Understanding the Private Sector Role in Promoting a Science and Innovation Culture

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1. Introduction

In November 2006, the Minister of Industry asked the National Science Advisor (NSA) to consider how to promote a strong culture of science, technology and innovation in Canada. The NSA conducted some consultations with stakeholders across Canada and internationally and it became clear that the role of the private sector in promoting science among youth and the general public is a critical issue. In addition, more recent research indicated that the our graduation rates in scientific and technical fields are below the OECD average. Most recently, the federal government's S&T Strategy, *Mobilizing S&T to Canada's Advantage* released May 2007, highlights the importance of growing Canada's base of knowledge workers to ensure Canada's future prosperity and competitiveness.

With this in mind, the ONSA commissioned The Impact Group to do some qualitative research to explore the role of the private sector in promoting S&T internally and in the community at large and gain a better understanding of how and why the private sector is involved in S&T promotion for youth, the perceived impact of supporting these outreaches and suggested improvements for more effective private sector activity and support.

A total of 15 in-depth telephone interviews were completed with either a coordinator or manager of community investment or public affairs at each company during February and March 2008. Companies approached for an interview are or have been funding four or more S&T promotion outreach programs to youth (K-12) or have developed their own in-house program. All firms we interviewed come from a research-intensive sector. As much as possible, a good spread of interviews was completed across sectors and regions (Table 1).

Table 1. Number of Organizations Interviewed

Industry Sector	Number of Interviews #
Chemical	1
Energy/oil and gas	4
ICT	6
Pharmaceutical	4
Total	**15**

The primary objectives of the study were to:

1. Identify the main activities/initiatives and type of involvement of private sector S&T promotion
2. Determine the main reasons (objectives) for the private sector S&T promotion involvement
3. Determine how and why programs are chosen and evaluated as meeting corporate objectives
4. Identify any challenges/barriers that the private sector encounters in promoting S&T
5. Identify strategies/recommendations for more private sector involvement in promotion of S&T
6. Explore the role of the government for assisting in the promotion of S&T
7. Identify strategies/recommendations for government/private sector partnerships

The following report summarizes the information obtained from these interviews. This report is strictly qualitative in nature. Because of the small number of interviews, and because they were not drawn randomly, this report provides only directional information.

2. What is the Private Sector Doing?

- Most of these firms have been involved in supporting science and technology promotion and awareness in one form or another for 10-15 years or more.

- Some started from the beginning of the company's existence. "It's in the DNA of our company. The founder was a scientific inventor."

- S&T promotion and awareness is an important aspect of philanthropic and communications activities for all the firms we interviewed. All of them support formal and informal science education for youth at the K-12 level and skills development and research at the postsecondary level. Several firms also support activities aimed at raising public awareness of the importance of S&T to society.

- Overall, oil and gas and chemicals companies were heavily involved in S&T promotion and are more recently beginning to shift their S&T focus onto environment and sustainability. This evolution is being driven primarily by public recognition of the importance of these areas and the impact of these sectors on the environment.

Sponsorships and funding

- Most firms prefer to support third party organizations that specialize in S&T promotion, education and public awareness. Partnership models are preferred, where the company provides funds as well as in-kind support through employee volunteers, equipment, and resource materials. *"We don't see that as our key expertise. We're more into finding the right partners and providing support."*

- Firms tend to support organizations that operate in communities where their company has a presence, either headquarters or R&D facilities, as well as support national organizations that can deliver programs in all communities where they are active.

- Many of the firms interviewed have charitable foundations that donate funds to not-for-profit organizations. In some cases, annual budgets are in the $5-10 million range.

- Several firms have both a foundation and an internal company budget for funding projects. For example, one firm supports K-12 S&T promotion and awareness through its foundation, but also donates significant sums of money to colleges and universities through it corporate office.

- Firms without philanthropic foundations typically fund projects from corporate communications or public affairs. Thematic giving guidelines are set by senior management, or sometimes by the Board of Directors, and a committee decides how the funds are allocated.

- Science museums, science camps, teacher training at local schools and science fairs are typical organizations and programs that interviewees mentioned.

- Actua, Let's Talk Science, Canada-wide Science Fair, Youth Science Foundation, YES I Can, Shad Valley, Women in Science and Engineering (WISE) and Go Eng Girls are examples of programs that have been or are being supported by a number of firms we interviewed.

- Regional organizations such as the Science Alberta Foundation, WISEST or SciTech Ontario are also seen as important organizations for firms looking for a regional reach if they are headquartered in a particular province.

- A few firms we talked to have developed in-house programs or are looking to develop one in the future. Some began as a partnership, and when the partnership did not work out the firm developed its own program. For others, the purpose is to develop a "signature" program that marries philanthropic goals with the company's mission and business objectives.

- Multinational firms typically develop programs and roll them out gradually in different countries. Domestic firms typically have the program in Canada as well as elsewhere, as do many of the foreign multinationals we interviewed. Some of the foreign multinationals referred to interesting programs being done in the U.S., but they are not being implemented at present in Canada. For example, one firm is encouraging U.S. employees to become S&T teachers and subsidizing the tuition costs for those that make a successful transition to teaching.

Employee volunteerism

- Most firms encourage employees to volunteer, for example at a local school or as a judge at a local science fair. Firms tend not to monitor this activity systematically, relying on anecdotal reports on what employees are doing. As a result, there is little hard data on the extent of this activity.

- A number of firms provide non-financial incentives and support for employee volunteers. For example, one firm has a formal process to identify science fair judges from among employees with a science degree. Employees who volunteer receive recognition in the company's internal publication, in some cases including interviews and photo essays. Another firm operates a volunteer intranet that helps coordinate the activities and resources of a network of hundreds of volunteers and employee mentor groups across the country. Volunteers who donate 100 hours of their time in a given year receive personal recognition by the CEO.

- Several of the firms interviewed are using financial incentives to encourage volunteerism, for example by allowing employees to apply for $500 to support a volunteer activity of their choice. In some firms, only employees who volunteer above a certain number of hours per year may apply. Often employees choose to support local sports teams, but sometimes a local science fair is the beneficiary. Again, firms with such schemes do not formally track the activities that their employees support. Some firms are more proactive in trying to recruit employees to support S&T promotion activities and programs specifically. One firm reported that due to active recruiting within the firm, 10% of the grants they give to employees who volunteer above a certain number of hours are targeted to S&T promotion.

- Many of the firms interviewed have a policy of combining funding and employee volunteerism, in order to complement funding with in-kind human resources. For some firms, this process is ad hoc, but several firms have, or are developing, formal employee volunteer programs to complement their funding programs.

Target age groups

- All firms supported K-12 programs as well as providing significant support to organizations at the postsecondary level. *"We look at the range of education, including programs that reach K-*

12 and those that focus on the upper end and postsecondary. It's a continuum starting with engaging young people in science, retaining their interest, exploring it more fully as they get older and begin to make decision, and then, we hope more will continue at the postsecondary level, where we focus on science and engineering topics relevant to our industry."

- Typically the dollar value of support at the postsecondary level is higher than at the K-12 level, largely because postsecondary support tends to be in the form of large cash donations ($1-5 million) to colleges or universities for research facilities or training programs. A donation of $100,000 is typically considered large for K-12, although a few national organizations, such as Let's Talk Science and Actua, have received grants in the millions. Ratios of postsecondary funding to K-12 funding mentioned in interviews ranged from a high of 5:1 to 2.5:1. One firm has equal funding in both areas and one spends 3:1 in favour of K-12. One company recently reduced dramatically a long-standing commitment to K-12 to focus on postsecondary, due to urgent recruitment requirements.

- In the K-12 space, firms have a range of strategies. Many interviewees highlighted the importance of the decision-making years in which students begin to select courses and drop others. One firm, for example, focuses on grades 5-7. *"We're trying to influence students when they are making decisions. If we can excite them and spark their interest in S&T, likely they will stay with these subjects."*

- Another firm focuses on grades 7-8, because students are beginning to think about careers and selecting courses accordingly. One firm supports S&T programs exclusively at the high school level (grades 9-12). *"If you spread too thin, you don't do well. Others do elementary very well."*

- Some firms are urging their management to put more effort into earlier age groups for a more long-term impact. *"We need to go younger and younger. We need more research on how kids learn. By second grade most kids know what they want to do. Tenth grade is also critical, though, because they are making important choices."*

Teachers

- Many interviewees emphasized the importance of reaching elementary and secondary teachers as well as students. *"It has to start with the school system. We need to help teachers." "We need to get to science teachers in grades 7-12 and elementary teachers who don't know enough science."*

- A number of firms have programs that specifically support teachers. Employees will go to schools to work with teachers on projects or give class presentations on science or technology topics. Several firms provided teacher training where employees help teachers learn how to teach science and technology topics related to the company's business. One firm has developed a website for teachers with extensive teaching materials and other resources available for download. In some firms, teachers come to the company to learn about an area of technology. Some firms allow teachers to bring students so that students can talk to scientists and engineers and learn more about how S&T are applied in industry and what S&T-related jobs are like.

- A consistent theme that emerged in the interviews was the need to equip teachers at both elementary and secondary levels to teach S&T subjects more effectively and engagingly. At the elementary level, interviewees highlighted the problem that teachers are not comfortable with

S&T and turn students off these subjects. At the secondary level, the problem most discussed was the lack of information and experience with how science is applied in society, how technology impacts society, and the opportunities that exist in industry to apply S&T to make the world a better place.

- Some interviewees emphasized the enormous impact that teachers can have on future education and career decisions their students make. Two interviewees mentioned that they personally could remember being inspired by specific teachers to continue studying math and science, and as a result they ended up working in a research-intensive company.

- One multinational firm described a new program that qualifies interested employees for teaching. The program is being implemented in the U.S., where employees are being trained and qualified to become math and science teachers in order to address a critical shortage. The firm reimburses successful employees the fees they pay for teacher training and certification.

- Firms see their efforts as complementing and supporting the school system with expertise and real-world experience that is not generally available in schools. *"The private sector doesn't see itself replacing the government role in education. We're not absolving government of its responsibilities." "Sharing expertise and human resources is the best contribution companies can make."*

Females and other special groups

- Several interviewees mentioned that their firms are trying to attract and help keep females interested in S&T-related studies. Firms support organizations such as WISEST in Alberta, WISE, Go Eng Girls and other programs targeting S&T promotion to females. One firm discovered the problem years ago when dealing with schools as customers. *"We noticed an alarming trend: the females were not signing up for math and science."*

- A number of firms are focusing on Aboriginals, especially firms with facilities in the West. Several firms support Actua's Aboriginal program. One interviewee noted that Aboriginals represent the youngest demographic group in Canada. *"With an aging population, we've missed the boat."*

- Within the past 4-5 years some firms have been increasingly looking to promote skilled trades in addition to S&T studies that lead to college and university. This trend is particularly evident in the oil and gas sector. According to one interviewee: *"Trades and technology are critical."* Another interviewee highlighted the need to promote skilled trades as an option for young people not interested in college or university. *"Many kids are more interested in trades. We feel it's important to promote trades as a viable option."*

3. Why is the Private Sector Involved in S&T Promotion?

- The firms we talked to have a range of goals and objectives for their S&T promotion activities.

Filling the "talent pipeline"

- The top reason given for why firms support S&T promotion was to increase the talent pool of qualified people for companies to hire. All interviewees highlighted the fact that their firm hires scientists and engineers, and so "filling the pipeline" is one of the main reasons they engage in and support programs in this area.

- Several interviewees highlighted that the world is facing a global talent problem. Specific skill sets and talents are driving the economy and people with these skills are increasingly in demand in all areas of society, not only the private sector. *"We're investing in developing a high-quality education system for Canada, which is critical not only for Canada but also for our company. We're very concerned about the statistics on S&T enrolments and drop-out rates. There is no question we have to do this. We have total clarity and total support from the top."*

- *"We have a responsibility, because we hire scientists and engineers."*
- *"We want the next generation to get in touch as early as possible with business-related S&T."*
- *"We have 89,000 jobs to fill in IT within the next 3-5 years in Canada, including brand new hires and retiree replacement."*
- *"Immigration is no longer a solution for skilled labour. We need to engage Aboriginals, keep them in school, and build the workforce of the future."*
- *"We have a voracious appetite for scientists, mathematicians, physicists and chemists. If enrolments decline in these subjects, it's not good for us."*
- *"There's a war on talent. We need young people to see the link between their studies and the neat products they use. Kids don't link science to technology. Math, physics, computer science, chemistry are employed to develop technology that's imbedded in the products they think are so cool."*
- *"How long can we keep on outsourcing? We have a shortage of labour. We need to focus on giving students opportunities."*

Scientific literacy

- A number of firms also support S&T promotion aimed at the general public. Their main goal is to raise scientific literacy.

- *"We're a technology rich industry. Science plays a significant role in our day-to-day operations. We need to support the development of people who can help us do that. That's one level. But it's also important to communities and to civil society. It's becoming increasingly apparent that we need a higher level of scientific literacy among Canadians in general. Technology is more and more important in society. Both "Joe Citizen" and public policy makers both need some basic science. There is a dearth of scientific understanding in the public policy arena. Decisions are being made in a vacuum. There are global competitiveness implications here, because other nations have higher scientific literacy than we do."*
- *"We need more awareness of science literacy. Patients need to be well informed. There are lots of websites out there that a scientifically illiterate population can't assess properly. There's a revolution in patient medicine that's challenging doctors. People are feeling empowered, but they're not finding good information on the Internet."*

Corporate citizenship and recognition

- A large percentage of the interviewees' firms have a stated goal to give back to communities in which they have a presence. *"We want to be good corporate citizens and give back to the community by sharing our excitement about science and technology. We also want to reach the next generation to encourage them to pursue these fields in their studies and in industry."*

- Many interviewees saw human resources needs as relevant not only to their company, but also for the country as a whole. They emphasized that global competition is fuelling the need to build a talent pool in Canada. *"We need policy makers to realize it's their problem, too."*

- Firms also seek recognition for their philanthropic efforts. In the S&T promotion area, several interviewees highlighted the importance of being associated with credible S&T promotion organizations, such as a science center or a national not-for-profit organization like YSF or Actua. Interviewees also discussed the corollary need for organizations seeking support to make a credible case and be clear about the value proposition they are bringing to the table.

- One interviewee noted that for business-to-business firms that don't advertise to consumers, S&T promotion sometimes represents the only way to gain exposure in communities.

Employee engagement and satisfaction

- A major goal for S&T promotion efforts in firms is employee satisfaction. All firms encouraged employee volunteerism, and many of them see S&T promotion as particularly motivating for employees with science and engineering degrees.

- Firms also see employee volunteerism as an opportunity for management to develop promising employees and give them interesting challenges outside their immediate job.

- Most firms try to link employee volunteerism with their philanthropy, by encouraging or actively recruiting employees to participate in S&T promotion programs that they fund.

- *"Our HR department has done lots of research on the benefits in supporting employee volunteerism. There is a strong awareness of the benefits."*
- *"Employee engagement is a big piece now. Our employees are engaged in the community where we leverage their skills. Employee satisfaction has increased as a result."*
- *"Employees donate volunteer time; the company donates facilities. This in-kind support complements the funding."*
- *"We're working with our HR department to formalize how to attach employees to programs that we support. We need to build their volunteerism into their work plan. We see this as a way to provide development opportunities for high-potential employees."*

Alignment of philanthropic and business goals

- Almost all interviewees emphasized the importance of linking philanthropic goals with business ones.

- Within the context of pure philanthropy, firms select themes that relate to their business. S&T promotion directly relates to companies' human resource needs, but it also connects to larger societal issues such as: public awareness of the importance of S&T in everyday life, enhanced public understanding of risk and how to assess risk, public acceptance of new technology.

- Over the past 4-5 years, firms have started to scrutinize more carefully how and where they invest. We talked to a significant number of people whose companies have formally reviewed their investments and are now linking their philanthropic and business goals more closely.

- The trend is to focus on fewer giving themes. Some firms are more advanced in this process than others, but a majority of them are making this shift. S&T promotion is a good fit for most of the firms we talked with, and it is still included in most of these firms' investment strategy.

- Many firms rely on employees to identify opportunities for the company to support S&T promotion activities and programs. Some interviewees formally involved employees in the refocusing exercise. *"We did an employee poll. We presented three themes and the employees voted."*

- *"Twenty years ago corporate philanthropy was largely driven by the interests of the CEO and other executives. There has been a shift to more strategic investments that are not only good for the community, but also for the company. Putting business needs into the mix has increasingly narrowed companies' focus. The broader social good approach is a thing of the past."*
- *"You can see a general trend. Expectations from shareholders are forcing management to focus on serving the business. We're all trying to reach the "sweet spot" where we can help the business and serve a good cause."*
- *"In the past year to year and a half we've become much more focused on investing in a sustainable workforce. When we looked at what we were doing, we sensed we were too broad. It was all great stuff that we were proud to support, but the impact was too diffuse."*
- *"We went through a painful two-year process of refocusing our philanthropic dollars. We let good programs go, for example in the health area, because we can't make an impact there. Other charities can do that."*
- *"We did an inventory of all the donation checks going out. We were horrified! Nothing was strategic. We were spending $7-8 million but what did we get? We decided to focus and developed a unified framework for assessing proposals and investments. We stopped writing small checks in a million directions."*
- *"Funding became more focused. Kids' hockey teams were out of luck. Programs we support have to be core to the company business or mission."*

- Some firms have begun to notice a change in sponsorship applications coming in to the firm, both in quantity and quality, as a result of the general trend for firms to focus more. *"We used to get thousands of requests per year, but now it's much less. Not-for-profit organizations are increasingly demonstrating a business case for the company. Everyone is becoming strategic. Organizations who understand the business model can move forward."*

- Companies are increasingly looking for partners to collaborate with them in supporting their S&T promotion efforts and investments. Firms want to leverage their more focused investments with other groups that have different yet complementary objectives. This trend toward partnering creates opportunities for governments and other public sector organizations, as well as private sector organizations and firms, to work together more closely.

4. Perceived Impact of Current Activities

Impact Measures

- One of the more surprising findings is that none of the firms have a formal evaluation system in place that will allow them to decide whether or not their efforts have made any impact. Most rely on initial due diligence on the programs they support including, to varying degrees, ensuring the corporate and organization goals are complementary and aligned. However, some firms are looking at changing this situation and exploring how to evaluate programs more systematically.

- Very few firms proactively seek out organizations to support or partner with, primarily due to the enormous demand from the S&T promotion community for private sector support. *"We're pretty much inundated with requests." "We receive proposals from everybody. The hardest part is filtering and making decisions. We say 'no' to good stuff every day."*

- Firms have a range of criteria in selecting projects to support and partner organizations. The key criteria are whether it fits in with the firm's focus and also if the program takes place within the geographic area of operations. The latter criterion is important because proximity maximizes the opportunities for employee participation and enhancement of the firm's reputation in the community.

- A number of interviewees noted that most program evaluations that they receive from organizations they support measure user satisfaction, but there is no longitudinal tracking of participants after they complete the program. *"A couple of groups have started surveys with students, but these are usually administered right after they've completed the program. Long-term tracking is the missing component. Has the experience changed them? Will they choose S&T courses later on in their education?"*

- Many interviewees felt that tracking is important, although they acknowledged that it is difficult. Some efforts in this area are being developed. *"We could do better in helping to identify the end benefit of the activities we support. There's very little information on what the kids end up doing. We're trying to stay in touch with kids in a 'block and tackle' kind of way through the organization we support." "We really grapple with measuring outcomes in this area. We tried to get organization we support to do it, but they can't. It's not enough to say that 3,000 girls took the program. We think we're getting a net positive gain, otherwise we wouldn't be doing it. But it's 'wishy washy.'" "K-12 programs represent a long-term investment. It would require a well-designed longitudinal study to measure their impact. This is just not in place." "Most people rely on a more intuitive assessment of whether or not a particular program is going well."*

  - In addition to wanting longitudinal tracking, companies would like S&T programs to track demand. For example, one firm that funds a camp expects the camp organizers to track the number of applications. Some interviewees suggested similar demand measures be made for postsecondary education.

  - Some companies are trying to develop more rigorous impact measures that can be used up front when selecting projects and also to evaluate success. *"In the past, we used a gut check. How does it feel? Does it feel right? Now we're implementing new processes that evaluate deliverables against stated objectives."*

- The central feature of this approach is a more formalized articulation of the company's objectives and those of the partner organization up front. *"It's not rocket science, but it's amazing how it's not been done. You work with the organization about what their objectives are and how they're going to measure them. If they're quantifiable, then what data do we collect, how do we collect them and how to we report on it? If they're qualitative, use surveys or focus groups. The end goal is to have a system in place for articulating objectives, evaluating against objectives, implementation, gathering data and reporting. Then we'll have more confidence in deciding later whether we will do this again. It's remarkable the number of times people approach us for continued funding without any idea of what they've achieved."*

- For others, longitudinal tracking is not as important. Many emphasized the importance of anecdotal evidence and student feedback on their satisfaction level with their S&T promotion activities. They felt it is sufficient to see programs having an immediate positive impact on students, teachers and other participants. *"There is an ongoing debate in industry. Should this be tracked? What is the basic rationale for the investment? Is it about investing in the supply of human capital or the good of educating young people?"*

- One person referred to the London Benchmarking Group (LBG), a group founded in London, England by the CEO of National West Bank. LBG, which has 130 member companies worldwide, provides firms with a system for evaluating the impact of their charitable spending. The LBG system uses a goal setting exercise that looks at business and community objectives together. Evaluation measures include cash and time. LBG has recently come to Canada. Its website is: www.lbg-canada.ca.

Perceived impacts – little progress or mixed results for the larger goals

- Most firms do not feel that their larger goals of getting more people into S&T careers and increasing scientific literacy in Canada are succeeding. Postsecondary enrolments are still declining in certain S&T topics. While female participation rates in postsecondary education have increased dramatically, their participation is still relatively low in important disciplines such as physics, math, computer science and engineering. ICT firms continue to face a pending skills shortage and graduation rates in critical fields are not encouraging. Skilled trades are still in short supply.

- Several interviewees felt that the S&T promotion community is adequately addressing young people who are keen on S&T, but missing those that are not initially interested. They highlighted the need to reach large numbers of Canadians. *"My concern is how to reach the masses, how to reach those kids that don't self motivate."*

- Additionally, a number of firms, especially in oil and gas and ICT, expressed concern that the "pipeline" problem is still not being adequately addressed. *"For the company's HR goals, it could be better. The availability of skilled people is still low. It's tough for smaller firms."*

- *"No one is doing a good job of promoting STEM. If you walk up to a kid who has just won a national science fair, who is promoting him or her?"*
- *"I'm not sure the organizations we all support are having an impact. It's hit and miss. Active individuals are acting as catalysts, but there's no overarching strategy."*
- *"The S&T promotion community is doing a good job keeping interested kids in the game. Is the impact big enough to get new people in? No."*

- Many interviewees felt that they could do more. Several firms are doing less than they have in the past due to drops in revenue, but they intend to increase their involvement when and if revenue rises again.

- Some interviewees saw progress in certain areas, while others reported setbacks. For example, success with some special target groups received mixed reviews: *"We are making a difference with girls. And with second-generation immigrants who value education." "We're not as strong as we could be. Our numbers are down again in WISE[1]." "I just came back from the science fair at my son's primary school. It was nice, but very basic. Out of 30 projects, 26 had teams of girls and 4 had boys. There were no boys whatsoever at the fair. Why? I don't know."*

- Several interviewees noted that the biosciences have seen increased enrolments, but information sciences have suffered since the dot.com crash. *"The shine is off IT, reinforced by all the people that were laid off." "After the bubble, there was a huge pull-out from IT applications due in large part to the media highlighting all the lay-offs."*

- Many firms see the school curriculum as a critical element, and expressed concerns that the situation still needs to improve. *"I hope the curriculum is changing and that S&T learning is more project based. We need kids to understand that the video they're shooting is from Japan with Japanese technology, not Canadian." "Science still doesn't have a cool image. I tried with my own kids. I brought them to science fairs to try to motivate them. But it's not working with my daughter." "The way science is taught is a bit discouraging. The system is changing somewhat, but teachers can't tell students what they can use science for later. We need to find ways to help teachers be better at making it real." "There's more recognition from teachers that this is important. They're asking for help."*

- Several firms expressed concern about the media, noting that science coverage has not improved a great deal in Canada over the past decade or more. *"The number of popular publications on S&T is still low. We have no equivalent to Nature magazine. There are only two science programs in broadcast media – Quirks and Quarks on CBC radio and Discovery Channel. The Financial Post covers small business, but no science." "Public visibility is not great, because the media doesn't cover it. I also haven't seen lots of books on how firms are supporting S&T promotion. What we also need is activities targeted to the masses. You have to be smart to do science, but you don't have to be Einstein. The 'brainiac' image of science is not good."*

- Yet some thought that the media's image of young people who excel in S&T has changed. *"In the past ten years, the media interest has increased. We've been able to shine a light on the issue. The media now thinks of these kids who do well in science fairs and competitions in a more balanced way. They used to portray them as 'geeks', but now they're seen as more grounded kids."*

- While most interviewees acknowledged that reaching some of the larger goals might be a long way off, some felt that the impact of S&T promotion programs on the young people who participate in them is significant and important. *"You see it in the eyes of the kids and you hope they keep the 'fire in their belly.'" "The programs are having a tremendous impact with the kids. Science fairs are elitist. They target the best, and it's important to have these kinds of activities for these kids. They're having a huge impact. I've seen it and talked with them."*

[1] Women in Science and Engineering.

Impacts on the company

- Despite the mixed results vis a vis the larger goals for S&T promotion, companies have other measures they use to assess the impact of their S&T promotion activities on their business goals.

- One important measure is enhanced reputation. Is the firm mentioned in a positive way in the media? Do partners acknowledge their support and participation publicly? *"We look for immediate value. We don't track or do follow-up to measure the larger impact. Measures we use include enhanced reputation for the company by the public, the media and the education community; employee satisfaction; and feedback from students involved in the program."*

- Employee engagement and satisfaction is also critical to most of the firms we talked to. One firm includes the potential for employee participation as a key criterion for getting involved with a program. Several firms survey their employees to measure employee satisfaction. *"Employees want to volunteer in their community with company support. The company gets better engagement of employees by providing funding to external organizations where employees can participate. It raises awareness of volunteer opportunities and creates a buzz around the topic of S&T."*

Suggestions for improvement

- One of the most prevalent suggestions for improving the impact of S&T promotion efforts was to provide more information to young people about careers.

- A significant number of people expressed concern that educators are unfamiliar with the opportunities available in industry, and also government, for young people who pursue higher education in science, technology, engineering and math (STEM).

- *"Kids don't appreciate the value of opportunities that STEM provides. We need public promotion of career opportunities that are open to kids who study these subjects."*
- *"We need to provide more information on careers and that there are opportunities to make good money in STEM-based careers. If a student goes to work right after high school and works for $40 per hour, that's a short-term gain. If they invest 2-3 years in a college education, they will do much better."*
- *"I'd like to see more of a bridge between employees and the not-for-profit organizations active in this field. They need to have greater awareness of the kinds of jobs available and the 'street smarts' you need as an employee to succeed. Communications skill is a critical piece. We need more programs that combine communications with S&T."*

- In summary, the private sector has a range of criteria it uses to assess which organizations to support and also to measure success. The larger goals to increase the human resource pool and increase enrolments and graduation rates in S&T are difficult to measure and too important to abandon, while secondary benefits related to reputation and employee engagement are clearly important to firms. The above discussion clearly indicates that firms are increasingly interested in measuring the impact of their investments on both the company and the community and society at large.

5. Maximizing Private Sector Involvement

- There was a strong sense that the private sector has a critical role to play in S&T promotion, but that it is a shared responsibility with public sector organizations and governments. *"We're starting to see more and more companies getting involved. There are lots of ways the private sector is driving this. There is stronger alignment between the private and public sector, which is good for the country."*

- Private sector responsibility lies primarily with firms that use S&T in their daily operations, according to most interviewees. S&T promotion is just one among many good causes that are clamoring for private sector support. Employees drive much of corporate giving and they typically opt for supporting local sports teams or giving to major charities. Only "talent hungry" firms can see an immediate benefit for S&T promotion, and are hence more aware of the larger societal benefits as well. *"If a firm can see a benefit, they'll get involved."*

  - *"All industry has a role, but it's more important for pharma, telecom, aerospace and other high tech sectors. Food, energy, retail sectors don't spend as much on R&D. We have a responsibility, because we hire scientists and engineers."*
  - *"Companies have to be practical. Those that get a direct benefit then you have to be involved. If your business isn't impacted by talent, then why do it? Most of the ICT firms are involved."*

- Firms that do not see an immediate benefit from S&T often still support S&T promotion, but the decision will depend on the interests of senior management as well as the employees. *"It depends on the company culture. The firm has to have a vision that science is important before funding will flow for these activities. There are two reasons why companies are doing it now: 1) if they're really at the cutting edge of S&T, and 2) if the leader is passionate about it. For us, science is our daily bread and butter. It's a natural fit. For others, the leader is involved." "For SMEs, participation will depend on the interests of individual employees. For large companies, it depends on senior leadership and board governance."*

Challenges – money and time

- Several interviewees identified a number of challenges that companies face in getting involved in S&T promotion and some suggested ways to address them. The top two issues identified were money and time.

- The bottom line is too important for some companies, and supporting S&T promotion and other causes is an expense. This reality is one of the major forces driving the move to link philanthropic goals with business objectives.

- Even for firms that consider S&T promotion important for their business, balancing bottom line issues is difficult. *"Our own productivity targets pose a challenge. We work with global metrics which measure unit costs. We compete with other jurisdictions. We have to figure out how to engage in these activities without compromising our productivity." "The importance of quarterly business results poses a challenge for firms. It takes time to realize a return from S&T promotion investments. Companies need senior management support. They need to be patient. It takes 1-3 years before any measurable impact."*

- Revenue fluctuations can seriously affect the scale of S&T promotion activities in a company. Several interviewees have experienced the consequences of reduced revenue. One firm stopped

funding S&T promotion activities from its corporate communications budget, transferring some of the projects to the company's foundation. Another firm saw staff cuts in the group that supports S&T promotion and outreach. It is significant, however, that in every such case discussed, the activity was always retained, even though at a reduced level.

- When we asked these interviewees whether or not they envisioned an increase in the future, they all stated that if revenue increases, the S&T promotion would increase as well. One interviewee who experienced significant cuts described how passionate employees remained about going to the provincial science fair. *"They continued to have our support, 200 percent. We're proud. We'll fight to the last dollar to stay in the game."* Another interviewee encountered a similar attitude under difficult financial circumstances: *"For a few years we didn't get any budgets, but they didn't fire all of us. Now we have budgets. Our leaders believe in it. This is true around the world."*

- Most people we talked with identified time as another major challenge for the private sector. *"Everyone is so busy. It's hard to find the time to volunteer."*

- Employees who volunteer represent the most valuable asset of the company. Any time taken away from the job is hard to justify, not only for the employee, but also for his or her superior. A major obstacle for managers of S&T promotion programs is getting line managers to cooperate and release their staff for volunteer activities. Even firms with explicit policies that encourage employees to volunteer will encounter managers who refuse to participate.

- Time constraints and the challenges inherent in combining volunteerism with getting the work done lead many employees to donate their own personal time to S&T promotion projects. Managers are comfortable offering flexible work hours, as long as the work gets done. This practice often puts a heavy load on employees. Some interviewees suggested that many employees simply choose not to volunteer under these circumstances.

Solutions

- Firms address the financial challenge in a number of ways. If revenue drops, funding may be reduced. Most firms, however, keep some level of activity going, due to its perceived importance.

- Partnerships represent another way that firms use to leverage their own financial resources. Some firms are working together by jointly funding programs.

- Some firms simply need to have the case made to them in a more compelling fashion. *"If I invest $50,000, what's the return on my investment?" "Companies need to invest more strategically. Firms tend to do the easier things, like buy an airport ad, support local hockey teams and give to big charities. But the link between charitable investments and company goals is more complex." "We need to communicate to them that it is worthwhile to spend money on future generations. Firms have a responsibility as parents and as a company."*

- Firms counseled S&T promotion organizations also to do a better job at making the case to firms. *"Recipient organizations need to be more market oriented. They should develop a package and demonstrate value – PR, recognition, employee opportunities, etc. There's room for improvement."* Another interviewee counseled organizations: *"Never align to one thing. Present your program as a strategic community investment that addresses HR, sales, marketing, etc. You need to add value. Always tie into many objectives, otherwise in 'dark days' you'll be cut."*

- The time challenge requires management to devise a system that recognizes approved volunteer activities. *"Scientists are doing these things on their own time. Corporations have a responsibility to include pro bono activities in employee work plans." "Charity begins at home. Work with your employees. Give them opportunities. This is a smart thing for employees and their employers." "People want to do this. They want to do the right thing and get involved. But they need the time, and the tools. They need facilitation – they're given a day, told where to go, etc. We need to make opportunities visible and accessible."*

- Middle managers responsible for S&T promotion within the firm need to work with senior management: *"Engage the executive first. Tell them 'here's what I need.' Then they will help if the customer can accommodate it."*

6. The Federal Government Role

- There was a high degree of consensus among interviewees about the role the federal government needs to play in the area of S&T promotion. The single most important role for the federal government, according to a majority of people we talked to, is to raise the national profile of the issue.

- A majority of people we talked to don't believe the federal government is doing enough in this area. Interviewees generally emphasized that the federal government needs to promote the importance of S&T to society and the important opportunities that can open for young people and communities that engage with S&T. *"The federal government needs to ring the alarm bell and create a sense of urgency." "The federal government needs to show leadership and provide investment to support this area. It's important for Canada."*

- Many people we talked with were passionate and articulate about how the two levels of government could work together more effectively. They emphasized that the federal government has a key role to play in promoting and facilitating the overall agenda.

- "Promoting wider participation in S&T is the most important role for the federal government. But they are not doing it even though it's clearly their responsibility. The federal government talks about fostering innovation in Canada and attracting investments here. Promoting participation in S&T education and careers fits right in."
- "The federal government can help to keep Canada innovative by actively promoting careers in S&T through commercials and advertising. They're doing it for the army. The federal government is the number one co-op employer in Canada, and is probably feeling the pinch. They should promote science, engineering and technology, and the important role these subjects play in Canadian society."
- "The most important role for the federal government is to recognize the importance of S&T promotion. The federal strategy on S&T needs to be more open to integration with the private sector and the provinces. Given the importance of this area to Canada, the federal government has to give it more importance."
- "We need to demonstrate the importance of innovation in building Canada's economy. This is more of a political role, and the federal government needs to understand that. Knowledge industries are the future. We need political will to promote this understanding."

In addition to promotion, firms feel strongly that the federal government needs to put more funding into S&T promotion.

- Several interviewees highlighted the need for more funding of S&T promotion programs by the federal government. Some of them were aware of federal programs such as NSERC's PromoScience, but generally people felt that the federal government should do more. *"The federal*

government contributes very sporadically." "The federal government is not doing its job. Budgets are too low for what should be a national mandate. There's too much short-term thinking. It's sad, but it's the reality. There's no visibility. These are long-term, grassroots things. It takes 20 years. Meanwhile India is graduating so many engineers and scientists."

- One interviewee reminded us that in the U.S., the national government makes money available for a national dream, such as putting a man on the moon. Firms bid on the projects, job opportunities increase and this fuels the process. Other national governments have taken a similar approach. *"Canada spends $100 billion a year on health care. The federal government could create a national initiative to shift 20% of that spending to R&D on how to reduce health care costs."*

A National Strategy on S&T Promotion

- Many people we talked to mentioned the need for a national strategy to promote the importance of S&T. Few referred to the current federal S&T strategy. Rather there was a consistent call for a federal strategy to raise awareness of the importance of S&T and a national campaign to promote it. *"A shift in culture needs government efforts. Change is not occurring fast enough. Not everyone who should be involved is. It's very fragmented. We have no national strategy."*

- Firms suggested a national S&T promotion strategy is critical to communicate the urgency of the talent issue and create a framework to mobilize private sector and other participation. *"Other companies don't know about the opportunities out there. We could use a national strategy to tap into. Companies could learn about what's going on and how to contribute." "If there were a national strategy, we could write one check and fund everything."*

- In terms of messaging, many interviewees felt that the federal government has to shift more attention onto the importance of S&T to Canada's economy, rather than relying so much on our resource industries.

- *"This is a big social issue. Science is important in a global sense. We talk about traditional industries, but not science-based industries. Where is any mention of science and its applications in the Prime Minister's speeches? We need more conversations with leaders in government and the public about science and its importance. Stand up and be proud about our accomplishments."*
- *"Canada's identity is tied too much with natural resources. Germany decided to be great in technology. France, too. The Canadian government has relied too much on wealth from resources. Our resource wealth has kept the quality of life too high. There hasn't been a perceived need for more effort in S&T. But it will come. Six percent of Canadian undergraduate programs are in engineering. Women students represent 20% of that 6%. In China, 45% of undergraduates are in engineering."*
- *"We don't have a national culture that science is important. Forestry, mining and oil are important. What can we do in addition to resources? Raw resources will always be at a premium. It can't be the only engine of growth. Other countries will figure out how to do the value-added side of the business. We need to focus upstream."*

Disconnect Between Federal S&T Strategy and Education

- Some interviewees acknowledged that the government has released an S&T strategy, but saw a major disconnect with S&T education, which they believe is a dangerous mistake. *"If there is a really clear strategy for S&T at the federal level, there's not a strong connection between that strategy and the education system that is implementing that. In fact, there's a big disconnect. We need a clearer connection and integration between K-12 education and the federal strategy."*

- A significant number of interviewees expressed frustration about federal-provincial jurisdictional challenges that they see hampering the country's efforts in this area. Most understood and acknowledged the fact that provinces are responsible for implementing K-12 education, but many emphasized that the federal government still has major responsibilities, for example to promote the importance of education and facilitate access. *"We don't hear from the feds about education. We need to hear it."*

- Firms felt that the federal government can play an important role in working with both the private sector and provincial governments. *"Visibility and access to programs and opportunities in S&T promotion is a challenge to companies. A 'one-stop shop' would be useful. The federal government could create a portal to organize the information and make access easier." "Government leaders need to understand that we'll fail without serious promotion to kids about STEM. We need to promote cool careers and jobs. Provincial governments are too siloed. They don't share well. The feds should invest in a central repository. The federal and provincial governments can pool resources in an on-line database, each providing half the funding."*

- "In a federation, the federal government needs to play a public relations role for issues that involve education; set the tone; share best practices across the country, in different provinces, in other countries. Create a platform for provinces to join in and work under one program."
- "The federal government can lower barriers, financial barriers. It can promote higher education in general. It can provide bursaries, tax deductions."
- "The federal government can provide the environment where educational institutions and companies can meet. It can provide networking opportunities, create an environment that encourages experiment and encourages companies to get involved."
- "I'm frustrated by the federal silence on S&T education at the K-12 level. There's nothing wrong with jurisdictional responsibilities, but the situation weakens when there are hard dividers and lack of communication. There is no reason not to work together. There's magic that can happen. We need to build a consensus: 'this is where we're heading and how we're sharing resources.' We fail to achieve our potential as a nation when people say 'that's somebody else's job.' Silos harden and nothing great happens. I'm not saying that we should have no silos. That would be chaos. But we need a strong central focus on where we're going, and then great things happen."

- When we asked people about opportunities for the private sector to partner with the federal government and other stakeholders, the general reaction was positive. Most interviewees acknowledged that the private sector cannot do it alone and that all levels of government have critical roles to play.

- "Both federal and provincial governments need to be involved. It's a matter of being competitive in a global market."
- "Our firm strongly believes in joint effort between public institutions and the private sector."
- "We've had a number of collaborations where we each put in some money into the same program, but haven't done so much working together."
- "We're riding the same ship. We serve different roles and different masters, but we serve the same society. We believe in civil society and that we have a responsibility to contribute."

- However, some interviewees emphasized that the commitment from the federal government would have to be stronger than it is at present. *"It's easy to get involved, but the goals need to be clear. We need an innovation agenda in Canada. For R&D-intensive firms like ours to stay in Canada, the government needs to pull it together. No one is saying to the private sector 'we need your help.' To keep companies in Canada, government needs to enlist CEOs to get involved, for example to set up high school co-op programs. It's likely that the country is already suffering. Companies may have to move outside, because the government isn't stepping up." "Government needs to take the*

lead, but we need clarity. What is the government's vision? What are they doing? Within the company we need clarity in order to develop an effective program. We need to be strategic."

- A few people we spoke with were emphatic that the federal government should not hold any more consultations. They don't want more talk. They want action. *"The problem with so many workshops that I attend are that there are recommendations, but no actionable items for specific groups. We have so many coalitions, but let's do something. We need more actionable items for which people are held responsible."*