FBW 11

CANEUS FLY-BY-WIRELESS WORKSHOP 2011

June 14-17, 2011 Montréal, Quebec

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Contents

Welcome from the 4th CANEUS/IEEE Fly-by-Wireless 2011 Workshop Chair

Dear Workshop Participants:

On behalf of the organizing committee of the 4th CANEUS / IEEE Fly-by-Wireless 2011 International Workshop, it is my pleasure to extend a hearty welcome to all of you!

We, at Concordia University, are very pleased to host this important event, which we believe addresses a critical need for the aerospace industry. The aerospace industry needs an infusion of new technologies and systems, which we believe can be particularly influenced by exciting worldwide developments in Sensor DAQ Micro-Miniaturization, Passive Wireless Sensor Tag, Less–Wire Architectures, Structural Health Monitoring, and Wireless systems immunity in Electromagnetic Environment (HIRF, Lightning, etc).

Given that the entire aerospace market sector is relatively small and specialized, while yet needing a broad spectrum of enabling technologies, the CANEUS FBW approach of creating collaborative consortia has gained worldwide recognition as an innovative approach to marshal and focus our limited and constrained resources.

Canada is pleased to host this 4th CANEUS / IEEE Fly-by-Wireless 2011 International Workshop, which will count on the support and participation of:

- IEEE Canada (Region 7)
- IEEE Region 1
- IEEE Montreal Section
- IEEE Maine Section
- IEEE ComSoc, AES and UFFC Societies
- Concordia University, Montreal
- CANEUS International
- Bombardier Aerospace

The CANEUS / IEEE FBW11 Workshop is unique and different from many conferences and workshops, in that it emphasizes measurable deliverables with lasting impact for the aerospace industry. Participants of this Workshop will collectively prepare implementation plans for well-defined projects, and identify new project concepts. The end result will be a neutral virtual business model for international collaboration that brings the best solutions to the boardroom,

so that well-informed decisions on new program starts - whether it be research, test and evaluation, or introduction of new products to the end user- can be made quickly and confidently.

Have a productive workshop at Concordia University.

Anader Benyamin-Seeyar
Host Chair, CANEUS / IEEE Fly by Wireless (FBW) 2011 Workshop
Adjunct Associate Professor at Concordia University
Chair, IEEE Montreal Communications & IT Chapter

Steering Committee

Charles Rubenstein, Pratt Institute, NY, USA
Om Malik, University of Calgary, Canada
Jim Castellano, Industry Canada
Ali Abedi, University of Maine, Orono, USA
Luis Rodrigues, Concordia University, Canada
William "Cy" Wilson, NASA LaRC, USA
Hugh Liu, Toronto University, Canada

Welcome from CANEUS International

Dear Workshop Participant:

Thank you for participating in the 4th CANEUS / IEEE Fly-by-Wireless 2011 International Workshop! On behalf of CANEUS International, we are very pleased to host this workshop in Montreal and extend a warm welcome to you and urge you to participate fully in this event. I am sure this will be a very worthwhile and productive event.

CANEUS' primary mission is to rapidly and cost-effectively bridge the mid-TRL "Valley of Death" for transitioning emerging micro-nano technologies to aerospace systems, thereby enabling next generation missions with advanced capabilities. Since the nature of these transitioning projects varies on a project-by-project basis, CANEUS has put in place an extremely "lean" and flexible core organization to create the collaborative virtual organizations necessary for the advocacy and ultimately the manufacture and demonstration of specific MNT-based systems for aerospace end users.

CANEUS adds value by bringing together its global network of professionals with complementary skill-sets, from the low TRL researchers to the mid-TRL system developers and the high-TRL system testing, integration and reliability assurance personnel. As the premier advocacy organization for aerospace MNT system development, CANEUS has gained the trust of both private and government sponsors as a reliable, due-diligence body for vetting and "packaging" system development projects to minimize the investment risks by these sponsors.

Potential system development projects are proposed, defined, and peer-reviewed by the CANEUS advisory committees for completeness and soundness, prior to submission to potential sponsors for funding. CANEUS Workshops, such the FBW11, offers the forum to network and discuss these projects, and to form the teams that will be responsible for the generating the system-level end products.

One of the most compelling reasons to participate fully in CANEUS, is to have the many opportunities to collaborate across organizations, and, if necessary, across international boundaries, on these high-risk, high-cost system development projects that are beyond the resources of any single organization. In essence, effective risk mitigation can be achieved under the auspices of CANEUS for the generation of new intellectual property.

The primary cause for the failure of a great majority of emerging technology development projects in their inability to make the transition to system level is because these projects have been largely developed in response to the inventors' vision, i.e. a "technology push" approach, and therefore stand the great risk of wrongly predicting customer demand. CANEUS overcomes this key transitioning challenge by first determining if a sustainable customer base exists for the

proposed system, in other words, CANEUS uses a "technology pull" approach instead to evaluate the economic viability of a specific project prior to embarking on the development effort. The system need could either be an existing customer need, or a need that is created as a result of CANEUS' advocacy activities with potential customers and end-users.

Because CANEUS activities, by necessity, have to span the continuum of technology development and commercialization, CANEUS projects could be conducted in either a small, focused collaborative group effort approach or, alternatively, as a much larger, consortium-style, development of precompetitive intellectual property that is subsequently licensed by several aerospace companies and other organizations that see the benefit in mitigating their risk for expensive, high-risk, high-payoff technology development. It is then highly probable that these precompetitive developments will spawn a host of proprietary development projects within the licensee organizations.

The topics covered at CANEUS / IEEE FBW11 workshop are very much synergistic with the activities and mission of CANEUS. The Workshop has an exciting program consisting of three days of workshops, networking opportunities through social gatherings and poster sessions designed to define and implement plans to infuse next-generation technologies within various aerospace industry segments.

As you are meeting at this workshop, the Aerospace industry worldwide is facing a major challenge: How to keep its new technology pipeline for future aircraft/spacecraft from drying up? The CANEUS / IEEE FBW11 Workshops emphasize measurable deliverables with lasting impact for the aerospace industry. Workshop participants will collectively prepare implementation plans for well-defined projects, and identify new project concepts.

As a valued participant, it is critically important that you interact with speakers, poster session presenters, and other participants and provide your vital input to improving and thereby strengthening our mission.

It is our sincere hope that you will benefit tremendously from your participation and that you will have a technically, professionally, and socially enriching experience.

Milind Pimprikar
Founder and Chairman
CANEUS International
June 14th, 2011

FBW11

CANEUS
FLY-BY-WIRELESS
WORKSHOP 2011

June 14-17, 2011 Montréal, Quebec

Program Schedule

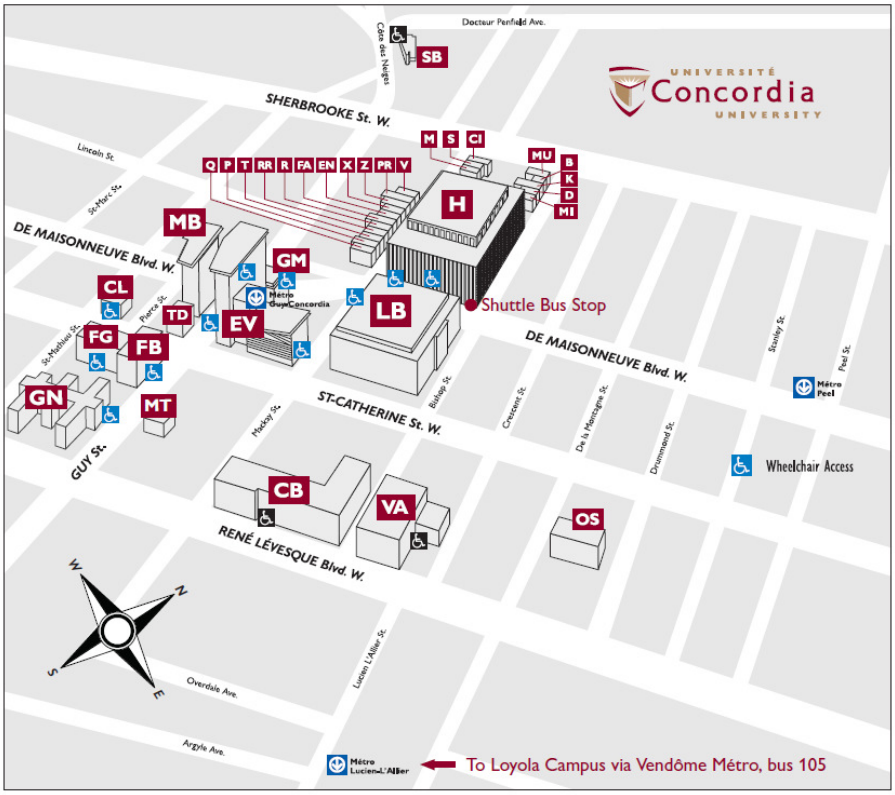
Time /Day Theme	Tue June 14 End Users Needs Assessment and Lessons Learned	Wed June 13 Technology Providers: State-of-the-Art	Thu June 16 Programmatic Issues: Funding, IRB, Projects Success Criteria	Fri June 17 Project Development Plans and Team building
08:30 - 10:00	**Session 1:** Welcome and FBW Program Overview **Session 2:** Keynote Address	**Session 8:** Review of Day 1 & Overview for Day 2: **Session 9:** Keynote Address	**Session 15:** Review of Day 2 & Overview for Day 3: **Session 16:** Keynote Address	**Session 22:** Review of Day 3 & Overview for Day 4 : **Session 23:** FBW 11 Potential Consortia Projects
10:00-10:30	**Networking Break**	**Networking Break**	**Networking Break**	**Networking Break**
10:30-12:00	**Session 3: Aircraft Needs and Lessons Learned:** Speakers will discuss: - Technological capabilities required for future civilian and military aircrafts -Challenges facing future aircraft development and how wireless instrumentation, architecture and networks can meet future needs.	**Session 10:Wireless Instrumentation and Design:** Speakers will discuss: - Developments made to date in new Wireless Instrumentation & Design to meet the challenging requirements of next generation aircraft and spacecraft.	**Session 17: IRB Programs:** Speakers will present: -The IRB policy and mechanism to potential Aerospace Primes and technology providers, to encourage in industry-government-academia Consortia. -The IRB implications with the Aerospace and defense programs, which are synergistic with the aims of the FBW11 Workshop.	**Session 24: Project Planning Breakout Groups:** The goal of these breakout sessions is to define projects and project concepts. A general project plan coherent with the roadmap outlined in the previous session will be drafted (6 months, 1 year, 2 years)
12:00-13:30	**Lunch**	**Lunch**	**Lunch**	**Lunch**
	Session 4: Keynote Address	**Session 11: Keynote Address**	**Session 18: Keynote Address**	**Session 25: Keynote Address**
13:30-15:00	**Session 5: Space Needs and Lessons Learned:** Speakers will discuss: - Technological capabilities required for future generation of spacecraft for earth and planetary missions. - How the recent developments in wireless instrumentation, architectures, networks, and passive sensor tags can meet these needs.	**Session 12: Wireless Architectures and Networks:** Speakers will discuss: -Latest developments in new Wireless Architectures & Networks for aerospace applications, to a proof-of-principle level of maturity. -Advances in organizations within the context of worldwide developments and their technological successes.	**Session 19: IRB/Offset Program-Success Stories and Examples from primes:** -Presentations from major Primes that has IRB commitments, to identify exactly what type of projects they are looking for in terms of their IRB obligations. -Examples and success stories.	**Session 26: Project Implementation Breakout Groups:** Participants will address business development issues, such as NDA, IP. These breakout sessions aim to refine the well-defined projects: participants will outline teaming and funding schemes, plan project oversight & execution, and establish milestones from which to gauge success of the project.

15:00-15:30	**Networking Break**	**Networking Break**	**Networking Break**	**Networking Break**
15:30-17:00	**Session 6: Defense Needs and Lessons Learned:** Speakers will discuss: - Technological capabilities required for future defense and military applications -Challenges facing future military spacecraft development and how wireless instrumentation, architecture and networks can meet the needs	**Session 13: Passive Wireless Sensor Tags:** Speakers will discuss: -Latest developments in new Passive Wireless Sensor-Tags for aerospace applications, to a proof-of-principle level of maturity. -Recent advances in organizations within the context of worldwide developments in these areas. -Potential aerospace application areas for the specific instrumentation will be discussed.	**Session 20: Consortia Project Success Criteria: Panel Discussion** Panelists will discuss: -Success criteria's for collaborative projects metrics used for assessing collaborative project progress, and strategies for infusing emerging technologies into aerospace applications.	**Session 27: Project Summary:** This session aim to summarize the output of each of the Sector Consortia projects sessions to learn about the activities and roadmaps of other Sector Consortia project teams. **Session 28: Workshop Summary:** This last session aim to summarize the output of each of the FBW11 workshop. ____End at 4:00 PM___
17:00-18:30	***Session 7:*** **Project Updates** from FBW10/FBW09 and Potential Areas of Interest for FBW11 projects roadmap	***Session 14:*** **One-on-one meetings:** Workshop Technology Developers will have the first opportunity to sign up for 13 minute "one-on-one" appointments with Application End-users. Sign-up will be available at the Workshop Information Table.	***Session 21:*** **Project Group Leaders Meetings**	
18:30-	**Networking Reception**	**Gala Dinner and Awards**	**Evening Free (Group Dinners)**	

Venue Information

The 4th CANEUS/IEEE Fly-by-Wireless Workshop will be held at the EV Building of Concordia University, in downtown Montreal.

Concordia University, EV Building Room EV2.260
1515 St. Catherine W
Montreal, Quebec, Canada. H3G 1M8



Concordia University's downtown campus map

For more information, directions, detailed maps, please visit
www.concordia.ca/about/contact/campus-map

The Gala Dinner will be held at:

Hotel Maritime Plaza
1155, rue Guy
Montréal, Quebec, Canada H3H 2K5

For further information about the venue, please visit:

Concordia University website
www.concordia.ca

Tourism and travel information in Montreal
www.tourisme-montreal.org/Travel-Information

Société de transport de Montréal
www.stm.info

Internet connection

Concordia University will provide Wi-Fi connectivity to the participants. Please find the access details in your Registration Package.

Program Overview

The 4th CANEUS / IEEE Fly-by-Wireless conference (FBW11) is targeted to foster collaboration between university, industry and government partners for the research, development and experimental validation of wireless technologies and concepts for next generation of aircrafts and spacecrafts. The FBW11 conference represents a unique and ambitious attempt to bring together the technology developers, end-users and systems integrators involved in fly-by-wireless Aerospace technology development from within the Americas, Europe, Asia and elsewhere.

The objective of the CANEUS Fly-by-Wireless Consortium is to minimizing cables and connectors across the aerospace industry by providing reliable, lower cost, and higher performance alternatives for a vehicle's or program's life cycle. The core premise is that complementary skill sets from across several organizations and countries are needed to rapidly and cost-effectively transform emerging FBW concepts into practical Aerospace systems.

In order stimulate formation of project teams comprised of technology providers and application/end users, and develop project proposals from each team that have significant mutual benefit and high potential of funding from internal or external organizations, the Concordia University is co-hosting this strategic conference at Montreal on June 14-17, 2011.

The 2011 CANEUS Fly-by-Wireless Conference, fourth of its kind, builds on the successes from the 1st Joint CANEUS/NASA 2007 "Fly-by-Wireless" Workshop, held in March 2007 at Grapevine, Texas http://www.caneus.org/fbw/FBW07/, the 2nd CANEUS "Fly-by-Wireless" Workshop held in June 2009 at Montreal, Canada (www.caneus.org/fbw09) and last one took place at University of Maine, Orono, USA (www.caneus.org/fbw10) . The first CANEUS/NASA "Fly-by-Wireless" workshop grew out of an identified need from CANEUS 2006 held at Toulouse, by the CANEUS Aerospace End-User Committee on Aerospace SHM - Structural Health Monitoring.

The FBW11 conference will also help advance / refine the projects identified and initiated from previous FBW10, FBW09 and FBW07 workshops. The goal of these past workshops was to significantly advance the CANEUS Fly-by-Wireless Consortium by creating roadmap and articulating well-defined projects for the aerospace industry. The workshop will culminate in measurable deliverables, namely a set of project "blueprints", for developing the most promising FBW concepts to system-level prototypes.

Day 1: Plenary and End-User Briefings (Needs Assessment – End User Requirements)
(Sessions 1 to 7)

The plenary session of the Workshop will provide participants with the raison d'être of Fly-by-Wireless initiative and the collaborative approach to implementing the goals. This session will also address the key challenges faced in working on collaborative pre-competitive projects. Issues to be addressed include intellectual property, regulatory compliance and funding.

Sessions Covering End-User's Needs Briefings: The goal of the second half-day is to update participants on the needs and lessons learned of the aerospace industries including the basis for the business case, as well, all aspects of fly-by-wireless technologies: the state-of-the-art in developments related to FBW, challenges, applications and to identify the technology gaps. The presentations of the End-User Briefing sessions are intended to provide input to the FBW Project development sessions. Speakers will be provided with a template to address key issues in their respective presentation.

After day 1 of the workshop participants should walk away with a clear understanding of the workshop process:

- the raison d'être of FBW consortia
- project developments from past meetings
- clear understanding of end-user and customer needs as related to:
    - Structural Health Monitoring
    - Passive Wireless Sensor Tag
    - Sensor DAQ Micro-Miniaturization
    - EMC- HIRF
- project concepts/ideas from end-user/customers that could offer potential solutions for identified needs

Day 2: Technology Developer Briefings:
(Sessions 8 to 14)

The Day 2 of the workshop presentations supports the "technology assessment". After day 2 of the workshop participants should walk away with a clear understanding of the:

- current technology and project developments of relevant Fly By Wireless technology providers
- maturity level of current technology developments
- state-of-the art or bleeding-edge technology concepts

Sessions Covering Technology Provider Briefings: These Sessions will review the state-of-the-art and technology breakthroughs being made worldwide that can reduce aerospace cabling. For example, Surface Acoustic Wave (SAW) sensors are making their commercial debut in temperature and pressure applications. Low power, adaptive, and robust radio technologies and systems are being used for important wireless applications in several Space Agency programs. Some aircraft now have FAA-approved wireless devices, e.g. a breakthrough has produced a no-power sensor-tag system that can collect data from a variety of common sensors and switches at distances useable for aerospace vehicle applications.

Speakers will discuss exciting developments from their own organizations to meet the challenging requirements of next generation aircraft and spacecraft applications. Each speaker will present recent advances in his/her organization within the context of potential collaborative projects, to a proof-of-principle level of maturity, and speculate on the path and timeframe for future system-level development.

Day 3: Programmatic Issues: Funding, IRB and Offsets Collaborative Projects, Success Criteria
(Sessions 15-21)

The third day working sessions are the heart of this workshop. We are endeavoring to create a program that optimizes the use of participant time to produce measurable deliverables to advance the goals and activities of each of the existing well-defined projects and identify new research and development projects with strong business case. Participants will apply the knowledge acquired during the first two day's sessions towards formulating and implementing existing as well new projects. Finally, as a measure of the workshop success, the project team will present the findings and outcome to gauge project completion and milestone achievements, and the avenues to be pursued to overcome challenges such as intellectual property, funding, and government regulations.

After day 3 of the workshop participants should walk away with a clear understanding of the:

- The goals and activities of each of the existing well-defined projects as well identify new projects with strong business case.
- Priority of government programs to fund and procure relevant FBW projects and technology developments
- Selection criteria, metrics for assessment, project duration expectations, and transition or infusion strategies for these types of aerospace funding initiatives
- Cross agency and international organization core competencies in developing new technology concepts to a proof-of-concept maturity level?
- Important considerations regarding

Day 4: Project Development Plans, Team building with Implementation Plans

The expected workshop outcome is to come up with well-defined scope for the project supported by all stake holders, which will include:

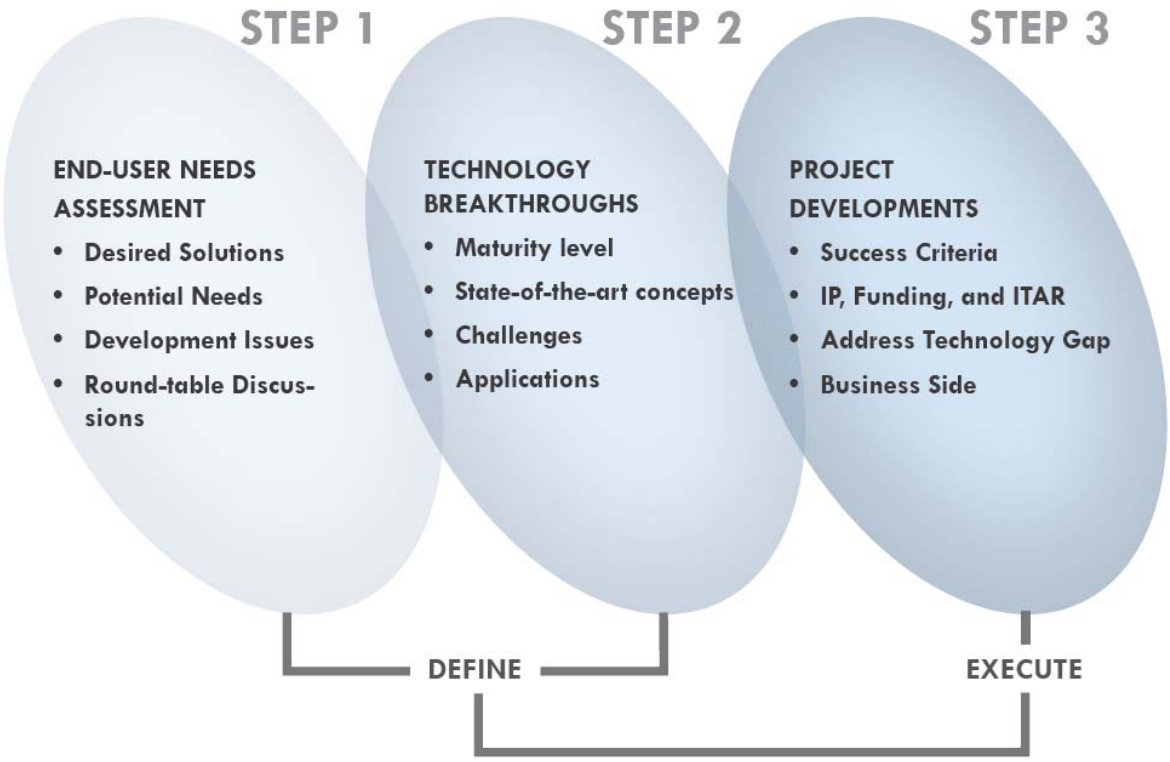
- Define projects and project concepts. A general project plan coherent with the roadmap will be drafted (6 months, 1 year, 2 years)
- Refine the well-defined projects, outline teaming and funding schemes, plan project oversight & execution, and establish milestones from which to gauge success of the project.

Program

FBW11 Workshop Format:

The FBW11 workshop will follow the unique CANEUS flow-down format, consistent with prior FBW workshops, which emphasizes, as its primary deliverable, a categorical breakdown of the potential collaborative framework associated with joining this Industry-University-Government Laboratory collaboration, as a potential stakeholder; the issues such as costs and benefits involved; which prospective stakeholders / end-users have the potential to participate,, outline teaming and funding schemes, plan project oversight and execution, and establish milestones from which to gauge success of the projects.

During the four days of workshop program, participants will (a) present various wireless needs for both short and long-term requirements; (b) identify outstanding research issues important to the end-users, (c) formulate set of system requirements and system specifications toward the characterization of the proper operation and behavior of the wireless sensors system when used in aerospace and aircraft indoor environment, (d) address regulatory issues, potential collaboration agreement; and (e) define proposed project scope, structure, roadmap and funding to further develop the implementation plan. It is expected that this process will lead to detailed proposal with cost estimates, a work breakdown structure, and proposed funding strategies.



In order to accomplish these ambitious goals, the workshop has been structured in four parts:

I. Raison d'être for CANEUS Fly-by-Wireless Consortium: The first part of the Workshops will provide participants with the raison d'être of the CANEUS Fly-by-Wireless Consortium and the CANEUS approach to implementing its goals. This plenary session will also address the key challenges faced in working on collaborative FBW high-risk, high-cost projects, and issues to be addressed during the FBW11 workshop.

II. Sessions Covering End-User Needs and Technology Developers Gap: The goal of the subsequent Sessions and the presentations from world-class Experts, including those selected from the abstracts received in response to the call for papers, is to update participants on the needs and lessons learned of the aerospace (aeronautics, space and Defense) industries including the basis for the business case, as well, all aspects of fly-by-wireless technologies: the state-of-the-art in developments related to FBW, challenges, applications and to identify the technology gaps.

III. Poster sessions: Poster sessions featuring presentations from universities, research laboratories, SME's and end-users complement the topics covered in the sessions.

IV. FBW Consortia Project Development Using the IRB/Offset Program, Implementation, Success Criteria and Deliverables: These sessions are at the heart of this workshop. We endeavored to create a program that optimizes the use of participant time to produce measurable deliverables to advance the goals and activities of each of the existing well-defined projects and identify new projects with strong business case.

The topics covered in the sessions from the second part of the workshop will feed into this third part of the workshops: participants will apply the knowledge acquired during the prior sessions towards formulating and implementing existing as well new projects.

Finally, as a measure of the workshop success, each project team will present the findings and outcome to gauge project completion and milestone achievements, and the avenues to be pursued to overcome challenges such as intellectual property, funding, and government regulations.

	Day 1: Tuesday June 14th
	Plenary & End User Briefings
07:30-08:30	**Registration**
08:30-09:30	***Session 1:*** Welcome and Workshop Overview **Chair:** William Lynch, Chair, ECE Department, Concordia University **Speakers:** 1. Christopher W. Trueman, Acting Dean of Engineering, Concordia University 2. Anader Benyamin, Host Chair, FBW11 Workshop 3. Milind Pimprikar, Founder & Chairman, CANEUS International 4. Charles Rubenstein, Director, IEEE R1 5. Nakih Kaddaj Mallat, Chair, IEEE Montreal Section
09:30-10:00	***Session 2: Keynote Address*** **Chair:** Anader Benyamin, Host Chair, FBW11 Workshop **Speaker:** Dominique Leroy, Industry Canada
10:00-10:30	**Coffee Break**
10:30-12:00	***Session 3:*** Aircraft Needs & Lessons Learned Speakers will discuss technological capabilities required for enabling the next generation of civilian and military aircraft. Speakers are encouraged to make the link between the challenges faced by future aircraft development and SHM, and how wireless instrumentation, architectures& networks, and passive sensor tags can meet them. **Chair:** Luis Rodrigues, Concordia University, Montréal, Canada **Speakers:** 1. Eugene Stewart, Manager, Systems and Sensors, Lockheed Martin, New Jersey 2. Fidele Moupfouma, Chief Aircraft Electromagnetic hazards protection Engineer (PES) Bombardier Aero., "More Wireless Systems Onboard of Aircraft with Metallic Nanoparticles" 3. Loftur Jónasson, Chair, ACP, ICAO, "Aeronautical Frequency Spectrum Management, ICAO Position and Policy with the WRC-12 Agenda Items and on-going Preparation activities" (Representative) 4. Pankaj Goyal, MicroMega, Inc., "Emerging In-Flight End-User Needs for Entertainment Computing and Communications" Confirmed Participants, not Speakers: 1. Jan Mueller, Airbus, France 2. Peter Lance, Pratt & Whitney, Canada 3. Michael Dell Anno, GE, USA 4. Haydn Thompson, Rolls Royce, UK

12:00-13:30	***Session 4: Lunch Keynote Address:*** Aviation and Space Safety Policies or Vision, roadmap and technical challenges of Fly-by-wireless **Chair:** Laurent Lamarre, IREQ, Montreal **Speaker:** Horst Hüners : DLR - Germany Aerospace Center, "Aviation & Space Safety Policies Vision, Roadmap and Technical Challenges of Fly-by-Wireless"
	End User Briefings
13:30-15:00	***Session 5:*** Aerospace and Defense Needs & Lessons Learned Speakers will discuss (a) Technological capabilities required for future generation of spacecraft for earth orbiting and planetary missions, and (b) Challenges facing future missions and how the recent developments in wireless instrumentation, architectures & networks, and passive sensor tags can meet today and future needs. **Chair**: Nakih Kaddaj Mallat, Chair, IEEE Montreal Section **Speakers**: 1. Keng C. Yap, Boeing Space & Defense, "Probabilistic Structural Health Monitoring using the Wing Leading Edge Impact Detection System WLEIDS – and Lessons Learned" 2. Oroitz Elgezabal, DLR - German Space Agency, "Technological Foundation for Future Intra-Aircraft Wireless Applications: State of the Art of Wireless Data" 3. John Culbertson, California State University Long Beach, "Implementation of Wireless Technologies on Launch Vehicles" 4. Curtis Banks, NASA-MSFC, "Wireless SHM" (Invited)
15:00-15:30	**Coffee Break**
15:30-16:30	***Session 6:*** Aerospace & Defense Needs & Lessons Learned Speakers will discuss (a) Technological capabilities required for future defense and military applications, and (b) Challenges facing future military spacecraft development and how wireless instrumentation, architecture and networks can meet the needs **Chair**: Jacques Lyrette, CANEUS International **Speakers**: 1. Nezih Mrad, DRDC, Canada, "Defense needs and lessons learned" 2. Frost & Sullivan, "Industry Trends & Analyst Insights Fly-by-Wireless Technologies in the Aerospace Structural Health Monitoring Sector"

<table>
<tr><td>16:30-17:30</td><td>Session 7: Project Updates FBW2010/FBW2009

Chair: Mauricio Pereira da Cunha, University of Maine
Update from FBW2010:
Project 1: Ali Abedi*, University of Maine, USA, “Success Story of Flight Test of Wireless Sensors”
Project 2: Oroitz Elgezabal*, DLR, “Evaluate existing wireless & less wire technologies”
Project 3: Steve Horan*, NASA Langley, “Review & summarize End-users Requirements”
Project 4: Carles Ferrer, Universitat Autonoma de Barcelona, “Wireless Networks studies”
Project 5: David Russel, NRC Canada, “Benefit of Wireless solution for monitoring stress/strain during aircraft’s landing”</td><td>Update from FBW2009:
Project 1: Wi-Testbed*: Anader Benyamin, Concordia University
Project 2: Wi-Engine: Gérard Boutteville, Meggitt, Switzerland (proposed new Leader)
Project 3: Wi-Sense: Jackie Hines, AS&RD, USA
Project 4: Wi-SHM: Curtis Bank, NASA</td></tr>
<tr><td>17:30-20:00</td><td colspan="2">Poster Session

1. Mehdi Si Moussa, LACIME Lab, ETS. “Design Of a Small Microstrip Tag Antenna for RFID Applications”.
2. Aswin Amirtharaj, ECE, SREC VEPPAMBATTU. “Automated Charging System for Mobile Phones”.
3. Nazrul Taajwar, University of North Dakota. “Fly-By-CDMA Wireless and Single Wire-Line technology - a potential solution for Fly-By-Wireless/Less-Wire”.
4. Johanis Bay, Cenderawasih University. “A Prototype of ZigBee to Bluetooth Gateway for emerging Body Area Network Application”.
5. Saleh Faruque, University of North Dakota. “Development of an Instrument to Visualize RF Coverage Footprints of Mobile Ad Hoc Wireless Network”.
6. Tasbirun Upal, University of North Dakota. “Fly by wireless/Less-wire: A LASER solution”.
7. Zeeshan Qamar, COMSATS Institute of Information Technology. “Circularly Polarized Dual band Microstrip Patch Antennas with Multiple Techniques”.
8. Hassane Saghir, Ecolepolytechnique de Montreal. “Aircraft Wireless Channel Characterization”.
9. Tasbirun Upal, University of North Dakota “Fly by Wireless: An ultrasonic approach for UAV”.
10. Han-Ti Chuang, Carleton University. “A Low Cost Oscillator for High Data Rate E-band Transceivers”.
11. G. Borgese, L. Rizzo, G. Artese, & C. Pace, Dipartimento di Ingegneria dell’Informazione, Università di Pisa, Italy. “Compact Wireless GPS/Inertial System”.
12. Nezih Mrad, Department of National Defence (DND). “RF-Based Power Transmission”.

Networking Reception at Concordia University
EV Building, Faculty & Staff Lounge. Room EV4.101</td></tr>
</table>

	Day 2: Wednesday June 15th
	Plenary & Technology Providers Briefings
07:30-08:30	Speakers and Chairs Breakfast
08:30-09:30	***Session 8:*** Review of Day 1 & Overview for Day 2 **Chair**: Reza Soleymani, Concordia University **Speakers:** **Review of Day 1:** Nezih Mrad, DRDC **Overview of Day 2:** Anader Benyamin, FBW11 Chair
09:30-10:00	***Session 9:*** **Chair**: Sylvain Riendeau, IREQ, Canada **Speaker**: Oroitz Elgezabal, DLR - German Space Agency, "Technological Foundation for Future Intra-Aircraft Wireless Applications: Technology Assessment"
10:00-10:30	**Coffee Break**
10:30-12:00	***Session 10:*** Wireless Instrumentation & Design Speakers will discuss (a) Developments made to date in new Wireless Instrumentation & Design to meet the challenging requirements of next generation aircraft and spacecraft, and (b) Latest advances in organizations within the aerospace arena and worldwide developments in these areas, to a proof-of-concept level of maturity. **Chair**: Jules O'Shea, École Polytechnique de Montréal **Speakers:** 1. Nezih Mrad, DRDC Canada, "SHM Implementation" 2. Amir Sepasi Zahmati & Xavier Fernando, Ryerson University, "Emerging Wireless Applications in Aerospace: Benefits Challenges and Existing Methods" 3. Bahaedinne Jlassi, Vahé Nerguizian & Adel Merdassi, ETS and McGill, "Design Methodology of a High Power RF MEMS Switch for Wireless Applications" 4. Camilo Ossa-Gomez, Miad Moarref & Luis Rodrigues, Concordia University, "Design Construction and Fly-By-Wireless Control of an Autonomous Quadrotor Helicopter" 5. Hojoon Lee, Hoseo University. "Optical True Time-Delay Beam-forming for Phased Array Antenna Using a Dispersion Compensating Fiber and a Multi-wavelength Laser"
12:00-13:30	***Session 11:*** Lunch + FBW Innovation and Technology Update

13:30-15:00	***Session 12:*** Wireless Architectures & Networks Speakers will discuss (a) Latest developments in new Wireless Architectures & Networks for aerospace applications, to a proof-of-principle level of maturity, and (b) Advances in organizations within the context of worldwide developments in these areas and their level of technological successes. **Chair** : Ali Abedi, University of Maine, USA **Speakers**: 1. Houman Ghajari & Kamran Mahbobi, Director, MaXentric Technologies, USA. "Wireless Network V-band 60 GHz Gbs Links" 2. Marc Barcelo, Jose Lopez Vicario & Gonzalo Seco-Granados, SPCOMNAV group & Applus+ LGAI – Spain, "Multi-Channel Routing Algorithm for Cluster-Tree Wireless Sensor Networks in Aerospace Applications" 3. Marco Crepaldi, Danilo Demarchi & Pierluigi Civera, Istituto Italiano di Tecnologia (IIT), Italy, "A Low-complexity Short-Distance IR-UWB Transceiver for Real-Time Asynchronous Ranging". 4. Tolga Coplu, Genetlab, Istambul, Turkey. "A Novel Scheme for Predictive Channel Access in Wireless Sensor Networks" 5. Adel Gaafar, Electronics & Communication Eng. Dept. Ain Shams University, Cairo, Egypt. "Improving TCP Congestion Control for Wireless Sensor Networks"
15:00-15:30	**Coffee Break**
15:30-17:00	***Session 13:*** Passive Wireless Sensors Speakers will discuss (a) Latest developments in new Passive Wireless Sensor-Tags for aerospace applications, to a proof-of-principle level of maturity, and (b) Recent advances in organizations within the context of worldwide developments in these areas. -Potential aerospace application areas for the specific instrumentation will be discussed. **Chair**: Amir Aghdam, Concordia University **Speakers:** 1. Mrad Nezih, Li Zhenzhong & Xiao George, University of Waterloo & DRDC Canada, "Effects of Orientation and Obstacles on the RFID Performance" 2. Mohammadreza Balouchestani, Ryerson University, Toronto, Canada "Low-Power Wireless Sensor Network with Compressed Sensing Theory" 3. Jackie Hines, ASRD, USA, "Passive Wireless SAW Sensors Advancements" 4. Ali Abedi & Abolfazl Razi, Maine University, USA, "Interference Reduction in Wireless Passive Sensor Networks Using Directional Antennas" 5. Amir Sepasi Zahmati, Xavier Fernando, & Dr. Hassan Kojori, Ryerson University, Canada, "Transmission Delay in Wireless Sensing, Command and Control Applications for Aircraft"
17:00-18:30	***Session 14:*** **One on One Meetings** Workshop Technology Developers will have the first opportunity to sign up for 15 minute "one-on-one" appointments with Application End-users. Sign-up will be available at the Workshop Information Table. **Chair 1**: George Studor, NASA - JSC **Chair 2**: Ron Brown, Brown Consulting, Maine, USA
18:30 -	**Gala Dinner and Awards Presentations** **Hotel Maritime Plaza, Montreal**

	Day 3: Thursday June 16th
	Programmatic Issues
07:30-08:30	Speakers and Chairs Breakfast
08:30-09:30	***Session 15***: Review of Day 2 & Overview for Day 3 **Chair**: Charles Rubenstein, IEEE Director and Region 1 Chair, NY, USA **Speakers** **Review of Day 2:** Luis Rodrigues, Concordia University, Montreal **Overview of Day 3:** Milind Pimprikar, CANEUS International
09:30-10:00	***Session 16***: Keynote Address 5 Funding Challenges **Chair**: Milind Pimprikar, CANEUS International, Canada **Speaker:** Chris Boivin, Director - Projects, Sustainable Development Technology Canada, "Funding Gap in the Innovation Chain" (Invited)
10:00-10:30	**Coffee Break**
10:30-12:00	***Session 17:*** **IRB Programs, Success Stories and Examples from Primes** Contributors will provide: (a) The IRB policy and mechanism to potential Aerospace Primes and technology providers, to encourage in industry-government-academia Consortia, (b) The IRB implications with the Aerospace and defense programs, which are synergistic with the aims of the FBW11 Workshop, (c) Presentations from major Primes that has IRB commitments, to identify exactly what type of projects they are looking for in terms of their IRB obligations, and (d) Examples and success stories. **Chair**: Jacques Lyrette, Director, CANEUS International **Contributors**: 1. Industrial Regional Benefits Program, Industry Canada 2. Gary Hones, Industrial Regional Benefits/Offsets Manager, Lockheed Martin 3. Brian Beyrouty, Manager IRB, Boeing
12:00-13:30	***Session 18:*** Keynote Address + Lunch **Chair**: Peter Eggleton, Telligence Canada **Speaker**: Garth Williams, Executive Director of the ERA-Can project, "EU-Canada aeronautics cooperation and FP7 opportunities for collaborative projects"

13:30-15:00	***Session 19:*** **IRB Program-Success Stories from Suppliers** Input from suppliers to major Primes that has IRB commitments and their experiences from past **Chair**: Jacques Lyrette, Director, CANEUS International **Contributors:** 1. Rick Harvey, IRB Program Manager Pratt & Whitney Canada 2. Patrick Pharand, Manager, Offsets & Industrial Participation, CAE 3. Business Development Manager, Honeywell
15:00-15:30	**Coffee Break**
15:30-16:30	***Session 20:*** Title: **Consortia Project Success Criteria and Opportunities under FP7: Panel Discussion** Panellists will discuss: Success criteria's for collaborative projects metrics used for assessing collaborative project progress, and strategies for infusing emerging technologies into aerospace applications. **Moderator**: Peter Eggleton, Telligence Canada **Panelists**: 1. Eugene Stewart, Manager Mission Systems and Sensors, Lockheed Martin Moorestown, NJ, USA 2. Clement Fortin, CRIAQ and Carlos Trindade, former Bombardier, Aerospace Advisor at McGill (Invited) 3. Louise Beauchamps, Mission Manager, Canada Space Agency, FP7 National Contact Point in Canada for Space
16:30-17:30	***Session 21:*** **Networking and Project Concept Teams Get-Together**
17:30 -	**Evening Free**

	Day 4: Friday June 17th
07:30-08:30	Group Leaders Breakfast meeting
08:30-09:00	***Session 22:*** **Review of Day 3 & Overview for Day 4 :** Review of Day 3 and Overview of Day 4 Milind Pimprikar, CANEUS International
09:00-10:00	***Session 23:*** **FBW 11 Potential Consortia Projects Concepts:** *Presentations and engagement of participants* **Chair**: Oroitz Elgezabal, DLR and George Studor, NASA-JSC Some examples may include, but not necessary: 1. "Development and Flight Testing of an Autonomous Landing Gear Health-Monitoring System" 2. "Development and Flight Testing of an Adaptable Vehicle Health-Monitoring Architecture" 3. "Engine monitoring" 4. "Project Concepts" **from Day 3** 5. "Project Concepts" **from FBW11 Handbook**
10:00-10:30	**Coffee Break**
10:30-12:00	***Session 24:*** **Project Planning Breakout Groups** The goal of these breakout sessions is to define projects and project concepts. A general project plan coherent with the roadmap outlined in the previous session will be drafted (6 months, 1 year, 2 years) Group A Project Concept: Group B Project Concept: Group C Project Concept: Group D Project Concept:
12:00-13:30	***Session 25:*** **Lunch + Keynote Address**- "*GARDN R&D Projects and Financing Program, by Sylvain Cofsky, Executive Director, Green Aviation R&D Network*
13:30-14:30	***Session 26:*** **Project Implementation Breakout Groups:** Participants will address business development issues, such as NDA, IP, and government regulations; These breakout sessions aim to refine the well-defined projects: participants will outline teaming and funding schemes, plan project oversight & execution, and establish milestones from which to gauge success of the project. Group A Project Concept: Group B Project Concept: Group C Project Concept: Group D Project Concept:

14:30-15:00	***Session 27:*** Title **Project Summary** This session aim to summarize the output of each of the Sector Consortia projects sessions. In these sessions, workshop participants have the opportunity to learn about the activities and roadmaps of other Sector Consortia project teams. **Chairs**: Anader Benyamin-Seeyar, Concordia University **Speakers**: Group Leaders from Project Groups from Sessions 24 & 25
15:00-15:30	***Session 28:*** **Workshop Summary** This last session aim to summarize the output of each of the Sector Consortia workshop sessions. In these sessions, workshop participants have the opportunity to learn about the activities and roadmaps of other Sector Consortia. **Chair**: Milind Pimprikar, CANEUS International **Speakers**: Anader Benyamin-Seeyar, Concordia University
	Group Photo

Workshop Resources:

A. Handbook for Project Development: The CANEUS FBW Workshop handbook will help guide participants through the various stages of the project preparations. Furthermore, throughout the three days of workshop activities, you will be given extra documents and notes to add to the Handbook manual in order to supply you with the tools needed to participate in all the planning processes. Please make a special effort to keep your Handbook up-to-date by adding documents and presentation notes. Doing so will enable you to maximize the benefits from this workshop. By the last workshop session, this document is expected to be complete and an accessible, take-home guide for the entire workshop.

B. Presentation Templates: In order to accomplish the ambitious goal, presenters were provided a template to help prepare their presentation. Participants will also gain valuable exposure with a broadly represented international audience, as well as provide important input and influence in future international collaborations aimed at FBW development for aerospace

FBW11 Session Chair Guidelines

On behalf of the 4th CANEUS/IEEE Fly-by-Wireless Workshop Organizing Committee, thank you for accepting our invitation to chair a Session at the 2011 Workshops! Here are some guidelines for chairing your session.

BEFORE THE SESSION:

1. Please review the presentations of your session with your co-chair, and make any comments as to length or content. Each presentation will be followed by 2 minutes for questions, if any. The Questions and Answers, as well other discussion will be at the end of the session for a total timeframe of 90 minutes. Please decide on an order for speakers to present, and notify the speakers, Technical Co-Chairs Dr. Reza Soleymani & Dr. Ali Abedi as well as at FBW11 Chair to Dr. Anader Benyamin-Seeyar.
2. Ensure that the speakers have taken the appropriate steps to set-up their presentations beforehand. If they have not, please advise them to do so and notify a workshop associate so as to ensure a speedy set-up. Please inform a workshop associate of any problems with the operation of AV equipment and/or room lights.
3. Please meet speakers 15 minutes before the session outside the assigned room. They will be asked to meet with you there at that time, and will give you introductory details about themselves. Double check the running order for speakers and advise speakers of the strict time limit on presentations.

DURING THE SESSION:

1. Please ensure the Session begins at the scheduled time.
2. To open the session, announce the Session title, the number of presentations to be made, the timing for the presentations and Q&A, plus a short personal overview of both co-chairs.
3. Next, announce the title of the first paper and the short personal details of the speaker
4. In order to keep track of the time, please alert speakers when they have 2 minutes left in their presentations. Be polite but firm when alerting speakers of their presentation time.
5. After each presentation is over, please move to the next presentation by announcing the title of the presentation and the short personal details of the speaker.
6. After all the presentations are over, the Session chairs can facilitate the Q&A period by being the first to pose a question. If there is already a line at the audience microphone, the Session Co-chairs will prompt the audience member to ask their question.
7. All audience members asking questions should identify themselves by Name and Organization.
8. If presentations run short and audience members have no questions, the Session chairs may opt to host a general discussion for the remainder of the session.

9. Please close the session by thanking the speakers and delegates.
10. And lastly, please make special announcements if asked by Workshop organizers. Please note that if a session runs over the allotted time, into a break, the next session will start at the scheduled time, and the break will be cut short.

AFTER THE PANEL SESSION:

1. As Session Chair, we also ask that you to keep record of important points from the presentations, including the Q&A period, which would then be useful for the reports scheduled for the last day of the Workshops. These points will be summarized to propose and formulate the potential strategies.
2. The summary you will prepare will also be published in the final proceeding book, prior to each chapter.

Thank you to 4th CANEUS/IEEE Fly-by-Wireless 2011 International Workshop Organizing Committee Members

Dear Organizing Committee Members:

Our sincere thanks to you for volunteering your valuable time and expertise to the Organizing Committee of the CANEUS/IEEE FBW11 Workshop! Due to your dedication and hard work, we have succeeded in achieving our ambitious goal of creating an international FBW network devoted to identifying promising concepts that have been proven in the laboratory, and subsequently transitioning them for application into aerospace systems.

As a result of your efforts, we have put together a series of sessions that have proved unparallel in terms of the focus of topics presented by world-class speakers. For this significant achievement, you should all be very proud. We are honoured to have had the opportunity to work side-by-side with you in coordinating this trendsetting event that will continue to shape and influence our community in this critically important area.

Thank you once again for your vital contributions, and we look forward to working with you in the future.

Best regards,

Anader Benyamin-Seeyar
Chairman
4th CANEUS / IEEE Fly-by-Wireless 2011 International Workshop Organizing Committee

Milind Pimprikar
Founder and Chairman
CANEUS International

FBW11 Program Committee

Host Chair:
Anader Benyamin-Seeyar, *Concordia University, Montreal*

Technical Program Committee:
Reza Soleymani **(Chair),** *Concordia University*
David Russel **(Co-chair),** *NRC- National Research Council*
Ali Abedi **(Co-chair),**
Mauricio Pereira da Cunha, *University of Maine, Orono, USA*
Fidele Moupfouma, *Bombardier, Montreal*
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Chahé Nerguizian, *École Polytechnique, Montreal*
Jacqueline Hines, *Applied Sensor R&D Corp., USA*

Honorary Chairs:
Charles Rubenstein, *Pratt Institute, NY, USA*
Om Malik, *University of Calgary*

Project Manager:
Nazih Khaddaj Mallat, *École Polytechnique, Montreal*

Registration:
Preeti Raman, *EIDOS,*
Nazih Khaddaj Mallat
Kian Jalaleddini, *McGill University*

Local Arrangements:
Luis Rodrigues & Anader Benyamin-Seeyar, *Concordia University*

Publications:
Ron Brown**,** *Ronald O. Brown Consulting*
Camilo Ossa-Gómez, *Concordia University*

Publicity:
Milind Pimprikar, *CANEUS*
Charles Rubenstein, *Pratt Institute*
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IEEE Montreal Section
IEEE Ultrasonics, Ferroelectrics, and Frequency Control (UFFC) Society

Acknowledgement from CANEUS

Ultimately, CANEUS measures its success as an international organization by the number of emerging concepts that it has successfully "shepherded" to system-level products for aerospace applications.

The CANEUS/IEEE Fly-by-Wireless 2011 Workshop is the product of intense collaboration by committed individuals at various levels of preparation.

From the day we initiated this activity until its implementation today, this workshop would not have been possible without the creativity, hard work, un-selfish dedication and numerous sacrifices of one individual: Dr. Anader Benyamin-Seeyar. There are simply no words to express our gratitude and appreciation for all of his contributions to the workshop and to the FBW Consortium as a whole.

On behalf of the Organizing Committee, the CANEUS International Organization, and IEEE, he receives our sincerest thanks for all he has done throughout this process.

The workshop program is the core of the workshop planning and implementation process. The program formulation, constant attention on details, communication and guidance through every stage of preparation, up to assisting with authoring and formatting the program, has enabled the success of the workshop. CANEUS extends special appreciation to the Honorary Chairs Dr. Charles Rubenstein, IEEE Director Region 1 and Dr. Om Malik, IEEE Director Region 7, as well the Technical and Organizing Committee for their invaluable contributions throughout the preparation process. The hard work and sacrifices of Charles and Om has helped to make the FBW11 vision a reality.

CANEUS thanks Concordia University for hosting this event. Prof. Luis Rodrigues, Prof. Reza Soleymani, Dr. Amir Aghdam, Dr. Sheldon Williamson and their teams have been involved in ensuring the success of this entire event by overseeing everything from broad issues to minor details. We are deeply grateful for their leadership and guidance over the past several months.

We are fortunate to have received support for the workshop from several exceptional organizations in Canada. CANEUS would like to thank Concordia University, IEEE Montreal and Maine Sections, IEEE UFFC (Ultrasonics, Ferroelectrics, and Frequency Control), Bombardier Aerospace, for their generous financial support to help facilitate the workshop.

The CANEUS/IEEE Fly-by-Wireless 2011 Workshop is an end-user driven forum capable of providing highly refined technology guidance in the form of well-defined projects. As such, the contribution of the End-user Companies: NASA, Lockheed Martin Corp, Boeing, ASRD,

Raytheon, Bombardier Aerospace, Pratt & Whitney Canada, CAE, has been essential in the workshop mission and goals.

CANEUS would like to extend a special thanks to Mr. Jim Castellano of Industry Canada for his phenomenal support over the past several years. CANEUS thanks him for his efforts to coordinate the IRB Session as well as for his contribution to Sensors and DPHM communities.

CANEUS extends special appreciation to IEEE Montreal Section Chair Dr. Nazih Khaddaj Mallat for his unwavering and energetic support to promote the workshop to IEEE members as well as providing financial assistance and program management to the workshop.

At the forefront of coordination and communication with Workshop speakers and expert panelists are the Workshop Organizing Committee Members. These dedicated individuals have worked tirelessly to ensure that the multi-faceted workshop sessions come off smoothly. CANEUS thanks Workshop Chair Dr. Anader Benyamin-Seeyar, Technical Chairs: Dr. Reza Soleymani for their technical roles in bringing the workshop to fruition.

CANEUS thanks Ms. Cléa Desjardins, at Concordia University as well as many dedicated volunteers for their intense efforts with various workshop program and logistical activities. Their team at Concordia worked patiently and diligently to facilitate all critical logistical issues of registration, catering, audio-visuals, signage, security, public-relations, amongst others. It is highly notable contributions made by Dr. Ron Brown as Publication Chair, who has done an excellent job putting together the whole paper proceedings and the binder material in a timely fashion and helping with all the IEEE Publications matters.

Finally, our special appreciation goes to the webmaster Mr. Kian Jalaleddini, who has been working hard on the website, banners and notepads designs and on miscellaneous other crucial workshop coordination.