NRC·CNRC

NRC Publications Archive
Archives des publications du CNRC

University-Government-Industry Collaboration for Conducting R&D Projects

Moreau, Christian

NRC Publications Archive Record / Notice des Archives des publications du CNRC :
https://nrc-publications.canada.ca/eng/view/object/?id=71722f52-18c3-4f1a-b965-a5df3a16087f
https://publications-cnrc.canada.ca/fra/voir/objet/?id=71722f52-18c3-4f1a-b965-a5df3a16087f

Access and use of this website and the material on it are subject to the Terms and Conditions set forth at
https://nrc-publications.canada.ca/eng/copyright
READ THESE TERMS AND CONDITIONS CAREFULLY BEFORE USING THIS WEBSITE.

L'accès à ce site Web et l'utilisation de son contenu sont assujettis aux conditions présentées dans le site
https://publications-cnrc.canada.ca/fra/droits
LISEZ CES CONDITIONS ATTENTIVEMENT AVANT D'UTILISER CE SITE WEB.

Questions? Contact the NRC Publications Archive team at PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca. If you wish to email the authors directly, please see the first page of the publication for their contact information.

Vous avez des questions? Nous pouvons vous aider. Pour communiquer directement avec un auteur, consultez la première page de la revue dans laquelle son article a été publié afin de trouver ses coordonnées. Si vous n'arrivez pas à les repérer, communiquez avec nous à PublicationsArchive-ArchivesPublications@nrc-cnrc.gc.ca.

National Research Council Canada | Conseil national de recherches Canada

Canada

NRC·CNRC

Industrial Materials Institute

University-Government-Industry Collaboration for Conducting R&D Projects

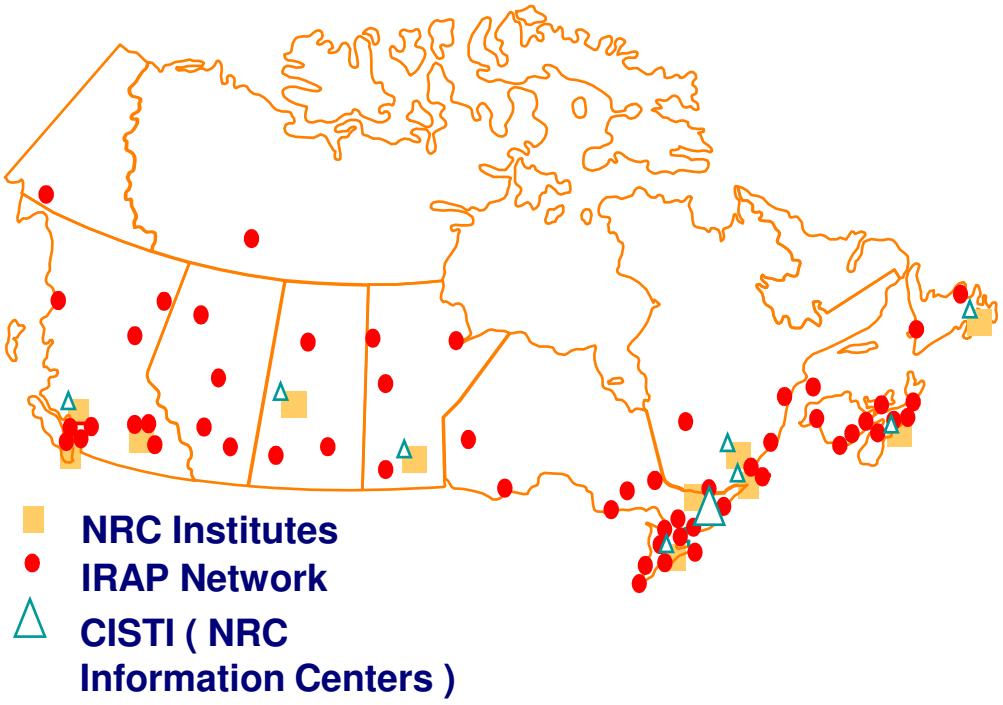
Christian Moreau

Combustion Turbine Coatings Symposium 2005
October 26-27, 2005
Houston, Texas

NRC·CNRC
Industrial Materials Institute

National Research Council - Canada

As Canada's principal public R&D organization carrying out scientific and technical work, the NRC plays a leading role in developing an innovative and knowledge-based economy.



- 18 research institutes
- Close to 4000 employees
- 1 400 guest researchers
- $800 million budget
- $150 million income

NRC·CNRC
Industrial Materials Institute

Outlook

- Introduction:
  - Value of collaborative research
- Roles and objectives:
  - University (U)
  - Government Laboratories (G)
  - Industry (I)
- Challenges
- Examples of collaboration
- Conclusion

NRC·CNRC
Industrial Materials Institute

Introduction

- We are moving towards an economy that is more and more based on knowledge and technology
  - For the industrially advanced countries, future growth will depend more on advanced technologies and less on primary resources
- In this context, the economic value of research activities increases
- It becomes crucial to:
  - Stimulate the creation of new ideas or intellectual property (IP)
  - Protect the IP
  - Translate the new IP in a commercial product/service

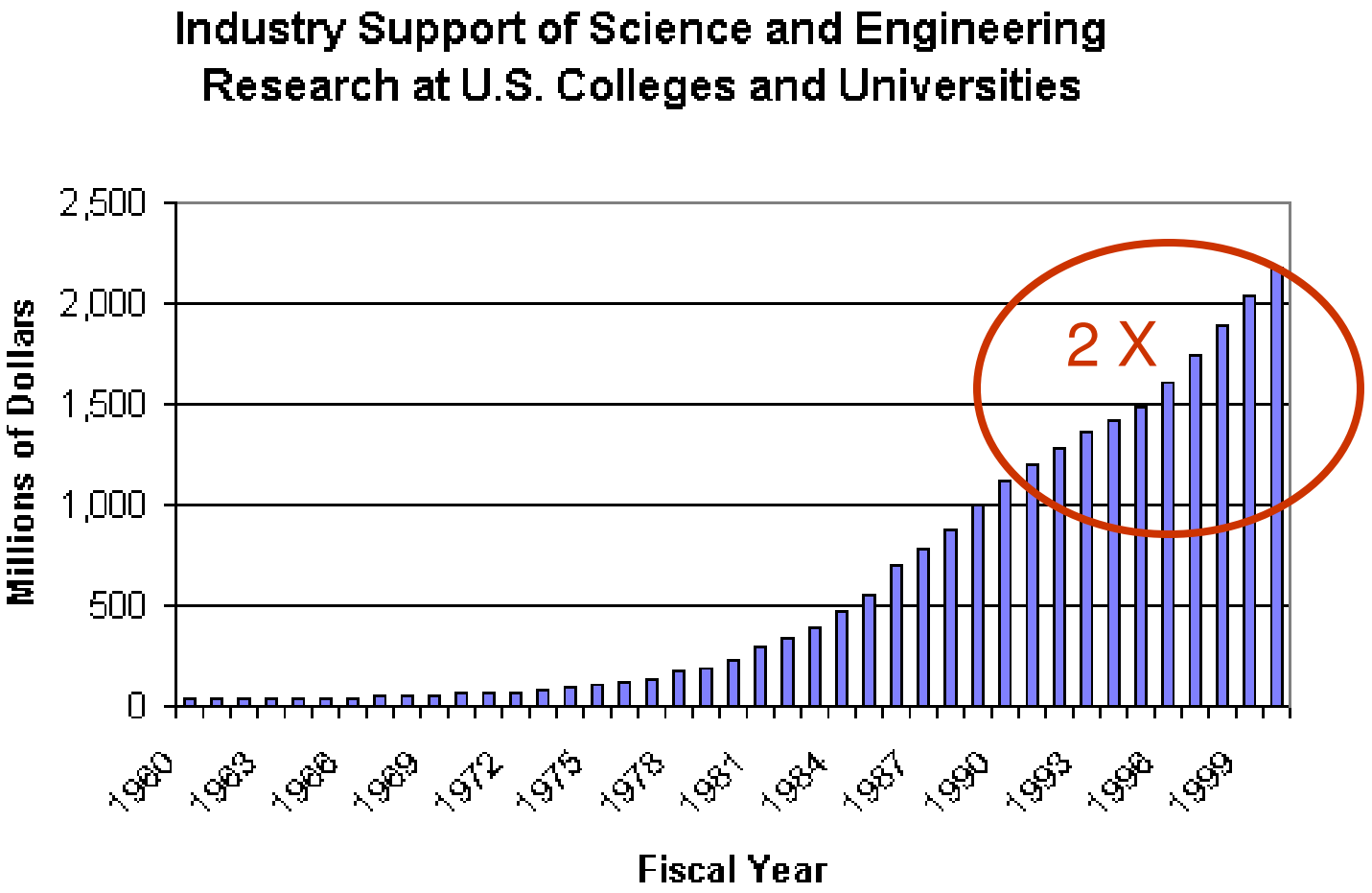
NRC·CNRC
Industrial Materials Institute

Introduction

- These different steps are often times carried out by different actors in different organizations:
  - Research labs
  - Industry liaison offices in U and G
  - Venture capital firms
  - Small and larges enterprises
- The technical skills and knowledge required for the development of new IP are often found through scientists and engineers from different labs:
  - Many companies cut their central research laboratories that did basic, long-term research for cost saving
  - They leverage research capabilities in universities, research institutes and federal laboratories.
- The valorisation of the IP requires the input from different collaborators from U, G and I

NRC·CNRC
Industrial Materials Institute

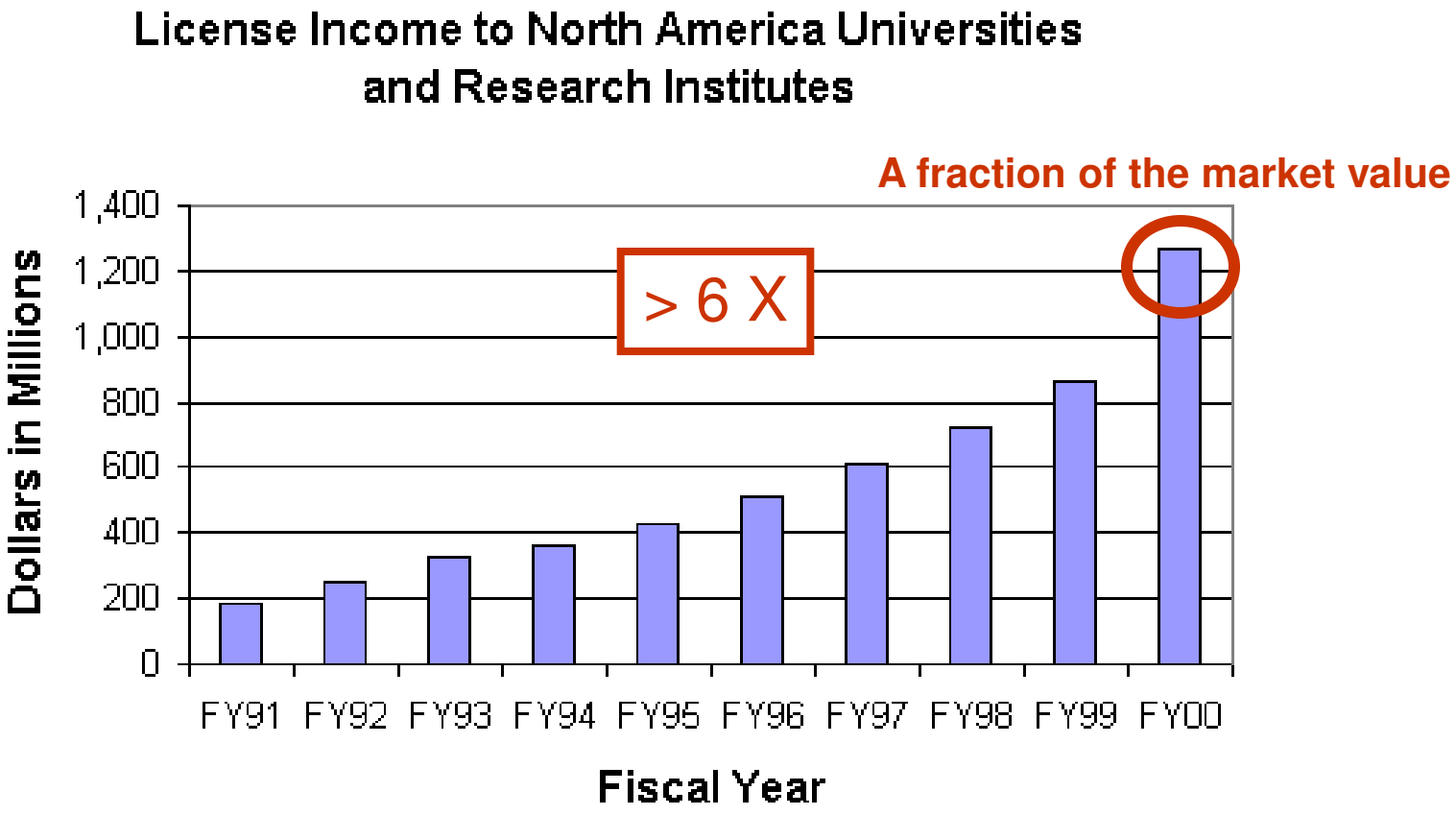
Industry Support of Research



- http://nationalacademies.org/

NRC·CNRC
Industrial Materials Institute

License Income

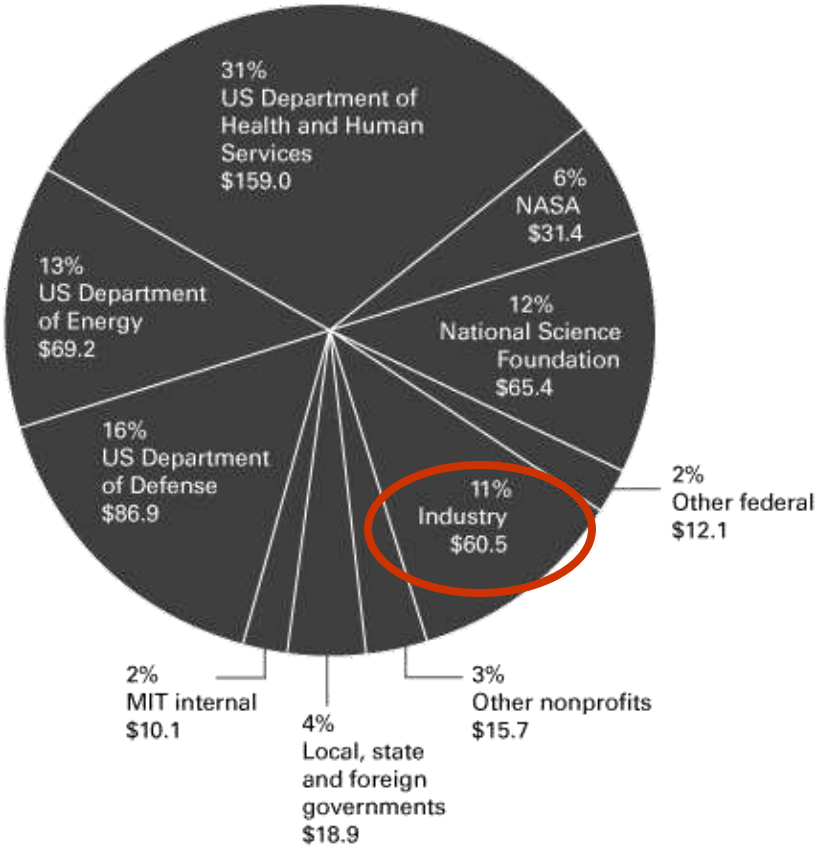


- http://nationalacademies.org/

NRC·CNRC
Industrial Materials Institute

A Few Numbers from MIT

- Each year, MIT grants 10 to 15 percent of its licenses to start-up firms
- Each year, 400 new inventions, and 100 US patents obtained
- 60% of the new patents are licensed within one year
- Boston's 8 research universities provide $7B annual boost to regional economy
- MIT graduates have started 4,000 companies employing 1.1 million people, and having annual world sales of $232 billion

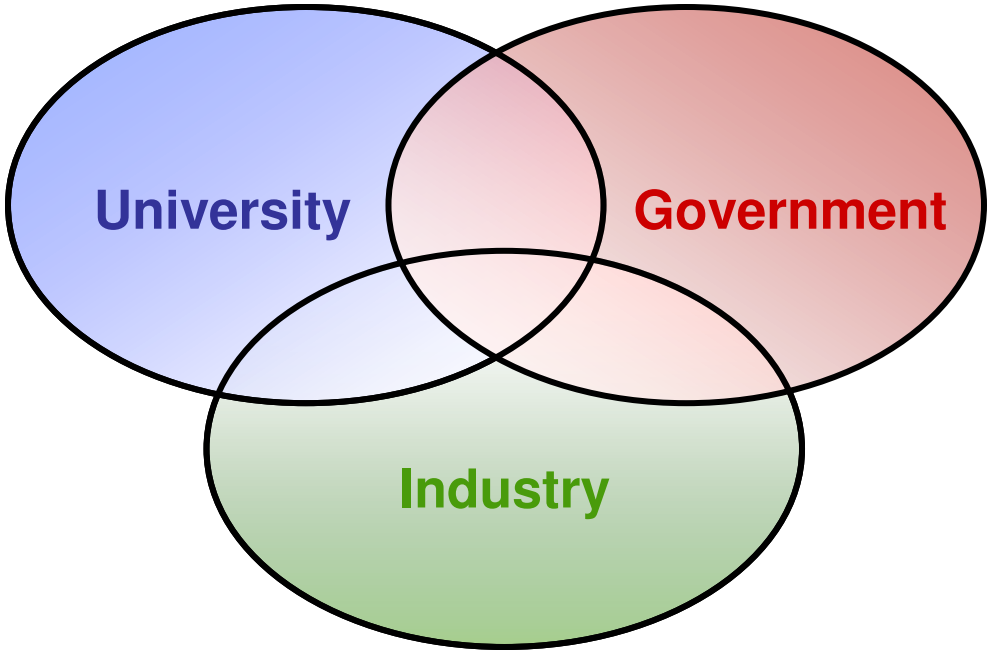


Research Sponsorship:
$ 530 millions in 2004

NRC·CNRC
Industrial Materials Institute

U-G-I Collaborative R&D

- Many types of collaboration are possible between U, G and I (we will see a few examples in this presentation)
- The nature of these collaborations depends on the roles and objectives of each organization



NRC·CNRC
Industrial Materials Institute

University

- Roles:
  - Teaching students:
    - Undergraduate and graduate students
  - Carrying out applied and basic research
- Need money to support their activities
  - Tuition fees
  - Grants from funding agencies and industry
  - Royalties (represent a small fraction of the total revenues)
- Collaborative projects with industry are often times positively seen by granting agencies
- Most universities have put in place a Industry Liaison Office/Program that is responsible for:
  - IP protection
  - Negotiation of contracts and licenses

NRC·CNRC
Industrial Materials Institute

Government National Laboratories

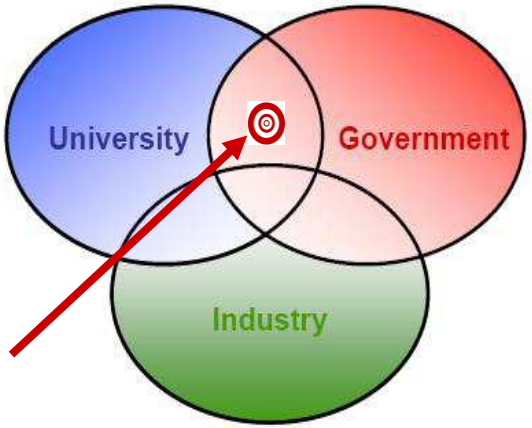
- Roles (NRC for example):
  - Carrying out R&D activities to play a leading role in developing an innovative and knowledge-based economy
  - Creating value through:
    - Advances in scientific knowledge
    - Commercialization and technology transfer
    - R&D assistance to Canadian companies
    - Creation of new companies and highly skilled jobs
    - New and improved technologies
    - Community-based technology cluster and innovation initiatives
    - Provision of scientific, technical & medical information
    - Incubator facilities for young companies
  - Maintaining national facilities
  - Defining standards and methods of measurement

NRC·CNRC
Industrial Materials Institute

Industry

- Roles:
  - Providing value to their shareholders
  - Commercializing services and products
- Needs:
  - Competitive advantages over their competitors
  - New business opportunities
  - Profits

U and G

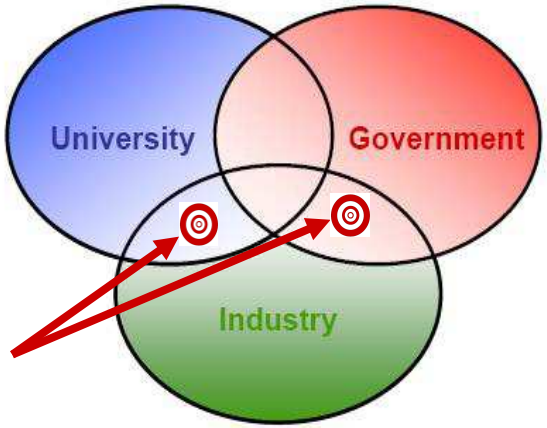


- Projects tend to be oriented towards more basic research with a longer time frame
- IP issues have to be negotiated in advance
- Might be simpler as the objectives are similar
  - A “reasonable” share of the benefits of the research

- G researchers appointed adjunct professors in universities
  - Usually the researchers are not paid by the university (less possibility of conflict of interest)

NRC·CNRC
Industrial Materials Institute

U and I
G and I



- U and G interactions with industry have many commonalities
  - Transfer IP to industry for commercialisation
  - Seek financial or “moral” support for their projects
- Some G laboratories have a clear mandate to help the industry:
  - Better geared to conduct applied research projects with:
    - Specific deliverables
    - Well defined schedule
    - Dedicated scientists and technicians
  - Pressure to publish reduced

NRC·CNRC
Industrial Materials Institute

Challenges

- Intellectual property
  - Ownership
    - U and G want to keep the property to transfer it to another partner if the technology is not used
    - Small spin-off companies financed by venture capital firms would like to have the ownership to increase the “value” of the company
  - Licensing
    - Exclusivity, royalty, field, territory, etc.
    - Companies ask for royalty free licenses when they pay for the project (incremental costs only)
    - The royalties negotiated between the partners depend on:
      - Perceived value of the technology
      - Share of the development cost
      - Exclusivity or not, extent of the field and territory

NRC·CNRC
Industrial Materials Institute

Challenges

- Background rights
  - The company wants to have access to the background IP of the partner to be able to commercialize the IP developed in the project
- Confidentiality
  - U and G researchers need to publish
  - The company's know-how must be kept confidential
  - Publications reviewed by the industrial partner and eventually delayed for a pre-determined period of time:
    - Makes it possible to protect the IP (patent application) before publication
    - Restricts the publication freedom of the researcher
  - U or G researchers working with competitors on the market place
    - Relationship based on trust and fairness

NRC·CNRC
Industrial Materials Institute

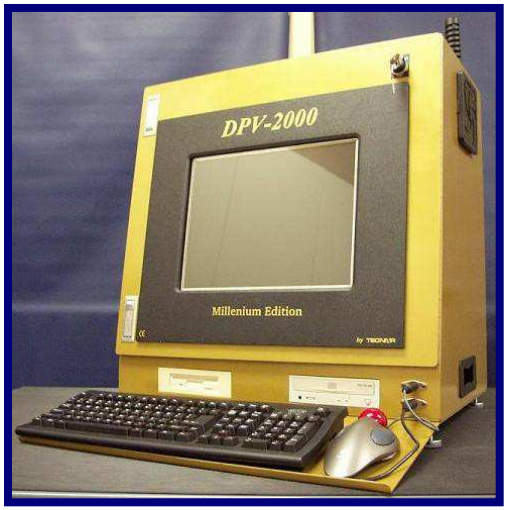
Challenges

- Conflicts of interest
  - Faculty member having his/her own company
    - Not permitted in some Government labs
- Different time horizons
  - Industry tends to look for shorter term results
- Research independence
  - Research curiosity ↔ market needs
- Develop trust between partners

NRC·CNRC
Industrial Materials Institute

Tecnar–NRC: A Long Term Collaboration

- DPV-2000
  - Invented and developed at NRC without the company financial support
  - Technology license offered to Canadian firms
  - Agreement with Tecnar that didn't know anything about thermal spray at that time
  - The first systems sold were exact copies of our prototype

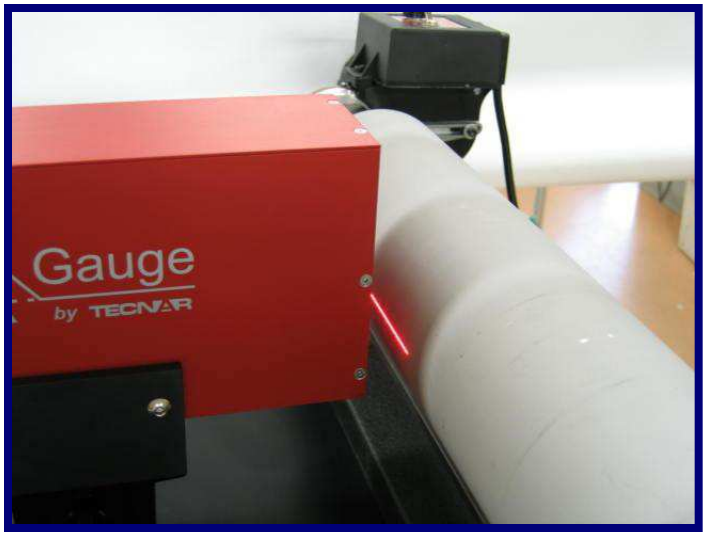


- AccuraSpray:
  - Proof of concept and patent application done by NRC
  - R&D project with Tecnar to develop a first industrial prototype financed by IRAP
  - Today the third generation is on the market

NRC·CNRC
Industrial Materials Institute

Tecnar–NRC: A Long Term Collaboration

- LayerGauge
  - Invented and preliminary tests done at NRC
  - Discussions with Tecnar
  - R&D project signed to better define the concept (joint patent application) and develop an industrial prototype

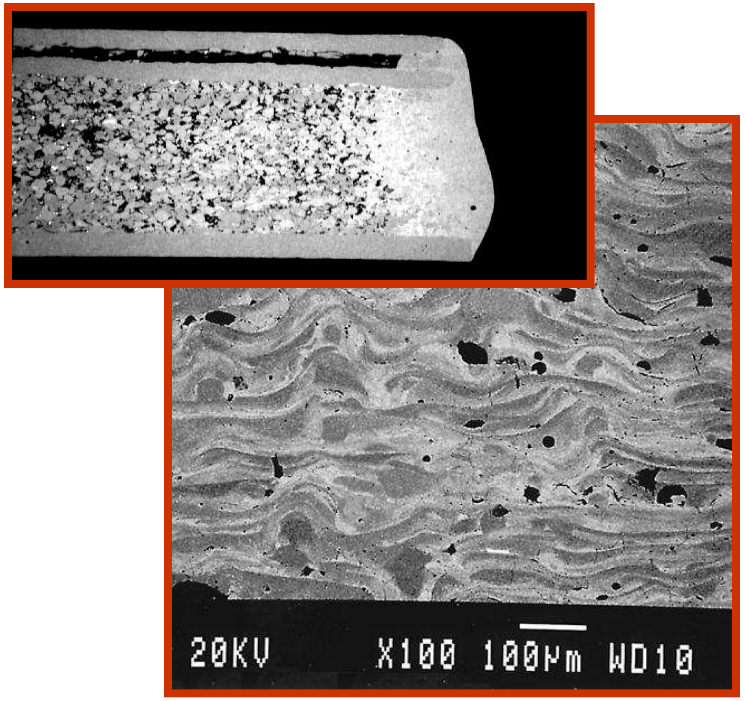


- Keys of success
  - Trust
  - Technical skills
  - Market development strategy
  - Reasonable expectations

NRC·CNRC
Industrial Materials Institute

SYNTHESARC – Reactive Cored Wires

- R&D contract with Québec Cartier Mining for developing an high temperature erosion resistant coating
- A highly successful project
- S. Dallaire decided to commercialize the technology and created a spin-off company, SYNTHESARC



- Incubated in our new CIMI facility
- NRC continues supporting the company through applied R&D projects

NRC·CNRC
Industrial Materials Institute

Surftec – A Surface Technology Group

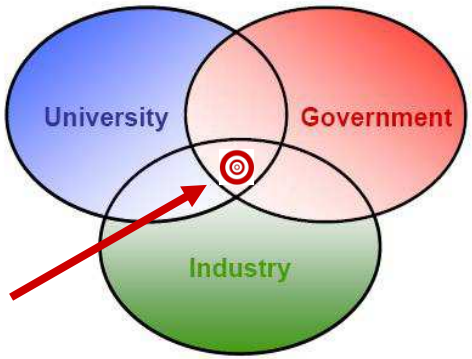
- Consortium of companies, Canadian universities and NRC labs
- Work on common research issues
- Research program established with the members
  - TBC systems
  - Particle diagnostics
  - Wear (process map)
- Information confidential for 2 years
- Confidential services

The group has been active for 10 years

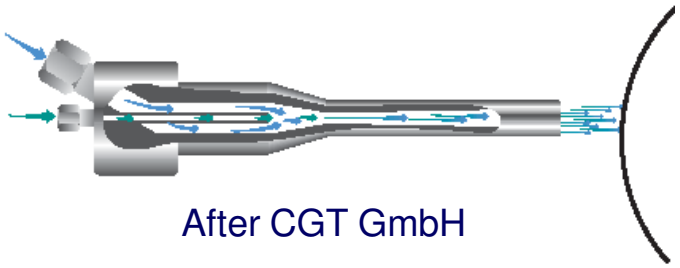
SULZER
Pratt & Whitney Canada
A United Technologies Company
Université de Sherbrooke
Syncrude
TECNAR Automation Ltée
METTECH
PRAXAIR
Montreal Carbide
UQAR
ALCAN
Castolin Eutectic
ALSTOM
Alberta Research Council
GE
PLASMATEC
Carleton University
LIBURDI
PyroGenesis
U of T
uOttawa
Université du Québec
Institut national de la recherche scientifique
Université Laval

NRC·CNRC
Industrial Materials Institute

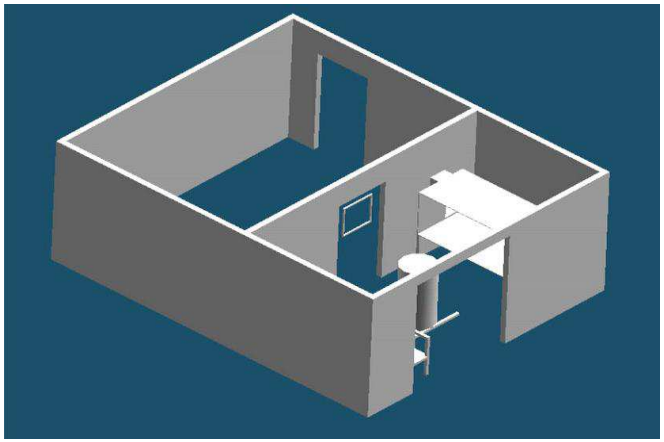
U, G and I



- Creation of an Aerospace Materials & Alloy Development Center in collaboration with **McGill University** and **NRC**
  - EB-PVD, Cold Spray, Isothermal Vacuum Forging
- Installation of a fully integrated Cold Spray facility at IMI-NRC:
  - 2 commercial cold spray systems
  - Helium recovery system
  - Surface preparation by laser (Protal)
  - Optical diagnostics systems



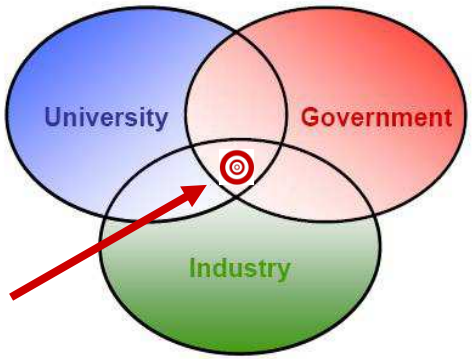
After CGT GmbH



McGill

NRC·CNRC
Industrial Materials Institute

U & G & I



- Development of technologies that can be commercialized by the growing aerospace industry in the Montreal region
- The research program will comprise:
  - Development of new materials processed by cold spraying
    - Super alloys
    - Nano dispersion reinforced super alloys
  - Cold spray forming and repair
    - Prototyping capabilities
    - Demonstration of the technology viability

NRC·CNRC
Industrial Materials Institute

The Future

- Converging technologies
  - New technologies will be a blend of two or more disciplines, and advances in one field will enable advances in another
    - Nano-bio-opto-information technologies
  - Opportunities for more U-G-I collaborations

- Global challenges facing our societies
  - Energy
  - Environment
  - Health and wellness
    - aging population

NRC·CNRC
Industrial Materials Institute

Journal of Thermal Spray Technology

From the scientific to the practical— stay on top of advances in this fast-growing coating technology

- Critically reviewed scientific papers and engineering articles combine the best of new research with the latest applications and problem solving
- Covers all fundamental and practical aspects of thermal spray science, including processes, feedstock manufacture, and testing and characterization
- Contains worldwide coverage of the latest research, products, equipment and process developments
- Includes technical note case studies from real-time applications and in-depth topical reviews
- Provides abstracts of recent technical literature with patents and critically reviewed scientific papers
- Covers industry news such as organizational changes and event listings

NRC CNRC

Industrial Materials Institute

Science at work for Canada

National Research Council Canada

Conseil national de recherches Canada

Canada