

CSTHA CONFERENCE / CONGRÈS DE L'AHSTC
TORONTO OCTOBER 11-14, 2007

Remerciements

Nous tenons à remercier Ryerson University et l'Université de Toronto pour leur aide financière précieuse qui nous a beaucoup aidé à organiser notre congrès. En particulier nous remercions Clara Cassidy, Doyenne de la Faculté des Arts de Ryerson University et Paul Thompson, Directeur de l'Institute for the History and Philosophy of Science and Technology.

Our Thanks

We would like to thank Ryerson University and the University of Toronto for financial aid that facilitated the organization of this conference. In particular we would like to thank Professor Clara Cassidy, Dean of Arts at Ryerson, and Professor Paul Thompson, Director of the Institute for the History and Philosophy of Science and Technology.

Thursday, October 11, 2007 - Victoria College, University of Toronto (91 Charles St., W., behind the Bader Theatre)

3:00-5:30 Tour: Toronto Distillery District. Assemble at Victoria College

5:30-9:00 - Registration, Victoria College Foyer

5:30-7:00 – Reception, Victoria College Foyer

Friday, October 12, 2007 Ryerson University - Oakham House (Ryerson Student Campus Centre) - 55 Gould Street

Registration/Breakfast/Petit Déjeuner: 8:30-9:00

Session 1a: Engineering I

Oakham House Lounge 9:00-10:30

Larry McNally - “Professional Engineers and the Early Development of the Dominion Bridge Co., 1882-1900”

Professional engineers played a key role in the formation of Dominion Bridge Co. in Montreal in 1882. Over time engineers became even more dominant in the organization and by 1900 they dominated the company. This paper will look at the engineers who created and ran Dominion Bridge such as Job Abbott, his brother Ira, Phelps Johnson, James Ross, C.H. Duggan and C. Shaler Smith. Their role will be contrasted with those of the Scottish iron and steel merchants and Montreal wholesalers/manufacturers who helped set up Dominion Bridge.

Janet Martin-Nielsen – “Engineering Development: The International Role of the Engineering Institute of Canada”

This paper examines the international involvement of the Engineering Institute of Canada (EIC) through the 20th century. While the EIC had relations with its counterparts in the United States and Britain in the early 20th century, it was only after a set of internal and external factors converged in the 1970s that the EIC (through its constituent societies) became significantly involved in the developing world. It is argued that the rise in the EIC’s involvement with the developing world in the 1970s was due to the growing economic gap, new sources of funding, and the development of a program of international work compatible with the objectives of learned societies.

Christopher Andreae – “The Princess Louise Wet Dock”

The Princess Louise Wet Dock opened at Quebec City in 1890 after 14 years of construction. Wet docks were common in high-tidal range European – especially British – ports British. Elsewhere the design was rare; the Louise Dock was the only such one built in North

America. The British harbour engineers, Knipple and Morris, were hired to design and construct the dock. They were fired after a few years and replaced with Canadians. This paper examines the design evolution of the Louise Dock and the complications that arose as construction shifted from British to American engineering methods.

Session 1b: Medicine

Oakham House A/B Friday 9:00-10:30

Isabel Wallace – “The Impact of the Pill on Canadian Women”

Looking at primary sources from the years between the pill's decriminalization in 1969, and new female workplace participation trends in the mid-80s, I argue that Canadian family planning organizations actively promoted the Pill as a technological tool for regulating family size and spacing children within families, particularly within the institution of marriage. More specifically, I examine the impact of the pill on two distinct groups of young Canadian women: married or romantically attached childless women between the ages of 17 and 22, and married women between the ages of 22 and 35. My thesis is that the pill was technologically deterministic, in that its adoption by these two main groups of married women allowed women to have an unprecedented level of personal control over their own life planning.

D. Theodore* - “Tower of Power: The Drummond Medical Building and the Interwar Centralization of Medical Practice”

This presentation focuses on Montreal’s Drummond Medical Building (1929), designed by the well-known architectural firm of Nobbs & Hyde, as a case study of the new typology that emerged in urban Canada in the 1920s: a modern, purpose-built high-rise for healthcare professionals, with elevators, telephones, indoor parking, and retail shops, located in an upscale commercial district. This CIHR-funded project illustrates complex social and physical networks among architects and doctors, drawing attention to the importance of studying architecture as a technology in the history of modern medicine. We speculate that these clinics marked the end of the house-office era across Canada, centralizing the practice of healthcare professionals. What role did medical high-rises play in the practice of modern medicine?

* co-authors: A Adams (McGill University) and S Burke (University of Manitoba)

William Feindel – “Brain Science and Technology at the Montreal Neurological Institute (1934-2004)”

The Montreal Neurological Institute(MNI), founded in 1934 by Wilder Penfield and his associates, integrated a hospital for treating disorders of the brain with a research facility in the same building complex. Highlights of the technological developments at the MNI include:

- (1) X-Ray Angiography of the brain (1936).
- (2) Fluorescein Angiography of the brain. (1966).
- (3) Brain mapping by electrical stimulation of the cerebral cortex(1934).
- (4) Recording of the electrical activity of the brain (EEG), an essential aid to the surgery of epilepsy (1938).
- (5) Three systems of computer assisted Brain Imaging----- Positron Emission Tomography (PET) using radioisotopes (1975); Computer Axial Tomography

(CAT) (1973) based on X-rays; Magnetic Resonance Imaging and Spectroscopy (MRI/S) and functional MRI for revolutionary studies on brain physiology and cognition .(1985).

10:30-11:00 Coffee /Café

Session 2a: Engineering II

Oakham House Lounge 11:00-12:30

Richard White – “Technical Expertise and the Public Good: A Case Study of the Humber Valley Sewage Treatment Plant, 1950-1960”

From 1955 to about 1965, the corporation of Metropolitan Toronto undertook a huge program of infrastructure construction in support of the rapidly growing city, the main components being roads and expressways, water and sewer trunk lines and treatment plants, and schools. One of the key elements of this expansion program was respect for technical expertise and a corresponding disregard for opinions of the local citizenry, as such a large public works program could not possibly have included repeated consultations with “stakeholders” and still be completed quickly.

In an effort to understand the phenomenon more clearly, this paper relates and analyses the building of one particular public works project – the Humber Valley Sewage Treatment Plant at the mouth of the Humber River, in western Metropolitan Toronto, from about 1955 to 1960. This large plant was constructed on the grounds of a public golf course, adjacent to a fairly affluent residential neighbourhood. The locals, not surprisingly, opposed it, and they petitioned the Ontario Municipal Board, but after a review by the respected civil engineer Norman Wilson their objections were dismissed and the plant went ahead. What was the nature of Wilson’s “engineering logic” that carried the day so decisively? In whose interest was this decision made? How were the objections of local citizens received?

Contrary to today’s orthodox interpretations, which tend to present episodes like this from the 1950s and 60s as an imposition on the public by an elite, self-serving professional class, and which often put ‘scientific expertise’ in inverted commas – with all that that implies – this paper will raise the possibility that the technical experts did indeed act in the public interest, in the sense that their project improved the water quality of a public watercourse and protected the health of a large number of people, at minimal public expense. There is, of course, little doubt that private benefits did result from this public work, and this point will be explored, but the argument will be that focusing entirely on this aspect of the plant’s construction is to see only part of the picture.

Crystal Sissons – “The Formation of a Feminist Engineer”

In 1927, Elsie Gregory MacGill was the first woman to graduate from electrical engineering at The University of Toronto; she subsequently was the first woman in North America to complete a masters degree in aeronautical engineer at the University of Michigan in 1929. In 1967, MacGill, an acknowledged feminist, was appointed as a commissioner on the Royal commission on the Status of Women (RCSW). This paper will assess the events and

experiences which forged MacGill into a feminist engineer. A brief analysis of her feminist legacy and engineering education will illustrate how she was able to merge these two diverse disciplines, which are often assumed to be at odds with one another. More importantly, it will be argued that she pulled aspects of feminism, the women's movement, the professions, public policy, and social context together and actively engineered them towards achieving the wide variety of goals she pursued as a feminist engineer.

Andrew H. (Drew) Wilson - "Engineering Institute Presidents : 1887 to the Present"

Since the founding of the Canadian Society of Civil Engineers (CSCE) in 1887, and of the Engineering Institute of Canada (EIC) which replaced it in 1918, its presidents have usually been prominent members of the profession. But, as might be expected, others of equal prominence have not served in this capacity. Also, the Institute has undergone a number of significant changes in the past 120 years and these have influenced the election of its presidents.

This paper analyses the backgrounds of those who have held the CSCE-EIC presidency, and a sampling of those who did not. It argues that the principal background changes have taken place since the establishment of the Institute's discipline-oriented member societies in the early 1970s and the evolution of their status within it since then.

Session 2b: 19th and Early 20th Century Science and Technical Education

Oakham House A/B 11:00-12:30

Michelle Hoffman – "School science and the campaign for technical education in Ontario, 1890-1911"

The campaign for technical education in Ontario (~1890-1911) mirrored similar campaigns in other Canadian provinces and some American states as educators moved to respond to the pressures of industrialization. This paper explores the relationship between technical education and the science curriculum in Ontario high schools. I will show how academic high schools responded to the rhetoric of the campaign for technical education and increasingly championed the relevance and utility of science over its supposed ability to foster 'mental discipline.' I argue that the rise of technical education helped to cement the technology-laden, applied orientation of high school science – an orientation that would remain generally unchallenged until mid-century.

Alain Couillard – « Le premier manuel de physique publié au Québec : contenu des Notions élémentaires de physique de Joseph Cauchon »

En 1841, Joseph Cauchon publie un manuel de physique destiné aux «écoles et à toutes les classes de la société». Selon ses propres dires, il puise les notions qu'il présente chez les auteurs les plus recommandés à l'époque. En étudiant attentivement les manuels de physique français et américains les plus en vogue au début du 19^e siècle, ainsi que les notes de cours utilisées dans divers collèges canadiens, il est possible d'évaluer la provenance, le niveau et le mode de présentation des connaissances figurant dans les Notions élémentaires. C'est donc un portrait général du contenu et de la portée du manuel de Cauchon que nous suggérons de tracer ici.

Scott Campbell – “Micro-What? Microcomputing at the University of Waterloo, 1979—1982”

When computer science departments were first forming in the early 1960s they were linked pedagogically with large, centralized computers, and these expensive machines were shared among faculty and students. The invention of small and cheap microprocessors in the early 1970s soon led to inexpensive personal microcomputers suitable for individual use, a spectacular and widely recognized technological shift. In this talk I will explore how the University of Waterloo – world famous for its commitment to student-oriented computing and a practical undergraduate education -- shaped microcomputing and was shaped by the new technology.

12:30-2:00 Sandwich Lunch /Dîner Oakham House/Ryerson Student Conference Centre

Tour: 12:30-2:00 Scientific and Technical Sites at the University of Toronto - Assemble near lunch tables at the Ryerson Student Centre end of hall.

Session 3a: Astronomy

Oakham House Lounge 2:00-3:30

Richard Jarrell – “Does the Individual Count? Peter Millman and the Rise and Decline of Canadian Meteor Science”

Until the 1930s, meteor science did not exist in Canada; by the 1960s, Canadian work in the field was recognized world-wide. Today it has almost disappeared. There is no question that the individual – in this case Peter M. Millman – was the catalyst that brought the field to Canada and into international prominence. By the time he died, the field had largely withered away in this country. This paper will explore the interplay between individual leadership and the evolution of a research programme. In this case, the individual nurtured the programme and brought it into the limelight, but by the end of his long life, the programme’s goals had been largely realized, paving the way for its passing from the Canadian scientific scene.

Rita Griffin-Short – “James Short F.R.S. Optician for Reflecting Telescopes”

James Short (1710-1768), precocious student born into that 'Hotbed of Genius', Edinburgh, embraced Newtonian science. Under the tutelage of Colin MacLaurin at Edinburgh University, he began experimenting with specula for reflecting telescopes whose improvement led to membership in the Royal Society; the patronage of Lord Morton, assured his career. From his London shop he made, signed and numbered, reflectors to order. A member of the Longitude Board, he supported John Harrison at the expense of a career as astronomer royal. He sponsored John Dolland's improved refractor object glass to the Royal Society; as a member of the transits of Venus committee he computed the 1761 results.

David B. McLay and Joan M. Schwartz – “Canadian Photography of the 1860 and 1869 Solar Eclipses”

The total solar eclipse of May 26, 1854, observed at four stations along the St. Lawrence River, created much interest in astronomy in the Canadas and led to the foundation of the Kingston Observatory. The solar eclipses of July 18, 1860, and August 7, 1869, stimulated major scientific expeditions in Europe and North America. Both were recorded photographically by William Notman in Montreal, where the eclipses were partial, and observed at totality by Edward Ashe of the Quebec Observatory, who was able to make four photographs of the 1869 eclipse at totality during the expedition of the Canadian Eclipse Party to Jefferson City, Iowa. Notman’s 1860 photographs were lost from Canadian collections until 1998 when they were discovered in “The Blackwell Album”, purchased by the National Archives of Canada at a Sotheby’s (Toronto) auction. Two “polymaths” in Canada who were very aware of the scientific significance of total eclipses were Dr. Daniel Wilson of University College, Toronto, and the Rev. Dr. William Leitch, Principal of Queen’s University at Kingston, the author of the first Canadian treatise on astrophysics. Photographic images and textual material from the 1860-9 period will be presented in this paper as precursors of later Canadian achievements in astrophysics.

Session 3b: Hobbyists, Computers, and Technological Success

Oakham House A/B Friday 2:00-3:30

Norman R. Ball – “Junk-Yard Parts and Ingenuity: The Early 1930s Snow Vehicles of Eric Stevens and Art Hobson, Saskatoon Secondary School Students”

Commercial success is not the only way to measure the value of exploring new technology. As depression-era high school students in Saskatoon, neither Eric Stevens nor Art Hobson thought of trying to commercialize their gasoline engine-powered snow vehicles. Stevens and Hobson were mechanically inclined teenagers who wanted to make things, go fast and have fun. They also helped local MDs reach snowbound rural patients. This paper introduces the Stevens-Hobson snow vehicles as an essential part of the formal and informal education that helped prepare two young men for successful technical careers that had nothing to do with mechanized transport.

Zbigniew Stachniak and Dov Lungu – “TRACE- a Canadian Homebrew Computer Club”

The computer hobbyists' movement played an important role in the emergence, shaping and adoption of the personal computer. Often identified as an American phenomenon, this movement had in fact a less-known international character. In Canada, it assumed an organized form as early as the mid-1970s, when the Canadian Computer Club in Brandon, Manitoba (1975) and the Toronto Region Association of Computer Enthusiasts (TRACE) (1976) were formed. The proposed paper presents the preliminary results of a study on TRACE, which constitutes the first stage of a broader project aiming at evaluating the ways in which early computer hobbyists contributed to the transformation of Canada into an information society.

Henry Trim – “The Prophets of Babble: A Brief History of the Alternative Technology Movement in North America”

In the late 1960s the Alternative Technology (AT) movement emerged and challenged the established norms and goals of modern industrial technology in North America, influencing government policy and perceptions of Technology, before disappearing in the 1980s. Unfortunately, most analysis of this radical movement has been superficial, self-referential or flawed. By concentrating on the AT movement’s intellectual foundations, a previously under utilized approach, this paper attempts properly understand the movement and discuss both its critique of technology and why it failed to carry out its program to radically change technology in North America.

3:30-4:00 Coffee/Café

Session 4a: Mining

Oakham House Lounge 4:00-5:30

Jeremy Mouat – “Inquiry-based Learning: Government inquiries and the growth of Canada’s mining industry, 1890-1919”

From the end of the 1880s through to the First World War, various governments held a series of formal inquiries that examined different aspects of mining in Canada. Commissioners pondered education and training, technology, labour relations, and much else besides. What the inquiries had in common was a growing recognition that the mining industry was becoming both more complex and economically important, and that consequently some form of government action might be necessary. This paper will assess the role and purpose of various inquiries, listed below, as well as suggesting their significance.

ONTARIO. Report of the Royal Commission on the Mineral Resources of Ontario and Measures for their Development, 1890.

CANADA. “Report of the Commission Relating to Unrest and Discontent among Miners and Mine Owners in the Province of British Columbia,” 1899.

CANADA. Report of the Commission Appointed to Investigate the Zinc Resources of British Columbia and the Conditions Affecting their Exploitation, 1906.

CANADA. IMPERIAL MUNITIONS BOARD. A Record of the Investigation, Report and Subsequent Action of the Commission . . . To investigate the feasibility of Refining Copper and Producing Metallic Zinc on a Commercial Scale in the Dominion of Canada, 1916.

ONTARIO. Report of the Royal Ontario Nickel Commission, 1917.

GREAT BRITAIN. Royal Commission on the Natural Resources, Trade, and Legislation of Certain Portions of His Majesty’s Dominions, 1917

Fathi Habashi – “Mining and Metallurgy in Canada”

Interest in mining and metallurgy in Canada, can be traced to time of the Jesuit College founded in 1635 in Quebec City, which library contained an original copy of the Latin edition of Agricola’s *De Re Metallica* published in 1555, and other related works. In 1842 the Geological Survey of Canada under Montréal-born William E. Logan (1798-1875) was created to explore

for the mineral resources. During the second half of the nineteenth century, important deposits of gold, nickel, copper, asbestos, and phosphate rock were discovered. In 1901, the German-born Eugene Haanel (1841-1927) was appointed director of the newly created Mining Section in the Ministry of Interior. The first task that Haanel created was the Assay Office of the Dominion of Canada in Vancouver to help gold prospectors and operators in the region. The Mining Section grew rapidly and became later known as the Mines Branch where the first metallurgical research took place.

The golden age of the Mines Branch was during the mandate of John Convey (1910-2006) from 1951 to 1973 when extensive uranium research was conducted, the foundation of the Gold Operators Committee in 1962 which became later Canadian Mineral Processors Division of the Canadian Institute of Mining and Metallurgy, and the creation of the Canadian Metallurgical Quarterly to publish Canadian metallurgical research.

Patrick Couperus – “Putting the Genie Back in the Bottle: Systems for Disposing of Long-lived High-Level Radioactive Waste”

It would seem that nuclear energy is experiencing a renaissance of sorts these days. Due to economic and environmental factors, nuclear energy seems like a green option that has consequently been promoted and reinvigorated by governments world wide. Yet, nuclear energy does produce dangerous wastes, which are toxic, mutagenic and cancer causing and remain so effectively forever. This waste has been the industry’s Achilles Heel and its ‘dirty secret’ for over 50 years. In November of 2005, the Nuclear Waste Management Organization [NWMO] released its final report to the Canadian government detailing a system of sheltering and isolating the waste deep within the ground for millennia. My paper proposes to examine the unprecedented challenges posed to societies and humanity by the presence of long lasting nuclear waste. The temporal factor is paramount in these challenges. My paper will examine how human society can conceive of a technological system that will need to last a period of time far in excess of current recorded human history? How do we accurately model a natural geological system for tens and hundreds of thousands of years into the future? Do we trust the scientists to accurately predict responses within the ground over such long periods of time? How do we account for future generations of humans within this equation? Do we permanently seal the repository? Or do we leave that to future societies? Will the waste be a valuable resource in the future? Do we adopt systems and infrastructures and institutions that will attempt to offer continuity of control over centuries? These are the questions that the government studies, scholarly examinations, industry literature and the general public have been asking and answering for several decades in Canada. The potential increase in electrical generation from nuclear power plants, the huge stockpile of existing spent nuclear fuel, and the risks posed by the wastes from those sites make this a timely topic for examination

Session 4b Science and the Ocean Environment

Oakham House A/B 4:00-5:30

Jennifer Hubbard – “Not Purely Scientific: The Fisheries Research Board’s fight for survival and its effects on fisheries management in the 1970s”

By the early 1970s the Grand Banks’ groundfish stocks were clearly in serious decline. The International Commission for the Northwest Atlantic Fisheries (ICNAF), headquartered in Halifax, Nova Scotia, was unable to respond adequately to international political pressures contributing to this decline. The proposed Third Law of the Sea treaty promised a solution by extending national “exclusive economic zones” 200 miles from the coasts of each maritime nation. The Fisheries Research Board of Canada, responsible for scientifically managing Canadian fisheries, anticipated a role of greater importance. However, in 1973, the Liberal government began appropriating the Fisheries Research Board’s powers, throwing the Board’s scientific executive into disarray. The FRB’s executive and senior scientists sought to save the FRB, but even they did not envisage its ultimate absorption into the Department of Fisheries and Oceans, in 1977 – the same year in which Canada unilaterally claimed territorial limits out to 200 miles. Meanwhile, the executive and senior scientists had been distracted from addressing the weakening status of the fish stocks by bureaucratic demands that they reshape the Board to meet new government goals. This loss of focus on real issues contributed to the short-sighted Canadian response to the impending ecological disaster on the Grand Banks.

Stephen Bocking – “Local Science in the Global Market: Examining the History of the Science of Salmon Aquaculture”

Over the last two decades salmon aquaculture has become a significant industry in British Columbia. There has also accumulated a substantial history of scientific research aimed at improving industry practices, while ameliorating their environmental impacts. This paper examines this history, emphasizing the diverse institutions within which knowledge has been created and disseminated to a variety of audiences. I also argue that this scientific activity can be best understood in the context of the lengthier history of technological transformation of the salmon, as well as in terms of the contested "place" of this fish: as both the basis for a global resource industry, and a symbol of regional identity.

Katharine Anderson – “Networks at War: Oceans and weather observations in World War II”

The paper analyzes the ways that national and international meteorological networks depended on ocean observations, looking at examples of ships’ logs of Atlantic voyages just prior to and during the second world war. These logs are key sources in a project in historical tempestology. They contribute to the scientific study of hurricanes by recovering observations lost to the scientific record because of the imposition of radio silence. They also contribute to the history of meteorology -- and ocean sciences in general -- as formal and informal observation networks, with a scientific community required to balance its research questions with the practical demands of working at sea & with seamen. Both these contributions are valuable in themselves. But the project is also an experimental exploration of the relationship of scientific and historical thinking, suggesting that the historical turn in environmental sciences deserves our

attention. Because these logs represent a bridge between different disciplines, their example can help us think about different forms and uses of history in the classroom and in the media as well as in formal research projects.

**Saturday, October 13, 2007 Victoria College, University of Toronto
IHPST, 3rd Floor Victoria College**

8:30-9:00 Registration/ Breakfast/Petit Déjeuner 3rd Floor, Victoria College

Session 5a: Archives and Museums

VC 323 9:00-10:30

Helen P Graves Smith – “The Trade Literature and Archival collections of the Canada Science and Technology Museum”

The Trade Literature collection at the Canada Science and Technology Museum includes over 75000 items. This material complements our artifacts and serves as a tool to help us to document our three-dimensional objects. The collection is also available for researchers documenting almost any aspect of science and technology history from the pure technical to the social and cultural history of objects such as: To whom was it marketed? How does it work? When was it sold? How much did it cost? Our trade literature, with its repair manuals, operating guides, manufacturers’ catalogues, price lists and promotional pamphlets, can help to answer these questions and more. In addition, our Archival collection consists of documentary, drawing, audio, photographic, film and video materials. This presentation will present examples of how the Trade Literature and Archival collections have contributed to various research projects.

Ingrid Hehmeyer – “The challenge of authenticating scientific objects in museum collections: an example from the Royal Ontario Museum”

The astrolabe is an instrument designed to measure the altitude of celestial bodies in order to tell time by day or by night. An astrolabe in the Royal Ontario Museum’s collections was acquired at auction in 1988 by the ROM’s Planetarium. According to the auction catalogue, it was made in Morocco, dated 1845. When the Planetarium was closed to the public, the instrument languished neglected. In 1999, in preparation for a university course on the history of science, my scrutiny of the astrolabe’s inscribed features and physical condition suggested that it was a forgery. This paper explains the mistakes the forger made.

David Orenstein – “Resources for the History of Astronomy at the University of Toronto Archives and the Thomas Fisher Rare Books Library”

Over the past four years I’ve delivered about a dozen papers based on using materials from these institutions. My prime sources have been the Stillman Drake Galileo Collection and the Collection of British Almanacs at the Thomas Fisher Rare Books library and the Papers of Clarence Augustus Chant and Helen Sawyer Hogg at the University of Toronto Archives. The Drake consists of a few thousand books by Galileo, about Galileo and by his contemporaries,

both supporters and opponents (such as NEW PLANET NO PLANET). There is a restricted amount of manuscript material but it does include a holograph letter by Galileo. The core of the British Almanacs is the Playfair Family Collection, purchased and annotated in rural England over the course of the 18th and 19th centuries. The J.B. Tyrrell Fonds does have astronomical observations in his geological field books to find his location in the great Canadian Wilderness. Chant's papers form the larger part of the U of T's Astronomy Department Archives including correspondence, 1900-1950, with renowned international astronomers, telescope manufacturers, and a wide array of members of the public of all ages interested in astronomy. Two separate boxes form Chant's own selection of archival materials around the Establishment of the David Dunlap Observatory. The Helen Sawyer Hogg Fonds is an exhaustive personal archive of 17 running metres covering personal and professional correspondence, research notes, publications, RASC material, and images. There is also a separate collection of materials commemorating the now defunct U of T Southern Telescope in Chile."

Session 5b: Gender in Science and Technology

VC 304 9:00-10:30

Jean-François Auger – « Le personnel de laboratoire au Canada à la veille de la Seconde Guerre mondiale »

Les femmes n'occupaient pas les mêmes emplois que les hommes dans les laboratoires au Canada à la veille de la Seconde Guerre mondiale. Cette étude propose une explication de ces différences professionnelles selon les sexes par la méthode quantitative. Elle exploite plus exactement les données du Survey of Scientific and Industrial Laboratories in Canada (Ottawa, 1941), une rare enquête du genre produit par le Bureau de la statistique du Dominion. Parmi les indicateurs statistiques, elle utilise le coefficient de symétrie pour les apprécier et neutraliser les biais interprétatifs généralement induits par l'utilisation de pourcentages. Les résultats montrent que les hommes et les femmes travaillaient en grand nombre dans des laboratoires industriels. Par comparaison avec les hommes toutefois, les femmes assumaient davantage des tâches routinières de contrôle de la qualité, de normalisation et de mesure scientifique. En outre, l'université représentait un tremplin pour obtenir un statut de professionnel chez les hommes, tandis que les femmes tendaient à accéder au même statut en travaillant dans la fonction publique fédérale.

Suzanne Beauvais – « Le véhicule de Monsieur et celui de Madame : une étude sur les véhicules hippomobiles et le genre »

L'histoire de la mobilité au 19^e siècle au point des genres est particulièrement intéressante dans le cas des véhicules hippomobiles. Dans le cadre de cette communication, nous aimerions étudier les véhicules en tant qu'objets culturels et sexualisés. Au cours du 19^e et au début du 20^e siècles, certains types de véhicules sur roues et sur patins étaient en effet désignés par les convenances sociales et par les manufacturiers de véhicules, les uns pour l'usage des femmes, les autres, pour les hommes. Certaines croyances et stéréotypes contribuaient peut-être aussi à l'origine de cette dichotomie suggérée.

Nous débiterons donc notre communication par une présentation des véhicules recommandés selon le sexe, pour ensuite décrire leurs particularités physiques et leur contexte

social d'utilisation. Par la suite, au moyen de photographies historiques, nous observerons quels types de véhicules les hommes et les femmes conduisaient effectivement en milieu urbain au Canada. La comparaison entre la prescription et la réalité nous permettra d'évaluer la validité de notre hypothèse sur l'attribution de véhicules hippomobiles selon le sexe, ceci, pour les gens de classes sociales aisées □ l'époque victorienne tardive.

Dorotea Gucciardo – “Modernizing the Domestic Workshop: The Invasion of Electric Servants into Canadian Kitchens, 1920–40”

My paper will examine the rise of domestic science and the consumption of electrical products in Canadian kitchens during the inter-war years. Canadian women were under pressure to modernize their daily routines by employing the latest equipment available. The kitchen became a domestic workshop and electrical appliances were the tools with which the “modern housewife” of the post-First World War period could efficiently perform her tasks. But, as my essay will demonstrate, reality did not always match the rhetoric. Electricity was still a relatively new technology and it was not until the post-war years that most Canadians truly benefited from electrical goods.

10:30-11:00 Coffee/Café

Session 6a: The State and Research in Canada

VC 323 11:00-12:30

Ian Slater – “Shaking the Invisible Hand: Privatization, Market Forces, and the Control of Science and Technology”

While there has been considerable economic analysis of the impact of privatization on firm efficiency, there has been comparatively less investigation into its impact on scientific research and technological development. Through a historical discussion of the Canadian crown corporations AECL and Polymer Inc., I will outline some of the immediate impacts on science and technology from the short-term profit focus that exemplifies privatization and commercialization. Further to this, I will use the Canadian experience to challenge existing assumptions about the competitiveness of the state.

James Hull – “Demythologizing Revisited: World War One and Research in Canada”

World War One has been seen as a major turning point in the development of research in Canada's universities, most notably with the organization of the Honorary Advisory Council for Scientific and Industrial Research. However Canadian science and engineering professors had already found that their professional ambitions and those of their students intersected with both fundamental changes in industrial production and an expanding Federal state. This paper thus supports McCalla's challenge to the view of WW1 as causing a great industrial transformation in Canada.

Steve Koerner – “Canada and the Hunt for Nazi Science and Technology”

Shortly before the end of the Second World War and for several years afterwards, the Canadian government conducted an extensive investigation of German science and technology.

Canadian investigators visited a number of sites throughout Germany including aircraft factories and shipyards. Their goal was to ascertain what plant and equipment could be brought back to Canada in order to assist in the transition to peace-time production.

This proposed paper will assess the success of this investigation, not only in terms of the German industrial assets that were acquired, but also the less tangible benefits such as technical know-how and research.

Session 6b: Alternative and Innovative Technologies

VC 304 11:00-12:30

Matthew N. Eisler – “Fueling Dreams of Grandeur: Ballard Power Systems and the Rise and Fall of the Fuel Cell Automobile”

The emergence of Ballard Power Systems as the world’s leading developer of low-temperature fuel cells in the mid-1990s was seen by many scientists, engineers, politicians and pundits as a harbinger of a paradigm shift in energy and automotive technology. Ballard’s alliance with Daimler-Benz and Ford not only promised a revolution in environmentally-sustainable transportation but showcased Canadian science and engineering expertise on the international stage. In the early 2000s, however, the company suffered serious reverses as most major automakers downsized or abandoned efforts to commercialize fuel cell electric passenger vehicles. Far removed from its glory days, Ballard currently markets its technology in niche stationary and vehicular applications.

How to explain this precipitous rise and decline? I argue that the Ballard phenomenon can only be understood in the context of post-Second World War fuel cell technology development. Fuel cell research and development communities have functioned as a key generator of expectations, a nexus where the physical-material realities of this electrochemical technology meet external factors, those political, economic and cultural pressures that create a “need” for a “miracle” power source. With limited sources of revenue, these communities have long employed controlled demonstrations of notional fuel cells of increasingly high power as an important means of financing research. Initial demonstrations have tended to be dramatic, raising investment capital and hopes of further rapid progress. But building commercial fuel cells has proven a very expensive and time-consuming process measured by slow, incremental improvements in durability and cost-effectiveness. This has led to crises of expectation and reduced investment. As such, Ballard is only the latest fuel cell developer to experience a “boom-bust” pattern of growth.

Claude Beauregard Ph.D. et Alain Canuel Ph.D. – « L’identification par radiofréquence : pour un véritable débat de société »

L’utilisation de dispositifs d’identification par radiofréquence (IRF) au Canada suscite des préoccupations importantes. L’IRF remplacera dans quelques années le système des codes-barres et les cartes magnétiques. L’IRF, qui se compose de trois éléments (une étiquette radiofréquence, un lecteur et un ordinateur), permet la lecture des données de façon automatique et à l’insu des personnes. La miniaturisation des étiquettes radiofréquences et des équipements informatiques favorise l’expansion de l’IRF et de l’informatique nomade et offre une versatilité qui va se traduire par une augmentation importante des usages. Le réseau Internet tel que nous le

connaissons aujourd'hui sera chose du passé dans quelques années. L'ordinateur, qui est présentement le principal moyen utilisé pour accéder au réseau des réseaux, sera remplacé par une multitude d'objets dotés d'étiquettes radiofréquences. Pourtant, malgré l'importance des changements technologiques annoncés et leurs répercussions dans le domaine de la protection de la vie privée, aucun débat public n'est venu éclairer les Canadiens sur les implications de l'IRF. Notre communication portera donc sur les applications de cette technologie et sur le rôle des historiens dans ce qui pourrait être l'amorce d'un véritable débat de société.

Norman Ball – “Electrical Enthusiasm, Alonso Mather, and the Niagara River Peace Bridge that Never Was”

Railroad equipment brought early fame and fortune to both George Westinghouse and Alonzo Mather. The prospects of large-scale hydroelectric development on the Niagara River also attracted both men. Recognition of the value of Nikola Tesla's work vaulted Westinghouse onto another successful entrepreneurial path. Mather had a different electrical vision. Today Mather is virtually unknown except in the Niagara region and to railway historians. This paper explores Mather's plans for an ultimately unsuccessful combined bridge and hydro-electric generating station spanning the Niagara River at the site of the present-day Peace Bridge that links Buffalo, NY, and Fort Erie, Ontario.

**12:30-2:00 Sandwich Lunch and Annual General Meeting,
Dîner et Assemblée générale annuelle VC323**

Session 7a: Cold War and Technology in Education

VC 323 2:00-3:30

Edward Jones Imhotep – “Maintaining Humans”

The history of technology has long focused on the processes – cognitive, material, social – involved in getting machines to work. This paper seeks to expand our studies of technology by exploring instead the much more pervasive, but often invisible act of fixing them after they fail. It focuses specifically on the Canadian military's use of “teaching machines” to train technicians maintaining the electronic infrastructures of the Cold War. Teaching machines here emerge as one resolution to the often fierce and desperate debates over the nature of maintenance work that consumed 1950s electronics and helped shape the electronic material culture of the Cold War.

Norman Friesen and Robert Teigrob – “Coming in from the Cold: Educational Technology Quo Vadis?”

Instructional technology, and the behaviourist, systems and cognitivist paradigms that underpin it, grew out of the military-industrial complex during the Cold War. Much as the Pentagon and associated researchers defined the architecture of the Internet, they also essentially created, sui generis, the fields of instructional technology and instructional design. The results of the ongoing dominance or influence of the military-industrial complex in these areas have been traced in research that appeared during the final phases of the cold war. But this research has not been updated to reflect circumstances now most definitive of the post-Cold War world for the

US military: 9/11 and the war in Iraq. Tracing the imprint left by the Cold War on instructional technology and design, this paper/presentation considers how this influence may now extend, like the Internet itself, in a diffuse and insidious manner. It will conclude by stressing that the end of the Cold War, along with developments in the Iraq war, presents a juncture offering both opportunity and challenge to the evolving fields of “eLearning” and educational technology, and their relationships to the military.

Jonathan Turner – “Technology and Strategy: Canada, the Defence Research Board and the Cold War”

The Defence Research Board (DRB) was created after the Second World War to centralize the research efforts of all the branches of the Canadian military. In addition to its role in the research and development of weapons it was also called upon, along with External Affairs, to provide analysis of strategy and the technologies chosen to enforce that strategy. The recommendations of these civil servants were often critical of the flaws in American strategy and reasoning, but also fully cognizant of Canada’s position as a middle power in an alliance with a superpower and neighbour.

Session 7b: Research and Development

VC 304 2:00-3:30

Jonathan Paquette - « De la science, □ l’innovation, □ la délibération : l’Évolution des June 21, 2007 des Dynamiques Professionnelles de la Communication des Sciences au Canada au Travers des Histoires de Pratique »

En tant qu’institutions de la culture scientifique, les centres de science du Canada ont contribué grandement au développement de la pratique de la communication des sciences. En raison de craintes au sujet des technosciences, mais en raison aussi du contexte de l’émergence des politiques de l’innovation, la fin des années 1990 sera porteuse de transformations majeures et de remises en question pour les institutions et pour la pratique de la communication des sciences, invitant cette dernière à se renouveler. Inscrite dans un travail de recherche en cours, et articulée par le biais de l’analyse biographique de l’histoire de pratique (Bertaux, 1974), la communication proposée s’intéresse à l’évolution des identités et repères professionnels des praticiens de la communication des sciences au Canada.

Mike Almeida - « Comment se rendre utile : Les centres de recherche universitaires en sciences sociales au Canada »

Cet article est la première étude historique qui porte sur le processus menant □ la multiplication des centres de recherche universitaires en sciences sociales au Canada. Nos résultats, étayés par des sources quantitatives et qualitatives, montrent que la généralisation des équipes de recherche relève autant de facteurs internes □ l’université – l’établissement de centres est une stratégie permettant □ des « chercheurs-entrepreneurs » de générer des fonds de recherche et aux dirigeants universitaires de développer leur institution – que de facteurs externes – le financement d’unités de recherche permet □ des commanditaires d’acquérir des connaissances sur des problèmes qui ont leur source □ l’extérieur du milieu académique et qui ne cadre pas avec les frontières d’une seule discipline. L’objectif de cette étude est de contribuer

□ la réflexion actuelle sur les « modes de production » et les finalités de la recherche universitaire en sciences de l'homme et du social.

(English translation)

This paper traces the multiplication of Canadian university-based research centres in the social sciences. The results, which stem from quantitative and qualitative data, show that the generalization of research teams comes from forces within the universities – the establishment of centres is a strategy employed by the “academic-entrepreneur” to generate research funds and by university administrators to develop their institution – and from without the universities – the financial support of research units by funding agencies enables them to acquire useful knowledge on problems originating from outside the academia and that cannot be tackled by the practitioners of a sole discipline. The overall objective of this article is to contribute to the actual debate on the “modes of production” and aims of university research in the social sciences and humanities.

Sylvia Nickerson – “Taking a stand: Exploring the role of the scientist prior to the Pugwash Conference on Science and World Affairs, 1957”

In 1957, a small group of world-renown scientists gathered in Pugwash, Nova Scotia to discuss the growing threat of nuclear arms. Funded by Cyrus Eaton and spearheaded by Bertrand Russell, this 1957 meeting founded an organization of scientists that believed they had a duty to speak out against escalating nuclear testing and the irresponsible use of science. My paper will look at the various perspectives of scientists who were both active participants in the organization of the first Pugwash Conference, and those that declined to take a publicly anti-nuclear stance. Revealed through correspondence prior to the first Pugwash conference, attitudes about what is, and what is not the appropriate role for the scientist in times of contentious science will be explored.

3:30-4:00 Coffee/Café

Plenary Lecture /Conférence plénière

Yves Gingras

“Can there be a History of Canadian Science without Nationalism?”

4-5:30 VC 323

Refreshments to Follow

5:30-7:00 Tour of the Royal Ontario Museum - Leave from Victoria Foyer on Foot

7:30-9:00 Banquet (Victoria Alumni Hall)

**Sunday, October 14, 2005 Victoria College, University of Toronto
IHPST, 3rd Floor Victoria College**

8:30-9:00 Breakfast/Petit Déjeuner

Session 8a: Exploration and Romance

VC 323 9:00-10:30

Dick Bourgeois-Doyle – “The Mystery of the Maple Leaf”

The Maple Leaf Trainer II was a Canadian built biplane that first flew in Fort William, Ontario in October 1939. A creation of Elsie Gregory MacGill, the plane was quite likely the first aircraft to be principally designed by a woman aeronautical engineer and thus a milestone in aviation history. Although stable, durable, and easy to manoeuvre, the plane was never used operationally nor produced in quantity in Canada. MacGill and others were misled, perhaps purposely, about the fate of the prototype and the ultimate application of the design, leading to conflicting accounts and some mystery. This paper draws upon declassified U.S. Military Intelligence Reports and other sources to shed light on the last days of the Maple Leaf Trainer II and its eventual contribution to one of the more inspiring and unexpected military programs of World War II.

Randall C. Brooks – “On the Trail of Hans Kruger”

In the mid-1920s, a German geologist, Dr. Hans Kurt Erich Krüger, was determined to explore the high western Arctic Islands and possibly solve the question of even more westerly islands that R.E. Perry thought he had glimpsed. Outfitting himself in 1925 with local knowledge, tools and equipment based on correspondence with Vilhjalmur Stefansson who had ventured through the region in 1916 and 1921, Krüger and Prof. F. Klute traveled to Greenland (the so-called Hessian West Greenland Expedition) to test the equipment and carry out geological observations. Delayed until late 1929 awaiting permission to enter Canadian territory, Krüger and a Danish companion, Pge Rose Bjare, traveled to Greenland for a trial run in 1929. There the pair picked up an Inuit guide, Akqioq, but may also have endured medical problems that would later have disastrous consequences. Undeterred, they went to Ellesmere Island the following year with their Canadian permit and left Bache Post heading north and west never to be seen again. Two RCMP teams searched for them in 1931 and 1932 finding a note left by Krüger in a cairn erected by R.E. Perry on the northern tip of Axel Heiberg. In 1954 another note was found in a second Perry cairn on Ellesmere Island and 3 years later a third note was found in a cairn at Andersen Point on Meghan Island. Until recently, no other trace of the team had been found.

In 1999 a Canadian geological team stumbled upon some remnants of a shirt (with a German label), gas and food tins and a small mountain transit by Max Hildebrand of Freiberg Germany. In 2003 I was asked to assist in attempting to link the site to Krüger. This paper will give the story of how 3 letters on the transit instrument led to a firm, but circumstantial, association to the German geologist, a subsequent archaeological dig at the site and a definitive link to Krüger and his companions. The mystery of this compelling story is not yet completely

solved. The apparent reappearance of Akqioq at home in Greenland in the 1930s leads to some speculation on the demise of Krüger and Bjare.

Olivier Craig-Dupont – « Des « Beautés Naturelles » au Précambrien : la Scientifisation du Romantisme au parc national de la Mauricie, 1968-1979 »

Le champ disciplinaire de l'écologie, dans la seconde moitié du XXe siècle en Amérique du Nord, s'est profondément transformé. L'écologie scientifique s'est vue être de plus en plus mobilisée dans les programmes gouvernementaux pour justifier une gestion plus « rationnelle » du territoire. Les parcs nationaux, en tant qu'objet institutionnel construit principalement pour la conservation de la nature, offrent un terrain d'enquête particulièrement riche pour l'étude de cette transformation disciplinaire et des représentations de la nature qui en découlent. Je voudrais présenter ici mes travaux sur le cas du parc de la Mauricie, créé en 1970 dans la province de Québec. En détaillant les filiations culturelles romantiques de l'agence fédérale Parcs Canada, principale agence responsable du « sublime » territorial canadien, je voudrais inscrire le parc national de la Mauricie, héritier de cette tradition, dans le contexte scientifique particulier des années 1970. En étudiant principalement les lois, les politiques et les plans directeurs qui ont structuré son implantation, je voudrais documenter une certaine transformation épistémologique des représentations de la nature chez Parcs Canada au courant des années 1960-1970. L'étude démontrera que les éthiques romantiques de Parcs Canada, par la volonté de préservation des « beautés naturelles » de la région mauricienne, étaient encore subtilement présentes dans les premières lignes directrices du parc. Ces représentations romantiques, dans la première décennie du projet, auront toutefois été progressivement éclipsées au profit d'une vision plus abstraite de la nature, basée sur des concepts de l'écologie scientifique. Le romantisme constitutif de Parcs Canada aura toutefois, argumenterai-je, persisté dans les mandats scientifiques du parc sous la forme d'une histoire naturelle non-intrusive, muséale et contemplative.

Session 8b: 19th Century Science and Technology in Agriculture and Construction

VC 304 9:00-10:30

Patricia Bowley – “James Robertson, Canadian Agricultural Improver and Founder of the Canadian Seed Growers' Association”

James W. Robertson's (1857-1930) important work in rural education and seed production was done after he left OAC in 1890 to become Dairy Commissioner for Canada. He believed in an ideal Canadian farm family, but this was balanced by a lifetime of practical work advocating for improved rural education and agricultural production. These were not mutually exclusive philosophies or concerns; his conviction that farming was the mothering occupation at the heart of society, and that the farm, the household and the rural school were the foundation on which Canadian agriculture would most surely succeed, guided his life's work.

Ross Fair – ““To render labour more easy and expeditious”: Processing Upper Canadian Hemp, 1801-1833”

In 1807 William Bond of Upper Canada received a silver medal from the Royal Society of Arts in London for his model of a hemp-breaking machine. Bond was just one of a series of individuals who had tried to achieve fame and fortune from hemp cultivation following Britain's announcement in 1801 that it desired the Canadas to become the empire's chief source of hemp fibre.

The paper examines the acquisition and invention of machinery as Upper Canadians tried to reduce the hours and cost of labour required to process hemp. The paper argues that the overall project failed because no amount of ingenuity was able to overcome the insufficient transportation infrastructure required to ship hemp from farm to mill and then to British markets.

Gerard V. Middleton – “Factors determining the use of stone for construction in southern Ontario, 1820-1880”

Extensive use of building stone was confined to three main areas: (i) Galt-Guelph-Fergus; (ii) Ancaster, Dundas, Hamilton (Wentworth County); (iii) St. Mary's. The reasons for this are (i) geological: suitable bedrock must be exposed, or suitable boulders available (as “fieldstone” of glacial origin); (ii) technological (positive influences): local immigrants had to be skilled in stone masonry, and have access to mill-driven gang saws; stone was also favoured for construction of canal locks, and railroads; (iii) technological (negative influence): stone was locally cheaper than bricks until the arrival of brick-making machinery in the 1860s, and concrete in 1889; and (iv) cultural: stone construction was favoured for Government buildings, and by the Scots, the affluent, and the Protestant clergy.

10:30-11:00 Coffee/Café

Session 9a: Aviation and Climate

VC 323 11:00-12:30

Eda Kranakis – “The ICAO (International Civil Aviation Organization) and Airspace Governance”

This paper will trace the early history of the ICAO (headquartered in Montréal) and its role in the governance of airspace. The ICAO was established at the close of the Second World War, and continues to serve as the main international forum governing civil aviation. Yet very little has been written about the history of this important organization and its activities. The aim of this paper is to analyze the system of global airspace management and governance that emerged in the post-WWII era (1944-1965) under ICAO auspices, and how it interacted with the system of national sovereignty over airspace. I will also explain how this system of airspace governance shaped transatlantic air mobility patterns in the period 1945-1965.

David MacKenzie – “Canada, ICAO, and the Search for Multilateralism in International Air Transport”

The 1944 Chicago Civil Aviation Conference created the International Civil Aviation Organization as a technical organization to oversee the development of international air transport. There was widespread agreement on the shape and responsibilities of the new organization, but no agreement was reached concerning international commercial rights, or the three “R’s” – routes, rights and rates. This paper will examine the early postwar efforts to achieve a multilateral aviation agreement on commercial rights with a special focus on the important role played by Canada in these activities.

André Lamalice – « Plus ç change, moins c'est pareil: Étude du corpus sur le changement climatique »

Au cours des derni res décennies, s'est constitué un vaste corpus dérivé de disciplines des sciences de la nature, des sciences sociales et des sciences humaines. L'étude du passé, lointain ou immédiat, constitue un élément clé de ce corpus. Ce « passage obligé » vers l'histoire donne tout son sens à l'utilisation de l'historiographie comme méthode d'investigation privilégiée. Au travers des fonds et collections de la biblioth que de l'université d'Ottawa, la présentation retrace la trame historique du corpus sur le changement climatique et en identifie les caractéristiques principales et les enjeux.

Session 9b: Group Presentation **VC 304 11:00-12:30**
Training Canadian Engineers to meet Societal Needs: Engineering Education, Social Relevance and the Recruitment of Women in Engineering Since the 1980's

Participants:

Ruby Heap, Professor, Department of History, University of Ottawa
Crystal Sissons, Doctoral student, Department of History, University of Ottawa
Ann B. Denis, Professor, Department of Sociology, University of Ottawa
Janice Ahola-Sidaway, Professor, Faculty of Education, University of Ottawa

SUMMARY:

This panel session is based on the SSHRC-funded research project conducted by the participants on the links between the promotion of social relevance in Canadian engineering education and the recruitment and retention of women in the profession. This session aims to provide insights into the development of Canadian policymaking with respect to engineering education, to depict both continuity and change on this front and to contribute to a better understanding of the ways the internal historical logic of engineering education has responded to demands for transformation and reform.

The session is divided in two parts, with each part including two presentations.

PART I:

Crystal Sissons will examine, in a comparative perspective, the discourses, programs and policies designed by government, academia, the profession, industry and lobby groups to attract and retain more women in the engineering “pipeline” on the one hand, and to transform engineering education to make it more responsive to societal needs, on the other hand.

Ruby Heap will assess the importance of each of these two issues since the 1980’s, the links between the two, if any, and their impact on policy and programmatic development at those Canadian schools or faculties of engineering selected for the SSHRC project. She will also present an overview of the research design of the project.

PART II

Ann Denis will discuss selected preliminary findings from questionnaires completed by full-time engineering faculty members. Analysis will focus on individual and institutional practices related to social relevance and gender inclusiveness, and women’s experiences in the profession. Independent variables will include the respondent’s gender and sub-discipline.

Janice Ahola-Sidaway will discuss selected preliminary findings from student questionnaires. Analysis will focus on factors that students consider important within engineering, together with their reported experiences in courses, para-academic and faculty-related social activities, as these pertain to social relevance and gender inclusiveness. Independent variables will include the respondent’s gender and sub-discipline.

CONCLUSION

Drawing on the four presentations, the session will conclude by proposing working hypotheses highlighting continuities and transformations that are occurring within the organizational cultures and subcultures of today’s engineering schools. Particular attention will be given to the themes of social relevance and women’s participation.

12:30-2:00 Sandwich Lunch/Dîner, VC 304