

**ORION Research and Discovery News**  
**Vol. 2 NO. 12 December 2004**

1. Sensor grid new "skin" covering the earth - Ontario research to help revolutionize data use worldwide.
2. Shapson takes over as Chair of research network - building Ontario's innovation capacity is a priority
3. ORION Technical Committee to strike working groups on applications
4. e-Learning key in new patient-centered approach to health care
5. Pan-Canadian project with global aspirations - Inter-connecting repositories has advantages
6. ORION News Briefs
  - June 13-14 set for 2005 Ontario R&E Summit
  - Ontario plugs into Megaconference
  - Yellow pages" for Alberta videoconferencing
  - Queen's biologist wins top science prize
  - Funds for VR technology at Niagara
  - Atkinson leaves Brock for Carleton
  - Guelph opens Ozone Research Lab
  - K-12 students access remote microscope
  - Manhattan on the Rideau
  - HPCS2005 extends Call for Papers deadline
  - Chamber and ACAATO sign agreement

**Sensor Grid - New "skin" covering the earth - Ontario research to help revolutionize data use worldwide**

An Ontario researcher and his team are drawing international attention with new technology that helps integrate data from a growing global grid of remote sensors - a new and intelligent "skin" around the planet that is revolutionizing the way we interact with each other, here at home and on a global scale.

Dr. Vincent Tao - Canada Research Chair and an Associate Professor in Geomatics at York University, directs the York Geospatial Information and Communication Technology Research Lab, which has developed groundbreaking satellite mapping technology that enables users to visually zoom in on - or fly over - any place on the planet in real time.

Called SAME (See Anywhere - Map Everywhere), it is an Internet-based technology that provides 3-D imagery with ground resolution of a half-metre - close enough to identify the make of an automobile.

Integrated smart sensor devices, computers, wireless communication networks, and intelligent software agents now cover the planet with an ever-expanding Sensor Web, an interconnected network of sensors that is re-shaping the way we collect data and use and distribute information.

"I believe that Sensor Grid will have a profound impact on the way the sensors are used and on the sensor research and business," says Dr. Tao.

Monitoring, surveillance and mapping of critical infrastructure sites and regions around the world are the most obvious potential uses of this technology, while the span of potential applications is quite broad, including defence, emergency response, environmental monitoring, telecommunications and urban planning.

Dr. Tao's work - geomatics engineering - utilizes Geographic Information Systems (GIS), remote sensing and positioning and navigation systems to develop geospatial information technology.

SAME integrates data from different satellites, web sites, traffic cameras, mobile graphing data and a multitude of other "sensing" databases.

The program captures the most remote pictures of the earth from a NASA satellite, and as the program zooms in further, the feed switches from one source to another to provide more and more detailed images.

"I am able to pull out images at multiple resolutions from multiple remote servers, and see them all on my laptop," says Dr. Tao, who notes he has used the technology to reconstruct three-dimensional images of a nuclear facility in North Korea. "This gave international inspectors a lot of power to really look at those nuclear sites."

Modern geomatics is a Canadian invention that has spawned an industry generating over \$2 billion in products and services annually, and employing a workforce of approximately 30,000.

Dr. Tao asks us to visualize the impact of geomatics technology employed on a global scale, "where sensors monitoring traffic, weather, water and seismic variations are all connected to a central processor. It would provide an unparalleled opportunity to use that data for disaster preparedness and relief."

It's a compelling vision for the research community, business and governments alike, a vision he recently shared with a cluster of influential decision makers in the National Capital.

Dr. Tao demonstrated his program to the Partnership Group for Science and Engineering (PAGSE) in Ottawa last month, at the regular "Bacon and Eggheads" lecture series that brings together Parliamentarians with experts from science and engineering, showcasing outstanding Canadian research accomplishments.

PAGSE, an umbrella group of over 20 science and engineering organizations operating under the auspices of the Royal Society, invited Dr. Tao to brief them on his work and discuss trends in modern geomatics.

It's one of the few opportunities Canadian scientists have to communicate important findings and scientific issues directly to an influential audience of key decision-makers.

Perhaps the most compelling aspect of Dr. Tao's research is the "wow-factor" expressed in audiences whenever he demonstrates his technology.

In an age of sophisticated computer-generated and three-dimensional images and video, witnessing Dr. Tao manipulate the satellite mapping technology with the click of a mouse, and flying over and zooming in on any object, any place on the planet in real time, never fails to impress.

Just as the success of the Internet was largely based on the development of an interoperable 'grid' of legacy and segmented computing networks, says Dr. Tao, the success of the Sensor Grid will also rely on the interoperable connection.

He believes this technology will become invaluable for decision makers as they perform on-line and remote 'situation' analysis and monitoring.

While thoughts of "Big Brother" and surveillance come to mind when contemplating the implications of a global sensor grid, Dr. Tao believes people should not be concerned or afraid of this technology.

"Interoperability or interconnection is the first step towards the sensor grid integration. This is largely the research where I am conducting. We work with many researchers, and industry performers to develop and test an 'open' sensor communication standard."

He acknowledges, however, that "we need to develop technologies that can prevent the misuse of the network infrastructure such as the Internet or the Sensor Grid. This is also part of our research."

The next phase for the work is securing research funding and infrastructure support to scale-up the research to the next level.

A start-up company, GeoTango International Corp, is already commercializing part of the SAME technology. Sponsored by GeoConnections, Geoide, and Defence Research and Development Canada, GeoTango is developing the first version of the commercial product in 2005. "We are looking for both research and business partners to help us research, develop, test and commercialize the technology," he says.

You can learn more about the research at [www.geoict.net](http://www.geoict.net) and our sensor web research is on [www.sensorweb.geoict.net](http://www.sensorweb.geoict.net)

### **Shapson takes over as Chair of research network - building Ontario's innovation capacity is a priority**

York University's VP of Research and Innovation Stan Shapson takes over as Chair of the Ontario Regional Advanced Network of Ontario (ORANO), as the network transitions from the crucial "build" phase to a major focus on establishing the network's full value as a critical tool for innovation in Ontario's research and education community.

Over the past three years, ORANO and its private sector partners built a world leading, next generation research and advanced education network across Ontario, with links to innovators across Canada and around the world.

The Ontario Research and Innovation Optical Network (ORION) consists of 4,200 kilometres of fibre optic cable and sophisticated electronic equipment that links the main campuses of all of Ontario's universities, several teaching hospitals, 19 colleges of applied arts and technology, and other research and learning facilities.

Dr. Ross Paul, President of the University of Windsor, leaves as founding Chair, after having led ORANO over its critical initial phase. He applauded President and CEO Phil Baker and his team for their tremendous accomplishment in building the network. "This was a significant achievement for Ontario and it represents a remarkable feat of engineering and teamwork," he said.

"Now the focus must be on encouraging greater use of the network and the development of applications that can take full advantage of ORION's capabilities. That's what ORION is for ... let's get on with it," he said.

The change in leadership occurred at ORANO's board meeting last week, which saw Contact North/Contact Nord President Maxim Jean-Louis elected Vice-Chair, and Brian Desbien, past-president of Fleming College, elected Treasurer.

"This is a critical new phase in ORION's history," says Shapson, who is certain that ORION will be front and centre in advancing research and learning in Ontario.

"We now have a globally leading, sophisticated optical network infrastructure that provides Ontario with a competitive advantage as we move forward in the 21st Century. Ross can take great pride in this achievement. I look forward to working with Phil Baker and the rest of the board to advance Ontario's research and innovation agenda."

As noted in ORION's submission to the Ontario Postsecondary Review Panel, "we need to draw upon the collective resources available in all our postsecondary research and education institutions. ORION can help do that, and I see it as our job on the board to help deliver that message, forcefully," says Shapson.

"We can't afford to lag behind on this. This is important for our province's economic development and our competitive position in the world."

One of Canada's foremost authorities on the use of technology in the field of learning, Shapson is a member of the executive of the Ontario Council on University Research (OCUR).

Published widely, he has chaired provincial working groups on information technology and co-chaired federal committees on technology and professional development. He is a member of the Governing Council of the Social Sciences and Humanities Research Council (SSHRC) and chair of the council's Research Support Committee. Most recently, he led the launch of the innovative, CANARIE funded Advanced Broadband Enabled Learning (ABEL) program.

Other board members include Anne Sado, President of George Brown College, and Robert Kennedy, Educational Consultant with Apple Canada.

### **Technical Committee to strike working groups on new applications**

ORION's new Technical Committee meets this week to kick-start a series of Working Groups that will be instrumental in deploying new applications over the network and between user institutions.

The Committee, created earlier this year, will help advance new and critical uses of the network, says ORION Senior Director of Engineering and Operations Sam Mokbel, who anticipates a number of working groups will be created to follow up on the applications to explore the best ways to proceed with implementation.

Collaboration technologies and videoconferencing are the most likely candidates for quick follow-up, but the group will also focus on other topics, such as shared storage and disaster backup and recovery.

Federated identify Management (FIM), which involves managing identities across security domains, and Certificate Authority are both significant security and

authentication issues for CIOs and Information Technology Directors, and the group will share information and trends in these areas.

VoIP, videoconferencing and webcasting are other major applications the Technical Committee expects to pursue.

Mokbel will also report on ORION's network development and review the network's backup and redundancy plans.

The Committee was established earlier this year to advise ORION on network design and technology deployment, management and operations. It held its first meeting at the Ontario R&E Summit in Toronto June 14. The committee will initially meet a minimum of twice a year.

Members include, from western region, Doug Payne from the University of Waterloo and Kent Percival of University of Guelph; from eastern region, Andy Hooper of Queen's University, Gerry Pinkney from UOIT and Marc Lefebvre from the University of Ottawa; from northern region, Bill Sandblom of Sudbury's Laurentian University; from southern region, Colin Wu of McMaster University in Hamilton and Casey Carvalho of Sheridan College; and from GTAnet, Bob Chambers from the University of Toronto, and Ken Woo from Ryerson University.

### **E-Learning key in new patient-centered approach to health care**

Few issues rival the importance of healthcare among Canadians. In today's tight fiscal environment where much of the attention has been on the business side of healthcare, the Interprofessional Knowledge Building Project took a much-needed step toward putting the focus on patients—with a lot of help from communal database technology called Knowledge Forum.

In 2002, when Hamilton Health Sciences (HHS) made the decision to take a serious look at developing a new and improved model of patient-centered care, they had no illusions about the amount of work that would be involved.

The first challenge was to learn in detail what patients and their families felt were important to their care. That would eventually mean undertaking over 600 surveys and focus groups to find out what mattered most to patients and their families, applying state-of-the-art consumer preference modeling in a health care context. All this data had to be distributed to HHS's 30-member Patient Centered Care (PCC) task force, analysed and discussed in a timely fashion before the task force could even begin to develop their new model of service.

Furthermore, interprofessional collaboration is generally recognized as being crucial to developing better patient-centered care. Since, the task force deliberately included representatives from a cross-section of health care professions at HHS, it was essential that the collaborative environment be conducive to a productive knowledge-building process among its members.

Added to these challenges were serious logistical obstacles that had to be overcome. HHS incorporates five hospitals across the city of Hamilton with 10,000 staff, physicians and volunteers and members of the Patient Centered Care (PCC) task force worked at different sites and even different shifts, and it was clearly not practical to rely on face-to-face meetings.

The Institute for Knowledge Innovation and Technology (IKIT) at the University of Toronto offered a practical alternative. IKIT's interest and expertise in

developing online knowledge-building communities and its Knowledge Forum communal database technology, proved to be the perfect solution for the PCC task force's needs.

IKIT worked with the PCC task force to create an e-learning community, set e-learning goals and objectives, and analyse collaborative learning and knowledge construction processes; it also provided consultation around design, implementation and evaluation of effective e-learning strategies.

This collaboration between IKIT and HHS resulted in the Interprofessional Knowledge Building Project, an active and dynamic networked e-learning environment that provided much more flexible sharing and analysis of information than traditional one-way communication technologies such as e-mail and voice-mail. The result was a seamless integration of administrative and knowledge management activities, and vastly improved turn-around times for collaborative work.

"Healthcare providers, like market researchers, have to be able to gather information very quickly and efficiently and turn the information around rapidly," said Dr. Chuck Cunningham, Department of Psychiatry and Behavioural Neurosciences and Jack Laidlaw Chair in Patient-Centered Health Care at McMaster, and a member of the PCC task force. "Utilization of formal consumer based research modeling methods in a broadband Internet methodology enabled us to do that."

Because HSS is committed to sharing their findings with other hospitals across Ontario and Canada, advances made, as part of this e-learning initiative will have far-reaching consequences beyond the two million patients and families served by HSS in southwestern Ontario.

Design ideas and innovative practices yielded from this collaborative enterprise underscore the need for broadband technology and HHS are already thinking about new ways to apply collaborative online technology in day-to-day work, education and research.

<http://ikit.org/intkb> and [www.knowledgeforum.com](http://www.knowledgeforum.com)

### **Pan-Canadian project with global aspirations - Inter-connecting repositories has advantages**

No other country is better suited—or motivated—to lead the world in e-learning development than Canada. With its vast geography, dispersed population, excellent education and advanced broadband infrastructure, Canada is a natural test-bed for this burgeoning research and education (R&E) frontier.

In a bold step toward exploiting this competitive advantage, CANARIE, the University of Waterloo and five other primary partners from across the country stepped up to the plate in 2002 with almost \$10 million for the "eduSource Canada" project.

eduSource started out as a pan-Canadian project to create a test-bed of linked and interoperable learning resources across Canada. It turned into a valuable open source resource for any R&E institutions interested in building economies of scale and seeking out global markets with cost-effective e-learning modules. Learning objects, which can be any form of digital educational material, are the building blocks of e-learning modules and can be expensive to produce.

Once produced, they are usually stored and organized for easy retrieval on servers, or learning object repositories (LORs), of the educational institution where the objects were created.

Until eduSource, most LORs were like silos of learning resources across Canada.

Not only was each educational institution deprived of access to valuable learning objects created by other institutions, there was also expensive duplication of efforts and material. Sharing them would go a long way to getting full value out of the investment while avoiding needless duplication, ultimately leading to substantial savings for education organizations across Canada.

Finding a way to link these LORs and make them interoperable was accomplished earlier this year. The real value of the project, however, is in getting the e-learning community to embrace the advantages of sharing.

To that end, eduSource also developed eRIB—the eduSource Repository in a Box—to help institutions and businesses create their own learning repositories quickly and easily. Furthermore, in addition to being fully bilingual and accessible to all Canadians, the software is free and open source, incorporating the best international standards and protocols in its development.

By encouraging the adoption of this software, the hope is to encourage the widest possible community of users who have built their repositories on the same standards and protocols, and are therefore able to share their content. Open source also levels the playing field, providing a foundation for small and medium sized operations to build on its software and compete with big companies, possibly jump-starting the e-learning industry in Canada.

eduSource's executive director Douglas MacLeod hopes that the combination of affordable accessible learning object repository software and the idea of sharing through exchanges will lead to a critical mass of content in every subject that would be available in Canada and, perhaps, even globally.

"The Canadian education market for e-learning products is very small," observes MacLeod. "If we don't work within a global context, then e-learning developers really won't be able to make money."

MacLeod is serious about putting the pan-Canadian effort in a global context. Not only has he been relentlessly marketing the software and its philosophy of sharing across Canada, he has also been representing Canada on the international stage in organizations such as the Commonwealth of Learning.

In addition to the University of Waterloo, the eduSource project involved Simon Fraser University, Athabasca University; Netera Alliance, TéléEducation NB, and Télé-Université as primary partners, as well as eighteen other post-secondary institutions and private sector partners.

Learn more about eduSource at [www.edusource.ca](http://www.edusource.ca)

## **ORION News Briefs**

### **June 13-14 set for 2005 R&E Summit**

ORION is finalizing details for its second annual Ontario R&E Summit, in Toronto June 13 and 14, 2005. The focus of the 2005 Summit will be on collaboration and expanding the use of the ORION network among the research and scientific community. ORION Marketing and Communications Manager Andre Quenneville says he expects the Summit, which kicked off with a successful two-

day conference last June, will likely expand on some of the themes that participants explored in the first session, particularly in the area of collaborative and grid technologies. Feedback from the 2004 Summit showed participants were unanimous in wanting the event to continue. ORION expects to finalize the program in the New Year.

### **Ontario plugs into Megaconference**

Several Ontario schools and universities were front-and-centre on the global stage last week, as the sixth annual Megaconference kicked off, attracting over 370 participating sites worldwide. York University, the University of Toronto and Lakehead University - all connecting over the ORION network - were among the global institutions of higher learning, which participated in the annual event. They joined a number of Ontario school boards, also connected to the global grid over the ORION network, including the Keewatin-Patricia District School Board and the Rainy River District School Board. Presentations ranged from the humorous to the serious, yet all illustrating just how far the use of videoconference technology has come in recent years and how it has been adopted in everyday learning and teaching. Other Canadian participants came in from Alberta, BC and the Northwest Territories. Visitors have access to over 13 hours of archived broadband streams of the Dec.9 global videoconference - all hosted by "Dr. Bob" Dixon of OARnet and Ohio State University, known globally as the "grandfather of the Megaconference and supreme leader", at [www.megaconference.org](http://www.megaconference.org).

### **"Yellow pages" for Alberta videoconferencing**

A new portal - that Ontario hopes to emulate - was recently launched in Alberta, providing a "Yellow Pages" directory of video conferencing facilities in the K-12 and postsecondary institutions in the province. The new site makes it easy to find a video conferencing facility, the technical capabilities of the facility, the person responsible for that location. It also includes tools, forums, FAQs and tips. ORION expects to work with the Ontario network user community to develop a similar resource for Ontario. The project began as a collaborative project between Mount Royal College and the University of Lethbridge, with funding from Alberta Learning. The site was developed over the summer of 2004. Visit the site at [www.vcalberta.ca](http://www.vcalberta.ca).

### **Queen's biologist wins top science prize**

Queen's Biology Professor John Smol is the winner of Canada's top science award - the prestigious Gerhard Herzberg Canada Gold Medal, awarded by Science and Engineering Research Canada (NSERC). Dr. Smol, Canada Research Chair in Environmental Change at Queen's University and pioneer in the reconstruction of past environments, received the medal Dec. 6 at a gala ceremony at the National Gallery of Canada. The award comes with a guarantee of \$1 million in NSERC research funding over the next five years. His studies of ancient lakes have generated new knowledge about past and present environments, and about what climate change may mean for our future. Recognized as one the world's leading environmental scientists, Dr. Smol is founder and co-director of the Paleocological Environmental Assessment and Research Lab (PEARL) at Queen's. "I am of course tremendously honoured to receive the Gerhard Herzberg Canada Gold Medal," says Dr. Smol, which credits his partnership with dedicated students and other colleagues at Queen's University and elsewhere. Finalists for the award included André Salama of the University of Toronto and David Dolphin of the University of British Columbia, who receive the NSERC Award of Excellence. "This is fantastic news," says Vice-Principal (Research) Kerry Rowe. This is the second consecutive year the award has gone to a researcher from Queen's. Learn more about all the winners, including additional awards to Ontario researchers at [www.nserc.gc.ca](http://www.nserc.gc.ca).

### **Funds for VR technology at Niagara**

A federal investment of \$600,000 will help Niagara College support "smart growth" decision-making in land-use planning by developing and sharing virtual reality (VR) technology. The grant is the first under the College and Community Innovation Pilot Program, a new initiative of Science and Engineering Research Canada. The funding will help the college's Centre for Advanced Visualization expand VR technology through software that provides high levels of realism into three-dimensional scenes; and to share the technology by helping partners and municipalities acquire the knowledge and skill required to use VR technology in planning scenarios. The funding will also help increase the use of VR technologies in land use planning projects. Since its inception in 2001, the Centre has become an important resource for the region's business, government and industry. Municipalities and urban planners have found the technology to be an excellent communications tool in the development of buildings, roads, bridges and other projects.

### **Atkinson leaves Brock for Carleton**

Brock University President and Vice-Chancellor, Dr. David W. Atkinson, will leave the University to assume the presidency of Carleton University in Ottawa, effective August 1, 2005. He will replace Dr. Richard J. Van Loon who has served as Carleton's President since 1996. Dr. Atkinson, Brock President since 1997, "has led remarkable change at Brock University," says Dr. Norris Walker, Chair of the Brock University Board of Trustees. "He is responsible for aggressive growth based on a strong strategic plan and we will stay the course." During his tenure at Brock, enrolment increased from 10,700 to more than 16,000 while the University's operating budget grew from \$63 million to more than \$156 million. Faculty grew from 315 to more than 490. "I am excited by the opportunity to join a research-intensive University that is already recognized nationally and internationally," said Dr. Atkinson.

### **Guelph opens Ozone Research Lab**

The University of Guelph has opened a new Ozone Research Lab that helps advance research on projects from enhancing greenhouse production to human life support in space exploration. The centre opened Dec. 13 at the university's Controlled Environment Systems Research Facility. The lab is funded in part by a \$100,000 gift from Phil and Laura Greenway of Purification Technologies Research Inc. (PTRI) in Guelph. The investment from PTRI has leveraged more than \$1 million in support from the Ontario Ministry of Agriculture and Food, the Centre for Research in Earth and Space Technology (CRESTech) and the University. Ozone is already widely used as an alternative disinfectant in water treatment and has been demonstrated to be among the most promising technologies for other uses. [www.ces.uoguelph.ca](http://www.ces.uoguelph.ca)

### **K-12 students access remote microscope**

K-12 instructors and students can now access one of the world's most powerful electron microscopes by remote control over broadband networks and bring a new learning tool to their science class. For only \$40 (US) an hour, instructors can obtain realtime, remote access to the Lehigh University's new Nanocharacterization Lab XL30 microscope. Lehigh, located in Bethlehem, Pa. is making the remote instrumentation device available to schools as part of its ImagiNations outreach program. This new program is among several that are making new resources available to teaching and learning over high-speed R&E networks. Learn more at [www.lehigh.edu/~inimagin](http://www.lehigh.edu/~inimagin).

### **HPCS2005 Call for Papers Deadline Extended**

SHARCNET has extended the deadline to January 3, 2005 for its Call for Papers for the International Symposium on High Performance Computing Systems and Applications - HPCS 2005. The symposium, to be held at the University of Guelph May 15-18, 2005, will focus new scientific and technical work involving High

Performance Computing. Researchers from all disciplines in the sciences, engineering, mathematics and applied human sciences are invited to participate. Papers will be refereed. Oral presentations and posters sessions will be available. Students are particularly encouraged to submit papers. The 3rd annual OSCAR (Open Source Cluster Application Resources) Symposium will also be held in conjunction with HPCS 2005. The call for papers for that Symposium has also been extended to Jan. 3. Learn more at [www.sharcnet.ca/events/hpcs2005](http://www.sharcnet.ca/events/hpcs2005)

#### **Manhattan on the Rideau**

The National Arts Centre is partnering with the Manhattan School of Music to produce jazz masterclasses connecting leading jazz faculty at the New York City school with accomplished music students in Ottawa and in New York, all connected over CA\*net 4 and Internet2 in the US. Four sessions, which use the latest in broadband videoconference technology to connect teachers and students in real time with high fidelity audio and video, kicked off last week. Three student musicians participate in each masterclass, followed by a Q&A period in which the audience is invited to participate. The next session is Tuesday January 11, 2005 featuring Bob Mintzer on saxophone at the NAC Salon. Admission is free. Learn more at [www.nac-cna.ca](http://www.nac-cna.ca).

#### **Chamber and ACAATO sign agreement**

Ontario's colleges of applied arts and technology and the Ontario Chamber of Commerce (OCC) have signed an agreement which is expected to lead to new training programs that will meet the needs of Ontario's business community. "Ontario's economic and social success depends on a dynamic and healthy relationship between the Ontario college system and the Ontario business community," says David Lindsay, President of the Association of Colleges of Applied Arts and Technology of Ontario (ACAATO). OCC President Len Crispino believes this collaboration will help ensure Ontario's business has the career-ready workforce it needs to grow, prosper and contribute to the province. The agreement includes a commitment to share information on advocacy for economic development and skills training and to cooperate in developing customized training opportunities, programs and services to meet the needs of OCC members.