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### Canada's contribution to excellence in science and innovation: NRC signature stories

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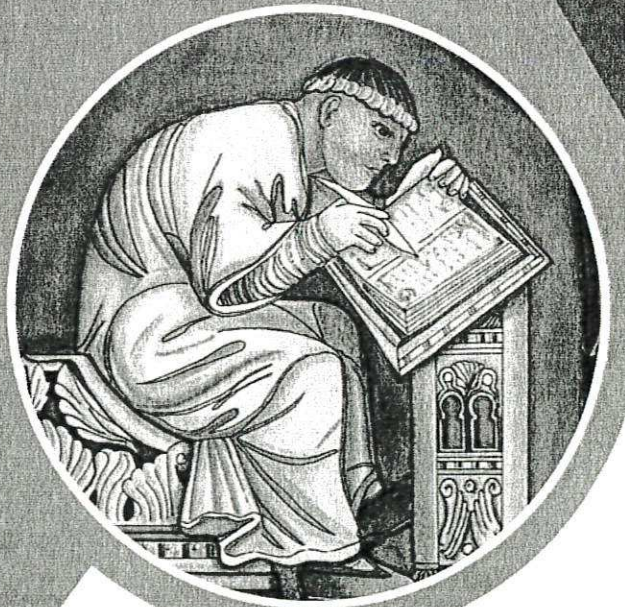
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**Canada's Contribution to  
Excellence in  
Science and Innovation**

**NRC Signature Stories**



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# 1. Introduction

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The National Research Council (NRC) is in the midst of a Corporate Positioning initiative to redefine the way it presents itself to the public, build on its positive image, and make NRC's science and technology (S&T) activities more accessible and relevant to Canadians.

NRC's new S&T messaging is based on "solving tomorrow's problems today." The focus will be on describing the impacts of NRC's S&T activities on issues that matter most to Canadians, such as safe drinking water, air pollution, fast food, genetically modified food, and climate change. Working with NRC representatives from the institutes, NIVA has been engaged to identify and develop a series of signature project success stories that will form the basis of a variety of future communication vehicles (e.g., new and traditional media, website content, and other outreach products).

## 1.1 Evaluating Suggested Success Stories

The process to identify specific success stories was initiated through the compilation of a draft inventory of programs and projects underway in NRC institutes. Based on this list, representatives from each institute were engaged to help identify potential projects for consideration based on media interest, impact or potential impact, the multi-disciplinary nature of the project, and other key criteria.

### Interviews and Information Gathering

NIVA contacted communications officers and spokespersons from the institutes to gather a list of projects and initiatives that would collectively tell the general public how NRC is solving tomorrow's problems today and making a significant contribution to Canada's economy. NIVA distributed a list of discussion topics to institute representatives to further explore potential success stories. The response was enthusiastic and prolific. Almost 100 suggested stories were discussed in detail in extensive interviews conducted over several weeks. Following these interviews and other research, NIVA evaluated the projects to determine their merits and marketability, using but not limited to the following criteria:

- Impact on Canadians, based on findings expressed in the corporate positioning presentation (e.g., how they address public health issues, solve Canadian security concerns, etc.);
- Federal S&T priorities;
- Representation across NRC's broad themes and initiatives (clusters, programs, and institutes);
- Multi-disciplinary collaboration involving institutes, other government departments, small- and medium-sized enterprises, innovation clusters, and industry;
- Current use in existing NRC communications, previous media exposure, and availability of good spokespersons;
- Applicability over a wide range of communication vehicles; and
- Geographical representation.

## Analysis

An evaluation matrix was developed and used to rank the projects, based on a point-rating system that attributed points based on 19 criteria. The ranking that resulted formed the basis of further internal discussions. The merits of highly ranked stories were compared against lower ranked stories to provide a reality check on the process. In a certain number of cases, owing to the specific nature of some projects, it was clear that the ranking system had an inherent bias that tended to score some success stories at a level that belied their potential. For example, stories of an astrophysical nature that might have the potential for high media or public interest would not rank in the top tier since they tended not to address health or environmental concerns. As a result, NIVA analysts' experience and knowledge of audience preferences were also applied to adjust the ranking.

Coverage across a wide range of institutes was also determined to be important; this consideration also factored into our evaluation to some degree. Since funding information was not available in standard formats for comparison, it was not used as a rating criterion. However, where possible, significant financial expenditures were noted in the story highlights.

## 1.2 Committee Review Process

Of the almost 100 stories evaluated in depth, 52 potential success stories were selected for the first round of evaluations to use in NRC's corporate positioning initiative. These stories were presented in a report for review. To provide some perspective, the stories were grouped according to federal S&T priorities: health and related life sciences and technologies, natural resources and energy, environmental science and technologies, information and communications technologies, and other federal priorities. In cases where a success story cuts across multiple S&T priorities, the most relevant priority was used. The report was reviewed by the following team:

- Katharine Trim, Director General, NRC Communications and Corporate Relations Branch
- Andrew Norgaard, Director, Strategic Communications
- Taylor Bildstein, Senior Communications Advisor, Strategic Communications
- Anne-Marie Brugger, Strategic Communications Advisor, NRC Physical Sciences
- Susan Dell, Project Manager, NRC Investment Plan & Management of Projects
- Nishma Kassam, Planning Officer, Planning and Performance Management
- Leslie Meerburg, Media Relations Advisor, Corporate Relations
- John Burke, Principal, Burke Cader Media Strategies
- Anton Holland, Senior Vice-President, NIVA Inc.
- Kendra Toby, Senior Communication Consultant, NIVA Inc.
- Kasia Kaluzny, Communication Consultant, NIVA Inc.

Following group discussions and deliberations on relevance and impact of the stories on Canadians, 14 signature stories ready for immediate use in the corporate positioning initiative were selected and are listed in the following pages of this document. Others were grouped in categories such as themes that require further development and stories that could be used for other purposes.

A brief description of each story is provided, along with a potential tagline, evaluation highlights, participating institutes, intended audience, and named spokespersons.

## 1.3 How This Document Is Organized

The remainder of this document is organized as follows:

- Section 2, “*Signature Stories*” provides the list of 14 signature stories ready for immediate use. The story pitch, project and institute on which the story is based, and suggested spokesperson are indicated.
- Section 3, “*Selected Story Themes for Further Development*” presents groups of stories that can be combined and worked into a thematic story. For these stories, further work will be required to identify other projects that fit under each theme and to gather the necessary background information to write the summaries.
- Section 4, “*Selected NRC Stories for Other Purposes*” provides stories that have potential for development at a later date or for specific audiences.
- Appendix A, “*Content Template*” presents suggested content structure and design through draft content for 10 sample signature stories (currently under development).

Appendix B, “*Eliminated Stories*” lists the stories that were considered but ultimately rejected for use at this time.

## 2. NRC Signature Stories

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The following stories were selected to brand NRC and target a general Canadian public audience.

### New Innovations Will Improve Heart Disease Treatment

**Story Pitch:**

Every seven minutes in Canada, someone dies from heart disease or stroke. Improved imaging and diagnostic tools for treating heart disease will increase the survivability of patients experiencing evolving heart attacks and improve the success of surgery and treatment options such as the use of stents. Researchers from five NRC institutes are working with an NRC spin-off company to develop and commercialize tools to enable better triage, improve the safety and effectiveness of coronary angioplasty, and guide surgery and treatment.

**Project for Story Basis:** Heart Disease: Better Tools for Better Treatment  
(IBD, IMI, SIMS, IMS, GHI)

**Spokesperson:** Michael Sowa (IBD)

### Testing a Vaccine to Treat Cancerous Tumours

**Story Pitch:**

Cancer is expected to surpass heart disease as the leading cause of death in Canada in 2010. NRC is assisting a Halifax company to test a new weapon in the arsenal to fight the disease: vaccines that target tumours. Researchers are using magnetic resonance imaging to follow progress and determine whether the vaccine is effective at eliminating tumours.

**Project for Story Basis:** Vaccines for Cancerous Tumours  
(IBD, IRAP)

**Spokesperson:** Ryan D'Arcy (IBD)

## Improving Battery Technology

### Story Pitch:

The demand for hybrid electric vehicles and plug-in hybrid electrical vehicles is growing rapidly. NRC researchers are collaborating with university and industry partners to improve the performance, lifespan, and safety of lithium ion batteries, which have three times greater energy density than the nickel metal hydride batteries currently used in hybrid vehicles. Their work will make lithium ion batteries safe enough to use in vehicles while significantly lowering their cost.

**Project for Story Basis:** Improving Electrical Storage (Battery) Technology (ICPET)

**Spokesperson:** Isobel Davidson (ICPET)

## Mapping Canada's Coastline for Sustainable Energy

### Story Pitch:

Tidal power is a sustainable energy resource that holds almost limitless power. NRC's Canadian Hydraulics Centre (CHC) is using its knowledge of Canada's coastline to develop an energy map for future exploitation. Results from 14 different tide models have been used to analyze over 250 potential sites. The top 190 sites have the potential to provide over 42,000 MW of power, enough for 42 million homes.

**Project for Story Basis:** Coastal Energy Map: Waves, Tides, and Currents (CHC)

**Spokesperson:** Andrew Cornett (CHC)

## Assessing Survival-at-Sea Options

### Story Pitch:

The risks of working on the North Atlantic has spawned a unique cluster of industries that produce lifeboats, survival suits, location beacons, and evacuation systems. The NRC Institute for Ocean Technology has partnered with Memorial University in St. John's, Newfoundland, as well as industry, regulatory and rescue agencies, and government organizations to test lifeboat hull designs in pack ice and wave conditions, set baseline data for different marine evacuation systems, and develop new software that will help vessel designers and operators optimize evacuation systems according to weather and geographical area.

**Project for Story Basis:** Escape and Rescue Evaluation (IOT)

**Spokesperson:** António Simões Ré (IOT)

## Hemp and Other Industrial Enzymes

### Story Pitch:

Enzymes enable environmentally friendly processing of hemp and other fibres to make textile-grade materials that are stronger, more versatile, and save money. Enzymes used in the treatment of cellulose waste can produce ethanol fuel, turning industrial waste produced in Canada into a potential energy source. NRC's Institute for Biological Sciences (IBS) partners with companies to develop enzymes that can be used for a wide range of industrial applications.

**Project for Story Basis:** Industrial Enzymes (IBS)

**Spokesperson:** Dr. Wing Sung

## Finding Cold Comfort for Aircraft Engine Technology

### Story Pitch:

Operating aircraft in Canada's cold climate places huge demands on aviation technology that must operate safely and reliably at all times. NRC's Institute for Aerospace Research (IAR) and a consortium of engine manufacturers are working together at a unique research facility (CanETREC) that specializes in supporting engine icing certification and research and development (R&D) of new, more efficient and advanced aerospace designs. NRC's direct involvement will provide a significant contribution to the aviation industry's understanding of the effects of ice crystals on the operation of large aircraft engines.

**Project for Story Basis:** Aeronautical Engine Icing  
(IAR)

**Spokesperson:** Jim McCloud (IAR)

## World-class Fabrication Centre Helps the Photonics Industry

### Story Pitch:

Canada has 370 photonics companies employing some 20,000 people who collectively generate close to \$4.5 billion annually, with approximately 85 percent from exports including 50 percent to the United States. A world-class industrial grade facility, NRC's Canadian Photonics Fabrication Centre supports the growth of the photonics sector by reducing the risk of investment in photonic technology and "bridging the gap" from innovation to product commercialization. The Centre provides a unique advantage to its clients by leveraging NRC's world-class R&D infrastructure within the Institute for Microstructural Sciences (IMS), NRC's incubation facilities, and sources of capital.

**Project for Story Basis:** Canadian Photonics Fabrication Centre  
(IMS, IRAP)

**Spokesperson:** Frank Sheppard (IMS)

## Better Diagnostics for Infectious and Chronic Diseases

### Story Pitch:

From prostate and colon cancer to flesh-eating disease, NRC's institutes are developing a variety of state-of-the-art diagnostic devices, such as hand-held readers (biochips) that doctors can use bedside, which will improve the speed and accuracy of patient treatment, potentially saving thousands of lives and millions of dollars to the health care system.

### Potential Project(s)/Research for Story Basis:

- **Biochips for Diagnostics (IMB, INH):** Developing devices capable of quickly detecting pathogens at the point-of-care by detecting their specific DNA.
- **Multi-functional Nano-particles Platforms for Bio-molecular and Cellular Diagnosis Applications (IBS):** Designing microscopic probes called "nanoparticles" to identify different types of pathogens faster and give epidemiologists a vital head start on containing disease outbreaks
- **Magnetic Resonance Spectroscopy/Biomolecular Magnetic Resonance Facility (IMB):** Using spectroscopy equipment to develop diagnostic methods for thyroid cancer, urinary tract obstruction, and other medical conditions.
- **Molecular Imaging (IBS):** In collaboration with ART, new diagnostic applications of patented time-domain optical pre-clinical imager and equipment for detection of stroke and acute renal failure are being developed.
- **Collaborations with Sirius Genomics and Neuro-Hitech Inc., etc.**

**Spokesperson(s):** Jeremy Melanson (IMB) for Biotoxin Project, Ryan D'Arcy (IBD), Geoffrey Mealing (IBS) Christoffe Py (IMS) for Neurochip project

## Improving Construction Materials for Earthquake Protection

### Story Pitch:

The devastation caused by recent earthquakes in Haiti and Chile, as well as the terrorist activities in Oklahoma City and New York, underscore the need for better construction materials to protect public infrastructure against shocks. NRC research using advanced thermoplastics to strengthen concrete has already led to improvements in the strength and sustainability of infrastructure in Canada and around the world.

**Project for Story Basis:** Concrete Infrastructure Protection against Shocks Using Advanced Thermoplastics (IRC, IMI, IAR)

**Spokesperson:** Zoubir Lounis (IRC)

## And the Beat Goes On: Reviving Hearts for Transplant

### Story Pitch:

Time is of the essence in heart transplant operations; many factors affect the viability of a donated heart, not the least of which is the length of time it has not been beating. By developing the means to revive hearts that have not been beating for up to 24 hours, NRC research will increase the number of hearts available for transplant, greatly benefiting Canadians on transplant waiting lists.

**Project for Story Basis:** Investigation of Transplanting Non-beating Hearts (IBD)

**Spokesperson:** Ganghong Tian (IBD)

## Searching for Answers and Treatments for Alzheimer's Disease

### Story Pitch:

By 2031, approximately three quarters of a million Canadians will suffer from a form of aging-related dementia, the majority of which will be due to Alzheimer's disease. NRC is leading multiple research projects aimed at increasing our understanding of the neurological disorder and potential therapeutic treatments.

### Potential Project(s)/Research for Story Basis:

- **Biotoxin Analytical Development and Validation Project (IMB, INH):** Research into spirolides, a class of marine biotoxins, for potential treatment of glaucoma, Parkinson and Alzheimer's disease
- **Laboratory for Clinical Magnetoencephalography (IBD):** The (Mag) lab, which will provide a non-invasive technique for measuring brain activity, can be used to assess brain traumas and diseases such as epilepsy and Alzheimer's.
- **Neurochip (IBS, IMS, SIMS, IMI):** New chip could simulate diseases of the brain by mixing different types of neurons and testing how living tissue interacts with environmental toxins or new therapeutic drugs without having to use animals or other alternatives such as patch clamping.
- **Antibodies Research (IBS):** developing antibodies against certain elements that may be responsible for brain deterioration in people with Alzheimer's disease.
- **Bioactives for Neurological, Obesity-related, and Infection- and Immunity-related Disorders (INH):** Studying the cause and process of cell damage in neurodegenerative diseases like Alzheimer's and how natural compounds like anti-oxidants can be used in future therapeutic and preventative approaches to the disease.
- **Magnetic Resonance Imaging (IBD):** Working with France's Commissariat à l'énergie atomique (CEA) to develop innovative technologies that will use high-powered magnets through advanced medical imaging to unlock the mysteries of neurodegenerative diseases such as Alzheimer's.
- **Molecular Imaging (IBS):** In partnership with ART, advancing both scientific discovery and technology development in the emerging field of molecular imaging with the aim of developing better understanding and diagnosis of devastating neurodegenerative brain diseases.

**Spokesperson(s):** Jeremy Melanson (IMB) for Biotoxin Project, Ryan D'Arcy (IBD), Geoffrey Mealing (IBS), and Christoffe Py (IMS) for Neurochip project

## 3. Selected Story Themes for Further Development

The following story themes have been identified for development into success stories. These stories will combine multiple projects. Further work will be required to identify other projects that fit under each theme and to gather the necessary background information to write the summaries.

### New Techniques to Target Cancer and Monitor Radiation Exposure

#### Story Pitch:

About 150,000 Canadians are diagnosed with cancer every year, roughly half of whom eventually receive radiation treatment to destroy their tumours. Doctors must ensure they are delivering just the right amount of radiation during cancer treatments—it must be enough to kill the cancer cells but not so much that it could harm the patient by destroying healthy tissue. NRC has played a critical role in ensuring the accuracy of radiation therapy in Canada and is an international leader in this field, verifying standards, and developing new dose calculation software that provides health care professionals with a speedy and highly accurate means of helping their patients, and calculating the amount of radiation to which patients are exposed during their lifetimes.

**\*Note: Activities are distinct from those of Health Canada's Radiation Bureau.**

#### Potential Project(s)/Research for Story Basis:

- **Monte Carlo Software for Radiation Calibration (IMB, INH):** Program devoted to the development, refinement, and application of Monte Carlo techniques for problems of relevance to medical physics.
- **Dose Registry and Radiation Exposure Monitor Project (IIT):** Measuring impact of repeated, low-dose radiation on patients, especially its effect on children and radiation-sensitive organs.
- **BIPM calorimeter and Canada's Ionizing Radiation Standards (INMS):** The institute recently participated in an international program to improve the consistency of radiation therapy around the world.
- **Other projects TBD**

**Spokesperson(s):** Andrew Reddick (IIT) for Dose Registry and Radiation Exposure Monitor Project, Katalin Deczky (INMS) for Monte Carlo Software project

## From Hockey Sticks to 747s: NRC's Cutting-edge Composite Research Yields Lighter Materials

### Story Pitch:

The NRC has established a niche in developing lighter, stronger composite materials (nanotubes and polymer and thermoplastic composites) for a variety of industrial applications, from manufacturing and aerospace to defence and security. Nanotubes, for example, are currently being used by Boeing to make hockey sticks, baseball bats, and Kevlar clothing. Their unique properties (100 times stronger than steel at one-sixth the weight, and best conductors of heat and electricity) could potentially lead to valuable commercial applications, ranging from electronics to chemical process control.

NRC's Institute for Aerospace Research (IAR) is currently supporting a series of 10 projects, including nanocomposite research, that aim to advance manufacturing technologies to improve materials for aircraft: the new materials will be lighter and more aerodynamic, which will reduce riveting and drag, resulting in fuel savings. NRC's Industrial Materials Institute (IMI) recently announced that it will be collaborating with Magna Exteriors and Interiors to create Canada's Composite Centre of Excellence in Vaughn, Ontario. The new centre will be equipped with leading-edge moulding equipment for thermoplastic composites that will be used to develop lightweight and more durable automotive parts. Test results show that natural fibre-reinforced plastics (e.g., mixed with hemp, flax, or soy flour) can reduce a vehicle's weight by up to 30 percent.

### Potential Project(s)/Research for Story Basis:

- **Single-walled Carbon Nanotubes (SIMS)**
- **Light-weight Auto Parts (IMI)**
- **Manufacturing Technologies for Better Materials (IAR)**
- **Other projects TBD**

**Spokesperson(s):** Benoit Simard (SIMS, French) and Orson Bourne (SIMS, English) for single walled carbon nanotubes, and Martin Bureau (IMI) for light-weight auto parts project

## Medical Records Could Reveal Clues to Predict and Prevent Future Outbreaks

### Story Pitch:

Medical records provide critical information that can be used to predict and track disease outbreaks such as listeriosis, swine flu, or other medical emergencies (e.g., Walkerton water crisis). For the most part, this information can be converted into numbers and codes to make it universally understood. However, some information will always be written in text, which makes it difficult to enter into a computer. NRC's Institute for Information Technology (IIT) is conducting research to establish text-mining tools that are flexible and adaptable so that the end-user can use them for processing electronic health records and other medical text in situations where the scope may change, or other forms of uncertainty occur. The technology will ultimately be commercialized and sold to health care services and related industries around the world.

**\*Note: NRC maintains a national digital repository of peer-reviewed health and life sciences literature. The searchable web-based archive is bilingual and free to access.**

### Potential Project(s)/Research for Story Basis:

- **PubMed Central Canada (CISTI):** Launched in February 2010, PubMed Canada is a national digital repository of peer-reviewed health and life sciences literature.
- **Text Mining of Medical Records (IIT):** Developing text-mining tools to access records' essential medical facts that computers cannot yet understand.

**Spokesperson(s):** Pam Bjornson (CISTI) for PubMed Central Canada Project, Joel Martin (IIT) for Text Mining project

## NRC's Out-of-This-World Technology

### Story Pitch:

**[\*\*More information required to develop most interesting lead\*\*]**

NRC astronomers have the world at their fingertips thanks to access to some of the world's best telescope facilities (two in British Columbia, one in Hawaii, and one in Chile), which led to the discovery of a new solar system that includes three planets larger than Jupiter orbiting a star known as HR 8799. The star is 130 light years from Earth in the constellation of Pegasus. The star scientists have also been involved in several major instrumentation projects for the 3.6-metre Canada-France-Hawaii Telescope (CFHT), the Gemini Observatory's eight-metre telescopes and the future Thirty Metre Telescope (TMT).

### Potential Project(s)/Research for Story Basis:

- TBD

**Spokesperson(s):** To be determined.

## Developing the Next Generation of Energy Efficient Buildings and Homes

### Story Pitch:

Buying an energy-efficient home or making energy-saving renovations can offer big savings to a homeowner or business owner. NRC is responsible for developing and maintaining Canada's National Energy Codes for Houses and Buildings and is working on several projects aimed at making homes and buildings across the country, including in the Arctic.

### Potential Project(s)/Research for Story Basis:

- **Canada's National Energy Codes for Houses and Buildings (IRC)**
- **Power Nap (IRC):** Investigating how Canadian homes can become zero-peak power consumers, and demonstrating a practical zero-peak house.
- **Building Envelopes in the Arctic (IRC):** Focusing on air and moisture performance of Canadian Arctic housing.
- **Advanced Façade Solutions: Towards Net Zero Energy Commercial Buildings (IRC)**
- **Eco-Friendly Advanced Thermal Insulation (IRC):** Identifying advanced thermal insulation materials that are renewable, energy efficient, biodegradable and indigenous, and developing a selection guideline for advanced thermal insulation materials targeted at Canadian end users.
- **Demand Responsive Buildings (IRC):** Completed in 2008.
- **Other projects TBD**

**Spokesperson(s):** Guy Newsham (IRC)

## From Forklifts to Olympic Shuttles: NRC Showcases Canada's Fuel Cell Technologies

### Story Pitch:

Canada's fuel cell technology recently received international attention thanks to the 2010 Winter Olympic and Paralympic Games. The Hydrogen Highway Project, led by the NRC Institute for Fuel Cell Innovation (IFCI), operated a showcase system of 20 hydrogen-powered buses and refuelling stations along the highway between Vancouver and Whistler, British Columbia during the Olympic events. The Hydrogen Highway Project is only one initiative to be borne out of the IFCI. The institute houses the Hydrogen and Fuel Cell Gateway, a technology demonstration and exhibit centre, and is currently incubating 14 hydrogen fuel cell companies (e.g., Cellex Power Products, which used the test facility to develop forklift fuel cell packs). **[\*\*More information required to develop best lead\*\*]**

### Potential Project(s)/Research for Story Basis:

- **Hydrogen Highway**
- **Cellex/Plug Power Canada and forklift Fuel Cell Packs**
- **Other projects TBD**

**Spokesperson(s):** TBD

## Sustainable Agriculture: New, More Efficient and Environmentally Friendly Farming Methods

### Story Pitch:

**[\*\*More information required to develop best lead. Literature review did not yield a lot of results\*\*]**

Canada's agriculture sector produces an abundant supply of food, feed, and fibre, but not without impacts to our natural resource base—particularly air, soil, water, and biodiversity. Canadian consumers are increasingly expecting agricultural practices to be conducted in an environmentally sustainable manner—a factor that influences their purchasing decisions and those of like-minded consumers in export markets. NRC is working on a variety of projects, including a partnership with Nature's Crop International (NCI) in Hunter River, Prince Edward Island, to address these concerns and to develop more sustainable farming methods and products. INH is working with Nature's Crop to explore the commercial potential of bioactive compounds that are derived from the waste products of eight different seed oil crops and *Myrica gale*. The objectives of the project are to build both small and large molecule chemical libraries and a detailed natural product chemical database of phytochemicals of processed crops. NCI also intends to discover the biological activity of the extracts in areas such as immune modulation, anti-aging, skin health, and sundry related health applications.

### Potential Project(s)/Research for Story Basis:

- Partnership with Nature's Crop
- Oilseeds for Biofuels
- Other projects TBD

**Spokesperson(s):** Robert Chapman (INH)

## Creating Drought-tolerant Crop Varieties

### Story Pitch:

**[\*\*More information required to develop best lead. What is below is based on very limited literature and would need to be written to avoid possible concerns about biotech and food \*\*]**

Shifting agricultural conditions due to climate change and competing demands for water, have created a high demand for NRC's research and expertise in drought-tolerant crop varieties both in Canada and abroad. Researchers at the Plant Biotechnology Institute (PBI) recently developed a method to enhance a plant's ability to modulate water retention in response to drought conditions. The technology, which results in earlier maturation without a reduction in yield, has been filed in Canada and the United States.

### Potential Project(s)/Research for Story Basis:

- Abscisic acid research
- Plant hormone profiling
- Other projects TBD

**Spokesperson(s):** PBI (to be determined)

## Monitoring Canada's Water Quality and Sewer Systems

### Story Pitch:

**[\*\*More time is needed to identify best approach to this story. Please identify which projects we should include \*\*]**

Clean water: it is something most Canadians take for granted, in part because of the hard work of NRC researchers to develop innovative approaches to water quality monitoring. NRC's Biotechnology Research Institute scientists, for example, have designed DNA microarrays for the identification of 500 water-borne pathogens simultaneously. Other microarrays have been designed to distinguish between harmful strains of the pathogen *Escherichia coli*, and strains that are harmless.

In addition, researchers at the Institute for Research in Construction (IRC) are working with the City of Regina to ensure that the city's aging water and wastewater pipes can be replaced and then continually monitored to support operation and maintenance decisions.

### Potential Project(s)/Research for Story Basis:

- **Investigation of Failure Mechanisms, Long-term Performance, and Management Tools of Asbestos - Cement Pipes in Regina and of Asbestos Cement Water Pipe**
- **Sustainable Management of Municipal Stormwater Drainage**
- **Wireless Sensor Networks for Real-Time Continuous Monitoring and Assessment of Water and Wastewater Pipes**
- **Online Monitoring of Drinking Water Quality**
- **An Integrated Approach to Sustainable Management of Municipal Infrastructure Assets**

**Spokesperson(s):** Charles Greer (BRI); TBD (IRC)

## JASLab

### Story Pitch:

NRC's state-of-the-art Joint Attosecond Science Laboratory (JASLab), the only facility of its kind in the world, houses Canada's fastest X-ray laser flash. Through a strategic partnership with the University of Ottawa, JASLab technology is being used to freeze the motion of electrons or document the movement of molecules during a chemical reaction. The research performed at the JASLab may eventually lead to scientific breakthroughs in health care, diagnostic medicine, nanotechnology, quantum computing, nanotechnology, environmental science, and energy.

**Project for Story Basis:** Stories on JASLab and Paul Corkum (IBD)

**Spokesperson:** Paul Corkum (IBD)

## NRC and Next Generation of ICT

### Story Pitch:

**[\*\*More information required to develop best lead, text below related to 3-D imaging as topic with wide appeal.\*\*]**

### 3D Technology: Creating Roller Coasters and Preserving Ancient Artifacts

NRC's revolutionary three-dimensional (3D) digitizing technologies have been used to create computer graphics for big Hollywood blockbusters, including *Lord of the Rings: Return of the King* and *The Matrix*, and digital records of some of the world's greatest works of art in Paris, including three paintings by Renoir. The technology has applications spanning many fields, not only entertainment and conservation. Virtual reality (VR) simulations can be used for training people to perform complicated or dangerous tasks, like flying a plane or operating a construction crane. Theme park designers can test virtual roller coasters for safety before building the real thing.

### Potential Project(s)/Research for Story Basis:

- 3D imaging and modeling technology and 3D cameras (IIT-Neptec)
- Mona Lisa (IIT)
- Gaming
- Digital Human Modeling project
- Other projects TBD

**Spokesperson(s):** TBD

## 4. Selected NRC Success Stories for Other Purposes

The following stories have potential for development at a later date or for specific audiences. The rationale for why they have been set aside for the time being is indicated under selection rationale.

### Researchers Grow Brain Cells on Neurochips to Study Disease

**Story Pitch:**

Several NRC institutes are contributing their expertise to grow neurons on a semiconductor chip substrate. The neural cells form a functioning synaptic network and send and receive signals among each other. The chip substrate can detect the electrical signals, capture this information, and send it to a computer for data processing. Applications include simulating diseases of the brain by mixing different types of neurons, as well as testing how living tissue interacts with environmental toxins or new therapeutic drugs without having to use animals or other alternatives such as patch clamping. The Institute for Microstructural Sciences (IMS) developed the first prototype chip substrate from silicon glass. Steacie Institute for Molecular Sciences (SIMS) and IMI are working on advancements.

**Selection Rationale:** Difficult for public to understand, but applicable to pharmaceutical industry.

**Project for Story Basis:** Neurochip (IBS, IMS, SIMS, IMI)

**Spokesperson:** Geoffrey Mealing (IBS), Christoffe Py (IMS)

### BRI Paints a Target on Tumours

**Story Pitch:**

The treatment of cancerous tumours is forging partnerships between NRC's BRI and private health care companies. Alethia Biotherapeutics, a Montreal-based biotechnology company, recently concluded an agreement on the terms and conditions of an option to license the exclusive worldwide therapeutic and diagnostic rights on Clusterin-specific antibodies from BRI. Under the terms of the option agreement, Alethia obtains a family of high-affinity antibodies that block the function of secreted Clusterin to prevent tumor invasion. Alethia also gains access to the BRI's expertise in the humanization and production of therapeutics antibodies that will accelerate the development of these monoclonals to the clinical stage. Breast cancer prognostic biomarker sets are being considered for licensing by another Mississauga-based biotech company, YM Biosciences Inc.

**Selection Rationale:** Better suited for a researcher audience.

**Project for Story Basis:** Targeting the Tumour Microenvironment (BRI)

**Spokesperson:** Maureen O'Connor-McCourt (BRI)

## New Centre Houses State-of-the-Art Microscopes

### Story Pitch:

The Hitachi Electron Microscopy Products Development Centre (HEMiC) at the National Institute for Nanotechnology (NINT) houses three new electron microscopes valued at \$7 million, including the first-ever Hitachi environmental transmission electron microscope (Model H-9500) in operation outside of Japan. With funding from the Alberta government, Western Economic Diversification, the University of Alberta, and the NRC, the purchase of the new equipment will make NINT's electron microscope capabilities among the best in the world.

**Selection Rationale:** No clear impact that a general public would grasp right now.

**Project for Story Basis:** Hitachi Micro Electron Product Centre (NINT)

**Spokesperson:** Richard Brommeland (NINT)

## Plants for Health and Wellness

### Story Pitch:

The Plant Biotechnology Institute (PBI) coordinates NAPGEN, a consortium of researchers across Canada that has created a genomics resource for plant natural products. The project involves sequencing plant genomes and building a genomics library. Although the project is winding down, the impact will continue for the next few years. NAPGEN has enabled spin-off research and, to date, has led to over \$30 million in external projects. It provides a resource for gene discovery within biosynthetic pathways, which could lead to new bioactive compounds for disease prevention and treatment.

**Selection Rationale:** Lacks mass public appeal and there is controversy surrounding genetically modified organisms. Better suited for a researcher audience.

**Project for Story Basis:** NAPGEN (PBI, IRAP, CISTI)

**Spokesperson:** John Page (PBI)

## Computer Modeling Helps Resolve Bilateral Watershed Issues

### Story Pitch:

The long history of transboundary flooding issues on the lower Pembina River between North Dakota and Manitoba have been a point of ongoing study and debate for the International Joint Commission. The Commission was created in 1909 by Canada and the U.S. to manage issues related to watersheds, lakes, and rivers shared between the two countries. In the past few years, the CHC has contributed scientific data and modeling to resolve issues surrounding the impact of man-made surface structures in the flooding of the Pembina River on both sides of the border. The Centre became a member of the Lower Pembina River Flooding Task Team (LPRFTT) in 2008. The team will use CHC's expertise and computer modeling resources to assess the impact of proposed mitigation measures.

**Selection Rationale:** Could be developed with link to spring flooding/climate change.

**Project for Story Basis:** International Joint Commission Support (CHC)

**Spokesperson:** Thierry Faure (CHC)

## Fired-up Research for Road Tunnel Safety

### Story Pitch:

The Institute for Research in Construction (IRC), in association with Carleton University in Ottawa Ontario and the National Fire Protection Association, tests the parameters of damage for road tunnel fires in Mississippi Mills, Ontario. Used for conducting tests that simulate realistic fires in roadway and mass-transit tunnels, the test site can accommodate a full-size train or subway car. Research aims to help authorities to select the most appropriate tunnel fire detection technologies, to assist standards-writing agencies to determine performance requirements for road tunnel fire detectors, and to improve fire detection technologies for tunnel protection. IRC researchers have also been called upon to simulate the effects of terrorist attacks on the Holland and Lincoln Tunnels in New York.

**Selection Rationale:** This story has visual appeal, highlights Canada's unique infrastructure, and would be effective if told through video (e.g., as a segment on The Discovery Channel's *Daily Planet*). It can also be given a terrorist-protection spin.

**Project for Story Basis:** Road Tunnel Fire Protection (IRC)

**Spokesperson:** Ahmed Kashef (IRC)

## Producing Medical Isotopes from an Electron Accelerator

### Story Pitch:

Medical isotopes are an effective treatment for many diseases but interruptions due to reactor shutdowns at Chalk River and elsewhere affect supply. The Institute for National Measurements Standards (INMS) has been working on a process to produce medical isotopes from their electron accelerator. The LINAC accelerator was built over 40 years ago as a research tool. Now INMS, working with Natural Resources Canada and a private sector partner, are close to bringing their process to commercialization and resolving the supply issues for a proven medical therapy.

**Selection Rationale:** On hold. Issues with reactor.

**Project for Story Basis:** Using Electron Accelerator to Make Medical Isotopes (INMS)

**Spokesperson:** Carl Ross (INMS)

## Hydrogen Storage Research for Alternative Fuels

### Story Pitch:

Finding a safe way to compress and store hydrogen is one of the biggest challenges in making hydrogen a viable source of energy. NRC's Canadian Neutron Beam Centre (CNBC) is making a significant contribution to the Canadian research community working in the field of hydrogen storage materials (hydrogen fuel engines) with the recent development of new equipment at its laboratory at Chalk River. Beyond supporting an in-house NRC-CNBC research program on hydrogen storage, the experimental infrastructure provides a useful, unique national capability for other research groups within NRC and elsewhere across Canada.

**Selection Rationale:** Too early in development.

**Project for Story Basis:** Hydrogen Storage Research for Alternative Fuels (CNBC, NINT, IFCI)

**Spokesperson:** Helmut Fritzsche (CNBC)

## Low-Cost Organic Solar Cells

**Story Pitch:**

Organic photovoltaic technology will provide consumers seeking clean energy solutions with a low-cost, renewable energy source. Significant progress has been made in developing non-silicon-based chip arrays; however, the technology still faces issues of relatively low-device efficiency and short lifetime as compared to silicon-based solar cells. The project, which is funded in part by NRC, Natural Sciences and Engineering Research Council, Sustainable Development Technology Canada, and the Business Development Bank of Canada, seeks to address both the efficiency (by eight percent in short-term) and lifetime issues, and has the ultimate goal of developing low-cost printable organic solar cells and bringing them to the commercial market.

**Selection Rationale:** Not very exciting.

**Project for Story Basis:** Low-Cost Photovoltaics Produced from Organic Material (IMS, SIMS, ICPET)

**Spokesperson:** Ye Tao (IMS)

## Marine Algae: The Next Generation of Biofuels

**Story Pitch:**

The goal of this project is to develop a biofuel made from algae for use in all types of vehicles, including aerospace, as well as power generation. Algae grows quickly and therefore provides a cleaner, more sustainable, alternative fuel source. Farming algae for biofuel development would create a new industry in Canada (farming will likely take place in the Atlantic provinces). The project is just starting but as it unfolds three NRC institutes will contribute their expertise for each phase: IMB will identify the algae fuel sources and make the fuel; ICPET will refine the fuel; and IAR will test the fuel. Once in the testing phase, there is a possibility for industry collaboration.

**Selection Rationale:** Too hard to visualize.

**Project for Story Basis:** Biofuels from Marine Algae (IAR, ICPET, IMB)

**Spokesperson:** Ibrahim Yimer (IAR)

## Canada's First Iceberg Drift Prediction Model

### Story Pitch:

Oil exploration and production on the Grand Banks contributes significantly to Canada's East Coast economy and the world supply of oil and natural gas. Production can be threatened by migration of icebergs through "iceberg alley" each spring. Provincial Aerospace Limited conducts marine surveillance of icebergs and uses CHC's iceberg drift model to predict the movement of ice that might interrupt oil operations. Once a collision has been predicted, options for the client can be to move the iceberg with towboats or interrupt operations and move the oil rig out of the drift path of the iceberg. The NRC-CHC iceberg drift model is also the first of its kind to predict iceberg calving and the resulting size distribution and drift of "bergy bits"—blocks of ice ranging in size from 2 to 15 metres in length. The first Canadian technology of its kind, the iceberg drift model was developed collaboratively by NRC-Canadian Hydraulic Centre (CHC), McGill University, and Fisheries and Oceans Canada's Canadian Ice Service. Development funding for the research was from Natural Resources Canada's Program of Energy Research and Development. Licensing of the software now provides a revenue stream for NRC.

**Selection Rationale:** Should run in spring; on hold until future Arctic research is defined.

**Project for Story Basis:** Iceberg Drift Model (CHC)

**Spokesperson:** Garry Timco (CHC)

## Appendix B: Eliminated Stories

The stories listed in the following table were reviewed and eliminated for use in the Corporate Positioning initiative at this time.

<b>Project Title</b>	<b>Participating Institute(s)</b>
Virtual Reality Systems for Surgical Oncology	Industrial Materials Institute, Institute for Information Technology , Institute for Biagnostics, Genomics and Health Initiative
Meningitis Vaccine	Institute for Biological Sciences
National Bioproducts Program	Institute for Chemical Process and Environmental Technology, Institute for Microstructural Sciences
Oil Sands Development Program	Institute for Chemical Process and Environmental Technology, Institute for Microstructural Sciences
Hydrogen Storage Research for Alternative Fuels	Canadian Neutron Beam Centre, National Institute for Nanotechnology, Institute for Fuel Cell Innovation
The Magnesium Network	Canadian Neutron Beam Centre
Redekop Cob Harvesting Equipment	Industrial Research Assistance Program
Underwater Vehicles	Institute for Ocean Technology
National Research Council Publications Archive	Canada Institute for Scientific and Technical Information, all NRC
Aquaculture Engineering: Swing Site Open Ocean Containment System	Institute for Ocean Technology; Industrial Research Assistance Program
Synergic3	Institute for Information Technology
Wireless Sensor Networks to Monitor and Assess Water Pipes	Institute for Research in Construction
Assessment Framework for Canada's Infrastructure	Institute for Research in Construction
Measurement Science for Nanotechnology Conference	Institute for National Measurement Standards
Fuels Cells - dPoint Technologies	Industrial Research Assistance Program
Next Generation Hydrogen Fuels Cells	Institute for Fuel Cell Innovation
Cement-based Nanocomposites	Institute for Research in Construction
Fire Performance of Houses	Institute for Research in Construction
Night Vision Goggles for Forest Fires	Institute for Aerospace Research
Helicopter Brownout	Institute for Aerospace Research
Air Vortex	Institute for Aerospace Research

Non-destructive Material Testing	Canadian Neutron Beam Centre
Portable Radiation Detector Prototype	Institute for National Measurement Standards
Manufacture Pure Metals – Firebird Technologies	Industrial Research Assistance Program
Viral Vectors	Biotechnology Research Institute
Manufacture Stable Polymers – Sixtron Technologies	Industrial Research Assistance Program
Mitigation Strategies for Pandemic Preparedness	Institute for Biodiagnostics
Nuclear Medicine	Canadian Neutron Beam Centre
Zebrafish	Institute for Marine Biosciences
Subcellular Processes	Stacie Institute for Molecular Science
Origin Biomed	Institute for Nutrisciences and Health
PORTAGE	Institute for Information Technology
Artemisinin Biosynthesis	Plant Biotechnology Institute
Nano Imprint Lithography	Industrial Materials Institute
Manufacture Equipment Using INMS Software	Institute for National Measurement Standards
Thermospraying	Industrial Materials Institute
Neutron Beam Summer School	Canadian Neutron Beam Centre
Correlator Computer	Herzberg Institute of Astrophysics
Quantum Computing	Institute for Microstructural Sciences
Technology Development	Herzberg Institute of Astrophysics



