

precarn

Intelligent Systems. Thinking Technology.



Message from the Chair and the President

This has been a year when Canadians experienced a number of events that brought us together and had us, as a nation, glued to the media for updates: the fires in Kelowna; the blackout in Ontario; the largest music concert in Canadian history in Toronto resulting from the impact of SARS; and, Hurricane Juan in Halifax. For the intelligent systems industry, each of these events brought to the fore just how pervasive the technology has become in our day-to-day lives.

In its infancy, dangerous or hazardous situations spurred the development and application of intelligent systems technology. Creating systems and devices with the ability to gather information, analyse the data collected and take appropriate action was the overriding goal. Today, as we have witnessed in recent events, the technology is being used to predict, manage or prevent damage.

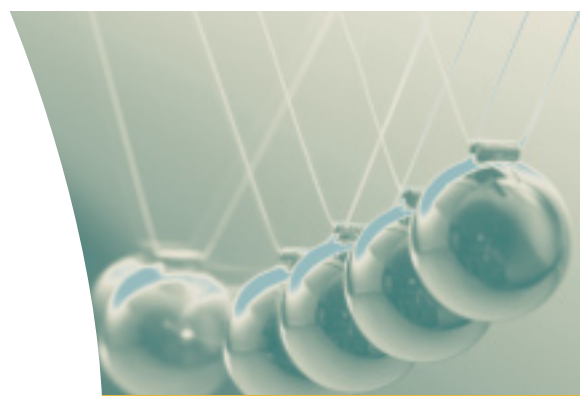
An intelligent systems technology developed through a Precarn project has resulted in a system that helps firefighters concentrate their efforts in forested areas most susceptible to ignition. Storm management uses modelling and simulation of weather systems to predict catastrophic situations and to suggest appropriate actions by the civil authorities. Security at large public gatherings often depends on vision systems and object recognition, among other technologies. A team of Precarn project researchers that linked companies and researchers from British Columbia, Alberta, Québec and Belgium, developed a system for the early detection of power line instability. Directly applicable to each of

... continued inside



Precarn's strengths are:

- its unique collaborative model, which involves an end user and sets up the conditions for commercialization within the project itself.
- its ability to invest public funds judiciously, with high levels of leverage with private investment in national collaborative R&D projects.
- its people, a coast-to-coast network of large and small companies, universities and colleges, and government research labs.
- its enabling technologies, with application in all sectors of the Canadian economy both now and for decades to come.
- its success in seeing research commercialized and marketed internationally.



OUR MISSION

Precarn's mission is to make Canadian firms more globally competitive by promoting the development and use of intelligent systems technologies and expertise.

Industry-Led Research

The Precarn network is made up of private businesses, SMEs, government research labs, universities, user companies, suppliers to the intelligent systems industry and individual academic researchers from across the country. A wide spectrum of expertise and interests make up this diverse group, and more notably, a great deal of world-class innovation stems from it as well.

The past year has seen continued success in project results and strengthened relationships with national and international partners.

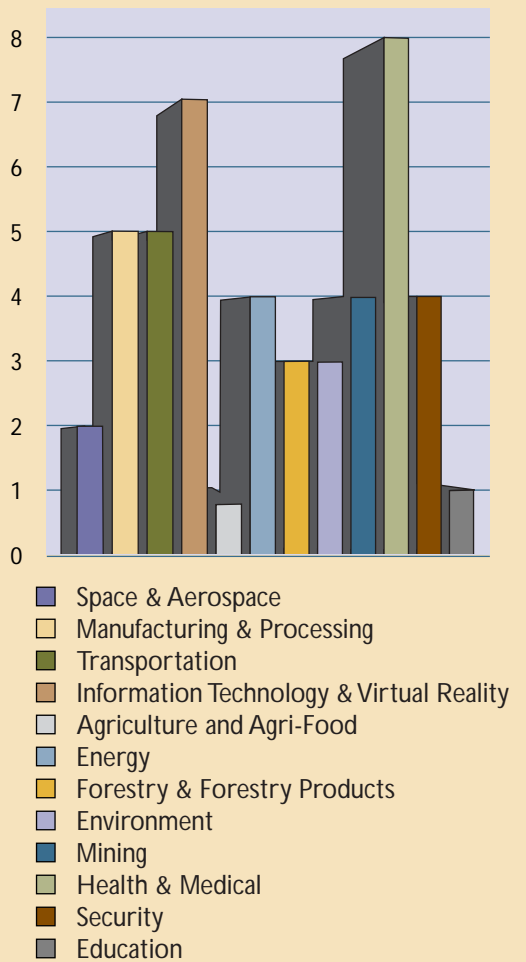
Core Program

The base of the Precarn Research Program, the Core Program, had 18 projects started, underway or completed in the past year. This program addresses the call for medium and large, longer term projects that involve large and small companies, universities, end-users and often government labs.

With the quintessential principle of a Precarn project being to provide an intelligent systems solution to a real business or technical issue, the sectoral scope to which the developed technologies apply is wide. (Note: Attached bar chart addresses this point.) A study performed in 2000 found that the greatest growth area for intelligent systems in the coming years would be in healthcare, transportation and security. Indeed, Precarn project results show a growth in the number of applications in these fields, as well as in mining, environment and education.

For years, intelligent systems technologies have been improving the day-to-day lives of Canadians in a wide spectrum of applications—and the impact is on an upward climb. This chart shows the application range of the current roster of Precarn and IRIS projects.

Technology Applications



Network News

The network membership is growing continuously. As of February 2004, Precarn had 63 Corporate members, 41 Researcher members, 20 Student members, and 9 Associate members, including industry associations, SME suppliers and research organizations. As a 4th Pillar organization, connecting this breadth of membership is key to the continued strength of intelligent systems innovation in Canada. Precarn projects under management this year involved 51 companies of all sizes, 18 universities, 13 federal government agencies, 4 provincial agencies, 2 municipalities and 1 independent research organization.

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Seated (left to right): Paul Pearl, Judith A. Whittick.
Standing (left to right): Paul Guild, Edmée Métivier,
Jean-Paul Boillot, Grant Thomas, John McDougall,
D.W. (Don) Denney, Yves Langhame, Prabha Kundur,
James Middleton, Don Hewson, Jim Roche, Anthony T. Eyton.

Alliance Program

Precarn has Alliance partnerships with six regional research organizations: BC Advanced Systems Institute; Alberta Research Council Inc.; Saskatchewan Research Council; Communications and Information Technology Ontario; Centre de recherche informatique de Montréal; and, Canadian Centre for Marine Communications. The program provides local links to companies performing intelligent systems R&D and ensures that SMEs across the country have access to and receive information on national activities. Matching funds for each research project, Precarn and its Alliance partners worked together in managing and funding 8 projects in 4 provinces.

International Program

Precarn's International Program encourages the pursuit of intelligent systems R&D opportunities and joint ventures with other countries, where a Canadian team works in collaboration with companies outside our borders. Projects in this program provide participants immediate access to an international network of potential strategic partners and a global customer base, in addition to the inside track on the latest technologies from foreign sources. Precarn is currently supporting Canadian teams participating in two projects involving 21 companies, 6 universities and 4 government labs in 10 countries.

"The Precarn-CRIM Alliance is a great example of a partnership supporting Québec's small and medium sized businesses in their efforts to drive innovation. Thanks to the contributions of the Alliance program, Québec-based companies have access to substantial financial support and can draw on the expertise of skilled researchers, allowing them to develop innovative technologies at an accelerated pace. Such was the case for Ryscho Media, whose new product, used in the dubbing and post-synchronization of videos and movies, is well positioned to become a commercial success on an international scale. All this to say, we are very proud of our collaboration with Precarn!"

Yves Sanssouci, President and Chief Executive Officer, Centre de recherche informatique de Montréal (CRIM)

Researcher Profile

Shahram Tafazoli: From student to entrepreneur

Shahram Tafazoli was a Ph.D. student at UBC when he first joined the Precarn network. Supported by IRIS funds, his research focused on machine monitoring and diagnosis, machine safety, control systems, simulator systems, and vision systems, and was the genesis of his company, Motion Metrics International Corp., which was formed in July 1999. Dr. Tafazoli is currently a member of the IRIS Research Management Committee.

Today, Motion Metrics has grown to an 8 person company, has 3 product lines, employs new university graduates and graduate students to develop its innovative products, has worked with Precarn members Wenco International Mining Systems Ltd., Syncrude Canada Ltd., and the Alberta Research Council Inc., and has started selling its systems



internationally to large surface mining companies and Original Equipment Manufacturers (OEMs).

Applicable to mining, forestry and construction, Motion Metrics has recently installed its intelligent embedded systems for large mines in Africa (diamond mine), Australia (gold mine), and USA (copper mine), and is testing its products with major European OEMs.

"After receiving the Emerging Opportunities Fund grant, I encouraged some of my students to submit papers to the 2003 Summer Simulation MultiConference, in Montreal – one of the oldest and most prestigious conferences in modeling and simulation. The papers were accepted, two were chosen to compete and eventually won first and third prize! This is a great experience for students and the support of Precarn allows me to do these kind of things."

Gabriel A. Wainer, Assistant Professor, Dept. of Systems and Computer Engineering, Carleton University

Message from the Chair and the President... continued

the Canada-wide events mentioned above, we can see how intelligent systems developed under the Precarn program have direct application to the lives and livelihood of all Canadians.

As a 4th Pillar organization, we are dedicated to linking industry, university and government through our network. With IRIS (Institute for Robotics and Intelligent Systems) entering its sunset year as a Network of Centres of Excellence, the coming year will be a time for Precarn to concentrate on ensuring the continuation of a strong university-led research program. The merging of the Precarn and IRIS networks has been in the works for the last four years. The synergies realized by integrating the two networks are creating new opportunities for companies and researchers of the enlarged network, which in turn ensures that Canada remains a leader in the development of advanced intelligent system technologies.

Innovative, creative, intelligent people underpin the success of the Precarn network. Working in collaborative projects, with the end goal of producing technologies that make a difference in our lives now and in the future, energizes the entire network. We continue to grow with new companies and researchers being added to the Precarn membership every month. New intelligent systems, at the very heart of enabling technologies, will be the drivers of productivity increases and quality of life enhancements. The Precarn network of over 142 companies, 37 universities, 25 government agencies and 16 other organizations (including non-government research organizations, funding organizations, and hospitals) is positioned to respond and deliver results for the benefit of Canadians.

Judith Whittick
Chair, Board of Directors,
Precarn Incorporated

Anthony T. Eyton
President and CEO,
Precarn Incorporated

University-Led Research *Ideas, technologies and people for Canadian industry*

The Institute for Robotics and Intelligent Systems (IRIS), a federal Network of Centres of Excellence, has been administered by Precarn since its inception in 1990. An integral contributor to the strength of the Precarn network, it provides a direct link to the university research community. Over the years, as the two programs have evolved, an unplanned benefit of the joint administration has been in seeing the IRIS researchers surface in Precarn member companies years after their graduation – and continue collaborations with their university connections.

The regular IRIS program currently has 18 projects underway, all of which will conclude in March 2005. Details of all IRIS programs and projects are available on the Precarn website at www.precarn.ca.

In 2002, in recognition of the need to retain highly qualified personnel in intelligent systems, Precarn developed the **Precarn Scholars Program**. Through it, Precarn has provided IRIS with \$1 million over three years to dedicate to keeping the best and brightest here in Canada. To date, 124 graduate students have been the recipients of varying award amounts. The fund supports study in a wide range of educational disciplines, including computer science, electrical engineering, mechanical engineering, medicine and psychology.

Getting a technology to a state of commercial readiness is a challenge for researchers everywhere, and perhaps even moreso in the university setting, where resources are in short supply. The **Technology Gap Assistance Program** (T-GAP) is the IRIS program dedicated to technology transfer. Be it building engineering prototypes, refining designs, conducting field studies or market assessments, T-GAP fills a recognized chasm of innovation and helps take university research one step closer to the world stage. Three projects are currently underway in this program.

To support university-industry interaction, Precarn, with funds from Industry Canada, supports cutting-edge university-led projects that are also supported by Canadian companies. The **Precarn University-Led Program** accelerates the creation and adoption of intelligent systems techniques from idea creation through to project completion. Two projects, involving a total of 7 universities, 2 government labs and 5 industry partners, are currently underway.

IS 2003: 13th Annual Canadian Conference on Intelligent Systems (Halifax)

Once a year, intelligent systems researchers from across the country come together to listen and learn from each other and to meet new people. It is Precarn's opportunity to bring together a national showcase of the year's fieldwork and to facilitate connections between like-minded individuals.

Demonstrations of surgical tools for closing incisions, robots that are being developed to aid the elderly, and more than 40 other projects, along with 60 academic posters, were just some of the highlights on the tradeshow floor. Technology snapshot presentations and the showcase area of demonstrations, posters and networking functions kept the more than 300 participants busy with lots to see, experience and learn.

"We (CSA) must make judicious use of our resources, and one of the smartest decisions that Canada has made is to create key partnerships and synergies to achieve projects of a truly national scope. We collaborate with other nations, with our stakeholders in Canada in the academic and industrial communities, and with organizations like Precarn. Precarn helps bridge the innovation gap between university and government research and commercial applications - a hub for uniting the critical mass of robotics researchers in Canada."

Marc Garneau, president of CSA, at the IS 2003 Conference in Halifax

Better Buildings through Integrated Intelligent Systems

Working in collaboration with Industry Canada and several other partners, Precarn convened a national workshop of construction industry stakeholders to explore how barriers to the integration of intelligent systems in present and future buildings can be overcome. Intelligent buildings offer reduced energy consumption and environmental impacts, improved building value, lower life-cycle costs and improved security and comfort for occupants. The workshop produced a set of recommendations that have been transmitted to government decision-makers and all the stakeholders. This workshop arose from Precarn's participation in Technology Roadmaps, a joint initiative of the federal government and Canadian industry. Intelligent buildings is a field in which collaboration at the R&D, demonstration and design stages prepares the foundation for successful, cost-effective implementation.



Pictured from left to right: Marc Garneau, IS 2003 Keynote Speaker; Stephen Smith 2003 Gordon M. MacNabb Scholarship Winner; and James Middleton, MD Robotics, Scholarship Sponsor.



Connecting researchers across the country

Bringing industry and businesses, universities and colleges, and government labs – the three traditional pillars of our economy – together is the *raison d'être* of 4th Pillar organizations ... and of Precarn.

Precarn and other 4th Pillar organizations enable innovation and amplify its impact. They bring together communities of common interest to focus on important opportunities to stimulate innovation. They add value to the innovation system in four ways:

- they create networks of industry and university leaders;
- they build partnerships and collaborations to undertake R&D;
- they create a national, cross-sectoral vision for R&D excellence; and,
- they develop, attract and retain highly qualified people.

Technology Snapshots

Never enough time or money. It's a message that we hear often. A Saskatchewan-based project developed smart scheduling software that considers available resources and time restraints in its solution. The research took into account the needs of targeted companies and a first trial took a \$2.3 million endeavour and reduced costs to \$1.7 million. Three end users, including Hitachi Canada are in place.

An early "heads up" to power system operators might have averted or reduced the impact of the power failure experienced in Canada last summer. The Power System Security Using Intelligent Technology (POSSIT) project – involving researchers from Powertech Labs, Institut de recherche d'Hydro Québec, University of British Columbia and the Alberta Research Council Inc. – can do just that. The technology is an online intelligent system that allows a power system to operate closer to its limits. It is currently being marketed to utilities throughout the world.

Safe, clean water is a right of all Canadians. Contamination, though, is possible, and Precarn project researchers are developing a system to eliminate the critical delays in testing municipal water systems. With the technological capability to detect contaminants and alert operators immediately, confidence in water purity will be renewed.

A new technology that automatically time-synchronizes text with the soundtrack of the dialogue for movies and videos is on the international market. Early in 2004, Ryshco media Inc., lead CRIM-Precarn Alliance project participant, ran a recording session at DreamWorks Studio in Los Angeles. They also have agreements to outfit five Techné Colour Studios in Montréal, Hollywood, England, Germany and Italy.

Pipeline corrosion can injure the environment, decrease productivity and cause long-term damage. The Intelligent Systems for Pipeline Infrastructure Reliability (ISPIR) project developed a system of fibre-optic sensors coupled with knowledge-based decision support software that provides early detection of pipeline weaknesses. Requests from two international companies for prototypes of this technology have been received.



Photo courtesy of Natural Resources Canada

To develop a system for detection and quantification of flaws, such as corrosion, cracks and impact damage in aircraft and aerospace structures, new technology was developed in which intelligent recognition techniques translate the very efficient discriminating power of the human eye into equally efficient algorithms. This project helped Tektrend to increase the employment from 28 to 34 employees during the two-year project. The successful outcome also helped to close the sale of Tektrend to Québec-based R/D Tech. R/D Tech is currently working on developing a beta version for their sales team and will begin commercializing the technology later this year.

Pulp and paper production might seem old school, but the industry is alive and well and very much a part of the competitive global economy. The Intelligent Systems for Thermomechanical Pulping project is developing intelligent models to characterize wood chip quality. The vision systems can pick out bark, decay and knots and determine chip size. The technology will make it possible to reduce manufacturing costs, improve and stabilize paper quality and increase production capacity due to higher quality fibre selection.

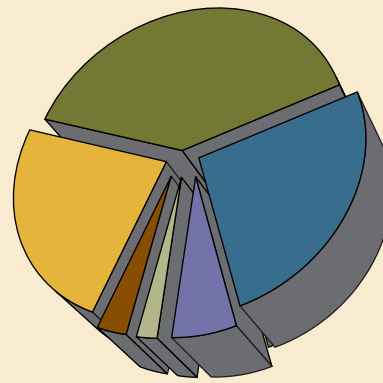


Information on all Precarn and IRIS projects is available on the corporate website at www.precarn.ca.

Precarn Research Management Committee (PRMC) 2003-2004

Mike Lipsett (Chair), Syncrude Canada Ltd.
Allan Akerman, Inco Limited
Claude Cajolet, BlueStreak Technology Inc.
Ahmad Chahbaz, R/D Tech
Anthony T. Eyton, Precarn Incorporated
Ray Gosine, C-CORE
Michael A. Greenspan, Queen's University
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Janice Singer, National Research Council Canada
Jacob Slonim, Dalhousie University
Kim Young, Saskatchewan Research Council
Harold Zwick, MacDonald Dettwiler and Associates Ltd.

Research Program Contribution Sources



This chart represents 3 reporting quarters. Final numbers will be available with the official financial statements.

- Industry Canada 24%
- Industry 39%
- NCE Program 26%
- CANARIE 6%
- CSA 2%
- Alliance Partners 3%



Seated (left to right): Anthony T. Eyton, Paul Johnston. Standing (left to right): Maryse Côté-Singer, Rick Schwartzburg, Peggy MacTavish, Celeste Burnie, Derek Best, Nancy Allen, Karen Gaw, Julie Haywood, Colin Taylor, Graham Taylor, Wendy McDiarmid, Cheryl Elliott.

Precarn Staff

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Paul Johnston, Vice President, Operations

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Derek Best, Senior Manager, Research Projects
Colin Taylor, Manager, Research Projects
Wendy McDiarmid, Program Support, Research Projects

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Graham Taylor, Director, Business Development
Cheryl Elliott, Communications Officer
Julie Haywood, Communications Officer
Celeste Burnie, Member Relations Coordinator
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Rick Schwartzburg, IRIS Network Manager

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