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Graphics, Animation and New Media

2012/13

ANNUAL REPORT

A Canadian Network of Centres of Excellence



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The NCE Secretariat manages four national programs: Networks of Centres of Excellence (NCE); Centres of Excellence for Commercialization and Research (CECR); Business-Led Networks of Centres of Excellence (BL-NCE); and Industrial Research and Development Internships (IRDI). Through research partnerships between academia, industry, government and not-for-profit organizations, NCE programs turn Canadian research and innovation into economic and social benefits for all Canadians. Since its inception in 1989, the NCE has helped launch over 100 companies; supported the development of more than 39,000 highly qualified professionals; and invested more than \$1.8 billion in research, commercialization and knowledge translation to enhance the lives of Canadians.

GRAND gratefully acknowledges the support of



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And the support of GRAND's host university:



a place of mind

THE UNIVERSITY OF BRITISH COLUMBIA

Cover Image: SingTel experience (Singapore). Photo by Tim Franco, Propaganda Studio, courtesy of Singapore Telecommunications Ltd./Human Media Lab. The Human Media Lab at Queen's University developed an immersive interactive Natural and Organic User Experience for the Singtel Mobile Phone Flagship store in Singapore, in collaboration with Frog Design. Visitors use remote gestures via the largest Kinect Fusion array in the world (10 units) to fly through Gigapixel imagery of cities around the world on a concave screen 14 m in circumference. Cities are selected by touching a spherical multi-touch globe first pioneered at HML in 2008.



2012/13

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Message from the Chair of the Board

This year's annual report comes a little ahead of the fifth anniversary of the 2008 competition announcement for new Networks of Centres of Excellence. Since then, GRAND has grown from the dream of a new collaboration focused on digital media that crosses disciplinary and geographic boundaries, to a mature research network that is nearing the end of its first five-year funding cycle – and gearing up for a second five years. Over the past year, strategic planning initiatives have already established the framework for the renewal application that will be submitted to the NCE Program in June 2014. The planning will continue over the next six months as the theme structure for the research program is revised and projects that will be put forward in the application become finalized.

As part of the long-range planning for the network, the Board of Directors has selected a new Scientific Director to lead GRAND's second five-year cycle. Following extensive consultation with the GRAND community, the Board invited Dr. Eugene Fiume of the University of Toronto who I am delighted to say has accepted our offer. Eugene has already begun to work with the current Scientific Director, Dr. Kellogg Booth, in preparation for the transition that will be completed at the end of December 2014 when Dr. Booth will step down following his five-year term.

The Board expects to see additional changes as GRAND moves into the next phase of its life as an NCE. To fully capitalize on the strengths we have developed in the digital media sector, there will be an increased emphasis on having a receptor-driven research program that meets the evolving needs of Canadians in a global digital economy.

I look forward to the coming year, my last year as Chair, and continuing to work with the Board of Directors in the selection of a new Chair as we prepare GRAND for its next five-year mandate as Canada's Network of Centres of Excellence in digital media.

C. Ian Kyer

Chair, Board of Directors
GRAND NCE



Message from the Scientific Director

The GRAND NCE has already met many of its goals for the first five years.

We have successfully bridged the NSERC and SSHRC research communities by combining a social sciences and humanities component with a natural sciences and engineering component in many of our projects. We have also built strong ties with the art and design community by including the top three Canadian art and design schools among the 26 universities that comprise the GRAND network. Through a framework of five themes, each representing a core capability of the network, GRAND has successfully encouraged the cross-fertilization of 40 projects in the network. The significant achievement of establishing a robust and mature network provides a great foundation that allows us to look ahead to the next phase of our life as a Network of Centres of Excellence.

As a first step in setting our goals for the next five years, GRAND has identified seven “new” themes to provide the framework for selecting the projects set to ramp up next year. Each theme focuses on a single GRAND Challenge that has strategic importance for Canada: Entertainment, Learning, Health & Wellness, Sustainable Communities, Big Data, Work, and Digital Citizenship. Over the course of the next six months a new set of theme leaders will join the Research Management Committee to complete the task of shaping the research program that will be put forward in our renewal application.

To lead this effort, I am pleased to welcome Dr. Gerald Karam as the new Chair of the Research Management Committee. Gerald has been an active member of the RMC since its inception. He brings a wealth of experience to the job from both his current position as an industrial research manager and as a former academic researcher at Carleton University. He will be joining the GRAND Board as a non-voting member. Outgoing RMC Chair, Dr. Gord Kurtenbach, provided able leadership through the initial application process and during the crucial early years as the RMC developed its role within the network. I am very grateful to have been able to draw on Gord’s experience and wisdom during this time and I look forward to continued engagement with him and his colleagues at Autodesk as GRAND moves forward.

Kellogg S. Booth

Scientific Director
GRAND NCE



GRAND is a research network and knowledge mobilization engine that addresses complex issues in digital media and transforms multidisciplinary research into user-centred solutions. GRAND explores the use and application of digital media in a variety of settings including entertainment, healthcare, education, environmental sustainability, and public policy.

As a federally funded Network of Centres of Excellence, GRAND supports **35** research projects divided into **5** cross-pollinating themes involving researchers at **26** universities across Canada with nearly **60** industry, government, and nonprofit partners.

OUR VISION

Through technology solutions, training the next generation of talent and encouraging a robust policy environment,

GRAND plays a pivotal role in supporting Canada’s National Digital Economy Strategy.

OUR MISSION

- Integrate and enhance Canada’s thriving digital media sector through development of new or revised policies and practices
- Focus research and commercialization efforts towards solution-driven products and services

- Facilitate research across the broad spectrum of digital media by linking computer scientists and engineers with artists, designers and social scientists
- Develop opportunities for researchers and partner organizations to join together to build more constructive working relationships
- Teach and mentor the next generation of digital media innovators

OUR THEMES

GRAND addresses five themes: New Media Challenges and Opportunities (**nMedia**), Games and Interactive Simulation (**GamSim**), Animation, Graphics and Imaging (**AnImage**), Social, Legal, Economic and Cultural Perspectives (**SocLeg**), and Enabling Technologies and Methodologies (**TechMeth**).

DR. GORD KURTENBACH INAUGURAL CHAIR OF THE RESEARCH MANAGEMENT COMMITTEE

GRAND relies heavily on its partners in the digital media sector to play a critical role in the management of the network. The leadership role played by Dr. Gordon Kurtenbach, Senior Director of Research at Autodesk, is no exception.

At Autodesk, Gord oversees a research group focused on 3D interactive graphics for Human-Computer Interaction and Computer Graphics. Gord helped build the vision for GRAND during the original NCE submission and subsequent preparation of the proposal, and has chaired the network's Research Management Committee since its inception. He has also provided insight into the needs of the receptor community and a wealth of industry and academic experience, including extensive experience in industry-university collaboration. These latter efforts were recognized in 2011 with an NSERC Synergy Award for Innovation given jointly to him and Dr. Eugene Fiume of the University of Toronto.

That history of collaboration was one of the foundations on which GRAND was built. It was therefore natural to seek Gord's support in establishing our research program during GRAND's first five years, and in fostering collaboration between our university researchers and industry and public sector partners. We owe much of our success in these respects to Gord's leadership, and also to the wisdom, service and time of the other members of the Research Management Committee.

ORGANIZATIONAL CHART





GRAND's fourth Annual Report reflects on the past year's research excellence and the many accomplishments of our network. In addition to our regular features on event highlights and the successes of individual researchers, this year we shine a spotlight on some of the Centres of Excellence that are the source of GRAND's success through a series of nine short Profiles about research labs and centres across Canada where much of our research takes place.

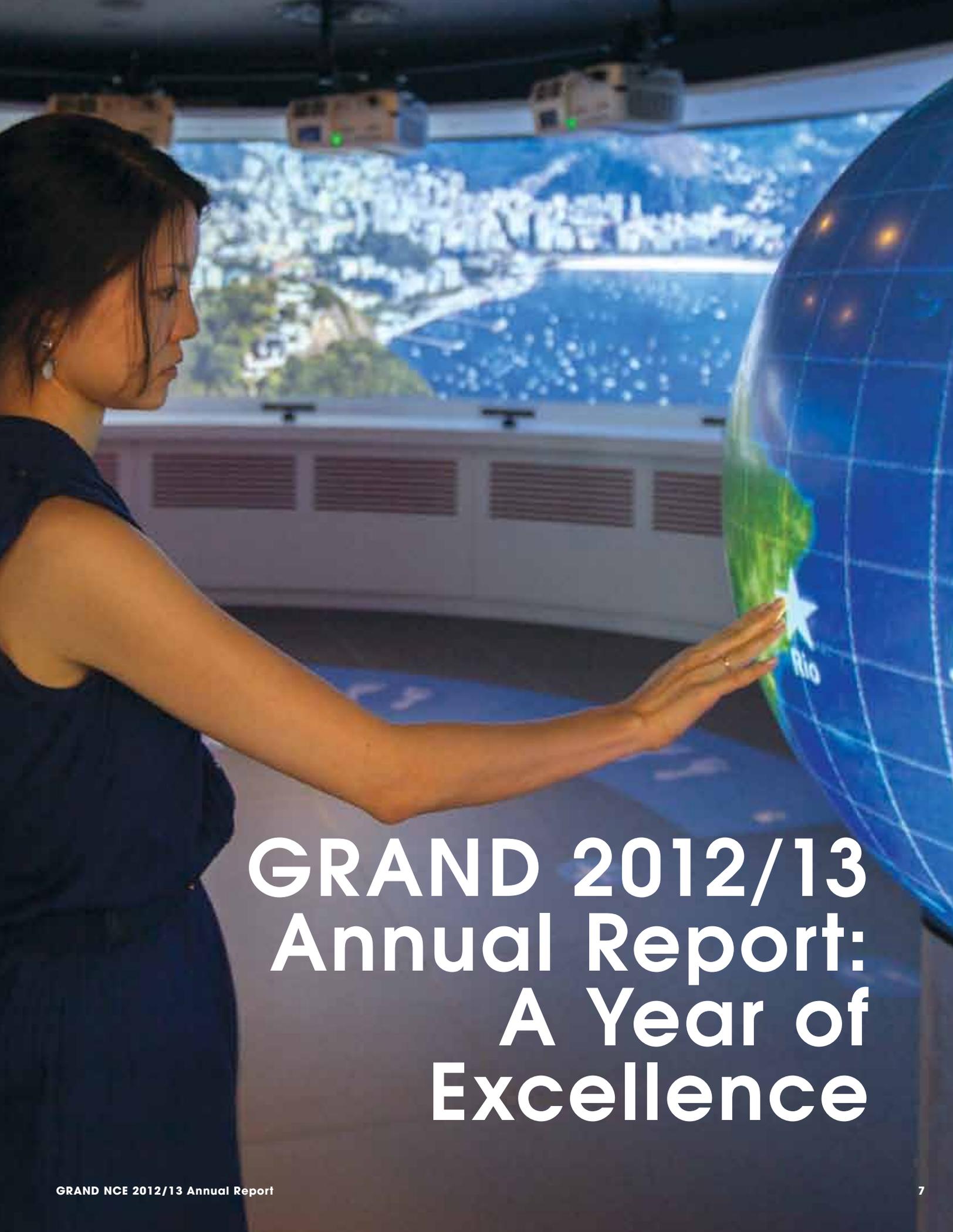
As Canada's largest digital media research network, GRAND integrates over 20 world-class Centres of Excellence at Canadian universities from coast-to-coast. These laboratories and workspaces are Canada's epicentres for research, collaboration, and innovation that engage all of the academic fields that collectively make up digital media. These centres are focal points for GRAND's efforts to stimulate leading-edge research and knowledge mobilization in areas of highest importance to Canada.

The Profiles exemplify both the high calibre and the diverse range of research activities in GRAND. Covering visual analytics, social networks, computer graphics, game studies, digital humanities, games, digital stereoscopy, and human-computer interaction, the Profiles show a cross-section of the projects and partnerships in GRAND's highly-integrated multidisciplinary research program.

In addition, there is a feature Research Report that looks at some of the latest health and wellness digital media technologies being developed by Canadian researchers. The application of digital media in the healthcare sector is of increasing importance for GRAND, and one where our network researchers are breaking new ground.

As GRAND approaches the end of its first five-year term, we also look forward to the network's coming renewal. In our "Looking Ahead" section, Scientific Director Designate, Dr. Eugene Fiume, and incoming Research Management Committee Chair, Dr. Gerald Karam, each offer their views on the work that lies ahead for us.

SingTel experience (Singapore). Photo by Tim Franco, Propaganda Studio, courtesy of Singapore Telecommunications Ltd./Human Media Lab.



GRAND 2012/13 Annual Report: A Year of Excellence

CIV-DDD

YORK UNIVERSITY/OCAD UNIVERSITY/UNIVERSITY OF TORONTO

The tri-university CIV-DDD is a new interdisciplinary hub for information visualization research unrivalled in Canada for having equal scientific and artistic grounding.

In the era of Big Data, virtually every research field grapples with massive data sets to tackle some of the most important scientific, social and human problems. The challenge lies in transforming data into knowledge – creating a new demand for powerful and sophisticated visual tools for capturing and analyzing information.

The opening of the Centre for Innovation in Information Visualization and Data-Driven Design (CIV-DDD) in May 2013 marked a major step in fulfilling this need. Led by York University in partnership with OCAD University and University of Toronto, the \$11.5 million network joins together artists, designers, engineers and scientists in the development of new techniques for data discovery, design, analytics and visualization.

“In the new paradigm of data-driven discovery, art and design researchers have a profound role to play in partnership with scientists, making the

invisible visible, heralding a new era of knowledge, cultural creation, and technological products,” said President of OCAD University and GRAND Board Member Dr. Sara Diamond. Diamond is a co-principal investigator with CIV-DDD. The network is lead by Dr. Amir Asif, (York University).

Building on existing regional research strengths of the three universities, CIV-DDD focuses on four areas of visualization research: bioinformatics and medicine, mixed reality/interactive visualization, engineering and physical sciences, and humanities and social sciences – each addressing technology and design, research and innovation.

Collaboration between industry and academia has been crucial to the success of CIV-DDD, involving partners across the communications, business analytics, health care, earth sciences, and technology sectors, among them the Globe and Mail, BBM Analytics, IBM,

Zerofootprint, Empress, the CBC, Toronto Rehab, MDA Corporation, and SideFX.

The CIV-DDD-supported CBC News-world Project, led by GRAND PNI Dr. Martha Ladly (OCADU) in project NEWS, is looking at the visualization and sonification (making data available and searchable through sound) of large portions of the 24-hour news service’s corpus. The CBC, an industry partner, provided access to its vast and unique collection of audio and video material that dates back over 20 years.

CIV-DDD also maintains a strong connection with the GRAND-sponsored BRAVA (Brazil Visual Analytics) Initiative – an international research network for visual analytics funded through Boeing, Mitacs and other partners.

“As a research hub for the development of next-generation data visualization techniques, the CIV-DDD is unique in its level of interdisciplinary fire power, strong collaboration with end-users, and international links. It aggregates and extends much successful collaboration amongst the researchers,” said Diamond.

Unique in Canada, Dalhousie’s new Social Media Lab is a state-of-the-art research space that is helping us make sense of our networked world.

Those interested in the way people live, behave, and think online are progressively turning to social media as a rich source for discovery and analysis. With billions of conversations on social networks taking place – Tweets and Facebook posts – researchers at Dalhousie’s Social Media Lab are creating better ways to collect and decipher such a vast and unstructured mass of social data. Their work is proving valuable to governments, businesses and non-profit organizations looking to understand the context of our online interactions and how these interactions impact society.

“We’re trying to learn how social media changes the way we interact, share information, disseminate and communicate with others,” said GRAND PNI and lab director Dr. Anatoly Gruzd. “There’s a huge interest to study how different online communities are using social media to achieve their goals.”

Gruzd is an expert in social media and social networks analysis and formed the lab’s multi-disciplinary research group

in 2010. Thanks to a \$150,000 Canada Foundation for Innovation (CFI) Leaders Opportunity Fund and additional support from Dalhousie University and the Nova Scotia Research and Innovation Trust (NSRIT), he opened a new facility dedicated to social media research in March 2013 – the first of its kind in Canada.

Teeming with high-speed servers, multi-touch screens, and other advanced hardware and software, the new space offers researchers the computing power to collect and visualize gigabytes of social media conversations. The centerpiece: a 96-inch multi-touch digital display able to display millions of social network connections to help researchers find and understand patterns.

The lab’s core research focuses on powerful new analytical tools. Netlytic is a cloud-based tool designed by lab researchers to analyze public conversations from sites such as Twitter and YouTube. Another successful project is AcademiaMap: a web-based system to help scholars filter the “noise” from their

Twitter streams and identify trends and interesting voices to follow.

GRAND has been working with Gruzd to build relationships with businesses looking to commercialize the lab’s apps. Master’s student Sreejata Chatterjee recently cofounded Leadsift, a social media lead generation company, which secured a \$500,000 capital investment under PropelICT’s Launch36 accelerator program for Maritimes-based start-ups.

Lab-run conferences, such as the GRAND-sponsored September 2012 Symposium on Measuring Influence on Social Media have attracted world-class researchers and practitioners. The 2012 symposium drew participants from 60+ institutions in over 15 different countries. A follow-up conference entitled Social Media and Society is planned for September 2013.

“The GRAND network has greatly improved my ability to recruit high-calibre students, find new collaborators from both academia and the private sector, and has been especially supportive in helping me to establish the Social Media Lab. This kind of support from GRAND has helped to put Canada on the map in research on social media.”

Magic Wall at the Social Media Lab. Photo courtesy of the Social Media Lab (Dalhousie University).



DALHOUSIE UNIVERSITY

Social Media Lab

2012/13 Event Highlights

GRAND hosts and sponsors networking events throughout the year, and supports the participation of network researchers in regional and international conferences and workshops – all of which provide new opportunities for academic and industry partnerships. The following lists some of the major events of the past year.

GRAND 2012: ANNUAL CONFERENCE (MAY 2-4, 2012), MONTRÉAL, QC

“Over the last few years, the GRAND annual meetings have become a primary networking venue for Canadian research groups in graphics and new media.”

– Dr. Michiel van de Panne (UBC)

The GRAND Annual Conference has grown into a significant platform for exchange and networking among Canadian digital media researchers. GRAND 2012 in Montréal, the third annual conference, featured prominent speakers, guest panelists, as well as over 300 academics from across Canada presenting on some of the latest advancements in digital media research. The conference also hosted guests from industry, government and non-profit organizations interested in new technologies underway at Canadian research labs, and in connecting with researchers and HQP for potential collaborations.

Plenary speakers included internationally recognized youth online privacy expert Dr. Valerie Steeves (University of Ottawa), and Academy Award win-



ning computer scientist Dr. Ken Perlin (New York University). Panelists included Clint Hocking (LucasArts) and Caryl Shaw (Callaway Digital Arts) from the games industry.



Renowned film producer Robert Forset was also honoured with a GRAND Digital Pioneer Award for his original work in computer animation at the National Film Board. His experiments with emerging technologies in the 1970s and 1980s helped maintain the NFB's international presence as an innovative cultural institution.



Left: Robert Forset. Photo courtesy of the National Film Board of Canada · Right: GRAND 2012. Photo by Véronique Ducharme.

CONFERENCES, WORKSHOPS AND SYMPOSIA

“The (Funcom Internship) was immensely helpful – both in terms of my own research with my thesis by getting a grasp of the overall process of game development, but it also really showed me what being a (game) producer was like.”

– David Holmes, HQP (UAlberta)

GRAND supports the active involvement of its network researchers at top conferences and events worldwide and across a wide range of subject areas. Below are some of the highlights.



The inaugural **Feminists in Games (FiG) Workshop** (Toronto, ON: May 4-6, 2012) was held in collaboration with York, SFU and OCADU, and sponsored by GRAND and SSHRC. Organized by PNI Dr. Jennifer Jenson (York), the invitational workshop brought researchers, educators, game designers, and other participants into conversations with feminist scholars and activists on issues of gender in gaming and in the games industry. The second annual workshop was held at Vancouver’s Centre for Digital Media (May 31-Jun 2, 2013). The FIG network has funded eight projects through its incubator program.

GRAND had a significant presence at **CONGRESS 2012** (Kitchener-Waterloo, ON: May 16 – Jun 2, 2012) - Canada’s largest multidisciplinary gathering of scholars. The Canadian Game Studies Association (CGSA) hosted GRAND-

related presentations, and a GRAND team from the University of Alberta hosted a joint session with CGSA and the Digital Humanities (SDH). GRAND together with the CGSA, the SDH, the Film Studies Association of Canada (FSAC), the Canadian Association for Information Science (CAIS), and the Canadian Communication Association (CSA), also hosted a sold-out reception featuring music, interactive visuals and a games showcase.

GRAND with partner NCE NeuroDevNet, CanAssist, Mitacs and the Public Health

Agency of Canada (PHAS) sponsored **Intersection 2012** (Victoria, BC: May 15-16, 2012) at the University of Victoria. The workshop engaged researchers and participants from government, industry and non-profit organizations in stimulating panel discussions on the use of digital technologies to promote health, mobility and brain function, with a special focus on neurodevelopment and cognitive abilities.

PNI Lynn Hughes (Concordia), along with post-doc Cindy Poremba (Concordia), and game designer Heather Kelley curated **Joue Le Jeu / Play Along**: an exhibition at the **Gaîté Lyrique** (Paris, France: Jun 2 - Aug 12, 2012). The playable exhibition, which drew enthusiastic reviews from participants and the media, explored game development and research in its richly diverse and creatively innovative culture. *Proximity*, a full body interaction game co-created by Hughes and PNI Dr. Bart Simon at Concordia’s TAG Centre, was featured on opening night.



Left: FIG Workshop (Vancouver), Photo courtesy of Feminists in Games (FIG) · Right: Joue le Jeu at La Gaîté Lyrique (Paris, France). Photo by Eric Bréchemier.

BRIDGING THE ARTS AND SCIENCES

New program: Grants to New Media and Audio Artists – GRAND NCE Media Artist and Scientist Collaboration

GRAND is committed to fostering greater exchange and collaboration between the arts and the sciences by partnering artists and designers with researchers in the NSERC-SSHRC community.

A pilot grant program called the Grants to New Media and Audio Artists – GRAND NCE Media Artist and Scientist Collaboration, jointly sponsored by GRAND and the Canada Council for the Arts (CCA), is helping achieve this goal by funding collaborative projects that have both an artistic and a scientific component. Each project involves an artist and a scientist as co-applicants, and requires the use of media arts as a means of artistic expression, combined with peer-reviewed scientific research.

Co-funded equally by GRAND and the Canada Council, grants cover the direct costs of research, creative development, production and presentation of artworks created through media arts practices. The cross-disciplinary projects will explore and develop leading-edge technologies and applications through artistic works.

“To me, it’s a logical partnership,” said pioneering visual artist and CNI Catherine Richards (Ottawa), a key partner in establishing the collaboration between GRAND and the CCA. “There is a creative resonance between the arts and sciences – they spur each other on. Both are really intrigued with each other. What’s really great about this program is that it brings the artist and scientist together as equals.”

Launched in 2012, the program’s first applications were received in March 2013 with a second round expected in October 2013.

The **GRAND/Funcom Games Initiative** (Montréal, QC: Jun 11-21, 2012) was an intensive ten-week internship program piloted by GRAND and international game developer Funcom. Equipped with hardware, software and office space at Funcom’s downtown Montréal studio, ten young participants developed a playable prototype (*Dungeons of Londree*) under limited project supervision. The initiative proved a successful model for developing the core competencies and industry-readiness of games interns. For many of the participants, the experience helped accelerate their entry into professional game development. The internship also enabled Carleton University researcher and GRAND HQP Jennifer Whitson to conduct an ethnographic study of the development team. The research, led by PNI Dr. Bart Simon (Concordia), is part of an examination of the role of software in mediating the team design process.

For a second year, GRAND sent a delegation of doctoral students (five in total) from universities across Canada to attend the **Summer Social Webshop (SSW) 2012** (College Park, MD, USA: Aug 21 – 24, 2012) at the University of Maryland. Experts from a range of fields led the intensive workshop on Technology-Mediated Social Participation, focusing on the use of social networking tools in research and community-building activities.

Replaying Japan (Edmonton, AB: Aug 22, 2012) was an inaugural international symposium on the culture and industry of games in Japan that brought together researchers from Canada and Japan in dialogues about the challenges and opportunities of cross-cultural game studies. The event was jointly organized under the auspices of GRAND, the University of Alberta and researchers at Ritsumeikan University – Kyoto’s leading research centre in digital media. A follow-up symposium convened in Kyoto in May 2013, with a larger third

conference planned for Banff in 2014.

Dalhousie University’s Social Media Lab hosted the first ever **International Symposium on Measuring Influence on Social Media** (Halifax, NS: Sep 28-29, 2012) co-funded by GRAND, Mitacs and Dalhousie. Over 100 academics and business leaders from more than forty universities, companies, and other organizations in ten countries attended the symposium to share ideas on how to best study and measure the influence of social media. The **2013 Social Media and Society** conference in September builds on the success of the symposium covering topics related to online communities, social media, visualization and Big Data. The lab also celebrated the **Grand Opening** (Halifax, NS: March 22,

2013) of its new high-tech facility dedicated to social media research – the first of its kind in Canada. (See the lab profile for details.)

The **macGRID 2012 Workshop** (Hamilton, ON: Nov 7-8, 2012), co-sponsored by GRAND and McMaster University, engaged network researchers and others from across Canada interested in applications of virtual worlds. The event introduced the new macGRID OpenSim platform – a robust simulation research platform developed in part by GRAND researchers.

GRAND represented Canada’s digital media sector at the **2013 American Association for the Advancement of Science (AAAS) Annual Meeting**

(Boston, MA, USA: Feb 14-18, 2013). Staffed by HQP volunteers, the exhibit was part of the Canadian Pavilion organized by the Department of Foreign Affairs and International Trade (DFAIT) Canada. The AAAS is an international non-profit organization dedicated to advancing science around the world. The event drew science enthusiasts from some 60 countries to celebrate scientific research and its applications.



The legacy of the Banff New Media Institute (BNMI) was the focus of the **Euphoria and Dystopia Symposium** (Toronto, ON: Jan 31 – Feb 1, 2013). Panel discussions and workshops focused on themes drawn from *Euphoria & Dystopia: the Banff New Media Institute Dialogues*. The new book, co-edited by GRAND Board Member and former BNMI director Dr. Sara Diamond (President of OCADU) documents the groundbreaking BNMI summits during the period of 1995-2005. A new grant initiative that builds on the spirit of the Banff experience and sponsored by GRAND and the Canada Council for the Arts was announced at the symposium. The joint program supports new projects that pair scientists and artists in media arts collaborations.

GRAND delegates joined representatives of the DFAIT to attend the **Canada-Brazil 3.0 Conference** (João Pessoa, Brazil: Dec 3-4 2012). Inspired by Canada's premier digital media conference (Canada 3.0), the high-level meeting of government, academic and ICT sector representatives examined the economic benefits and social impacts of greater internationalization

Sara Diamond. Photo by Tom Sandler.

RESEARCH WITH AN EYE TOWARDS THE MARKET

Knowledge and Technology Exchange and Exploitation (KTEE)

From networking events to research-industry collaborations, GRAND's KTEE initiatives help commercialize, inform and share research results to fully develop the social and economic value of Canadian digital media research.

Twelve new spin-off companies were created in 2012-13 as a result of these efforts, with several potential spin-off relationships currently in development. University of British Columbia M.Sc. student Diane Tam, for instance, was able to transition her thesis work on haptic technologies into startup Haptok. Her customizable wrist-worn device gives tactile timing notifications to athletes in training. At University of Waterloo, Ph.D. student Krzysztof Pietroszek, working at the HCI Lab with Dr. Edward Lank, has started a Toronto-based company called Cineclick. Building on middleware that enables moviegoers to interact with the big screen using their mobile phones, Cineclick has a secured budget of \$825,000 from the Canada Media Fund to create a system for interactive games to be played during theatre pre-shows.

GRAND's partnership with Western Economic Diversification (WED) has also accelerated innovation and commercialization in the digital media sector across the four western provinces. Crucial to these efforts has been the Digital Wave Workshop series, which fosters industry connections that will enable market-ready technology to flow across provincial lines and get into the hands of people who can use it.

To date, the demonstration and networking events have exposed 159 businesses and organizations to 66 different technologies being developed at Canadian labs. The initiative has also helped commercialize seven new technologies, and develop 13 new prototypes and technologies with over \$300,000 in new business funding.

Not all of GRAND's knowledge mobilization is through commercialization with existing companies or spin-offs. For example, Dr. Deborah Fels at Ryerson University, an expert in inclusive media for people with disabilities, has proposed an ISO Standard for Guidance on Audio Descriptions for video, such as movies, TV shows and live news and sports.

GRAND's knowledge mobilization activity is putting research into action.

in digital media research and development. During the visit, an MOU was signed with the Universidade Federal de São Carlos and discussions were held with the Universidade de São Paulo for a second MOU that was finalized later in the year.

Researchers and industry representatives from six countries also met at the second annual **2013 BRAVA (Brazil Visual Analytics) Workshop**

(Cambury, Brazil: Apr 6-7, 2013). Sponsored by The Boeing Company, Mitacs and GRAND, and supported by the Federal University of São Carlos (UFSCar), the initiative was created to promote international cooperation in the field of Visual Analytics. Since 2012, the BRAVA network has grown to include over 18 research centres and universities in collaborations and student exchanges between Canada and Brazil.

GRAND CAFÉS

"The Café was a lot of fun to plan and attend. I learned about GRAND research here in Halifax and got to meet some new people. We really hope other HQP here plan another one soon."

– Lori McCay-Peet, HQP (Dalhousie)

GRAND Cafés are locally organized events that give students and post-docs in the network an occasion to meet and discuss their research.

The **GRAND Café @ Ryerson University** (Jul 16, 2012) was a fun, hands-on, full-day workshop exploring some of the hardware and software prototypes currently under development Ryerson's Centre for Learning Technology.

The **GRAND Café @ Concordia University** (Aug 13, 2012) welcomed close to 50 researchers, students, post-docs and local games professionals for an evening of presentations and dialogue at the TAG Centre looking at various facets of the Montréal games industry. Interns from the GRAND/Funcom Initiative at the event also demonstrated their finished game prototype.

Over twenty network researchers turned out for the **GRAND Café @ Dalhousie**



University (Jan 31, 2013), which included short presentations and demos by students at Dalhousie and NSCAD universities; other presentations discussed research projects going on in GRAND. Lunch followed by an off-campus walk to tour labs at NSCAD University provided an opportunity for participants to network.

GRAND'S DIGITAL WAVE WORKSHOPS

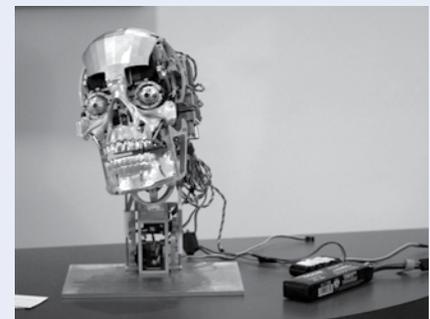
"Thank you for hosting such a great event in Edmonton. I am always impressed with the work being done in Canada yet wonder why it's not touted more, so I'm grateful for events like GRAND's."

– Digital Wave Workshop participant

GRAND, in partnership with CECRs Wavefront and the Canadian Digital Media Network (CDMN), presented **Catch Canada's Digital Wave** (Nov 2012) and **GRAND's Digital Wave** (Mar 2013) – part of an ongoing series of full-day workshops held across Western

Canada. Collectively, the past seven workshops have featured over 100 speakers with over 500 attendees from Vancouver, Edmonton, Calgary and Winnipeg. Funded primarily through Western Economic Diversification Canada, the events showcase some of the

innovative research and technologies being developed at Canada's universities, and put researchers in direct contact with interested industry receptors.



CONCORDIA UNIVERSITY

TAG Centre

Researchers at Concordia University's interdisciplinary TAG (Technoculture, Art and Games) Centre share a fascination with digital games that goes far beyond purely entertainment.

Digital games have evolved into a new form of cultural expression that is changing the world. Today, developers and gamers engage with political and social issues through games; they push technical innovation and influence popular culture.

This wider context of games has formed a new focal point for creativity and research that lies at the heart of Concordia's TAG Centre. The Centre provides a friendly, open space where students and faculty from different disciplines, as well as industry and community collaborators, encounter each other around games.

"This sounds very basic but in many ways it is the core," said Associate Director Lynn Hughes. She co-founded TAG with director and GRAND PNI Dr. Bart Simon in 2009 as a radical new cross-faculty research initiative to provoke dialogue centred on digital games.

"We deliberately set out to create an environment where making games, and thinking, talking and writing about

them, happen together. Similarly, discussion about both research and design aspects of games, and about entrepreneurship, tends to occur naturally."

"We're a pretty big outfit," said Simon. "GRAND has been instrumental to both establishing the Centre and enabling everything we have done."

Situated within the precincts of Montréal's thriving gaming industry, the lab connects independent artists, designers and programmers with mentors from Concordia and companies in collaborative projects. GRAND sponsored the Montreal Games Incubator at TAG in summer 2011, providing an opportunity for indie artists and designers to try out game ideas. TAG researchers were also involved in an intensive ten-week pilot program organized by GRAND and global game developer Funcom in August 2012 to offer a hands-on industry experience for students.

TAG is part of a growing movement to make "games for change." With partners Dawson College and

non-profit developer Decode Global, the Centre created an incubator program in July 2013 called Critical Hit. The program aims to encourage development of experimental games motivated by contemporary social, cultural and political concerns. Through the DIGILAB project, GRAND is helping support the evaluation of this innovative program funded by the Quebec government.

TAG projects and events span the gamut of game studies and design. LudicVoice, for example, is a cluster of projects looking at experimental sound and voice-based games and Skins is an aboriginal storytelling and game workshop series initiated to empower youth as producers of new technologies. TAG researchers are very active and have taken on a number of leadership roles in GRAND's multi-university PlayPR project, examining the interplay between performance and content in digital media.

"GRAND has supported a number of our best students both in the area of scholarly research and on interdisciplinary design teams for projects like *Propinquity*, *Victorianator* and *Jarbles*," said Hughes. "This is absolutely key to enhancing our ability to conduct our research."

Propinquity: a full body interaction game. Photo by Jane Tingley.

The Human Media Lab is working with industry partners on radically new interactive media that are poised to replace many of today’s mainstream technologies.

Flexible, paper-thin computer tablets, life-sized 3D video-conferencing, smartphones that bend with incoming calls – these are some of the latest prototypes underway at Queen’s University’s Human Media Lab (HML), whose mission is to explore “disruptive technologies” – innovations that challenge the tech status quo. Even though these prototypes could take many years to become commercially viable, HML’s research is charting new territory in human-computer interaction that is grabbing the attention of industry and the international media.

The lab’s latest focus has been Organic User Interfaces: new flexible displays and touchscreen interfaces that conform to the surfaces of everyday objects. For HML director and GRAND PNI Dr. Roel Vertegaal, the research is on the cusp of a revolution towards better, more human-centric user interfaces.

“We are creating completely new industries,” said Vertegaal. “Flexible displays, and flexible display interaction simply weren’t there ten years ago, and we’ve pioneered this. In the near future, a computer will have any shape or form. These Organic User Interfaces will be completely embedded in real world interactions.” Vertegaal, who started the lab in 2000, has also led pioneering research in Attentive User Interfaces, and is an expert on eye communication and eye tracking technology.

At the International Consumer Electronics Show (CES) in January 2013, Vertegaal unveiled one of the lab’s biggest breakthroughs: the PaperTab flexible tablet developed in partnership with Intel Labs and UK-based Plastic Logic. As an alternative to paper (and to rigid displays), PaperTab made international headlines, and intrigued both the tech industry and consumers.

The lab is also pushing the boundaries of an evolving relationship between industrial and interaction design. In February 2013, HML relocated to a unique “boutique” laboratory designed in collaboration with famed New York-based designer Karim Rashid. The lab’s vibrant, curvy rooms incorporate cutting-edge interactive technology, and serve as a versatile workspace for students and researchers to experiment with architecture as a user interface.

The novel interactive technologies being developed by Vertegaal and his students draw from a spectrum of interdisciplinary expertise. As he points out, connecting to GRAND’s Canada-wide network has helped bring the right people together to make it happen.

“There are always multiple designers and scientists working on similar problems, but you may not be aware of it. To be able to travel to each other’s labs, to be able to connect, to be able to work together is an enormous benefit. GRAND allows us to synchronize our efforts and create a whole that’s bigger than the sum of its parts.”

Inside the Human Media Laboratory, designed by Karim Rashid. Photo courtesy of the HML.

Human Media Lab

QUEEN'S UNIVERSITY



Awards & Achievements



Dr. Alissa Antle (SFU) was a recipient of an **Association for Computing Machinery (ACM) *Computing Reviews*' Best Paper of 2012** prize in the information technology category for her co-authored article "Embodied metaphors in interaction design, Personal and Ubiquitous Computing." The paper reports on research funded through GRAND. *Computing Reviews* surveys all of the journals and conferences from the ACM, a major international professional organization in the field of computing.

Antle's research team was also given the **ACE Diamond Award** for their

ACE Workshop students (Nepal). Photo by Alissa Antle (SFU).

creative design workshop for urban Nepalese children at **ACM's 9th International Conference on Advances in Computer Entertainment (ACE)**. The workshop (Kathmandu, Nepal: Nov 3-5, 2012) led to a project funded by GRAND, Microsoft Research, and SSHRC in conjunction with NGO Nepal House Society, to develop tablet-based biofeedback games to help children living in poverty.

Dr. Barry Wellman (University of Toronto) and co-author Lee Rainie (Pew Internet and American Life Project) received "Honorable Mention" for the **PROSE Award in Sociology & Social Work**

from the **Association of American Publishers** for their book *Networked: The New Social Operating System*. The PROSE Awards recognize the very best in professional and scholarly publishing.

Dr. Sheelagh Carpendale (University of Calgary) was presented with the **2013 CHCCS/SCDHM Achievement Award** from the **Canadian Human Computer Communications Society**. The award recognizes career achievement in computer graphics, visualization, or human-computer interaction. Carpendale has made significant contributions to all three areas, and is noted for her work in the design of

interactive displays to support collaboration.

Carpendale's doctoral student **Dr. Uta Hinrichs** (University of Calgary) received the **Bill Buxton Dissertation Award** for the best Canadian HCI dissertation of 2012. Her work "Open-Ended Explorations in Exhibition Spaces: A Case for Information Visualization and Large Direct-Touch Displays" was cited as exemplary research into the interaction challenges and design issues that exist when deploying large interactive displays in public settings.

Another GRAND HQP, **Lori McCay-Peet**



(Dalhousie University), was awarded the prestigious **Thomson Reuters Doctoral Dissertation Proposal Scholarship** at the **American Society**

of Information Science and Technology (ASIS&T) 2012 Annual Meeting. The Scholarship is awarded annually to foster original and creative information science research. McCay-Peet was also recognized at the ACM CHI 2012 conference – see below.

Dr. Frank Russo won the **Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS) Early Career Award** in recognition of the exceptional quality and importance of his research contributions to brain, behaviour, and cognitive science in Canada.

Dr. Derek Reilly (Dalhousie) and his creative collaborators won the **Nocturne 2012 Artist Award** for their hugely popular Tweetris Exhibit. Tweetris is a mashup of Tetris, yoga and Twitter where players use their whole body to create Tetris shapes. **Nocturne: Art at Night** is a major Fall street festival in Halifax, NS.

Dr. Jeremy Cooperstock and fellow team members were among the winners of the **Mozilla/NSF (National Science Foundation) Ignite Challenge** for their Real-time Emergency Response application, designed to detect, observe, and assess situations for

Top: Tweetris at Nocturne: Art at Night (Halifax), Photo by Derek Reilly · Lori McCay-Peet. Photo by Loren Beyerstein.

emergency responders using live video and social media data. The public innovation challenge was created to show revolutionary applications for next-generation networks.

A number of GRAND scholars were also distinguished at the **2012 ACM SIGCHI Conference on Human Factors in Computing Systems** (Austin, Texas: – the premier international conference for the field. **Dr. Carl Gutwin** (University of Saskatchewan) with **Dr. Andrea Bunt** (University of Manitoba), **Dr. Andy Cockburn** (University of Canterbury, NZ) and HQP **Joey Scarr** won “**Best Paper**” for “Improving Command Selection with CommandMaps,” showing the use of spatial memory in combination with hierarchy flattening to improve GUI performance. **Lori McCay-Peet** (Dalhousie University) and colleagues received **Best Paper (Honourable Mention)** for their publication “On saliency, affect and focused attention.”

At the **ACM SIGGRAPH 2012** conference (Los Angeles: Aug 5-9, 2012), the world’s leading conference and exhibition on computer graphics and interactive techniques, doctoral student **Tiffany C. Inglis** (University of Waterloo) placed first at the **ACM Student Research Competition (SRC)** for her “Pixelating Vector Line Art” poster. The SRC is an internationally recognized venue for students to present original research before a panel of judges and attendees. Inglis went on to place second in the 2013 Graduate Category for the Grand Finals – ACM’s comprehensive student competition that covers many areas of computing, not just digital media. As well, an impressive set of eight technical papers from **UBC’s Imager Lab** was accepted at SIGGRAPH 2012 – repeating the lab’s success in 2011. Read the Imager Lab profile to find out more.

Dr. Wolfgang Stuerzlinger (York) received a **Recognition of Service Award** from the ACM SIG Governing

Board for his role as program co-chair for the **ACM Symposium on Virtual Reality Software and Technology (VRST) 2012**, co-sponsored by GRAND.

Dr. Karon MacLean (UBC) with HQP **Vincent Levesque** (UBC) and **Louise Oram** (UBC) received **Best Paper Award** at the **2012 IEEE Haptics Symposium** (Vancouver, BC: March 4-7, 2012) for their presentation on “Exploring the Design Space of Programmable Friction for Scrolling Interactions.” The research provides valuable design information for new scrolling interactions that improve user experience. The symposium is a central venue where psychophysicists, engineers and designers to discuss multidisciplinary research relating to the sense of touch.

Dr. Roel Vertegaal (Queen’s University) and his students unveiled a pioneering paper-thin, flexible tablet prototype called PaperTab at the **2013 International Consumer Electronics Show (CES)** (Las Vegas, NV: Jan 8-11, 2013). Funded in part through NSERC and GRAND, PaperTab is the result of a two-year collaboration between Queen’s Human Media Lab (HML) and UK -based manufacturer Plastic Logic. (See the profile on Vertegaal’s Human Media Lab for details).



GRAND was also instrumental in its support of multiple new research initiatives across Canada.

Led by York University, in partnership with OCAD University and the University of Toronto, the Ontario-funded **Centre for Innovation in Information Visualization and Data Driven Design (CIVDDD)** opened in 2013 to accelerate visualization research in Canada. See the CIVDDD profile in this report for more information.

Through the support of a \$150,000 **Canadian Foundation for Innovation (CFI) Leaders Opportunity Fund** grant, **Dr. Anatoliy Gruzd** (Dalhousie University) established the new **Social Media Lab** in March 2013 – Canada’s first lab dedicated to social media research. Find out more in the Social Media Lab profile of this report.

Dr. Diane Gromala (Simon Fraser University) also opened the **SFU Chronic Pain Research Centre** to further her team’s development of innovative computer technologies to treat chronic pain – a notoriously complex, but epidemic disease that affects one in five Canadians. (See the featured Research Report for details).

The **Learning Across Disciplines (LEADS)** research group was awarded a \$2.5 million SSHRC grant to advance the study of technology-rich learning environments. GRAND researchers working with LEADS, **Drs. Cristina Conati, Lynn Hughes, Regan Mandryk and Bart Simon**, are conducting extensive research looking at innovative ways to employ the motivational power of computer games in learning and everyday activities.

As well, GRAND RMC member and games expert **Jason Della Rocca** launched **Executions Labs**: a Montreal-based independent games incubator and business accelerator. Della Rocca and fellow founders had the support of \$1.4 million in venture funding.

PaperTab flexible tablet. Photo courtesy of the Human Media Lab.

Encompassing computer graphics, animation, visualization, and human-centred technologies, the Imager Lab at The University of British Columbia maintains a strong international reputation for its prodigious and innovative work.

With six network PNIs and one CNI on its faculty team, and over fifty HQP involved in sixteen GRAND projects, The University of British Columbia's Imager Laboratory is one of the largest nodes in GRAND. Its researchers are among the most active and accomplished in the network.

At ACM SIGGRAPH 2012 – the premiere international computer graphics conference – Imager researchers presented nearly one tenth of all of the selected papers. Few groups have had comparable prominence at the conference. The lab is also well respected at the ACM CHI and IEEE Information Visualization, the top conferences in their fields.

The lab's graphics team is consistently rated one of the best in North America, producing many advances that quickly find their way into industry-standard tools. Through his startup Exotic Matter, graphics researcher and former CNI

Dr. Robert Bridson developed physical simulation software that has become the "go to tool" used in big-budget films to create impressive cinematic effects for fluids. GRAND industry partner Autodesk purchased the company in 2012; Bridson joined the company as a Senior Research Scientist in 2013.

PNI Dr. Wolfgang Heidrich and his student Felix Heide have conducted foundational work in computer graphics. Their team is developing a new mathematical framework that unifies existing approaches for analyzing and reconstructing multiplexed sensor data. The research has the potential to significantly advance computational photography by dramatically improving image quality.

The Imager Lab also has a strong track record for student successes. Bridson's doctoral student Tyson Brochu won the 2012 Alain Fournier Dissertation Award for best Canadian computer graphics

dissertation. This was the fourth consecutive year the award has gone to an Imager Lab student, and the fifth time overall since the award was established in 2005.

GRAND has been a key connector between Imager Lab members and other Canadian researchers. "Over the last few years, the GRAND annual meetings have become a primary networking venue for Canadian research groups in graphics and new media," said PNI Dr. Michiel van de Panne of Imager Lab's graphics group. "GRAND has been particularly useful in strengthening the network of connections to other research groups in Canada and internationally."

Through its annual meeting, the network introduced PNI Dr. Karon MacLean to researchers at the University of Saskatchewan, Queen's University, and the University of Waterloo, to work on motion sensors for children's "exer-games."

"When we say 'new media' we're not just talking about people who are doing research in new media itself," said MacLean. "We're also talking about who is using that media: clinicians, people in interactive design, and people who invent. Some of these collaborators I never would have met without GRAND."

Institute for Computing, Information and Cognitive Systems/Computer Science (ICICS/CS) building at UBC. Photo by Paul Joseph.

Imager Lab

UNIVERSITY OF
BRITISH COLUMBIA

UNIVERSITY OF ALBERTA

Humanities Computing Program

Humanities computing bridges computer technology and traditional humanities scholarship in a widely interdisciplinary field that aims to bring artistic, cultural and historical content to light through rich digital works.

In our digitized world, print is no longer the privileged medium of scholarship. Printed text is now embedded in new, digital forms alongside other computer-based tools, techniques, and media that have profoundly changed traditional humanities and social science research.

Through the Humanities Computing (HuCo) program at the University of Alberta – Canada’s first M.A. program in the field – researchers are examining both the applications and impacts of this digital transformation. GRAND PNIs Dr. Sean Gouglas and Dr. Geoffrey Rockwell work with Arts students on hands-on research that prepares them for roles in the professional community – both within academe and beyond.

“The program acts as a ‘meta lab’ in that our practice is to fund students with research placements,” explained Rockwell. “Our students apprentice in digital humanities projects – learning to become part of a research team, and often giving papers at national conferences by their second year.” As a result, more graduate students from HuCo are members of the Canadian Society for

Digital Humanities than from any other university.

Besides having to learn their discipline’s fundamentals, HuCo students and researchers learn the basics of computing – skills uncharacteristically technical for “humanities types.” The technical nature of the projects often requires collaboration with programmers and computing scientists. Students and scholars share resources such as TAPoR (Text Analysis Portal: a portal for discovering and reviewing text tools) and Voyant (a text visualization and analysis tool) – both developed under the direction of Rockwell.

Rockwell’s own recent research has focused on video games and game culture. He organized an International Conference on Japan Game Studies held in Kyoto in May 2013 that forged strong connections between game studies experts and developers in Japan and Canada. Jointly sponsored by GRAND, the U of A, and researchers at Kyoto’s Ritsumeikan University, the conference is the second in a series of annual symposia on cross-cultural game studies.

In other GRAND research with York University, Dr. Jennifer Jenson, Rockwell and Gouglas have been looking at gender inequality in games. One project involves text-analysis tools and visualization to evaluate the results of the FemShep project: an assessment of public reaction to a campaign by Edmonton-based game developer BioWare to include a female protagonist in its Mass Effect 3 video game. The study highlights the significant gender, racial, and sexual issues inherent in gaming communities and online discourses.

Rockwell and Gouglas are also leading a team of students in collaborations with researchers in GRAND’s PLAYPR project on locative game platforms. The project has expanded to include researchers in Japan. In another HuCo project, called fAR-Play (for Augmented Reality Play), students successfully built a framework for developing augmented reality games (ARGs), which has important applications for education and health-related serious games and visualizations.

“GRAND provided crucial support to bring together students and faculty interested in game studies around a network of projects. It then connected us with researchers across campus and across Canada,” said Rockwell. “This has given the graduate students invaluable exposure to what their peers are doing.”

Dr. Geoffrey Rockwell visits an arcade in Kyoto, Japan. Photo by Geoffrey Rockwell.

Focus on Health & Wellness

Advances in new media are rapidly moving the healthcare sector towards a digital revolution. Through new technologies and new approaches to medicine, GRAND researchers are helping to transform established practices in Canada's most vital industry.

The development of new health and medical applications has become one of GRAND's fastest growing research areas. Games and interactive media are helping to promote health and fitness, rehabilitate patients and reduce social isolation. Virtual reality and visualization technology is being used to help train doctors and inform patients. Chronic pain management incorporating digital media technology and network-based approaches are providing cost-effective prevention and care at a distance. These and other research developments are making a difference in the lives of Canadians.

The following is an overview of some of the recent successes in GRAND's health- and wellness-focused research.

MANAGING PAIN WITHOUT DRUGS

Using biofeedback systems, immersive virtual reality, visualization, robotics

and innovative social media, GRAND's **CPRM** (Confronting Pain: Redefining Mobility) project is at the forefront of innovative non-pharmacological treatments for long-term chronic pain. The research has the potential to aid over seven million Canadians suffering from or disabled by the disease, and to alleviate some of its costs, which surpass

those associated with cancer, heart disease and HIV infection combined.

Dr. Diane Gromala (Simon Fraser University, School of Interactive Arts + Technology) leads the CPRM project. Her work in immersive Virtual Reality (VR) to control pain applies mindfulness meditation techniques and biofeedback to reduce stress levels and promote pain self-management. The system is currently used in over 20 hospitals and clinics across North America.

In May 2013, Gromala's research group launched a \$2 million Chronic Pain Research Institute at SFU to accelerate cross-institutional collaboration and the adoption of CPRM's innova-



Participant in the CP Fit n' Fun project - a multiplayer exer-game therapy. Photo by Darcy Fehlings.

tive technologies in clinical practice. Advocating a “bio-psycho-social” or holistic approach, the GRAND team includes experts in computing science, engineering, sociology and psychology from across Canada, as well as artists and designers who work directly with patients. The efforts have made important contributions to the health research community and to pain medicine.

“Our collaboration with Dr. Gromala and SFU developing applications for chronic pain enters a whole new realm of research, using virtual environments as a means to train the brain to better handle pain.”

—Howard Rose, President,
Firsthand Technology

“We’re basically taking a GRAND project that grew to become this marvelous opportunity to form an institute,” explained Gromala. “As in any field, the difference between research and its actual use can be a very large distance. What we’re trying to do with the institute is give the researchers a place where they can do collaborative research that is highly responsive to clinical observations.”

By raising the profile and reach of CPRM, GRAND has enabled Gromala to lead a Canadian-U.S. collaboration with Seattle-based VR company Firsthand Technology. Funded by the American National Institutes of Health (NIH), Firsthand is developing and testing affordable VR technology for clinics and private practices.

Their prototype “Virtual Meditative Walk” includes a \$5,000 head-mounted VR display customized for chronic pain patients that is comparable to an existing \$40,000 unit. The Focus Forward

film *In Your Head* that talks about the collaboration was featured on Google’s exclusive Solve for X website, a forum for breakthrough technologies tackling worldwide problems.

“Our collaboration with Dr. Gromala and SFU developing applications for chronic pain enters a whole new realm of research, using virtual environments as a means to train the brain to better handle pain,” commented Firsthand Technology President Howard Rose.

The research team has also collaborated with Pain BC – BC’s largest non-profit dedicated to chronic pain – in collecting clinical pain research and practices from across Canada, providing patients and health practitioners an unprecedented knowledgebase. For Gromala, the non-profit is a critical node in CPRM’s growing pain research network.

“If I didn’t have a GRAND-funded project, I wouldn’t be collaborating with the people I’m working with at other institutions. It would have taken me years to meet them, years to find people interested in (pain research) or who have expertise.”

TECHNOLOGIES FOR AGING GRACEFULLY

As Canada’s population ages, GRAND’s **INCLUDE** (Accessibility of New Media for Disabled, Elderly, and Vulnerable Individuals) project is developing accessible technologies that help people deal with some of the consequences of growing older.

INCLUDE co-leader, Dr. Ronald Baecker (University of Toronto) directs U of T’s TAGLab (Technologies for Aging Gracefully Lab). TAGLab helps fast-track the adoption of new cognitive and communication aids for seniors and those suffering from Alzheimer’s disease, aphasia, and Multiple Sclerosis, as well as social isolation.

“We’ve seen individuals who are isolated and lonely start to connect much more with family and friends with the use of some of our prototype communication technology.”

— Dr. Ron Baecker,
University of Toronto

Working with medical practitioners and industry partners, the research engages the receptor community directly through hospitals, hospices, therapy, and disability support organizations. In partnership with seniors’ services provider Revera Inc., field trials are underway for TAGLab’s Families in Touch (FIT) technology – an interactive tablet-based device that allows seniors to connect with families and friends. Revera helps more than 30,000 North American seniors through retirement communities, long-term care homes, and other facilities.

Researchers are also attracting commercialization funding from sources such as NSERC Engage, provincial small business funding, private sector funding and the Ontario-based FedDev initiative. MyVoice, another communication aid developed through TAGLab, hit the market in the summer of 2012 as “Talk Rocket Go.” The context-aware application suggests vocabulary — words, phrases, and sentences — based on the user’s location, and has been embraced by over 10,000 people worldwide as their alternative communication tool.

“We’ve seen individuals who are isolated and lonely start to connect much more with family and friends with the use of some of our prototype communication technology,” Baecker noted. “What I think the next five to ten years is going to show is increasingly fruitful collaborations with people from the health sciences that will lead to exciting

new research advances as well as new commercializable products.”

PROMOTING HEALTHY LIVING THROUGH THE POWER OF GAMES

Inspired by the motivational power of play, researchers in the **GAMFIT** (Gaming for Physical Fitness) project are creating games to improve both the physical and cognitive wellbeing of Canadians.

Working with NeuroDevNet NCE Senior Scientist and physician Darcy Fehlings (University of Toronto), Dr. Nicholas Graham (Queen’s University) and his research team developed a multiplayer exer-game therapy that is making a difference in the lives of children with Cerebral Palsy (CP).

As children with CP reach adolescence, their muscle strength fails to increase in proportion to their body growth; some lose the ability to walk with a walker and have to transition to using a wheelchair. This reduced mobility contributes to poor physical fitness and can result in social isolation. Regular play sessions with the project’s cycle-based game “Liberi,” give teenagers with CP a vigorous cardiovascular and muscle strengthening workout that also encourages lively social interaction.

The project was part of GRAND’s joint NEUROGAM project with the NeuroDevNet NCE. NEUROGAM concluded in 2012, but that fall, the original two-year exer-game pilot was extended for another three years thanks to a \$511,000 Collaborative Health Research Projects (CHRP) award funded jointly through NSERC and CIHR.

“We’ve been able to really span over the sorts of new media research that we do together with real domain experts in cerebral palsy and in neurodevelopmental disorders in general,” said Graham. “Working within GRAND has been hugely helpful for us in moving forward because we’ve been able to bring together researchers from the Neurodevnet NCE



together with researchers from GRAND.” “This is exactly the type of impact an NCE should have,” commented GRAND’s scientific director, Dr. Kellogg Booth. “Two different networks got together to kick-start a new research initiative that is now being funded by two of the Tri-Council agencies through one of their regular joint programs.”

“There are a lot of social benefits to our work. If we’re creating systems that can delay or prevent the onset of certain diseases then that is going to have a huge impact on the health of Canadians.”

– Dr. Regan Mandryk,
University of Saskatchewan

At the University of Saskatchewan, PNI Dr. Regan Mandryk is also working on games for fitness and therapy. Her neurofeedback (NF) games developed through the same NEUROGAM collaboration with the NeuroDevelopmental Network are designed to promote better focus and concentration for children with FASD (Fetal Alcohol Spectrum Disorders). A life-long condition, FASD is the leading cause

of developmental disability among Canadian children. In partnership with experts in FASD and brain plasticity, Mandryk’s research team created a toolkit that can turn any off-the-shelf game into an NF game, allowing users to choose games that suit their play style from the large number of triple-A titles that are commercially available.

“There are a lot of social benefits to our work. If we’re creating systems that can delay or prevent the onset of certain diseases then that is going to have a huge impact on the health of Canadians,” said Mandryk. “This and other work done in the NEUROGAM project offer wonderful examples of how NCE funds augment and accelerate discovery and innovation in Canada,” adds Booth.

TOOLS FOR TRAINING THE NEXT GENERATION OF SURGEONS AND PHYSICIANS

With fewer hours of real patient exposure available for medical residents, resource-strapped care providers and medical schools are increasingly recognizing the potential of surgical simulation as an effective training tool.

Using virtual reality to model real procedures, computer-driven simulators enable doctors to acquire basic surgical skills, as well as plan and rehearse surgery, without the use of live patients

or cadavers. Simulators also improve the patient-safety and success-rate for a range of operations including laparoscopic and endoscopic surgeries.

“One of the great things about GRAND is that you can bring experts from all over Canada – you can mix engineers with medical doctors – and try to fill up a gap that’s currently existing in surgical simulation.”

– Sandrine de Ribaupierre MD,
Western University



For Sandrine de Ribaupierre, physician and Assistant Professor at the Division of Neurosurgery (Western), this means that Canada has the potential to become a global leader in simulation technology. She is a PNI in GRAND’s **HLTHSIM** (Healthcare Simulation) project team comprised of clinicians and researchers who have a strong presence within the clinical regime and the healthcare training sector. Her research focuses on surgical applications of virtual and augmented reality and the use of visualization systems for specific clinical tasks.

“I think that one of the great things about GRAND is that you can bring experts from all over Canada - you can mix engineers with medical doctors - and try to fill up a gap that’s currently existing in surgical simulation,” said de Ribaupierre. “We are showing that the training curve on a simulator seems to improve the learning curve in a real setting.”

In partnership with award-winning game developer Digital Extremes (London, ON), de Ribaupierre and HLTHSIM Project Leader Dr. Roy Eagleson (Western) are creating simulation scenarios using the company’s Evolution Engine game engine. Other collaborations involve the National Research Council and their NeuroTouch simulator project, as well as prominent international companies Symbionix, VisionSense, and Intuitive Surgical, and physicians at London Health Science Centre and Hospital in Toronto.

Advanced simulation research is also underway at the University of Alberta where CNI Dr. Bin Zheng is applying eye-tracking and 3D motion tracking to study the eye-hand coordination and skill acquisition of surgeons. Like de Ribaupierre, Zheng aims to shorten the learning curve for surgeons while strengthening their OR competencies. His work was recognized with a 2013 Digital Alberta Award in June 2013.

Also at the U of A, PNI Dr. Eleni Stroulia and her team have developed two platforms for serious games and simulations for students in nursing, pediatrics, and EMT programs, which was ranked 12/206 in Education & Educational Research Journals (a major framework for monitoring instructional environments in a virtual world). Stroulia’s interdisciplinary work with collaborators from across campus, with special focus on healthcare, was also recognized with the U of A’s Information Technology Leadership Award.

VISUAL ANALYTICS A NEW FRONTIER IN HEALTH SERVICES

The GRAND-sponsored **BRAVA** (Brazilian Visual Analytics) Initiative has brought together Canadian and Brazilian researchers in the development of advanced mobile tools that give clinicians and doctors the power to work with medical “big data” – an important advancement in health informatics.

“In the healthcare setting, decision makers are on the move. They want to access all the capability to analyze big data from where they are – on a tablet, or a mobile phone.”

– Dr. Sidney Fels,
University of British Columbia

PNI Dr. Sidney Fels (UBC), one of the main organizers of BRAVA, has been joined by researchers at UBC, OCAD University, and Dalhousie University, along with Dr. Junia Anacleto, a key researcher at Brazil’s Federal University of São Carlos (UFScar), and other Brazilian collaborators, in looking at ways to analyze enormous datasets using new interactive and accessible visual interfaces.

“In the healthcare setting, decision makers are on the move. They don’t have the time or the space to do a big analysis of a bunch of data they’ve been collecting at the hospital. They want to access all the capability to analyze big data from where they are – on a tablet, or a mobile phone,” explained Fels.

Research seeded by BRAVA through Boeing is incorporating virtual presence and visual analytics to support and improve practices at a Brazilian treatment facility for neurological disorders. Field studies at Brazilian hospitals and other care facilities are paving the way for similar trials in Canada. Additional funding is now needed to move the research in new directions.

“It’s blossoming and ready for new funding because the research agenda has gone beyond visual analytics. We’re finding lots of other things, such as mobile applications and ubiquitous computing, and research around how these technologies can impact health care that don’t have so much to do with visual analytics on its own.”

Dr. Christopher Schlachta (Western) demonstrates simulation-based training for surgeons. Photo courtesy of the University of Western Ontario.

InnoVis

UNIVERSITY OF CALGARY

The InnoVis lab at the University of Calgary is designing useful, intuitive technologies that improve how we personally deal with information on a day-to-day basis.

Information overload is a common experience in our data-driven times. By changing how we interact with data, Dr. Sheelagh Cpendale believes people can instead become empowered by it.

The GRAND PNI is leading research at the InnoVis lab (University of Calgary) to develop tools and techniques that can transform the flood of data we encounter daily into something accessible and understandable for everyone.

"We've been spending the last thirty years getting really good at putting data into computers and amassing it and having masses and masses of it, so that now everywhere you turn people are talking about big data and big data problems," Cpendale said in a 2011 interview for University of Calgary's UToday magazine. "But there has been comparatively little research on making this data useful and useable by humans."

An internationally renowned and award-winning innovator in informa-

tion visualization and touch-sensitive interactive displays, Cpendale draws upon her broad interdisciplinary research expertise in the design of new technologies. In recognition of her work, she was awarded a 2012 NSERC E.W.R. Steacie Memorial Fellowship, and she holds the Canada Research Chair in Information Visualization and the NSERC/SMART/ICORE Industrial Research Chair in Interactive Technologies at the University of Calgary.

Cpendale and her students spend a good deal of time studying people's everyday interactions with information, images, technology and each other. Multi-touch tables field-tested at the Vancouver Aquarium, for example, helped researchers see how visitors explore horizontal interactive exhibits. This hands-on method of inquiry has been key to the successful design of more natural, accessible people-centred technologies.

Other InnoVis projects have developed applications in areas as diverse as financial management, healthcare,

and sustainability. Many of the lab's students have held industrial research internships with Canadian and international companies.

InnoVis is one of the few labs globally that is developing interactive tabletop displays. Cpendale's research group recently patented an application of three-dimensional, tabletop interaction techniques. The research is a significant contribution to the international revitalization of tabletop research, helping put Alberta on the map for its work in the field of human-computer interaction.

Through industry collaboration, a number of other patents and products have come out of InnoVis research. The lab's partnership with Calgary-based SMART Technologies helped influence the development of the company's interactive whiteboards, and the addition of interactive tabletops to their multi-touch display product line, now being used in classrooms and offices around the world.

"For me, GRAND is all about the people," said Cpendale. "GRAND participants are practically the who's who of digital media researchers in Canada. Being part of this group is invaluable."

Multi-touch table installed at the Arctic Exhibit at the Vancouver Aquarium. Photo courtesy of the Vancouver Aquarium.

The University of Saskatchewan’s Interaction Lab supports a rich interdisciplinary research community working with local, national and international partners on the future of human-computer interaction.

Whether at work, at home or on the street, on laptops or mobile devices, interaction with computers has become a core part of our daily lives. Researchers at the University of Saskatchewan’s Human-Computer Interaction (HCI) Lab are dedicated to making these interactions easier and more effective, developing technologies and interfaces that match how we think, work and play.

Lead by PNI’s Dr. Carl Gutwin and Dr. Regan Mandryk, the lab supports regular collaborations that cross several disciplines – computer science, psychology, engineering, geography, kinesiology, nursing, and medicine – as well as industrial research partners, with expertise covering both the machine and the human side of the interaction. Projects involve core HCI areas, including computer-supported cooperation, interface design, digital games, affective computing, and

information visualization.

Mandryk and her students are investigating how game technology can improve people’s lives, and they are evaluating the impact of lab prototypes on the wellbeing of people, rather than simply looking at improvements to productivity or efficiency. Her research team works with children, the elderly and those with physical and cognitive disabilities, such as children with FASD (Fetal Alcohol Spectrum Disorder).

“In my particular research field, most of my work ends up in the hands of participants,” said Mandryk. “These are not just games for learning or games for health. These are games to learn empathy, or games that help with problem solving.”

Lab director Dr. Carl Gutwin is one of the world’s leading HCI scholars. A CHI

Academy fellow, he is internationally recognized for his work in the human factors of distributed collaboration and collaborative software. He is also looking at how to design visual information and interaction for ubiquitous display technology.

In partnership with NSERC, Gutwin’s team developed a new projector-based display called “UltraLux” that offers a low-cost and simple solution for full-room applications, such as computer workspaces distributed across interior walls. The technology provides a glimpse into the design possibilities for future full-coverage displays.

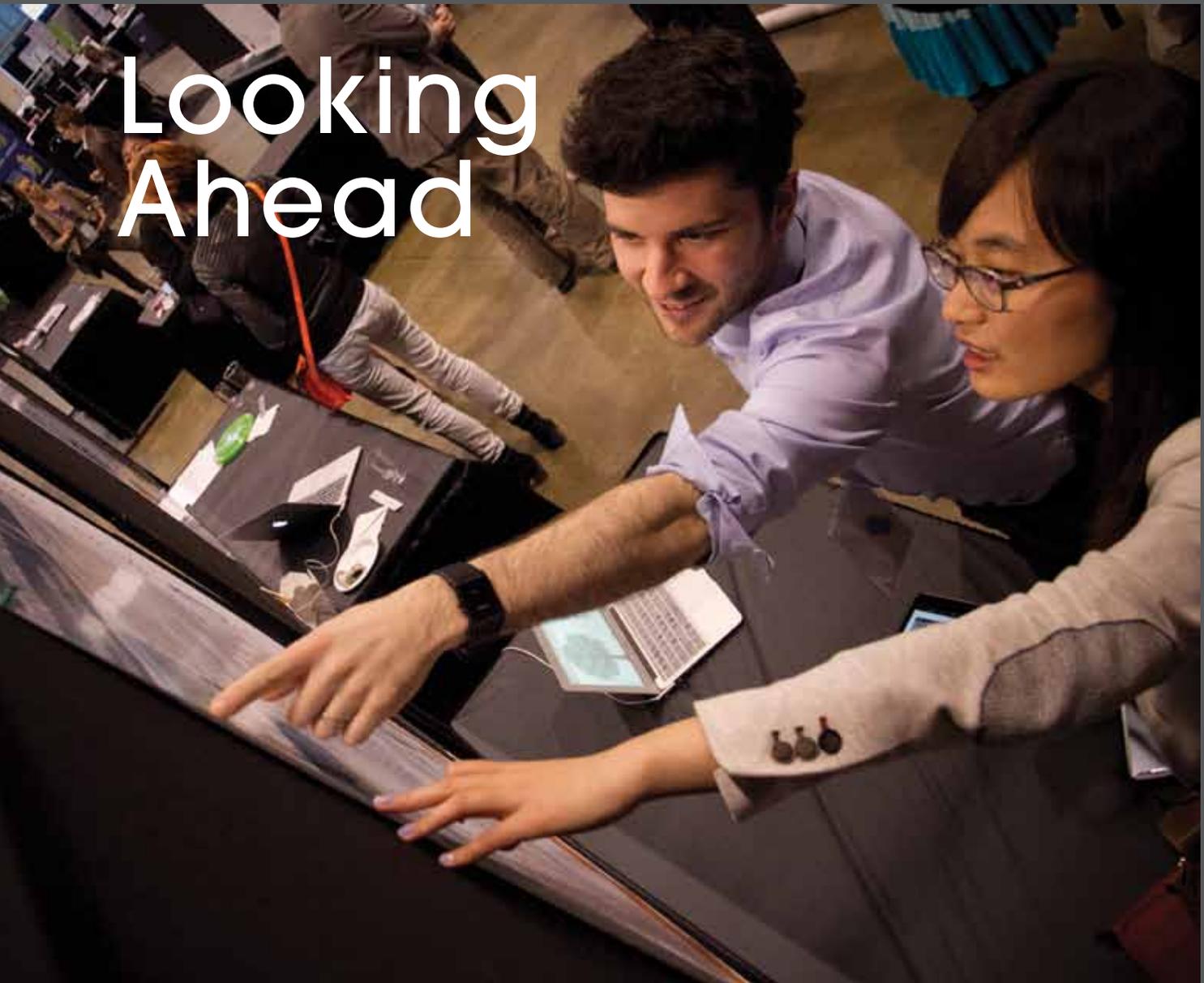
For Gutwin, GRAND provides tremendous opportunities to build connections outside the lab. “The GRAND conferences, for example, have been extremely valuable as a venue for us to meet new collaborators, to show our work to industrial contacts, and to help our students build their professional networks,” Gutwin said. “GRAND’s network approach has enabled us to carry out research that we would not have been able to take on before the NCE.”

Thorvaldson Building at the University of Saskatchewan. Photo by Mark Ferguson.

Interaction Lab

UNIVERSITY OF SASKATCHEWAN

Looking Ahead



GRAND has been operating as a Network of Centres of Excellence since January 2010, and this is the fourth annual report that has been produced. Our first five-year funding cycle will end in December 2014, so by the time our next annual report is prepared the renewal application for a second five-years of funding will have been submitted.

Needless to say, a lot of activity in the coming year will be focused on the renewal process and mapping out GRAND's second five-year term. Having learned a great deal about operating a Canadian digital media research network since the original application was submitted, planning for our second phase is already well underway, and some initial steps have already been taken to reshape the network and its programs for the next funding cycle.

Photo by Jonathan Nuss.

Two individuals who are taking on new leadership roles in the network as we move toward renewal are Dr. Gerald Karam, who became Chair of the Research Management Committee in May 2013, and Dr. Eugene Fiume, who has agreed to take on the role of GRAND's Scientific Director beginning in January 2015 and who will lead the renewal effort. Each of them has prepared a message that is included in this year's report to provide a further glimpse into the preparations that are underway and the steps that are expected to take place over the next nine months as GRAND prepares for the next phase of its life as an NCE.



Message from the Chair of the Research Management Committee

DR. GERALD KARAM:

INCOMING CHAIR OF THE RESEARCH MANAGEMENT COMMITTEE (RMC)

Dr. Gerald Karam is Executive Director at AT&T Labs-Research in Florham Park NJ. Before joining AT&T in 1995 he was an Associate Professor in the Department of Systems & Computer Engineering at Carleton University. At AT&T, Gerald's primary research has been on new platforms for consumer and enterprise communication services that leverage emerging technology and devices for fixed and mobile services. His continuing interests include mobile applications and technology, telecommunications software, platforms and services, software design and analysis, concurrent systems, and real-time systems. Gerald is an AT&T Fellow, the company's highest technical honor, an IEEE Senior Member, and he sits on the IEEE Advisory Committee for IT and the New York Institute of Technology (NYIT) Electrical and Computer Engineering Advisory Board.

The GRAND Research Management Committee (RMC), a body of academic

and industrial appointees, is responsible for assessing and guiding GRAND's portfolio of research projects. At this special point in our organization's life, the RMC and the entire research community are addressing the preparation of the renewal application for GRAND. With the Scientific Director, the RMC considered how to approach the renewal process, and after a number of deliberations arrived at the path we are now following. First, we decided to use a philosophy of "GRAND Challenges" – important problems for Canadian society that if addressed by GRAND, could produce valuable impact. With this organizing structure, we defined a process to elicit a series of larger projects to focus on the GRAND Challenges, starting with the principle of a clean slate, where each contribution had to seek its way into the new proposal, even if it was in the previous GRAND mandate.

Our process kicked off discussions among the research community as we began the first major step of inviting descriptions of projects, or subprojects through "Letters of Intent" (LOI). The RMC is then undertaking a multi-step review process to assess and assemble the research program for the renewal. The final set of projects will submit full proposals that will be incorporated in the renewal application that will be prepared in 2014, and additionally we will start some funding on these projects in 2014 to get them bootstrapped in our plan for success.

This is the process – but the excitement is about the opportunity! We will have bigger projects in the second phase of GRAND that, through a series of subprojects, span the country and the scope of work in the multidisciplinary manner that GRAND exemplifies. Projects will focus much more on connections to the receptor community, in all the appropriate ways for a Network of Centres of Excellence.

For me, it is thrilling to participate in the execution of this renewal effort for GRAND – to be on the ground floor of something that will combine the best of what GRAND has achieved, innovative thinkers at the forefront of Canadian research, and an exciting opportunity ahead. To borrow a line from the Rocky Horror Picture Show, "I shiver with antici-----pation!"

Gerald Karam

Chair, Research Management Committee
GRAND NCE



Message from the Scientific Director Designate

DR. EUGENE L. FIUME: SCIENTIFIC DIRECTOR DESIGNATE

Dr. Eugene Fiume is a Professor and past Chair of the Department of Computer Science at the University of Toronto, where he co-directs the Dynamic Graphics Project and is Director of the Master of Science in Applied Computing Program. Eugene's research interests span most aspects of realistic computer graphics, including computer animation, modeling natural phenomena, and illumination, as well as strong interests in Internet-based imaging, image repositories, software systems and parallel algorithms. He has written two books and co-authored over 120 papers. Eugene is a co-recipient of the 2011 NSERC Synergy Awards for Innovation for the 20-year collaboration between the Dynamic Graphics Lab and industry partner Autodesk.

The research collaborations supported by GRAND anticipate a sea change

in the creation and consumption of digital media. The traditional serial broadcast model is giving way to an interleaved model of creation and consumption over an expanding array of digital media. All of this is now playing out in a broad social context in which digital media has become a tool of social change. As the demand grows for tools to allow anyone to create digital media, the range of important research problems will broaden. Most of the original fundamental problems will persist, for few interesting problems are solved in five years, but pressing new questions will continually challenge us. GRAND is a platform from which to view new problems; it is a community in which to discuss their importance; it is a dynamic network that can mobilize researchers to solve some problems; and it is a vehicle to engage industry and other receptors while solutions are developed.

The first phase of GRAND is nearing completion. It truly is impossible to overstate the achievements of Kelly Booth and his leadership team in creating GRAND and bringing it to such an impressive stage of development. But it is the researchers who determine the success of GRAND. It is a profound honour to help lead GRAND into its next phase. With so much achieved, it is now possible to imagine a future in which our Centre expands its base of funding, becomes more prominent in the public eye, and tackles the most important problems in digital media research.

With the achievements of GRAND to date, we are in an opportune position to create ever better conditions for successful collaboration that, in time, will lead to a more prosperous, harmonious society. I eagerly look forward to working with all participants in GRAND to achieve this goal together.

Eugene Fiume
Scientific Director Designate
GRAND NCE

Built around some of the latest stereoscopic 3D technology, Emily Carr’s S3D Centre is a national research lab experimenting in new applications and visual aesthetics for this rapidly evolving medium.

Digital stereoscopy – a fairly new approach to the old technique of blending of two images to give the illusion of depth – is transforming the art of film. Canadian research, known for its pioneering contributions to the form, is leading the way, exploring possibilities of the 3D kind.

In the West, the lead is taken by the Stereoscopic 3D (S3D) Centre at the Emily Carr University of Art + Design. Opened in May 2010 with support from Western Economic Diversification, NSERC, and industry partners Kerner Optical, Sony, and Panavision, the S3D Centre has become a major resource for Canadian filmmakers and researchers exploring stereoscopic 3D production.

The Centre’s facilities, housed at Emily Carr’s Intersections Digital Studios, are equipped with advanced stereoscopic 3D enabling technologies, stereo camera rigs, and processing pipelines, provided by leaders in stereoscopic technology such as Christie and Quantel. The Centre engages both technical and artistic explorations including

high frame rate film (HFR), S3D content production, user interfaces, as well as aspects of the film production pipeline.

With partner TELUS, the HFR project is experimenting in the art of compelling storytelling using high-definition stereoscopic 3D. In “L’âme Soeur (Soul Mate) 3D,” the first HFR short film of its kind, scenes shot at 24, 48, and 60 frames-per-second have helped evaluate the creative potential of variable frame rates for both 3DTV and cinema.

In addition to this basic research on advanced display technologies, the S3D Centre is creating immersive environments for art, entertainment, and wellness using its newly acquired Oculus Rift head-mounted virtual reality display. Using Magic Lantern software, researchers are looking at new approaches to computational photography for stereoscopic imaging.

“Our goal is to be on the edge of experimental media and transfer the knowledge gained quickly and directly for the benefit of the local film and

cultural industries,” said Centre director and GRAND PNI Dr. Maria Lantin. A stereoscopic 3D researcher since 2000, Lantin has become one of Canada’s leading experts in the field.

The Centre engages several companies in the lower mainland of British Columbia, and provides resources and support for local filmmakers. It founded the first Canadian Chapter of the International 3D and Advanced Imaging Society, connecting members to a wide network of professionals in Hollywood and beyond.

Through the GRAND network, the S3D Centre is linked with universities working on stereoscopic topics across Canada, creating a multifaceted, comprehensive approach to the research. The MOVITA project within GRAND links researchers across seven universities, which has strengthened the ties between the S3D Centre and 3DFLIC, a 3D research consortium in Ontario.

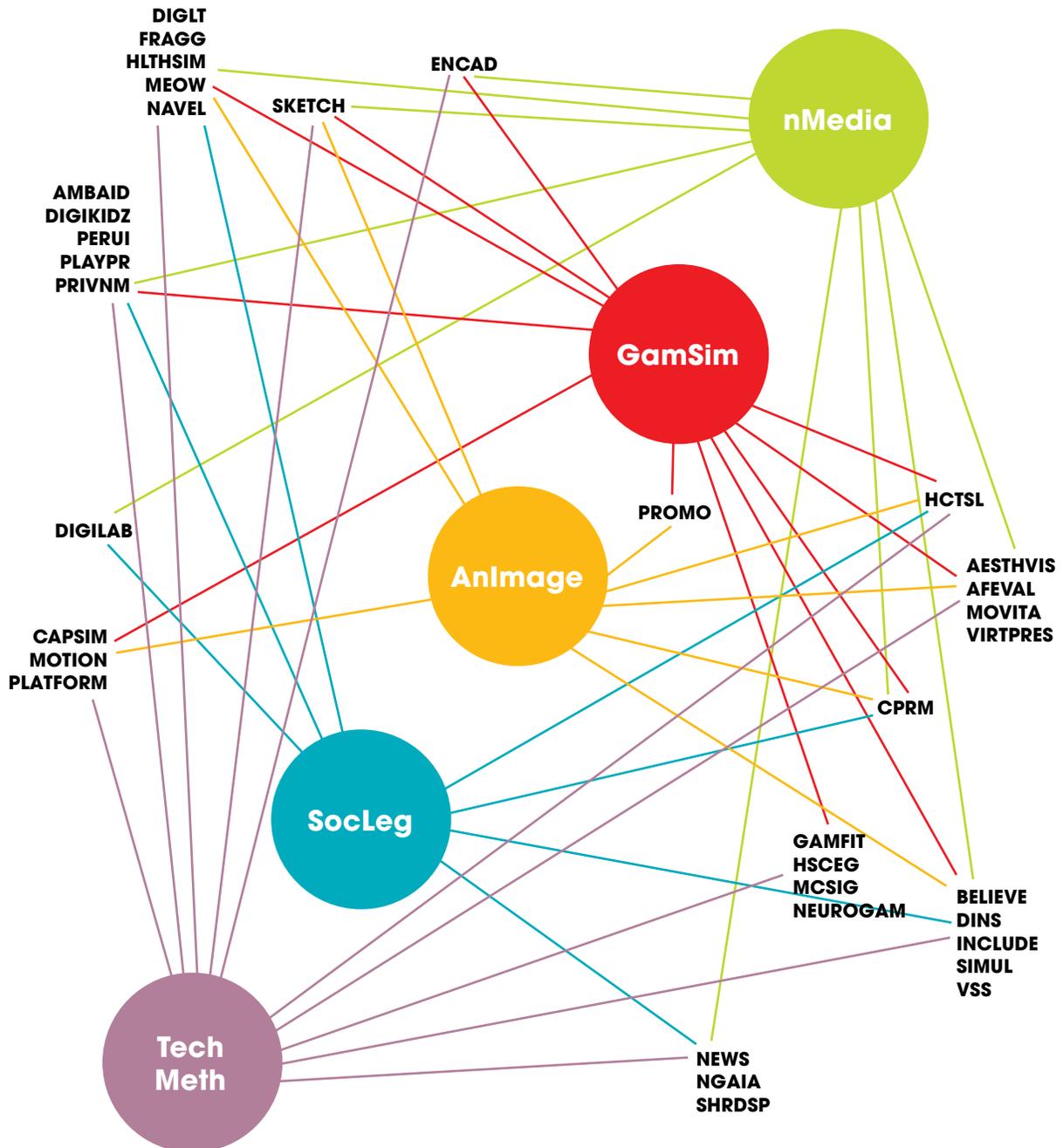
“GRAND has helped to support a series of meetups and master classes featuring some of the best stereographers, directors, and researchers in the field,” said Lantin. “The network has been instrumental in helping fund student researchers and has enabled us to reach out to the local and national community.”

Filming of “L’âme Soeur (Soul Mate) 3D”, a short film exploring applied High Frame Rate (HFR) techniques. Photo courtesy of the S3D Lab (Emily Carr).

S3D Centre

EMILY CARR UNIVERSITY OF ART + DESIGN

GRAND’s research program is organized into a matrix of projects that mutually interact within five themes (nMedia, GamSim, AnImage, SocLeg, TechMeth) defined below. Each theme is focused on specific aspects of the research program. Most projects have multiple activities that include basic and applied university-based research conducted in collaboration with partners in the appropriate receptor communities.



RESEARCH THEMES

NMEDIA

NEW MEDIA CHALLENGES AND OPPORTUNITIES

Leader: Catherine Middleton, Ryerson University
Co-Leader: Sean Gouglas, University of Alberta

nMedia researchers identify, develop, and evaluate the tools, skills, and methodologies needed to advance the next generation of new media applications and distribution channels. nMedia also addresses the ever-evolving challenges and impacts these changes have on lifestyle, culture, law, and business.

GAMSIM

GAMES AND INTERACTIVE SIMULATION

Leader: Regan Mandryk, University of Saskatchewan
Co-Leader: Bart Simon, Concordia University

Canada is an important global leader in the computer game production industry. Beyond entertainment, “serious applications” using interactive gaming technologies have made huge strides in education, training, healthcare, and social discourse. The GamSim theme covers a broad range of research in the construction, use, and understanding of games in three areas: Game Development Technologies, Education, and Applications.

ANIMAGE

ANIMATION, GRAPHICS, AND IMAGING

Leader: Brian Wyvill, University of Victoria
Co-Leader: Pierre Poulin, Université de Montréal

The AnImage theme not only tackles the question of how to create content, it also questions what to create, including ways to intuitively guide creators toward the details that matter. Areas of focus include: Animation, Scalable Content Generation, Effective and Intelligent User Interfaces, and Human Perceptions

SOCLEG

SOCIAL, LEGAL, ECONOMIC AND CULTURAL PERSPECTIVES

Leader: Samuel Trosow, University of Western Ontario
Co-Leader: Jennifer Jenson, York University

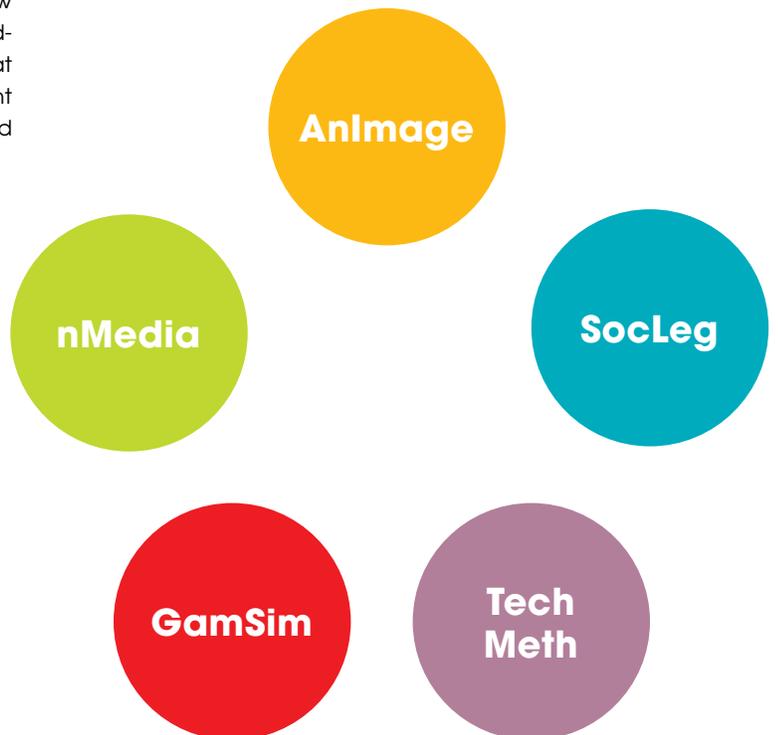
SocLeg asks hard questions about how GRAND research in the areas of new media, games, graphics and animation are relevant and beneficial to Canadians in all walks of life, and from social, cultural, economic, political and legal contexts. SocLeg also delves into how policymakers can best adopt legal and regulatory processes to the challenges of digital media.

TECHMETH

ENABLING TECHNOLOGIES AND METHODOLOGIES

Leader: Jeremy Cooperstock, McGill University
Co-Leader: Carl Gutwin, University of Saskatchewan

The TechMeth theme identifies and develops the building blocks used to invent, design, produce and evaluate the next generation of games, animation and new media technologies for use by consumers, research and industry. Broadly speaking, the TechMeth theme concentrates on four categories of reusable knowledge: Architectures, Specific Techniques, Methods and Methodologies, and Tools.



AESTHVIS

Aesthetics and Visualization

Project Leader: Sheelagh Carpendale, University of Calgary

Project Co-Leader: Lyn Bartram, Simon Fraser University

AESTHVIS develops empirical guidelines for aesthetics in visualization so designers can produce more imaginative and innovative visualizations less constrained by technology.

AFEVAL

Evaluating Affective User Experience

Project Leader: Regan Mandryk, University of Saskatchewan

Project Co-Leader: Jeremy Cooperstock, McGill University

AFEVAL provides better tools for testing the emotional impact of games and other digital media products to reduce development costs.

AMBAID

Appropriate-Modality Bases For Ambient Information Display

Project Leader: Karon MacLean, University of British Columbia

Project Co-Leader: Jeremy Cooperstock, McGill University

AMBAID provides multi-sensory input and output capability for next-generation digital media applications.

BELIEVE

Believable Characters, Behaviors and Stories in Story-based Games

Project Leader: Duane Szafron, University of Alberta

Project Co-Leader: Magy Seif El-Nasr, Simon Fraser University

BELIEVE provides authors a library of high-level behaviour, plot patterns, and game story idiom scripts for adaption to the story at hand.

CAPSIM

From Capture to Simulation

Project Leader: Wolfgang Heidrich, University of British Columbia

Project Co-Leader: Eugene Fiume, University of Toronto

CAPSIM produces general methods to capturing time-varying geometry of complex physical phenomena including fluids, fire, smoke, fabric, and facial expressions to bring a new level of realism to computer graphics.

CPRM

Confronting Pain: Redefining Mobility

Project Leader: Diane Gromala, Simon Fraser University

Project Co-Leader: Chris Shaw, Simon Fraser University

CPRM leads to improved pain management tools and techniques for people who suffer from chronic pain.

DIGIKIDZ

Children's Digital Culture: Connecting, Communicating and Collaborating in a Digital World

Project Leader: Alissa Antle, Simon Fraser University

Project Co-leader: Joanna McGrenere, University of British Columbia

DIGIKIDZ focuses on understanding, designing, developing and evaluating child-computer interaction in the rapidly changing landscape of digital media and technologies that enable children to connect, communicate and collaborate.

DIGILAB

Digital Labour: Authors, Institutions and the New Media

Project Leader: Bart Simon, Concordia University

Project Co-Leader: Andrew Herman, Wilfrid Laurier University

DIGILAB informs public policy on copyright, access to information, employment standards, and historical archiving.

DIGLT

Digital Games for Learning and Training

Project Leader: Cristina Conati, University of British Columbia

Project Co-Leader: Geoffrey Rockwell, University of Alberta

DIGLT identifies the components of successful instructional game design and develops guidelines for developers.

DINS

Digital Infrastructures

Project Leader: Catherine Middleton, Ryerson University

Project Co-Leader: Barry Wellman, University of Toronto

DINS provides a better understanding of the continued evolution of Canada as a networked society and its relationship to the global network.

ENCAD

Enabling Technologies for CAD Systems

Project Leader: Wolfgang Stuerzlinger, York University

Project Co-Leader: Robert Woodbury, Simon Fraser University

ENCAD combines constraints, simulation, histories and alternatives with established representations so CAD system developers can readily transfer to commercial practice.

FRAGG

Focusing Research about Gendered Gaming

Project Leader: Jennifer Jenson, York University

Project Co-leader: Sean Gouglas, University of Alberta

FRAGG will examine gender issues in gaming from the perspectives of both consumers and producers.

GAMFIT ● ●

Gaming for Physical Fitness

Project Leader: Nicholas Graham, Queen's University

Project Co-Leader: Regan Mandryk, University of Saskatchewan

GAMFIT harnesses the popularity of computer and video gaming to maintain and improve physical and cognitive well being.

GRNCTY ● ●

Greenest City Conversations

Project Leader: Robert Woodbury, Simon Fraser University

Project Co-Leader: Meg O'Shea, University of British Columbia

GRNCTY engages the general public with participatory media events to understand the roles media can play in forming sustainable attitudes and actions.

HCTSL ● ● ●

Human Centred Technologies for Sustainable Living

Project Leader: Lyn Bartram, Simon Fraser University

Project Co-Leader: Robert Woodbury, Simon Fraser University

HCTSL develops interactive control and visualization systems that help building occupants make appropriate energy and resource use decisions without imposing undue technological complexity.

HLTHSIM ● ● ● ●

Multi-Modal Augmented Reality for Training Healthcare Professionals

Project Leader: Roy Eagleson, University of Western Ontario

Project Co-Leader: Eleni Stroulia, University of Alberta

HLTHSIM uses virtual world scenarios to train future health professionals to better collaborate in teams and enhance clinical-diagnostic skills.

HSCEG ● ●

High-Speed Coordination in Electronic Games

Project Leader: Carl Gutwin, University of Saskatchewan

Project Co-Leader: Nicholas Graham, Queen's University

HSCEG develops tools for high-speed networked games that allow true coordination amongst players.

INCLUDE ● ● ● ● ●

Accessibility of New Media for Disabled, Elderly and Vulnerable Individuals

Project Leader: Deborah Fels, Ryerson University

Project Co-Leader: Ronald Baecker, University of Toronto

INCLUDE explores, develops and evaluates technologies to improve access to interactive media systems for people with disabilities, people isolated from others, and seniors.

MCSIG ● ●

Monte Carlo Search in Games

Project Leader: Jonathan Schaeffer, University of Alberta

Project Co-Leader: Holger Hoos, University of British Columbia

MCSIG improves decision making for imperfect information games and in the presence of uncertainty, infers hidden state from move sequences, and models opponents' weaknesses.

MEOW ● ● ● ● ●

Media Enabled Organizational Workflow

Project Leader: Eleni Stroulia, University of Alberta

Project Co-Leader: Kellogg Booth,

University of British Columbia

MEOW ensures that GRAND uses 'best of breed' digital media tools to manage itself.

MOTION ● ● ● ●

Modeling Human Motion

Project Leader: Michiel van de Panne,

University of British Columbia

Project Co-Leader: Paul Kry, McGill University

MOTION develops results for animation, games, e-commerce, new media interfaces, health care applications, and entertainment robotics.

MOVITA ● ● ● ● ●

New Directions in Moving Image Technology and Aesthetics

Project Leader: Maria Lantin,

Emily Carr University of Art and Design

Project Co-leader: Jim Bizzocchi, Simon Fraser University

MOVITA will examine how 3D among other new digital film technologies are impacting approaches to developing narratives, the use of space in film and other creative decisions by filmmakers.

NAVEL ● ● ●

Network Assessment and Validity for Effective Leadership

Project Leader: Barry Wellman, University of Toronto

Project Co-Leader: Abby Goodrum, Wilfrid Laurier University

NAVEL is the yin for project MEOW's yang, ensuring GRAND researchers network effectively with each other.

NEUROGAM ● ● ● ● ●

Employing Game Technology for the Remediation of Neurodevelopmental Disorders in Children

Project Leader: Nicholas Graham, Queen's University

Project Co-Leader: Bruce Gooch, University of Victoria

Neurogam researches the effectiveness of digital games in improving the health and lifestyles of children with cerebral palsy (CP) and fetal alcohol spectrum disorder (FASD).

NEWS

Access to News Media: Production, Search, Retrieval and Distribution

Project Leader: Jacquelyn Burkell, University of Western Ontario

Project Co-Leader: Charles Clarke, University of Waterloo

NEWS explores the future of news seeking behavior, news retrieval, news mining and the interplay of social media and institutional media outlets in global news flows.

NGAIA

Next Generation Information Appliances

Project Leader: Luanne Freund, University of British Columbia

Project Co-Leader: Charles Clarke, University of Waterloo

NGAIA examines the advantages of a task-based rather than document-based approach to the retrieval of information for workplace decision-making.

PERUI

Personalized User Interfaces in Real World Contexts

Project Leader: Michael Terry, University of Waterloo

Project Co-Leader: Joanna McGrenere, University of British Columbia

PERUI investigates interface personalization techniques to address problems of complexity and learnability in modern interfaces.

PLATFORM

Platform Performance

Project Leader: Alexandra Fedorova, Simon Fraser University

Project Co-Leader: David Fleet, University of Toronto

PLATFORM relieves game developers from thread and shared state management and provides faster parallel algorithms for geometry processing.

PLAYPR

Play and Performance Interfaces for Culture and Games

Project Leader: Lynn Hughes, Concordia University

Project Co-Leader: Ron Wakkary, Simon Fraser University

PLAYPR integrates the analysis, evaluation and design of cultural and entertainment applications with the development of interfaces for play, performance, and storytelling.

PRIVNM

Usable Privacy and Security for New Media Environments

Project Leader: Robert Biddle, Carleton University

Project Co-Leader: Jacquelyn Burkell, University of Western Ontario

PRIVNM supports privacy and security in new media environments by leveraging social science research and exploring new designs and legal perspectives.

PROMO

Procedural Modeling

Project Leader: Pierre Poulin, Université de Montréal

Project Co-Leader: Przemyslaw Prusinkiewicz, University of Calgary

PROMO expands the range of procedural modeling capabilities and extends it to a number of applications areas and industry uses.

SHRDSP

Understanding Roles and Rules for Shared Display Environments

Project Leader: Sid Fels, University of British Columbia

Project Co-Leader: Ravin Balakrishnan, University of Toronto

SHRDSP investigates a range of computer display modalities and techniques in order to enhance human-human communication.

SIMUL

Enhanced Communication in Simulation and Training

Project Leader: Gerald Penn, University of Toronto

Project Co-Leader: Carl Gutwin, University of Saskatchewan

SIMUL provides direct benefit to Canada's defence and aerospace technology sectors, as well as civilian applications through video gaming and voice-controlled operations.

SKETCH

Sketch Interfaces

Project Leader: Karan Singh, University of Toronto

Project Co-Leader: Faramarz Samavati, University of Calgary

SKETCH designs new interaction interfaces that leverage affordances of sketching to infer user intent, recognize complex gestural communication, and create 3D models and animation.

VIRTPRES

Enhanced Virtual Presence and Performance

Project Leader: Jeremy Cooperstock, McGill University

Project Co-Leader: Stephen Brooks, Dalhousie University

VIRTPRES enhances the next generation of virtual presence and live performance technologies in a manner that supports the task-specific demands of communication, interaction and production.

VSS

Visual Science for Stakeholders: Experimental Designs of Scientific Visuals for Health and Science Consumers

Project Leader: Paula Gardner, OCAD University

Project Co-leader: James Reynolds, Queen's University

VSS will apply visual science research to improve tools that communicate and interpret health and scientific information for consumers

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AS AT SEPTEMBER 2013

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* Non-voting members

We would like to acknowledge the contributions of **Sara Esam**, our former NCE Observer.

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SCIENTIFIC ADVISORY
COMMITTEE (ISAC)**
AS AT SEPTEMBER 2013

Steven Bathiche, Director of Research, Applied Sciences Group, Microsoft · **Shawn Brixey**, Dean, Fine Arts, York University · **Steven Collins**, Adjunct Associate Professor, School of Computer Science & Statistics, Trinity College Dublin · **Arvind Gupta**, CEO & Scientific Director, MITACS Inc. · **Osman Khan**, Assistant Professor, School of Art & Design, University of Michigan · **Scott Kirsner**, Writer/Columnist · **Harry Lewis**, Professor, Computer Science, School of Engineering & Applied Sciences, Harvard University · **Joe Marks** (Chair), Founder, Upfront Analytics · **Jacquelyn Martino**, IBM Master Inventor, IBM, T.J. Watson Research Center · **Jennifer Preece**, Professor and Dean, College of Information Studies, University of Maryland · **Philipp Slusallek**, Professor, Computer Graphics, Saarland University

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COMMITTEE (RMC)**
AS AT SEPTEMBER 2013

Kellogg Booth (Scientific Director, GRAND), Professor, University of British Columbia · **Jeremy Cooperstock** (Theme Leader, TechMeth), Professor, McGill University · **Jason Della Rocca**, Co-Founder, Execution Labs · **Beverly Harrison**, Principal Scientist, Yahoo · **Gerald Karam** (RMC Chair), Executive Director, AT&T Labs Research · **Regan Mandryk** (Theme Leader, GamSim), Associate Professor, University of Saskatchewan · **Catherine Middleton** (Theme Leader, nMedia), Professor, Ryerson University · **Peter Pirolli**, Research Fellow, PARC · **Samuel Trosow** (Theme Leader, SocLeg), Associate Professor, University of Western Ontario · **Brian Wyvill** (Theme Leader, AnImage), Professor, University of Victoria

We thank former committee member **Elizabeth Churchill** for her service. Also, we would like to acknowledge the contributions of **Gord Kurtenbach**, our former RMC Chair.

GRADUATE STUDENT AND POSTDOC COMMITTEE (GSPC) AS AT SEPTEMBER 2013

Neesha Desai, University of Alberta · **Victoria Moulder** (Vice-chair), Simon Fraser University · **Lola Wong** (Chair), University of Western Ontario

We thank former committee members **Ryan Armstrong**, **Lori McCay-Peet** and **Charlotte Tang** for their service. Also, we would like to acknowledge the contributions of **Neesha Desai**, our former GSPC Co-chair.

The Graduate Student and Postdoctoral Committee (GSPC) is a student-led initiative established by and for HQP within the GRAND network. The GSPC serves to communicate a student and postdoc perspective to the GRAND network, and to coordinate HQP activities.

GRAND STAFF AS AT SEPTEMBER 2013

Tahina Awan, Program and Administrative Assistant (Part Time) · **Kellogg Booth**, Scientific Director · **Brie Chauncey**, Program and Administrative Officer · **Fauve Mackenzie**, Operations Coordinator (Part Time) · **Josh Miller**, IT Support · Spencer Rose, Communications Officer · **Mark Salopek**, Manager, Technology Transfer and Commercialization · **Adrian Sheppard**, Director, Operations & Network Manager

We would like to thank **Grace Battiston**, Director, Communications, for her tremendous hard work and dedication to GRAND. Grace was there at the beginning, and helped bring energy and a sense of community to the network.

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PRINCIPAL NETWORK INVESTIGATORS (PNIs)

Carleton University - Robert Biddle, Brian Greenspan, David Mould · **Concordia University** - Lynn Hughes, Bart Simon · **Dalhousie University** - Stephen Brooks, Anatoliy Gruzd · **Emily Carr University of Art + Design** - Maria Lantin · **McGill University** - Jeremy Cooperstock, Paul Kry · **OCAD University** - Paula Gardner, Martha Ladly · **Queen's University** - Nicholas Graham, Roel Vertegaal · **Ryerson University** - Deborah Fels, Catherine Middleton · **Simon Fraser University** - Alissa Antle, Lyn Bartram, Alexandra Fedorova, Diane Gromala, Chris Shaw, Ron Wakkary, Rob Woodbury · **Université de Montréal** - Pierre Poulin · **University of Alberta** - Sean Gouglas, Geoffrey Rockwell, Jonathan Schaeffer, Eleni Stroulia, Duane Szafron · **University of British Columbia** - Kellogg Booth, Cristina Conati, Sidney Fels, Luanne Freund, Wolfgang Heidrich, Karon MacLean, Joanna McGrenere, Alla Sheffer, Michiel van de Panne · **University of Calgary** - Sheelagh Carpendale, Przemyslaw Prusinkiewicz, Faramarz Samavati · **University of Saskatchewan** - Carl Gutwin, Regan Mandryk, Kevin Stanley · **University of Toronto** - Ronald Baecker, Ravin Balakrishnan, Eugene Fiume, Gerald Penn, Karan Singh, Barry Wellman · **University of Victoria** - Melanie Tory, Brian Wyvill · **University of Waterloo** - Charles Clarke, Edward Lank, Michael Terry · **University of Western Ontario** - Jacquelyn Burkell, Sandrine de Ribaupierre, Roy Eagleson, Samuel Trosow · **Wilfred Laurier University** - Abby Goodrum · **York University** - Jennifer Jenson, Wolfgang Stuerzlinger

COLLABORATING NETWORK INVESTIGATORS (CNIs)

Carleton University - Audrey Girouard, Gabriel Wainer · **Concordia University** - Jason Camlot, Jason Lewis, Lisa Lynch, Sudhir Mudur, Elena Razlogova, Kim Sawchuk, Xin Wei Sha · **Dalhousie University** - Kirstie Hawkey, Derek Reilly · **École de technologie supérieure** - Eric Paquette · **McGill University** - Karyn Moffatt, Tina Piper · **McMaster University** - David Harris-Smith · **NSCAD University** - Sam Fisher · **OCAD University** - Bill Leeming, Geoffrey Shea, Greg Van Alstyne · **Ryerson University** - Jason Nolan, Frank Russo · **Simon Fraser University** - Jim Bizzocchi, Tom Calvert, Halil Erhan, Marek Hatala, Kate Hennessy, Carman Neustaedter, Jian Pei, Bernhard Riecke, Richard (Hao) Zhang · **University of Alberta** - Patricia Boechler, Michael Buro, Mike Carbonaro, Sharla King, Martin Mueller, Ioanis Nikolaidis, Toni Samek · **University of British Columbia** - Konstantin Beznosov, Ray Cole, Robert Gardiner, Holger Hoos, Heather O'Brien, John Robinson, Stephen Sheppard · **University of Calgary** - Jeffrey Boyd, Anthony Tang · **University of Manitoba** - Andrea Bunt, Pourang Irani · **University of Ontario Institute of Technology** - Bill Kapralos, Lennart Nacke · **University of Ottawa** - Mary Cavanagh, Jochen Lang, Won Sook Lee · **University of Toronto** - Jeremy Birnholtz, Mark Chignell, David Fleet, Kyros Kutulakos, Siobhan Stevenson, Yuri Takhteyev · **University of Victoria** - Bruce Gooch, Ryan Rhodes · **University of Waterloo** - Mark Hancock, Craig Kaplan, George Labahn · **University of Western Ontario** - Diana Mok, Anabel Quan-Haase, Matt Stahl, Nick Withford · **York University** - Barbara Crow

COLLABORATING NETWORK INVESTIGATORS (CNIs) - INTERNATIONAL

Northeastern University, USA - Magy Seif El-Nasr · **University of Canterbury, New Zealand** - Mark Billingham, Andy Cockburn · **University of Sheffield, UK** - Elaine Toms

YOUNG NETWORK INVESTIGATORS (YNIIs)

University of Alberta - Michael McNally · **University of Saskatchewan** - Ian Stavness · **University of Toronto** - Frank Rudzicz

GRAND created the Young Network Investigators Awards in 2011 to recognize the need for start-up funds when HQP make the transition from doctoral student or postdoctoral fellow to research faculty positions. Up to \$5,000 in seed funding over the first 12 months in their new positions nurtures, as well as leverages, their involvement with GRAND until they become CNIs and can qualify for funding requests.

Financial Statements

**To the Directors of Graphics,
Animation and New Media NCE Inc.**

We have audited the financial statements of the GRAND FUND - Network Centres of Excellence (the "Fund"), which comprise the statements of financial position as at March 31, 2013, 2012 and April 1, 2011 and the statements of operations and cash flows for the years ended March 31, 2013 and 2012, and a summary of significant accounting policies and other explanatory information.

MANAGEMENT'S RESPONSIBILITY FOR THE FINANCIAL STATEMENTS

Management is responsible for the preparation and fair presentation of these financial statements in accordance with Canadian accounting standards for not-for-profit organizations, and for such internal control as management determines is necessary to enable the preparation of financial statements that are free from material misstatement, whether due to fraud or error.

AUDITOR'S RESPONSIBILITY

Our responsibility is to express an opinion on these financial statements based on our audit. We conducted our audit in accordance with Canadian generally accepted auditing standards. Those standards require that we comply with ethical requirements and plan and perform the audit to obtain reasonable assurance about whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor's judgment, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the entity's preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the entity's internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by management, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.

OPINION

In our opinion, the financial statements present fairly, in all material respects, the financial position of the Fund as at March 31, 2013, 2012 and April 1, 2011, and the results of its operations and its cash flows for the years ended March 31, 2013 and 2012, in accordance with Canadian accounting standards for not-for-profit organizations.

Chartered Accountants
Vancouver, British Columbia
September 17, 2013

STATEMENTS OF FINANCIAL POSITION

	March 31, 2013	March 31, 2012	April 1, 2011
ASSETS			
Current			
Cash - unrestricted	\$86,623	\$45,986	\$32,328
Cash - restricted			
Uncommitted	113,234	1,018,907	797,209
Committed to research funding (Note 4)	614,730	1,162,500	-
Accounts receivable	105,536	63,508	11,497
Research administration advances	56,705	61,222	61,315
Research advances	1,320,150	130,000	1,164,500
	2,296,978	2,482,123	2,066,849
LIABILITIES			
Current			
Accounts payable and accrued liabilities	102,324	35,079	37,095
Unearned revenues	16,859	16,279	12,094
Deferred research funding contributions (Note 6)	2,085,780	2,363,399	1,986,671
	2,204,963	2,414,757	2,035,860
NET ASSETS	\$92,015	\$67,366	\$30,989

STATEMENTS OF OPERATIONS
YEARS ENDED MARCH 31, 2013 AND 2012

	2013	2012
RECEIPTS		
Contribution from Networks of Centres of Excellence (Note 5)	\$4,935,958	\$4,286,712
Other contributions	231,685	133,512
	5,167,643	4,420,224
EXPENDITURES		
Events	250,011	211,958
Professional fees	25,013	20,801
Administration	65,659	78,572
Research funding grants (Note 4)	3,919,202	3,504,655
Salaries and benefits	358,028	332,372
Technology transfer	213,752	73,694
Travel	311,329	161,795
	5,142,994	4,383,847
INCREASE (DECREASE) IN NET ASSETS	24,649	36,377
NET ASSETS, BEGINNING OF YEAR	67,366	30,989
NET ASSETS, END OF YEAR	\$92,015	\$67,366

STATEMENT OF CASH FLOWS YEARS ENDED MARCH 31, 2013 AND 2012

	2013	2012
CASH PROVIDED BY (USED IN) OPERATING ACTIVITIES		
Cash received from Networks of Centres of Excellence	\$4,650,000	\$4,650,000
Cash received from Western Economic Diversification Canada	126,386	29,232
Cash received from host university	56,977	41,800
Cash received from other sources	38,850	31,454
Cash disbursed for research funding grants	(5,178,702)	(2,340,155)
Cash disbursed for administration and events	(1,106,317)	(1,014,475)
INCREASE (DECREASE) IN CASH	(1,412,806)	1,397,856
CASH, BEGINNING OF YEAR	2,227,393	829,537
CASH, END OF YEAR	\$814,587	\$2,227,393
CASH COMPOSED OF		
Unrestricted cash \$86,623	\$45,986	
Restricted cash	727,964	2,181,407
	\$814,587	\$2,227,393

1. OPERATIONS

The Networks of Centres of Excellence Program (the "NCE") was created by the Government of Canada to mobilize Canadian research talent in the academic, private and public sectors and apply it to the task of developing the Canadian economy and improving the quality of life of Canadians. The GRAND Fund (the "Fund") was established jointly on January 8, 2010 by the Natural Sciences and Engineering Research Council ("NSERC") and the Social Sciences and Humanities Research Council ("SSHRC") specifically for the purpose of promoting research in new media, animation and games, initially for the period ending on January 7, 2015. Graphics, Animation and New Media NCE Inc. (the "Network") was selected to operate the Fund and the University of British Columbia ("UBC") was selected to serve as the host institution for the Network and the Fund, providing facilities and services for the Network's administrative centre and acting as the legal entity on behalf of the Fund.

- The Network is a not for profit company which was incorporated under Part II of the Canada Corporations Act on December 9, 2009 to achieve the following objectives:
- Build an integrated, multi-disciplinary understanding of the technical aspects of new media, animation, and games as well as the social, legal, economic and cultural aspects.
- Foster an appreciation for the role of design in the research and development of technology.
- Develop strong end-to-end networking and partnerships among the academic, private and public sectors to enhance Canada's competitive advantage.
- Conduct world class research in new media, animation and games.
- Train highly qualified personnel and facilitate knowledge and technology exchanges that lead to commercialization and innovation.

On January 8, 2010, the Network entered into a supplemental Memorandum of Agreement with UBC, to clarify UBC's responsibilities as the host institution.

These financial statements include the Fund's contributions received from the NCE by the Network and disbursed on behalf of the NCE. During the period the Network received substantially all of its revenue from NCE and may not be able to maintain the operations described in these financial statements should this funding be significantly reduced or ended.

2. BASIS OF PREPARATION

STATEMENT OF COMPLIANCE

These financial statements have been prepared in accordance with Canadian accounting standards for not-for-profit organizations ("ASNPO").

The Fund adopted ASNPO on April 1, 2012, with a transition date of April 1, 2011. Under Section 1501 First-time Adoption by Not-for-Profit Organizations, ASNPO standards are applied retrospectively at the transition date with all adjustments to assets and liabilities taken to net assets unless certain exemptions are applied. None of the exemptions which could be applied on the transition to ASNPO were applicable to the Fund.

ASNPO employs a conceptual framework similar to Canadian GAAP. Adoption of ASNPO has not changed the Fund's statements of financial position at April 1, 2011 and March 31, 2012 or its results of operations or cash flows for the year ended March 31, 2012.

BASIS OF PRESENTATION

These financial statements have been prepared on the historical cost basis, except for certain financial instruments which are measured at fair value, as explained in the accounting policies set out in Note 3.

3. SIGNIFICANT ACCOUNTING POLICIES

ACCOUNTING ESTIMATES AND JUDGMENTS

The preparation of these financial statements requires management to make estimates and judgments and to form assumptions that affect the reported amounts and other disclosures in these financial statements. The estimates and associated assumptions are based on historical experience and various other factors that are believed to be reasonable under the circumstances. The results of these assumptions form the basis of making the judgments about carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions and conditions.

The estimates and underlying assumptions are reviewed on an ongoing basis. Revisions to accounting estimates are recognized in the period in which the estimate is revised if the revision affects only that period or in the period of the revision and further periods if the review affects both current and future periods.

Critical accounting estimates are estimates and assumptions made by management that may result in material adjustments to the carrying amount of assets and liabilities within the next financial year. Critical estimates used in the Fund's preparation of these financial statements include, among others, the recoverability of accounts receivable and estimation of accrued liabilities.

CASH AND CASH EQUIVALENTS

Cash and cash equivalents comprise cash at banks and short-term deposits with an original maturity of three months or less which are readily convertible into a known amount of cash.

CASH - RESTRICTED AND UNRESTRICTED

Contributions received which are reserved for program expenditures are considered as restricted cash.

FINANCIAL ASSETS AND FINANCIAL LIABILITIES

The Fund's financial instruments are cash and cash equivalents, accounts receivable and accounts payable and accrued liabilities.

The Fund makes its fair value measurements based on a three-level hierarchy:

- LEVEL 1 – inputs are unadjusted quoted prices in active markets for identical assets or liabilities;
- LEVEL 2 – inputs other than quoted prices in Level 1 that are observable for the asset or liability, either directly or indirectly; and
- LEVEL 3 – inputs for the asset or liability that are not based on observable market data.

Transaction costs directly attributable to the acquisition or issue of a financial asset or financial liability that will be measured subsequently at amortized cost are added to the carrying amount of the financial asset or financial liability.

CONTRIBUTIONS

Contributions to the Fund are recorded as "receipts" at the time all criteria established in the funding agreement are satisfied. The agreement for each grant or fund determines the appropriate disbursement of contributions. Contributions received but not disbursed at the end of a fiscal period are recorded as "deferred" and are transferred to "receipts" when disbursed during a subsequent fiscal period.

Any contributions received from the NCE and not spent when the Fund is ended are to be refunded to the NCE, no later than three months after the end of the Fund.

IN-KIND CONTRIBUTIONS

In-kind contributions from the University of British Columbia as part of the Network Host agreement and other organizations are not included in these financial statements.

INCOME TAXES

The Fund, as a non-profit organization, is not subject to Federal or Provincial income taxes.

4. GRANTS TO NETWORK MEMBERS

During the year ended March 31, 2013, the Fund granted \$3,919,202 (2012 - \$3,504,655) of the NCE contributions to Network Members. Of the total NCE contributions granted to Network Members, \$656,268 (2012 - \$627,050) was reported as unspent at the end of the fiscal year. These amounts are expected to be spent by the Network Members during the next fiscal year.

The Fund also awarded \$614,730 (2012 - \$1,162,500) in research grants for the next fiscal year. These awards were disbursed subsequent to year end and have been included as restricted cash committed to research funding.

5. FUNDING AGREEMENTS

NETWORKS OF CENTRES OF EXCELLENCE

On January 8, 2010, NSERC and SSHRC agreed to contribute funding of \$23,250,000 to the Fund over five years to January 7, 2015. The funding is to be received according to the following schedule:

FISCAL YEAR	NSERC	SSHRC	TOTAL	
2009 – 2010	\$1,860,000	\$465,000	\$2,325,000	received
2010 – 2011	3,595,000	1,055,000	4,650,000	received
2011 – 2012	2,800,000	1,850,000	4,650,000	received
2012 – 2013	2,800,000	1,850,000	4,650,000	received
2013 – 2014	2,800,000	1,850,000	4,650,000	
2014 – 2015	1,400,000	925,000	2,325,000	
TOTAL FUNDING	\$15,255,000	\$7,995,000	\$23,250,000	

The annual contributions will be released subject to:

- Parliamentary appropriation of the funds in each fiscal period
- Satisfactory progress, as determined by the NCE Secretariat, towards predetermined milestones for the NCE Network
- Continuing eligibility of the NCE Network Host and the NCE Network, and
- Compliance with the terms of the funding agreement

When all the conditions for the release of contributions to the Fund committed by, but not yet received from, NCE under this agreement have been met, the contributions to be received will be recorded as "Research contributions receivable" and "Deferred research funding contributions" on the statement of net assets of the Fund.

WESTERN ECONOMIC DIVERSIFICATION

The Fund entered into an agreement with Western Economic Diversification Canada ("WED") on February 25, 2011 to receive \$399,000 in funding over 4 years. This funding is from the Western Diversification Program for small and medium enterprise outreach, commercialization and technology transfer and is intended to strengthen BC and Western Canada's digital media cluster. The funding will be disbursed as a reimbursement of 64% of directly related project costs.

The schedule of payments is as follows:

FISCAL YEAR	TOTAL		
2010-2011	\$2,978	received	
2011-2012	73,736	received	
2012-2013	167,812	received-	\$78,904; claimed - \$88,908
2013-2014	154,474		
TOTAL FUNDING	\$399,000		

6. DEFERRED CONTRIBUTIONS

	2013	2012	2011
BALANCE - BEGINNING OF YEAR	\$2,363,399	\$1,986,671	\$790,353
Contributions received during the year			
Grant from NSERC	2,800,000	2,800,000	3,595,000
Grant from SSHRC	1,850,000	1,850,000	1,055,000
Grant from Host Institution	31,979	16,800	-
	7,045,378	6,653,471	5,440,353
Amounts recognized as receipts during the year	(4,959,598)	(4,290,072)	(3,453,682)
BALANCE - END OF YEAR	\$2,085,780	\$2,363,399	\$1,986,671

7. CAPITAL MANAGEMENT

The Fund's capital management objectives are to meet the requirements of the funders providing grants for research and to safeguard its ability to continue as a going concern in order to pursue the advancement of graphics, animation and new media. The Fund considers its capital for these purposes to be its available received and committed grants, as disclosed on the statement of net assets. The Fund manages its capital by preparing annual expenditure budgets, which are revised periodically based on current commitments and available funds, and potential additional funding which it may be actively pursuing. Annual budgets and budgets which are materially updated during the year are approved by the Board of Directors.

8. FINANCIAL RISK MANAGEMENT

The Fund's activities expose it to financial risks, which include credit risk and liquidity risk. The Fund's risk management program focuses on the unpredictability of financial markets and seeks to minimize the risk to its assets and its ability to meet its mandate.

A. CREDIT RISK

Credit risk is the risk of an unexpected loss if a customer or third party to a financial instrument fails to meet contractual obligations. The Fund is exposed to credit risk through its cash and accounts receivable. The Fund limits its exposure to credit risk arising from cash by only depositing cash in major Canadian financial institutions and holding only financial instruments of institutions with the highest credit rating.

B. LIQUIDITY RISK

Liquidity risk is the risk that the Fund will not be able to meet its financial obligations as they fall due. Accounts payable and accrued liabilities are due within the current operating period. The Fund manages this risk through its capital management programs (Note 7).

The Fund does not hold financial instruments which subject it to market risks.

9. COMMITMENTS

During the year, the Fund agreed to administer a grant from Mindset Social Innovation Foundation to the Centre for Digital Media. The grant was for the Centre for Digital Media's Open Health Initiative Project. The total grant amount awarded was \$90,000 in 2013 of which \$80,000 remains unspent as of March 31, 2013. This grant does not represent an activity of the Fund and has not been recorded in these financial statements.

GRAND NCE

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