



ITB infoservice
Special Edition No. 16 – 06/2021

Germany & Canada

Celebrating 50 Years of Scientific and Technological
Cooperation

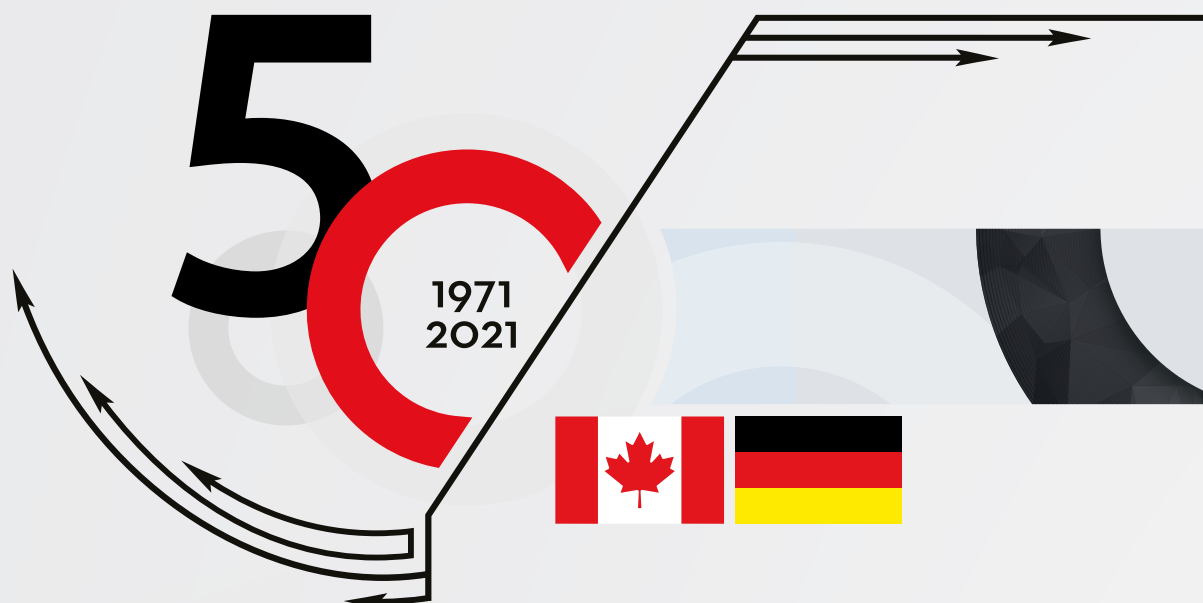


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Editorial

Dear readers,

The many global crises of today are drawing democracies closer together. What great advantage it is to be able to build upon a solid base in research and innovation – like there is between Canada and Germany! The Agreement on Scientific-Technological Cooperation between these two countries entered into force on 30 June 1971. The 16th Special Edition of the ITB infoservice is thus dedicated to the 50th anniversary of the scientific-technological cooperation between Canada and Germany.

In view of the longstanding and varied cooperation activities, this Special Edition can, of course, put a spotlight on some selected programs and thematic areas only, which represent but a fraction of the close cooperation between the two countries. If you are interested in obtaining further information, please follow the links below the editorial and below the articles and interviews.

In the first section, an interview with the current chairholders of the Canada-Germany Joint Science and Technology Cooperation Committee (JSTCC) will provide you with an insight into past, present and possible future perspectives for bilateral cooperation.

In the second section, we present a number of cooperation formats and programs. The first two focus on scientific training through cross-border research internships and bilateral research training groups. The other three programs presented have a regional focus and promote cooperation either through clusters or between Canadian provinces and German Länder, e.g. between Québec and Bavaria or Ontario and Baden-Württemberg (OBW).

The third section highlights the role and importance of local representations of research funding agencies and research centers of non-university research organizations in the respective partner country.

The fourth and final section focuses on cooperation in selected thematic areas: social sciences and humanities, earth observation through satellites, climate, polar and marine research, industrial research (including artificial intelligence), the development of fuel cells, neurosciences and personalized medicine. Two articles demonstrate that Canadian-German cooperation can be successfully embedded into multilateral research consortia with further countries, funded under European Partnerships like ERA PerMed or the transatlantic Partnership T-AP.

Yours sincerely,

Sonja Bugdahn and Andreas Ratajczak



Further Information at Kooperation international



Additional links and sources for all articles and interviews in this publication are available via the following link or QR-code.

► <https://s.dlr.de/16>



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Liebe Leserinnen und Leser,

angesichts vieler krisenhafter Entwicklungen in der Welt rücken die Demokratien näher zusammen. Wie gut, wenn man in Forschung und Innovation auf einer soliden Grundlage aufbauen kann – so wie Kanada und Deutschland! Am 30. Juni 1971 trat das Abkommen für wissenschaftlich-technologische Zusammenarbeit (WTZ) zwischen den beiden Ländern in Kraft. Die 16. Schwerpunktausgabe (SAG) des ITB infoservice ist daher dem 50-jährigen Jubiläum der WTZ zwischen Kanada und Deutschland gewidmet.

Vor dem Hintergrund einer langjährigen und vielfältigen Kooperation zwischen Kanada und Deutschland kann die vorliegende Schwerpunktausgabe naturgemäß nur einen Einblick in wenige ausgesuchte Programme und Themenfelder geben, die nur einen Bruchteil der Kooperation zwischen Partnern aus beiden Ländern abbilden. Weitere Informationen erhalten Sie unter anderem durch das Video der Eröffnungsveranstaltung zum 50. Jubiläumsjahr. Diese und andere weiterführende Informationen sind über Links am Ende dieses Editorials und am Ende der einzelnen Interviews und Artikel zugänglich.

Im ersten Teil der Schwerpunktausgabe gewähren wir in einem Interview mit den beiden derzeitigen Vorsitzenden der deutsch-kanadischen Kommission für wissenschaftlich-technologische Zusammenarbeit (WTZ) Einblicke in Vergangenheit, Gegenwart und mögliche Zukunftsperspektiven für die bilaterale Kooperation.

Im zweiten Abschnitt stellen wir Ihnen verschiedene Kooperationsformen und -programme vor. Die ersten beiden legen den Fokus auf die wissenschaftliche Ausbildung durch grenzüberschreitende Forschungspraktika und bilaterale Graduiertenkollegs. Drei weitere Programme setzen regionale Schwerpunkte bei der Internationalisierung von Clustern und der Kooperation zwischen kanadischen Provinzen und deutschen Bundesländern, wie beispielsweise Québec und Bayern oder Ontario und Baden-Württemberg (OBW).

Der dritte Abschnitt beleuchtet die Rolle und Bedeutung von permanenten Präsenzen von Forschungsförderorganisationen und Forschungszentren von

außeruniversitären Forschungsorganisationen im jeweiligen Partnerland.

Der vierte und letzte Abschnitt nimmt die Kooperation in ausgesuchten Themenfeldern in den Blick: Sozial- und Geisteswissenschaften, Erdbeobachtung durch Satelliten, Klima-, Meeres- und Polarforschung, Industrieforschung (einschließlich Künstlicher Intelligenz), die Entwicklung von Brennstoffzellen, Neurowissenschaften sowie personalisierte Medizin. Zwei Beiträge zeigen, dass die kanadisch-deutsche Kooperation auch erfolgreich in multilaterale Forschungskonsortien mit weiteren Ländern eingebunden werden kann. Diese werden unter europäischen Partnerschaften wie ERA PerMed oder der transatlantischen Partnerschaft T-AP gefördert.

Ihre Sonja Bugdahn und Andreas Ratajczak



Weitere Informationen bei Kooperation international



Ergänzende Links und Quellen zu allen Artikeln und Interviews dieser Ausgabe finden Sie unter dem folgenden Link oder über den QR-Code.
▶ <https://s.dlr.de/16>



Die Länderseite „Kanada“ mit Verlinkung zur Seite „Veranstaltungen 50 Jahre WTZ“ finden Sie unter dem folgenden Link oder über den QR-Code.
▶ <https://s.dlr.de/kanada>



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German-Canadian Cooperation in Science & Technology: Past, Present and Future

Die beiden derzeitigen Vorsitzenden der deutsch-kanadischen Kommission für wissenschaftlich-technologische Zusammenarbeit (WTZ) beleuchten in diesem Interview Erfahrungen mit der Kooperation, ihre Besonderheiten und Zukunftsperspektiven.



Dr. Geneviève Tanguay
Co-chair of the Canada-Germany
Joint Science and Technology
Cooperation Committee (JSTCC)
Vice-President, Emerging
Technologies
National Research Council of
Canada (NRC)
Ottawa, Canada



Susanne Daria Burger
Co-chair of the Canada-Germany
JSTCC
Director General European and
International Affairs
German Federal Ministry of
Education and Research (BMBF)
Bonn, Germany

ITB infoservice: The long-lasting science and technology cooperation between Canada and Germany is very successful and wide-ranging. What makes German-Canadian science and innovation cooperation so effective and rewarding? What do you consider to be the main success factors?

Geneviève Tanguay: The key to any successful collaboration lies with connections – personal, professional and official. Fifty years ago, leaders in Germany and Canada solidified our connection in science, technology and innovation and committed to that collaboration throughout all these years through shared values and goals, through openness and transparency. Our collaboration was nourished by a quest for innovation to answer some of the world's most pressing challenges. I have seen first-hand that the Canada-Germany relationship is based on research excellence and how it has yielded numerous successful projects due to the many levels of cooperation including among research organizations, universities, entrepreneurs and governments, both nationally and at the state or provincial level.

The 50th anniversary of Canada and Germany's collaboration in science, technology and innovation is a wonderful opportunity to recognize the success of our partnership. Taking stock of our achievements

will allow us to understand how together we can push the boundaries of science even further to tackle the complex issues facing our world today and into the future.

Susanne Burger: Excellent researchers want to work with other research leaders around the world, to challenge their ideas and develop their research together in order to influence science. Canada and Germany are leading research nations.

One distinctive feature of our research collaboration is that it starts at a very early stage, e.g. with one program for undergraduate students that provides support for cross-border research internships. Together, Germans and Canadians have also been extremely successful in securing funding for a large number of long-term partnerships for collaborative research training.

That means, it is a collaboration of equals and that the collaboration evolves almost organically. Our countries have the same understanding of the role of science in and for the wealth and prosperity of society. Both research and innovation ecosystems are committed to seeking excellence. Add in both governments' support and funding programs and you have a recipe for success. In the end the quality

of the research and – as Geneviève highlighted the networks, both personal and profession are key. To sum up the success factors: opportunity to cooperate from an early stage onwards, excellence in science and innovation as well as trust, enthusiasm and a sincere wish to achieve joint goals together. A winning combination!

ITB infoservice: Given that we are celebrating 50 years of the formal science and technology collaboration between Germany and Canada this year, what has changed over time? How have trends in science and society influenced the cooperation?

Geneviève Tanguay: Fifty years ago, Dr. Gerhard Herzberg, originally from Germany and a National Research Council of Canada researcher, received the Nobel Prize in Chemistry. I believe Dr. Herzberg's achievements illustrate the depth of the scientific knowledge and also the personal connections between Canada and Germany that have created world-leading research. We are honoured to continue his legacy.

Over the years, we have seen an evolution in our partnerships. An important development over the years has been the recognition that innovation and research are both key to international success for our companies and there have been many successful industrial collaborations, particularly supporting our small and medium-sized enterprises (SMEs).

Collaborative projects cover significant areas for research and innovation, such as oceans, bioeconomy, fuel cells, brain research, fundamental physics and optics, wheat and canola breeding. Another area is artificial intelligence (AI), which is becoming more and more integral to our everyday lives. The Government of Canada's AI strategy will strengthen Canada's ecosystem by developing talent, fostering collaboration and understanding the social implications. Recently, Dr. Sandra Zilles, Canada Research Chair in Computational Learning Theory, also from Germany and now doing research in Canada, received an AI Chair and federal funding through the government's Canadian Institute for Advanced Research (CIFAR) AI Chairs Program. Over the 50-year history, there have been many collaborative projects.

Dr. Geneviève Tanguay joined the National Research Council of Canada in 2016 as the first woman Vice-President Research. She leads the Emerging

Technologies Division which oversees Nanotechnology, Metrology, Herzberg Astronomy and Astrophysics, Security and Disruptive Technologies, and Advanced Electronics and Photonics. Prior to joining NRC, she served as Vice-Rector Research, Creativity and Innovation at the University of Montréal, one of the four universities with the biggest volume of research in Canada. Prior to this, she served as the Assistant Deputy Minister responsible for Research, Innovation, Science and Society in the Québec Government, responsible for preparing and implementing the Québec Research and Innovation Strategy (2007-2010 and 2010-2013). She is an active member of boards for national and international organizations.



National Research
Council Canada
Conseil national de
recherches Canada

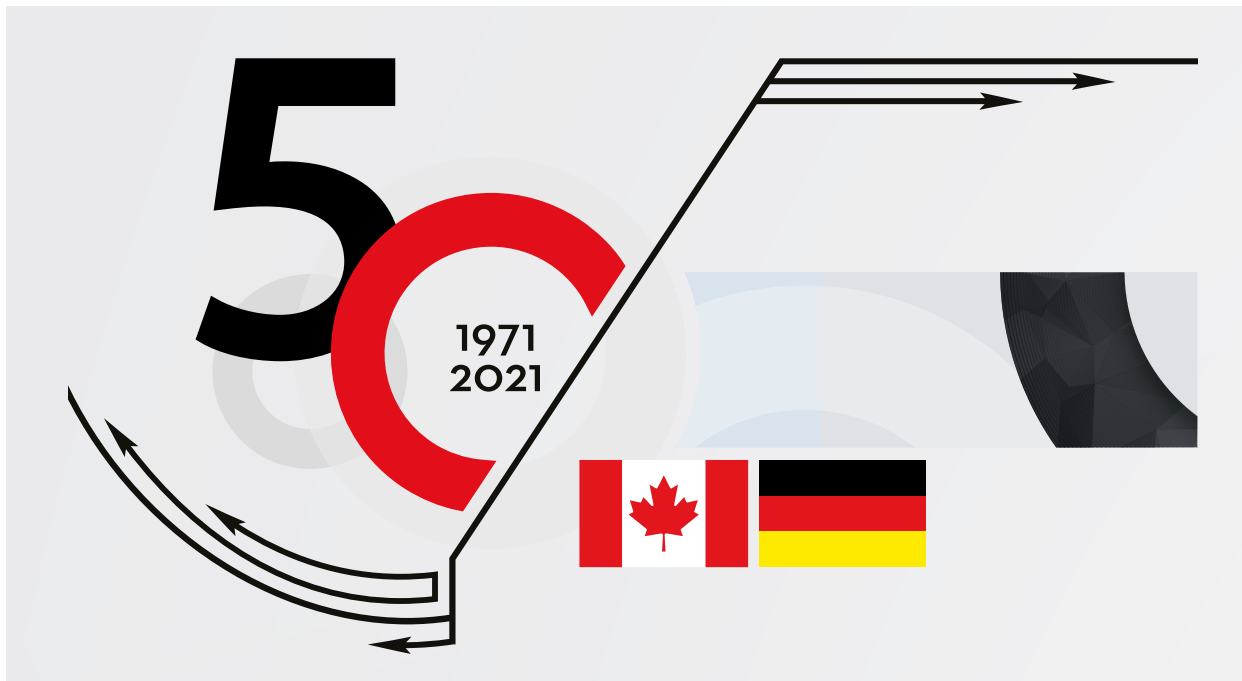
Susanne Burger is Director General for European and International Cooperation in Education and Research at the German Federal

Ministry of Education and Research (BMBF). Previously she was responsible for Education policy issues and EU Education programmes at BMBF. She also headed the Division for Education and Research at the Permanent Representation of the Federal Republic of Germany to the European Union in Brussels.



Federal Ministry
of Education
and Research

Today, we bring solutions to world challenges such as a post-pandemic recovery that is more inclusive and resilient, both socially and economically. Although equity, diversity and inclusion have been long recognized as key factors to foster science and technology excellence, it has more recently become a high priority. The COVID-19 pandemic has made it clear that innovation and economic resiliency depend



on inclusion and access to the best ideas from everyone, thereby ensuring broad acceptance of science driven policy initiatives that are so important during the pandemic and to achieve our climate change goals. And let's not forget that German-Canadian dynamic cooperation contributed to the development of a vaccine in less than a year, with the Canadian company, Acuitas Therapeutics, based at the University of British Columbia, producing the delivery system for the new Pfizer/BioNTech COVID-19 vaccine.

It is truly impossible to completely summarize our many successes!

Susanne Burger: One of the many strengths of our mutually-beneficial collaboration has been our ability to adapt quickly to new trends, priorities and research areas that had the potential for new insights or new technological pathways. One example is our successful cooperation in integrating digitalization, machine learning and AI into industrial production technologies and also into brain research, e.g. through the Helmholtz International Lab HIBALL (see page 38). While continuing our cooperation in longstanding fields like materials and climate, arctic and marine research and others, our dynamic partnership has been able to take up new themes and

to address new challenges. This does not necessarily mean to abolish long lasting cooperation themes but rather widen the overall portfolio, e.g. by integrating personalized medicine approaches into our thriving health research cooperation (see page 40).

Furthermore, as Geneviève mentioned, the institutional background of the teams has changed due to a shift from pure scientific cooperation to innovation partnerships. We have seen a marked increase in the number of funding programs and number of SME recipients. Here again, due to the strong role that SMEs play in the innovation ecosystems of both countries, this was an almost natural development.

Over the years, nearly all German research organization have developed their own ties and linkages to Canada, many of them now having a permanent liaison office in Canada. Today there are almost 700 cooperation agreements between universities in Canada and Germany and we have created a 'pipeline' for the next generation of young researchers that intend spend some time of their professional career in Canada or Germany.

At the beginning of the partnership, from the 70s to the 90s, research tended to be organized

within disciplinary borders. Interdisciplinary and transdisciplinary teams, with stakeholders from a wide variety of backgrounds are now common in many joint projects. I see the next step as a strengthening this trend e.g. with citizen science projects, better science communication and encompassing social and ethical imperatives as Canada and Germany share similar values and challenges.

ITB infoservice: Looking to the future: What do you anticipate in the coming years? What new directions would you like to see for German-Canadian science, technology and innovation cooperation?

Geneviève Tanguay: Looking to our future, I know we will all continue to foster this long and fruitful relationship. Commitment to sustainability and inclusivity will be key to our success. We have powerful opportunities to collaborate to solve the world's problems, for example by harnessing the power of Quantum and Hydrogen technologies. We will continue to exchange and to build on each other's expertise. As Susanne highlighted, there are many joint agreements, which are excellent catalysts for bringing people and partners together to support industrial innovation.

We also look forward to many joint Canada-Germany projects, from research in the Arctic (see page 32), to sustainable crops, or the development of the Inuvik satellite receiving station (see page 30) or the Fraunhofer Advanced Materials collaboration with Western University, in London, Ontario (see page 22).

We can be proud of what we have accomplished in a variety of areas including life sciences, advanced manufacturing and underlying technologies, and technologies for clean energy. We're looking forward to the next 50 years of joint research and innovation!

Susanne Burger: I'm very confident that we won't run out of new ideas! We are in the middle of several important transformations that will change our lives on both sides of the Atlantic.

The digital transformation, the climate and sustainability challenge, and the social and societal changes that will go accompany will present many

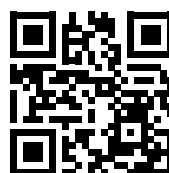
challenges. Geneviève already mentioned two areas (Quantum and Hydrogen) that are high on the political agendas in both countries.

The many events and meetings of Canadian and German researchers that we will have during this jubilee year, will contribute to the momentum of our relationship. From my perspective, the ties between German and Canadian research and innovation organizations are becoming stronger and stronger. Every year we see measurably more willingness to cooperate, e.g. recently formalized by new MoUs ('Memorandums of understanding') or through researcher mobility.

Last but not least, there is one aspect that we should not underestimate. The enormous potential to cooperate together in Horizon Europa, the world's largest multilateral research programme that offers enormous possibilities for cooperation with Canada to shift the borders of knowledge and innovation jointly with other European partners. For Germany the European Research Area is for obvious reasons of high priority, but we collaborate with Canadian partners in more than 160 projects in the H2020 programme now and SMEs from Canada and Germany regularly partners in EUREKA projects. In the first calls for proposals of Horizon Europe just released some weeks ago, Canada is quoted 55 times and even a dedicated call for Quantum technologies is part of the work programme. The next seven years will bring challenges and plenty of opportunities.



Further Information at Kooperation international



Additional links and sources for this interview are available via the following link or QR-Code.

► <https://s.dlr.de/16-01>

Two Countries – Many Paths to Cooperation

Mitacs and the DAAD: Cross Border Research Internships

2016 sind der Deutsche Akademische Austauschdienst (DAAD) und die kanadische Förderorganisation Mitacs eine Partnerschaft eingegangen („RISE-Globalink Research Internship“, GRI). Darunter bieten sie fortgeschrittenen Studierenden im grundständigen Studium („senior undergraduate researchers“) im jeweils anderen Land Sommer-Forschungsaufenthalte vor Ort an. Die Partnerschaft hat sich als sehr erfolgreich erwiesen: Die Programme werden von den Teilnehmenden als bereichernd bewertet und erfreuen sich steigender Nachfrage auf beiden Seiten des Atlantiks.



Darren Lum
International Partnership Officer
Mitacs
Toronto, Canada



Michaela Gottschling
Senior Desk Officer
RISE programs
German Academic Exchange
Service (DAAD)
Bonn, Germany

The German Academic Exchange Service (DAAD) and the Canadian organization Mitacs have successfully partnered on the Research Internship for Science and Engineering (RISE) and Globalink Research Internship (GRI) programs since 2016. The program enables senior undergraduate researchers to participate in summer projects in Germany and Canada. Surveys from 2017 to 2019 show that over 95 percent of participants recommend the programs, and more than 90 percent said that it was a great experience or better.

ITB infoservice: How many students have been supported over the last 5 years?

Darren Lum: The DAAD-Mitacs cooperation has funded over 450 students since 2016. Originally, our partnership supported 60 students in each direction per year, but it has since grown to 100 participants in each direction.

Michaela Gottschling: We noticed an important increase in the number of applications from German

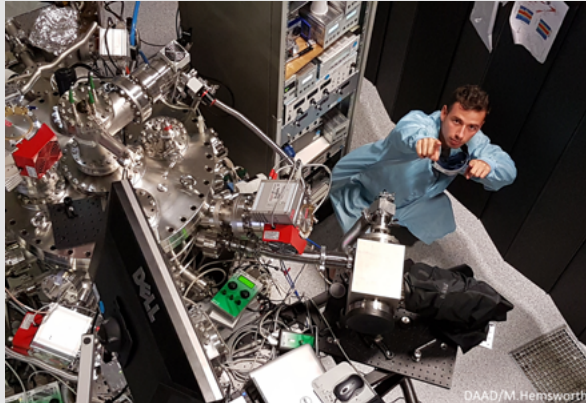
students for an internship in Canada. Also, the number of applicants from universities of applied sciences was very high from the first year onwards.

ITB infoservice: What makes your cooperation special?

DL: First off, the DAAD was Mitacs's first partner in Germany to support researcher mobility. Our cooperation is also unique because it is the only partnership for both Mitacs and the DAAD where there are two coordinated cohorts of student exchange – amongst all partnerships with organizations from other countries. This process allows us to trust each other's strengths and share best practices to optimize processes and consistently improve our programs.

MG: Further, I think our relationship is very special. Although we are across the Atlantic Ocean, both sides are willing to collaborate, communicate regularly, and problem-solve to ensure the success of our cooperation. Darren and I were planned to

meet multiple times in Canada and Germany in 2020, but we'll have to wait until late 2021 or 2022 to finally meet in person.



Michael Hemsworth, Simon Fraser University, CA, Physics, Max-Planck-Institute of Quantum Optics in Garching. Source: DAAD

ITB infoservice: What are the main characteristics and biggest successes?

MG: The main shared characteristic is that both RISE and GRI offer a comprehensive research internship database for undergraduate students. We also both offer funding support for selected students to travel and pursue these opportunities abroad. There are only a few programs for undergraduate students that offer a research experience at this early stage.

DL: For me, the largest success is the growth in the programs. Year after year since 2016, we have set records in number of applications and selected researchers. Additionally, I always enjoy reading the success stories and thankful messages from students. For example, Friederike Floegel, then a science student at Eberhard Karls Universität Tübingen, travelled to Canada in 2019 to work at the Dalhousie University on a new approach for culturing cells that better replicate human tissue. She shared with us that the project not only improved her research skills, but also helped develop a vision for her future career. Receiving the personalized and positive feedback and hearing the students' anecdotes is truly rewarding!

ITB infoservice: What have been obstacles to overcome in the cooperation?

DL: The most difficult obstacle has certainly been COVID-19. Unfortunately, with the onset of the pandemic, the GRI and RISE programs had to be cancelled in 2020. But for the 2021 cohort, both us and the DAAD put in tremendous effort to plan out and receive approvals for virtual internships, while also keeping options open in case travel was permitted. We know the virtual format isn't ideal, but we are pleased to offer an international experience to students despite the global scenario.

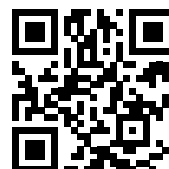
MG: Aside from the pandemic, the GRI-RISE cooperation is logistically more difficult to operate because we are two organizations, required to work on different timelines, communicate effectively, and cooperate to solve any issues that may arise. As mentioned previously, we too are grateful that everyone at Mitacs is amazing to work with. We are able to help, problem-solve, and compromise when needed. We support each other in any travel or visa inquiries and this way we could ease the administrative procedures for the respective student cohort.

ITB infoservice: What do you plan in the coming years?

DL & MG: The current cooperation is on pace to support 200 students each year (100 to Canada and 100 to Germany) until the end of 2022. At that time, we will come together to discuss potentially renewing our partnership to continue supporting the successful cooperation between Canadian and German students and faculty members. In addition, DAAD and Mitacs are always in communication to advance international collaboration. We're currently in discussions to expand our partnership, which would enable mobility schemes for graduate-level and postdoctoral researchers in high impact innovation projects in both academic and industrial settings.



Further Information at Kooperation international



Additional links and sources for this interview are available via the following link or QR-Code.

► <https://s.dlr.de/16-02>

NSERC and DFG: Collaborative Research Training in Natural Sciences and Engineering

2011 haben der Natural Sciences and Engineering Research Council of Canada (NSERC) und die Deutsche Forschungsgemeinschaft (German Research Foundation, DFG) ein Übereinkommen zur Förderung der gemeinsamen Forschungsausbildung zwischen kanadischen und deutschen Hochschulen geschlossen. Partnerschaften zwischen den Hochschulen beider Länder können sich gemeinsam um eine Förderung aus den Programmen des NSERC („Collaborative Research and Training Experience“, CREATE) und der DFG („International Research Training Groups“, IRTG) bewerben. Eng abgestimmte Begutachtung und Entscheidungsprozeduren sind Merkmale dieser langfristigen Kooperation.

Teresa Jurewicz
Team Leader
Innovative Collaborations and Science Promotion
Natural Sciences and Engineering Research Council of Canada (NSERC)
Ottawa, Canada

Dr. Sebastian Granderath
Program Director
Research Careers
German Research Foundation (DFG)
Bonn, Germany

In 2011, the Natural Sciences and Engineering Research Council of Canada (NSERC) and the Deutsche Forschungsgemeinschaft (DFG, the German Research Foundation) agreed to collaborate to support scientific research and training programs between German and Canadian universities. German-Canadian partnerships can apply jointly to NSERC's 'Collaborative Research and Training Experience' (CREATE) and DFG's 'International Research Training Groups' (IRTG) funding programs. Synchronized review and decision procedures pave the way for long-term bilateral partnerships.

ITB infoservice: How many projects have been supported with the CREATE-IRTG cooperation over the past 10 years?

Teresa Jurewicz: Since establishing the NSERC-DFG cooperation in 2011, NSERC and DFG have granted funding for eight bilateral CREATE-IRTG programs – six were able to establish successful programs. Each is based on a focused and cutting-edge research topic and provides a dedicated training program for a total of 40-80 PhD students. The research topics of the currently funded CREATE-IRTG programs cover the whole range of natural sciences and engineering, including plant molecular biology, climate change in

the North Atlantic Ocean and the Canadian Arctic, and engineering of lightweight polymer technologies (see page 14 for link to homepages of active Canadian-German IRTGs, also box on IRTG 1830 in this interview and page 32 for article on IRTG 1904 ArcTrain).

ITB infoservice: What makes your cooperation special?

Sebastian Granderath: The CREATE-IRTG-DFG partnership is unique in terms of its long-term perspective, providing up to nine years of funding for large projects. The program requires multiple levels of cooperation – research, qualification, supervision and program management are all carried out jointly by the German and Canadian partners. Joint workshops and extended research stays of three to twelve months at the respective partner site ensure that the junior researchers have access to complementary resources at the partner site and can fully exploit the scientific and training synergies. And of course, it is a unique opportunity for researchers to immerse themselves in the culture of the partner country and to build transatlantic friendships.

ITB infoservice: What are the biggest successes?

TJ: First of all, the scientific output and the subsequent placements of the program alumni demonstrate that the CREATE-IRTG-programs are successful in fostering productive German–Canadian research and training collaborations. While the

number of funded projects may seem small, we have achieved considerable leverage: in total, the projects funded so far have involved some 200-300 graduate students and postdoctoral fellows in bilateral cooperations. At the same time, some

IRTG 1830: Complex Membrane Proteins in Cellular Development and Disease (2012-2022)

Universities: Technical University (TU) Kaiserslautern, Saarland University, University of Alberta



German and Canadian Members of the IRTG at the 7th Joint Symposium in April 2018 in Banff (Alberta, Canada)
Source: IRTG 1830

Prof. Ekkehard Neuhaus (TU Kaiserslautern):

“Similar cultural characteristics made it highly attractive for German graduates to move to Canada. Our PhD candidates were always warmly welcomed in Edmonton and they conducted part of their research in well-equipped and successfully running laboratories of our partner teams. Since nearly all of our PhD fellows took the chance for a research stay in Edmonton the ‘new’ visitors received detailed instructions from the ‘returners’ in somewhat funny ‘survival guides’, e.g. on housing, accommodation and the organization of the daily life. Several of our alumni took over post-doctoral positions in leading international laboratories. The IRTG also played a crucial role in developing the scientific profiles and careers of the Principle Investigators (PIs), especially of our Young Scientist-PIs, as several of them received appointments for full Professorships during their memberships in the IRTG.”



German and Canadian universities have renewed and expanded their institutional partnerships, based on their CREATE-IRTG-programs.

SG: We have certainly contributed significantly to putting Germany and Canada on the respective other country's 'map' of worthwhile partnerships. The CREATE-IRTG partnership is well-known in both countries' research communities and has even become something of a 'trademark' for bilateral cooperation.

ITB infoservice: What is the main obstacle in the cooperation?

TJ: One problem is the limited availability of funding. On both sides, CREATE-IRTG-proposals compete with 'regular'/national initiatives. When we initiated the cooperation ten years ago, the potential of bilateral cooperation was not as clear, and we were surprised to realize that there is such a high and continuous demand for funding. As a consequence, sometimes even high-quality proposals cannot be approved.

SG: The other persistent challenge is that the two funding programs are not completely congruent and have to resolve partly different national qualification requirements. While both DFG's Research Training Groups and NSERC's CREATE program aim for the acquisition and development of professional skills among students and postdoctoral fellows, CREATE has a stronger focus on job readiness for careers in the non-academic sector and on industry cooperation on the Canadian side. Combining international and intersectional cooperations within the training program is a challenge for CREATE-IRTGs. This is not always easily resolved and requires creative thinking to exploit the best of both worlds. While DFG and NSERC have increasingly streamlined their review and decision procedures, their different emphases mean that there is still some risk for new initiatives of falling between the two programs.

ITB infoservice: What do you plan in the coming years?

TJ: This cooperation has helped to intensify the relation between our organizations. Over the past ten years, our cooperation has proven to be highly

reliable, and we are determined to continue and improve the CREATE-IRTG-cooperation. Based on this positive experience, we are also aiming to expand our cooperation and open joint funding opportunities in other funding programs.



Further Information at Kooperation international



Additional links and sources for this interview are available via the following link or QR-Code.

► <https://s.dlr.de/16-03>

The German Cluster 'it's OWL' in Canada: Connecting Ostwestfalen-Lippe and British Columbia

Im Technologie-Netzwerk „it's OWL – Intelligente Technische Systeme OstWestfalenLippe“ entwickeln über 200 Unternehmen, Forschungseinrichtungen und Organisationen Lösungen für intelligente Produkte und Produktionsverfahren. Ausgezeichnet im Spitzencluster-Wettbewerb der Bundesregierung gilt „it's OWL“ als eine der größten Initiativen für Industrie 4.0 im Mittelstand. Unter der Fördermaßnahme des Bundesministeriums für Bildung und Forschung (BMBF) „Cluster-Netzwerke-International“ erhielt der Cluster eine Finanzierung für das Konzeptionsphasenprojekt „itsowl-EA“ (2018-2019). Darunter wurde eine Kooperation mit kanadischen Partnern, insbesondere in der Provinz British Columbia, aufgebaut. Das Resultat ist eine Fortsetzung der Förderung im Rahmen von drei Forschungs- und Entwicklungsprojekten zu Künstlicher Intelligenz in der Produktion (2020-2023).

Günter Korder
Managing Director
it's OWL Clustermanagement GmbH
Paderborn, Germany

Professor Homayoun Najjaran
Okanagan School of Engineering
University of British Columbia (UBC)
Kelowna, Canada

In the technology network 'it's OWL – Intelligent Technical Systems OstWestfalenLippe', more than 200 companies, research institutes and organizations develop solutions for intelligent products and production processes. Named as one of the Leading-Edge Clusters by the German Federal Ministry of Education and Research (BMBF), it's OWL is considered to be one of the largest Industry 4.0 initiatives for small and medium-sized enterprises (SMEs) in Germany. The German-Canadian cooperation 'it's OWL: European Alliance for Securing a Leading Position in Intelligent Technical Systems' (itsowl-EA, 2018-2019) received funding from the BMBF for the internationalization of clusters, future projects and similar networks. Canadian partners are mostly located in the target province British Columbia, with the University of British Columbia (UBC), which is part of the Canadian Supercluster Digital Technology, taking the lead. The results are three research & development (R&D) projects in the field of Artificial Intelligence (AI) for production.



Clusters that receive BMBF-funding for cooperating with Canadian partners include Cluster Leichtbau

BW, Hamburg Aviation and OptoNet e.V. – Photoniknetzwerk Thüringen.

ITB infoservice: [How many projects/visits/conferences have been supported over the last five years?](#)

Homayoun Najjaran: With regard to our current collaborations with German partners, we, the Okanagan School of Engineering of the University of British Columbia (UBC), have five ongoing R&D projects including two with it's OWL members in my own research lab, the UBC Advanced Control and Intelligent Systems (ACIS) Laboratory. In total, 18 of our postdocs, PhD and master students work on these projects including nine working specifically on these two it's OWL projects.

Günter Korder: Interestingly, this whole cooperation started with a delegation visit in 2018 where we first met Professor Homayoun Najjaran. During that visit we already conceived the first project ideas and decided to pursue them further. In the course of this partnership, we were able to visit our partners at UBC twice. Additionally, two international conferences (TCI Global Conference, EU-Canada Matchmaking Event) were attended.

ITB infoservice:
What makes your cooperation special?

GK: With UBC, we have found a complementary partner. This cooperation developed organically, but all the same very intensively.

HN: I can only agree – over a short period of time, a high level of trust on both sides could be established, which indicates the good quality of our partnership.

ITB infoservice: What are the main characteristics and biggest successes?

HN: Both regions, British Columbia and Ostwestfalen-Lippe are characterized by research excellence as well as a high density of SMEs. Thanks to these structural similarities, we were quickly able to find common ground and focus on three concrete projects around the topic of AI.

GK: I would also call these three projects our biggest successes: here, companies and research institutions from Canada and Germany work closely together on joint questions and therefore create knowledge exchange across nations. We cover the topics AI in production control, deep learning for industrial robotic systems and embedded AI for production systems. The projects are:

- 'Artificial Intelligence in Production Planning and Control' (ARISE);
- 'Embedded Artificial Intelligence for Production Systems' (EASY);
- 'Integration of deep-learning into distributed intelligent systems with applications in robotics and 3D computer vision' (its-3DL).



TCI Global Conference 2018 and Meetings of Superclusters in Toronto
Source: it's OWL Clustermanagement GmbH

ITB infoservice:
What have been obstacles to overcome in the cooperation?

GK: As part of the internationalization project of it's OWL, a change of target region was made late in the project for strategic reasons. As a result, the conception phase was initially behind

schedule which had to be compensated for by focusing on essential core activities.

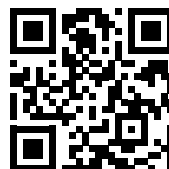
HN: Unfortunately, we lost the opportunity to use the designated Natural Sciences and Engineering Research Council and German Federal Ministry of Education and Research (NSERC-BMBF) 2+2 Call for Proposals to secure funding for this initiative (see page 34 for article on industrial research). So, it took us a while to explore appropriate funding opportunities to support the Canadian teams. Fortunately, we have been able to secure funding from both NSERC and Mitacs for our joint research.

ITB infoservice: What do you plan in the coming years?

GK: As mentioned, three R&D projects are the result of our joint internationalization project which will continue into 2023. In the meantime, we are working on other project ideas, thus intensifying our relations in Canada.



**Further Information
at Kooperation international**



Additional links and sources for this interview are available via the following link or QR-Code.

► <https://s.dlr.de/16-04>

Academic Mobility and Regional Scientific Cooperation – The View from Ontario and Baden-Württemberg

Das Programm Ontario Baden-Württemberg (OBW) bietet für Studierende im grundständigen Studium und für Graduierte verschiedene Austauschmöglichkeiten in den zwei Partnerregionen an. Seit der Gründung des Programms im Jahr 1990 haben es fast 3.000 Studierende genutzt, um mit Hilfe eines Auslandsstudiums ihren Bildungsstand zu verbessern und Lebenserfahrung zu sammeln. Auch Dozentinnen und Dozenten nehmen die Angebote für Forschungsaufenthalte wahr. Erfolge des Programms sind das Ergebnis enger Kooperation zwischen den teilnehmenden Hochschulen und den Koordinierungsbüros auf beiden Seiten des Atlantiks. In einer separaten Box stellt das Wissenschaftsministerium Baden-Württemberg sein Programm zur Forschungsk Kooperation mit Ontario vor.

David Darby
Professor Emeritus
Department of Languages and Cultures
Director OBW Program (2003-2020)
Western University
London (Ontario), Canada

Tina Bebensee
OBW and Exchange Coordinator
University of Konstanz
Konstanz, Germany

The Ontario/Baden-Württemberg (OBW) program offers a range of overseas exchange opportunities to undergraduate and graduate students in the two partner regions. Since the program's founding in 1990, nearly 3,000 students from the Province of Ontario (Canada) and the state of Baden-Württemberg (Germany) have enhanced their education through the experience of living and studying overseas.



ITB infoservice: How many students and scientists have been supported over the last five years?

Tina Bebensee and David Darby: Over the last five years we have worked with 435 exchange and visiting research students and 61 experienced researchers and professors.

ITB infoservice: What makes your cooperation special?

TB: OBW is much more than just a student exchange program: it also offers summer research opportunities for students from Ontario, as well as

a summer language school at Lake Constance. The program has always been ready to respond to the needs of the partner institutions and their students. And through its Faculty Mobility Program, it provides experienced researchers with opportunities to pursue their own transatlantic collaborations, while simultaneously promoting OBW and its objectives.

DD: With over 20 universities in Ontario and Baden-Württemberg (BW), OBW can offer a well-matched opportunity to each student and researcher who participates, to whom we take pride in providing individual advice and support. We aim to foster in our students a sense of membership in an active community, and each year yields stories of OBW students from diverse backgrounds, studying very different subjects at different universities, who form friendships, find common ground, and support each other throughout their exchange stays. Beyond that, our students are challenged to make their own contribution to the ongoing development of the partnership and friendship between our two regions.

ITB infoservice: What are the main characteristics and biggest successes?

TB: My favourite part each year is the orientation meeting in May, when we bring together all the students from BW and we also invite students from Ontario that are currently studying in BW. To me, it is always amazing to see students connect, build their networks, and share their enthusiasm for international and intercultural exchange.

DD: I think the capacity to adapt, to which Tina referred earlier, has been an essential characteristic of OBW. Through the introduction of additional shorter-stay opportunities, we have found solutions to the challenges of balancing the numbers of participants from each region and of opening the program to students in the natural and applied



Strong Research Alliance between Two Partners

Baden-Württemberg (BW) and Ontario first agreed to work closely together in a 'Memorandum of understanding' (MoU) in 1987, as two of the most innovative sub-national jurisdictions in the world. At the 25th anniversary in 2012, BW and Ontario reaffirmed their long-standing friendship by renewing this MoU. Both regions have steadily expanded their cooperation on the basis of shared values, and now regularly do joint events in fields from water technology to Artificial Intelligence (AI) to life sciences. This partnership has a focus on the environmental and climate change, energy, science, technology and innovation, education and culture, digitalization and health. The partners see the cooperation as an opportunity to better master similar challenges through economic strength and complementary competencies, and continue to look for new ways to further grow the relationship.

Examples of excellent research cooperation are:

Partner Institution: Cyber Valley + University of Toronto / Vector Institute / CIFAR / University of Ottawa / et al
Project Field: AI

Project: Various; Europe's largest research consortium in the field of artificial intelligence with partners from science and industry

Partner Institution: Heidelberg University Hospital + University of Toronto

Project field: Medical Technology

Project: Iterative reconstruction for dose reduction in computed tomography perfusion in order to help reduce patient radiation exposure without compromising measurement accuracy

Partner Institution: Karlsruhe Institute of Technology (KIT) + The University of Waterloo + The Waterloo Institute for Sustainable Energy (WISE)

Project Field: Energy Access

Project: Affordable Energy for Humanity

Partner Institution: Fraunhofer ICT + Western University (University of Western Ontario)

Project Field: Lightweight Materials

Project: The Fraunhofer Project Centre for Composites Research @Western combining Fraunhofer's latest global technologies and Western's strengths in materials engineering (see page 22 for interview on the FPC@Western)

Martina Diesing, Baden-Württemberg Ministry of Science, Research and Arts

sciences, as well as those in health-science disciplines, the structure of whose degree programs, in Ontario at least, often leaves little room for an exchange semester or year.

Of course, such initiatives create considerable extra work for other people, and nothing would have been possible without creative energy of our wonderful international office colleagues at universities across Ontario and BW.

ITB infoservice: What have been obstacles to overcome in the cooperation?

TB: Financial and structural pressures in Ontario have seen universities re-evaluate their priorities. Also, we have witnessed a gradual shift in interest on the part of Canadian students from traditional exchange programs toward shorter-term programs, while in BW our students' demand for exchange opportunities in Canada continues to increase.

DD: The COVID emergency is probably too obvious to mention in this context! Looking back further, OBW's greatest challenges in Ontario have flowed from successive changes to the program's financial and organizational circumstances. That said, working with the universities and the government of Ontario, as well of course as with all our university and government friends in Baden-Württemberg, OBW has always found a constructive way forward. The program in Ontario has evolved from its launch as an exclusively government-funded initiative: first into the shared project of a voluntary consortium of universities, and later into its most recent configuration as a project co-funded by government and the participating universities.

ITB infoservice: What do you plan in the coming years?

TB & DD: The COVID pandemic has, unfortunately, brought the movement of students between Ontario and BW to a complete standstill, and OBW's first priority must be to get people moving again as soon it becomes possible. Beyond that first step, the program will, as ever, need to evolve in order to remain relevant to students' needs and wishes.

The assumption from an Ontario perspective is that, while the long-stay exchange program will remain a mainstay of OBW, the growth area in the coming years will be in shorter-term opportunities, particularly in the area of experiential education, where OBW can build on its existing expertise.

From the Baden-Württemberg perspective, we hope to be able to cooperate successfully with universities in Ontario as circumstances improve. We look forward to creating exciting exchange experiences that inspire students on both sides of the Atlantic to take that leap of faith and study overseas at one of the many great universities in BW and Ontario.



**Further Information
at Kooperation international**



Additional links and sources for this interview are available via the following link or QR-Code.

▶ <https://s.dlr.de/16-05>

Academic Mobility and Regional Scientific Cooperation – The View from Bavaria and Québec

Bayern und Québec arbeiten seit weit über 30 Jahren umfassend zusammen. Forschung und Innovation haben sich zu einem sehr wichtigen Bestandteil der Kooperation entwickelt. Neben gemeinsam finanzierten Forschungsprojekten und dem Austausch von Wissenschaftlerinnen und Wissenschaftlern und Studierenden spielen Delegationsreisen und der Ergebnistransfer, beispielsweise in die Wirtschaft, eine herausragende Rolle. Für die nähere Zukunft sind die Themenbereiche Künstliche Intelligenz (KI) in der Medizin, Quantentechnologien und Wasserstoff eine Priorität.



Dr. Florence Gauzy Krieger
Senior Scientific Officer
Scientific Coordination Office
Bavaria – Québec/Alberta/
International
Bavarian Research Alliance
(BayFOR)
Munich, Germany



Dr. Peter Freier
Attaché commercial, science
et technologie
(Commercial, Science and
Technology Attache)
Québec General Delegation
in Munich
Munich, Germany

ITB infoservice: How many students/scientists/projects/visits/conferences have been supported over the last five years?

Florence Gauzy: From 2016-2019, we supported on average 24 research projects annually, up to 10 researchers' and up to 12 students' mobility to Québec, one business and science mission and two major conferences within the bilateral cooperation. In 2020 the COVID-19 pandemic severely affected the mobility side of our portfolio, but we digitalized most of our exchange and networking activities while creating online formats like the weekly Science Cafés (Forschungscafés) and the regular 'Tête-à-tête' meetings on Artificial Intelligence (AI) in health applications, a promising new cooperation field.

Peter Freier: In Québec, we support roughly the same numbers as Bavaria since we mainly work on a reciprocity basis. As Dr. Gauzy stated, we sincerely hope that physical meetings and conferences can be restarted soon, as they enrich our relationship significantly.

ITB infoservice: What makes your cooperation special?

FG: The scientific cooperation is part of a longstanding institutional partnership between the Government of Québec and the State of Bavaria that has continuously developed since 1989 and provides a stable frame for our projects. This partnership covers a broad range of activities: politics and administration, economy, education and youth, culture and the arts and science and technology. The dialogue among these sectors nourishes our cooperation.

PF: Innovation has become an important pillar and it is notable that the scientific cooperation integrates strongly with the business side of our activities. Behind these partnerships, many colleagues from our institutions, researchers, science managers and companies work together with enthusiasm at all levels towards shared objectives. Furthermore, Québec has had an official presence in Bavaria since 1997 and Bavaria has its official representation in Québec.

ITB infoservice: What are the main characteristics and biggest successes?

FG: We promote science-driven initiatives and remain in close partnership with the researchers' groups throughout the project cycle. Our programs encourage Master's students' and young researchers' early

participation in research work. We start deliberately small and then move to big projects.

One significant science-cooperation success is the ClimEx project that investigates the effects of climate change on extreme meteorological and hydrological events and their implications for water management in our two regions. The project partners join forces to run climate models, linked with hydrological modeling, using the power of high-performance computing.



PF: The diversity of our bilateral projects is amazing. We could give many examples of further projects: a longstanding summer school in neurosciences of aging, the creation of a Master's student exchange in microsystem technologies, a collaborative project in materials for aeronautics and a book on comparative federalism available in French and in German. Also, the Chief scientist of Québec, Rémi Quirion, was on a mission to Bavaria in early 2020 where he notably developed the exchanges in Health & AI, a key Québec savoir-faire.

Our fruitful exchanges are based on complementarity of know-how, capacities and financing of innovation. These collaborations lead to innovative products, services, medical treatments and scientific government advice. One partner alone would not be able to achieve as much.

FG: A further specificity of our cooperation is that Bavaria and Québec are part of a multiregional and multilateral research network called RLS-Sciences under the framework of the Regional Leaders Summit (RLS). RLS is a high-level forum of seven states: Bavaria, Georgia, Québec, São Paulo, Shandong, Upper Austria and Western Cape. Ongoing projects are in the fields of renewable energies, digitalization, aerospace, small satellites, and since 2020, digital health.

PF: Bilaterally or in the multilateral frame of RLS-Sciences, we encourage participation in EU-funded

research. A current priority is hydrogen as storage option for renewable energies. As the nucleus of our cooperation is to be found very often in the Québec-Bavaria collaboration, the leverage in multilateral collaboration can be even higher.

ITB infoservice: What have been obstacles to overcome in the cooperation?

FG: Funding! We can fund cooperation activities (mobility and networking), and we provide non-financial support to the researchers on their way towards research funding. It can be a long way. To overcome gaps, we engage in creative funding partnerships.

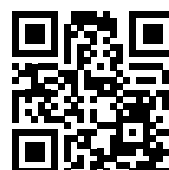
PF: Funding! In 2019 the Fonds de Recherche du Québec (FRQ) and the Bavarian State Ministry of Science and the Arts (StMWK) renewed their agreement to strengthen the Québec-Bavaria collaboration in the areas of health research and in science and technology. We also support researchers to use manifold further funding mechanisms. It is part of our work to contribute to the synchronization of administrative regulations and procedures.

ITB infoservice: What do you plan in the coming years?

FG & PF: We have just launched an important initiative on AI in health applications. We want to expand it and enable high-risk / high-reward exploratory research to take full advantage of the scientific excellence available in our network. Quantum technologies and mobility solutions are other highly promising fields and a new priority for our bilateral working group, backed by strategic investments of both states. We are growing!



Further Information at Kooperation international



Additional links and sources for this interview are available via the following link or QR-Code.

► <https://s.dlr.de/16-06>

Joining Innovation Ecosystems

FPC@Western – Strengthening Links between Fraunhofer and North American Industry

Das Fraunhofer-Institut für Chemische Technologie ICT hat in Kooperation mit der Western University im Juli 2011 das Fraunhofer Project Centre for Composites Research in London (Ontario) eingerichtet. In dem Zentrum werden Leichtbau-Komponenten vor allem für den Fahrzeugbau entwickelt und getestet. Der Standort wurde gewählt, um eine Verbindung zwischen deutschen Herstellern und der nordamerikanischen Automobil- und Zuliefererindustrie zu sichern, die in Ontario und dem US-amerikanischen Bundesstaat Michigan in unmittelbarer Nachbarschaft präsent ist.



Prof. Dr.-Ing. Frank Henning
Managing Director
Fraunhofer Project Centre for
Composites Research at Western
University (FPC@Western)
London (Ontario), Canada
Director Fraunhofer ICT
Pfinztal, Germany



Professor Andrew N. Hrymak,
PhD
Deputy Director FPC@Western
Provost & Vice-President
(Academic)
Western University
London (Ontario), Canada

ITB infoservice: What was the initial motivation for establishing a representation in Canada?

Frank Henning und Andrew N. Hrymak: Baden-Württemberg is the heart of the German automotive and supplier industry. In addition, equipment engineering, and materials technology are innovation drivers in lightweight construction. These industries are globally networked and demand globally implementable solutions.

Alongside Europe, North America is one of the leading nations in mobility industries. For this reason, it makes sense to offer our German industry a platform that enables targeted cooperation with North American partners in applied research to make these innovations globally available and to contribute to resource conservation through weight reduction in this important segment. North American industry asked for a more applied research approach, different from the collaboration model with universities in order to focus on real industrial scale

prototyping and upscaling of new technologies for commercialization. In the end both sides could see the potential benefits and pulled together to create an institute that would serve both North American and European industry.

ITB infoservice: Why was Canada chosen as a partner country rather than another country?

FH & AH: Ontario is the heart of the North American automotive industry and directly borders Michigan, where the 'Big Three' of the North American automotive industry are located. One focus is the processing of composites and the manufacturing of composite prototypes. The USA had outsourced their parts production to a significant extent to Canada, Mexico, and Asia, especially in this field. Most mold makers for example for our technologies are Canadian.

In addition, Western University has promoted the establishment of an Advanced Manufacturing Park,

which has made it possible to integrate the innovation platform in the form of a technical centre.

The extended network of Canadian scientists far beyond London offered possibilities for deep scientific collaboration, which resulted in an international training group. In addition, Canadian culture is very European and that enabled

us to quickly arrive at the legal basis for the terms of cooperation.

ITB infoservice: What is the added value of a permanent representation in times of digitalization?

FH & AH: The added value of a presence on site is certainly that understanding the materials and technologies demands hands-on experience. The centre offers customers a training ground to experience new materials in innovative processes and to benefit from the synergies of the collaboration as well as to train personnel. The academic side benefits from the opportunity to offer students internships as well as experience in experimental design and execution at larger scale.

Digital tools are very important in the design of sophisticated, highly anisotropic lightweight solutions and will be in the future, also in manufacturing in the context of Industry 4.0. Self-learning and optimizing processes accelerate innovation, especially for sophisticated lightweight materials. This will certainly strengthen cooperation in the future. Nevertheless, the North American industry needs tailored solutions within a robust, local, and international value chain. The components, which are significantly larger on average, require appropriate tooling technologies and proprietary material solutions and are dependent on the vehicle concepts. Since most plastics come from the local packaging industry, the solutions developed are also not easily transferable

to other markets and require material adaptations. Thus, the companies experimenting on our platform

learn about local boundary conditions and can tailor and adapt their product range and expand into new markets.

From a scientific point of view, cooperation with Canadian scientists is also horizon-expanding

– this has been proven in the joint International Research Training Group ‘Integrated engineering of continuous-discontinuous long fiber reinforced polymer structures’ (see page 12 for interview on the CREATE-IRTG programs).

The direct cooperation of the scientists, the exchange of students, the experience of other cultures, markets and approaches have all proven to be very valuable to the participants and well equip them for their careers in a global market. A permanent establishment enables these personal encounters in work and friendship and is – as the pandemic currently demonstrates – to be supplemented by digitalization, but not to be replaced.



FPC@Western shopfloor in London, Ontario
Source: The University of Western Ontario



Further Information at Kooperation international

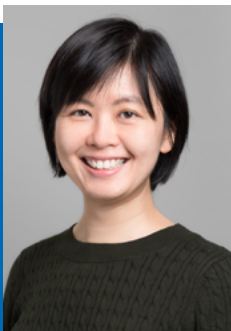


Additional links and sources for this interview are available via the following link or QR-Code.

▶ <https://s.dlr.de/16-07>

Max Planck Establishes a Third Centre with Canada

Die University of Toronto und die Max-Planck-Gesellschaft (MPG) bündeln ihre Expertise in einem neuen interdisziplinär ausgerichteten Zentrum, um gemeinsam gesundheitsorientierte Hirnforschung zu betreiben und dabei Methoden der Künstlichen Intelligenz anzuwenden. Das am 14. April eröffnete Max Planck – University of Toronto Centre (MPUTC) for Neural Science and Technology ist damit bereits das dritte Zentrum der MPG in Kanada. Zuvor wurden bereits das Max Planck – University of British Columbia (UBC) – UTokyo Centre for Quantum Materials und das Max Planck – University of Ottawa Centre for Extreme and Quantum Photonics eingerichtet.



Prof. Dr. Joyce Poon
Co-Director Max Planck –
University of Toronto Centre
(MPUTC) for Neural Science and
Technology
Director Max Planck Institute of
Microstructure Physics (MPI-MSP)
Halle, Germany



Taufik Valiante, MD, PhD
Co-Director MPUTC
Associate Professor of Surgery
(Neurosurgery)
University of Toronto
Toronto, Canada

The Max Planck – University of Toronto Centre (MPUTC) for Neural Science and Technology was officially launched on April 14, 2021. Its Co-Director Joyce Poon was appointed Assistant Professor of Electrical and Computer Engineering at the University of Toronto in 2007. Since 2018 she has been Director of the Max Planck Institute of Microstructure Physics in Halle, Germany. Co-Director of MPUTC Professor Taufik Valiante is a scientist and a practicing neurosurgeon. He is Director of the Surgical Epilepsy Program at the Toronto Western Hospital and a Scientist at the Krembil Research Institute of the University Health Network.

ITB infoservice: What was the initial motivation for setting up an International Max Planck Centre with Canada?

Joyce Poon & Taufik Valiante: The motivation for setting up the Max Planck – University of Toronto Centre (MPUTC) for Neural Science and Technology is to bring together two of the world's foremost research leaders, the Max Planck Society and the University of Toronto, to tackle one of the hardest scientific and technological challenge of our times – namely, to understand the brain, for the betterment of human health and to advance computing.

The Max Planck Society is renowned for its prowess in the basic sciences, including neurobiology, neuroscience, optics and materials science. This complements the University of Toronto, which is strong in connecting research to immediate societal needs and is a world leader in many fields, especially in medicine and artificial intelligence (AI). The University of Toronto also has a large network of affiliated hospitals, important partnerships that promote the translation of research to patient care.

The MPUTC aims to break down the silos amongst disciplines and works at the interfaces between many fields, ranging from basic neurobiology through to hardware technology to artificial intelligence, in order to open a new chapter in the study of the brain.

ITB infoservice: Why was Canada chosen a partner country rather than another country?

JP & TV: The University of Toronto is a partner for the MPUTC because of its scientific excellence and complementary research strengths. Prior to the MPUTC, the Max Planck Society had established two highly successful centres in Canada, one in quantum materials based at the University of British Columbia and another in photonics in the University



Max Planck - University of Toronto

Centre for Neural Science and Technology



of Ottawa. This new University of Toronto centre is unprecedented among all Max Planck centres in its interdisciplinarity and broad scope, made possible by the fact that the University of Toronto is Canada's leading and largest university. More than twelve Max Planck Institutes have signed up to be involved in the MPUTC with the University of Toronto, demonstrating the very strong interest within the Max Planck Society to collaborate with the university.

On the scientific front, the University of Toronto is a notable leader in medicine and AI. The Vector Institute, a hub of AI research involving the university and industry, serves as an inspiration for Germany and Europe.

Canada is an important partner for the Max Planck Society. The ties with Canada for the Max Planck Society are strong. There are presently 150 Canadian visiting scientists within the Max Planck Society and there are 120 collaborative projects with Canada. The Max Planck Society has published more than 13,000 papers with Canada. Canada has an excellent postsecondary education system, with strong universities across the country. The University of Toronto and Canadian universities in general, share many of the same values as the Max Planck Society, including a commitment to excellence, innovation and diversity and inclusion. Our shared values make partnership with Canada (and the University of Toronto) natural and productive.

ITB infoservice: [What is the added value of a permanent joint centre in times of digitalization?](#)

JP & TV: Digitalization has made global interactions easier than ever, enabling people from around the world to quickly share ideas and data. Therefore, internationalization is an important priority for both the Max Planck Society and the University of Toronto.

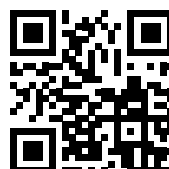
Both organizations have numerous partnerships worldwide, so they can effectively engage in and contribute their expertise in scientific and societal discourse.

The MPUTC provides a specific platform to increase the visibility to and intensify the cooperation between scientists in the Max Planck Society and the University of Toronto, which will help accelerate scientific progress and bring new perspectives to the centre's research. Furthermore, a key focus of the MPUTC is talent development and the support for international mobility for young scientists, especially doctoral students. The MPUTC will provide a unique opportunity for young scientists to be embedded in scientific environments in both Germany and Canada.

Developing a global perspective will be important for the leaders of tomorrow, since solving the grand challenges in our society, such as human health, climate and sustainability, will require international cooperation and cross-disciplinary thinking.



Further Information at Kooperation international



Additional links and sources for this interview are available via the following link or QR-Code.

► <https://s.dlr.de/16-08>

National Research Council of Canada (NRC) in Germany: How Being Present on the Ground Makes a Difference

Die kanadische Forschungs- und Förderorganisation National Research Council (NRC) ist seit 2019 in Deutschland vertreten. Ausschlaggebend für die Standortwahl war die deutsche Forschungs- und Innovationsexzellenz in strategischen Schlüsselgebieten. Der NRC Germany stellt notwendige Informationen und Erfahrungswissen zusammen mit Kontextwissen bereit, um erfolgreiche deutsch-kanadische Forschungspartnerschaften und den Transfer von Forschungs- und Entwicklungsergebnissen in die Praxis zu unterstützen.



Dr. Jennifer E. Decker
Consul
National Research Council of
Canada (NRC) – Germany
Munich, Germany

ITB infoservice: What was the initial motivation for establishing a representation in Germany?

Jennifer Decker: The simple answer is research and business innovation excellence. Our knowledge and capabilities in key strategic areas are advanced through working with leading international scientists and innovators. The National Research Council of Canada (NRC) has enjoyed longstanding and fruitful collaborations with Germany in many theme areas, for example, aerospace, optical sciences, plant breeding, metrology and nanotechnology in addition to many others. The NRC wanted to build on these productive activities, and partnering with top labs provides a pathway to accessing the best science!

The NRC's goal is to be recognized as a global science, technology and innovation (STI) leader and top of mind to engage for collaboration with the Canadian and global innovation ecosystem. We also want to facilitate international co-innovation for our Canadian small and medium enterprises (SMEs) working with complementary partners who are engaged in leading areas of science and technology.

The NRC seeks to maintain and intensify the breadth and depth of STI collaborations between Canadian

and German research institutions, leverage funding programs and resources, develop and deepen science and innovation networks, enhance mobility of researchers and establish joint research and industry projects. The NRC presence in Germany provides a direct channel to increase our own visibility, to learn more about the organizations constituting the German STI ecosystem, to deepen our current relationships and to explore new partnerships – including with the NRC, Canadian labs and SMEs with support of the NRC Industrial Research Assistance Program (see page 34 for article on the NRC IRAP program).

ITB infoservice: Why was Germany chosen as a partner country rather than another country?

JD: Germany has many impactful and collaborative institutions whose priorities and goals are well-aligned to those analogues in Canada. Germany possesses world-leading science and technology facilities and deep strengths in research, paired with leadership in advanced manufacturing economies – creating a great potential for alliances, where the sum is greater than the parts.

Over the years, it became clear that Canada and Germany share compatible operating environments, for example, laboratory language, intellectual property frameworks, and openness to partnerships. These observations were supported by our analysis of research indicators such as co-publications, joint projects, number of innovative firms with links to Canadian economy and joint participation in EUREKA platforms. Germany was clearly one of our partners with a diverse history of productive outcomes, providing a well-rounded foundation on which to build.

Of particular consideration to the decision was our formal Canada-Germany Science, Technology and Innovation Treaty, in addition to the many MoUs ('Memorandums of Understanding') between the NRC and German research entities, providing a secure basis for establishing deeper agreements. Collaboration is paramount for reaping the socio-economic benefits of research, development and innovation that also impact our everyday lives.

ITB infoservice: What is the added value of a permanent representation in times of digitalization?

JD: A high level of trust in our interpersonal relationships is vitally important for creativity and successful research collaborations, and these are still best achieved through face-to-face interactions. That said, essential elements of teamwork: trust, loyalty and respect, are established through honesty and communication, whether in person or virtually.

At another level, it is important to 'know your audience' – to understand their realities and to be aware of existing or emerging issues, both for positive lab-to-lab relationships as well as to provide information and advice for science policy development. Being on the ground provides access to key stakeholders in the same time zone, and also gives us the ability to participate in the STI ecosystem.

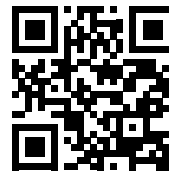


As a result, the NRC can be more familiar with Germany-based context, and upcoming issues of concern. In a way, the idea is to translate Germany back to the NRC and Canadian research and innovation partners, and in turn, provide translation

of the Canadian ecosystem to German partners, so as to map the ecosystems. A broad landscape understanding is essential for providing leadership and coherent advice in brokering partnerships. Information and knowledge ensure that our collaborations are relevant to both sides, and increase the impact of our partnership activities – creating a 'win-win' for both Canada and Germany.



Further Information at Kooperation international



Additional links and sources for this interview are available via the following link or QR-Code.

▶ <https://s.dlr.de/16-09>

Collaboration Themes

Canadian-German Collaboration in the Social Sciences and Humanities: Joint Research within the Trans-Atlantic Platform

Kanada und Deutschland unterhalten seit langem eine enge Zusammenarbeit in den Sozial- und Geisteswissenschaften. Im vergangenen Jahrzehnt wurde diese Zusammenarbeit gestärkt, indem sich kanadische und deutsche Forschungsfördereinrichtungen am Aufbau der 2013 gegründeten Trans-Atlantic Platform (T-AP) beteiligten. Bisher wurden interdisziplinäre Projekte auf dem Gebiet der Digital Humanities und der sozialen Innovationsforschung gefördert. Die jüngste gemeinsame Förderbekanntmachung zu sozialen Folgen der COVID-19-Pandemie verspricht umfassende Erkenntnisse auf der Basis international vergleichender Forschung.

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Society, Innovation
DLR Projekträger
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Research Partnerships Portfolio
Social Sciences and Humanities Research Council of Canada
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Ottawa, Canada

Canadians and Germans have been successfully collaborating in the humanities and social sciences (SSH) for the last eight years under the Trans-Atlantic Platform for Social Sciences and Humanities (T-AP). T-AP is an unprecedented collaboration between SSH funders from South and North America and Europe. In this framework the Canadian Social Sciences & Humanities Research Council (SSHRC) and the Fonds de recherche du Québec – Société et culture (FRQSC) closely work together with the German Federal Ministry of Education and Research (BMBF), the German Research Foundation (DFG) and the DLR Project Management Agency (DLR-PT) to identify common research and societal challenges and promote a culture of collaboration.

By jointly calling for research in areas where there is strong potential for international collaboration, the Platform facilitates the formation of networks and promotes interdisciplinarity. T-AP also strives to heighten awareness of the important role the social

sciences and humanities play in addressing twenty-first century challenges.

Since 2016, the Canadian and German funders have launched three research calls together with funding organizations from the US, South America and Europe: 'Digging into Data' (2016), 'Social Innovation' (2018), and, the most recent, 'Recovery, Renewal and Resilience in a Postpandemic World' (2021).

Digging into Data

'Digging into Data' facilitated international team-based research into how large-scale computational techniques might be applied in SSH areas as diverse as musicology, economics, linguistics, political science, and history.

In one project, an interdisciplinary team comprised of participants from Canada, Germany and the United States, developed and applied a new



computerized method for translating and analyzing 67,000 administrative documents from twenty-first century BC southern Mesopotamia. In another, a cognitive scientist from Germany joined a sociologist from the United States and Canadian-based experts in computer science and software engineering, to explore the social and psychological mechanisms at play during collaborative groups.

Social Innovation

The T-AP ‘Social Innovation’ research call permitted knowledge sharing and facilitated multi-sectoral collaborative work to address social challenges experienced on both sides of the Atlantic. One ongoing project, ‘Collaborative Social Innovation’, brings research partners from Canada, Germany, and the Netherlands together with non-profit, for-profit, and governmental organizations to navigate context-dependent challenges in scaling social innovation responses. By contrast, a German-Canadian team of humanities researchers, ‘Worlding Public Cultures’, is using art, art exhibitions, conference presentations and scholarly writing to shift public discourse about our globally interconnected yet conflicted world.

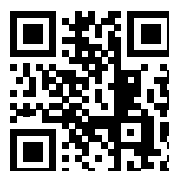
Recovery, Renewal and Resilience in a Postpandemic World

The most recent call, ‘Recovery, Renewal and Resilience in a Postpandemic World’, aims to address key gaps in our understanding of the dynamic and complex interaction of medium and long-term societal effects of COVID-19 pandemic. This

understanding, in turn, should advance knowledge of how to mitigate the negative societal effects of the COVID-19 pandemic and support recovery and renewal in a post-pandemic world. In launching the call, Canadian, German and the other T-AP funders are seizing on a unique opportunity to unite SSH researchers worldwide around a common cause and a common need. Alongside funding agencies from Brazil, Columbia, Croatia, Finland, France, Poland, South Africa, Switzerland, the United Kingdom and the United States, the research and collaboration enabled promises to be unprecedented in scale, reach and value. Research projects are slated to begin in March 2022.



Further Information at Kooperation international



Additional links and sources for this article are available via the following link or QR-Code.

► <https://s.dlr.de/16-10>

Connecting to Space: DLR's Satellite Station in the North of Canada

Satelliten liefern bei der Erdbeobachtung wesentliche Informationen zu Ozeanen, Eis, Land und Atmosphäre. Für Forschung zum Erdsystem und für das Monitoring von Maßnahmen gegen den Klimawandel sind Satellitenbilder und -expertise unverzichtbar. Seit 2009 betreibt das Deutsche Zentrum für Luft- und Raumfahrt (DLR) eine Satellitenbodenstation in Inuvik in den Northwest Territories. Sie ist Teil der Inuvik Satellite Station Facility (ISSF), die von dem Canada Centre for Mapping and Earth Observation (CCMEO) administriert wird. Der Artikel legt dar, warum der Standort gewählt wurde und welche Aktivitäten dort stattfinden.



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German Remote Sensing Data Center
International Ground Segment
German Aerospace Center (DLR)
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Stuart Salter, P.Eng.,
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Canada Centre for Remote Sensing (CCRS, now CCMEO)
Canada

Regions near the poles are particularly advantageous for Earth observation satellites which are polar-orbiting in a low orbit and only visible for a short time just above the horizon. Most Earth observation satellites are circling the Earth on a polar route at an altitude of between 350 and 800 kilometres. Whereas near the equator, polar orbiting satellites are visible only ever other day or so, their orbits cross the North Pole and the South Pole about every 45 minutes. Near the poles, these orbits meet and the satellites emerge above the horizon at each orbit, able to communicate with ground stations nearby.

The German radar mission TanDEM-X's tipped the scales for Inuvik. The TanDEM-X mission's main objective is to generate an accurate three-dimensional topography of the Earth. Orbiting Earth in a novel orbit, two nearly identical radar satellites are flying in close formation, permitting data to be captured in an interferometric stereo view, the radar equivalent of optical 3D vision. For this particularly data- and control-intensive mission, German Aerospace Center (DLR) required a station in Northern Canada in addition to the existing European and near-polar stations in Northern Europe.

DLR's partner organizations in Canada, the Canadian Space Agency (CSA) and the Canada Centre for Mapping and Earth Observation (CCMEO) were also interested in stations in the Canadian North. Their research agendas were the impetus for the DLR, together with its European partner, the Swedish Space Corporation (SSC), to search for a suitable location and they found one in Inuvik, in the Canadian Northwest Territories.

Inuvik is an ideal location as it is as far north as possible while still offering access. The city was founded in 1958 and is accessible by road most of the year via the Dempster Highway and by regional airlines year-round. Inuvik is also a good location for research and development. For example, the on-site Aurora Research Institute serves DLR and international research groups as a focal point for Earth system research in the Canadian Tundra.

After coordinating with Canadian government partners in Ottawa, the first two antennas were erected in 2009 with the support of CCMEO, on a government site near the airport. CCMEO handled the logistical build-out of the Inuvik Satellite Station Facility (ISSF) and also deployed its own antenna systems for Canadian Earth observation missions

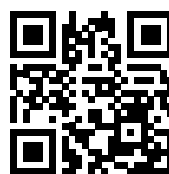
in the subsequent years. Since 2017, a fiber optic link has greatly accelerated the transmission of data around the world. This cable, the Mackenzie Fibre Link, traverses 717 miles of the Canadian Tundra. Its establishment was driven by the needs of the largely Gwich'in and Inuvialuit population of Inuvik and communities along the Mackenzie Valley for high speed data services, such as education and tele-medicine. Combined with the requirements of the new satellite stations, the Territorial Government in Yellowknife was finally able to install the much-needed cable.

Today, there are six antenna systems on the ISSF. With its own antenna, DLR has now recorded approximately 30,000 satellite passages from the TanDEM-X mission. Since 2018, DLR has also been receiving data for the European Earth observation program Copernicus via the Sentinel-5P satellite. Initiated through a German-Canadian cooperation

and sustained by the support and investment of our Canadian partners, Inuvik has established itself as an ideal location for international satellite missions. The station in Inuvik is a pioneering example of European-Canadian cooperation in Earth observation technology, involving the local indigenous populations.



Further Information at Kooperation international



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► <https://s.dlr.de/16-11>



DLR Inuvik ground station at ISSF, artwork: Ronnie Simon (Gwich'in)
Source: DLR

Canadian and German Researchers Join Forces to Unlock Arctic Climate Change Secrets

Das Internationale Graduiertenkolleg (International Research Training Group, IRTG) ArcTrain hat bereits über 100 Studierende in der Promotionsphase aufgenommen. Dank dieser deutsch-kanadischen Kooperation werden die Promovierenden in die Lage versetzt, Veränderungen in der Arktis auf dem Land wie auf See zu erforschen, deren gesellschaftliche Dimensionen nachzuvollziehen und von der Arbeit in einem internationalen und interdisziplinären Netzwerk zu profitieren. So hat die Forschung unter ArcTrain dazu beigetragen, unser Verständnis von der Wandelbarkeit der Ozeane sowie der von Eis bedeckten Oberfläche unseres Planeten (Kryosphäre) voranzubringen und darüber hinaus sowohl die Folgen des früheren als auch des prognostizierten Klimawandels besser einzuschätzen.



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Center for Marine Environmental
Sciences (MARUM)
University of Bremen
Bremen, Germany



Prof. Dr. Anne de Vernal
Speaker of ArcTrain
Research Centre on the
Dynamics of the Earth System
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Université du Québec à Montréal
Montréal, Canada

Long considered a distant and unexplored realm with no connections to the world at large, the Arctic has since become an icon of global warming, recognized by scientists as a region that holds the key to the future of our planet. Through numerous feedbacks, climate change in the Arctic is linked with sea-level rise, with the instability of the global oceanic circulation and with the routing of air masses that determine the weather on the Northern Hemisphere.

The central theme of the German-Canadian research training group ArcTrain has been investigating the processes and impacts of climate changes in

the Arctic. The project emerged from numerous bilateral collaborations. When the German Research Foundation (DFG) and the Canadian Natural Sciences and Engineering Research Council (NSERC) announced a joint call for research training groups in 2012, we immediately realized that working together in such an international context, within a larger and now interdisciplinary research network, would have an enormous added value for the training of PhD students (see page 12 for interview with DFG and NSERC on the IRTG/CREATE program). Such a partnership would allow us to bundle our strengths covering all aspects of Arctic ocean and cryosphere science, from observations in the geological past and monitoring of ongoing change to numerical simulations of future projections and their environmental impacts.

Understanding how the individual components of the Arctic climate system are connected and how these interactions impact global change scenarios is a key challenge for us and future generations, requiring internationally networked experts who can think beyond disciplinary boundaries and consider the societal impacts of their domain's physical processes. We have been very proud to see our initial idea to

Canadian Universities Participating in ArcTrain

Université du Québec à Montréal
Université du Québec à Rimouski
Université Laval
University of Alberta
University of British Columbia
University of Calgary
University of Dalhousie
University of New Brunswick
McGill University
Memorial University of Newfoundland





Summer in Baffin Bay, arm of the Atlantic Ocean between Canada and Greenland – one of the areas in which PhD students from ArcTrain carry out research. Source: IRTG ArcTrain

train researchers with these multidisciplinary skills become a reality.

In less than a decade, ArcTrain has brought together research teams from ten Canadian partner universities with colleagues at the University of Bremen and the Alfred-Wegener-Institute (Helmholtz Centre for Polar and Marine Research, AWI). We established a curriculum for our PhD students, facilitating transdisciplinary Arctic experience and education, and we incorporated transatlantic research stays, a floating university, Arctic field courses and training in science communication.

Since 2013, ArcTrain has hosted more than 100 PhD students in Bremen and in Canada: more than half have completed their studies and many have remained active scientists. Their research has contributed to the development of better sea-ice models, to the understanding of how ocean currents transport heat to the Arctic and to understanding how the interactions between ocean and cryosphere affect Arctic environments.

This network has transformed our research. It facilitated dozens of scientific expeditions and was the catalyst for many new collaborations. Fueled by shared supervision and exchanges of our PhD students, and inspired by regular networking of the research teams, ArcTrain truly brought together researchers on both sides of the Atlantic to work together in teams on projects which would otherwise not have taken place.



Further Information at Kooperation international



Additional links and sources for this article are available via the following link or QR-Code.

► <https://s.dlr.de/16-12>

National Research Council of Canada Industrial Research Assistance Program – Supporting SME Collaboration between Canada and Germany

Seit mehr als 70 Jahren setzt der kanadische National Research Council mit dem Industrial Research Assistance Program (NRC IRAP) Anreize für Wirtschaftswachstum durch technologische Innovation. NRC IRAP stellt für kleine und mittlere Unternehmen (KMU) Beratung, Beziehungen und Fördermittel bereit, um die Innovationskapazität zu stärken und den Transfer von Ideen in den Markt zu beschleunigen. Deutschland gehört zu den prioritären Kooperationsländern. Das zeigen die verschiedenen Partnerschaften, die mit deutschen Ministerien beziehungsweise Projektträgerorganisationen unter IRAP eingegangen wurden.



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For more than 70 years, the National Research Council of Canada Industrial Research Assistance Program (NRC IRAP) has been stimulating economic growth through technological innovation. NRC IRAP provides Canadian small and medium-sized enterprises (SMEs) with advice, connections and funding to increase their innovation capacity and take ideas to market. Creating opportunities for Canadian SMEs and researchers to collaborate with German partners is a priority for NRC IRAP, as demonstrated through the strength of the partnerships established with key German innovation agencies and organizations.

NRC IRAP and the Federal Ministry for Economic Affairs and Energy (BMWi)

Over the past four years, NRC IRAP and BMWi's ZIM program (Central Innovation Program for SMEs) have launched nine calls for proposals inviting Canadian SMEs and German SMEs and institutions to perform joint research and development (R&D) leading to technology commercialization. These calls have resulted in 25 co-innovation projects valued at more than EUR 27 million (\$40M CAD), the majority of which are in key sectors including advanced

manufacturing, photonics, medical technologies, and environmental technologies.

NRC IRAP and ZIM have built a strong partnership stemming from the similarity and significance of the two programs in their respective countries. For instance, both programs focus on a bottom-up approach to help SMEs grow through technological innovation. NRC IRAP and ZIM continue to build on their successful relationship conducting smooth and repeatable calls for proposals open to SMEs from both countries in all technological sectors, except military.

NRC IRAP and BMWi are also continuing to work together on R&D collaboration projects specifically on artificial intelligence applications in manufacturing and medical technologies. These projects involve collaborative partnerships between Canadian SMEs and universities partnered with German SMEs and research institutions. Three projects have recently been approved with advisory services and funding support from NRC IRAP and BMWi.

NRC IRAP and the Federal Ministry of Education and Research (BMBF)

In 2018, NRC IRAP and BMBF launched a new program for '2+2' research and development projects in collaboration with the Natural Sciences and Engineering Research Council of Canada (NSERC). '2+2' refers to the nature of an eligible project consortium, which must include at least one SME and one academic partner on the Canadian side, in addition to at least one academic or research institute partner and one eligible industrial partner

Canada-Germany Project Spotlight

In the Closed Loop Manufacturing 4.0 (CLM 4.0) project, which receives funding under the 2+2 BMBF Call, Canadian and German project partners have built an efficient system architecture that enables the high-frequency acquisition of internal machine data as well as data from external sensors. Based on this system architecture, the participating research institutes and enterprises design advanced applications that prevent excessive machine loads and tool wear and compensate for incorrectly selected process parameters. In summary, the results of this project will enable a suitable process from the onset of production, leading to a reduction of scrap and thus more environmentally friendly manufacturing.

The consortium consists of industrial enterprises and research institutes. The companies involved are ModuleWorks GmbH (Germany) and Manufacturing Automation Laboratories Inc. (Canada). Additionally, the University of British Columbia (Prof. Dr. Jin Xiaoliang), the Technical University of Munich (Prof. Dr.-Ing. Michael F. Zaeh), the University of Waterloo (Prof. Dr. Kaan Erkorkmaz) and the University of Stuttgart (Prof. Dr.-Ing. Alexander Verl) are part of the international project team.



on the German side. In total, seven projects were co-funded valued at more than EUR 13 million (\$20M CAD) for the development of Industry 4.0 enabling technologies which focuses on the digitalization of the manufacturing sector (see box). The seven selected projects involve a total of 30 Canadian and German organizations working together on collaborative projects.

Last year, the NRC and BMBF launched the '3+2' Canada-Germany Collaborative Industrial Research and Development Program. This bilateral program aims to foster collaborative R&D projects on innovative artificial intelligence solutions for industrial production. The project consortiums developed through this program are composed of a Canadian SME, researchers from the NRC, and a Canadian university partnered with an SME and research institution in Germany. In total, six projects have been approved, valued at more than EUR 14 million (\$21M CAD), through the '3+2' program and are set to begin in April 2021.

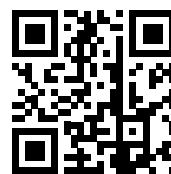
Canada-Germany collaboration through Eureka

Eureka is an international network for industrial R&D collaboration that includes over 45 countries

in Europe and beyond. Over the last several years Canadian and German partners have participated in 35 collaborative R&D projects through the Eureka platform, valued at more than EUR 43 million (\$64M CAD). These projects include Eureka Network, Eurostars, and Cluster projects and were facilitated by the NRC in Canada and DLR Projektträger (DLR Project Management Agency) in Germany.



Further Information at Kooperation international



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► <https://s.dlr.de/16-13>

A Decade of German-Canadian Cooperation in Fuel Cells

Die gemeinsame Forschung und Entwicklung von Brennstoffzellentechnologien zwischen Deutschland und Kanada hat eine Geschichte, die über ein Jahrzehnt zurückreicht. Die Erfolge der Kooperation gehen auf das besondere Engagement der Partnerinnen und Partner und eine hohe Transparenz zurück. Die deutsch-kanadischen Partnerschaften haben sich in mehrfacher Hinsicht als fruchtbar erwiesen: Ein Schwerpunkt lag auf Kostenreduktionen, während gleichzeitig die Lebensdauer der Brennstoffzellen verlängert wurde. Ein neues Kapitel wird demnächst durch die Schwerpunktsetzung auf Kommerzialisierung aufgeschlagen, insbesondere durch die Entwicklung von intelligenten Herstellungslösungen und neuen Analysemodellen.



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Dr. Zamel, a Canadian scientist, carried out research in Canada between 2005 and 2011 before joining the Fraunhofer Institute for Industrial Mathematics ITWM and then moving to Fraunhofer ISE in Freiburg in 2011.

The pledge to reach zero-net greenhouse gas emissions by 2050 and the increased use of renewables in our electricity mix have been the main drivers for research and development (R&D) around hydrogen as an energy carrier. Abundantly available, hydrogen is also considered to be one of the best energy storage solutions. An end-use technology of hydrogen, R&D on polymer electrolyte membrane (PEM) fuel cells has also gained traction in the last thirty years. PEM fuel cells convert the stored chemical energy of hydrogen and oxygen (from air) to useable electrical energy. These cells are a great solution for mobile applications due to their scalability, efficiency, easy start-up and zero emissions at use. Although promising, groundbreaking scientific work is still required to optimize and bring PEM fuel cells to market. Marketability is best achieved through fundamental and systematic analysis combined with open collaboration between industry and research facilities.

In 2007, the Canadian/German initiative by the Germany Federal Ministry on Education and Research (BMBF) on Energy Collaboration paved

the way for a strong and ongoing collaboration on PEM fuel cells between Canadian and German universities/institutes. In parallel the Fraunhofer Society created an important impetus for the collaboration by investing in a program to enable several guest professors' stays at the Fraunhofer Institute for Solar Energy Systems ISE and scientific exchange between the two countries.

Since 2007, both partners have worked tirelessly towards the optimization of the so-called membrane electrode assembly (MEA), which is where the electrochemical reactions occur. Its optimization will not only lead to improved performance and increased durability, but will also lower the overall costs of PEM fuel cells, making them competitive. To date, we have collaborated through three BMBF-funded projects (PEM-CaD, GECKO and DEKADE) from the German side that were complemented by CaRPE-FC on the Canadian side. The main aims of the projects were the development of novel characterization methods, understanding the underlying mechanisms behind performance loss, degradation of the MEA and the production of the next generation MEA.



International Participants of the First Canadian-German Workshop on Fuel Cell Quality Research 2018 at Fraunhofer ISE (Freiburg). Source: Fraunhofer ISE

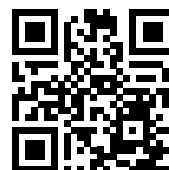
The cooperation between Canada and Germany on fuel cell R&D is only a natural outcome for both countries' commitments to the development of alternative solutions to a global problem. For decades, Canada and Germany have been committed to hydrogen scientific research and hydrogen's application to market-ready products. As signaled by the Ballard's launch of the world's first hydrogen buses in 1986 at the World Expo in Vancouver, Canada is a hub for the fuel cell and hydrogen industry, including and not limited to Daimler, Audi and Volkswagen, Ford, Hydrogenics, Greenlight and AVL. In addition to this industrial support, there has been strong support for the industry from the federal and provincial governments on both sides of the Atlantic. Industry and government have partnered to support the development of basic scientific and applied research on fuel cells. As equal partners in the world's journey towards a hydrogen economy, Canada's and Germany's contributions have been critical, not only in quantity, but also in scientific and technical impact.

Throughout the years, we have laid a strong foundation for collaboration, building on relationships through personnel exchange in both directions. As a result, a strong network between Freiburg and Vancouver has been constructed with

the main partners being Fraunhofer ISE and the University of Freiburg in Germany and Simon Fraser University (SFU), the University of British Columbia (UBC), and the National Research Council of Canada (NRC). Through these exchanges we have produced scholarly talks, publications, joint conferences and workshops, patents, and awards. Our work has been awarded the F-Cell award twice, in 2015 (GECKO) and in 2020 (DEKADE). In addition, we have recently contributed a joint publication on the attributes and properties to consider in quality control. This key contribution will become an industry standard and is a true testament to the power of open collaboration. Ongoing collaboration will remain even more valuable in a future where generational problems can only be solved through partnership.



Further Information at Kooperation international



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► <https://s.dlr.de/16-14>

Canadian-German Cooperation in the Neurosciences: From BigBrain to HIBALL

In den frühen Nullerjahren begann die langjährige, äußerst erfolgreiche Zusammenarbeit zwischen den Instituten von Katrin Amunts am Forschungszentrum Jülich (FZJ) und Alan Evans an der McGill University. Im Rahmen des BigBrain Projekts wurde ein extrem hoch aufgelöstes 3D-Modell eines menschlichen Gehirns erstellt, das beispiellose neuroanatomische Einsichten ermöglicht. Das deutsch-kanadische Helmholtz International Lab HIBALL wird diese Kooperation ab 2020 weiter vorantreiben und in Zusammenarbeit mit kanadischen und deutschen Einrichtungen neuartige Deep Learning Methoden und neueste Supercomputing-Architekturen sowie miteinander kompatible Forschungsinfrastruktur rund um BigBrain für Europa und Kanada entwickeln. Damit wird eine nachhaltige, transkontinentale Forschungsplattform zur Berechnung des Gehirns aufgebaut.



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James McGill Professor of Neurology
Director McGill Centre for Integrative Neuroscience (MCIN)
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Prof. Dr. med. Katrin Amunts
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Brain mapping is a branch of neuroscience that combines brain imaging and advanced computational techniques to understand the brain. Researchers combine data from thousands of individual brains within a common coordinate space, in the same way that we identify any location on Earth's surface using longitude and latitude. This powerful approach reveals how the brain differs between groups at every point in the brain, enabling a deeper study of normal brain development or aging, as well as brain disorders like autism or Alzheimer's disease.

This common coordinate space is derived from a 3D reference image of the brain, usually derived from Magnetic Resonance Imaging (MRI). Typical MRI resolution is 1mm, or 1000 microns, but in the early 2000's two international researchers set out to create a reference brain with much higher resolution. Katrin Amunts, a world-class neuroanatomist, and Alan Evans, a world authority on brain imaging, created the BigBrain dataset. Amunts' team at Germany's Forschungszentrum Jülich painstakingly cut a human brain into over 7000 sections that were then digitized. At McGill University, Evans and his team

processed these two-dimensional, digital sections to correct for mechanical artifacts and missing data, using a combination of manual correction and advanced image processing techniques. The collaboration resulted in a 3D map of the entire brain at 20 micron resolution in each of the three dimensions. As a result, BigBrain is equivalent in size to 125,000 MRI volumes.

Published in Science in 2013, BigBrain was made available as a public resource and downloaded over 25,000 times worldwide.

Even today, a decade after its creation, BigBrain remains the gold standard for whole-brain imaging. However, it is only the first step in a larger vision, as Amunts and Evans are now using BigBrain as the foundation for a new project: the 'Helmholtz International BigBrain Analytics and Learning Laboratory' (HIBALL). Combining BigBrain's detailed model of the brain's anatomy with 3D maps outlining the density of neuroreceptors in the brain, connections between nerve cells, and the brain's electrical patterns, HIBALL uses artificial intelligence

(AI) to simulate the network architecture and decision-making operations of the brain. Such computer-simulated exploration takes advantage of the booming information technology (IT) revolution to offer new insight into how the brain works (or how it breaks down in brain disorders). Similar in spirit to 'big data' physics projects like

Canada's Sudbury Neutrino Observatory and TRIUMF particle accelerator, HIBALL provides a forum for international scientists to explore the brain. A key HIBALL goal is to offer big-data analytics on Canada's Information Technology (IT) infrastructure for free, making Canada a global hub for big-data neuroscience. These examples offer a vision for Canada's future role within international research networks. Major Canadian investments in training, infrastructure, computational research and faculty hiring, remembering that research is about people and ideas, not just hardware, will have the greatest payoff for Canada in the long term.



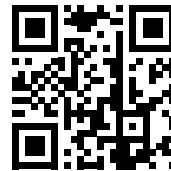
Preparation of human brain tissue sections at INM-1
Source: Mareen Fischinger

and Brain Stimulation efforts. Developing ultra-high-resolution models of the human brain creates big challenges for computer power and data handling, that require advanced supercomputing, including upcoming Exascale computing. As a result, HIBALL has relevance far beyond

neuroscience, linking researchers across many different fields and educating a new generation of computationally advanced researchers.



Further Information at Kooperation international



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HIBALL is funded by the 'Healthy Brains, Healthy Lives' initiative at McGill University and Canadian partners include the Montréal Institute for Learning Algorithms (MILA). In Germany, HIBALL creates synergy with Helmholtz AI and is a strong partner for the European flagship 'Human Brain Project', broadening the network that the German-Canadian Lab has formed. The EU level partnership makes brain atlases available through the new European EBRAINS IT infrastructure and has created new connections to clinically-oriented Brain Modelling

ERA PerMed: German-Canadian Cooperation in Health Research within European Partnerships

ERA-NETs gehören zu den Public Public Partnerships (P2Ps) an denen sich Förderorganisationen verschiedener, vor allem europäischer Länder beteiligen, um transnationale Forschungskonsortien zusammen mit der Europäischen Kommission zu finanzieren. Die Bedeutung solcher Partnerschaften für die deutsch-kanadische Forschungskooperation zeigt das Beispiel des ERA-Net Cofund for Personalised Medicine (ERA PerMed). 2018 stimulierte eine erste gemeinsame Förderbekanntmachung zu diesem neuen Gebiet der Medizin die Bildung zahlreicher Forschungskonsortien mit deutscher und kanadischer Beteiligung und Koordinierung.

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Personalized Medicine is a concept that promises evolution from a 'one-size-fits-all' approach to an approach incorporating the needs and characteristics of each patient. According to the European Commission, personalized medicine refers to "a medical model using characterisation of individuals' phenotypes and genotypes (e.g., molecular profiling, medical imaging, lifestyle data) for tailoring the right therapeutic strategy for the right person at the right time, and/or to determine the predisposition to disease and/or to deliver timely and targeted prevention". As a cross-cutting topic, personalized medicine approaches are not limited to a specific disease indication. Cancer and rare diseases are possibly the most advanced fields, but the concept of personalized medicine is increasingly being applied to other therapeutic areas, including, for example, neuroscience and cardiovascular diseases.

For both Germany and Canada, this field has been a research funding priority for some time. On the European level, personalized medicine has also received a great deal of attention. The ERA-Net Cofund for Personalised Medicine (ERA PerMed) was launched in this context. It is closely connected to the International Consortium for Personalised Medicine (ICPerMed). Both of these initiatives stem from the CSA PerMed project that the EU funded

under the Seventh Research Framework Programme (2013 – 2015). ERA-Nets, which fall into the category of Public Public Partnerships (P2Ps) are consortia of research funding organizations that implement Joint Transnational Calls for research proposals. With the financial support of the European Commission for networking and management, the research funding is mainly provided by the national and regional funding organizations. ERA-NETs tend to be open to the participation of non-EU member countries like Canada.

ERA PerMed, coordinated by the National Institute of Health Carlos III (ISCIII), Spain, is the largest ERA-Net in health research, both in terms of participating countries and funders (23 and 32, respectively) and in the budget raised for the Joint Transnational Calls. ERA PerMed aims to foster the implementation of personalized medicine approaches by funding translational, interdisciplinary projects that span the whole value chain of research, from biomedical research to implementation science.

In the first Joint Transnational Call of ERA PerMed 2018, the Canadian Institutes of Health Research (CIHR) and the Fonds de recherche du Québec – Santé (FRQS, Québec) from Canada, as well as the German Federal Ministry of Education and Research

(BMBF) and the Saxon State Ministry for Higher Education, Research and the Arts (SMWK; Saxony) from Germany were involved.

The topic of the call was a “smart combination of preclinical and clinical research with data and ICT (information and communication technology) solutions”. This call funded interdisciplinary, translational projects in personalized medicine that combined preclinical and/or clinical research with bioinformatics components to enable data quality and the potential applicability for healthcare providers. Through this call, 25 transnational research consortia, each consisting of 3–7 research groups from at least three different countries, were selected for funding, representing a total investment of EUR 28 million. These ongoing projects cover a wide range of disease areas, including cancer, neurological, cardiovascular, nephrological, and allergic diseases. Both Canadian and German research groups were very successful, with German partners participating in 22 of the funded consortia and Canadian partners participating in 12. Out of these, 10 consortia have both German and Canadian partners, with four German and four Canadian coordinators (see Box for two examples and link at the end of the article for full overview). Overall, these collaborations under the European umbrella truly testify to the research excellence and shared priority of personalized medicine research in both Germany and Canada.

In the current European research and innovation funding programme, Horizon Europe, the ERA-Net funding instrument is replaced by European Partnerships. Personalized medicine is one of the suggested topics, which – if selected – could offer new opportunities to strengthen research collaborations between Canada and Germany.

ERA PerMed

Canadian-German projects in ERA PerMed's Joint Transnational Call 2018

Two illustrative projects with partners from both Canada and Germany from the first Joint Transnational Call in 2018 are described below. The projects began in 2019 with a planned duration of three years. More details on all of the projects funded by ERA PerMed can be found on ERA PerMed's website.

PersoProCaRisk: Integrative Personalized Risk and Therapy Stratification of Localized Prostate Cancer

Coordinator: University Medical Center Freiburg, Germany

Canadian Partner: University of Toronto, Canada

Other Partner Countries: France

The aim of PersoProCa Risk is to improve diagnosis, risk prediction and therapy in prostate cancer with the use of multidimensional molecular data. This data will help to decide for each patient whether a treatment is needed, and whether radiation therapy or surgery would be the best option in their case.

RAISE-GENIC: Rational antiepileptic drug selection by combining gene network and ICT analysis

Coordinator: University of Calgary, Canada

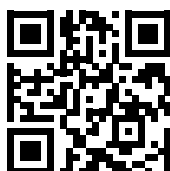
German Partner: Goethe University Frankfurt, Germany

Other Partner Countries: Finland, Belgium

Epilepsy is treated with anti-seizure drugs. Many anti-seizure drugs are available, but selecting the right drug for a specific patient is currently based on trial-and-error. The aim of RAISE-GENIC is to allow a better prediction based on a combination of cell culture experiments and ‘big data’ analysis of genetic data, brain wave signals and brain imaging data.



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