



2013/14 ANNUAL REPORT

CELEBRATING 5 YEARS OF EXCELLENCE



Canada's Digital Media
Network of Centres of Excellence



NCE RCE

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The Networks of Centres of Excellence (NCE) program was created in 1989 as a joint initiative of the Natural Sciences and Engineering Research Council (NSERC), the Social Sciences and Humanities Research Council (SSHRC), the Canadian Institutes of Health Research (CIHR), Industry Canada, and Health Canada. 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.

GRAND gratefully acknowledges the support of:



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MESSAGE FROM THE CHAIR OF THE BOARD

PAUL SALVINI

This has been a year of change for the GRAND NCE leadership. In the spring of 2014, our founding board chair, Dr. Ian Kyer, transitioned from his board duties so that he could focus on the growing number of historical books that he has been researching and authoring. His strong stewardship in the first phase of GRAND was instrumental in creating all the right conditions for the GRAND NCE to grow and thrive. We wish Ian all the best with his work and I want to personally thank him for his friendship and support over the years.

The position of Scientific Director is also in transition as we near the end of the term for our founding director, Dr. Kellogg Booth. I first met Kelly as an undergraduate in Computer Science at the University of Waterloo where he inspired a generation of computer scientists to consider a career in computer graphics. There's no doubt that Kelly has inspired many of us over the years and his outstanding leadership in GRAND has truly helped us to make a real impact towards our mission. Our sincere thanks for an incredible job building GRAND into the strong network that it is today. Kelly will continue to play a pivotal role at GRAND as he continues his work as one of our Principal Network Investigators.

As we enter our next cycle of funding for GRAND, we welcome the arrival of Dr. Eugene Fiume as our new Scientific Director. A newly minted Fellow of the Royal Society of Canada (RSC) this year, Eugene has been working closely with Kelly and the rest of the team over the past year to ensure a seamless transition combined with a strong vision for the future of our network. In our second phase, we will see a shift in the direction of GRAND as we begin to grow our relationships with the broader receptor community across the country.

As we approach the end of the first five years of the GRAND NCE, we both celebrate the great work that has been accomplished to date and wait in anticipation for news on our NCE's renewal. In August of this year, a team of GRAND researchers, staff members, and board directors headed to Ottawa to meet with the NCE's expert panel. We shared the stories of our success to date and laid out our strategic plan – a vision for the years to follow. In the months to come, we look forward to hearing the results of our review. It was a great team effort and I appreciate the tremendous work of all those who participated in building and shaping our renewal application.



OUR THANKS TO C. IAN KYER

Founding Chair of the GRAND Board of Directors

C. Ian Kyer was instrumental in the development of GRAND. He was a member of the core team that put together a letter of intent and then the full application that led to GRAND's being funded as a new Network of Centres of Excellence in 2009. Ian served as the founding chair of the board of directors for GRAND until March 2014. A former Senior Partner and later Counsel at Fasken Martineau DuMoulin in Toronto, he is a distinguished lawyer, historian, and author. Ian served for more than a decade as Fasken Martineau's Director of the Technology and Intellectual Property Group. An expert in information technology law, he holds a doctorate in

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history from the University of Toronto and co-authored *The Fiercest Debate*, a history of legal education in Ontario, published by the Osgoode Society. His latest books are *My Lawyers, Families and Businesses*, a history of the Faskens firm, and *Damaging Winds*, an historical novel about the relationship between Salieri and Mozart. In addition to guiding GRAND through its formative years in his role as chair of the board, Ian also contributed a blog, *Kyer's Code*, that appears on the GRAND website. It provides insights on legal issues of interest to those working in graphics, animation and new media in Canada. Since stepping down as chair, Ian continues to advise the board. Now retired from Faskens, he is currently legal counsel at RPM Technologies and Director of the Osgoode Society for Canadian Legal History. The GRAND community has been very fortunate to have had someone of Ian's calibre and dedication leading its management team.

Earlier this year the Government of Canada released its "Digital Canada 150," a national digital strategy. It is great to see that among GRAND's research are elements that enhance all five of the strategy's pillars: connecting Canadians, protecting Canadians, economic opportunities, digital government, and Canadian content. There is much work to be done if we are to achieve our goals in the next five years, but we have a strong foundation on which to build. As the new chair of the Board of Directors for GRAND, I look forward to the exciting times ahead.

GRAND's mission is to accelerate Canadian leadership in the digital economy to improve our

economic impact, quality of life, and global influence. Of our many accomplishments, I'm proudest to say that we're doing this in a way that bridges multiple areas of research and discovery – in natural science and engineering, in social science and the humanities, and in health research. It is in this bridging of the traditional research areas that GRAND has demonstrated strong leadership in the past, and in which I know we will continue to make great advances into the future.

Sincerely,

Paul A. Salvini
Chair, Board of Directors
GRAND NCE

Paul Salvini is the Chief Executive Officer of the Accelerator Centre, a leading technology incubator located in the University of Waterloo's David Johnston Research and Technology Park. He is also Waterloo's Associate Vice-President, Research Commercialization. Formerly Chief Technology Officer (CTO) of Christie Digital Systems Canada Inc. and CTO at Side Effects Software, Paul has led award-winning teams of engineers and software developers in bringing to market advanced visualization, simulation and display technologies. Paul is a graduate of the University of Waterloo (BMath) and the University of Toronto (MAsc, PhD, MBA). He completed his master's degree and PhD in traffic engineering. In 2008, he was named a recipient of the "Top 40 Under 40" award that honors outstanding leaders who are shaping Canada's future. Paul currently holds appointments as Adjunct Professor of Engineering and KMDI Senior Research Fellow at the University of Toronto. Appointed GRAND chair in March 2014, Paul succeeds founding chair C. Ian Kyer.



MESSAGE FROM PHASE 2 SCIENTIFIC DIRECTOR

EUGENE FIUME

I write this passage as we await with bated breath the outcome of our renewal proposal. This intermezzo gives us a natural pause to take stock of what we have accomplished and what remains.

The inception of GRAND was the culmination of years of participation in previous collaborative research projects. With the vision, energy and leadership of Kellogg (Kelly) Booth, a small group of people (which included Vic DiCiccio, Sid Fels, Abby Goodrum, Diane Gromala, and Rob Woodbury to develop the research agenda, and Sara Diamond, Gordon Kurtenbach, Ian Kyer, Angus Livingstone, and Gerri Sinclair to define governance and operations) came together to create the GRAND Network of Centres of Excellence.

It has been a remarkable experiment in building a community of researchers across many disciplines. Given the broad talent in Canada, surely the road would have been easier had Kelly built an initiative focused on a few cognate strengths in the sciences, social sciences, or art and design. Instead, Kelly and his team created a network that would embrace virtually the entire

spectrum of disciplines touching digital media. Inspired by the early success in the 1970s of the collaboration between the National Research Council and the National Film Board, GRAND built upon a foundation of a diverse community of scholars. After almost five years, we are seeing synergies emerging from a deeper mutual understanding and purpose. Whatever the outcome of our renewal, through GRAND Kelly has fostered a permanent change in how we will approach research in digital media. We owe the original GRAND team both our congratulations and our deep gratitude.

My research career began as an undergraduate under Kelly's supervision. It was at a time in a long passed century when graphics systems were presumed to be interactive and human-centred; artists naturally worked with scientists, and social scientists wondered what all this meant for real people. For some time those connections were stretched thinly as new fields emerged to fill the ever-expanding research gaps while scholarship specialized. Canada became a stronghold for research in all aspects of digital media research, and

many successful companies particularly in graphical design tools emerged. What we missed was a greater sense of unity and purpose. With GRAND, those times returned.

It is a fitting completion of a circle that I now look to continue Kelly's marvelous work. In GRAND's next phase, we will take great advantage of this emergent network of astonishing diversity. We will focus on some strategic projects while continuing to foster Canada's digital media community. GRAND's mission is to accelerate Canadian leadership in the digital economy to improve our economic impact, quality of life, and global influence. We shall accomplish this through our outstanding digital media research and knowledge transfer. Through our innovations, scholarship and creativity, the tools once built in pursuit of "content" creation by experts will be put in the hands of all Canadians. We have work to do, and we have the network to do it.

Eugene Fiume
Scientific Director (Phase 2)
GRAND NCE



MESSAGE FROM PHASE 1 SCIENTIFIC DIRECTOR

KELLOGG BOOTH

GRAND is approaching the end of its first five years as a Network of Centres of Excellence, and I am nearing the end of my five-year term as Scientific Director. Looking back on all that has been accomplished during Phase 1 of the network is something that should make everyone who has been part of GRAND feel proud. It has definitely been a team effort.

The original application to become an NCE that was prepared in 2009 included a full set of research projects that were started as soon as GRAND was approved and launched in 2010. The choice of projects was supported by a robust theme structure built on the core capabilities that served as the foundation for all of GRAND's activity. We are similarly prepared for Phase 2, with a new set of themes that capitalize on our success in Phase 1 while focusing the research over the next five years on seven key challenge areas in

which digital media can have significant impact.

We have a great leadership team in place that has evolved during the past two years, with many people taking on new roles within the network as we become more outward facing to the various receptor communities with whom we partner. Eugene Fiume and I have worked very closely for the past 18 months to develop the strategic plan that underlies the renewal application, which was submitted in June and was reviewed in August by an Expert Panel appointed by the NCE Secretariat. Over the next three months, we will complete the transition to Phase 2 of the network and the start of Eugene's five-year term as the next Scientific Director. Throughout this process Gerald Karam, the chair of the GRAND's Research Management Committee, and Paul Salvini, the chair of GRAND's Board of Directors, have been essential

partners in the planning.

This report summarizes GRAND's achievements during the 2013-2014 fiscal year, but it also provides an overview of our accomplishments over all of Phase 1 and it gives a preview of what is coming in Phase 2.

It has been my great pleasure to serve as the founding Scientific Director for GRAND. I am confident that the second five years will be even more successful than the first. This is a high standard to meet, but the network is in very capable hands with the new leadership team and is already well underway working to meet our goals and objectives for Phase 2.

Kellogg S. Booth
Scientific Director (Phase 1)
GRAND NCE

CORPORATE PROFILE

GRAND IS COMMITTED TO RECEPTOR-DRIVEN RESEARCH THAT IS SOLUTION-ORIENTED

The GRAND NCE (Graphics, Animation and New Media NCE Inc.) is Canada's only comprehensive digital media research network.

Launched in 2009 through the federally funded Networks of Centres of Excellence program (NCE), GRAND addresses complex and important issues related to digital media through research, training, partnerships, policy development, and early-stage

commercialization to improve quality of life for Canadians and strengthen Canada in the global digital economy.

GRAND supports 24 Interdisciplinary Research Projects distributed across seven Themes: (Big) Data, Citizenship, Entertainment, Health, Learning, Sustainability, and Work. The GRAND network spans universities across Canada with more than 200 industry, government, and non-profit partners.

OUR MISSION

GRAND's mission is to accelerate Canadian leadership in the digital economy to improve our economic impact, quality of life, and global influence. Our network strives to:

- **Integrate and enhance Canada's thriving digital media sector through policy and practice**
- **Focus research and knowledge mobilization 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 work together**
- **Teach and mentor the next generation of digital media innovators**





GRAND'S FIFTH ANNUAL REPORT

LEADING CANADA'S DIGITAL FUTURE, 5 YEARS ON

In this Annual Report – the fifth and final report during GRAND's initial five-year phase – we look back on this past year's accomplishments and take stock of how far we have come. With much still in store for the network, we present a view of the new vision for GRAND as it moves towards its second five-year phase as an NCE.

From the outset, GRAND had an audacious vision: to build a robust community of digital media researchers, industry partners, and other organizations that stretched across Canada and across the disciplinary boundaries of the natural sciences, engineering, the social sciences, humanities, art, and design. Working together, this community would address a comprehensive range of problems in digital games, interactive media, human-computer interaction, and new media technologies, from an interdisciplinary perspective. With this vision came the expectation that an interdisciplinary approach would lead to serendipitous discoveries – discoveries that would

keep Canada at the forefront of digital media research – and it did.

Over the past five years, GRAND has been laying the groundwork for the next wave of innovation. It has built its capacity as a network and strengthened its ties with **250+ researchers** at **31 Canadian universities** in nine provinces as well as **200+ industry partners and other receptors** – the beneficiaries of our research. Network activities have cut across disciplines in all of the Tri-Councils – NSERC, SSHRC, and CIHR – as well as artistic and cultural initiatives funded by the Canada Council for the Arts. The network has fostered new research agendas and opened new avenues for collaboration that have both enriched

knowledge and informed curricula. By strengthening relationships among researchers and by developing a strong social network, GRAND has helped build an identity and a voice for digital media researchers that has broken down barriers between disciplines and between institutions.

Fulfillment of GRAND's original vision has expanded the social, economic and cultural impact of university research. We have advanced the state of the art for digital media technologies and methodologies, and we have informed public policy. We have trained and engaged **over 1,200 Highly Qualified Personnel (HQP)** – Canada's up-and-coming digital media researchers, practitioners, and entrepreneurs.

(In this year's report we present HQP profiles of nine outstanding undergraduate and graduate students and postdoctoral fellows.) Our networking, outreach efforts, and partnerships with government, industry, and other organizations have stimulated new collaborative R&D, the commercialization of pioneering technologies, and the launch of entrepreneurial ventures. We present some of the latest successes in our feature report **Research Impact**.

The digital revolution in Canada continues at a rapid pace. Technology is revolutionizing how Canadian businesses compete in a global marketplace and how Canadian cultural discourse is conducted. Digital media continues to alter our daily experiences of time, space, and place, shifting fundamental perceptions of human limits. The impacts are felt in every aspect of the Canadian economy and by every Canadian.

To meet these new developments and realities on the digital media landscape, GRAND is changing too. In early 2014, the network introduced a renewed **Research Program**, outlined in this report. Structured around seven of Canada's most important digital media

challenges – (Big) Data, Citizenship, Entertainment, Health, Learning, Sustainability, and Work – this new program focuses academic research on the digital media issues that matter most to Canadians. **Eugene Fiume** (U of T), GRAND's incoming Scientific Director, will lead this new phase, taking over from founding Scientific Director **Kellogg Booth** (UBC) at the end of his five-year term in December 2014.

However, Canada's academic researchers cannot solve these challenges alone. In Phase 2, GRAND is placing greater emphasis on sustaining and growing its strong end-to-end networking and partnerships between academic, public, and private sector stakeholders. (We take a closer look at this in **Our Partners**). Our partners and receptors take on larger roles in the new research projects. Every project and sub-project now has its own "Champion" – a representative from one of our partner organizations who advises and directs the research agenda towards outcomes and applications relevant to a specific receptor community. GRAND will also continue to increase the impact of research through **Knowledge and Technology Exchange and**

Exploitation (KTEE) activities that lead to commercialization, innovation, and informed public policy decisions.

Above all, GRAND will continue to conduct world-class research in digital media, animation, and games that has an impact across many fields and sectors, as well as on everyday lives.

With the timely unveiling of the Canadian government's **Digital Canada 150 (DC150)** in Spring 2014, GRAND is well positioned to take a leading role in realizing the goals of this new national digital strategy. Like DC150, GRAND aspires to make Canada a leader in the digital economy and to improve our economic impact, quality of life, and global influence. We are also committed to bringing the full benefits of mobile, wireless, and digital technologies to every community and every citizen across Canada.

Five years on, GRAND is a strong and vibrant network with active researchers at every stage in their careers and a growing set of partners who share our vision. We are now in a position to drive innovative research that improves the lives of Canadians and enhances Canada's competitive edge in the global economy.



AWARDS & ACHIEVEMENTS

2013/14

GRAND researchers receive numerous awards and recognitions each year for outstanding contributions to digital media research and innovation. Starting with researchers in BC and moving eastward, the following lists some of those honours received during the reporting period.

Alissa Antle (NI, SFU) received a DEVICE (DEsign for Vulnerable generations: Children and Elderly) Best Practice Award for her Developmentally Situated Design (DSD) cards. DEVICE is part of the Erasmus Multilateral Projects funded by the European Commission within the Lifelong Learning Programme. Created in collaboration with researchers in Canada and The Netherlands, the DSD cards provide designers with specific tools and knowledge to create interactive media for children and older adults.

Cristina Conati (NI, UBC) and **Samad Kardan** (HQP, UBC) won one of two Springer Best Paper Awards (sponsored by Springer publishers) for their UMAP 2013 paper entitled "Comparing and Combining Eye Gaze and Interface Actions for Determining User Learning with an Interactive Simulation." The award is given to the paper that contributes the greatest value to

the User Modeling, Adaptation and Personalization conference proceedings by providing new ideas and innovative approaches. The award was presented at UMAP 2013, the international User Modeling, Adaptation and Personalization conference (Rome, Italy: June 10-14, 2013).

Three University of Calgary researchers placed second in the Armour39 Challenge for their prototype sports technology that "sonifies" motion. Team members **Jeffrey Boyd** (NI, U of C), **Andrew Godbout** (HQP, U of C), and former undergraduate HQP **Chris Thornton** (Google) were awarded \$10,000 USD by competition organizer Baltimore-based sports apparel maker Under Armour. The prototype technology was developed and promoted with the support of GRAND.

Sean Gouglas (NI, U of A) launched the first Certificate Program in Computer Games at the University of Alberta with computing science professor Michael Bowling in the fall of 2013. Students of the popular new program can specialize in a single discipline while taking courses that involve working in multidisciplinary teams, building complete small and medium-scale games, and interacting with industry.

Master's student **David Holmes** (HQP, U of A) and his team showcased their highly successful adventure-puzzle video game *Life Goes On* at the 2013 PAX Prime (Seattle, WA, USA: August 30-September 2, 2013) – one of the largest game conventions in North America. The game went on to win the 2013 Intel Level Up Award for Best Character Design at Intel's independent game demo contest. Interest in the game continues to grow following its official release in January 2014.



Sheelagh Carpendale (NI, U of C) was an ASTech 2013 Honouree: Innovation in Information and Communications Technology. Presented by Alberta Science and Technology Leadership (ASTech) Foundation, the award

recognizes the impact and commercial application of her research in data visualization. She is also a 2011 ASTech Honouree and she holds a prestigious two-year E.W.R. Steacie Memorial Fellowship from NSERC, the Natural Sciences and Engineering Research Council of Canada.

Carpendale and **Alice Thudt** (HQP, U of C) won Best Short Paper Award at EuroVis 2013, the Eurographics Conference on Visualization (Leipzig, Germany: June 17-21, 2013) for their research into spatiotemporal visualization of location histories. EuroVis is considered the most important visualization venue in Europe.



GRAND researchers won in three of sixteen categories at the 2013 Digital Alberta Awards (Edmonton, AB: June 2, 2013): **Faramarz Samavati** (NI, U of C) – Best Cross-platform Content; **Duane Szafron** (NI, U of A) – Best Digital Media Leader; and **Bin Zheng** (NI, U of A) – Best Combined Hardware & Software. Presented by industry-led Digital Alberta and sponsored by the Canada Media Fund (CMF), the awards honour the province's leading experts in all areas of the digital media sector.

“As we enter the era of digital technology, we are able to create virtual patients to save patients from being used for training purpose. Thanks to the GRAND NCE, my research focuses on the development of new digital models that can reduce training costs of surgeons and save lives in the operating room.”

– **Bin Zheng (NI, U of A)**

Two major awards were presented to GRAND HQP at the Graphics Interface 2013 conference, sponsored by GRAND. **Xing-Dong Yang** (HQP, U of C) was presented with the Bill Buxton Best Canadian Human-Computer Interaction Dissertation Award by the Canadian Human Computer Communications Society (CHCCS) for the best doctoral dissertation completed at a Canadian university in the field of HCI. His dissertation introduces how direct and indirect input modes can co-exist and improve our digital interactions. Xing-Dong is currently a Postdoctoral Fellow at the University of Calgary, where he works with GRAND researcher **Tony Tang** (NI, U of C). **Hua Li** (HQP, Carleton) was presented with the Alain Fournier Best Canadian Computer Graphics Dissertation Award administered by the Vancouver Foundation for her work under the supervision of **David Mould** (NI, Carleton). Her dissertation, entitled “Perception-Motivated High Quality Stylization”, made several outstanding research contributions to non-photorealistic image stylization. The award is given to an exceptional computer graphics doctoral dissertation defended in a Canadian University over the previous year.

David Flatla (HQP, U of S) and **Carl**



Gutwin (NI, U of S), with co-authors Katharina Reinecke and Krzysztof Gajos of Harvard University, won a Best Paper award at ACM CHI 2013 (Paris, France: April 27 - May 2, 2013), the premier international conference of Human-Computer Interaction. The paper was on SPRWeb, the first tool to automatically preserve the subjective and perceptual properties of website colour schemes to support users with colour vision deficiency. Gutwin was awarded a second Best Paper with **Stephen Fitchett** (HQP, Canterbury, NZ) and **Andy Cockburn** (NI, Canterbury, NZ) for innovative work on navigation-based file retrieval. Best Paper awards are presented to the top 1% of submissions.

Also at CHI 2013, Gutwin, along with Cockburn, **Joey Scarr** (HQP, Canterbury, NZ), and Sylvain Malacria (University College London) received a RepliCHI Award for their paper “Testing the robustness and performance of spatially consistent interfaces.” The award is given to seven papers out of more than 1000 appearing at CHI 2013 that provide exemplars of ‘replicability’ for the research community.

Kathrin Gerling (HQP, U of S) and **Carolyn Pang** (HQP, SFU) were recipients of two of the five 2013 Google Canada Anita Borg Memorial Scholarships. The scholarships were established to encourage women to excel in computing and technology and

(left) 2013 Digital Alberta Award winner Bin Zheng (NI, U of A) - Best Combined Hardware & Software.

Photo courtesy Lance Burns and Heiko Ryll

(right) Xing-Dong Yang (HQP, U of C), winner of the 2013 Bill Buxton Best Canadian HCI Dissertation Award.

Photo courtesy Xing-Dong Yang.



become active role models and leaders.

Sherene Ng (HQP, Ryerson), a student entrepreneur working in Ryerson's EDGE Lab with **Jason Nolan** (NI, Ryerson), received a \$54,000 FedDev Ontario "Scientists and Engineers in Business" Fellowship to develop innovative wearable shoe sensors for people with impaired vision to avoid tripping hazards and falls. The technology was developed with GRAND funding.

"GRAND has been transformational in terms of how the EDGE Lab at Ryerson has been able to support innovative research ideas from undergraduate HQP. I hired undergraduates to be mentored by my more senior graduate students, which has worked out well in the past."

– Jason Nolan (NI, Ryerson)

To celebrate World (Cerebral Palsy) CP Day (October 2, 2013), Holland Bloorview Kids Rehabilitation Hospital hosted a live cross-Canada demonstration of the "Cycle to Fun" CP exergame developed by GRAND and NeuroDevNet researchers led by **Nicholas Graham** (NI, Queen's)

and NeuroDevNet NCE NI Dr. Darcy Fehlings (U of T). Two players, one at the NeuroDevNet Conference in Vancouver, and the other at Holland Bloorview in Toronto, connected via a virtual system that allowed them to pedal and play together in real-time.

PaperTab, a flexible, paper-thin tablet developed by **Roel Vertegaal** (NI, Queen's) and his team at Queen's Human Media Lab, placed Runner-Up for the prestigious Innovation of the Year 2013 by Stuff Gadgets Awards that recognizes the year's most important product releases. Vertegaal was a World Technology Network Awards Finalist IT Hardware (Individual) 2013 for innovative work of "the greatest likely long-term significance" in his field.

Gabriel Wainer (NI, Carleton) was presented with the Distinguished Professional Achievement Award by the Society for Modeling and Simulation International (SCS) at the 2013 Summer Simulation Multi-Conference (Toronto, ON: July 7-10, 2013). The award recognizes Wainer's technical contributions to the modeling and simulation discipline, which have been widely disseminated in the technical literature.

Robert Ferguson (HQP, McGill), former HQP **Michael Massimi** (Microsoft Research, UK), **Emily Crist** (HQP, McGill), and **Karyn Moffatt** (NI, McGill) won a Best Paper Award at CSCW 2014, the ACM Conference on Computer-Supported Cooperative Work and Social Computing (Baltimore, MD, USA: February 15-19, 2014). The paper was the first study in the CSCW and HCI literatures of communication technology use for hospice and palliative care.

APPOINTMENTS

Wolfgang Heidrich (NI, UBC) was one of three Fellows of the Eurographics Association elected during Eurographics 2013 (Girona, Spain: May 6-10, 2013) for his significant contributions to the development of computer graphics and to the organization of the Eurographics Association.

Three GRAND researchers were granted Canada Research Chair (CRC) professorships in 2013. **Pourang Irani** (NI, U of M) became the new Chair in Ubiquitous Analytics; **Diane Gromala** (NI, SFU) was renewed as the Chair in Computational Technologies for Transforming Pain; and **Linda Li** (NI, UBC) was renewed as Chair in Patient-oriented Knowledge Translation.

In November 2013, **Catherine Middleton** (NI, Ryerson) was appointed Vice-Chair and **Jonathan Schaeffer** (NI, U of A) was appointed a member of the Board of Directors of CANARIE, the not-for-profit Canadian Network for the Advancement of Research, Industry and Education.

*Kathrin Gerling (HQP, U of S), winner of the 2013 Google Canada Anita Borg Memorial Scholarship.
Photo courtesy Ralf Schmidt.*



EVENT HIGHLIGHTS

2013/14

GRAND sponsors and organizes multiple workshops, conferences, and other events throughout the year that bring together diverse stakeholders from academia, industry, and government to initiate and enhance research collaborations and to showcase Canada's leading digital media research.

GRAND 2013 ANNUAL CONFERENCE/CANADA 3.0

GRAND's fourth annual conference, **GRAND 2013** (Toronto, ON: May 14-16, 2013), was the network's largest gathering of Canadian researchers and innovators in digital media to date. Co-located with the CDMN (Canadian Digital Media Network) **Canada 3.0** (May 14-15, 2013) at the Metro Toronto Convention Centre, the first ever CECR/NCE combined event drew more than 1,800 attendees from Canada and abroad, including over 350 GRAND researchers and scholars.

“The collaboration created a holistic meeting of the key digital media stakeholders in Canada – academics from GRAND, meeting with incubators and accelerators that comprise the CDMN, the entrepreneurs in attendance from Canada and the world, as well as important government officials

that can create policy that supports Canada's ability to compete in the global digital economy. At no time during the conference was the living lab model more apparent than at the joint opening reception and poster session.”

– Kevin Tuer, Managing Director, CDMN

A joint opening reception was a conference highlight with 100+ GRAND research posters and demonstrations on display. Strong industry representation at Canada 3.0 gave GRAND exhibitors the opportunity to share emerging technologies and research with a broad audience that included a number of major Canadian companies.

GRAND 2013 also featured popular plenary talks by well-known CBC broadcasters Terry O'Reilly and Jian Ghomeshi, and a thought-provoking panel discussion on issues around gender inequality in digital games with Cecily Carver (Dames Making Games), Brenda Bailey Gershkovitch (Silicon Sisters Interactive), Anita Sarkeesian (Feminist Frequency), and Grace gtz (FUoS), hosted by Jennifer Jenson (NI, York). Closing plenary speaker Roel Vertegaal (NI, Queen's) offered an exciting glimpse into current HCI



innovation from 3D printing and flexible displays to haptic (touch-sensitive) technologies embedded in ordinary objects.

Sara Diamond (President of OCAD University) and **Ron Baecker** (Director of U of T's TAGlab) were honoured at the **2013 Canadian Digital Media Pioneer Awards** (CDMP Awards) for their significant contributions to digital media in Canada. Diamond's leadership at the Banff New Media Institute in the 1990s fostered critical dialogue and collaboration across disciplines within the international digital media community. Baecker, one of the 60 Pioneers of Computer Graphics named by ACM SIGGRAPH, is a distinguished researcher in human-computer interaction and known internationally for initiating research fields that set the agenda for successors and kept Canada



at the forefront of digital media.

CONFERENCES, WORKSHOPS AND SYMPOSIA

Jointly sponsored by GRAND, the University of Alberta, and researchers at Kyoto's Ritsumeikan University, the **International Conference on Japan Game Studies** (Kyoto, Japan: May 24-26, 2013) was the second in a series of annual symposia on cross-cultural game studies created to link game studies experts and developers in Japan and Canada. A follow up symposium **Replaying Japan** (Edmonton, AB: August 21-23, 2014) is planned for the summer of 2014.

Congress 2013 (Victoria, BC: June 1-8, 2013), Canada's largest gathering of scholars across disciplines, saw the convergence of over 70 academic associations. Under Congress, annual meetings were held for the Canadian Game Studies Association (CGSA), co-organized by Jennifer Jenson (NI, York), and the Canadian Society for Digital Humanities (CSDH). Discussions between GRAND and CSDH led to an MOU and the creation of the GRAND Digital Humanities (DigHum) project.

The second **FIG** (Feminists in Games) 2013 (Vancouver, BC: May 31-June 2, 2013) workshop saw the meeting of

a growing international association of feminist theorists, researchers, activists and industry professionals examining issues of gender and gaming. Sponsored by SSHRC and GRAND, and spearheaded by Jennifer Jenson (NI, York), FiG aims to enact principles and policies that open up the predominantly male industry of digital games to women.

"The Women in Games panel at GRAND 2013 and the Feminists in Games organization more generally are working to intervene in the status quo which positions women on the margins of game play and production, legitimating and giving voice to women's work and play in games."

– Jennifer Jenson (NI, York)

Critical Hit 2013 (Montreal, QC: June 17 - August 23, 2013) was a 10-week summer games incubator program hosted at the Hexagram-Concordia Institute as a joint initiative of Concordia's TAG Research Centre, Dawson College, and Decode Global with the support of GRAND. The "games collaboratory" joined media artists, designers and programmers with mentors from Concordia and Montreal's gaming industry to develop innovative experimental games motivated by contemporary social, cultural and political concerns. Read more about Critical Hit in Research Impact.

Bridges (Enschede, The Netherlands: July 27-31, 2013) is the world's largest annual conference on connections between art and mathematics. GRAND, in cooperation with Foreign Affairs, Trade and Development (DFATD) Canada, sponsored a special event at Bridges 2013 to showcase Canada-

Dutch cooperation in mathematical art. Bridges organizer Craig Kaplan (NI, Waterloo) was the MC for the event. The exhibition featured works by one of Craig's doctoral students, Tiffany C. Inglis (HQP, Waterloo).

GRAND organized a delegation of three doctoral students – Naureen Nazam (HQP, Dalhousie), Claude Fortin (HQP, SFU) and Farjana Eishita (HQP, U of S) – to attend the **2013 Digital Societies and Social Technologies Summer Institute (DSST)** (University of Maryland, College Park, MD, USA: July 28 – August 1, 2013). Jointly organized by the Consortium for Science of Sociotechnical Systems (CSST) and the Summer Social Webshop, the event is a gathering of academic and industry researchers focused on the interplay of social and technological systems.

"There was an effective bridge between DSST and my research that is going to leave a positive impact on my research career."

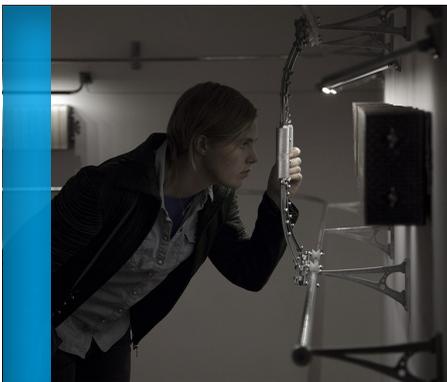
– Farjana Eishita (HQP, U of S)

GRAND's Human-Computer Interaction research was under the spotlight at **MobileHCI 2013** (Munich, Germany: August 27-31, 2013), the world's leading conference in the field of HCI for mobile technologies. The conference, sponsored in part by GRAND, was unique in bringing together researchers and practitioners in an informal and collaborative format. In January 2013, MobileHCI organizers announced GRAND Board member Sara Diamond, President of OCAD University, as the general co-chair for MobileHCI 2014 (Toronto, ON: September 23-26, 2014).

Co-directed by Geoffrey Shea (NI, OCAD), the **Common Pulse 2013**

Arts & Disability Festival (Durham, ON: September 7-29, 2013) was a major celebration of contemporary developments in the Canadian arts and culture scene. Hosted by the Durham Art Gallery and organized in collaboration with OCAD University, the festival showcased art and promoted inclusion through exhibitions, artist residencies, performances, film presentations, and a symposium featuring GRAND panels and presentations.

Nearly 200 researchers and professionals – including many from across GRAND – attended the **2013 International Conference on Social Media and Society** (Halifax, NS: September 14-15, 2013), Canada's second major interdisciplinary symposium focused on the effects of social media on society. Sponsored by GRAND and Dalhousie University, and organized by Dalhousie's Social Media Lab, the conference was a successful follow-up to the 2012 Measuring Influence on Social Media conference, the first international symposium in



Canada to explore the societal impact of social media.

The findings of a two-year assessment of public views on urban sustainability were the focus of the **Greenest City**



Conversations (GCC) (Vancouver, BC: September 18, 2013) public lecture. Lead researchers Alissa Antle (NI, SFU) and John Robinson (NI, UBC) took part in the talk sponsored by GRAND, the Pacific Institute for Climate Solutions (PICS), BC Hydro, Envision, Mitacs, and the City of Vancouver. GCC began as a GRAND's GRNCTY (Greenest City Conversations) project, which is now completed.

Gamification 2013 (Stratford, ON: October 2-4, 2013), Canada's first comprehensive event focused on the growing area of gamification and "gameful" research, attracted nearly 150 participants from around the world, including North America, Portugal, Sweden, Norway, Germany and Australia. The inaugural conference was a partnership of GRAND, CDMN, IMMERSse, UOIT, and the University of Waterloo. Conference Chair Lennart Nacke (NI, UOIT) helped to qualify the conference as an official ACM and SIGCHI event. Over 40 speakers from eight countries presented at the conference, including several from the GRAND network.

Curators for **IndieCade 2013** (October 3-6, 2013, Los Angeles, CA) selected

Propinquity, a two-player sensor-based gestural game developed by Concordia researchers in GRAND, as one of 36 games (from over 800 submissions) featured at the celebrated independent game festival. Lynn Hughes (NI, Concordia), Bart Simon (NI, Concordia), and Jane Tingley (HQP, Concordia) developed the game with collaborators Marius Kintel and Severin Smith as part of GRAND's Phase 1 PLAYPR project. Tingley was also a speaker at IndieCade. *Propinquity* has been showcased in Montreal, San Francisco, Boston and Brussels, as well as at La Gaité Lyrique, Joue le jeu / Play Along in Paris in 2012.

"Not only did GRAND enable and focus the collaboration between Lynn [Hughes] and myself, it also gave us the resources to experiment and iterate on the design with diverse kinds of students as well as a terrific community of experts, critics and advisors in the PLAYPR project."

– Bart Simon (NI, Concordia)

With nearly 750 delegates from 80 countries, the **WSSF (World Social Sciences Forum)** (Montréal, QC: October 13-15, 2013) brought international exposure to Canada's

(left) *The Logic of Subduction* by Grahame Lynch (detail with gallery visitor) presented at the Common Pulse Festival, 2013. Photo by Mie Shimizu.

(right) *Social Media & Society 2013 Conference* in Halifax. Photo courtesy the Social Media Lab (Dalhousie).

leading thinking and research on the uses and impacts of digital technologies. Organized by the International Social Science Council (ISSC), WSSF 2013 included presentations about wide-ranging social sciences research in GRAND, including an opening plenary discussion with Sara Diamond and an open discussion led by Jason Della Rocca, co-founder of Montréal's Execution Labs and member of GRAND's RMC. Lola Wong (HQP, Western) and Adam van Sertima (HQP, Concordia) staffed GRAND's exhibition booth at WSSF.

GRAND helped to sponsor the **2013 Sustainable Design Awards** (Toronto, ON: October 17, 2013), a student-led initiative co-founded by former GRAND HQP and tech entrepreneur Mike Lovas (OCAD). The annual student-led initiative was created in 2011 to inspire a wider dialogue around sustainability and design in post-secondary education. The 2013 competition offered \$10,000 in cash prizes to three winning design concepts.

The charming Gault House on the shore of Lac Hertel at McGill University's Gault Nature Reserve was the site of the second Montreal Fall Graphics Retreat, sponsored as a **GRAND Café** (Mont-Saint-Hilaire, QC: October 24, 2013). The retreat was organized by Paul Kry (NI, McGill) and Sheldon Andrews (HQP, McGill) for 25 faculty and graduate students from five universities to present ongoing research in the fields of computer graphics and animation.

The **GRAND NCE Health and Digital Media Workshop** (Toronto, ON and Vancouver, BC: October 25, 2013) video-linked health practitioners and researchers at the MaRS Discovery District and at SFU's Harbour Centre

to develop a broad vision for GRAND's health-focused research over the next five years. The workshop included panel discussions as well as keynote talks by Dr. Kendall Ho (NI, UBC) and Yaakov Stern (Columbia University, USA).



GRAND helped bring **Hacking Health Edmonton** (Edmonton, AB: November 22-24, 2013) to Alberta in the province's first health-centric 48-hour coding jam. Through hands-on events held in cities across the country, Hacking Health matches technology experts with health practitioners to collaborate on realistic, human-centric solutions to front-line healthcare problems. Co-sponsored by GRAND, the Edmonton jam drew over 100 health professionals along with students, designers, developers, and others. GRAND's Eleni Stroulia (NI, U of A) and Sharla King (NI, U of A) were key organizers of the event.

Representatives from GRAND joined high-level delegates from government, academia, and the ICT sector at the **2013 Brasil-Canada 3.0 Conference** (João Pessoa, Brazil: December 5-6, 2013) to strengthen research partnerships and exchanges with Brazilian universities. Catherine Middleton (NI, Ryerson), the new Vice-Chair of CANARIE, gave a virtual

presentation from Australia on how Canada's digital infrastructure supports research, education, and innovation. Following the inaugural meeting in 2012, the conference has become Canada's main summit devoted to

boosting international cooperation with Brazil around Information and Communication Technology (ICT).

GRAND was a sponsor of the **SPARK [FWD] 2014** (Vancouver, BC: February 5 - 9, 2014) conference and festival. Merging SPARK FX and Emily Carr's 3D[FWD] conferences, the joint event featured panels and presentations for attendees to gain insight into the latest techniques of the industry as well as leading artistic and technological advancements. An open discussion on High Frame Rate (HFR) and the Future of Content included panelist Paul Salvini, Chief Technology Officer (CTO) of Christie Digital Systems Canada Inc., and Chair of the GRAND Board of Directors.

Concordia University's TAG Centre hosted **Arcade 11** (Montréal, QC: March 6-9, 2014) as part of the festival Montréal joue 2014. The open house included talks and hands-on workshops plus a 'DIY' arcade for parents and youths to try out experimental games.



At **SXSW (South by Southwest) Interactive 2014** (Austin, TX, USA: March 7-11, 2014), GRAND's Emma Westecott (NI, OCAD) was a panelist on "Interaction Design and the Performing Arts" looking at intersections between interaction design and the performing arts. Biotech startup Synbiota co-founded by Connor Dickie (HQP, Queen's) was also selected as a finalist in the Innovative World Technologies category for the sixth annual SXSW Accelerator competition – the marquee event of SXSW Interactive's Startup Village where leading startups from around the world showcase new technology innovations.

Canada Research Chair Mia Consalvo (NI, Concordia) presented "Feature Creep or Essential Mechanics? Top Twenty Things Game Development Programs Should be Doing Outside the Classroom" with Roger Altizer (University of Utah, USA) at **GDC 2014** (March 17-21, 2014, San Francisco, CA, USA). GDC is the world's largest and longest-running professionals-only game industry event attracting over 23,000 attendees each year.

GRAND sponsored Amory Lovins, a leading authority on energy and

building technology, as a plenary speaker at the **Building a Research Agenda for Next Generation Green Buildings** (Vancouver, BC: March 25, 2014) workshop led by Lyn Bartram (NI, SFU). The invitational meeting, also sponsored by NSERC, SIAT (SFU), Autodesk, RAIC/IRAC, Athabasca University and DIRTT, brought together engineers, architects, urban planners, and other experts in discussions around sustainability and the built environment.

GRAND DIGITAL WAVE WORKSHOPS

GRAND's ongoing **Digital Wave Workshop** series was seeded by a two-year partnership with Western Economic Diversification (WD) that began in 2012. The mandate: to support technology transfer, start-up creation, and prototype development in BC, Alberta, Saskatchewan and Manitoba. The series continued in 2013/14 with nine one-day workshops held in Vancouver, Edmonton, Calgary, and Winnipeg that helped connect businesses with university research.

As part of the WD-funded activity, GRAND connected with First Nations entrepreneurs and youth at **STRONG**

(**Summit of Technology, Resources, Opportunities, Networks and Growth**) (Richmond, BC: May 6-8, 2013) organized by the First Nations Technology Council of BC.

A discussion of our Western initiative, as well as profiles of some of its successes over the past year, can be found in our Research Impact section of the report.

"Being my first GRAND event, I was interested to hear from and speak to diverse and engaging people from research and industry. It was a great opportunity to network, and at least two relationships have developed after that meeting."

– Miles (Academic Researcher)

"It was good and very informative. I liked to learn about the various funding possibilities. I also got to talk to many researchers and I am now trying to establish new exciting collaborations."

– Barbara C. (Entrepreneur)



FEATURE REPORT

RESEARCH IMPACT

Maximizing KTEE (Knowledge and Technology Exchange and Exploitation)

The impact of research – any economic, social, or cultural change to the quality of life for receptor community members that results from research outcomes – is seldom easy to demonstrate. Doing so, however, is an essential part of GRAND’s mandate because it helps us target our research efforts on problems that matter.

Researchers do not create policy – governments and public officials do. Nor do researchers generally deliver services or create products – businesses and community organizations do. What researchers do is develop knowledge – analyses, methods, techniques, and models – that can lead to impact. But this impact is not limited to the mere production of knowledge; impact is also measured by how well knowledge is put it into practice – its “mobilization” – shown in the appreciable uptake, application, and development of research outcomes by its receptors,

the end users. The impact of research can therefore be generated through diverse pathways, take many forms, and become apparent at different stages in the research lifecycle and beyond.

Maximizing this kind of impact in Canada is central to GRAND’s mission. We employ a multifaceted approach based on **People, Knowledge Transfer, Collaborative Research, Intellectual Property, and Entrepreneurship** that cuts across a broad range of disciplines and receptor communities to facilitate real-world impacts on industry, policy, and society. GRAND is unique in its ability to broadly network the capabilities of university innovation in digital media and put research into action. These are important factors in accelerating growth in Canada’s digital economy and making a positive difference in Canadians’ lives – our strongest indicators of success as an NCE.

INDUSTRY PARTNERS ACROSS MULTIPLE SECTORS

200+

TECHNOLOGY DEMONSTRATIONS TO BUSINESSES

120+

NEW COMPANIES LAUNCHED

14

exploiting research ranging from 3D simulations to haptics to medical training using VR techniques

CAPITALIZATION FOR NEW COMPANIES

\$1Million+

NEW PATENT APPLICATIONS

13

TECHNOLOGIES TRANSFERRED INTO PRODUCTS

11

PROTOTYPES DEVELOPED

9

Research Impact: Cumulative figures as of March 31, 2014



RESEARCH IMPACT PEOPLE



Developing Canada's next generation of digital media specialists

Graduate students and postdoctoral fellows offer an invaluable source of fresh ideas and talent for universities, governments, and private sector employers. Attracting, developing, and retaining young researchers – or Highly Qualified Personnel (HQP) – is a key part of GRAND's mandate and vital to ensuring Canada maintains a competitive advantage worldwide. In this year's report, we feature short profiles on nine exceptional current and former HQP in GRAND.

Training and mentoring students for the complex challenges of the digital media sector requires experiences that go beyond traditional scholarship. Full participation in today's global economy, which is built on a rich and evolving digital media infrastructure, demands specialists that can work within a variety of collaborative and interdisciplinary settings.

To meet these demands, GRAND's comprehensive HQP program offers a distinctively interdisciplinary, cross-university research experience for

students – one not easily obtained in other training programs. Network HQP learn how the natural sciences, engineering, social sciences, humanities, art and design all have a role to play in solving new and complex digital media problems in academia and industry.

Since 2010, the network has engaged **over 1,200 HQP** at universities across Canada. They are integral to GRAND's collaborative research projects, which bring them in close contact with internationally recognized experts and industry partners, providing opportunities that have the potential for great technological, socio-economic and cultural impact. Plus, given the interdisciplinary nature of GRAND research teams, students have the rare opportunity to work with researchers at multiple institutions.

Former GRAND HQP **Jennifer Whitson**, profiled in this report, has kept her connections with Concordia researchers in GRAND where she completed her postdoctoral studies, and at Carleton, where she finished her PhD. Now an

Filling in the pieces: Making the research- industry connection

PhD student Lesley Northam (Waterloo) is charting new ground in computer graphics that can help filmmakers and studios realize their creative visions. The industry is taking notice.

At GRAND 2012 in Montreal, Lesley's RNote presentation on stylizing stereoscopic 3D images (two images blended to give the illusion of depth) made a big impression on Russell MacKenzie. Russell is a Stereoscopic Rendering Programmer at Vancouver-based Gener8 Digital Media Corp, a VFX studio with some big name clients that specializes in stereoscopic conversion (2D to 3D) of feature-length films.

Lesley's presentation focused on the problem of "infill" – the filling in of missing pieces to make 3D content from 2D images

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shot with a single camera. By adjusting the disparity map (the apparent pixel difference or motion between a pair of stereo images) Lesley had figured out a novel solution that guarantees consistency between left and right views.

Back at Gener8 in Vancouver, Russell began applying a technique modeled on Lesley's to clean up disparity maps generated from paired stereoscopic images. Encouraged by the results, Gener8 stereographer Ben Breckenridge presented the technique at SPARK [FWD] 2014 in Vancouver, a conference sponsored by GRAND and Emily Carr University of Art + Design. Lesley, who happened to be in the audience, soon discovered the impact her research had made on Russell back at GRAND 2012.

Seizing the opportune connection, GRAND's Director for Research Partnerships Vic DiCiccio arranged for Lesley to meet with the folks at Gener8; this led to a six-week site visit that began in April 2014. There she learned the ins and outs of stereoscopic conversion, working on methods to automatically improve the consistency and quality of 3D rendering. The partnership between Gener8 and GRAND has since expanded into a full-fledged research plan that runs through the fall of 2014.

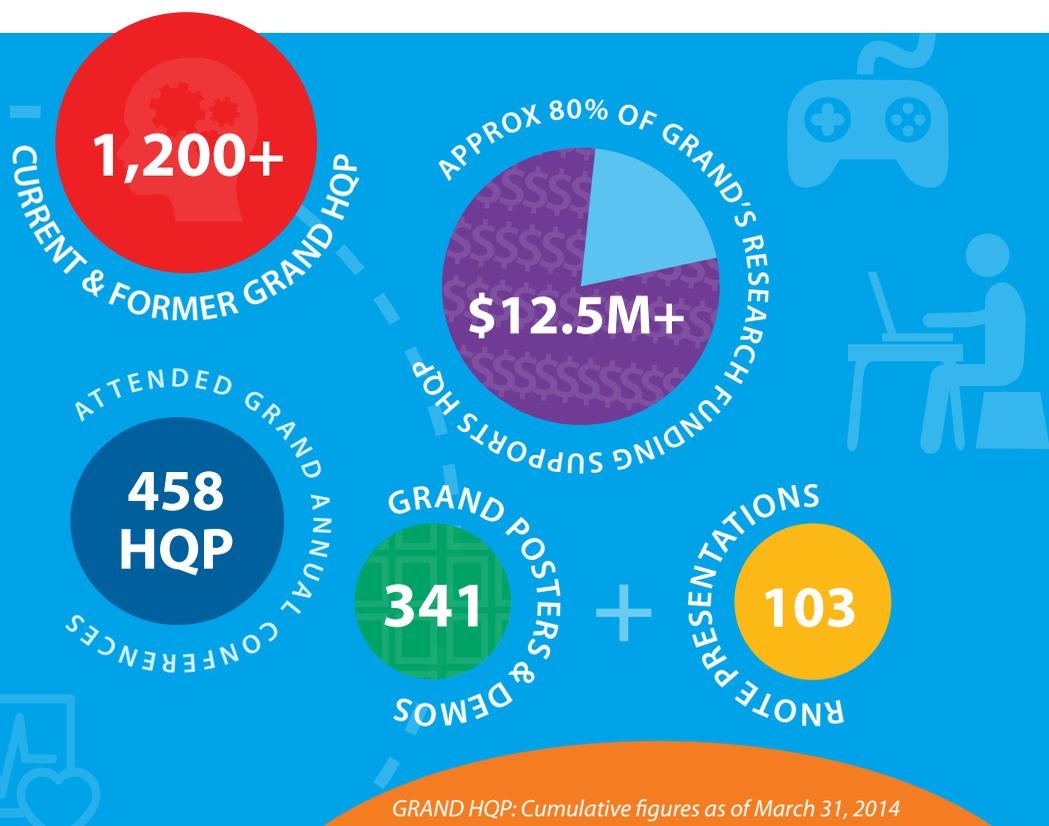
You can read more about Lesley and other current and former HQP in profiles featured in this report.

assistant professor of Sociology and Legal Studies at Waterloo, she continues her research on the games industry as part of GRAND's INDIEGAME project.

Beyond graduate-level training, GRAND helps many scholars find internships and placements that allow emerging talent to branch out and excel. We encourage direct interaction with project receptors and industry partners to support HQP in driving research progress. PhD student **Lesley Northam** (Waterloo), for example, has already made important contributions to the development of digital film and TV postproduction through GRAND-facilitated collaborations with companies Side Effects Software and Deluxe. Her research on stereoscopic 3D media has similarly influenced 3D conversion techniques adopted by Gener8, a Vancouver-based VFX company.

Our networking events and industry outreach initiatives offer another way for students to connect with like-minded researchers, and with business partners to develop emerging technologies, and with employers to build their careers in Canada. GRAND helps universities to recruit Canadian and international students by having a strong presence at top national and international conferences in areas related to digital media. These events enrich the experience that GRAND provides to all HQP who participate in research mobilization and translation activities.

Humanities Computing master's student **David Holmes** (U of A), also profiled in this year's report, was one of ten students selected for the 2012 GRAND-Funcom Games Initiative: a hands-on, industry-focused project created through a unique partnership between GRAND and Funcom, a



GRAND HQP: Cumulative figures as of March 31, 2014

Montreal-based MMO game developer. He recently went on to develop one of North America's top up-and-coming independent videogames, *Life Goes On*.

Our HQP have multiple platforms to share their research experiences with each other, providing significant opportunity for peer mentorship. Over the years, students have presented a total of **103 RNote (Research Note) papers and 341 Poster and Demos** held during GRAND's annual conferences through May 2013. RNote presentations are reviewed by HQP in GRAND based on a process similar to that used at leading digital media conferences, such as ACM CHI and ACM SIGGRAPH. This provides valuable training in the peer review process, as well as valuable informal feedback to authors when they prepare their work for later submission to a conference or a journal. For some students, this is their introduction to the reviewing process.

In all, GRAND has invested over **64% of its total NCE Funding** through March 2014 (roughly 80% of GRAND's research

funding), **or over \$12.5M**, in support for HQP. Students are eligible for additional funds to attend workshops and other events organized by GRAND researchers across Canada, as well as travel subsidies to attend international workshops and exchange visits between nodes in the network.

PhD student **Claude Fortin** (SFU), profiled in this report, has benefited from GRAND support to attend multiple top-tier conferences and elite workshops in Canada and beyond. Most recently she spent time as an international visitor at the University of Melbourne with funding from SSHRC.

GRAND also provides special funding initiatives, such as our Young Network Investigator (YNI) program – critical seed funding and continuity for former GRAND HQP who make the transition to faculty researchers. YNIs **Audrey Girouard** (Queen's), **Lennart Nacke** (UOIT), and **Tony Tang** (U of C) are profiled in this year's report.

Finally, HQP play a role in the leadership and support of GRAND. The Graduate

Student and Postdoctoral Committee (GSPC), elected by network HQP, is a student-led initiative established by and for HQP that helps define and manage the diverse HQP training activities and events within GRAND. It also serves a liaison role with the GRAND Board.

PhD student **Lola Wong** (Western) was GSPC co-chair in 2012, and chair in 2013 and 2014. She has been a strong voice for HQP in GRAND, ensuring graduate students and post-docs get the most out of being part of the network.

David Turner, a research assistant at the University of Alberta, is an HQP who played a key role in the development of the GRAND "Forum," the network's robust and all-inclusive online management system.

You can find more HQP successes presented throughout this report.



HQP Networking session, GRAND 2013. Photo by Jonathan Nuss.



LESLEY NORTHAM

PhD Student
Computer Graphics Lab (CGL)
University of Waterloo

Lesley Northam is an exceptional model of a student researcher in GRAND: highly collaborative with both academic and industry partners with great promise for significant impact and innovation in the digital media sector.

Lesley Northam’s doctoral research, supervised by Associate Professor Craig Kaplan (NI, Waterloo), focuses on the ways interactive computer graphics software can help filmmakers to design, prepare, and shoot their movies. With research interests ranging from stereoscopic 3D film, previsualization, virtual production, and film language, Lesley is intent on applying her skills as a computer science researcher to solve real industry problems.

Working in a GRAND research collaboration with Sheridan College’s SIRT (Screen Industries Research and Training) Centre, a production studio and lab facility at Pinewood Studios in Toronto, Lesley connected with directors, game developers, cinematographers, and other film professionals to get a look inside the postproduction technical issues and challenges faced by the industry – a rare opportunity for an academic researcher. At SIRT she developed a Real-Time Special Effects (RTFX) visualization framework by adapting

game engines to communicate with high-end Houdini 3D animation software built by Toronto-based Side Effects Software. RTFX helps directors design live action shots in advance, view cinematic sequences on-set, and preview animated characters driven by motion capture of live actors on-set.

“In working with Lesley Northam and her faculty, we were able to address issues in terms of the relationship between game technology and movie technology that are really at the forefront of what people are looking at internationally. We were able to develop things the partner company found extremely important,” remarked John Helliker, Director, SIRT, Sheridan College

Through the support of GRAND and Mitacs, Lesley put her skills to work as an intern at Side Effects, building tools to bring cinematic special effects to computer games. Her research proved a successful testbed for investigating problems in computer-assisted film production as well as broadening

entertainment production capability and creative expression.

Lesley’s introduction to the real world of film continued via GRAND’s partnership with Deluxe Entertainment’s Post Production studio in Toronto. There she had the opportunity to visit the set of a major 3D motion picture and learn about improvements needed in postproduction tools and workflow. Lesley is currently extending her previous experience with Adobe to the 3D film production pipeline at Vancouver-based Gener8, one of the largest 2D to 3D conversion production companies in the world and employer of a number of former GRAND HQP.

“I’d really like to stay in academia, but I’d like to maintain a strong relationship with the industry – both the film industry and the visual effects industry. Why GRAND is so important is that I can start my collaborations now and hope that they carry on past my PhD degree.”



LENNART NACKE

Assistant Professor and Research Director of the HCI Games Group, Faculty of Business and Information Technology and Research, University of Ontario Institute of Technology (UOIT)

Postdoctoral Fellow, Computer Science, University of Saskatchewan

Lennart Nacke is a remarkably active and talented researcher exploring the social, cognitive, affective, and physiological facets of digital entertainment and gameplay.

One of Europe’s first PhD graduates in Digital Game Development (Blekinge Institute of Technology, Sweden), Lennart Nacke launched his Canadian academic career as a GRAND-sponsored postdoctoral research associate in the Interaction Lab at the University of Saskatchewan. There he collaborated on three GRAND projects spanning affective gaming, games for physical fitness, video game usability, interaction design, and user experience design. His core research, though, focuses on player-game interaction.

Lennart’s GRAND-funded research has made its mark. His scientific papers have won best paper and honorable mention awards at premier human-computer interaction (HCI) conferences: CHI 2011 and 2012, and CSCW 2012. When he became an assistant professor for HCI and Game Science at UOIT in 2011, he received a Young Network

Investigator (YNI) award to continue his research in GRAND. His portfolio later expanded to include Research Director of UOIT’s GAMER Lab and supporting GRAND research in UOIT’s HCI and Game Science Group.

Abroad, Lennart was part of the EU-funded “Fun of Gaming” (FUGA) research project on developing psychophysiological engagement evaluation techniques, and he has helped create game development curricula in computer science programs in Germany, Sweden, and New Zealand.

Lennart is highly active within the HCI and game research communities. He co-chaired the first-annual Gamification 2013 conference, sponsored by GRAND and SSHRC-funded IMMERS (Interactive Multi-Modal Experience Research Syndicate). This was Canada’s first comprehensive event focused

on the growing area of gamification. Lennart also organized workshops for CHI 2011, 2012, and 2013 and co-chaired the CHI 2014 games and entertainment spotlight, which involved many GRAND researchers. He will also chair the inaugural CHI PLAY 2014 in Toronto (October 19-22) – a conference on “player-computer interaction” – organized in collaboration with several other GRAND researchers.

“Without GRAND, I would have never had the chance to start my research career in Canada the way I did. I really appreciate everything the network has done for me – including helping me meet amazing researchers and having immediate access to experts in my core research areas. GRAND has also been extremely supportive in the organization of several events that I have set up and plan to set up in the next year.” ●

RESEARCH IMPACT KNOWLEDGE TRANSFER



Translating research into benefits for Canadians

Knowledge transfer helps to make research useful to society. University expertise and innovation, in particular, present a tremendous opportunity for potential industry and other partners – Small and Medium-sized Enterprises (SMEs), entrepreneurs, and start-ups, as well as community organizations – who have the capacity to develop and commercialize or otherwise disseminate new applications, products, services, and programs.

GRAND sponsors or co-sponsors many regional, national, and international digital media events and conferences, as well as organizes and hosts academic and industry-focused workshops, gaming hackathons, and other events to bring researchers in closer contact with these partners. The network also mentors a broad range of new entrepreneurs and startups to guide them in the commercialization of research and development of their businesses.

The challenge for **Mark Salopek**, GRAND's Technology Transfer & Commercialization Manager, has been to make university research accessible and industry-ready. Mark leads one of GRAND's most successful initiatives in matching entrepreneurs and companies with academics ready to explore commercial opportunities for their research. Seeded by a two-year partnership between GRAND and

Western Economic Diversification (WD) that began in 2012, the initiative has helped researchers in BC, Alberta, Saskatchewan, and Manitoba launch businesses and get their prototypes to market.

WD funds have supported multiple networking workshops held in cities across Western Canada (called the **GRAND Digital Wave** workshop series). These workshops provide a forum for exchange on key digital media problems and industry needs, including targeted "show and tell" where a specific technology or set of technologies is presented to potential partners.

"The general problem with academic-industry interaction is that academics don't know what industry is interested in, and industry doesn't have a clue

what is happening at the university labs," said Mark. "The GRAND workshops bridge that chasm and provide insight that both find useful; the workshops are the first step toward creating partnerships and unlocking opportunities for both academics and entrepreneurs."

As of March 31, 2014, GRAND's technology transfer program in Western Canada has exposed over **300 SMEs and other organizations** to technologies being developed at labs all over Canada, including **127 research demonstrations to businesses** and the **commercialization of 11 new technologies**. Canada-wide, GRAND's commercialization and outreach initiatives have led to **over \$1,000,000** in new business capitalization.



By modifying a Microsoft Kinect sensor, researchers at the University of Saskatchewan have shown how gamers in wheelchairs can play motion-based games. Demonstration at CHI 2013. Photo courtesy IDG News Service.



CANADIAN INNOVATION, GLOBAL IMPACT

GRAND efforts in entrepreneurship and tech transfer go beyond Canada's borders.

Three University of Calgary researchers turned their motion "sonification" technology into a winning design thanks to the support of GRAND. Using accelerometer data to produce real-time audio feedback during performance, the prototype allows athletes to follow rhythmic audio feedback to correct and improve techniques. Speedskaters can use it to sharpen their corner-turning skills; runners can improve performance by following sonified footfalls. Jeffrey Boyd (NI, U of C), Andrew Godbout (HQP, U of C) and Chris Thornton (former HQP now at Google) entered their design into the international Armour39 Challenge. The goal: to "expand the capabilities" of the Armour39, a wearable motion

and heart rate sensor created by Baltimore-based sports apparel maker Under Armour. Out of thousands of submissions, the team placed second, winning \$10,000 to take the prototype to the next level. Now GRAND has also provided startup funds to assist Boyd in launching 1763412 Alberta Inc. to develop new technologies.

GRAND also helped Winnipeg-based MOBRO Software take the leap into the mobile market with Space Evaders Xtreme. The motion-controlled pilot game uses a platform inspired by eye-tracking research conducted by GRAND researchers at McGill University. Space Evaders Xtreme garnered a People's Choice Winner and placed 2nd in the 2013 Extreme Motion iPad Challenge run by Israeli-based software company Extreme Reality. Mentoring and networking

support from GRAND allowed MOBRO to connect with collaborators needed to bring their products to market as well as hire recent graduates.

NMotive Research Inc., which had its start via GRAND's support in 2012, developed an eye gaze tracking application for portable devices based on the same McGill research. Called "Eyecelerate," the prototype offers a gaze-enhanced interface for handheld devices that can be used for early detection of Alzheimer's disease. NMotive proposed the idea at the Cognition Challenge, a program supported by the Consulate General of Canada in partnership with Johnson & Johnson Innovation held in San Francisco in July 2013. The company was selected as one of four finalists out of 45 submissions across Canada.



ANTHONY TANG

Assistant Professor, Department of Computer Science, University of Calgary
 Postdoctoral Research Fellow, Georgia Institute of Technology, USA
 PhD, Department of Electrical and Computer Engineering, University of British Columbia

Anthony (Tony) Tang’s fast-rising academic career reflects GRAND’s success in developing and retaining HQP.

Now an Assistant Professor at the University of Calgary, Tony Tang’s engagement with GRAND, and its predecessor NECTAR (an NSERC strategic network from 2004 to 2008), began at the start of his graduate studies. As a NECTAR HQP, while completing his master’s degree (supervised by Saul Greenberg at the U of C), he investigated ways in which mixed presence groupware could support the sharing of visual workspaces.

As a doctoral student and GRAND HQP supervised by Sid Fels (NI, UBC), he explored designs for collaborative workplace applications (such as visualization tools for interactive

tabletops) in GRAND’s SHRDSP (Shared Displays) project. He continued his research as an NSERC postdoctoral fellow at the Georgia Institute of Technology, and returned to Canada in 2011 to take up his current faculty position in Calgary.

“[Canada] has top-notch researchers interested in working on exciting, hard problems ... GRAND makes it possible to work with all these folks, as well as to meet new people and discover new problems.”

Tony was awarded one of four Young Network Investigator (YNI) Awards in 2012. The award helped him to transition to Collaborating Network Investigator (CNI) in GRAND’s AESTHVIS

(Aesthetics and Visualization) project while continuing his research in SHRDSP. He is now a project co-leader on SHREXP, the Phase 2 continuation of SHRDSP.

At the University of Calgary, Tony leads the RICELab (Rethinking Interaction, Collaboration and Engagement Lab) research group, where he focuses on the integration of mobile devices in large display environments, personal informatics, and technologies for collaborative work.

Tony’s continued collaboration with many labs and institutions across Canada and abroad exemplifies the spirit of GRAND. ●

RESEARCH IMPACT

COLLABORATIVE R&D



Solving Canada's key innovation challenges

GRAND is committed to accelerating research by leveraging collaborative projects involving Canada's top research talent with government agencies, businesses, and other organizations (see **Our Partners** for a complete list of partnering organizations). Below we present a few highlights from the reporting period.

OCAD University President **Sara Diamond**, a Board member in GRAND, worked with policy experts including **Catherine Middleton** (NI, Ryerson) to develop Taking Ontario Mobile with the Ministry of Research and Innovation. The five-year Mobile Action Plan, based on lessons learned in other jurisdictions

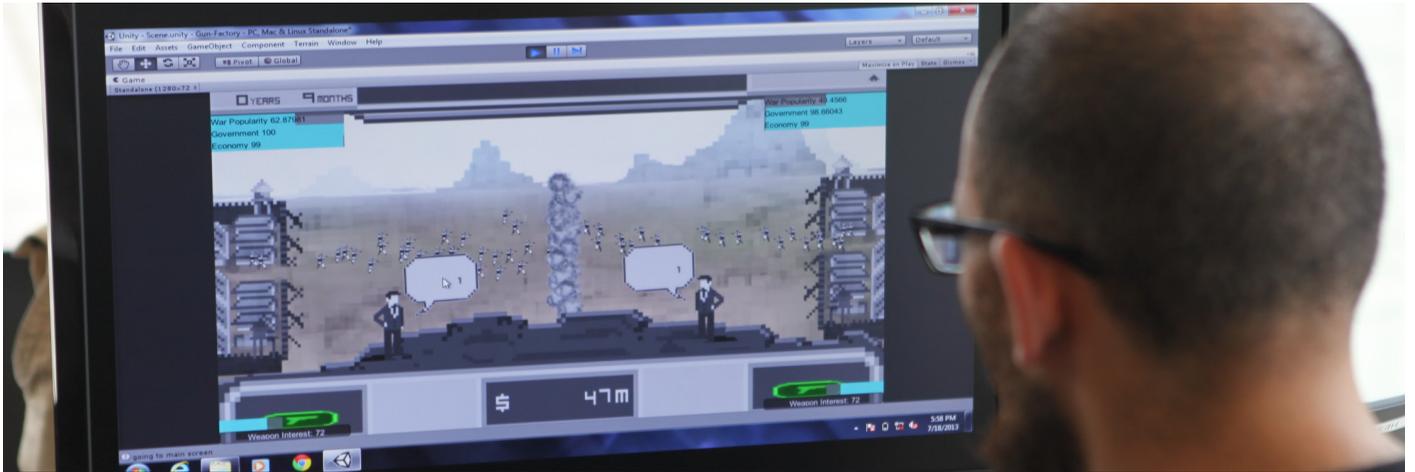
and successful pilots, aims to bring significant increases in productivity and competitiveness, create and retain jobs in the knowledge industries, and enhance efficiency and access to services for Ontarians.

Sheelagh Carpendale (NI, U of C) and **Lyn Bartram** (NI, SFU) launched a new exhibit entitled *Data: New Ways of Seeing the World* at the Canada Science and Technology Museum in Ottawa. The interactive installation shows visitors how new technologies can use complex data to help us to more intuitively accomplish everyday tasks. The project was funded through NSERC.

The **SYNTHIUS project** is an example of a new kind of collaborative research project called "SPARK-GAP" that was introduced as part of GRAND's Phase 2. Building on GRAND's existing multi-university collaborative work with **Autodesk**, the goal of SYNTHIUS is to create a complete digital model of a human being. Each successful incremental step of this project is expected to impact Autodesk's products significantly. (Details about SPARK-GAP projects, with a profile on the SYNTHIUS project, are presented in our **Research Program** section of this report.)



Alice Thudt (HQP, U of C) demonstrates interactive exhibit at the Canada Science and Technology Museum in Ottawa . Photo by Riley Brandt, U of C.



CRITICAL HIT: MONTREAL'S "GAMES FOR CHANGE" COLLABORATORY

A new movement is gaining momentum within Montréal's vibrant gaming community. Comprised of media artists, game developers, and programmers who share a concern for today's social, cultural and political issues, these gamers are looking to go beyond simple entertainment: they want to make games with a social impact.

"[Games] are now a medium for cultural expression and that includes political, social and all kinds of cultural critique and comment," said Bart Simon (NI, Concordia), director of the Centre for Technoculture, Art and Games (TAG), in an interview with *The Canadian Press*.

Bart and colleague Lynn Hughes (NI, Concordia), along with fellow collaborators at TAG, created a unique games incubator dedicated to experimental, avant-garde, and otherwise innovative games. Called "Critical Hit" (a gaming term for a high-scoring combat move), the program funded roughly 20 grads and undergrads to make publicly releasable games under the guidance of faculty and local game industry mentors – among them GRAND

RMC member Jason Della Rocca, co-founder of the Execution Labs incubator.

Over ten intensive weeks, four teams developed games around a range of social themes. *Gun Factory*, for example, puts the player in the shoes of an arms manufacturer, exploring the world of war profiteering and how greed can lead to unforeseen consequences on a global scale. For participating students, Critical Hit was an opportunity to apply what they had learned at school to move past prototypes and studies.

"We called the program Critical Hit because we are serious about making playable games with the community," said Bart. "We also want to create a space where cultural critique and critical design are combined in the innovation of game mechanics and content. That's exactly what TAG is."

Critical Hit was a successful partnership of GRAND, Concordia's TAG Centre, and Dawson College in conjunction with Hexagram-Concordia and Decode Global, a company that specializes in mobile games for social impact. Support for the program was also provided

by the Ministère de l'Éducation, du Loisir et du Sport's Programme de collaboration universités-collèges (or Chantier 3). GRAND researchers embedded within the incubator studied the social collaboration and the game design process, assessing the program as a new model for game developer education.

For Angeliqe Mannella, founder and CEO of Decode Global, TAG's game incubators, such as the 2011 Montreal Games Incubator co-sponsored by GRAND, give graduate students solid, real-world development experience in a supportive environment.

"The space that Concordia and TAG provide for games for social change is different than what a for-profit can provide. And in Montreal, with its unique gaming industry, Concordia is the perfect place for research and development to align," Angeliqe said in an interview for *Concordia News*.

Bart agreed: "There's such a great indie game development scene in this city; people want to create interesting, low-cost games. Universities can handle more risk than business, so really innovative games can be created in a safe and inclusive space."



JENNIFER WHITSON

Assistant Professor, Department of Sociology and Legal Studies,
University of Waterloo

Postdoctoral Fellow, TAG (Technoculture, Art and Games),
Concordia University

PhD, Department of Sociology and Anthropology, Carleton University

Sociologist Jennifer Whitson is taking a close look at Canada’s transforming game industry – from the inside.

Much of Jennifer Whitson’s sociological research examines the development, design, and culture of digital games. Unlike many studies that only analyze the games themselves or player interactions, Jennifer is taking an ethnographic approach, learning from the people in game development themselves – developers, producers, managers, and entrepreneurs – which she sees as critical to understanding how and why games are actually made.

As part of a 2012 initiative led by GRAND and international MMO game developer Funcom, Jennifer tracked a team of student developers at Funcom’s Montréal game studio as they developed and built a complete multiplayer game. As an embedded ethnographer, she studied the inner workings of team collaboration as they solved design and technical problems – something of great interest to GRAND collaborators at Funcom.

“The GRAND Funcom project was really a key access point for my research on the daily work of developers and the larger economics of digital media industries. My involvement opened the door to opportunities that would not exist otherwise.”

As a GRAND HQP, Jennifer worked at Carleton University’s Hyperlab (where she continues as a researcher) building playful locative apps. Collaborating with architects and archivists, her team built two apps and a website for the Virtual Museum of Canada. One app features 3D models of Ottawa and the Rideau Locks as seen during the 19th century that enrich visits to the City and the canal with historical information.

As a postdoctoral fellow at Concordia University’s TAG (Technoculture, Art and Games) Centre, Jennifer is continuing her study of independent studios and

game incubators, acting as a resident ethnographer at Execution Labs, a games software incubator in Montreal founded by industry consultant and GRAND RMC (Research Management Committee) Member Jason Della Rocca. Recently appointed assistant professor at Waterloo, Jennifer also co-directed Critical Hit ‘14 (see Critical Hit 2013 profiled in Research Impact), an annual summer incubator for experimental games sponsored by GRAND.

Of great potential interest to industry, Whitson’s highly original cultural research into game development and technology is a direct result of her involvement in the GRAND network. She continues to collaborate with scholars in digital humanities, computer science, information studies and sociology using many of the connections she made through GRAND. ●



DAVID HOLMES

MA Student in Humanities Computing,
University of Alberta

With the launch of his award-winning game *Life Goes On*, David Holmes' career as an indie game developer is off to a great start.

David Holmes has loved video games since he was young. Now nearing completion of his Humanities Computing master's degree at the U of A, he realizes the best way to get into the game industry is go out and make them.

David, along with three U of A alumni, is a creator of an immensely popular puzzle-based adventure game called *Life Goes On*. First dreamt up at the 2012 Global Game Jam, the game challenges videogame conventions by having players sacrifice their lives to complete the level. It was later developed in part through GRAND funding and the support of professors Sean Gouglas (NI, U of A) and Geoffrey Rockwell (NI, U of A) to become one of North America's top up-and-coming independent games.

In 2013, the game won an Intel Level Up Award and was among the top games featured at the 2013 PAX Prime – one of the largest game conventions in North America. The game's early success has also landed it on Steam, which is

supported by more than 100 million users and considered the marquee platform for video game distribution. David and his team started a company called Infinite Monkeys Entertainment and officially released the game in April 2014; interest in the game continues to grow.

David's passion for games was fueled during the 2012 GRAND-Funcom Games Initiative, a hands-on, industry-focused, and non-commercial mentorship program formed through a unique partnership between GRAND and international MMO game developer and publisher Funcom. That summer, David joined nine other students on an experimental team-based project at Funcom's Montréal studio. As well as adding valuable industry experience to their resumes, the team used the resources provided by Funcom to successfully develop a complete multiplayer game – *Dungeons of Londree* – from the ground up.

"The [initiative] was immensely helpful, both in terms of my personal research

with my thesis, but it also really showed me what being a producer was like, and what it's like to work with a creative team."

In GRAND, David has worked on a number of network projects. He was a primary developer for the U of A-led fAR-Play, a geo-locative game engine developed through GRAND's PLAYPR project. Working with Sean Gouglas, he also contributed to the FemShep project in collaboration with Edmonton game developer BioWare. FemShep is looking at gender biases in games and the significant attachment players have to their avatars in computer games.

"Sean [Gouglas] and Geoffrey [Rockwell] push me to use my GRAND research to publish papers, and to look back and reflect on how it has affected my overall development as an academic. I think GRAND has been incredibly supportive. Being in the network has absolutely affected my research and my professional development for the better." ●



RESEARCH IMPACT

INTELLECTUAL PROPERTY

Using IP to advance research and spur innovative spin-offs

In the development of intellectual property (IP), GRAND research has led to a total of **13 patent applications** for new technologies as of March 31, 2014. Application areas range from advances in 3D graphics, innovative biofeedback gaming applications, to data encryption on mobile devices.

A recently patented technology by researchers at Queen's University's **Human Media Lab** offers new ways for users to interact with thin, flexible

displays – an emerging area of digital media. The apparatus projects images generated by a computer onto real paper. Using computer vision technology, the system then detects deformations in the shape of the paper by the user to manipulate the images in real time.

A new developer-friendly open-source library called OpenVL (Open Vision Library) released by UBC's **Human Communication Technologies**

Laboratory is helping pave the way for new applications in computer vision. UBC researchers **Gregor Miller** (HQP, UBC) and **Sid Fels** (NI, UBC) have been working with industry partners including global microprocessor manufacturer **AMD (Advanced Micro Devices)** to determine whether the library offers a viable open standard for the computer vision developer community.



ANDRA MOTION FOCUS: END-TO-END RESEARCH DEVELOPMENT

Professor Sam Fisher (NI, NSCAD) of NSCAD's Film Department saw his students grapple with the technical challenges of "focus pulling." An entirely manual process in film industries, traditional focus requires years of training and practice, and goes far beyond the scope and budget of most independent artists. The skill

is crucial, however, to the polished look of big budget cinema and video production.

"I'd get these really talented students, but they couldn't create work that can compete in a big arena simply because they didn't have access to the funding. One of the key aspects to that is focus

pulling. Without it, much of what they shoot is unusable. I wanted to solve this real problem and be able to give it to my students to test out."

As a graduate of the prestigious London Film School and with over thirty years of experience in the film

(continued on next page)

Sam Fisher (NI, NSCAD) and Research Assistant Marissa Ranali at NSCAD's Cineflux facility.
Photo by Krista Kirby.

ANDRA MOTION FOCUS: END-TO-END RESEARCH DEVELOPMENT (CONT.)

business, Sam understood the limits of manual focus. With the shift to digital, filmmakers had pushed for larger chip sizes, low light filming, and shallower depths of field. Difficult shots such as improvised performances and quick-paced movements are virtually unmanageable using traditional manual focus. Depending on the parameters of a given shot, there is simply too little room for error. It inspired him to rethink decades-old film technology.

Shortly before joining GRAND in 2010, Sam and Mike MacDonald (HQP, NSCAD), a former NASA programmer, began work on a prototype that merged motion capture tech with remote focus – a way to control lens focus wirelessly. The hybrid technology would allow cinematographers to automatically track camera subjects and actors while delivering near perfect focus with terrific accuracy.

A key step early on was acquiring an expensive wireless motion tracker system purchased through a special GRAND equipment grant that was necessary for some of the original research. The technology delivered the precise real-time motion and location measurements needed for the proof of concept.

Based on the prototype, Sam began working with other researchers in GRAND, including Paul Kry (NI, McGill) and Derek Reilly (NI, Dalhousie), to determine the effectiveness of his technique. The system is now being shared between NSCAD University and Dalhousie, where it is used in Derek's laboratory for experimental studies. The system was demonstrated at the NAB conference in 2014, receiving significant critical acclaim.

In partnership with Sunsel Systems, Sam was able to turn his automated focus-pulling technology into the

Andra Motion Focus system and productize it with the launch of his company Cinema Control Laboratories. He plans to make Andra commercially available in 2015. His students will get to try it out even sooner.

Without the funding from GRAND and the connections that GRAND helped establish, Sam claims, it would have been much more difficult for the project to have come to a quick, successful completion.

"The film technology companies are all very small companies, for the most part. There's a lot of money in the film industry, but not a lot of research dollars. GRAND has been on board with this thing the whole way through. Even though the product that I'm making is very industrialized – a straight line towards solving a problem – I'm a huge supporter of pure research."



RESEARCH IMPACT

ENTREPRENEURSHIP

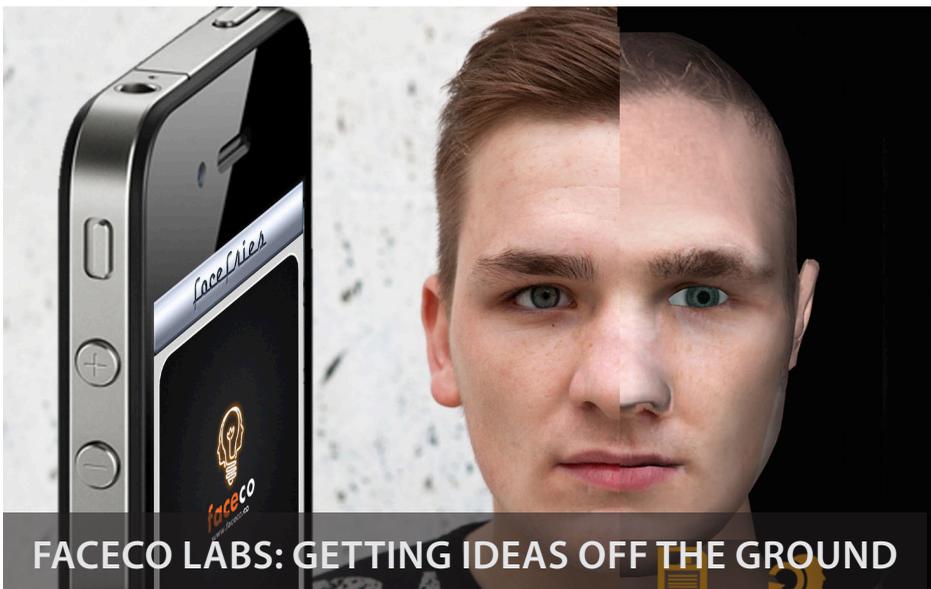


Driving the commercialization success of research innovations

GRAND works continually with its member universities to fully develop and commercialize research. Through funding, networking opportunities, and mentorship, we help digital entrepreneurs take the next step in developing new products and businesses.

GRAND's entrepreneurship program, co-funded with Western Economic Diversification (WD) as part of a broader technology transfer initiative (see Knowledge Transfer), has done well in ensuring university entrepreneurs understand both needs of their receptor communities and the business realities of taking that step.

Entrepreneurship is an area where GRAND has had some of its most notable successes. As of March 31, 2014, the network has helped launch **14 new companies** exploiting research ranging from 3D simulations to haptics to medical training using VR techniques.



FACECO LABS: GETTING IDEAS OFF THE GROUND

Timely startup funds and supportive business mentorship are often critical in translating inventive IP into marketable products.

Thanks to GRAND funding and support, two BC researchers were able to get their start-up FaceCo Labs off the ground to develop new facial 3D technology for mobile devices. The company debuted its first mobile app "Face Fries" on Apple's iTunes in Spring 2014 that lets users create talking, animated 3D avatars from photographed faces and share them

online. National media coverage of the app's release helped generate some considerable online buzz.

Though designed for easy use, the technology behind Face Fries is based on years of development and expertise in advanced image processing, animation technology, and psychological models of personality and emotion. Getting this software out of the lab and ready for public users, however, required business know-how.

Following a March 2013 GRAND

industry workshop, company founders Liane Gabora, an Associate Psychology Professor at UBC, and Steve DiPaola, an Associate Professor in SFU's School of Interactive Arts and Technology (SIAT), began working with GRAND's Mark Salopek on a business plan.

Mark found software programmers for the project and arranged lab space at UBC's MAGIC lab. With funding of \$15,000 from GRAND, plus a further \$5,000, in combination with investment from the founders, the team was able to get the company up and running.

Since then, FaceCo's five researchers, programmers and designers have been developing new research-informed social media applications. The company also plans to follow up with a FaceFries app for Android devices.

"FaceCo would not have come into being were it not for GRAND. I don't think there could be any better way to support innovative research in digital media or future startups in Canada than through its continued support," said Liane.



AUDREY GIROUARD

Assistant Professor, School of Information Technology,
Carleton University

Postdoctoral Fellow, Human Media Lab (HML), Queen's University

Audrey Girouard has become a key GRAND researcher, pioneering new flexible displays and radically innovative approaches to human-computer interaction.

As a postdoctoral fellow at the Human Media Lab (HML) at Queen's, Audrey Girouard was part of the research team behind 'PaperTab' – a revolutionary paper-thin, bendable tablet developed in partnership with Intel Labs and Plastic Logic. Unveiled at the 2013 Consumer Electronics Show (CES), the device was globally acclaimed as a breakthrough in flexible electronics; users could now interact with information and data in ways analogous to how they handle paper documents (for example, turning the 'page' by bending the corner of the tablet).

Under the direction of Roel Vertegaal (NI, Queen's), Audrey contributed to other ingenious HML inventions such as

Telehuman, a life-size hologram-like 3D display designed to transform how we videoconference. She has also furthered studies into bend gestures for organic user interfaces.

In 2011, she was awarded one of the first Young Network Investigator (YNI) Awards – a GRAND initiative introduced to help former HQP transition into faculty positions while remaining involved in GRAND projects – and thereafter became a GRAND Collaborating Network Investigator (CNI).

As an Assistant Professor at Carleton University, Audrey is continuing her research into the next generation of

flexible displays that she sees making their way into our homes within a few years. In GRAND, she is collaborating on the SHREXP project, where researchers have only scratched the surface as far as developing new technologies to support interaction with touch-responsive, flexible 3D objects and other tangible digital media.

"GRAND is a great place to network, to start new research relationships, and to exchange ideas in a (mostly) informal venue about current research projects and direction. It is very important to know who the other HCI researchers are in Canada, and GRAND has helped me make numerous connections in the last few years."



THE ARTS-SCIENCES CONNECTION

TWO UNIQUE INITIATIVES THAT PROMOTE CREATIVE INNOVATION

Artists and designers are as much a part of any innovative undertaking in digital media as the scientists who advance the state of the art. This is why GRAND continues to explore new initiatives that bridge the art and design community and the community of scientific researchers. By bringing art and design research and practice into its scientific research, GRAND expands the solution space projects might conceive and improves the quality of the digital media tools that are produced.

CANADA COUNCIL-GRAND ARTIST-SCIENTIST JOINT PROGRAM

In early 2013, the **Canada Council for the Arts (CCA)** – Canada’s national arts funder – together with GRAND introduced a one-of-a-kind grant

program that pairs independent artists with scientists in the creation of new artistic works. The **GRAND NCE Media Artist and Scientist Collaboration** supports cross-disciplinary projects that explore and develop leading-edge technologies and applications through artistic works.

The joint program is based on a commitment shared by both organizations to build constructive exchanges and partnerships between the arts and the natural, social and health sciences. It aims to further artistic and scientific knowledge and practices for the benefit of Canadian society. Both organizations have pledged to contribute \$240,000 per year over the next three years to support the initiative when it is fully launched at the end of 2014.

As part of a pilot program, funding has already supported four projects led by Canadian artists and their collaborating researchers at McGill University, Ryerson University, and Simon Fraser University.

As one example, media artist David Bobier and researcher **Deborah Fels** (NI, Ryerson) have used their awards to establish the VibraFusionLab media studio in London, Ontario. Building on vibrotactile technology pioneered at Ryerson, the 2,000 sq. ft. creative space is dedicated to exploring new multi-sensory art forms that enable the deaf or the hard of hearing – as well as the hearing – to experience sound and music. Through workshops and outreach supported by CCA-GRAND funds, VibraFusionLab has engaged with local artists and community

*3D Printing has emerged as a powerful production platform for artists and designers.
Photo courtesy Emily Carr University*

groups on new creative explorations such as vibrotactile wearables and gesture recognition. In 2013, the

has a wonderful skill at reaching out to the artistic community.”

Director of Emily Carr University’s Health Design Lab.



team partnered with Orchestra London to give concertgoers a tactile rendition of The Christmas Carol using “Emoti-Chairs” –audio-tactile chairs – prompting CBC to proclaim the device one of the five top classical music innovations.

“Artists in all disciplines are really looking at technology and trying to find out how to handle it effectively, but to also use it in a way that is nurturing, humanistic. And that is what I felt working with the scientists on this project,” said David. “I learned a great deal about how scientists think – and they don’t think that much differently than artists, which is why this program is so important. [The program] has been critical in bringing people together to make it happen.”

“The project has really shown what can be accomplished in the spirit of bringing together different disciplines,” said Deborah. “David has brought a wealth of ideas to the collaboration and

GRAND’S ART AND DESIGN NODE (AD-NODE)

In 2012, GRAND began a two-year initiative to better integrate artists and designers at its three member art + design universities (OCAD University, NSCAD University and Emily Carr University of Art + Design) with researchers within the larger GRAND network. Internal competitions within each of the three universities have provided funds to seed and develop budding projects, train HQP, and grow expanding network connections, as well as ensure an equal footing with projects based at research-intensive universities.

“AD-Node has been terrifically effective in bringing art and design to the table with other researchers. The harder job is getting other researchers to understand that what we do [as designers] should be an embedded part of their process – not an afterthought,” explained GRAND associated researcher **Jonathan Aitken**,

Through AD-Node, Jonathan, in collaboration with **Dr. Darren Warburton** (NI, UBC), an Associate Professor and physician at UBC’s School of Kinesiology and Experimental Medicine Program, and other researchers have developed a new clinical app that makes doctor-prescribed exercises easier to follow. Designed for tablets and other touchscreen devices, the tool lets physicians customize exercises to suit the needs of individual patients. The goal is to better inform patients about their conditions and to better track their progress.

“I am hopeful that the tools that we develop will be used by thousands worldwide in short order,” said Darren, whose core research addresses the barriers to physical activity faced by people living with chronic illnesses. “Our initial work has led to major advancements in the primary and secondary prevention of chronic disease. Our initial exercise prescription tool has important implications for a wide range of medical conditions.”

For Jonathan, the collaboration has shown how designers and clinicians working together can accelerate the process of getting research technology into the hands of patients and practitioners.

“Understanding the user experience of a technology helps researchers by adding to their repertoire a different perspective that represents and champions the patient,” said Jonathan. “Clinicians see how they can fix the problem; designers try to understand the patient’s experiences of emotion, pain, social issues, communications issues.”



INTERDISCIPLINARY R&D: MEDICAL ADVANCES FROM THE WORLD OF ART AND DESIGN

Thanks to a research collaboration enabled by GRAND, a new low-cost 3D printing material formulated in part by researchers at ECUAD has dramatically reduced the cost of printing 3D surgical models being studied at the U of A's Surgical Simulation Research Lab (SSRL).

"The models are of excellent quality and [come] at a very low cost. This has allowed us to create more models for healthcare applications than we originally planned. It has let us do more research in surgical education," said Bin Zheng (NI, U of A), who leads SSRL. Bin is the Endowed Research Chair in Surgical Simulation in the U of A's Department of Surgery, and a collaborating researcher in GRAND. His research team is exploring the wider applications of virtual and augmented reality to the training of physicians and healthcare

professionals.

An outgrowth of the pioneering work of Mark Ganter at the University of Washington's OPEN 3DP lab, the printing material was further developed by GRAND associated researchers Keith Doyle, Philip Robbins, and H el ene Day Fraser at Emily Carr University's Intersections Digital Studios (IDS) with the support of NSERC's College and Community Innovation Program and GRAND's AD-NODE initiative. The enhanced formula reduces printing material costs from an average of \$50 to between \$0.50 and \$0.80 per pound – offering an attractive alternative to the pricy proprietary printing materials.

The UA-ECUAD collaboration was made possible through the efforts of Mark Salopek, GRAND's Technology

Transfer and Commercialization Manager, who put Bin's team in contact with Keith and Philip. Following a site visit by a U of A researcher, the Emily Carr team began producing models based on CT scans of hip and pelvic bones to a resolution, and at a speed and cost, that would make such printing viable for the medical user.

"We had no idea about the research going on at the U of A, and it was Mark [Salopek] that really made that happen," said Keith. "He has been a great advocate, and I think he sees the value in the art and design application."

"It's valuable to have someone who is connected to the research community in a broad sense and not immersed in it," said Philip. "When you're doing the research you're very focused – whereas Mark has a good overview of what people are doing and developing and can see how he can interconnect them. That is how this connection came about."

The collaboration has opened up new possibilities to develop cost-effective models for the visualization and study of other surgical procedures.

"Essentially, the creativity of artists paved the way for surgeons to improve the well-being of their patients," said Mark Salopek.



CLAUDE FORTIN

PhD Student,
School of Interactive Arts and Technology
Simon Fraser University

At SFU's interdisciplinary Making Culture Lab (MCL), Claude Fortin is studying the power of interactive media to engage citizens and transform urban spaces.

With the advent of so-called “Smart Cities” – digitally augmented urban areas – Claude Fortin sees a growing need for citizens to have a voice in the design and use of public technologies. A media artist herself, her research draws from artistic practice, the humanities, the social sciences, and human-computer interaction – a convergence that fits well with GRAND's interdisciplinary model of research.

In Fall 2013, Claude led a ten-week ethnographic study of *Mégaphone*, an interactive “Speakers’ Corner” in Montréal designed by Moment Factory and co-produced by the National Film Board of Canada and the Quartier des Spectacles Partnership. *Mégaphone* was the main case study in her doctoral research, which examines the ways digital technology might be used in public spaces to support more participatory models of social, cultural and political interaction.

Back at SIAT, Claude collaborates with several GRAND CNIs, including her senior supervisor, Kate Hennessy

(NI, SFU), and co-supervisor, Carman Neustaedter (NI, SFU), as part of GRAND's SHREXP (Shared Experience) project, which is looking at how we share interactive experiences.

Claude's past year has been particularly busy. In 2013, she presented seven conference papers on her research. This included an analysis of her early field findings at the World Social Science Forum 2013 in Montréal a mere one month into the *Mégaphone* deployment. Claude then spent the first part of 2014 as an international visiting fellow at the University of Melbourne's Research Unit in Public Cultures (RUPC) in Australia studying Federation Square's digital public infrastructure. This research will soon be published in an upcoming RUPC book.

After returning to Canada, she presented papers at multiple top-tier conferences such as CHI 2014 (April 26 – May 1, 2014), CONGRESS 2014 (May 24 – 30, 2014), PerDis 2014 (Symposium on Pervasive Displays, June 3-4, 2014), and DIS 2014 (Designing Interactive

Systems, June 21-25, 2014). Most recently, she has been co-authoring a paper with the technology designer of *Mégaphone* for ISEA 2014 (October 30 – November 8, 2014) in Dubai.

Through GRAND, Claude has also taken part in a variety of international conferences and workshops, including the 2012 Computer Human Interaction Mentoring (CHIME) Workshop and the 2013 Euphoria & Dystopia Symposium sponsored by GRAND and OCAD University, as well as the 2012 Summer Social Webshop (SSW) and the 2013 Digital Societies and Social Technologies Summer Institute (DSST), both held at the University of Maryland, College Park, USA.

“The GRAND-sponsored specialized workshops I attended in the U.S. gave me a much better understanding of what the structure of technology R&D looks like; [It has put] me in touch with new actors, whether from the academic community or from industry.” ●

(top) *Mégaphone* interactive installation at the Quartier des spectacles, Montreal, 2013

GRAND RESEARCH



INTRODUCING GRAND'S PHASE 2 THEMES AND PROJECTS

Canada faces a number of tough challenges – from environmental degradation and climate change, to an aging population in need of care, from growing concerns about digital surveillance, privacy and cyber-bullying to economic recovery, prosperity, and the training of a future workforce. These are issues of utmost consequence to Canadians.

With the introduction of a new multifaceted research program in Phase 2, GRAND has taken bold steps towards better addressing Canada's digital media research challenges. All research projects in Phase 1 concluded on March 31, 2014, in preparation for this new set of projects and themes. Building on GRAND's research capacity established in Phase 1, the new program encompasses seven critical research problem areas, multiple interdisciplinary research teams, invested industry and community partners, and innovative approaches to knowledge mobilization.

ADDRESSING CANADA'S "SEVEN CHALLENGES"

GRAND's new research program is built around a framework of seven problem areas or "Challenges" deemed of strategic importance to Canada. These Challenges – (Big) Data, Citizenship, Entertainment, Health, Learning, Sustainability, and Work – affect Canadians in a host of ways – from concrete problems such as workplace productivity and civic engagement to more abstract concerns such as perceptions of privacy and security in a world of ever increasing data. By putting Canada's digital media research into action we believe GRAND can address these and other national

challenges and work towards practical solutions.

Each Challenge is addressed through multiple projects each focused on one or more specific issues within the overall problem area. Some of these projects continue promising research avenues developed in GRAND's first phase; others address entirely new areas of research. Every project is comprised of tightly coupled subprojects, each representing a key milestone or deliverable in the project's life cycle. Through this theme and project structure, GRAND brings the best researchers from across Canada to bear on particular aspects of a problem in teams that are formed for that purpose.

The new framework builds on an earlier model of five themes that represent the network's core capabilities: 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). These former themes will continue to underlie the research program, which has been reshaped by the GRAND Challenges.

REACHING OUT TO THE RECEPTOR COMMUNITY

By design, Phase 2 projects will be more closely aligned with their receptor communities – the end users of the research outcomes. Every project identifies and partners with appropriate receptors that are involved at every stage of the project. Led by academic experts, projects have industry partners and other stakeholder representatives – called “Champions” – who help define, execute, and evaluate the research activities.

For some of our researchers and partners, commercializable products and patents are the goal. For others, influencing policy decisions or contributing to public and governmental discourse around compelling social issues are the most valuable outcomes. Still others measure influence by the number of students who graduate from a lab to join partner organizations. In GRAND, meaningful, measureable outcomes in a variety of fields are encouraged and supported.

ALLIANCE PROJECTS (SPARK-GAP)

SPARK-GAP projects represent the natural evolution of GRAND networking activities. These large-scale, high profile collaborations formalize relationships between researchers and partners who have identified a common, challenging, high-risk, and high-impact research objective that spans the competencies of the GRAND network and beyond. These projects tap into the broad research infrastructure used by all GRAND partners to fast-track results while also contributing back to that shared infrastructure. SPARK-GAP projects also require fully engaged industry champions who help lead the project, and who contribute significant in-kind and cash support. The name comes from a combination of Strategic Projects Accelerating Receptor Knowledge (SPARK) that emphasizes the importance of impact on the receptor community, and GRAND Alliance Project (GAP) that emphasizes the importance of partnering with the receptor community from the outset.

The impact of SPARK-GAP projects is envisioned to be great – reaching researchers, industry, and society with demonstrable outcomes and clear mechanisms for knowledge mobilization. The scope and crosscutting nature of these projects will also significantly impact the

Canadian digital media sector, providing a competitive alternative to other research acceleration programs.

The first of these new projects, SYNTHIUS, forms a template for future SPARK-GAP projects. By the end of Phase 2, these projects are expected to account for more than half of the research program’s funding. A full profile on SYNTHIUS is presented at the end of this section.

SYNTHIUS

Creating a Synthetic, Physical, Social and Emotional Human

PROJECT LEAD

Sidney Fels (UBC)

PROJECT CO-LEAD

Ian Stavness (U of S)

SYNTHIUS is focused on creating the technology required to synthesize lifelike, believable, expressive, and responsive digital humans. With potential applications in entertainment, games, ergonomic design, and healthcare, this project combines biomechanics, motion capture, and robotics with theories of social behavior as well as cognitive and emotion models, to develop a virtual person who is able to respond to the world as we do.



THE SYNTHIUS PROJECT

GRAND AND AUTODESK TEAM UP TO CREATE THE FIRST SYNTHETIC HUMAN

Researchers across Canada are building innovative computer models for practically every facet of what it means to be “human.” From the virtualization of our physical presence; our body, anatomy, senses, and physiology, to the simulation of human cognition, emotion, and memory, as well as social behaviour, this research aims to bring valuable insight into how we tick.

Integrating these models into an organic whole – a “synthetic human” – is the purpose of the new SYNTHIUS project, a unique research project within GRAND that is arguably its most ambitious yet. “Bringing it all together – the ‘synthesis’ – is a key component of the overall SYNTHIUS project,” explains project lead Sid Fels (NI, UBC). “It’s about finding out how research in other areas can be pulled together to develop a single integrated digital human system.”

SYNTHIUS is the first of GRAND’s SPARK-GAP projects: large-scale, high profile research collaborations that are tightly coupled with industry partners

who kick in significant co-investment. The scope and crosscutting nature of these projects is intended to make a significant impact on the Canadian digital media sector.

In partnership with software developer Autodesk, multi-university SYNTHIUS merges six research areas within GRAND, each exploring a core aspect of the human animal: physical form, motor control, biomechanics, cognition, emotion, and social behaviour. Each area, cutting-edge in its own right, will help complete the human model.

“From the bones, to the muscles, to the nerves, to the brain, to the cognition, to the social and expressive human, all of those pieces will be in the synthetic human and predictable,” says Sid. “We’re going to make the whole human.”

For Azam Khan, head of the Environment & Ergonomics Group at Autodesk Research in Toronto, the project offers a much-needed catalyst for translating some of Canada’s leading research in human modeling into new applications that span human health, advanced education, ergonomics,

animation, and design.

“When I talk about SYNTHIUS with others, they say ‘that sounds really cool but isn’t somebody already working on that?’ The answer is no. These amazing advances being done at labs across the country are great, but they’re so far from being useful to people because they need to be integrated into a holistic system like SYNTHIUS.”

As a SYNTHIUS Project Champion, Azam communicates end user needs to the researchers and helps to guide the research objectives. For designers, engineers, and creative professionals – Autodesk’s primary customer base – access to robust models of human anatomy and behaviour will help them design better things for people.

“It is really hard to build a digital human – it’s like going to the moon,” observes Azam. “GRAND is providing great access to the research community in Canada, giving Autodesk the infrastructure and support to even attempt something like this.”

“By bringing together people towards a common activity, you actually create something that is bigger than the sum of the parts,” adds Sid. ●





THEME: (BIG) DATA

Living with Big Data

THEME LEAD

Charles Clarke (Waterloo)

THEME CO-LEAD

Sean Gouglas (U of A)

As quantities of data grow, so does our need to understand that data. From making government data more open and accessible, to assessing the impact of social media use on learning, nearly every human endeavour can benefit from making sense of “Big Data.” The challenge lies in transforming data into knowledge, which demands innovative tools and new approaches for capturing, visualizing, and analyzing some of the biggest datasets “out there.”

AVID

Aesthetics, Visualization, Interaction, and Design

PROJECT LEAD

Sheelagh Carpendale (U of C)

PROJECT CO-LEAD

Christopher Collins (UOIT)

In our data-driven society, decisions are increasingly informed by engagement with visualization. Moving beyond concerns of efficiency and usability, AVID investigates the interplay between aesthetics and personalization, generating appealing new ways to visualize and interact with data, enabling Canadians to be more imaginative, innovative, and connected.

DIGHUM

Large Scale Digital Humanities

PROJECT LEAD

Geoffrey Rockwell (U of A)

PROJECT CO-LEAD

Michael Sinatra (UdeM)

The cultural record is how we know ourselves. Humanists have used computers since the 1940s to study textual, photographic and material culture. The large scale of materials now available on the web demands new methods to gather and study our cultural record, as well as new ways of communicating the results of our research to researchers and members of the public at large.

PLATFORM2

Big Data Systems, Platforms and Architectures

PROJECT LEAD

Martin Mueller (U of A)

PROJECT CO-LEAD

Alexandra Fedorova(SFU)

Computation is the key to solving many of the grand challenges of our time, and much can be gained by customizing hardware and software systems for optimized performance. PLATFORM2 aims to develop core methods for such customization and demonstrate their efficacy across a broad range of applications including computer memory management, healthcare treatment policies, and large-scale planning for autonomous agents.

SENSE-I

“I make sense of big data”

PROJECT LEAD

Wolfgang Stuerzlinger (SFU)

PROJECT CO-LEAD

Charles Clarke (Waterloo)

The phenomenon of “Big Data” involves having more data than we can understand, but almost every human endeavour can benefit from making sense of information buried in this data. Integrating a range of disciplines, SENSE-I focuses on developing better and more comprehensive models for interrogating, visualizing, analyzing and understanding complex data.



THEME: CITIZENSHIP

Digital Citizenship and Civic Engagement

THEME LEAD

Samuel Trosow (Western)

ACTING CO-LEAD

Catherine Middleton (Ryerson)

New media has become embedded in civic and political life, raising questions about what it means to be a “digital citizen.” Can social networks galvanize political movements? How equal is the access to information technology? Will online journalism build an informed and engaged public? Are governments and public institutions ensuring personal data is handled responsibly? How is the use of digital technologies reflecting the social values of the citizens those technologies are designed to serve?

NEWS2

Journalism and Digital News

PROJECT LEAD

Jacquelyn Burkell (Western)

PROJECT CO-LEAD

Luanne Freund (UBC)

The ability to openly and freely engage with information about the world around us is essential to Canadian society. The news and media have undergone profound changes in recent decades, however, giving rise to new threats and opportunities. NEWS2 examines this new media environment, with the aim of making sense of online news production and consumption and generating tools, policies, and strategies to ensure that Canadians reap the benefits of current developments while continuing to be engaged and informed.

PROTECT

Policy, Practice and Technology for Protection of Privacy, Integrity and Access

PROJECT LEAD

Robert Biddle (Carleton)

PROJECT CO-LEAD

Catherine Middleton (Ryerson)

With much of life now online, new challenges have emerged for the protection of privacy, security, integrity, copyright and access. PROTECT explores ways to build a shared understanding of the landscape, and a shared language for citizen engagement around the challenges and solutions.



THEME: ENTERTAINMENT

Entertainment in an Always-Connected World

THEME LEAD

Pierre Poulin (UdeM)

THEME CO-LEAD

Regan Mandryk (U of S)

The media and entertainment industries are heavily invested in a digital future. Just-in-time content creation and always-connected personal lives offer new possibilities for interactive games and entertainment that challenge traditional production and distribution practices. This new paradigm demands powerful new tools for creating digital content, generating realistic models, and crafting believable virtual characters and interactive stories that capture our imagination.

BELIEVE2

Believable Characters and Stories for Games and Simulations

PROJECT LEAD

Duane Szafron (U of A)

PROJECT CO-LEAD

David Mould (Carleton)

The quality of scenarios and virtual character behaviours has a major impact on the quality of virtual world user experiences in video games, simulations, training and treatment environments. BELIEVE2 aims to enable designers to create more believable scenarios and characters that exhibit more believable behaviours in these virtual worlds.

DATUM

Data- and User-driven Modelling of Visual Content

PROJECT LEAD

Pierre Poulin (UdeM)

PROJECT CO-LEAD

Richard Zhang (SFU)

Content creation is a key challenge in computer graphics applications; while it is relatively easy to acquire low-level measurement data, it is difficult to generate application-specific digital models. DATUM addresses the modeling challenge by innovating methods for data- and user-driven modeling.

CREATE

Creative and Expressive Interfaces

PROJECT LEAD

Faramarz Samavati (U of C)

PROJECT CO-LEAD

Karan Singh (U of T)

Enabling people to turn a creative idea into a digital artifact is an ongoing challenge in graphical human computer interaction. CREATE defines the next generation of graphical interaction for digital content creation.



THEME: HEALTH

Patient-centred Healthcare and Wellness

THEME LEAD

Diane Gromala (SFU)

THEME CO-LEAD

Nicholas Graham (Queen's)

Advances in new media are rapidly moving the healthcare sector towards a digital revolution. Games and interactive media are helping to promote health and fitness, rehabilitate patients, and reduce social isolation. Virtual reality and visualization are training doctors and informing patients. Online networks are providing cost-effective prevention and care at a distance. Research is making a difference in the well-being of Canadians and helping to transform established practices in healthcare.

CHRONIC

Managing Chronic Disease with Digital Media

PROJECT LEAD

Chris Shaw (SFU)

PROJECT CO-LEAD

Linda Li (UBC)

Chronic diseases such as chronic pain, arthritis, and diabetes require constant management by patients, caregivers, friends and family. By developing and testing tools that help patients self-manage their chronic disease, CHRONIC aims to help patients and their caregivers to better manage their conditions and quality of life, and potentially reduce the cost of chronic diseases on Canada.

HLTHSIM2

Simulator Design and Evaluation for Healthcare and Surgical Education

PROJECT LEAD

Roy Eagleson (Western)

PROJECT CO-LEAD

Bill Kapralos (UOIT)

HLTHSIM2 researchers focus on the application of computer graphics and new media in basic skills training for surgery, diagnostic reasoning and problem solving within healthcare teams. The project encompasses 3D modeling and simulating human biomechanics, and the design and evaluation of VR-based systems for a range of healthcare trainers.

G4HLTH

Games for Health

PROJECT LEAD

Nicholas Graham (Queen's)

PROJECT CO-LEAD

Kevin Stanley (U of S)

Compliance in physical exercise, physical therapy and cognitive training is poor — few Canadian children meet national activity guidelines, and many patients fail to complete their physiotherapy. Digital games are tremendously popular with the majority of adult Canadians and almost all children. By adding game-like elements to daily activities, G4HLTH aims to increase people's motivation to initiate and adhere to healthy behaviors.

INCLUDE2

Inclusive and Accessible Design

PROJECT LEAD

Deborah Fels (Ryerson)

PROJECT CO-LEAD

Joanna McGrenere (UBC)

INCLUDE2 research is looking at ways to reduce barriers to work, entertainment, social systems and daily living activities with a focus on people with disabilities and older people. The project addresses six different focus areas of research: social justice issues, health, inclusive technology to support cognition, communication, accessing knowledge, and creative expression.



THEME: LEARNING

Learning in the Digital Age

THEME LEAD

Jennifer Jenson (York)

THEME CO-LEAD

Carl Gutwin (U of S)

Digital media and technologies are transforming what, how, and where learning occurs – as well as what counts as knowledge. While learning has never been confined to the classroom, the opportunities for the acquisition of knowledge and skills in informal contexts such as tutorials, online communities, MOOCs, and digital games, among others, have grown enormously. Anticipating, documenting and detailing these shifts are the central challenges to learning in the digital age.

CONNECT

Connecting and Learning through Social Play

PROJECT LEAD

Regan Mandryk (U of S)

PROJECT CO-LEAD

Carman Neustaedter (SFU)

People spend a significant amount of time playing social games. Research has shown that this social play can result in many benefits for players. CONNECT leverages the power of play to create new social games that connect people, empower individuals, crowd source work, gamify learning, and generate revenue.

KIDZ

Supporting Children Learning in a Digital World

PROJECT LEAD

Alissa Antle (SFU)

PROJECT CO-LEAD

Karon MacLean (UBC)

Interactive media has the potential to radically change how children learn, yet few theories or empirical findings relate claimed benefits to specific causes, or validate existing design guidance. KIDZ develops and validates best practices for designing interactive systems that support children's learning in high impact, traditionally underserved areas of child development.

ENGAGE

Educational Gains and Achievements on the Edge(s)

PROJECT LEAD

Jennifer Jenson (York)

PROJECT CO-LEAD

Sean Gouglas (U of A)

Educational systems worldwide are changing to meet the perceived needs of the 21st century learner. ENGAGE examines the ways digital media can support the development of pedagogies and curriculum that are both ludic and educational, and understand the processes by which marginalized groups can become creative producers in both formal and informal learning environments.



THEME: SUSTAINABILITY

Sustainable Communities

THEME LEAD

Lyn Bartram (SFU)

ACTING CO-LEAD

Rob Woodbury (SFU)

Digital media has the potential to radically change how we – as individuals and as a society – make decisions and take action around sustainability. With 80% of Canadians living in urban communities, embedding sustainable thinking in the computer-based design and decision-making processes and practices of our built environment has become an urgent national priority, requiring both technological and social innovation to create, enhance, and implement solutions to improving energy efficiency and reducing our environmental footprint.

HEAP

Hydrocarbon Energy Analytics Program

PROJECT LEAD

Frank Maurer (U of C)

PROJECT CO-LEAD

Stacey Scott (Waterloo)

This receptor-focused project applies digital media technologies and other information technologies such as visual analytics and interactive simulations to provide more cost-effective exploration, extraction, refining, and distribution methods that reduce the environmental impact of fossil fuels. HEAP will target specific problems for quick interventions that produce solutions of immediate tactical importance for the partner.

NMSL

New Media for Sustainable Living

PROJECT LEAD

Lyn Bartram (SFU)

PROJECT CO-LEAD

Melanie Tory (UVic)

Making a positive impact on climate change involves policy, social change, human behaviour and technology. How people use the built environment around them is a critical factor in making human systems operate more sustainably. NMSL explores how new technologies can promote awareness, encourage conservation, and enable control of energy and water use from computational, social and psychological perspectives.

IIDEMS

Integrated and Interactive Design and Engagement Media for Sustainability

PROJECT LEAD

Ronald Kellett (UBC)

ACTING CO-LEAD

Rob Woodbury (SFU)

Planning and design for sustainability in the built environment must engage diverse public, professional, regulatory and political stakeholders in meaningful, collaborative decision-making about the future. IIDEMS investigates digital media approaches and tools that inspire, engage and inform stakeholders to imagine, plan, design, construct, operate and inhabit a more sustainable built environment.



THEME: WORK

Work in the Collaboration Economy

THEME LEAD

Bart Simon (Concordia)

THEME CO-LEAD

Jeremy Cooperstock (McGill)

For many in a knowledge-based digital economy, work is no longer the production of physical goods and services; it is understanding and utilizing information in creative and innovative ways. This has transformed the nature of work and changed the historic relationship between labour, capital, and natural resources as the drivers of economic growth. As well as improved work tools that support interaction and collaboration across time, distance, and scale, new policies are needed that reflect the new realities of working in the digital age.

EXPERT

Scaffolding Expert Performance

PROJECT LEAD

Gerald Penn (U of T)

PROJECT CO-LEAD

Michael Terry (Waterloo)

EXPERT will develop tools and techniques that gather and distill web-based knowledge, organize and focus crowd-based resources, and enhance communication and awareness with other participants, to streamline user interfaces and simulations, and empower us to operate software, individually and collectively, as experts.

KNOW

Knowledge Networking for Organizational Work

PROJECT LEAD

Eleni Stroulia (U of A)

PROJECT CO-LEAD

Anatoliy Gruz (Ryerson)

Today's grand challenges – climate change, energy shortage, disease-outbreak monitoring – can only be addressed by large-scale projects with distributed, multi-disciplinary teams, from academia and industry. Such knowledge-based work involves collaborative problem solving and knowledge exchange, using a variety of tools for discipline-specific and collaborative tasks.

INDIEGAME

Independent Game Development

PROJECT LEAD

Lynn Hughes (Concordia)

PROJECT CO-LEAD

Brian Greenspan (Carleton)

INDIEGAME mobilizes broad cross-disciplinary research capacity in the service of independent and small studio game developers in Canada by working to develop better understandings of small scale game production, appropriate technology, social and economic sustainability, and tools for creativity and innovation in the game and new media sector.

SHREXP

Shared Experience

PROJECT LEAD

Jeremy Cooperstock (McGill)

PROJECT CO-LEAD

Tony Tang (U of C)

Many human activities require the fundamental ability to interact with others, to share and co-create ideas, knowledge and artifacts. SHREXP designs tools to support collaborative interaction and shared experiences, leveraging digital media to enhance engagement between individuals, inter-personal awareness, and the shared use of interactive surfaces and objects.



LOLA WONG

PhD Student,
Faculty of Information and Media Studies,
Western University

A long-time contributor to GRAND, Lola Wong has been central in making the student-led Graduate Student and Postdoc Committee (GSPC) an active and engaged voice for HQP in GRAND.

As GSPC co-chair in 2012, and chair in 2013 and 2014, Lola Wong has kept students and postdocs informed about the important role the network can play in their current and future research and industry work. Her popular networking activities and events have helped GRAND HQP connect and collaborate with fellow researchers and industry from across Canada.

Lola has also served as an effective ambassador for GRAND. She represented the network at the American Association for the Advancement of Science (AAAS) 2013 Annual Meeting in Boston, USA and again at the 2013 World Social Science Forum (WSSF) in Montreal. At both conferences, Lola connected and shared

her research with attendees from across Europe, India, Philippines, United States, South Africa, Kenya, as well as here in Canada interested in learning about the network and its interdisciplinary research in the social sciences.

“My opportunities with GRAND have demonstrated the value of making connections beyond the classroom and beyond the lab. It isn’t just about presenting your research; it’s about sharing your research with colleagues you might not have known you had.”

A GRAND HQP since 2010, Lola’s initial research with Sam Trosow (NI, Western) and Jacquelyn Burkell (NI, Western) had focused on identifying successful user-generated content (UGC) models and

needed UGC policy infrastructure. She later turned to the phenomenon of viral media, and whether “virality” is due to random or predictable factors.

In Phase 2 of the GRAND network, Lola continues her collaboration with Jacquelyn in NEWS2, a project examining the production and consumption of news media online. Lola will focus on information diffusion via social media, looking at why people share information from external sources (such as news organizations) through social networking sites such as Facebook and Twitter. She is also assisting Jacquelyn’s research lab on a multi-stage project for the Office of the Privacy Commissioner of Canada. ●



DAVID TURNER

Software Developer, Department of Computing Science,
University of Alberta

BSc Student in Computing Science, University of Alberta

Since GRAND’s first projects got off the ground, David Turner has played an indispensable role in supporting research collaboration across the network.

David Turner joined GRAND when he was still an undergraduate in computing science at the University of Alberta under the direction of Eleni Stroulia (NI, U of A). Impressed by his skills as a developer, Eleni hired him as a Research Assistant to begin work on an ambitious web-based collaborative platform known as the “Forum,” as part of GRAND’s MEOW (Media Enabled Organizational Workflow) project.

Since then, David has been involved – either as the primary developer or as a consultant – with practically every piece of the Forum’s software code. Forum users have also come to count on his expertise and quick thinking in problem-solving technical difficulties.

Through David’s hard work and ingenuity, the Forum has evolved over the past four years into a system

unlike any other used by NCEs. What began as a straightforward wiki grew into a sophisticated, one-stop online portal supporting hundreds of scholars and network staff in everything from progress reports and research budgets, to data collection on members and projects, to social networking, surveys, and high-level data analysis. It has become an essential tool in GRAND’s administration and management processes.

Among his many contributions, David introduced and implemented ideas for simplifying the user interface, including enhanced “search” functionality, and a more streamlined interface for the reporting system. More recently, he has helped facilitate the analysis of data gathered through the Forum as part of GRAND’s self-reflective NAVEL

(Network Assessment and Validation for Effective Leadership) project. This work will continue in Phase 2 under the KNOW (Knowledge Networking for Organizational Work) project that builds on both MEOW and NAVEL.

David is now working with GRAND partner MediaSpotMe to allow users, such as potential industry collaborators, to use the Forum to find GRAND experts in a particular field of knowledge or subject matter specialization.

“I have gained a lot by being a part of MEOW. Since my work on the Forum has involved the full development stack – developing the frontend, user interface design, backend and database work, server management, and support – I have learned a lot about many new technologies and software engineering practices.”

OUR PARTNERS

LEVERAGING THE POWER OF THE NETWORK

GRAND is a truly partner-driven network. We take advantage of opportunities for growing Canada's digital economy by closely engaging more than 200 companies, universities, government agencies at the federal, provincial, and local levels, as well as non-governmental organizations, comprising a wide-range of relevant receptor sectors where our research has impact. (A complete list of our partners is presented below.)

Partners play a number of critical roles in ensuring GRAND research is relevant and beneficial to Canadians. Beginning in Phase 2, each GRAND research project and sub-project is required to have a Champion from the receptor community. These representatives of receptor organizations help set the research agenda of the projects, as well as help evaluate its progress.

Our researchers and HQP engage with, learn from, and advise partners and receptors through interactions with the individual Champions and others in the receptor community. These interactions help researchers understand user needs, they provide research direction, and more importantly, they promote collaboration with those who ultimately make use of research outcomes. Learn more about our Champions in Research Program.

MAKING CONNECTIONS

To build meaningful partnerships, you first need opportunities to connect. Through networking events, symposia, and workshops held across the country, GRAND's outreach efforts are raising awareness about innovative research and emerging technologies in digital media and new opportunities for research-industry collaboration.

GRAND 2013 co-located with Canada 3.0 was our largest annual conference yet with more than 1,800 attendees from Canada and abroad, including over 350 GRAND researchers and scholars. The conference was an opportunity to present GRAND research to a wide audience involving a number of major Canadian companies.

The GRAND Digital Wave workshop series, seeded by funds from Western Economic Diversification Canada, has been especially successful in connecting the GRAND community with businesses primarily in the four western provinces (BC, Alberta, Saskatchewan, and Manitoba). Seven events held in 2013-14 resulted in a total attendance of 500 companies meeting researchers and HQP to discuss their work.

Learn more about the workshop series and other networking events in our Events and Research Impact sections.

NCE PARTNERSHIPS

GRAND is a key partner for two CECRs (Centres of Excellence for Commercialization and Research): Wavefront and the Canadian Digital Media Network (CDMN). As highlighted in our Events section, GRAND and CDMN co-located their major annual gatherings, GRAND 2013 and Canada 3.0, in May 2013. GRAND and CDMN have directors on each other's Boards, as does GRAND and Wavefront, and meet frequently to collaborate on initiatives.

GRAND has identified a number of new opportunities with other NCEs. These emerging partnerships match digital media solutions to the research challenges in many domains.

NeuroDevNet NCE: Exploring therapeutic applications of game technology to treat neurodevelopmental disorders such as cerebral palsy and FASD;

PREVNet NCE-KM (Knowledge-Mobilization Network): Examining the use of social media technologies to alleviate problems of cyberbullying;

SERENE-RISC NCE-KM (Knowledge-Mobilization Network): Using existing and emerging knowledge about "best practice" to define privacy and security in a digital media world.

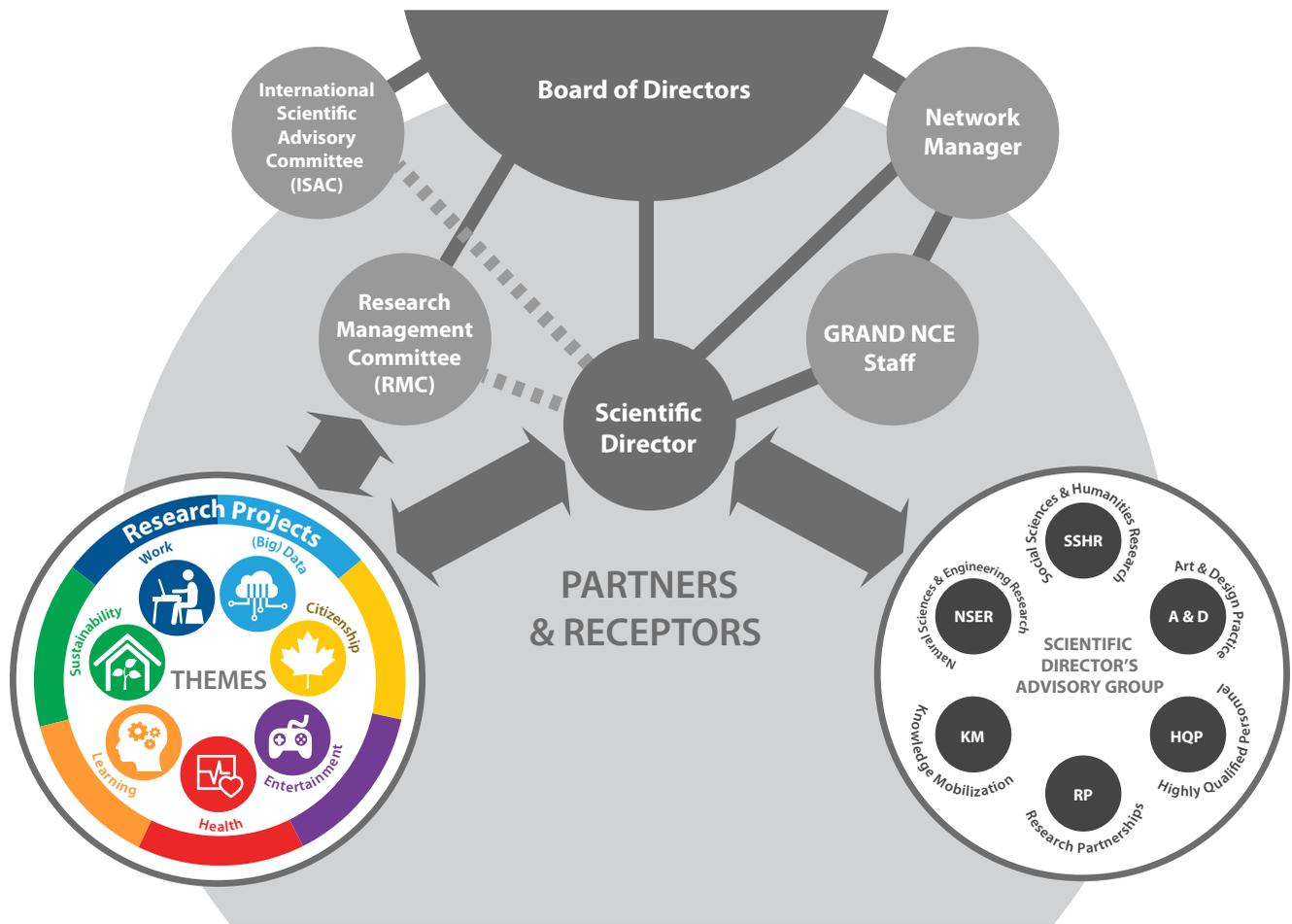
PARTNERS & PARTICIPATING ORGANIZATIONS

1763412 Alberta Inc.	Canadian Financing Forum	Elsevier
Adobe Systems Inc.	Canadian Human Computer Communications Society	Erudit
Agriculture and Agri-Food Canada	CanFASD	Esri Canada
Alientrap Games	Canopy Labs	Execution Labs
Arthritis Consumer Experts	Centre de recherche informatique de Montréal	Faceco Labs
Arthritis Research Centre of Canada	Centre for Digital Media	Fasken Martineau
The Arthritis Society	Centre for Interactive Research on Sustainability, UBC	Feminist Frequency
AT&T Labs - Research	Centro Interdisciplinar em Tecnologias Interativas	Firsthand Technology
Autodesk	Centro Nacional de las Artes	Fortis BC
AVA Health / SSHoldings Inc.	CGI	FUoS
Avaya Canada	ChangePain	Gener8 Digital Media Corp.
Axonify	Child & Family Research Institute	GestureTek
Ayogo Health Inc.	Christie Digital	Google
Balmoral Hall School	City of Vancouver	Gouvernement du Québec
Bardel Entertainment	CM Labs Simulations Inc.	GRVis Software Inc.
Baycrest Health Sciences	Communications Research Centre Canada	gsmprjct
BC Children's Hospital	Communitech	H+Technology
BC Hydro	Coole Immersive	Hacking Health
BC Immigrant Investment Fund & BC Renaissance Capital Fund	Cormode and Dickson	Hamilton
BC Information and Privacy Commissioner	Dames Making Games	Haptok
BC Innovation Council	David Eaves	Harvard University
BC Ministry of Health	Decode Global	HathiTrust Digital Library
Bentley Systems, Inc.	Defence Research and Development Canada	Holland Bloorview Kids Rehabilitation Hospital
BioWare	Dell Canada	Homebody Health
Boeing	Delta Controls	IBM Canada
The Boston Globe	Deluxe	Immersion Canada Inc.
Branchfire Software	Desire2Learn	in Motion
Bye Labs	DeviantArt	Independent Game Developers Association (IGDA)
CA Technologies	Digital Extremes Inc	Innovate Calgary
CAE Inc.	École Polytechnique de Montréal	INRIA
Canada Council for the Arts	Electronic Arts	Institut Philippe Pinel
Canadian Civil Liberties Association		Integrated Management & Realty Ltd.
Canadian Digital Media Network		Intel
Canadian Film Centre		InterAxon

PARTNERS & PARTICIPATING ORGANIZATIONS (CONTINUED)

ISIS Health Informatics	Ocean Networks Canada	Semandra Web & Mobile Technologies
Jardin Botanique	Office of the Information and Privacy Commissioner for BC	The Smart Cybersecurity Network (SERENE-RISC)
Joan Ganz Cooney Center	One Health Network	Sheridan College
Kenneth Gordon Maplewood School	One Story	Side Effects Software
Kilo-Beat	Ontario Government	Silentale
Kitfox Games	Ontario Privacy Commissioner	Silicon Sisters
Kiwi Wearable Technologies Ltd.	Open Sky Solutions	SMART Technologies
Komodo OpenLab	OpenText	Social Game Universe
LEADS	Pacific Institute for Climate Solutions	SPEAX Inc.
Ledcor Group	Pain BC Society	Spincore Fitness Inc.
Lexum	Palo Alto Research Center Inc.	Squabble Studios Inc.
London Health Sciences Centre	Parks Canada	Stitch Media
Lori Harrop	Perch	Swansea School of Dance
Maluuba	Perimeter Partners	Symanta
Media Spot Me	Pixar	TEC Edmonton
MediaSmarts	PowerPlay Technology Corp.	Toronto Rehabilitation Institute
Microsoft Corporation	Precision Conference Solutions	TRTech
Mitacs	PREVNet NCE	Trinity College Dublin
MOBRO Software Ltd.	PricewaterhouseCoopers	Twitter Canada
Mozilla Foundation	Princess Margaret Cancer Centre	University of Maryland
Murray Center for Women in Technology	ProFitHR	University of Massachusetts
Museum of Anthropology, UBC	Québec Ministère de la Sécurité publique	University of Michigan
National Film Board	Quillsoft Ltd.	Upfront Analytics
National Research Council of Canada	r/ally	Van Horne Institute
Nepal House Society	Ramius	Vancouver ACM SIGGRAPH
Networks of Centres of Excellence Secretariat	Redpath Centre for Social and Emotional Development	Vancouver General Hospital
NeuroDevNet	Revera Home Health	VENUS Cybersecurity Corporation
New Jersey Institute of Technology	Rogers	Wavefront
New Ventures BC (BCIC New Ventures Competition)	Saarland University	Western Economic Diversification Canada
nGauge Inc.	SAP Canada Inc.	Woodgreen Community Services
NGRAIN Corporation	School District No. 036 (Surrey)	XMG Studio Inc.
NMotive Research Inc.	Science World	Yahoo!
nognz brain fitness	Seaspan Vancouver Shipyards	

NETWORK COMMUNITY



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as at September 2014

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We would like to acknowledge the services of former board chair Ian C. Kyer and former board member Jim Brookes.

SCIENTIFIC DIRECTOR'S ADVISORY GROUP

as at September 2014

Kellogg S. Booth, Scientific Director (Phase 1), GRAND · **Vic DiCiccio**, Director, Research Partnerships, GRAND · **Eugene Fiume**, Scientific Director (Phase 2), GRAND · **Rodger Lea**, Director (Interim), Knowledge Mobilization, GRAND · **Catherine Middleton**, Director, Social Sciences & Humanities Research, GRAND · **Adrian Sheppard**, Network Manager and Director, Operations, GRAND · **Robert Woodbury**, Director, HQP, Director (Interim), Art & Design Practice, GRAND · **Brian Wyvill**, Director, Natural Sciences & Engineering Research, GRAND

We would like to thank former Director of Social Sciences & Humanities Research Abby Goodrum for her service.

INTERNATIONAL SCIENTIFIC ADVISORY COMMITTEE (ISAC)

as at September 2014

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We would like to thank former ISAC committee member Harry Lewis for his service.

RESEARCH MANAGEMENT COMMITTEE (RMC)

as at September 2014

Lyn Bartram, Theme Leader (Sustainability), GRAND · **Charles Clarke**, Theme Leader (Data), GRAND · **Jason Della Rocca**, Co-Founder, Execution Labs · **Diane Gromala**, Theme Leader (Health), GRAND · **Beverly Harrison**, Principal Scientist, Yahoo! · **Jennifer Jenson**, Theme Leader (Learning), GRAND · **Gerald Karam** (Chair), Executive Director, AT&T Labs -

Research · **Paul Lalonde**, Founder and CTO, PowerPlay Technology Corp. · **Peter Pirolli**, Research Fellow, PARC · **Pierre Poulin**, Theme Leader (Entertainment), GRAND · **Bart Simon**, Theme Leader (Work), GRAND · **Samuel Trosow**, Theme Leader (Citizenship), GRAND

We would like to thank former theme leaders Jeremy Cooperstock, Regan Mandryk, Catherine Middleton, and Brian Wyvill for their service.

GRADUATE STUDENT & POSTDOC COMMITTEE (GSPC)

as at September 2014

Farjana Z. Eishita, Vice-Chair, University of Saskatchewan · **Lola Wong**, Chair, Western University

We would like to thank former GSPC Co-chair Victoria Moulder for her service.

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 2014

Tahina Awan, Administrative & Project Assistant, GRAND · **Kellogg S. Booth**, Scientific Director, GRAND · **Brie Chauncey**, Special Projects Officer, GRAND · **Fauve MacKenzie**, Operations Coordinator, GRAND · **Josh Miller**, IT Support, GRAND · **Spencer Rose**, Communications Officer, GRAND · **Mark Salopek**, Technology Transfer & Commercialization Manager, GRAND · **Adrian Sheppard**, Network Manager, GRAND

MEMBER UNIVERSITIES

as at September 2014

Brock University · Carleton University · Concordia University · Dalhousie University · École de technologie supérieure · Emily Carr University of Art + Design · McGill University · McMaster University · Memorial University of Newfoundland · NSCAD University · OCAD University · Queen's University · Ryerson University · Simon Fraser University · University of Alberta · University of British Columbia · University of Calgary · University of Guelph · University of Lethbridge · University of Manitoba · Université de Montréal · University of Ontario

Institute of Technology · University of Ottawa · University of Prince Edward Island · University of Saskatchewan · University of Toronto · University of Victoria · University of Waterloo · Western University · Wilfrid Laurier University · York University

PRINCIPAL NETWORK INVESTIGATORS (PNIs) – BY UNIVERSITY

as at September 2014

Carleton University - Robert Biddle, Brian Greenspan · **Concordia University** - Lynn Hughes, Bart Simon · **McGill University** - Jeremy Cooperstock · **OCAD University** - Paula Gardner, Martha Ladly · **Queen's University** - Nicholas Graham, Roel Vertegaal · **Ryerson University** - Deborah Fels, Anatoliy Gruzd, Catherine Middleton · **Simon Fraser University** - Alissa Antle, Lyn Bartram, Diane Gromala, Chris Shaw, Wolfgang Stuerzlinger, Robert Woodbury, Richard Zhang · **University of Alberta** - Sean Gouglas, Martin Müller, Geoffrey Rockwell, Eleni Stroulia, Duane Szafron · **University of British Columbia** - Kellogg Booth, Sidney Fels, Luanne Freund, Karon MacLean, Joanna McGrenere, Michiel Van De Panne · **University of Calgary** - Sheelagh Carpendale, Frank Maurer, Przemyslaw Prusinkiewicz, Faramarz Samavati · **Université de Montréal** - Pierre Poulin · **University of Ottawa** - Valerie Steeves · **University of Saskatchewan** - Carl Gutwin, Regan Mandryk · **University of Toronto** - Ronald Baecker, Eugene Fiume, Gerald Penn, Karan Singh, Barry Wellman · **University of Victoria** - Brian Wyvill · **University of Waterloo** - Charles Clarke, Michael Terry · **Western University** - Jacquelyn Burkell, Roy Eagleson, Samuel Trosow · **York University** - Jennifer Jenson

COLLABORATING NETWORK INVESTIGATORS (CNIs) – BY UNIVERSITY

as at September 2014

Brock University - Kevin Kee · **Carleton University** - Sonia Chiasson, Audrey Girouard, David Mould, Liam O'Brien · **Concordia University** - Joanna Berzowska, Mia Consalvo, Jill Didur, Lisa Lynch, Kim Sawchuk · **Dalhousie University** - Dean Irvine, Derek Reilly, Michael Smit · **École de technologie supérieure** - Eric Paquette · **Emily Carr University of Art + Design** - Hélène Day Fraser · **McGill University** - Paul Kry, Karyn Moffatt, Stéfan Sinclair · **McMaster University** - David Harris-Smith · **Memorial University of Newfoundland** - Minglun Gong · **OCAD University** - Peter Coppin, Patricio Davila, Kate Sellen, Geoffrey Shea, Emma Westecott · **Ryerson University** - Jason Nolan, Frank Russo, Frauke Zeller · **Simon**

Fraser University - Suzanne DeCastell, Halil Erhan, Alexandra Fedorova, Carman Neustaedter, Fred Popowich, Bernhard Riecke, Philip Winne · **University of Alberta** - Susan Brown, Michael Buro, Sharla King, Michael McNally, Ioanis Nikolaidis · **University of British Columbia** - Konstantin Beznosov, Cristina Conati, Bernie Garrett, Caroline Haythornthwaite, Alfred Hermida, Kendall Ho, Holger Hoos, Ronald Kellett, Linda Li, Heather O'Brien, John Robinson, Alla Sheffer, Sheryl Staub-French, Darren Warburton · **University of Calgary** - Jeffrey E. Boyd, Tony Tang · **University of Lethbridge** - Daniel Paul O'Donnell · **University of Manitoba** - Andrea Bunt, Pourang Irani, Tony Szturm · **Université de Montréal** - Derek Nowrouzezahrai, Michael Sinatra · **University of Ontario Institute of Technology** - Christopher Collins, Bill Kapralos, Pejman Mirza-Babaei, Lennart Nacke · **University of Ottawa** - Mary Cavanagh, Jochen Lang · **University of Prince Edward Island** - Scott Bateman · **University of Saskatchewan** - Brent Nelson, Kevin Stanley, Ian Stavness · **University of Toronto** - Mark Chignell, Sara Grimes, Kiriakos Kutulakos, Kelly Lyons, Alexandra Marin, Rhonda McEwen, Frank Rudzicz, Li Shu · **University of Victoria** - Ryan Rhodes, Raymond Siemens, Melanie Tory · **University of Waterloo** - Parmit Chilana, Mark Hancock, Craig Kaplan, George Labahn, Edward Lank, Daniel Lizotte, Stacey Scott, Mark Smucker, Daniel Vogel · **Western University** - Anabel Quan-Haase, Sandrine de Ribaupierre, Victoria Rubin, Johanna Weststar · **Wilfrid Laurier University** - Andrew Herman

INTERNATIONAL COLLABORATING NETWORK INVESTIGATORS (CNIs) – BY UNIVERSITY

as at September 2014

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

YOUNG NETWORK INVESTIGATORS (YNIs)

as at March 31, 2014

Scott Bateman, University of Prince Edward Island · **Pejman Mirza-Babaei**, University of Ontario Institute of Technology · **Michael Smit**, Dalhousie University · **Daniel Vogel**, University of Waterloo

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

**GRAPHICS, ANIMATION AND NEW MEDIA NCE INC.
GRAND FUND - NETWORK OF CENTRES OF EXCELLENCE**

Years ended March 31, 2014 and 2013 and Auditor's Report

INDEPENDENT AUDITOR'S REPORT

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, 2014 and 2013 and the statements of operations and cash flows for the years then ended, 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, 2014 and 2013, and its financial performance and its cash flows for the years then ended in accordance with Canadian accounting standards for not-for-profit organizations.

Chartered Accountants
Vancouver, British Columbia
September 10, 2014

STATEMENTS OF FINANCIAL POSITION

ASSETS (CURRENT)	MARCH 31, 2014	MARCH 31, 2013
Cash and cash equivalents		
Unrestricted	\$ 129,801	\$ 86,623
Restricted	673,202	727,964
Accounts receivable	29,655	105,536
Prepaid expenses	151,220	60,650
Research administration advances	56,001	56,705
Research advances	868,560	1,259,500
	1,908,439	2,296,978
LIABILITIES (CURRENT)		
Accounts payable and accrued liabilities	47,383	102,324
Unearned revenues	31,927	16,859
Deferred research funding contributions (Note 6)	1,709,475	2,085,780
	1,788,875	2,204,963
NET ASSETS	\$ 119,654	\$ 92,015

STATEMENTS OF OPERATIONS

Years ended March 31, 2014 and 2013

	2014	2013
RECEIPTS		
Contribution from Networks of Centres of Excellence (Note 5)	\$ 5,149,751	\$ 4,935,958
Contribution from Western Diversification Program (Note 5)	154,474	167,811
Conference registration fees	47,163	38,874
Other contributions	53,394	25,000
	5,404,782	5,167,643
EXPENDITURES		
Events	407,813	250,011
Professional fees	24,773	25,013
Administration	71,355	65,659
Research funding grants (Note 4)	3,916,978	3,919,202
Salaries and benefits	456,808	358,028
Technology transfer	234,481	213,752
Travel	264,935	311,329
	5,377,143	5,142,994
INCREASE IN NET ASSETS	27,639	24,649
NET ASSETS, BEGINNING OF YEAR	92,015	67,366
NET ASSETS, END OF YEAR	\$ 119,654	\$ 92,015

STATEMENTS OF CASH FLOWS

Years ended March 31, 2014 and 2013

	2014	2013
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	243,383	126,386
Cash received from host university	54,515	56,977
Cash received from other sources	202,596	38,850
Cash disbursed for research funding grants	-3,526,038	-5,178,702
Cash disbursed for administration and events	-1,636,040	-1,106,317
DECREASE IN CASH AND CASH EQUIVALENTS	-11,584	-1,412,806
CASH AND CASH EQUIVALENTS, BEGINNING OF YEAR	814,587	2,227,393
CASH AND CASH EQUIVALENTS, END OF YEAR	\$ 803,003	\$ 814,587
 CASH AND CASH EQUIVALENTS COMPOSED OF		
Cash	\$ 783,003	\$ 794,587
Term deposit	20,000	20,000
	\$ 803,003	\$ 814,587

NOTES TO THE FINANCIAL STATEMENTS (MARCH 31, 2014)

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. The Network has 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. The current funding agreement with the NCE expires January 7, 2015 (Note 5). The Fund has applied to the NCE to renew the agreement and expects a decision by the NCE in the fall of 2014. There is no assurance that the NCE will renew the funding agreement.

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.

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 consist of 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.

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

Financial Assets and Financial Liabilities

The Fund classifies 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.

The Fund's financial instruments, which, consist of cash and cash equivalents, accounts receivable and accounts payable and accrued liabilities and are carried at amortized cost and approximate fair value due to their short-term maturity.

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, 2014, the Fund granted \$3,916,978 (2013 - \$3,919,202) of the NCE contributions to Network Members. Of the total NCE contributions granted to Network Members, \$665,978 (2012 - \$656,268) 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 has awarded an additional \$1,717,963 in research grants to network members for the next fiscal year which are expected to be disbursed after receipt of funding from the NCE (Note 5).

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	<i>received</i>
2010 – 2011	3,595,000	1,055,000	4,650,000	<i>received</i>
2011 – 2012	2,800,000	1,850,000	4,650,000	<i>received</i>
2012 – 2013	2,800,000	1,850,000	4,650,000	<i>received</i>
2013 – 2014	2,800,000	1,850,000	4,650,000	<i>received</i>
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 Diversification Program

The Fund entered into an agreement with Western Economic Diversification Canada ("WD") on February 25, 2011 to receive \$399,000 in funding over 4 years. This funding is from the WD 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.

As at March 31, 2014, the Fund had received the full amount of reimbursements from WD.

FISCAL YEAR	TOTAL	
2010-2011	\$ 2,978	<i>received</i>
2011-2012	73,736	<i>received</i>
2012-2013	167,812	<i>received</i>
2013-2014	154,474	<i>received</i>
TOTAL FUNDING	\$ 399,000	

6. DEFERRED CONTRIBUTIONS

	2014	2013
Balance - Beginning of year	\$ 2,085,780	\$ 2,363,399
Restricted contributions received during the year		
Grant from NSERC	2,800,000	2,800,000
Grant from SSHRC	1,850,000	1,850,000
Grant from Host Institution	31,068	31,979
Contributions from corporate partners	125,000	-
	6,891,848	7,045,378
Amounts recognized as receipts during the year	(5,182,373)	(4,959,598)
BALANCE - END OF YEAR	\$ 1,709,475	\$ 2,085,780

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.

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 cash equivalents and accounts receivable. The Fund limits its exposure to credit risk arising from cash and cash equivalents by only depositing cash in major Canadian financial institutions and holding only financial instruments of institutions with the highest credit rating. Accounts receivable are due from a service provider and were collected subsequent to year end.

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.

GRAND NCE

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Bree Galbraith, Spencer Rose