SUMMARY REPORT

Manitoba Aerospace Workshop

January 16-17, 2013

Technology Priorities, Economic Development and the Emerson Aerospace Review

Organizing Committee

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Background

The aerospace sector in Manitoba is a critical and thriving component of Manitoba's and Western Canada's economy, supporting over 5,000 jobs and for producing more than $1.6B worth of goods and services annually, of which 80% are exported. The sector includes more than 40 business establishments, anchored by three global companies: Boeing Operations Canada; Standard Aero; and Magellan Aerospace-Bristol Division. The industry's primary focus is on complex components design and manufacturing (composites, metallic, and thermoplastics), precision machining, maintenance, repair and overhaul (MRO), and environmental testing.

Manitoba has a vibrant and successful aerospace industry that has been built on entrepreneurship, effort and productivity. Technology capability and industrial competitiveness are the basis for continuing success.

Situation

Competitiveness is emphasized in an article in the Globe and Mail (3 Oct 2012) which states that Canada's aerospace sector is under increasing threat from a competitive global aerospace market. The main point of the article is as follows: *'To meet the new global challenge, more Canadian aerospace companies need to move up the value chain, stay ahead of the innovation curve and pour more resources into research and development to foster the growth needed to take on bigger rivals over the long term*'. To react to the global competitiveness challenge and to take full advantage of arising opportunities, this Workshop provided the Manitoba Aerospace Community the opportunity to discuss the benefits of developing a Technology Strategy Document that could provide prioritization and direction to Manitoba's technology initiatives based on economic development considerations.

One major opportunity is related to the Government of Canada's Aerospace Review launched in February 2012 and released in November 2012. The mandate of this review was '*to produce concrete, fiscally-neutral recommendations on how federal policies and programs can help maximize the competitiveness of Canada's aerospace industry'* and the final report **'Beyond the Horizon: Canada's Interests and Future in AEROSPACE'** has delivered these recommendations.

The recommendations of this report will affect the Government of Canada's aerospace program support and it is understood that the Aerospace Industries Association of Canada will be formulating a general response to the government regarding implementation. It is anticipated that regional/provincial aerospace associations will formulate their own response that will be used to ensure that their more local needs are reflected in any response to government by the AIAC and by any implementation plans by the government. In this competitive process, it is imperative that Manitoba should be prepared to ensure its needs and priorities are properly documented and marketed. At

this workshop, industrial, academic and government aerospace leaders from Manitoba had an opportunity in an open forum to consider the recommendations from the aerospace review report, particularly those related to technology development, technology funding, collaborations and workforce development.

This Summary Report documents the outcomes of this Workshop.

Workshop Sponsors

There was no attendance fee for this workshop due to the generous contributions of the following organizations:

Workshop Program Outline

The following provides an overview of the Workshop Program. A full listing of the program including panel membership is included as Annex A.

Day 1: January 16, 2013

Welcome K. Webb Manitoba Aerospace Association
Workshop Overview and Goals D.L. Simpson, EnviroTREC
Aerospace Review Summary: Opportunities and Challenges from Manitoba Perspective Ken Webb, MAA
PANEL 1: Manitoba Priority Technologies for Economic Development Moderator: Vic Gerden, WestCaRD
PANEL 2: Manitoba Priorities related to Technology/Funding Moderator: David Simpson, EnviroTREC

Day 2

PANEL 3: Manitoba Priorities related to Workforce Development Moderator: Ken Webb, MAA
PANEL 4: Manitoba Priorities related to Technology Development Partnerships Moderator: David Simpson, EnviroTREC
WRAP-UP PANEL DISCUSSION **Way Ahead: Technology Priorities, Economic Development and the Emerson Aerospace Review** Moderator: David Simpson, EnviroTREC

Workshop Presentations

All presentations made at the Workshop are available on the EnviroTREC website: **www.envirotrec.ca** under events.

Panel Summary Reports

The following sections provide a summary of the primary points made at the Workshop and generally reflect a consensus of the attendees and panel members. Annexes B through E provide a summary of the presentations and discussion at the Workshop based on scribe notes.

PANEL 1: MANITOBA PRIORITY TECHNOLOGIES FOR ECONOMIC DEVELOPMENT

Annex B contains a detailed summary of the Panel 1 presentations and discussion. The following section represents the consensus arising from the Panel 1 discussions.

General

- Better, cheaper, faster processes for manufacturing and MRO in Manitoba are drivers for identifying Manitoba's priority technologies.

- Previously created Future Major Platforms and Canadian Aerospace Environmental Technology roadmaps can still serve as a basis going forward but implementation needs to reflect and support regional industry niche capabilities and Manitoba companies' growth strategies.

- There is an over-arching need to identify what the OEMs (Airbus, Boeing, Bombardier, Embraer, GE, Bell, Rolls Royce, P&W) foresee with regards to future aerospace technologies to identify gaps and opportunities for Manitoba's industry.

- Must include and consider regional supply chain in important niche areas such as rocket propulsion and satellite component development.

- Some of the technologies that have been identified, or will be identified in the future are specific to aerospace. However, we must recognize that there may be technologies that are important beyond aerospace. We must consider leveraging the interest of other Manitoba manufacturing sectors.

Recommendation 2: The government establish a list of priority technologies to guide aerospace related policies and programs.

- Advanced manufacturing technologies that can increase production rates and lower cost are critical to the success of aerospace companies in Manitoba, and need to be included in the national priorities, such as:
    - Advanced machining, advanced measurement, additive manufacturing
    - Advanced Non Destructive Inspection and Imaging

- Automation and Robotics continue to be identified as key technologies for aerospace. i.e. Automated joining, inspection, robotic fastening, painting & treatments. Repeatability is essential. Vision technology coupled with robotics may be a significant coupling of priority technologies.

- Need to consider building on the successes of what we already have such as a sophisticated composites infrastructure, experience and expertise. Continued composites technology development includes:
    - Out-of-autoclave, co-processing to reduce steps, reduce waste
    - Need to expand capabilities into Ceramic Matrix Composites.

- Advanced materials and coatings used in both manufacturing and MRO activities will require advanced technologies to remain competitive.
    - Material build up, plating and joining such as laser, friction & E-beam welding,
    - New materials/processes such as, titanium aluminide

- Green/Environmentally friendly technologies will play a large part of future products and processes.
    - Material cleaning technologies need to be addressed with respect to environmentally friendly chemical alternatives, such as laser ablation
    - Reduction of hazardous waste;
    - Product lifecycle management including durability and recyclability of product at end of service life.

- Gas Turbine performance and reliability testing is required for R&O 'production', where technologies are used to understand and assess the effect of repairs on engine components, as well as in new OEM engine development & certification 'testing'.
    - Data acquisition, advanced sensors, monitoring and modeling of systems for performance prediction.

- o Engine icing, ingestion and endurance testing in Manitoba also requires high speed imaging technologies, advanced sensors & instrumentation and large volume data acquisition, transmission and analysis.
  - o Opportunities in Manitoba for other non-engine cold weather/icing testing
- Included in Annex B is a list of technology areas of interest to Manitoba identified during the workshop. This lengthy list must be refined and prioritized to isolate critical Manitoba technologies for economic development.
- From the Workshop presentations and discussions, the major high level technology thrust areas for Manitoba include: Composite Materials; Gas Turbine MRO and Advanced Manufacturing; Airframe MRO and Advanced Manufacturing; and Gas Turbine Test Technology, particularly Cold Weather Testing. The enabling priority technology areas described above can be grouped within these headings.

TDDC Recommendation 1: Complete a coherent National Aerospace Vision 2030

- There is a general consensus that the creation of a National Aerospace Vision 2030 would be a positive endeavour.
- Agreement that a coherent national aerospace & defence industry strategy would be highly beneficial, to include technical capabilities/priorities and funding models.
- It is critical that Manitoba provide its input and that this input be reflected in the National Vision. Manitoba must maintain a strong voice in this process.
- The National Vision must reflect and consider the future needs and objectives of SME's.

PANEL 2: MANITOBA PRIORITIES RELATED TO TECHNOLOGY/FUNDING RECOMMENDATIONS

Annex C contains a detailed summary of the Panel 2 presentations and discussion. The following sections represent the consensus arising from the Panel 2 discussions.

General

- Disappointment that there is no new funds to implement aerospace review recommendations.

Recommendation 3: The government create a program to support large-scale aerospace technology demonstration.

- Excellent opportunity to demonstrate higher level TRL technologies to position companies for a role in future major aircraft manufacturing and MRO development.

- Strong consensus that the Technology Demonstrator program should include access by smaller initiatives not led by OEM or Tier 1 integrator. Suggestion was that at least one-third of funds should be directed at smaller initiatives.

- Needs to reflect business drivers across the country.

- Each technology demonstration initiative could have a number of sub-projects so be more cost effective. Strong management needed to ensure progress.

- Fundamental necessity for LE and SME to engage/partner with OEM's to identify and demonstrate technologies required by OEM's OEM's and Tier 1 customers so that technology development in the supply chain is aligned with OEM and leading customers/integrators' technology priorities.

- Program needs to also accommodate and facilitate tech demo projects in niche technical areas where there are important markets and existing technical strengths (even if not tied directly to OEM projects). For example, must include 'process-improvement' technology demonstration projects in either manufacturing or MRO sectors

- Distribution of Technology Demonstrator funds must be done on national basis and not concentrated in any one region or by OEM's.

- Longer term sustainable funding important to attract participants.

- Identifying $45M for Technology Demonstrators by transfer from SADI and SRED Funding difficult. Likely to have net negative effect on funds available to Manitoba industry.

- The ability of the aerospace community in general and the SME community in particular to provide matching funds/in-kind support to technology development programs at a cumulating rate of $45M/year is challenging unless other funding sources can also be used to support industrial share.

- Transport Canada should be actively involved in the technology demonstrator projects so that they are prepared to support timely progress on certification.

- Project selection and management key to success. National collaborative consortium required to evaluate, match-make, and recommend for funding and national secretariat to manage approved programs is important. It is also important to define legal/PI structures, governance arrangements, operational

modalities and funding distribution in a way that enhances not inhibits collaboration and progress.

Recommendation 4: The government maintain Strategic Aerospace and Defence Initiative (SADI) funding at current levels – less reallocations recommended in this volume – and modify SADI's terms and conditions to make it a more effective program for stimulating the development of the aerospace and space technologies of the future.

- SADI funds directed at Technology Demonstrators will reduce funds available for technology development.

- SADI repayment funds should be re-invested in R&D rather than being returned to general revenue.

- SADI funds should not be used to fund IP development outside Canada but should be flexible enough to allow incorporation/use of IP, regardless of origin, providing Canadian entity benefits.

- SADI focuses on large scale projects which eliminate most SME's from participating. This needs to change.

- SADI processes as well as terms and conditions, particularly those related to SME's, should be simplified to facilitate use.

Recommendation 12: The government co-fund initiatives aimed at strengthening the Canadian aerospace supply chain.

- Strong Manitoba aerospace community support for this important initiative. Impact will be to both attract new SME's to aerospace and also develop current aerospace SME community.

- Important to the success of the program will be initiatives that engage OEM and 1st Tier companies in developing SME companies so they can win business from their organizations.

- Technology funding that focuses on strategic commercial technology specifically focused on real commercial opportunities is key.

- Manitoba has had great success with the Competitive Edge program in meeting the intent of this recommendation. Any implementation strategy should enhance this highly successful program, not compete with it.

PANEL 3: MANITOBA PRIORITIES RELATED TO WORKFORCE DEVELOPMENT

Annex D contains a detailed summary of the Panel 3 presentations and discussion. The following sections represent the consensus arising from the Panel 3 discussions.

General

- The Manitoba aerospace community supports the recommendations of the Emerson report as listed below.
- Technology is not useful if you don't have skilled workers. Without the human resources you can't move forward with technology
- Partnerships are essential to ensure people get skills needed to participate in workforce
- Communication is paramount with all partners

Recommendation 15: Federal programs be used – in collaboration with industry, academia, unions, and provinces – to promote science, technology, engineering, and mathematics studies generally, and aerospace and space careers specifically, among youth; to help college and university students acquire relevant expertise; to bridge new graduates into the aerospace and space workforces; and to bring skilled aerospace and space workers from abroad when efforts to develop labour supply in Canada do not keep up with demand.

Manitoba Aerospace has a history of working collaboratively with educational institutions to attract young people into considering aerospace, aviation & space careers. This was very evident in the significant number of representatives at the workshop from the University of Manitoba – Faculty of Engineering and Red River College. The presentation from MAHRC highlighted a number of those on-going initiatives. In addition, a lot of effort has been undertaken by both industry and our educational partners to establish pathways into careers.

- Education, R&D, industry expansion, human resource development and training programs should support STEM studies, aerospace and manufacturing career awareness programs, and post-secondary co-op programs.

- Initiatives must be ongoing and include operational supports and industry participation and leadership for programs to be sustainable

- Programs to connect students to industry at the undergraduate (e.g. co-op) and post-graduate (e.g. MITACS) level should be available to all post-secondary students.

- Under-represented groups in the STEM workforce such as women and Aboriginal peoples should be encouraged and supported to seek careers in the aerospace industry.

- Many successful STEM, career awareness, school to work transition, and skilled immigrant programs exist across the country. Any initiatives in this area should build upon current and past best practices.

Recommendation 16: Mechanisms be developed to support the efforts of aerospace companies to keep their workforces technologically adept and adaptable through continual up-skilling.

In Manitoba, with support from the Provincial Government Department of Entrepreneurship Training and Trades – Industry Workforce Development, companies in the industry have access to funds to cost share some of their training programs. Given that this industry is on the cutting edge of incorporating the latest in technology to design and manufacture aircraft, this training is costly and Manitoba strongly supports national initiatives and investments to increase the scope or current programs.

- The development and maintenance of the CCAA Occupational Standards should be supported by industry and government on an ongoing basis for use as occupational profiles and training curricula in industry and post-secondary institutions

- Apprenticeship programs should be adjusted to accommodate novel delivery models and the advanced and post-certification (graduate) training needed by the aerospace industry.

- Recognition, and perhaps incentives, should be considered to encourage employers to invest in the development of their employees

Recommendation17: **The government co-fund – with industry, provinces, and academic and research institutions – the purchase and maintenance of up-to-date infrastructure required for aerospace training and research purposes.**

In Manitoba, there are established productive relationships between industry and education institutions. More can be done so that industry has the right skills to take advantage of the business opportunities that present themselves. More collaborative initiatives like the CATT and CNDI industrial campuses need to be implemented so that workforce of tomorrow has exposure to leading edge technologies which industry can utilize to meet their operational requirements.

- Industry will need to partner and co-invest with schools to help put state of the art equipment into the programs.

- Canada should consider Manitoba's "industrial campus" model of industry hosted post-secondary facilities as a best practice model for expansion and support.

- The "Build Canada" infrastructure program that the federal government is considering for 2014 should include aerospace as a strategic focus.

- As the third largest aerospace centre in Canada with a critical mass of unique physical and intellectual assets, (e.g. cold weather testing, composites R&D and manufacturing, engine MRO, advanced manufacturing, NDI, space and rocket systems, etc.) and a proven track record of collaboration between industry, academia and the public sector, Manitoba should be considered a prime location as an aerospace hub along with Montreal and Toronto.

- R&D support programs such as NSERC, NRC and CFI should consider aerospace as a strategic priority for Canada

PANEL 4: MANITOBA PRIORITIES RELATED TO TECHNOLOGY DEVELOPMENT PARTNERSHIPS

Annex E contains a detailed summary of the Panel 4 presentations and discussion. The following section represents the consensus arising from the Panel 4 discussions.

Recommendation 3: The government create a program to support large-scale aerospace technology demonstration.

- Recommendation 3 discussions from Panel 4 have been included in the Panel 2 Summary Report under this same heading.

Recommendation 5: **The government co-fund a Canada-wide initiative to facilitate communication and collaboration among aerospace companies, researchers, and academics.**

- Manitoba aerospace community is disappointed that funding for this important initiative is from other existing initiatives.

- Collaboration within Canada and within the west of Canada is essential. There is strong support in Manitoba for a Canada-wide initiative to improve collaboration and communication. Enhanced regional and national collaboration will build capacity for international collaborations.

- Industry leadership and a focus on industrial technology are fundamental to the success of any Canada-wide initiative. All Technology Readiness Levels (TRL) should be considered.

- A national initiative to foster innovation and collaboration in the aerospace industry is supported. The implementation of any new initiative should leverage existing innovation/collaboration centres i.e. CRIAQ, GARDN, CCMRD, CIC, CRN and regional organizations such as Manitoba's Industrial Technology Center. A national collaborative initiative could be a vehicle to facilitate funding to these centres and could also promote collaboration and reduction of duplication between these centres.

- Any new initiative must have the flexibility to establish different kinds of collaborations. While all should be industry led, not all might require an academic partner (dependant on the TRL level). The collaboration example used in the Emerson Report, CRIAQ, has a foundation built on strong university involvement with industry support/participation, which may not be required for some innovation and development.

- Need to ensure there is a balance of membership costs versus payback for any new initiative. Again using CRIAQ as an example, there are high initial "cost of participation" costs without any assurances of payback. A value based 'cost of participation' structure is required.

- Workforce development initiatives must be integrated with collaboration/communication initiatives.

- As with all Technology Demonstrator Programs, project selection and management are key to success. A national collaborative consortium is required to evaluate, match-make and recommend projects for funding and a national capacity to centrally manage approved programs is important. It is also important to define legal/IP structures, governance arrangements, operational modalities and funding distribution in a way that enhances collaboration and progress.

- Technology Demonstrator Programs must have mechanisms and flexibility to conduct locally-run projects that advance and exploit regional industry capabilities.

- The regulatory agencies need to be part of the partnership process. Innovation and new technologies cannot add value until they can be used on or in an aircraft. The certification process needs to be transparent, efficient and effective.

Recommendation 7:   **The government endeavour to bring emerging aerospace players into multilateral agreements that create fair, competitive conditions for Canadian aerospace firms, and to clarify rules related to government support for domestic aerospace industries.**

- Manitoba supports government initiatives to develop multilateral aerospace agreements. Environmental issues should be included in these agreements.

- Manitoba supports clarification of rules related to government support for the aerospace industry to ensure this support is consistent with international agreements and with federal-provincial arrangements.

- Just as multilateral agreements are critical to help create a level playing field international, domestic support policies must also provide for fair, competitive conditions for Canadian aerospace firms.

WRAP UP PANEL: WAY AHEAD: TECHNOLOGY PRIORITIES, ECONOMIC DEVELOPMENT AND THE EMERSON REVIEW

The Wrap Up Panel members, in consideration of the points made during the previous panel discussions, addressed the Way Ahead regarding Technology Strategy and Manitoba response to the Emerson Recommendations.

Technology Road Map Discussion

Focus of discussion: What are the true thrust areas in the broad technology themes that will make an impact in Manitoba? Is there value in proceeding with a technology roadmap for Manitoba? It would have to be industry lead. Is there enough industrial interest and value added to be considered a technology document for MB? IRAP funds are available to support NPO participation and consulting support for this initiative.

- Strong support for proceeding with a Technology Road Map (TRM) from all the industrial and academic partners represented on the panel. Industry participants want an aggressive approach and want to push forward without delay.

- Included in the TRM activity should be a form of SWOT analysis (Strengths, Weakness, Opportunity, Threats). Threats especially need to be understood.

- Roadmap process must be forward looking, set within and connected to the national aerospace industry, and take advantage of what has been done.

- Target timeline for completed TRM to have most impact on implementation strategies for the Emerson Report is June 2013. Timeline and scope of TRM activity needs to be managed to meet this timeline.

- Training related to Road-mapping is available through RRC. A short, half day course is preferred option.

- Economic Development Winnipeg is available to provide support to aerospace sector by undertaking environmental scans and by collating and providing some background materials.

- NRC committed to support TRM by providing access to technology experts.

- EnviroTREC, WestCaRD and ITC committed to support TRM by providing technology input as well as support administrative processes related to the committees.

- MAA committed to coordinating the participation of its members, the engagement of its board, the communication and application of the outcomes and the connection to other strategic planning activities.

- Learning opportunity for some Manitoba companies in terms of roadmap activities.

- TRM process should document what capabilities are available in Winnipeg and what are the depths of these capabilities. SWOT analysis – it would be good to have a map of who we are and why should we have a centre of excellence here. Also include WHY we should be considered.

- Manitoba based Strategic Technology Document will provide background and substantiation to investments from organizations such as NRC, IRAP, WED, NSERC and others such as the Province.

- Aerospace TRM process should include a scan of other manufacturing capabilities in the province and should consider these capabilities in long term planning.

Emerson Recommendations Discussion

- Timeline for developing a Manitoba response to the Emerson report was raised. The upcoming federal budget is a deadline and may have some content influenced by the Emerson report. Consensus was that a Manitoba position on

the Emerson recommendations should be developed in the next few weeks, not months.

- The Paris Airshow also identified as an important event for government announcements related to aerospace initiatives and investments.

- Workshop organizers committed to table the Workshop Summary Report, which provides discussion of selected Emerson technology and technology investment recommendations by 6 February.

- Funding neutrality, a fundamental direction given to Emerson in preparing his recommendations, will ensure there will be a 'huge competition for resources'. Manitoba must be clear in what it needs to prosper in the future and negotiate hard for inclusion of its needs in the implementation of the Emerson Recommendations.

- The MAA, as endorsed by the MAA Board, should carry the message forward to the AIAC and others that Manitoba has held a Workshop directed at selected Emerson Recommendations and the positions arising from this workshop have strong industrial support. The message should also be sent that Manitoba has technology roadmaps under construction.

CONSENSUS/RECOMMENDATIONS:

1. Manitoba use a modified Technology RoadMap (TRM) process to create a Strategic Technology Document (STD)

   - The TRM be led by industry, including SMEs.

   - The TRM have wide involvement from all members of the aerospace community, including academia.

   - The TRM be supported administratively by non-profit organizations such as EnviroTREC, WestCaRD. MAA and the Industrial Technology Centre.

   - The TRM be supported by Economic Development Winnipeg, Inc, particularly in the area of aerospace sector environmental scans and collation of background materials.

   - The TRM be supported by the National Research Council Industrial Research Assistance Program in provision of funding to NPO's to support process.

2. Manitoba strongly supports the Emerson Report Recommendations.

   - Manitoba has specific priorities and concerns related to implementation of the Emerson Recommendations.

- Manitoba, through the Manitoba Aerospace Association, provide an industry response to the Emerson Review to the AIAC, provincial and federal governments.

3. A list of Action Items arising from the Consensus is included in Annex F.

ANNEXES

ANNEX A: **Manitoba Aerospace Workshop Program**

ANNEX B: **Panel 1 Presentation and Discussion Summary**

ANNEX C: **Panel 2 Presentation and Discussion Summary**

ANNEX D: **Panel 3 Presentation and Discussion Summary**

ANNEX E: **Panel 4 Presentation and Discussion Summary**

ANNEX F: **Wrap Up Panel – Action Items**

ANNEX G: **Attendee List**

Annex A
WORKSHOP PROGRAM

Technology Priorities, Economic Development and the Emerson Aerospace Review

January 16th & 17th 2013

Day 1

0730	Continental Breakfast
0800	**Welcome** **K. Webb** **Executive Director, Manitoba Aerospace Association**
	OVERVIEW
	Workshop Overview and Goals **D.L. Simpson, EnviroTREC**
0830	**Aerospace Review Summary: Opportunities and Challenges from Manitoba Perspective** **Ken Webb, MAA**
0900	**PANEL 1: Manitoba Priority Technologies for Economic Development** **Moderator: Vic Gerden, WestCaRD**
0920	**Magellan Aerospace** **John Bagan**
0940	**Standard Aero** **Melanie Mulder**
10:00	**BREAK**
1030	**Composites Innovation Center(CIC)** **Mr. Gene Manchur, CIC**

1050	**Academia Representative(s)** **Jonathan Beddoes, UofM** **Fred Doern, RRC**
1110	**SME Representatives** **Rob Jamieson, Cormer Aerospace**
1130	**Udaya Silva, Ian Stewart EMTEQ**
12:00	**LUNCH**
1300	**Industrial Technology Center** **Myron Semegen**
1320	**Panel discussion**
1410	**PANEL 2: Manitoba Priorities related to Technology/Funding** **Moderator: David Simpson, EnviroTREC**
1410	**Magellan Aerospace** **David O'Connor**
1430	**Standard Aero** **Kim Olson**
1450	**Boeing Winnipeg** **Rick Jensen**
1510	**BREAK**
1530	**Composites Innovation Center(CIC)** **Gene Manchur**
1550	**CRIAQ** **Clément Fortin**
1610	**SME Representatives** **Rob Jamieson, Cormer Aerospace**
	Speaker Panel *Identification of themes and priorities*
16:30	**Day 1 Closure** **Reception**

Day 2

0730	Continental Breakfast
08:00	**PANEL 3: Manitoba Priorities related to Workforce Development** **Moderator: Ken Webb, MAA**
	Magellan **David O'Connor**
	Standard Aero **John Leroux**
	Boeing **Nick Bevilacqua**
	University of Manitoba **Jonathan Beddoes**
10:00	BREAK
	Red River College **Tracey Dyer**
	Manitoba Aerospace HR Council **Wendell Wiebe**
	Speakers Panel *Identification of themes and priorities*

11:00	PANEL 4: Manitoba Priorities related to Technology Development Partnerships Moderator: David Simpson, EnviroTREC
	Magellan Walter Czyrnyj
	Standard Aero Melanie Mulder
	Boeing Rick Jensen
12:00	LUNCH
13:00	National Research Council J. Komorowski
	CRIAQ/GARDN Alain Aubertin
	Composites Research Network Anoush Poursatip
	CCMR&D Gene Manchur, CIC
	Industrial Technology Center Myron Semegen
	Speakers Panel *Identification of themes and priorities*
15:00	BREAK

15:30	**WRAP-UP PANEL DISCUSSION** **Way Ahead: Technology Priorities, Economic Development and the Emerson Aerospace Review** **Moderator: David Simpson, EnviroTREC**
	Panel members: Boeing Canada Winnipeg, Rick Jensen; Canadian Composites Manufacturing R&D Inc.; Gene Manchur; EMTEQ Canada, Udaya Silva; Manitoba Aerospace Association, Ken Webb; Magellan Aerospace, Winnipeg Division, David O'Connor; Manitoba Aerospace HR Council, Wendell Wiebe; Red River College, Don MacDonald; StandardAero, Kim Olson; University of Manitoba, Jonathan Beddoes; WestCaRD, Vic Gerden; Economic Development Winnipeg Inc., Greg Dandewich
	Topics: Panel members will address the Way Ahead regarding Technology Strategy and Manitoba response to the Emerson Recommendations with emphasis on the Goals stated below.
	Goals: • Broad understanding of the Technology challenges facing the Manitoba aerospace community from an economic development viewpoint, including timelines. • Identification of technology themes and collaborative mechanisms for the Manitoba aerospace industry. • Consensus on Manitoba aerospace community perspective on whether to generate a Strategic Technology Document for Manitoba, potentially through an industry led roadmap type process that has wide involvement from all members of the aerospace community. • Broad understanding of opportunities and challenges for Manitoba arising from the Emerson Report recommendations including discussion of developing a coordinated Manitoba response to the Emerson Report recommendations.
17:00	**WORKSHOP CLOSURE**

Annex B

Panel 1 Presentation and Discussion Summary
Manitoba Priority Technologies For Economic Development

A. DISCUSSION SUMMARY

General

- Manitoba aerospace industry, academia and other support organizations share the interest in establishing a Manitoba priority technology list and associated strategy to be used to help guide future aerospace related activities, both regionally and nationally.

- An list of technologies in five categories important to Manitoba is at Annex B

- An increased level of investment in R&D is required to remain competitive.

Recommendation 2: The government establish a list of priority technologies to guide aerospace related policies and programs.

- Better, cheaper, faster processes for manufacturing and MRO in Manitoba are drivers for identifying Manitoba's priority technologies.

- Key technology insertion, implementation and associated refinement of processes are strategic imperatives needed to enhance economic development and competitiveness.

- Emerson recommendations do not identify specific technologies; therefore, do not limit industry in identifying technology priorities that are important to specific regions. Solutions must support strengths and opportunities in Manitoba.

- Previously created Industry Canada/NRC/FMP technology roadmaps can still serve as a basis going forward but implementation needs to reflect and support regional industry niche capabilities and Manitoba companies' growth strategies.

- Need to anticipate and identify key technology needs of our customers, which we can help develop or apply. Goal is to achieve technology insertion/implementation based on sound customer-driven business case.

- There is an over-arching need to identify what the OEMs (for example, Airbus, Boeing, Bombardier, Embraer, GE, Rolls Royce, P&W) foresee with regards to future aerospace technologies? What gaps do they need to fill with our assistance?

- Priority technologies listing must reflect and balance regional interests with national interests that will reflect and support Canadian OEM interests, as well as the interests of the Manitoba/Canadian Supply Base that supply other major customers worldwide.

- Must include and consider regional supply chain in important niche areas. i.e. rocket propulsion, satellite component development.

- Need to ensure that the identification of technology priorities is a part of a broader approach that involves: demonstration centres, collaborative projects, national linkages.

- OEMs continue to want Tier 1's to assume more responsibility and risk; i.e. design authority and greater systems integration capacity requires substantial and increasing engineering design & analysis capability.

- Advanced manufacturing technologies that can increase rate and lower cost are critical to the success of aerospace companies in Manitoba, and need to be included in the national priorities, such as:
    - Advanced machining, advanced measurement, additive manufacturing
    - Advanced Non Destructive Inspection and Imaging

- Automation and Robotics continue to be identified as key technologies for aerospace. i.e. Automated joining, inspection, robotic fastening, painting & treatments. Repeatability is essential. Vision technology coupled with robotics may be a significant coupling of priority technologies.

- Need to consider building on the successes of what we already have such as a sophisticated composites infrastructure, experience and expertise. Continued composites technology development includes:
    - Out-of-autoclave, co-processing to reduce steps, reduce waste
    - Need to expand capabilities into Ceramic Matrix Composites.

- MRO repair technology demands are ever-changing. All manual and semi-automated processes need to be reviewed for applicability of automation and robotics.

- Advanced materials and coatings used in both manufacturing and MRO activities will require advanced technologies to remain competitive.
    - Material build up, plating and joining such as laser, friction & E-beam welding,
    - New materials/processes such as, titanium aluminide

- Green/Environmentally friendly technologies will play a large part of future products and processes.
    - Material cleaning technologies need to be addressed with respect to environmentally friendly chemical alternatives, such as laser ablation.
    - Reduction of hazardous waste;
    - Product lifecycle management. Durability, recyclability of product at end of service life.
- Gas Turbine performance and reliability testing is required for R&O 'production', where technologies are used to understand and assess the effect of repairs on engine components, as well as in new OEM engine development & certification 'testing'.
    - Data acquisition, advanced sensors, monitoring and modeling of systems for performance prediction.
    - Engine icing, ingestion and endurance testing in Manitoba also requires high speed imaging technologies, advanced sensors & instrumentation and large volume data acquisition, transmission and analysis.
    - Opportunities in Manitoba for other non-engine cold weather/icing testing
- Communication and antenna technology niche may offer opportunities in Manitoba. Is there an opportunity to do something in this area?
- The application of advanced technology is of critical importance to Manitoba aerospace companies. A significant level of effort over the past couple of years has already taken place. Boeing Winnipeg, Magellan, Standard Aero and the Industrial Technology Centre have been working together to identify areas of common interest and have launched a collaborative technology development project.
- Need to understand and build technology areas on existing strengths, capabilities and infrastructure at existing centres such as; CATT, CNDI, CIC, ITC, GE Aviation TRDCentre and GLACIER, to achieve practical, affordable, synergistic and effective technology development mechanisms.
- Need to develop and embrace concerted, collaborative Manitoba technology plan that ties in with national initiatives. Further integration of the current pockets of technical capabilities together with potential further integration with national technology initiatives would benefit Manitoba companies in achieving future goals.
- Some of the technologies that have been identified, or will be identified in the future are specific to aerospace. However, we must recognize that there may be

technologies that are important beyond aerospace. We must consider leveraging the interest of other manufacturing sectors.

- Tech demo projects are critical to successful adoption and implementation of technology and some are best done in close proximity to intended users.

TDDC Recommendation 1: Complete a coherent National Aerospace Vision 2030

- There is a general consensus that the creation of a National Aerospace Vision 2030 would be a positive endeavour.

- Agreement that a coherent national aerospace & defence industry strategy would be highly beneficial, to include technical capabilities/priorities and funding models.

- It is critical that Manitoba provide its input and that this input be reflected in the National Vision. Manitoba must maintain a strong voice in this process.

- The National Vision must reflect and consider the future needs and objectives of SME's.

- A National Aerospace Vision will provide Manitoba companies with additional impetus to further invest in technology advances and wider collaboration.

- Manitoba needs to be cognisant of what is happening at the national level. We must develop strong links with others in other regions. Collaboration will be a critical element to our success.

B. <u>SUMMARY OF MANITOBA'S TECHNOLOGY STRATEGY DRIVERS</u>

- There is a specific need to identify technologies that are of interest to Manitoba companies.
- Need to identify the drivers.
- Need to identify what capabilities our customers are currently demanding and foreseeing.
- Need to assess what the economic impacts are of selecting specific technology priorities.
- Need to reveal the current and future Manitoba advantage.
- The underlying reason to selecting priority technologies is the value they bring to Manitoba.
- Need to identify how Manitoba fits into the national objective?
- Manitoba Aerospace Association is already a united voice of the regional aerospace sector. Needs to continue to organize regional contributors.

- We need to be focussed on understanding the issues and challenges of Manitoba companies. Specifically, how these issues fit into identifying priority technologies.
- Need to identify how we will action efforts on technology priorities identified.

- Need to work closely with all Manitoba aerospace companies to compile the priority list
- Need to better understand national activities related to identifying priority technologies.

- Manitoba must take steps in identifying, compiling and coordinating a response towards the development of a National Aerospace Vision.
- Ensure that Manitoba Aerospace Association has a clear and strong voice in the development and completion of a coherent National Aerospace Vision 2030
- Develop mechanism for regional companies to contribute towards the vision, as well as understand where it is headed. Develop channels of communication. This must be at the regional and national levels.
- Seek input from other jurisdictions on where they believe the vision is headed.
- Ensure that the voice of SME's is reflected in our contribution to the vision.
- We must be prepared to take action in support of executing the Vision once identified.

C. LIST OF MANITOBA TECHNOLOGIES OF INTEREST

Advanced Manufacturing

Fabrication
- Industrial automation for joining
- Automated Inspection technologies
- Advanced high speed machining

Assembly & Finishing
- Semi Automated Assembly
- Robotic Fastening
- Robotic Painting
- Industrial Automation for treatments

'Emerging' Technologies

- Materials & Bonding
- Imaging & automation
- Computer-based simulation
- Machine vision

- RFID
- 'Greening' of materials & processes
- Process & Factory simulation, advanced visualization

Propulsion & space

- Guidance and Control in rockets
- Insensitive Munitions (IM)
- Rocket motors
  - Composite Motor Case Development
  - Energetics
  - Propellant formulation
  - Packaging
  - New Rocket Motor & Guidance systems Development
- Ammunition Demilitarization - Facility Development
- Satellite Attitude & Orbit Determination
  - Attitude reference generation
  - Autonomous safing
  - Thermal control
- Space Electronics – Radiation Hardening
  - FPGA - Reconfigurable Processing Platform
  - Multi-core processing
  - Extremely high computational throughput

Composites

- Advanced Materials
- Automated Lay Down
- Ceramic Matrix Composites (CMC)
- Automated Machining & Cutter Technology
- Acoustic Treatments
- Carbon fibre Reinforced plastic materials
- Space Composites
  - Structural Spacecraft Composites
  - Launch vibration survivability
  - Out-of-autoclave technology
  - Composite Radiation Shielding Panels
  - Alternative to Aluminum spacecraft shielding
  - "Multi-Functional" panels providing Structural integrity,
  - Radiation shielding, Thermal control

- High Temp materials
- Out-of Autoclave processes
- Co-processing

MRO

- Advanced Machining/Manufacturing Technology
    - Advanced Measurement (3D Scanning)
    - Additive Manufacturing (3D Metal Printing)
    - Adaptive Machining
    - Robotic Vision Systems
- Build-Up/Joining Technology
    - Laser Applications
    - Friction Welding
    - Electron Beam Welding
    - Cladding
- Coating Technology
    - Plating Alternative Technologies
    - Aluminide Coatings
    - Advanced Cold Spray
    - Electron Beam Physical Vapor Deposition (EBPVD)
- Cleaning/Stripping Technology
    - Chemical Alternative Technologies
    - Laser Ablation
    - Pulsed High Pressure Waterjet
- Composites Technology
- Fleet Management Systems Technology
    - Sensors/Data Acquisition Systems
    - Engine Performance/Reliability Modeling
    - Neural Networks
- Non-Destructive Inspection Methods
    - 3D Digital X-ray
    - Associated Training opportunities
- Aircraft Interiors
    - Composites
    - Seating systems
    - Communications & entertainment systems
    - Certification processes
- Antenna technology
- Certification process/timeliness

ICING/COLD-WEATHER ENGINE & OTHER TESTING/CERTIFICATION

- High Speed Imaging
- Large Volume Data Acquisition & Associated Streaming/Transmission
- Advanced sensors & instrumentation

Panel 2 Presentation and Discussion Summary
Manitoba Priorities Related to Technology Funding

Recommendation #3

- Program funding is not well spread out across the country, Manitoba receives very little and responds very slowly.

- Other countries are investing in aerospace with non-repayable grants

- Disappointed that no new funds are found/presented

- SRED budget is being reduced.

- Challenges: OEMs can dominate; message: program funding needs to be spread across the country;

- Other countries are investing in non-repayable grants to their aerospace industries – Canada is not

- Emerson report does indicate loans would be non-repayable. But means companies must come up with the other $45M per year. It is unlikely to happen even with the OEMs.

- Tech demonstration has to be broader; IP should be incorporated providing Canadian entity benefits; need global thinking as SAL has facilities all over the world besides locally;

- Need to focus on the actual development; we need to have a collective agreement with SMEs; we need to participate in our community; have SMEs involved;

- IP can be one of the key barriers when working together.

- Need to know how to match-make; how can we be better in Canada; locally it's being done

- Manitoba advocating existing regional hubs: composite manufacturing technologies; aerospace training; engine testing and MRO; aerospace airframe manufacturing and MRO. Which of these hubs can we lead nationally? Which

should we engage whatever group is leading in those different thrust so our interests are recognized.

- Describe in-kind contributions from companies – need a common definition so can be leveraged consistently
- Manitoba needs to identify priorities. Smaller group can be used to create technology roadmap for Manitoba.
- Supply chain management also needs to be addressed.

Recommendation #4,

- SADI funding is being reduced, no new funds
- Many criticisms from many voices of SADI during this workshop
- Recommend that Consortium should be able to apply for SADI funding
- $45 M of SADI has been adjusted so that it does not have to be repaid.
- 50/50 funding does not seem to be a winning feature as many SME and even LE have difficulty with their cash flow.
- Recycling of SADI dollars was suggested, rather than return to CRF

Recommendation #12

- MAHRC Competitive Edge Program, mentioned several times. Uses ETT funds for training purposes in Aerospace
- We now have 5 SME's in Competitive Edge, need to keep this going
- Move up from competitive edge program and enable SME's to bid into Big 3
- Assistance from government for SME to work with Big 3 would be of benefit.
- Definition of SME is at odds with definition of SME in the USA. This does have an impact on how we stage our industry.
- Staging of SME's to work on global scale could work if Big 3's made the intros, a bit of matchmaking
- Need to understand our labour/materials structure and we should work towards those items in the marketplace
- MRO needs are customer response - our tech investments need to address this approach; probably flexibility vs. long production runs
- Need to be aware of the global context to our industry

- MRO design characteristics and even staffing management are different at this end, vs. original manufacture. This leads to a different set of investments and investment strategies

- We should encourage local and national collaboration

- We have Tier 1 and Tier 2 types of companies at best in Wpg.

- We have to pursue the most challenging work, in order to remain competitive/profitable; this again points to investment approaches

- Sourcing cycle is 5 to 10 years;

- MRL is more important than TRL; this again points to certain investment strategies

- SME's need financial assistance to participate in aerospace research projects

- Funding levels need to remain stable; government changes its mind too fast. MB firms are slow adopters.

- Earlier TRL levels need to be funded/supported, but risks here are too high to consider repayment requirements.

- Challenge of how we finance the earlier TRL levels

- Need to consider CRIAQ type demos; their demos are distributed 1/3 small and 2/3 large

- Need to solve problems quickly this infers access to technologies, matrix management of teams, searching for new knowledge resources

- Technology flow needs to be sped up – Canada and Manitoba argument!

- SME's need harmonized support up to TRL 9

- SADI needs to be integrated with TRL levels

- IRAP interface is important

- Canada needs to get rid of idea that each project starts at TRL 1 and finished at TRL 9

- CRIAQ wants to work with Manitoba

- Quebec firms need to be developed to work with Manitoba; this is a time consuming process and will cost resources

- Technology areas to pursue: Composites; manufacturing; avionics; environment

- Technology cells and Centres of Excellence as alternatives to securing resources, knowledge capabilities, etc. MB has CATT and CNDI

- In-kind contributions vary widely across programs, need more consistency

- OEM TRM's are important to MB if we wish to examine where we intend to go

- GARDN is a good model

- Need to recognize that advanced training for red seal machinists

- SADI vs. IRAP. SME's prefer IRAP – which is closer to the client, better informed and funds more available. SRED is treated like an after-thought in SME's and their bookkeeping staff are not capable of supporting that program's requirements

- SME's need to raise $15M nationally to support SADI investments. Is this feasible?

- Project size vs. size of firm… in some instances project size will dominate who can participate

- SME' investments in CRIAQ are in the order of $5k/yr for 5 years.

- Impact of trade regulations on government support programs

- Definitions of technology demonstrations and stacking of government funds – some misapprehension on these terms and various interpretations of these terms

- Location of investments – MB vs. Montreal

- Are there capital investments which others could get around

- Program management/project management concerns – need to operate in tight timelines, this reduces wasted efforts, and keeps projects on their cost budget

- Accountability of results to funders

- Real dollar investments still have to be made by SME's

- Use of centralized funders/funding agencies to prevent funder fatigue and excessive overburden for SME's

- Choice of project management structure for tech demonstrations and research projects

- Selection of a secretariat for tech demo

- NRC vs. NSERC funds transfer needs to be examined. NRC is not eligible to receive NSERC funds even though they may be supporting an NSERC project.

- Europe vs. US approach to project development   RFP is used in Europe to a better effect. Able to build consortiums, and relationships rather than being fully competitive right from the start, with all parties, as in the US.

- SADI is not fully utilized; very poorly represented in the West. WD or IRAP should be the prime mover of any federal economic development funding

ANNEX D

PANEL 3: Presentation and Discussion Summary
Manitoba Priorities related to Workforce Development

General
- We support all Emerson report recommendations listed in the table below.
- Technology is not useful if you don't have skilled workers. Without the human resources you can't move forward with technology
- Aerospace career awareness and promotion is an important element of workforce development.
- Partnerships are essential to ensure people get skills needed to participate in workforce
- Industry should work together in terms of new technology
- Communication is paramount with all partners

Issues and Challenges
- There are never enough resources for training
- ITAR restricted work is an issue; limited to sharing information with foreign national employees
- There is an enduring shortage of skilled professionals, which is expected to tighten in the next few years. This is especially so with experienced engineers.
- Challenges in transferring knowledge from senior employees to younger employees as experienced employees move up or retire.
- Apprenticeship programs need flexibility to adapt to the changing world, as has been done in some MB programs.
- When OEMs restrict IP sharing with schools and other companies, partnering with educational institutions and other stakeholders to deliver training internally can be an alternative.
- In responding to the workforce development challenges, industry leadership needs to consider new models for recruitment and training and to see training as a strategic investment.

- Women, Aboriginals and immigrants are under-represented in engineering and across most skilled trades and technologies, providing both a challenge and an opportunity for aerospace employers.
- Winnipeg has a very diverse workforce, which is reflected in industry workplaces and must be reflected in training and workforce development programs.
- Boeing (and others) have an aging workforce
- Getting people into the aerospace sector is getting more difficult because of more options for students (Attraction)
- How many engineers are we short each year even with UofM running at full capacity? How many engineering grads leave the province? How big an engineering school do we need? (Data is lacking.)
- NDI training is urgent but only for 2 or 3 people in the province; industry has the expertise to train, but national standards require experience outside of aerospace industry.
- Most difficult shortages are often in professional and technical positions. Need specific skills, not just entry level. It is difficult to attract people to Winnipeg. We can hire in the US and just bring them here for specific projects/problems, but best long term solution is to build the skills locally
- How can we give education to capable learners who can't afford post-secondary education? We need to look at things differently;

Potential Solutions
- CCAA Occupational Standards can form the basis of occupational profiles and training
- Immigration is helpful to expanding the workforce, but ITARs considerations can reduce its effectiveness.
- The Aboriginal community is under-represented in the workforce and in aerospace. Manitoba employers and educational institutions have been successful in creating opportunities for this group but much more can be done
- Industry will need to partner with schools to help put state of the art equipment into the programs.
- Co-op programs provide many benefits to students and to industry
- We should try to build a consortium (U of M; NRC; RRC; Industry) to focus on research and training for technology areas

- Engineering school is looking to Increase the numbers of women in engineering to 30%
- There is no research chair for aerospace currently in MB. This may be a collaboration opportunity for RRC and UofM now that NSERC funds Chairs at Colleges.
- The Engineer in Residence program, pioneered by the aerospace industry in Manitoba, is very successful and may be a model for others and for expansion.
- No aerospace companies are taking advantage of NSERC Engage program or the MITACS Accelerate program.
- The Masters of Engineering program is underutilized and may be an opportunity for companies to up skill their engineers
- MB should be prepared for the "Build Canada" that the federal govt may introduce in 2014 for infrastructure and industry partnerships, etc.
- Consider hiring retired employees to transfer their knowledge to new, inexperienced employees
- CNDI is available for other companies in Manitoba to use for research or inspection
- Cross train employees – so people can be moved around to other divisions
- Many alternative delivery models have been developed to meet the needs of industry
- Ideas projects from industry
- ENGAP has graduated more engineers than all other Canadian universities together; however there may be only 200 aboriginal engineers across Canada
- WISE outreach programs to grades K to 12
- Engineer in residence – pioneered by aerospace industry in Manitoba but other industries are following suit
- Flip the funding model with Industry sponsorships. Companies could fund students through post-secondary, and then retain them for at least 5 years. Then we all win because those students will be loyal and stay on with the industry they are working for

ANNEX E
Panel 4: Presentation and Discussion Summary

Manitoba Priorities Related To Technology Development Partnerships

Recommendation 5 The government co-fund a Canada-wide initiative to facilitate communication and collaboration among aerospace companies, researchers, and academics.

- General community support for this recommendation however there are implementation concerns.

- Should be built around existing successful models such as CRIAQ and CIC. Other models showing signs of success such as CCMRD. CATT and CINDE are examples of highly successful industry-community college interaction and effective use of shared high end facilities. The infrastructure and expertise of provincial technology organizations such as the ITC need to be included.

- Disappointing that funding for this recommendation is from other existing initiatives.

- Advantage is creation of opportunities to establish more relationships and access more technical capabilities beyond our current network of Universities and Colleges.

- Concern as to how to address projects that are impacted by ITAR's restrictions and the use of academia to support development is restricted due to clearances, export licensing, etc.

- Want capability to establish collaborations that are not appropriate for/involve universities (dependant on the TRL level). CRIAQ's foundation is built on strong university involvement with industry support/participation, which may not be appropriate for some innovation and development.

- Need to ensure there is a balance of membership costs versus payback. For example, CRIAQ has a high initial "cost of participation" without any assurances of payback.

- National collaborations have the potential for provincially based industry/Government funds flowing away from local universities/colleges (UofM/RRC).

- IP processes need to mitigate risk of IP ownership/sharing complications.

- New technologies and equipment at CATT will add capability to Canadian Education and Research networks. CATT will supplement some of the capabilities developed in other core research and application areas in Educational Institutes and Research Facilities Canada-wide.

- Implement a program similar to Manitoba's Competitive Edge but with focus on technology development.

- Potential programs listed, CRIAQ, GARDN and STDC need to be expanded to include others such as CIC, CCMRD, CRN and NRC that can blend together to develop and commercialize technologies across the TRL spectrum

- Proposed creation of Canadian Aerospace Research and Innovation Consortium, CARIC is supported. Implementation should leverage existing innovation / collaboration centres i.e. CRIAQ, GARDN, CCMRD, CIC, CRN. CARIC could be a vehicle to facilitate funding to these centres and could also promote collaboration and reduction of duplication between these centres

- CARIC should support development of new innovation centres in niche areas not addressed by existing centres

- CARIC should be responsible for large–scale tech demo projects but delegate small to medium scale to existing innovation centres to maintain focus

- Existing innovation / collaboration centres should be involved as advisory committee to CARIC during development and its operation

- Collaborative Technology Partnerships are a mean to optimize/organize aerospace Canadian work chain for improved competitiveness

- Implement a program similar to Competitive Edge – with more of technology development – focus on gaps and SMEs

- Projects may be split into different skill levels and knowledge development and dissemination. What is relevant for Manitoba? CRIAQ is successful because of support of OEMs. Strongly suggest that OEMs in Quebec are willing to build bridges with Manitoba. There would then be reasons for knowledge transfer from OEMs to local sector.

- Co-fund the purchase and infrastructure required for aerospace training

- Industry needs to partner with schools and help put state of the art equipment into the programs.

- We have some very successful models within the composites scene and this is only the beginning. We must continue to invest significantly. Long term vision

with continuous, rolling short term benefits is the goal. CIC, CCMRD, CRN models provide better stability and continuity, and are complementary to CRIAQ.

- Technology development requires a very long term strategic approach: need to understand the needs and issues affecting all stakeholders; need critical and open discourse and need to continue building on what has worked

- Proposed creation of Canadian Aerospace Research and Innovation Consortium, CARIC is supported. Implementation should leverage existing innovation / collaboration centres i.e. CRIAQ, GARDN, CCMRD, CIC, CRN. CARIC could be a vehicle to facilitate funding to these centres and could also promote collaboration and reduction of duplication between these centres.

Recommendation 7 The government endeavour to bring emerging aerospace players into multilateral agreements that create fair, competitive conditions for Canadian aerospace firms, and to clarify rules related to government support for domestic aerospace industries.

- National coordination within consistent government support arrangements will allow industry to compete on a level international playing field.

- Ensure that not only government support rules are standardized but also other factors such as human resource and environmental standards.

- Method required to mitigate the risk of provincial funding limitations disqualifying their Tier 1's and SME's from participating.

Action Items
Manitoba Aerospace Workshop

WORKSHOP SUMMARY REPORT

The following actions are required to document the issues arising from the Workshop:

#	Action Item	Target Date	Actual	Responsible
1	Collate and distribute scribe's notes	28 Jan 2013	25 Jan 2013	Koncan
2	Prepare Summary of each session: Session 1 Gerden, Sessions 2, 4 Simpson, Session 3 Weibe	31 Jan 2013	1 Feb 2013	Gerden, Simpson, Weibe
3	Consolidate Summary Reports into one document. Circulate to Gerden, Webb, Koncan, Wiebe for comment	1 Feb 2013	3 Feb 2013	Simpson, Gerden, Webb, Koncan, Weibe
4	Distribute summary report to all attendees and interested parties.	6 Feb 2013		Simpson, Webb, Gerden, Koncan

CONSENSUS

Consensus was reached at the Workshop on two major issues:

1. Consensus on proceeding with a modified Technology Road Map process to generate a Strategic Technology Document for Manitoba. This process will be led by industry, including SME's, and should have wide involvement from all members of the aerospace community, including academia. It will be supported administratively by non-profit organizations such as EnviroTREC, WestCaRD, MAA and the Industrial Technology Centre.

2. Consensus was reached that Manitoba strongly supports the Emerson Report Recommendations. Consensus also reached that Manitoba has specific priorities and concerns related to implementation of the Emerson Recommendations.

ACTION ITEMS ARISING FROM CONSENSUS

1. Technology Road Map Implementation

#	Action Item	Target Date	Actual	Responsible
5	Develop general Terms of Reference (Steering Committee and Thrust Area Working Groups) and process proposal (schedule, Thrust Area Reporting Template). Consult with RRC, ITC and others. Note, technology thrust areas not included.	Draft 28 Jan 2013	28 Jan 2013	Simpson
6	Identify up to 4 technology thrust areas arising from the Workshop that would form the basis of the TRM Working Groups. TRM to consider explicitly SME technology requirements.	6 Feb 2013		Simpson, Webb, Gerden, Koncan
7	Integrate technology thrust areas into the Terms of Reference	7 Feb 2013		Simpson
8	Form Steering Committee made up of Final Panel Members with at least one SME participant. Circulate TOR for comment, modification and approval.	8 Feb 2013		Simpson
9	Steering Committee Meeting to finalize TOR and TRM Reporting Format.	14 Feb 2013		Simpson

9a	Issue Final Terms of Reference and Process	17 Feb 2013		Simpson
10	Interact with industry, academia, NPO's and other organizations (eg NRC) to populate panels. Suggest local residents Semegen, Webb, Gerden and Koncan each take leadership for one panel.			Webb, Gerden, Koncan, Semegen
11	Identify and Industrial Chairman and an NPO/Academia Co-Chair for each working group.			Webb, Gerden, Koncan, Semegen
12	Monitor/facilitate working group progress to ensure working group reports are submitted by target date.			Simpson
13	Review meeting of Steering Group and Working Group Chairs/Co-Chairs to formulate final recommendations			Simpson
14	Preparation of Final Strategic Technology Document.			TBD
15	Decision on endorsement strategy for the final Technology Road Map Report			TRM Steering Committee
16	Decision on how to market and distribute document.			TRM Steering Committee

EMERSON REPORT RECOMMENDATIONS

The Workshop included presentations and input from 68 attendees from a well distributed representation of larger industry, small and medium enterprises, academia, non-profit organizations and government. This provided a broad understanding of opportunities and challenges for Manitoba arising from the Emerson Report recommendations highlighted the requirement to develop a coordinated Manitoba response to the Emerson Report recommendations. Overall leader of these action items is Ken Webb. Action items arising include:

#	Task	Target Date	Responsible
16	Send letter to AIAC indicating that we had a Workshop dedicated to formulating a Manitoba response to the Emerson Recommendations. Could indicate that the general consensus was one of support for the recommendations but there are specific implementation issues that Manitoba wishes to highlight. Also indicate that Manitoba has initiated a Technology Road Map process to identify Manitoba's technology priorities.	Immediate	Webb
17	The MAA, as endorsed by the MAA Board, should carry the results of the Workshop as reflected in the Summary Report forward to the AIAC and others with the message the positions arising from this workshop have strong industrial support. The message should also be sent that Manitoba has technology roadmaps under construction		Webb

Annex G
Attendee List

Organization	First	Last	Title
Neeginan College of Applied Technology	Bill	Bumstead	Program Development, Neeganin
Boeing Canada Winnipeg	Rick	Jensen	Director, Government and Community Relations
Boeing Canada Winnipeg	Norm	Stamler	Senior Manager, Engineering and Product Development
Boeing Canada Winnipeg	Nick	Bevilacqua	Senior Manager, Business Operations
Boeing Canada Winnipeg	Marc	Groenewegen	Director, Engineering & Production Support
Boeing Canada Winnipeg	Loren P.	Hendrickson	Engineering Manager
Canadian Composites Manufacturing R&D Inc.	Gene	Manchur	Executive Director
Cormer Group Industries Inc.	Rob	Jamieson	Senior Manager, Engineering
University of British Columbia	Anoush	Poursatip	Professor
CRIAQ	Clement	Fortin	President and CEO
CRIAQ/GARDN	Alain	Aubertin	Vice-president, Business Development - Network and Innovation Processes
Duma Engineering	Roman	Duplak	Vice-President
EMTEQ Canada	Udaya	Silva	Business Unit Director
EMTEQ Canada	Ian	Stewart	
EnviroTREC	David	Simpson	Executive Director
EnviroTREC	Alfonz	Koncan	Director of Business Development and Government Relations
Industrial Technology Centre	Myron	Semegen	Manager, Advanced Technologies
Industrial Technology Centre	Trevor	Cornell	Chief Operating Officer
Industrial Technology Centre	Dale	Kellington	Manager, Engineering & Technical Services
Manitoba Aerospace Association	Ken	Webb	Executive Director
Magellan Aerospace, Winnipeg Division	John	Bagan	Senior Manager, Business Development

Magellan Aerospace, Winnipeg Division	Walter	Czyrnyj	Director, Engineering & Quality
Magellan Aerospace, Winnipeg Division	David	O'Connor	Division Manager Defence and Space Products
Manitoba Aerospace HR Council	Barbara	Bowen	Administrator
Manitoba Aerospace HR Council	Rachelle	Hallett	Administrator
Manitoba Aerospace HR Council	Wendell	Wiebe	Executive Director
Manitoba Competitiveness, Training and Trade	Bob	Manson	Senior Project Manager
Manitoba Competitiveness, Training and Trade	Donna	Roberecki	Project Manager
MDSAero	John	Jastremski	Vice-President, Sales and Marketing
Marnie Scott and Associates	Marnie	Scott	President
MicroPilot	Howard	Loewen	President
MicroPilot	Hamid	Bolandhemmat	Autopilot Systems Design Specialist
National Defence Public Affairs Office (Prairies & North)	Gloria	Kelly	Communications Advisor
NRC-IAR	Jerzy	Komorowski	General Manager Aerospace
NRC-IRAP	Jim	Prendergast	Industrial Technology Advisor
PointMan Canada Ltd.	Bob	Hastings	President
Red River College	Fred	Doern	Research Chair, STAM
Red River College	Tracey	Dyer	Business Development Manager, School of Transportation, Aviation and Manufacturing
Red River College	Ray	Hoemsen	Director, Applied Research & Commercialization
Red River College	Jose	Rizalino Melencio Delos Reyes	Research Manager
Red River College	Don	MacDonald	Dean, School of Transportation, Aviation & Manufacturing
Red River College	Dele	Ola	Applied Research Professional
Red River College	David	Bertin	Research Manager
Red River College	Stan	Chung	VP Academic and Research
Spiece Associates	Gene	Spiece	

StandardAero	Melanie	Mulder	Director Engineering Technology Support
StandardAero	Kim	Olson	Senior Vice President
StandardAero	John	Leroux	Director, Technical Training and Development
StandardAero	Florence	Ticzon	Sr. Manager, Human Resources
Tarry & Associates Ltd.	Bob	Tarry	
University of Manitoba	Jonathan	Beddoes	Professor and Dean
University of Manitoba	Kathryn	Atamanchuk	Engineer-in-Residence
University of Manitoba	Witold	Kinsner	Professor
UM - Tech Transfer Office	Jody	Dexter	Technology Manager
UM	Darren	Fast	Director of Technology Transfer
UM	Stephen	James	Executive Coordinator, Aerospace Programs
UM	Hieu	Van Dang	Graduate Student
UM	Mohamed	Nasri	Graduate Student
UM	Mark	Whitmore	Dean of Science
UM	James	Blatz	Associate Vice-President (Partnerships)
UM	Kuhn	David	Professor and Head of Department of Engineering
UWinnipeg	Currie	James	Dean of Science
Viafara Associates	Jairo	Viafara	
Western Diversification	Brent	Depape	Senior Policy Analyst
WestCaRD	Brian	Dempsey	Project Manager
WestCaRD	Vic	Gerden	CEO
Economic Development Winnipeg Inc.	Dandewich	Greg	Director, Economic Development