YEAR IN REVIEW

TRANSFORMATIONS

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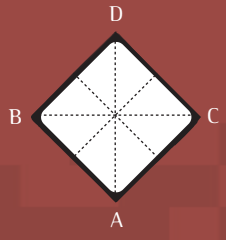
1.



Crease page as shown
and unfold.

TRANSFORMATION #1:

LEADERSHIP

It takes time to create.

A transformation in leadership is bringing new energy and ideas to iCORE.

ROGER SMITH

CHAIR OF THE BOARD

iCORE

IN a five-year period, iCORE has developed a strong group of researchers in key information and communication technology (ICT) areas at Alberta's universities. Targeted investment and a clear focus have been iCORE touchstones these past years. They have kept us on track, and have resulted in iCORE's impact being recognized and sometimes emulated around the province and across the country.

iCORE's focus was no accident. The ICT strategy the Alberta government released in 1998 was also focused. The government's willingness to provide substantial funding in targeted areas for sufficient periods of time has allowed us to make significant strides in areas that can transform the lives of ordinary Albertans.

While the government was clear in its focus, it has also allowed us tremendous freedom: to establish strong and innovative programs; to create entities like the international iCORE Research Advisory Committee (IRAC); and to establish a thoughtful and committed board of directors. These are some of the reasons iCORE has attracted attention in ICT research around the world.

We have also benefitted from the effective leadership of past president and chief executive officer Brian Unger, whose vision coupled with his ability to work effectively with the board and various advisory groups kept us moving in the right direction.

Partnerships – at all levels – remain key to iCORE's success. Alberta's universities, the Natural Sciences and Engineering Research Council of Canada, TRLabs, Alberta Ingenuity, Syncrude, Sun Microsystems and the Alberta Heritage Foundation for Medical Research are just a few of our many valued partners that have played an important part in iCORE's success.

As we embark on our second five-year cycle, we will seek to strike a balance between maintaining our roots and taking on new initiatives. First and foremost, we must maintain adequate resources to further develop our leadership position. To guide this process, iCORE has established an international board of review to examine our first five years. The board's recommendations, which will be forthcoming this autumn, will help us take stock of what we have achieved, what we can improve, and how we can further advance the ICT agenda in Alberta and Canada. These recommendations, along with the dynamic leadership of our new president and chief executive officer, Randy Goebel, will chart the course for the next five years.

iCORE is just one component of a successful ICT strategy in Alberta. While our mandate is focused on bringing the best information science and engineering researchers to the province, we also recognize we cannot work in isolation. iCORE's vision and strength, in collaboration with others, will continue as a significant contributor to transforming Alberta's economy.

BRIAN UNGER
PAST PRESIDENT AND CEO
iCORE

iCORE's central objective is to make four new major awards each year, and in 2004, we again met this target. I am pleased to welcome Dr Pierre Boulanger, Industrial Research Chair in Collaborative Research Environments at the University of Alberta, and at the University of Calgary, Dr Fadhel Ghannouchi, head of the new Intelligent RF Radio Laboratory, and Dr Christoph W. Sensen, the Industrial Research Chair in Applied Bioinformatics.

I am also delighted to welcome Dr Stuart Kauffman as the iCORE Chair of the Institute for Biocomplexity and Informatics at the University of Calgary. This award reflects a new "health informatics" direction for iCORE, a direction that was encouraged by iCORE's International Research Advisory Committee. Dr Kauffman's work brings together researchers in three faculties and five departments including medicine, biology, physics, computer science, and electrical and computer engineering. Multidisciplinary research of this kind is of accelerating importance. No longer content to work in silos, researchers are pushing collaborative boundaries that will ultimately make substantial improvements in the everyday lives of all Albertans.

As our 2004 annual research and performance reports indicate, iCORE has made major transformative contributions to informatics research in the province. In just five years we have funded 19 teams that support over 500 researchers: faculty, staff, postdoctoral fellows and graduate students. iCORE has committed over $40 million to these researchers while they have directly raised more than $100 million during the same period to support their work, and have participated in acquiring an additional $120 million to support Alberta-based research. This funding leverage, plus emerging technology commercialization (for example, four new spinout companies), has been achieved with an average time of only two years after receipt of an iCORE award.

iCORE has been transformative for me as well. When I came to Canada as a young postdoctoral fellow in 1972, I could not imagine the path my career would take. Thirty years and many initiatives later, I can say that these past five years at iCORE have been among the most rewarding. I have been privileged to recruit and work with extremely talented people who will have a major long-term positive impact on the knowledge-based economy within Alberta. Also, during my tenure with iCORE, I have been able to bring my professional associations with WestGrid and Netera in line with my work at iCORE. It has been very gratifying to see how these organizations have worked together to build, operate and effectively utilize Alberta's current ICT research infrastructure, which today is valued at more than $50 million.

iCORE's achievements would not have been possible without our highly competent and optimistic staff and consultants who have cheerfully and collaboratively dealt with the many challenges that we faced. Lynn Sutherland, Carole Carlton, Mary Anne Moser, Lilly Wong, along with Gordon MacNabb, John Mylopoulos, Betty Ann Snyder, Fred Stewart, Terry Caelli, Rob Holte, Peter Garrett, plus iCORE's Board and many committed volunteers, have all made crucial contributions to iCORE's initial successes.

It has been a great privilege to have served as iCORE's founding president. My term has now ended and I am very pleased to pass on the leadership of iCORE to a highly talented visionary successor, Randy Goebel. I am confident that he, working with the many other exceptional leaders within Alberta, will be able to build on past success and achieve far more towards making Alberta a recognized ICT leader on the world stage.

R.G. (RANDY) GOEBEL

PRESIDENT AND CEO

iCORE

iCORE set off in uncharted territory and has become an Alberta success story, attracting top researchers and students from around the world and creating a research community with the power to transform the province. While iCORE has attracted very good people and has some of the puzzle pieces in place, we still have a long way to go. Building iCORE has been like building a hockey franchise. Getting the right start and building an identity is a major accomplishment, but the next challenge is building talent pool depth, and sustaining an ever-dynamic roll-out of remarkable players.

We have started a huge ball rolling. Our challenge is to keep the ball moving in the right direction. In 2005, the first round of iCORE research chairs come up for renewal, so we are once again in uncharted territory. We know our resources are finite. There will never be enough dollars. We must continue major support for existing iCORE researchers while continuing to attract additional people capable of top science. We want more and better graduate students to move to Alberta and stay. And we must build a pipeline to the Alberta economy so the value these researchers are generating is recognized and exploited. Taking results from academic research and translating them into substantial economic value – this will be one of iCORE's key growth areas.

As iCORE's new president and CEO, I am committed to building on the accomplishments of the past five years. This will be challenging. Alberta continues to underestimate the role of ICT as an enabler of all other disciplines and sectors in the province's economy. Collaboration will be key to improving this situation and we will work with interested stakeholders to create a vital provincial ICT strategy.

As it has for the past five years, iCORE will continue to contribute to the transformation of the Alberta economy. iCORE expects to play an important role in the formation of Alberta's ICT Institute, announced in February 2004.

Like legs on a stool, three things are needed to make a difference in an effective innovation cycle: infrastructure, knowledge capital and financial capital. The infrastructure foundation has been laid with Netera and WestGrid. The knowledge capital is being built through iCORE and partners. The next challenge is to increase this knowledge capital and to realize the financial capital.

So how will we know when we have won the Stanley Cup of research? When iCORE receives unqualified recognition from around the world as an ICT leader, and more importantly, when everyday Albertans see the impact iCORE is having in the province.

Success in this business usually comes when you think the unthinkable. I am confident that together we can continue to build research teams that are contenders not only for the Stanley Cup, but every other top prize on the world stage.

2

Fold corners B and C inwards
to meet with A. Corner D will
again fold over as a result.

3.

Flatten corner D down
to meet with A, B and C.

4.

Fold corners E+F to the
centerline of the square.

5.

The creases created will be
used in again in Step 8.

6.

Unfold corners E+F.
Repeat steps 4–6 to corners
G+H on reverse side.

TRANSFORMATION #2:

FOUR NEW CHAIR AWARDS

Stay focused, but be agile.

iCORE is transforming its scope to include a powerhouse of research on management, analysis and processing of massive data sets.

STUART KAUFFMAN

iCORE CHAIR, BIOCOMPLEXITY AND INFORMATICS

BIOLOGY AND PHYSICS, UNIVERSITY OF CALGARY

IT was the appeal of resources to carry out important work and the opportunity to build an interdisciplinary institute that convinced Dr Stuart Kauffman to leave Santa Fe, New Mexico, his home for 18 years. Now at the University of Calgary, Kauffman is poised to launch the Institute for Biocomplexity and Informatics, which will focus on developing theories and conducting companion experiments that look at the structure, logic and integrated dynamics of genes.

The institute seeks to specifically understand how genes, and their capacity to control one another's activities, control normal and abnormal cell development. "We have known for 45 years that one gene can make a protein that binds to a site near a second gene, thereby modulating the second gene," Kauffman explains. What is less clear is how the 25,000 human genes coordinate their activities with each other through cell regulatory networks. Solving some of the mystery, says Kauffman, has the power to transform biomedicine toward a discipline that is able to control cancer proliferation and tissue regeneration, and sits astride the main conceptual and clinical issues that affect twenty-first century biomedicine.

Kauffman will lead an interdisciplinary team of physicists, biologists, computer scientists, mathematicians, computer and electrical engineers in Calgary and through a virtual institute of 20 colleagues around the world. Their experimental work will almost exclusively focus on stem cells and cancer cells, attempting to understand sequential patterns of gene activities. "We hope to find a small organic molecule that can control stem cell differentiation for tissue engineering purposes," says Kauffman. "This could mean repairing damaged heart tissue after a heart attack, neurons for people who have had a stroke or cartilage for those who have none left in their knees." And if the molecules that control stem cell differentiation in cancer were known, it is possible that methods could be developed to cause cancer cells to kill themselves or revert back to normal.

Only time will tell whether stem cell differentiation therapy will become a valuable tool in the fight against cancer, or whether it will live up to its potential for tissue engineering. Through the Institute for Biocomplexity and Informatics, Alberta is poised to tackle these challenges in a coordinated and organized way.

"I am deeply grateful to iCORE and the University of Calgary for creating this institute," adds Kauffman. "iCORE is acting precisely as a transformational agent on the Alberta, Canadian and North American scene by funding research and projects that are on the very edge of the achievable. This kind of capacity to fund novel, high-risk science is precisely the kind of 'venture' capital that will drive science forward and benefit the region and hopefully the world."

Dr Kauffman has received an iCORE Chair and Professor Establishment (CPE) grant of $4.45 million over five years to lead an $8.85 million research program that will establish the Institute for Biocomplexity and Informatics. iCORE's investment represents about half of the budget. The University of Calgary is contributing $1.35 million in cash and $415,000 in kind over the five-year research program. The University of Alberta and industry are contributing $415,000 and $360,000 in kind respectively. The Natural Sciences and Engineering Research Council of Canada ($575,000), the Canadian Foundation for Innovation ($700,000), the Alberta government ($335,000) and industry ($150,000) are expected to provide additional support over the initial five-year period.

FADHEL GHANNOUCHI

iCORE PROFESSOR, INTELLIGENT RF RADIO TECHNOLOGY

ELECTRICAL AND COMPUTER ENGINEERING, UNIVERSITY OF CALGARY

Developing a concept is good. Even better is pushing that concept into a prototype with real-world applications. That is the philosophy of Dr Fadhel Ghannouchi, head of the newly established Intelligent RF Radio Laboratory at the University of Calgary. Pushing concepts to the limits is nothing new for Ghannouchi. After 20 years as a researcher, scientist, engineer, technical leader and educator, he sees a world where wireless communication can be faster, cheaper and more efficient.

In the past 10 years, technological progress in the communication and computer industries has transformed how the world works. But this same transformation has increased expectations. People want to communicate with anyone, anywhere, at any time, and in many different ways. These expectations set the stage for Ghannouchi and the team he is building. "We will be doing leading-edge research, development, testing, validation and evaluation of new concepts and architectures pertinent to software-enabled (intelligent) RF radio activities," he explains. "The goal is to develop a new kind of reconfigurable multi-branch transceiver technology needed for broadband multi-antennas and MIMO communication systems that are two to 10 times faster and more reliable than the single input/output transceiver architecture we use today." This is good news for anyone who uses a cell phone, has a satellite TV or operates a home wireless network. And while the work they are doing now might not be realized in products for several years, this kind of research is essential to positioning the industry for the future.

Some would find it daunting to start a lab with the ambitious goal of becoming a first-class, internationally known RF radio research laboratory. Not Ghannouchi. While he admits it is quite a challenge, he thinks all the pieces are in place for success. "The support from iCORE, Nortel Networks and TRLabs was crucial in my decision to leave the University of Montreal and move to Calgary," he says. "I have resources, people and the support of the university. I know it will be challenging, but I am excited about what lays ahead."

Ghannouchi says iCORE continues to impress him as he becomes more familiar with the organization's objectives and mandate. "Investing in people and helping generate intellectual property and valuable knowledge related to information technology makes me proud to be supported by organizations like iCORE and TRLabs," he adds. It is this collaborative spirit between universities, government and the local wireless communication industries that Ghannouchi believes will transform academic theories into practical potential.

Dr Ghannouchi has received an iCORE Chair and Professor Establishment (CPE) grant of $1.508 million over five years to lead the $5.4 million Intelligent RF Radio Laboratory project. iCORE's investment represents approximately 27 per cent of the total budget. The University of Calgary ($750,000), TRLabs ($315,000), the Natural Sciences and Engineering Research Council of Canada ($750,000 expected), the Canada Foundation for Innovation ($291,000), Canada Research Chairs Program ($1,000,000) and industry ($650,000) are providing additional cash contributions. In-kind contributions from TRLabs, the University of Calgary and industry will provide an additional $3.9 million over the next five years.

PIERRE BOULANGER

iCORE / TRLABS INDUSTRIAL RESEARCH CHAIR, COLLABORATIVE VIRTUAL ENVIRONMENTS

COMPUTING SCIENCE, UNIVERSITY OF ALBERTA

Seated in his laboratory at the University of Alberta, Dr Pierre Boulanger sees a world where no geographic boundaries exist, where people can meet any time, any place and anywhere. It is an ambitious goal. But Boulanger believes in his science, and knows the technology and multimedia applications his team is developing for Collaborative Virtual Environments (CVE) have the power to transform the way people live and work.

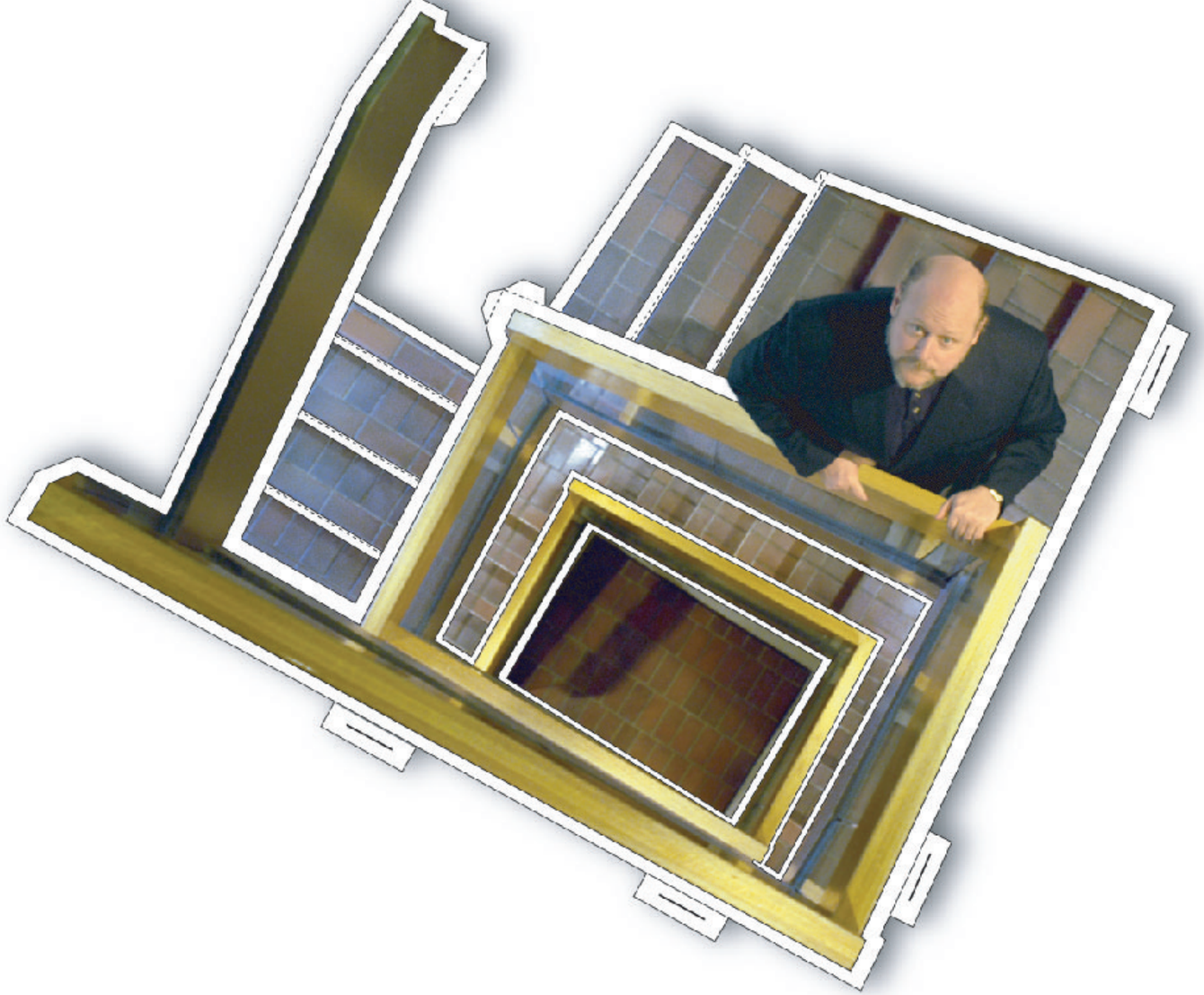
Imagine bringing virtual design, virtual simulation and communication together in one unique, integrated environment. It is an environment where science imitates life, allowing people to interact and collaborate in real time and sharing a virtual world where complex information can be easily interpreted, shared and manipulated. It is an environment that will quite literally transform the concept of telecommuting as we know it today, enabling people to work in their chosen field and live wherever they like.

"People are repositories of all kinds of information. We know that errors are often caused by lack of communication between members of multinational teams. Imagine the power when you are able to bring these people together in the truest sense of collaboration," says Boulanger. Engineering, medicine and urban design are just a few of the fields where projects often require many collaborators from around the world.

Consider the value of being able to show a defective machine part and demonstrate the error to colleagues a continent away. Or for physicians in one city to demonstrate new operating techniques to others thousands of miles away. Boulanger says that by creating virtual environments where people can interact with each other and with computer-generated models, industry can become more competitive and efficient, and could save millions of dollars in travel costs, design errors and time to market.

Boulanger came to Alberta because he saw the province as a place with a lot of breathing room both in a physical and virtual sense. "Albertans are doers. They like to get things done," he says, adding that iCORE is a good example of what can be accomplished in a short time. Boulanger applauds programs like iCORE's Industrial Chair Establishment (ICE) grant, which he says have the opportunity to leverage precious research dollars and create vital synergies between industry and academic research.

Boulanger also credits iCORE for its focused, yet hands-off approach. "The beauty of iCORE is the freedom it gives me. I am able to decide how to use the funds." He adds that in recent years it has been relatively easy to get money for equipment in Canada; however, it has been less easy to get money to hire people to work the equipment. "At the end of the day, it is not about the toys you have. It is about the people, because it is people who generate the ideas. iCORE is a solid program, unique in Canada, that is putting the money where it counts – in people."



Dr Boulanger has received an ICE grant of $50,000 per year for five years for a total of $250,000. This will contribute to a $1.7 million research program in Collaborative Research Environments. iCORE's investment represents about 15 per cent of the budget. TRLabs is contributing $265,000 over five years. Industry partners are contributing $478,000 in kind and the University of Alberta is contributing $125,000 in kind. The Canada Foundation for Innovation, the Natural Sciences and Engineering Research Council of Canada (NSERC) and CANARIE Inc. are providing additional funding.

CHRISTOPH W. SENSEN

iCORE/SUN MICROSYSTEMS INDUSTRIAL RESEARCH CHAIR
APPLIED BIOINFORMATICS

BIOCHEMISTRY AND MOLECULAR BIOLOGY, UNIVERSITY OF CALGARY

You can call Dr Christoph Sensen a CAVE Man. He doesn't mind the label. The medical CAVE is Sensen's brainchild, an eight- by eight-foot automated virtual reality environment at the University of Calgary. And while the room initially appears to be empty, the space becomes alive with spatial relationships that literally let researchers and visitors travel inside the human body.

Imagine travelling inside the human heart. Or watching an enzyme approach a cell membrane. Sensen's team and their groundbreaking use of Java 3D™ technology bring mathematical modeling to life, pushing the limits of science to build multidimensional models of cells, tissues, organs and entire organisms that allow researchers to better understand diseases such as cancer, diabetes, Parkinson's and Alzheimer's. It is like watching a magnificent 3D movie where the stars are the very fabric of human life.

"We are trying to build a wire frame of the human body," explains Sensen. "We want to take all the data sets from experts around the world, integrate them and add a spatial and temporal component that will ultimately help us find the underlying causes of complex genetic diseases." It is a top down approach that allows for knowledge gaps while pushing the boundaries of traditional biology and genetics research. And it is one that he hopes will eventually transform the lives of everyday Albertans.

"I made a conscious decision to come to Alberta because I saw future potential," he adds. Four years later, Sensen says that future is now, adding that support from the universities and the provincial government has been phenomenal. "We are building the infrastructure for a life sciences program that can transform this province. We are focused on creating diversity so when other more traditional economic areas falter, new avenues will be open to challenge and employ Albertans." So what is ahead for Sensen? The sky is the limit. "Four years ago we were starting at square one. I look at all we have accomplished and wonder where the time has gone."

Dr Sensen leads a five-year, one million dollar research program in Applied Bioinformatics. He has received an iCORE Industrial Chair Establishment (ICE) grant of $500,000, which represents about 50 per cent of the total budget. Sun Microsystems is also providing $100,000 per year for five years.

7.

Inverse fold corner E into itself, using the creases made in step 6 as a guideline for the fold.

8.

Corner E meets centerline of paper underneath the surface as indicated by dotted line. Repeat for corner F.

9.

Corners E+F should now be "hidden" under page surface. Flip paper and repeat steps 7–8 for corners G+H.

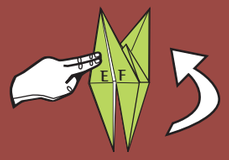
10.

Corners G+H shall meet the centerline of the square. Dotted line shows "hidden" corners G+H underneath.

11.

Unfold bottom corner upwards as shown. Corners G+H should now be visible again.

12.



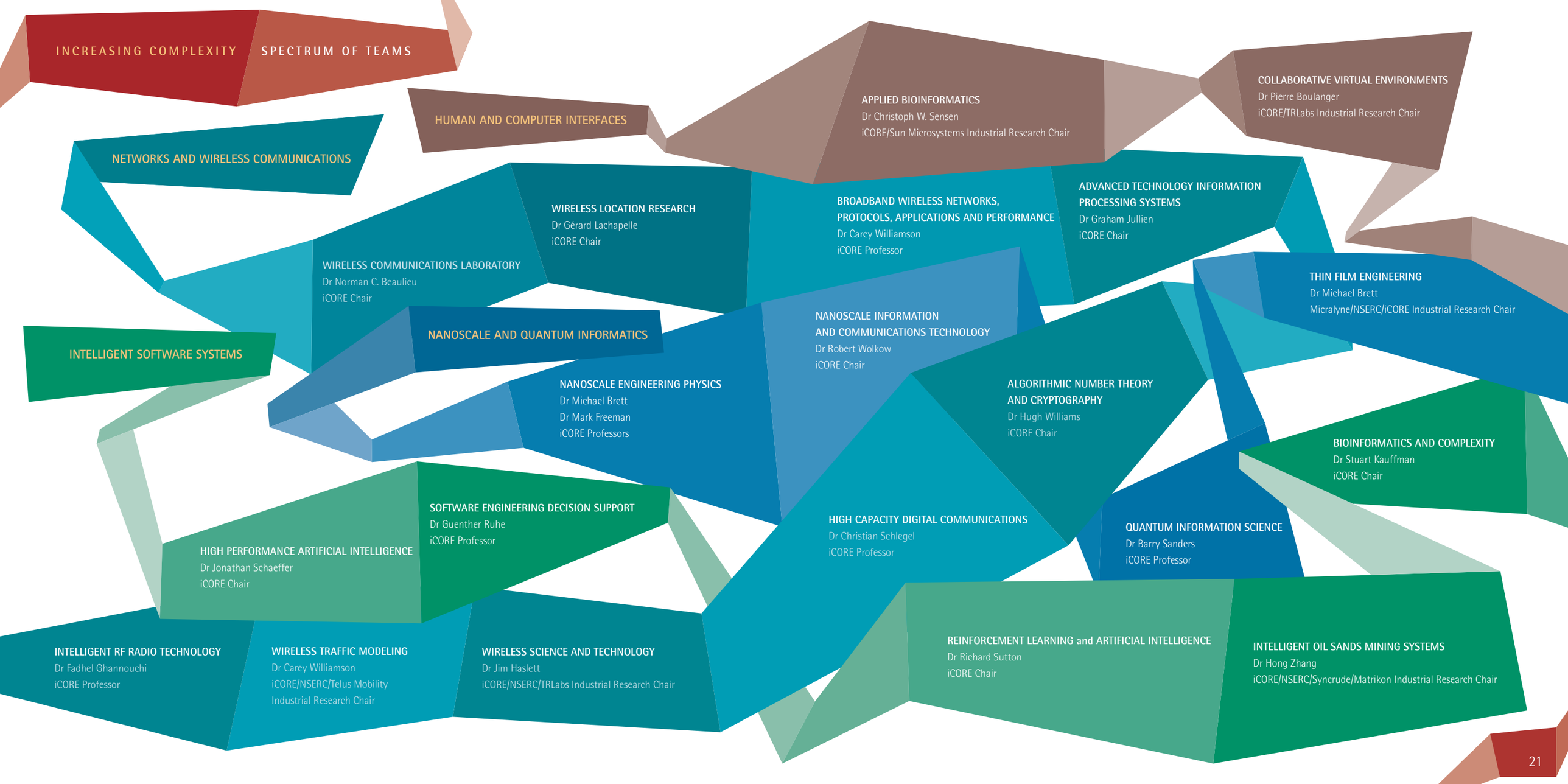
Repeat on reverse side to reveal corners E+F.

TRANSFORMATION #3:

INCREASING COMPLEXITY

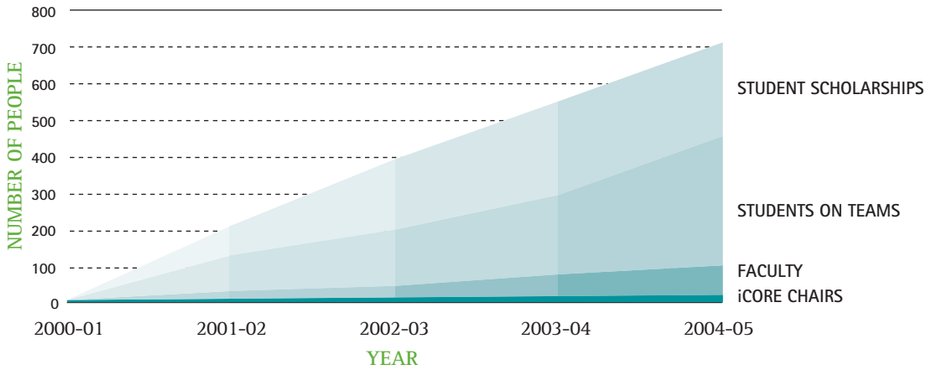
Keep track of progress.

The depth and breadth of iCORE excellence is transforming the ICT research sector in Alberta. Here's evidence.

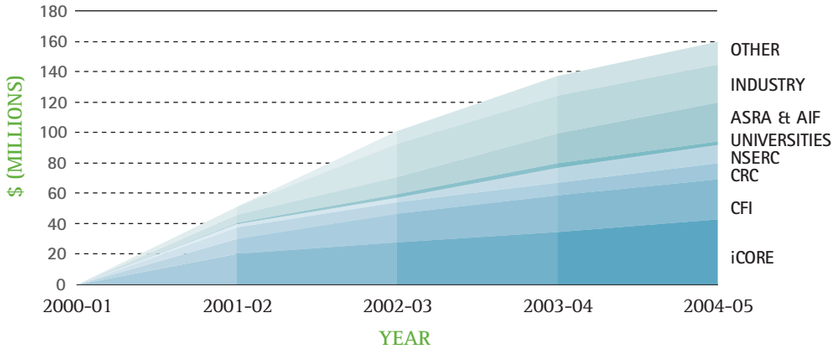

INCREASING COMPLEXITY
SPECTRUM OF TEAMS
HUMAN AND COMPUTER INTERFACES
NETWORKS AND WIRELESS COMMUNICATIONS
NANOSCALE AND QUANTUM INFORMATICS
INTELLIGENT SOFTWARE SYSTEMS
APPLIED BIOINFORMATICS
Dr Christoph W. Sensen
iCORE/Sun Microsystems Industrial Research Chair
COLLABORATIVE VIRTUAL ENVIRONMENTS
Dr Pierre Boulanger
iCORE/TRLabs Industrial Research Chair
WIRELESS LOCATION RESEARCH
Dr Gérard Lachapelle
iCORE Chair
WIRELESS COMMUNICATIONS LABORATORY
Dr Norman C. Beaulieu
iCORE Chair
BROADBAND WIRELESS NETWORKS, PROTOCOLS, APPLICATIONS AND PERFORMANCE
Dr Carey Williamson
iCORE Professor
ADVANCED TECHNOLOGY INFORMATION PROCESSING SYSTEMS
Dr Graham Jullien
iCORE Chair
THIN FILM ENGINEERING
Dr Michael Brett
Micralyne/NSERC/iCORE Industrial Research Chair
NANOSCALE INFORMATION AND COMMUNICATIONS TECHNOLOGY
Dr Robert Wolkow
iCORE Chair
NANOSCALE ENGINEERING PHYSICS
Dr Michael Brett
Dr Mark Freeman
iCORE Professors
ALGORITHMIC NUMBER THEORY AND CRYPTOGRAPHY
Dr Hugh Williams
iCORE Chair
BIOINFORMATICS AND COMPLEXITY
Dr Stuart Kauffman
iCORE Chair
SOFTWARE ENGINEERING DECISION SUPPORT
Dr Guenther Ruhe
iCORE Professor
HIGH PERFORMANCE ARTIFICIAL INTELLIGENCE
Dr Jonathan Schaeffer
iCORE Chair
HIGH CAPACITY DIGITAL COMMUNICATIONS
Dr Christian Schlegel
iCORE Professor
QUANTUM INFORMATION SCIENCE
Dr Barry Sanders
iCORE Professor
INTELLIGENT RF RADIO TECHNOLOGY
Dr Fadhel Ghannouchi
iCORE Professor
WIRELESS TRAFFIC MODELING
Dr Carey Williamson
iCORE/NSERC/Telus Mobility
Industrial Research Chair
WIRELESS SCIENCE AND TECHNOLOGY
Dr Jim Haslett
iCORE/NSERC/TRLabs Industrial Research Chair
REINFORCEMENT LEARNING and ARTIFICIAL INTELLIGENCE
Dr Richard Sutton
iCORE Chair
INTELLIGENT OIL SANDS MINING SYSTEMS
Dr Hong Zhang
iCORE/NSERC/Syncrude/Matrikon Industrial Research Chair


INCREASING COMPLEXITY
RESEARCH SUBSTANCE
ICORE RESEARCH TEAMS ARE MAKING SUBSTANTIAL TRANSFORMATIONS IN THE
BASIC AND APPLIED UNDERSTANDING OF INFORMATION TECHNOLOGY
GROUNDING KNOWLEDGE IN EXPERIENCE
IS CHALLENGING BECAUSE KNOWLEDGE IS HIGH-LEVEL
AND CONCEPTUAL WHEREAS EXPERIENCE IS LOW-LEVEL AND SENSORI-MOTOR.
OUR GOALS IN THIS PROJECT ARE TO DESIGN
A SERIES OF TRANSISTOR LEVEL BUILDING BLOCKS
TO ADDRESS A MAJOR FUTURE THRUST
MICRO-ELECTRONICS, MICRO-ELECTRO
AND COVARIANCE MATRICES WHILE MAKING OBSERVATIONS OF EACH OTHER.
MICROCONVERGENCE REFERS TO THE INTEGRATION OF ADVANCED MICROSTRUCTURE TECHNOLOGIES SUCH AS
THAT ONLY REQUIRES NETWORK ELEMENTS TO EXCHANGE STATE VECTORS
THE PARADIGM OF HYBRID INTELLIGENCE WAS FURTHER DEVELOPED AND REFINED.
A POSITIONING AND ORBIT DETERMINATION ALGORITHM
WAS DEVELOPED BASED ON A DECENTRALIZED PROCESSING STRATEGY
FEATURE-EXTRACTION-BASED TIMING RECOVERY
TWO DIFFERENT APPROACHES TO BE PURSUED ARE MAXIMUM LIKELIHOOD ESTIMATION AND
A LARGE NUMBER OF DIVERSE DATA TYPES INTO COHERENT MODELS.
TO DEFINE A SIGNATURE FOR THE IMPLEMENTATION
WE EMPLOY WAVELET ANALYSIS, WHICH PROVIDES A MULTI
THE MAIN GOAL OF OUR PROJECT IS TO MERGE
QUANTUM STATE SHARING, QUANTUM WALKS, AND GEOMETRIC PHASE HAVE BEEN ACHIEVED IN THE PAST YEAR.
SIGNIFICANT RESEARCH ADVANCES IN THE AREAS OF
QUANTUM FINGERPRINTING,
AND THE FREQUENCY HOPPING GIVES IMPROVED DIVERSITY
AND MULTIPLE ACCESS CAPABILITY.
AFFINITY, ETC.
THE BIT-INTERLEAVED CODED MODULATION PROVIDES ERROR CORRECTION
DEVELOPMENT AND EXTENSIONS OF
"CALIFANO" INVERSE ENGINEERING ALGORITHMS TO TIME SERIES EXPRESSION DATA.
A NEW PROJECT HAS US USING SEARCH ALGORITHMS TO AUTOMATE THE LAYOUT OF SANITARY AND STORM SEWERS IN HOUSING SUBDIVISIONS.
EXTREMELY EFFICIENT AND
CHEMICAL AFFINITY, LIGHT ABSORPTION AND
WE BELIEVE THAT THE BEAUTY OF MOLECULES AS BUILD
THESE WILL THEN BE EMPLOYED IN
A WIDE VARIETY OF APPLICATIONS, FROM SMART CLOTHING TO MEDICAL MONITORING TO ENVIRONMENTAL SENSING
THESE ARE THE FUNCTION FIELD COUSINS OF QUADRATIC NUMBER FIELDS
AND ARE THE
EXAMINATION OF THE EFFECTS OF NOISE ON ERGODIC SETS
AMONG ATTRACTORS IN BOOLEAN NETWORKS.

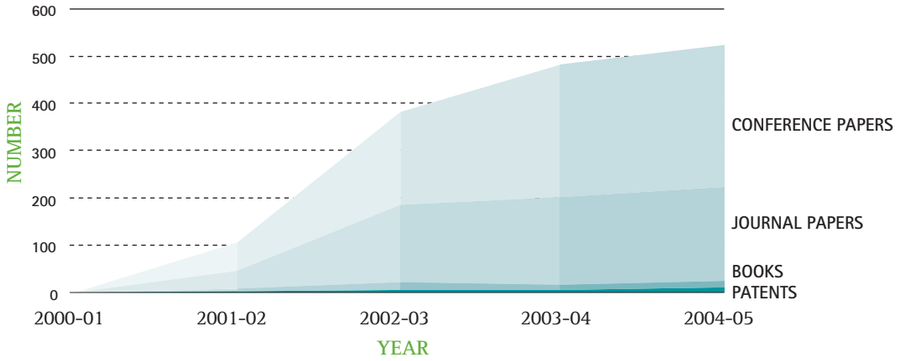
ACTIVE HIGH QUALITY PEOPLE SUPPORTED BY iCORE



ACTIVE RESEARCH FUNDING ATTRACTED BY iCORE



ANNUAL INTELLECTUAL PROPERTY CREATED BY iCORE

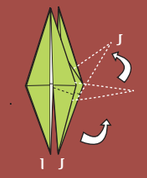


PERCENTAGE OF NSERC PGS AWARDS IN CS AND ECE HELD IN ALBERTA

13.

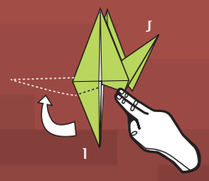
Flatten paper. Resulting form will have 3 peaks at top and two legs at the bottom.

14.



Pull leg J to the right and up. As leg is folded in upon itself, there will be some buckling.

15.



Press down on dotted line to lock in fold. Repeat process with leg I.

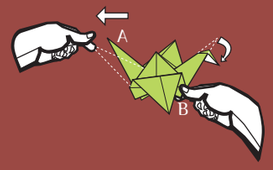
16.

Fold peak K downwards along dotted line, as shown, to create wings.

17.

Flatten wing tip down. Flip paper and repeat process with peak L.

18.



Inward fold to create head. Hold point B while pulling back on point A to flap wings.

TRANSFORMATION #4:

EXPANSION OF ICT IN THE PROVINCE

Get wings.

New owner, new partners, first award renewals, the first international review. The province's ICT research sector is taking flight.

iCORE is an organization that fosters an expanding community of exceptional researchers in the field of informatics, that is, areas of computer science, electrical and computer engineering, physics, mathematics and other disciplines related to information and communications technology (ICT). It operates several grant programs to develop iCORE Chairs at Alberta universities in these areas, around which world-class research teams are developed. Funding is provided by the Government of Alberta and supported by partners in universities and industry.

iCORE is directing its support to areas in which Alberta has a chance to develop internationally recognized research teams. It is also focusing on areas in which Alberta companies are active, so that intellectual property and valuable knowledge workers resulting from iCORE's investment will have compelling reasons to stay in Alberta.

FOCUS AREAS FOR THE FIRST FIVE YEARS:

Informatics – that is, areas of computer science, electrical and computer engineering, physics, mathematics and other disciplines related to information and communications technology – is the focus of iCORE's programs.

NETWORKS AND COMMUNICATIONS
(for example, wireless communications, Internet protocols, protocol design and performance analysis)

HIGH PERFORMANCE COMPUTING
(for example, grid computing, very large database systems, and computational science)

HUMAN AND COMPUTER INTERFACES
(for example, computer graphics, multimedia, collaboration, privacy, cryptography and secure systems integration)

INTELLIGENT INFORMATION SYSTEMS
(for example, artificial intelligence, machine learning, data mining, and data integration)

SOFTWARE SYSTEMS
(for example, system design, development, tools, and evaluation; embedded and distributed systems)

NEW ARCHITECTURES AND DEVICES
(for example, quantum computing, molecular computing, and nanocomputing)

A NEW AND EXPANDING ROLE FOR ICT IN THE PROVINCE

RENEWALS
iCORE undertakes its first round of renewals. All six original iCORE Chair and Professor Establishment grants are reviewed by international peers. Remarkable progress is noted and all grants renewed.

INTERNATIONAL REVIEW
The first international review of iCORE's programs and processes is undertaken to look at the first five years of operation. An International Board of Review is appointed, including:

- **Jim Derbyshire**
  Chief Executive Officer
  SiGe Semiconductor, Canada
- **Eugene Fiume**
  Department of Computer Science
  University of Toronto, Canada
- **Martyn Guest**
  Computational and Engineering Department
  Central Laboratory of the Research Councils (CLRC)
  Daresbury Labs, England
- **Veena Rawat**
  Acting President, Communications Research Centre Canada
- **Gabriel (Gabby) M. Silberman**
  Program Director, Centers for Advanced Studies
  IBM TJ Watson Research Center, US (Chair)
- **Seppo Turunen**
  Research and Technology
  Nokia Mobile Phones, Finland

The report is due in December 2005

Emerging areas of focus are very important because they will define how we transform ourselves. Other important changes include:

OWNERSHIP
iCORE's ownership changes hands. The ownership of iCORE was transferred from the Albera Science and Research Authority directly to the Ministry of Alberta Innovation and Science.

ICT INSTITUTE
An ICT Institute for Alberta is announced. Bill 4 to create the Institute moves through the Alberta legislature.

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Sun Microsystems

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Director of Corporate Relations

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Vice President Programs

Lilly Wong
Program Officer

GRANT PROGRAMS

The Alberta Informatics Circle of Research Excellence operates grant programs that cultivate the development of world-class research teams in Alberta.

CHAIR ESTABLISHMENT GRANTS (CPE GRANTS)

Funding is available to establish research positions in ICT at Alberta universities through Chair and Professorship Establishment (CPE) grants.

INDUSTRIAL CHAIR ESTABLISHMENT GRANTS (ICE GRANTS)

Funding is available to establish Industrial Chairs and associated research teams in information and communication technology (ICT) at Alberta universities.

VISITING PROFESSOR GRANT PROGRAM

Funding is available to support Visiting Professors in information science and engineering at Alberta universities for periods from six months to two years.

RECRUITMENT GRANTS (ISPR GRANTS)

ICT Strategy, Planning, and Recruiting Grants of up to $10,000 are available for university faculty members in Alberta to participate in the recruiting process.

GRADUATE STUDENT SCHOLARSHIPS

Funding is available to support graduate students in computer science, electrical and computer engineering who hold a major postgraduate scholarship.