority of surveyed employers identified as essential for engineers with more than five years of experience but, significantly fewer employers identified as essential for technologists and technicians with more than five years of experience. These skills were: 'project management', 'report writing', 'knowledge of statutes, regulations and codes', and 'leadership skills'. The lower proportion of employers identifying 'leadership skills' as essential (34%) is consistent with the view that many employers expect technologists and technicians to continue in essentially technical roles.
- *Approximately one-third of employers in the survey evidenced the same ranking pattern for technologists and technicians as for engineers. This suggests that a significant bloc of employers envision similar career paths for many technologists as for engineers.*

As was the case with engineers, as a technologist/technician progresses in his or her career, the importance of non-technical skills increases. In the survey, using a four-point scale, the average ranking of non-technical skills for junior technologists and technicians was intermediate between "very important, but not essential" and "moderately important" (2.45 on the 4-point scale). For technologists and technicians with more than five years experience, the average importance ranking was "very important, but not essential" (2.00 on the 4-point scale). This change in the relative importance of non-technical skills over the course of an engineering career is illustrated in Figure No. 7-5.

Figure No. 7-5
Employers' Average Ranking of the Importance of All Non-Technical Skills for Technologists / Technicians of 0-5 Years Experience and >5 Years Experience



The general importance of these survey findings is that:

- a small, but nevertheless significant, minority of employers (around 16%) are not satisfied with the technical skills of recently graduated technicians with less than five years of experience. The proportion for engineers and technologists is 10% and 11% respectively.

- dissatisfaction with non-technical skills of recent graduates is much more marked and is reported by approximately a third of survey respondents. The concern is greater for recent engineering graduates than for recent technologist or technician graduates, but this difference should not obscure the fact that the concern is broadly common across all three occupations.

- the range of non-technical skills expected of a recent engineering graduate and a recent technologist/technician graduate are similar.

- among more experienced engineers, the breadth of expected non-technical skills is greater than for technologists/technicians. This may reflect different career path expectations.

8. Diversity Policies and Recruitment of Internationally Educated Professionals

Diversity Policies and Goals

Approximately 60% of survey participants responded to questions on diversity policy. Response rates were generally invariant to size except for employers with more than 500 employees. The response rate of these large employers was 47%. The response rate of all other employers was 68%.

Owing to uncertainty about how to interpret non-responses, relative frequencies are reported both including and excluding non-responses. Figure No. 8-1 summarizes the percentage of survey respondents reporting that they have 'formal policies or goals' addressing various diversity issues. *As can be seen, by far the preponderance of employers do not have any formal policies or goals.* Governments and utilities reported the highest incidence of formal policies or goals. It should be noted, however, that federal legislation mandates employment equity goals for federally regulated industries. Manufacturing and construction reported the lowest incidence of formal policies or goals.

Figure No. 8-1
Incidence of Formal Policies or Goals to Address Diversity Issues

	Yes	No	No Response	Total
('No Responses' included in Total)				
Organization has formal policies or goals				
• to increase diversity within engineering staff	14%	45%	41%	100%
• to hire more women into engineering staff	8%	49%	43%	100%
• to hire more aboriginal Canadians into engineering staff	8%	49%	43%	100%
• to hire more persons with disabilities into engineering staff	7%	50%	43%	100%
• to hire more persons from visible minorities into engineering staff	8%	49%	43%	100%
('No Responses' omitted from Total)				
Organization has formal policies or goals				
• to increase diversity within engineering staff	23%	77%	omitted	100%
• to hire more women into engineering staff	15%	85%	omitted	100%
• to hire more aboriginal Canadians into engineering staff	14%	86%	omitted	100%
• to hire more persons with disabilities into engineering staff	12%	88%	omitted	100%
• to hire more persons from visible minorities into engineering staff	14%	86%	omitted	100%

Internationally Educated Professionals

Figure No. 8-2 shows that *approximately half of the employers who participated in the survey report difficulty in evaluating the education, professional qualifications, or experience of internationally educated engineers, technologists and technicians*. This proportion is somewhat lower for governments, utilities and the manufacturing sector, but significant in the resource industries and in telecoms. Figure No. 8-2 also shows that while the challenge of evaluating non-Canadian education, etc. is somewhat lower for technologists and technicians, it is still sufficiently high to constitute a barrier to integration into the Canadian engineering and technology labour market.

Figure No. 8-2
Percentage of Survey Respondents Reporting Difficulty Evaluating Education, Qualifications and Experience of Internationally Educated Professionals

	Engineers	Technologists	Technicians
Difficulty Evaluating non-Canadian:			
• educational qualifications	50%	46%	44%
• professional licence or certification	48%	43%	41%
• employment experience	50%	42%	40%

Employers were asked to rank on a four-point scale the importance of various skill weaknesses as impediments to hiring internationally educated engineering and technology graduates. Figure No. 8-3 shows that there are three clusters of skill weaknesses. The first cluster comprises those skills which half or more of the survey respondents identified as either a 'most serious' or 'very serious' impediment to being hired. The second cluster comprises skill weaknesses which a third to a half of employers identified as either a 'most serious' or 'very serious' impediment. The third cluster are those skill weaknesses which do not appear to be important impediments.

It is noteworthy that there is no appreciable difference in the clusters between engineering graduates and technology graduates.

As would be expected, *language and communication skills rank as the most important impediments, along with report writing skills.*

There are also concerns about 'knowledge of statutes, regulations and codes' and also 'technical skills'. *For both engineers and technologists/technicians, half or more of employers cited lack of knowledge of statutes, regulations and codes as an important impediment to being hired. In the case of 'technical knowledge', 41% of employers cited skill weaknesses as important impediments to being hired as an engineer. Virtually the same proportion (42%) cited 'technical knowledge' as a weakness in being hired as a technologist or technician.*

Figure No. 8-3
Skill Weaknesses as Impediments to Hiring International Engineering Graduates

First Cluster

More than 50% of Employers View these Skill Weakness as a "most serious" or "very serious" impediment

- General Communications Skills
- English or French Language
- Report Writing Skills
- Knowledge of Statutes, Regulations and Codes
- Inter-Personal Skills
- Knowledge of Canadian Business Practices
- Professional Presentation Skills

Second Cluster

One Third to One-Half of Employers View these Skill Weaknesses as a "most serious" or "very serious" impediment

- Technical Knowledge
- Team Working Skills
- Ability to deal with Cultural and Gender Diversity
- Working with Non-Technical Staff
- Leadership Skills

Third Cluster

Skill Weakness not Regarded as a Significant Impediment

- Personnel Management
- Knowledge of Quality Assurance Systems
- Contract Administration
- Project Management
- Developing a Business Case
- Risk Management
- Change Management
- Financial Analysis Skills
- Asset management

These survey findings are consistent with focus group reports that point to unevenness in the technical skills (including knowledge of codes, etc) of internationally educated engineering and technology professionals.

In some accounts, the difficulties of integration are identified entirely (or almost entirely) in terms of communication skills and familiarity with cultural norms. These survey results suggest that integration is more complex and that weaknesses in the technical area (which can be addressed by specialized courses) are also pertinent. For licensing bodies, this implies the need for continued attention to competency standards and to ensuring accessibility to the training necessary to address the most common technical deficiencies.

Appendix A

2007 Engineering and Technology
Employer Survey

A Joint Undertaking of
Engineers Canada
and
Canadian Council of Technicians and Technologists

With financial support from
Human Resources and Skills Development Canada

Your contribution to this survey is appreciated. The survey takes approximately 20 minutes to complete. The survey results will provide important information on how to strengthen engineering professions in Canada.

The results of this survey will also directly benefit companies and organizations that employ engineers and engineering technicians and technologists. Participants in the survey will receive an up-to-date and detailed report on:

- hiring trends,
- changing skill requirements,
- supply and demand conditions in different regions,
- skill shortages, and
- trends in workforce diversity.

You can receive your copy of the survey results by providing your name and email address in the survey questionnaire or by contacting us directly when the survey is completed in the fall of 2007. Should you provide your email address, please be assured that under no circumstances will it be used for any commercial purpose.

At various points in the survey, should you wish, you can save your answers and return to complete the survey at a later time. To use the "Save and Resume" option, enter a user name of your choice here (you may use any characters) _____, and a password of your choice here (you may use any characters) _____. If you wish to use the "Save and Resume" option, simply click the "Save & Quit" button at the bottom of the survey page. When you return, enter your name and password here at the start page. You will automatically be taken to where you left off.

Additional information on Engineers Canada is available at: www.engineerscanada.ca. Engineers Canada is the business name of the Canadian Council of Professional Engineers.

Additional information on the Canadian Council of Technicians and Technologists is available at: www.cctt.ca

Proceed to Survey

Part One: Employer Information

1. Name of Company or Organization

2. Contact information for person completing this survey (optional).

Name
Email

3. Location of Canadian Head Office (select one only):

- Not Applicable
- Newfoundland & Labrador
- Nova Scotia
- New Brunswick
- Prince Edward Island
- Quebec
- Ontario
- Manitoba
- Saskatchewan
- Alberta
- British Columbia
- Northwest Territories/Yukon Territory/Nunavut

4. Locations of Other Operations (select all that apply):

- Not Applicable
- Newfoundland & Labrador
- Nova Scotia
- New Brunswick
- Prince Edward Island
- Quebec
- Ontario
- Manitoba
- Saskatchewan
- Alberta
- British Columbia
- Northwest Territories/Yukon Territory/Nunavut

5. Location of Operation(s) covered by response to survey:

All Locations	◯
Head Office Only	◯
Specific Location (City)	_____

6. What is the approximate population in the location(s) covered by your response to this survey?

Under 100,000	◯
Over 100,000	◯
Locations in both <100,000 and >100,000	◯

7. Total estimated employment in Canada (all occupations):

8. Primary Industry (select one only):

◯	Accommodation and food services
◯	Administrative and support services
◯	Agriculture, forestry, and fishing
◯	Arts, entertainment, and recreation
◯	Construction (excl. consulting services)
◯	Education
◯	Finance and insurance
◯	Healthcare and social assistance
◯	Information and cultural industries, including telecommunications
◯	Management of companies and enterprises
◯	Manufacturing
◯	Mining (except oil and gas extraction)
◯	Oil and gas extraction
◯	Other services (except public administration)
◯	Pipeline transportation (including crude oil and natural gas)
◯	Postal service, couriers, and warehousing, and storage
◯	Professional, scientific and technical services
◯	Government
◯	Real estate and rental, and leasing
◯	Transportation
◯	Utilities (excl. telecommunications)
◯	Waste management and remediation services
◯	Wholesale and retail trade

Part Two: Information on Engineering Employment and Hiring Intentions

9. Please estimate your total engineering employment by functional category within your organization. Where functions overlap, please use the predominant function:

	Engineers (Licensed and Unlicensed)	Engineering Technologists (Certified and Uncertified)	Engineering Technicians (Certified and Uncertified)
Consulting (i.e., not operational)			
Design and/or R&D			
Inspection			
Management			
Planning			
Production or Process Control			
Project Management			
Quality Control			
Service and Support			
Supply and Install			
Technical Sales			
Total			

10. Do you expect to be hiring engineering staff in the next 12 months? Please check, if yes. Where functions overlap, please use the predominant function.

	Engineers (Licensed and Unlicensed)	Engineering Technologists (Certified and Uncertified)	Engineering Technicians (Certified and Uncertified)
Consulting (i.e., not operational)			
Design and/or R&D			
Inspection			
Management			
Planning			
Production or Process Control			
Project Management			
Quality Control			
Service and Support			
Supply and Install			
Technical Sales			

11. If you expect to be hiring engineering staff in the next 12 months, in what technical field will you be seeking new employees? Please check all that are relevant and indicate approximate numbers, if possible.

	Engineers (Licensed and Unlicensed)		Engineering Technologists (Both Certified and Uncertified)		Engineering Technicians (Both Certified and Uncertified)		Other Science Degree (e.g., Bachelor of Science, Bachelor of Technology, Bachelor of Computer Science)	
	Yes	Approx. #	Yes	Approx. #	Yes	Approx. #	Yes	Approx. #
	◯		◯		◯		◯	
Aeronautics, Aerospace	◯		◯		◯		◯	
Bio-systems	◯		◯		◯		◯	
Building, Structural	◯		◯		◯		◯	
Chemical	◯		◯		◯		◯	
Civil	◯		◯		◯		◯	
Computer Systems	◯		◯		◯		◯	
Electrical	◯		◯		◯		◯	
Electronics	◯		◯		◯		◯	
Engineering Science	◯		◯		◯		◯	
Environmental	◯		◯		◯		◯	
Forestry, Wood	◯		◯		◯		◯	
Geomatics	◯		◯		◯		◯	
Geological	◯		◯		◯		◯	
Industrial, Manufacturing	◯		◯		◯		◯	
Materials	◯		◯		◯		◯	
Metallurgy	◯		◯		◯		◯	
Mechanical	◯		◯		◯		◯	
Mining	◯		◯		◯		◯	
Municipal	◯		◯		◯		◯	
Nuclear	◯		◯		◯		◯	
Petroleum, Natural Gas	◯		◯		◯		◯	
Plastics	◯		◯		◯		◯	
Software	◯		◯		◯		◯	
Transportation	◯		◯		◯		◯	
Other	◯		◯		◯		◯	
Total	◯		◯		◯		◯	

12. Please indicate if you anticipate difficulties recruiting or retaining engineering staff in the following experience group. Please check any that apply.

	0-5 Years Experience	6-10 Years Experience	>10 Years Experience	No Difficulties Anticipated
Engineers				
Engineering Technologists				
Engineering Technicians				

13. Are there particular fields in which you have had difficulty retaining or recruiting qualified engineering employees? (Please check any that apply).

	Engineers (Licensed and Unlicensed)	Engineering Technologists (Certified and Uncertified)	Engineering Technicians (Certified and Uncertified)
Aeronautics, Aerospace			
Bio-systems			
Building, Structural			
Chemical			
Civil			
Computer Systems			
Electrical			
Electronics			
Engineering Science			
Environmental			
Forestry, Wood			
Geomatics			
Geological			
Industrial, Manufacturing			
Materials			
Metallurgy			
Mechanical			
Mining			
Municipal			
Nuclear			
Petroleum, Natural Gas			
Plastics			
Software			
Transportation			
Other			

14. What are your most significant challenges in hiring engineering staff?

15. Which of the following methods do you use when recruiting engineering staff? Check all that apply.

	Engineers			Engineering Technicians and Technologists		
	0-5 Years Experience	6-10 Years Experience	>10 Years Experience	0-5 Years Experience	6-10 Years Experience	>10 Years Experience
Campus-based recruitment						
Canada Employment Centre listing						
Company Web Site						
Informal channels (colleagues, word-of-mouth)						
Internet Job Boards (e.g.Workopolis.com)						
Newspaper advertisements						
Professional Associations' Listings						
Professional Search Firms						
References by current employees						
Technical Association Listings						
Unsolicited Applications						
Other						

16 Does your company or organization participate in university or college "work term" or internship programs whereby current students alternate between formal studies and work experience?

	Universities	Colleges, CEGEPs, or Technical Institutes
Our company or organization participates in co-op programs, internships, or other types of "work term" programs	Yes ◯ No ◯	Yes ◯ No ◯
Number of students hired per year by our company or organization from co-op programs, internships, or other types of "work term" programs	Number _____	Number _____

17. Please indicate, in general, where you source your new hires for **Engineers**. Please check all that apply:

	0-5 Years Experience	6-10 Years Experience	>10 Years Experience
Locally, i.e., typically within commuting distance			
Provincially/Regionally, but outside commuting distance			
Nationally			
Internationally			

18. Please indicate, in general, where you source your new hires for **Engineering Technicians and Technologists**. Please check all that apply:

Engineering Technicians and Technologists	0-5 Years Experience	6-10 Years Experience	>10 Years Experience
Locally, i.e., typically within commuting distance			
Provincially/Regionally, but outside commuting distance			
Nationally			
Internationally			

Part Three: Professional Licensure of Engineers, i.e, 'P. Eng' or 'ing.' (in Quebec)

Skip this section if you do not employ or plan to employ university engineering graduates

19. What best describes the policy or preference of your company or organization with respect to professional licensure for university graduate engineers who are employed in an applied science field? Please check only one statement.

In general, our company or organization *requires* professional licensure or requires that an individual be in the process of qualifying for a professional licence.	
In general, our company or organization *prefers* individuals to have a professional licence or be in the process of qualifying for a licence.	
Our company or organization has *no policy or preference* regarding professional licensure.	
Our company or organization *requires* that *only certain of our engineering staff* have a professional licence, but *prefers other individuals to have a professional licence or be in the process of qualifying for a licence*.	
Our company or organization *requires that only certain of our engineering staff* have a professional licence*, but has no policy or preference regarding other members of our engineering staff*.	
Other	

20. In the past five years, has there been a change in your company or organization's policy or preference with respect to professional licensure?

No change	
Change from requirement to preference	
Change from requirement to no policy	
Change from preference to requirement	
Change from preference to no policy	
Change from no policy to preference	
Change from no policy to requirement	

21 If your company or organization requires or prefers licensure, which of the following statements most closely reflects the views of your company or organization? Check all that apply.

We require licensure to meet our legal obligations.	
Licensure is a competitive advantage in dealing with customers or clients, even when it is not required by law.	
We require or prefer licensure because it encourages sound professional attitudes and conduct.	
Other reasons	

22 If your company or organization neither requires nor prefers licensure, which of the following statements most closely reflects the views of your company or organization? (Check all that apply)

We do not wish to restrict our ability to recruit Canadian educated engineering graduates who have elected not to be licensed.	
We do not wish to restrict our ability to recruit internationally educated engineering graduates who do not qualify for a Canadian licence.	
We wish to avoid legal liabilities that may be associated with professional licensure.	
We are philosophically opposed to licensure.	
We see no discernible advantages to professional licensure.	
Other reasons	

23. What support, if any, does your company or organization provide to support engineers obtaining and/or maintaining their professional license? (Check all that apply)

Subsidize fees associated with applying for a license	
Subsidize annual association dues	
Provide time off to prepare for examinations	
Assign a mentor or advisor who is already licensed	
Provide no formal support	

Part Four: Certification of Engineering Technicians and Technologists, e.g., A.Sc.T., RET, RPT (Eng.), C. Tech., CET or 'TP' (in Quebec)

Skip this section if you do not employ or plan to employ college or CGEP engineering graduates

24 What best describes the policy or preference of your company or organization with respect to certification of **engineering technicians and technologists** who are employed in an applied science field? (Please check only one statement)

	Technologists	Technicians
In general, our company or organization *requires* certification or requires that the individual be in the process of qualifying for certification.		
In general, our company or organization *prefers* individuals to have a certification or are in the process of qualifying for certification.		
Our company or organization has *no policy or preference* regarding certification.		
Our company or organization *requires that only certain engineering technicians or technologists to* be certified, but *prefers other engineering technicians or technologists to have a certification or to be in the process of qualifying for certification.*		
Our company or organization *requires that only certain engineering technicians or technologists* be certified and has *no policy or preference regarding other members of our engineering staff*.		

25. In the past five years, has there been a change in your company or organization's policy or preference with respect to certification of **engineering technicians and technologists**?

No change	
Change from requirement to preference	
Change from requirement to no policy	
Change from preference to requirement	
Change from preference to no policy	
Change from no policy to preference	
Change from policy to requirement	

26. If your company or organization requires or prefers certification, which of the following statements most closely reflects the views of your company or organization? Check all that apply.

Certification is a competitive advantage in dealing with customers or clients, even when it is not required by law.	
We require or prefer certification because it encourages sound professional attitudes and conduct.	
Other reasons	

27. If your company or organization neither requires nor prefers certification, which of the following statements most closely reflects the views of your company or organization? (Check all that apply)

We do not wish to restrict our ability to recruit Canadian educated technicians or technologists who have elected not to be certified.	
We do not wish to restrict our ability to recruit internationally educated technicians or technologists who do not qualify for Canadian certification.	
We are philosophically opposed to certification.	
We see no discernible advantages to certification.	
Other reasons	

28. Does your company or organization provide financial support for certification of engineering technicians or technologists by a provincial or territorial association? (Check any that apply)

Subsidize fees associated with applying for certification	
Subsidize annual association dues	
Provide time off to prepare for examinations	
Assign a mentor or advisor who is already certified	
Provide no formal support	

Part Five: Continuing Professional Development

29. Which of the following statement or statements most closely reflect the policies and practices of your company or organization? (Check all that apply)

We have no formal professional development training or policies. We rely entirely, or almost entirely, on informal training.	
Every member of our engineering staff has a training program.	
We maintain records of our engineering staff's participation in professional development training.	
Our engineering staff have an allocated number of days each year which they may use for approved professional development.	
We provide in-house, structured training to all or most members of our engineering staff.	
We reimburse our engineering staff for the cost of approved professional development training.	
We encourage and support members of our engineering staff to belong to technical associations and to attend professional development training offered by those associations.	
We support members of our engineering staff who wish to take off-site professional development training.	
We support members of our engineering staff who wish to take additional college or university training.	
Other	

30 For your engineering staff, can you estimate the average annual expenditure per employee on professional development or the total budget for professional development for your engineering staff? ($)

Average annual expenditure on professional development per member of engineering staff OR	$_____
Total annual expenditure on professional development for engineering staff	$_____

Part Six: Skill Requirements

31. In general, are you satisfied with the science-based skills of the engineering staff that your recruit?

	0-5 Years Experience		>5 Years Experience	
Engineers	Yes ◯	No ◯	Yes ◯	No ◯
Engineering Technologists	Yes ◯	No ◯	Yes ◯	No ◯
Engineering Technicians	Yes ◯	No ◯	Yes ◯	No ◯

32. In general, are you satisfied with the non-technical skills of the engineering staff that your recruit?

	0-5 Years Experience		>5 Years Experience	
Engineers	Yes ◯	No ◯	Yes ◯	No ◯
Engineering Technologists	Yes ◯	No ◯	Yes ◯	No ◯
Engineering Technicians	Yes ◯	No ◯	Yes ◯	No ◯

33. **Engineers:** When you are recruiting Engineers, what are the most important science-based skills which you have difficulty finding at a satisfactory level? Please list in order of importance. If you have no difficulties, please indicate.

0 to 5 Years Experience		6 to 10 Years Experience		>10 Years Experience	
We have no difficulties		We have no difficulties		We have no difficulties	
1.		1.		1.	
2.		2.		2.	
3.		3.		3.	
4.		4.		4.	
5.		5.		5.	

34. **Engineering Technicians and Technologists:** When you are recruiting Engineering Technicians or Technologists what are the most important science-based skills which you have difficulty finding at a satisfactory level? Please list in order of importance. If you have no difficulties, please indicate.

0 to 5 Years Experience		6 to 10 Years Experience		>10 Years Experience	
We have no difficulties		We have no difficulties		We have no difficulties	
1.		1.		1.	
2.		2.		2.	
3.		3.		3.	
4.		4.		4.	
5.		5.		5.	

35. **Engineers:** Please rank the importance of the following non-technical skills for your Engineers, where:

1 = Essential
2 = Very Important, but Not Essential
3 = Moderately Important
4 = Unimportant

	0-5 Years Experience				>5 Years Experience			
	1	2	3	4	1	2	3	4
Ability to deal with Cultural and Gender Diversity								
Asset management								
Change Management								
Contract Administration								
Developing a Business Case								
Financial Analysis Skills								
General Communications Skills								
Inter-Personal Skills								
Knowledge of Quality Assurance Systems								
Knowledge of Statutes, Regulations and Codes								
Leadership Skills								
Personnel Management								
Professional Presentation Skills								
Project Management								
Report Writing Skills								
Risk Management								
Team Working Skills								
Working with Non-Technical Staff								

36. **Engineering Technicians and Technologists:** Please rank the importance of the following non-technical skills for your Engineering Technicians and Technologists, where:

1 = Essential
2 = Very Important, but Not Essential
3 = Moderately Important
4 = Unimportant

	0-5 Years Experience				>5 Years Experience			
	1	2	3	4	1	2	3	4
Ability to deal with cultural and gender diversity								
Asset Management								
Change Management								
Contract Administration								
Developing a Business Case								
Financial Analysis Skills								
General Communications Skills								
Inter-Personal Skills								
Knowledge of Quality Assurance Systems								
Knowledge of Statutes, Regulations and Codes								
Leadership Skills								
Personnel Management								
Professional Presentation Skills								
Project Management								
Report Writing Skills								
Risk Management								
Team Working Skills								
Working with Non-Technical Staff								

37. Are there other important non-technical skills?

	Other Important Non-Technical Skills
Engineers	
Engineering Technicians	
Engineering Technologists	

Part Seven: Diversity Trends

38. Which of the following statements most closely reflect the policies and practices of your company or organization? (Check all that apply)

	Yes	No
Does your company or organization have formal policies or goals with respect to increasing diversity within your engineering staff.		
Specifically, does your company or organization have formal policies and goals with respect to hiring more women into our engineering staff.		
Specifically, does your company or organization have formal policies and goals with respect to hiring more aboriginal Canadians into our engineering staff.		
Specifically, does your company or organization have formal policies and goals with respect to hiring more persons with disabilities into our engineering staff.		
Specifically, does your company or organization have formal policies and goals with respect to hiring more persons from visible minorities into our engineering staff.		

39. Does your company or organization have any significant difficulty evaluating non-Canadian educational qualifications, professional qualifications, or previous employment experience? (Check all that apply)

	Significant Difficulty Evaluating					
	Engineers		Engineering Technologists		Engineering Technicians	
	Yes	No	Yes	No	Yes	No
Educational qualifications						
Professional licence or certification						
Employment experience						

40. Based on your company or organization's experience, what do you regard as the most important impediments to hiring internationally educated engineers and engineering technicians and technologists? Please rank, where:

1= Most serious impediment
2= Very serious impediment
3= Moderately serious impediment
4= Not a serious impediment

Weak/inadequate skills in the following areas:	Engineers				Engineering Technologists or Technicians			
	1	2	3	4	1	2	3	4
Ability to deal with cultural and gender diversity								
Asset Management								
Change Management								
Contract Administration								
Developing a Business Case								
English or French Language								
Financial Analysis Skills								
General Communications Skills								
Inter-Personal Skills								
Knowledge of Canadian Business Practices								
Knowledge of Quality Assurance Systems								
Knowledge of Statutes, Regulations and Codes								
Leadership Skills								
Personnel Management								
Professional Presentation Skills								
Project Management								
Report Writing Skills								
Risk Management								
Team Working Skills								
Technical Knowledge								
Working with Non-Technical Staff								

41. In the past five years, has your company or organization ever recruited engineering staff outside Canada to work in your Canadian operations?

Yes	
No	
Don't Know	

42. Additional Comments

Thank you for your assistance.

Appendix B
Members of Steering Committee

Kim Allen
Professional Engineers Ontario

Jean Luc Archambault
Order des Technologues Professionels du Quebec

Michelle Branigan
Electricity Sector Council

David Chalcroft
Association of Professional Engineers, Geologists, and Geophysicists of Alberta

Samantha Colasante
Engineers Canada

Manjeet Dhiman
ACCES Employment Services

Brian George
Association of Professional Engineers, Geologists and Geophysicists of the Northwest Territories and Nunavut

Stephen Gould
Canadian Council of Technicians and Technologists

Kevin Hodgins
Northwest Territories Association of Professional Engineers

Cheryl Jensen
Mohawk College

Ellie Khaksar
Diversity Integration and Retention Services Inc.

Lise Lauzon
Réseau des ingénieurs du Québec

Edward Leslie
New Brunswick Society of Certified Engineering Technicians and Technologists

Edwina McGroddy
Ontario Society of Professional Engineers

Andrew McLeod
Association of Professional Engineers and Geoscientists of New Brunswick

Perry Nelson
The Association of Science and Engineering Technology Professionals of Alberta

Robert Okabe
City of Winnipeg

D'Arcy Phillips
Manitoba Aerospace Human Resource Coordinating Committee

Pat Quinn
Professional Engineers Ontario

Colette Rivet
BioTalent Canada

Tom Roemer
Camosun College

Kyle Ruttan
Canadian Federation of Engineering Students

Deborah Shaman
Human Resources and Skills Development Canada

Len Shrimpton
Association of Professional Engineers, Geologists and Geophysicists of Alberta

Andrew Steeves
ADI Ltd.

Al Stewart
Royal Military College of Canada

Richard Tachuk
Electric Strategies Inc.

Jean-Pierre Trudeau
Ordre des ingénieurs du Québec

Gary Tulk
Engineering Technology Centre
College of the North Atlantic

Deborah Wolfe
Engineers Canada

Bruce Wornell
Association of Professional Engineers of Nova Scotia

Yaroslav Zajac
Canadian Council of Technicians and Technologists