

Working Group Report

People and Skills

September 1, 2012

This report reflects the views of one of the six industry-led working groups created to provide advice to the Aerospace Review Head and the members of the Advisory Council. The recommendations therein may not reflect the findings of the Aerospace Review.

For more information on the Review process visit www.aerospacereview.ca

Contents

Executive Summary.....	1
1. Background.....	7
2. Mandate.....	7
3. Approach	7
4. Priorities.....	8
Priority 1: Increase the intensity of up-skilling of the current workforce in Canada	8
Priority 2: Maximize workplace entry-level skills of Canadian aerospace candidates	8
Priority 3: Ensure a supply of skilled labour over the next 20 years.....	8
5. Assessment of Government of Canada Policies and Programs.....	9
6. Recommendations	13

7. Advice to Head of Review	18
Annex 1: National Strategies of Competitors.....	19
Annex 2: People and Skills Group Members.....	21
a) Members of the People and Skills Working Group.....	21
b) Members of the People and Skills Sub-Groups	22
Annex 3: Examples of Program Support to Aerospace	23
a) Recent HRSDC Program Activity in the Aviation/Aerospace Sector.....	23
b) Sample of Recent Government Programs Accessed by Industry.....	25
Annex 4: Labour Statistics Surveys.....	26
Annex 5: Cost of Delivering Aerospace Programs	27
Annex 6: NSERC Programming.....	27
Annex 7: The Jenkins Report.....	28
Annex 8: Case Studies	29
Annex 9: Competencies-Based, Outcomes-Driven Approach to Human Resources	30
Sources and Notes	31

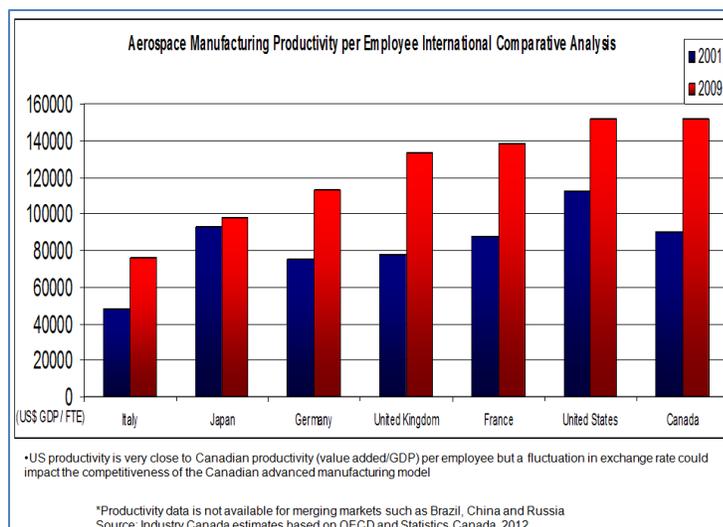
Executive Summary

In 2011, the Canadian Aerospace industry generated \$22.4 billion in revenue and directly employed more than 87,000 highly-skilled people with an estimated payroll cost of \$6.3 billion. According to the 2010 Deloitte report, the industry generated over \$1.5 billion in revenues to federal and provincial governments, and Canada relied more heavily on the industry for revenue and employment than most other major aerospace countries.¹

Looking forward, aerospace sector growth² will require a decisive and co-ordinated effort to strengthen and expand the supply of skilled and experienced workers³ and professionals.⁴ To capture these new market opportunities, productivity in the Canadian aerospace industry must increase. This productivity growth will be influenced by a number of factors including: investment in product development and new technologies; investment in tools and capital equipment; investment in human capital; and gains from economies of scale.

A survey conducted by AIAC in May 2012 found that:

- Employment at AIAC member companies now stands at over 87,000, comprising 42% production staff, 22% engineers and scientific staff, 11% technicians/technologists, and 25% other staff members.
- Employment distribution is 53% in Québec, 29% in Ontario, 13% in Western Canada, and 5% in Atlantic Canada.
- Employment growth over the next five years is estimated at 15,000 based on a 3% compound annual growth rate (CAGR).
- The number of employees eligible to retire over the next five years is approximately 2,200, increasing to 6,000 over the next ten years.



As shown in the chart, productivity per employee in Canada's aerospace manufacturing industry appears to be keeping pace with productivity levels in mature aerospace nations such as France, Germany, the UK, and the US, but emerging nations have a substantial cost advantage and are rapidly expanding their skill sets and infrastructure. This challenge underpins the strategic importance of the Canadian aerospace industry moving to higher-value-added products and services. To achieve this objective, Canada must expand its leadership role in skills

development and upgrading, strengthen its existing infrastructure and education system, and leverage its supportive government policies. These are key factors in making this nation a destination of choice for aerospace firms - it is a major part of our competitive advantage.

The Canadian aerospace industry is, however, facing intense competition: Brazil, Russia, India, and China (BRIC), are emerging to challenge the incumbent players in North America and Europe, at the original equipment manufacturer (OEM) level and as suppliers. Mexico, Poland, China and others are emerging as highly capable, low cost regions where aerospace suppliers are investing. Poland and India are emerging as compelling resources for aerospace engineering expertise. Brazil, France, and Turkey are becoming adept at developing 'soft (interpersonal) skills' in their workforce. OEM and Tier 1⁵ companies are increasingly locating manufacturing and design operations around the world to support market entry strategies, to follow their customers, and to achieve cost improvements, while small and medium sized (SME) suppliers are adapting to respond to new OEM demands. In recognition of the intense competitiveness of this sector, strategic support for aerospace at the national level is provided in

several countries with a view to attracting and retaining major projects and players. Such strategic packages include training grants; workforce training programs; and tax incentives (Annex 1).

The aerospace sector, like the general economy, has a cyclical demand for labour and this creates surpluses or shortages of employees. On average, the sector is able to find the human capital needed either from the output of specialized educational institutions, corporate training, or immigration. Most importantly, the elements are in place for developing the aerospace workforce of the future:

Strong educational system: According to the Conference Board of Canada,⁶ Canada ranks second out of 17 peer countries in high school completion rate and fifth out of 17 in university completion rate.

Bright and motivated students: Based on the 2012 Canadian Council for Aviation and Aerospace (CCAA) survey of skilled labour in the aerospace manufacturing sector,⁷ 1,505 students graduated from college aerospace programs, and 1,946 students graduated from aerospace related engineering programs in 2011. In the Group's experience, such Canadian aerospace programs produce students who are capable and eager to learn.

Innovative programs: One just needs to look to Québec as a leader in innovative people and skills practices, from the MACH and Montreal Aerospace Institutes initiatives, to the establishment of the Comité sectoriel de main-d'œuvre en aérospatiale (CAMAQ), and Québec's Consortium for Research and Innovation for Aerospace in Québec (CRIAQ). In Manitoba, there are several innovative outreach programs for youth, and strong coordination with aerospace training partners such as Red River College and the Centre for Aboriginal Human Resource Development. Other creative programs exist in other provinces and, where appropriate, these successes must be leveraged on a national scale.

An industry committed to investing in skills development and upgrading: Using data supplied for this report by Rolls-Royce Canada, Bombardier, Pratt & Whitney Canada, and StandardAero, these four organizations alone invested \$32.7 million and 1.1 million man hours over three years (2009-11) upgrading the skills of their Canadian employees.

Supportive government agencies and programs: At the federal level, agencies and departments such as the Natural Sciences and Engineering Research Council of Canada (NSERC), Human Resources and Skills Development Canada (HRSDC), Citizenship and Immigration Canada (CIC), the National Research Council (NRC) of Canada and Industry Canada deliver programs that can be utilized to accelerate the development of a world class workforce.

This being said, tactical adjustments to all of these can address normal growth; however, a continuation of the status quo with only marginal changes will not be sufficient; the competition is moving too quickly. To capitalize on the tremendous opportunities for growth into 2030, as articulated in the Deloitte report,⁸ transformational changes are required. Aerospace employees must increase the breadth of their skills to achieve higher levels of productivity in order to capitalize on the expanding global nature of the industry, and succeed in supply chain transformations where responsibility for work scope, technology, risk, and investment are increasing. Skilled workers must become agile and take on business functions that they have never done, such as: lean manufacturing, design for six sigma, concurrent engineering practices, strategic planning, marketing and business development, program management, supply chain management, financial management, and human resources management. These capabilities, as well as 'soft skills' have become critical for managing large complex projects, forging international alliances, and conquering markets. Companies, particularly SMEs, are now faced with the challenge of learning how to manage new business activities, hiring and training people to carry them out, and performing with excellence on cost, quality and delivery while evolving to become the 'go-to' supplier for higher value-

added products and services. Employees at all levels, including managers, engineers, technicians, operators, and support staff, are the ones who will make this transformation happen successfully—if they have the competencies (knowledge, skills, abilities, and work values) needed to perform their jobs efficiently and successfully.

A National Aerospace Policy Framework that includes a ‘People and Skills’ component is essential to developing the Aerospace workforce of the future. This report proposes ten key recommendations which, as part of a broader National Framework, will serve to: increase the intensity of up-skilling of the current workforce in Canada; maximize workplace entry-level skills of Canadian aerospace candidates; and ensure an adequate supply of skilled labour over the next 20 years.

The recommendations are:

- 1) Establish a National Forum of stakeholders to coordinate human capital development
- 2) Support the Forum in developing and implementing a ‘competencies-based, outcomes-driven’ approach to workforce management in Canada
- 3) Support the Forum in developing and implementing nationwide initiatives to transfer knowledge and skills across the supply chain, particularly to SMEs and Tiers 2 and 3
- 4) Support the Forum in forging stronger partnerships between industry and academic institutions
- 5) Support, through the Forum, for the development of an aerospace labour market information database
- 6) Support outreach strategies through the Forum

The Forum’s work will be supported by the following discrete federal measures:

- 7) Realign NSERC programs to target aerospace
- 8) Modernize the federal Apprenticeship Job Creation Tax Credit
- 9) Support regional Aerospace Centres of Excellence
- 10) Expedite the entry of experienced workers and professionals from abroad

The political will expressed by this Review supports our confidence that, working with government and other partners, we can advance our position in world markets using our people as a catalyst.

1. Background

The Government of Canada has mandated a national Aerospace Review to be completed in 2012. Expert groups were established according to six themes in consultation with the Aerospace Industries Association of Canada (AIAC). This report is the product of the sixth group, People and Skills (the Group).

2. Mandate

The Group examined the following Terms of Reference questions:

- a) What are the current and future human capital needs of the Canadian aerospace industry?
- b) What are the significant challenges in meeting these needs?
- c) How well do current Government of Canada policies and programs address these challenges?
- d) What changes to current policies and programs are recommended?

Based on these discussions, the Group was asked to offer advice to the Head of the Aerospace Review for consideration in preparing his final report to the Government of Canada.

3. Approach

The Group consisted of representatives from industry, academia, government, labour and industry associations, and other stakeholders as shown in Annex 2a. Four sub-groups, members of which are found in Annex 2b, deliberated around two axes: education and experience. In accordance with the Terms of Reference, the Group examined federal policies and programs, and industry and academic initiatives pertaining to skills development, skills upgrading, and employee recruitment.⁹ Statistics and verification of findings were obtained through credible sources such as Statistics Canada, the OECD, and the International Labour Organization, and case studies in Canada and other countries examined for best practices. Taking into account the cyclical nature of the industry and jurisdictional authority over programs related to human capital, recommendations were prepared for both short and medium term solutions, and for longer term and transformational solutions.

Structure and Discussion Topics of the People and Skills Working Group		
	Education	Experience
Skilled Workers	<p>Sub-Group 1 Adequately Educated Skilled Workers</p> <p>Consider how to: (a) reach out to youth, particularly Aboriginal youth and young women to draw them into the aerospace industry; and (b) ensure that university and college aerospace programs align with industry requirements.</p>	<p>Sub-Group 3 Adequately Experienced Skilled Workers</p> <p>Examine ways to ensure that the Canadian aerospace workforce, with the right type of skills upgrading and continuous learning, maintains a competitive edge.</p>
Engineers and Professionals	<p>Sub-Group 2 Adequately Educated Engineers/Professionals</p> <p>Examine how to: (a) nurture Canadian engineering talent so that students have the competencies to work in the aerospace industry as quickly as possible after graduation; and (b) attract youth, particularly Aboriginal youth and young women, to aerospace careers.</p>	<p>Sub-Group 4 Adequately Experienced Engineers/Professionals</p> <p>Consider how to: (a) cultivate experienced engineers and other professional employees in the workplace; (b) quickly recruit experienced engineers from abroad in light of global competition for talent; and (c) utilize the skills of older employees to transmit their knowledge to the next generation.</p>

4. Priorities

The following are the key priorities in meeting the current and future human capital needs of the Canadian aerospace industry:

Priority 1: Increase the intensity of up-skilling of the current workforce in Canada

This is as important—perhaps even more so—as new entries to our workforce, for the following reasons:

- This action would have an immediate and sustainable impact on increasing workforce productivity.
- It would facilitate knowledge transfer through training and mentoring programs to capture the knowledge, skills, abilities, and values of older employees to pass onto new recruits.
- Employee attrition in the aerospace industry is low, particularly on the shop floor. Notwithstanding the retirement of ‘baby boomers’, skilled workers employed today will be in place for many years to come.
- Increasing responsibility for work scope, technology, risk, and investment below the original equipment manufacturer (OEM) level, namely at small and medium sized enterprise (SME) and Tier 1 and 2 levels, requires higher, diverse skill levels. Programs at this level are lacking, and establishing and maintaining them are difficult and expensive, particularly for SMEs.
- As outlined in the 2011 AIAC survey and CCAA report previously referred to in the Executive Summary,¹⁰ skills shortages exist today and are expected to worsen in the future. Up-skilling is one way to fill this gap.
- Market success will be achieved by those firms who not only have access to a highly skilled and adaptable workforce, but who can also keep those skills relevant over the long term.

While the main responsibility lies with industry to invest in skills upgrading for its workforce, government and academic institutions also have an important role to play in this area.

Priority 2: Maximize workplace entry-level skills of Canadian aerospace candidates

Maximizing entry-level skills through the partnership between industry, academic/research institutions, and government is critical to:

- Ensure that competencies of new entrants are aligned with industry requirements and keep pace with rapid technological development.
- Ensure that industry has access to the right skills at the right time to meet the forecasted demand for skilled labour, particularly in light of the aging workforce.
- Increase productivity and competitiveness by reducing the time it takes for new graduates from university and trade schools to begin adding value to an organization. For example, it is estimated that engineers can take 12-18 months before they are ‘up and running’, and many years later to obtain the required level of expertise in areas such as systems integration.
- Effectively capture and transfer the knowledge of older members of the workforce to new entrants before this knowledge is lost due to retirement.

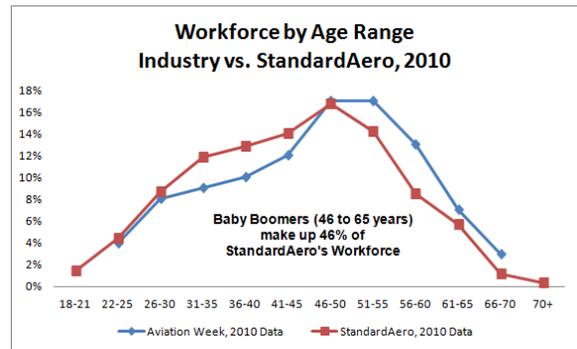
Priority 3: Ensure a supply of skilled labour over the next 20 years

To ensure that aerospace has the long-term supply of skilled workers and professionals it needs, a concerted strategy amongst all stakeholders is required to:

- Prepare for a projected skilled labour shortage, where a surplus of up to 2.6 million skilled vacancies across all industries in Canada is projected for 2021.¹¹ The highly technical nature of this industry will make competition for skilled labour more acute for this sector than for others. Moreover, the industry

faces competition for skilled labour from other Canadian industries such as oil and gas, shipbuilding, and information technology.

- Prepare for the baby boom retirements. At StandardAero for example (see chart), members of the baby boom generation make up a full 46% of the workforce, which is in fact slightly below the industry average. The 2011 AIAC member survey forecasts that 2.5% of the current workforce of over 87,000 people will be eligible to retire within five years and almost 7% within ten years.
- Reach out to women and Aboriginal youth, as both groups are under-represented in the industry.¹²
- Reach out to youth, particularly at the high school level, to improve their perception of the industry and to raise awareness of aerospace career opportunities.
- Easily access foreign experienced workers and professionals, who will remain an important source of labour for the industry, perhaps more so over time given the projected skilled labour shortages across Canada.



5. Assessment of Government of Canada Policies and Programs

While training and education fall under provincial authority, the Group determined that the Federal Government has a key leadership role to play in:

- positioning aerospace as a strategic sector for Canada;
- supporting endeavours to develop and upgrade workforce skills;
- maximizing workplace entry skills and competencies;
- facilitating outreach programs to under-represented Canadians;
- streamlining the recruitment, both temporary and permanent, of foreign skilled workers and professionals.

More importantly, given major disparities across different Canadian jurisdictions in supporting skills development and upgrading for the aerospace sector, the Government of Canada must cultivate a national approach to Canada's aerospace workforce. This will minimize jurisdictional differences and a lack of coordination between key partners that affect Canada's competitiveness worldwide. For example, there is a general lack of industry awareness of the programs and initiatives to support workforce development outside of the province; not all provinces have implemented structured practical learning for college trades related to aerospace; tuition fees for trade schools vary significantly across Canada, and may pose a barrier to entry in some jurisdictions; and close collaboration between industry, academic institutions and government, which is necessary to provide relevant curriculum and learning opportunities, is often lacking. It is also critical for federal programs relevant to aerospace workforce development to become more focused, cohesive, and visibly earmarked for the sector.

In the context of these overarching findings, the Group's assessment of the relevant federal programs and policies was as follows:

- **Aboriginal Affairs and Northern Development Canada (AANDC):** The Federal Government is uniquely positioned to assist industry in engaging with the Aboriginal community. In 2008-09, the Urban Aboriginal Strategy (UAS) under AANDC contributed to the start-up costs of the Neeganin

training centre in Winnipeg, which trains urban Aboriginal people for work in the aerospace industry. Funding was primarily used to cover the cost of tools and equipment. The training centre is now fully operational and trains urban Aboriginal students for work in the aerospace industry. This is considered to be a true 'success story'. In addition, HDSRC's Skills and Partnership Fund supports projects contributing to the skills development and training of Aboriginal workers for long-term, meaningful employment. Continued federal engagement in these efforts is important.

- **Citizenship and Immigration Canada (CIC)/Human Resources and Skills Development Canada (HRSDC):** Industry has relied upon the Temporary Foreign Worker Program (TFWP)¹³ to recruit experienced aerospace engineers, but red tape and delays, particularly in the Labour Market Opinion (LMO)¹⁴ process administered by HRSDC, became a serious irritant in recent years. The changes announced under Budget 2012 to implement an accelerated LMO process for employers with strong track records are appreciated, and would seem to go some way to addressing these concerns. However, it is critical that the Government of Canada continue to shorten the time to recruit skilled foreign engineers going forward. The TFWP should also reflect industry practices, such as the use of third-party talent providers to recruit skilled engineers for projects, and the full range of aerospace skill sets. Moreover, given projected skilled labour shortages in Canada, the aerospace industry may rely on both temporary and permanent immigration programs to recruit skilled labour. Over the coming years, it is important that the Government continue to be responsive to the labour market needs of this industry.
- **Canada Revenue Agency (CRA)/Finance Canada:** Employers can currently claim an Apprenticeship Job Creation Tax Credit (AJCTC) for each eligible apprentice.¹⁵ This is useful, but it is the only federal credit available to employers related to skills, and is narrow in scope as it applies only to apprenticeable trades, such as Red Seal designated trades. In general, traditional trade or skill-specific 'apprenticeship' programs are not the preferred approach for the aerospace industry. The current approach towards skills development for the aerospace workforce is to promote mobility and flexibility of functions through cross-training and interdisciplinary multi-skilling in order to maximize competitiveness. Collaborative research projects, internships, co-ops, and other types of paid experiences provide the type of learning that is needed to develop adaptable and relevant skills in this industry, yet tax policy has not kept pace with this development.
- While **HRSDC** offers a number of initiatives to support skills development/upgrading, the Group generally found that there is little Federal Government recognition of the need to continually upgrade the skills of this sector's highly educated, steady workforce. Given the significant investment that industry is currently making, and the critical importance of skills upgrading to maintaining a competitive edge globally, a more strategic packaging of aerospace-related, skills upgrading programs is needed. This could include direct program support offered through HRSDC, as well as taxation measures through CRA/Finance Canada.
- Funding support for the creation of voluntary national industry standards, provided to the CCAA through HRSDC's Sector Council Program,¹⁶ has been particularly beneficial. These standards are used to develop aerospace-related curriculum, which in turn provides better alignment between aerospace programs and industry needs; contributes to raising skill levels; and strengthens the attachment of workers to the industry. However, the recently-announced elimination of the Sector Council Program and with it, core operational funding to sector councils, is of concern to the Group. There is also concern that aerospace may no longer be sufficiently visible as a sector in the new Sectoral Intelligence Program that replaces the Sector Council Program, and that aerospace will be competing more fiercely with other sectors for a more limited pool of funding for projects.

- The Sector Council Program provided support to CCAA for the creation of a successful outreach aerospace program, the Aviation Maintenance Orientation Program (AMOP)¹⁷ that is being managed through the CCAA's Youth Internship Program. Twenty-two high schools and the Air Cadet League of Canada are participants to date, and 75% of students completing this program go on to related college programs, or to work directly in the industry. Other outreach tools developed by CCAA include a career guide listing over 100 careers in the industry; information on how to become qualified; opportunities for employment, and salary information. However, with the elimination of core operational funding to sector councils, the Group is concerned that these innovative tools could disappear over time.
- HSDRC is also one of the 11 government departments and agencies that deliver programming under the Government of Canada's Youth Employment Strategy,¹⁸ a horizontal initiative to help young people, particularly those facing barriers to employment, gain the skills they need to make a successful transition into the labour market. Funding has been provided through the Career Focus Program stream. From July 2009-2012, 130 college and university graduates were provided with opportunities to work in aviation/aerospace firms. While it is recognized that youth employment initiatives and other skills development programs offered by HRSDC (Annex 3) are not generally aimed at specific sectors, it is the Group's view that targeting federal support to the aerospace sector is vital if we are to react rapidly to market demand and reach the industry's full potential for growth.
- Particularly for SMEs, the cost of investing in new graduates can be prohibitive, which contributes to the aerospace skills shortage. **The National Research Council of Canada's Industrial Research Assistance Program (NRC-IRAP)** is responsible for delivering the Youth Employment Program,¹⁹ also under the Career Focus stream of the Youth Employment Strategy. The NRC-IRAP's Youth Employment Program provides SMEs with financial assistance to hire highly skilled post-secondary graduates in science, engineering, technology, business and liberal arts. Graduates work on innovative projects within the SME environment and may participate in research, development and commercialization of technologies. In addition to meeting the needs of innovative SMEs, the program facilitates the transition of highly skilled young people to the labour market. Given the widespread shortage of aerospace candidates with specialized skills and industry-relevant experience, such 'bridging' programs are essential to ramping up new entrants more quickly and closing the skills gap, and should be deployed as much as possible.
- Equally important to such 'bridging' programs are industry-academic 'exchanges' that accelerate students' acquisition of skills and knowledge, such as aerospace industry participation in teaching/research, and sabbatical programs in industry for educators. These exchanges have a number of benefits, such as: transferring industry expertise before it is lost due to retirement; ensuring that instructors' skills are relevant and up-to-date; promoting collaboration between industry and academic institutions to ensure that aerospace programs keep pace with the latest developments; and fostering the exchange of ideas and, in turn, innovation. Federal support for such exchanges, through whatever vehicle that may be appropriate, is vital to closing the skills gap for aerospace.
- While there is regional labour market information provided in Québec and Manitoba (Annex 4), there is a general lack of national, sector-specific labour market information that is needed to better align supply and demand across Canada and facilitate the recruitment of foreign trained workers and professionals. HRSDC's Sector Council Program has supported CCAA in developing a national database for the aviation sector that has proven very useful. Going forward, federal support, through whatever vehicle, would be beneficial in developing a real-time database on national labour supply

and demand information to assist with domestic aerospace sourcing.²⁰ Some labour market information and occupational projections are available from the Government of Canada, namely, through the Working in Canada website²¹, but are not detailed enough to quickly verify what is occurring in specific aerospace occupations, and what can be projected in the future.

- **Industry Canada:** The Knowledge Infrastructure Program, completed in 2011,²² was a successful joint federal and provincial government initiative for infrastructure enhancement at universities and colleges to enhance research capacity; help attract new students; and provide a better educational experience for the highly skilled workers and professionals of tomorrow. Programs such as this are essential for providing continued recognition of the high cost to aerospace schools and university engineering departments of delivering aerospace programs that entail heavy capital expenditures and ongoing investment in intellectual property and simulators (Annex 5).
- **The Natural Sciences and Engineering Research Council of Canada (NSERC):** NSERC supports university students in their advanced studies; promotes and supports discovery research; and fosters innovation by encouraging Canadian companies to participate and invest in postsecondary research projects. It has recently begun to support applied research in colleges and polytechniques. These programs are viewed by the Group as highly effective. While support is provided for highly qualified personnel at the undergraduate and graduate level, including their integration into the work force, there is a critical need to better support undergraduate engineering students in developing practical skills in aerospace that will allow them to 'hit the ground running' upon graduation. Currently, the Industrial Undergraduate Student Research Award, as well as the Collaborative Research and Training Experience program,²³ support undergraduate work terms in industry which includes, but is not targeted to, aerospace. In addition, technicians and technologists (highly skilled personnel) are largely overlooked. More fundamentally, aerospace is not directly targeted as a strategic area for NSERC; it is included within the strategic area of Manufacturing which may limit the visibility of the aerospace sector. Funding allocated to this sector is relatively low (2.5%) when compared with other sectors (Annex 6).

6. Recommendations

Aerospace workforce development should be primarily industry-driven, facilitated by federal and provincial governments and supported by the expertise of educators. Industry recognizes its key role in skills development and is committed to initiatives such as:

- Developing and investing in ‘flexible worker’ training programs that include up-skilling;
- Implementing mentoring programs to capture and leverage the knowledge and skills of experienced engineers;
- Participating in and contributing financially to collaborative research projects and case studies;
- Providing a larger number of short-term and multi-year co-op placements, work terms, and internships, followed by placements upon graduation;
- Facilitating access by schools to up-to-date aerospace products, technologies, and information, and ensuring close communication with those schools to help them remain relevant in both their technical and behavioural skills training; and
- Reaching out to under-represented groups (youth, women, Aboriginal Canadians) at younger ages, even in grades 5/6, to attract them to careers in the aerospace field.

In order to fully leverage industry knowledge, academic expertise and government support across Canada, it is recommended that the Government of Canada adopt a National Aerospace Policy Framework that includes a People and Skills component. Concretely, this would consist of the following actions, which would be packaged and promoted visibly for the aerospace sector. The Group’s recommendations are strikingly consistent with the people and skills-related recommendations of the Jenkins Report,²⁴ a brief summary of which is included in Annex 7.

Recommendations	
<p>The Government of Canada should adopt a National Aerospace Policy Framework that includes a People and Skills component. Concretely, this would consist of the actions outlined below, which would be packaged and promoted visibly for the aerospace sector. Access to relevant federal programs, which are now scattered, would be provided through a single portal. This portal would also include links to programs and initiatives at the provincial level. Case studies are provided in Annex 8.</p>	
Recommendation 1	Establish a National Aerospace Forum/Consortium of stakeholders to coordinate human capital development
Rationale	<p>The time has come to collaborate: OEMs and major MROs must share their experiences with SMEs and vice versa; college and university curricula must be fully aligned with industry needs; and Canadian firms must take best practices from within and outside of Canada to elevate their human capital competencies to world-leadership status at the higher value-added end of the sector. Given the constitutional challenges in Canada to establishing a competitive national approach to workforce development, a National Aerospace Forum is essential.</p>
Actions	<p>The Forum would be composed of industry, federal and provincial governments, academic/research institutions, sectoral and industry associations, unions and workers with a mandate to:</p> <ul style="list-style-type: none"> ▪ Develop a focused and coordinated approach to workforce development for the aerospace sector across Canada, taking into account regional needs; ▪ Foster a collaborative approach by Canadian industry towards workforce development; ▪ Exchange best practices and innovative ideas with regard to skills development and upgrading; ▪ Foster strong partnerships between industry and academic institutions, in order to ensure that academic programs are closely aligned with industry needs, and to share technology and industry expertise with academic institutions; and ▪ Minimize jurisdictional differences with regard to workforce training and development that may impede overall competitiveness. <p>The Department of National Defence should be among the federal departments engaged in this Forum, to share best practices in developing the aerospace workforce. Recommendations 2-6 are linked to the Forum and are actionable immediately and into 2030.</p>
Recommendation 2	Support the Forum in developing and implementing a competencies-based, outcomes-driven approach to workforce development
Rationale	<p>The aerospace supply chain must undergo a dramatic transformation if the sector is to compete at the high value-added end of the industry spectrum. 'Organic growth' – doing more of what a supplier company does today – is not a viable competitive posture, nor does it offer sufficient market scope to support the scale of growth that is available to and desired by Canada's ambitious suppliers. Suppliers cannot and should not rely on cost management alone to be competitive. To succeed, they must both add new business capabilities and improve their performance on existing business capabilities, the enabler being employees with the right competencies. By using 'competencies-based, outcomes-driven' principles (Annex 9) to define their positions, companies facilitate the efficient movement of people from one company to another, from one industry to another, or from one country to another. Such enhanced mobility can help this sector better manage skills demands that occur with periodic cyclicity and labour shortages. Companies can work together to define families of positions and to identify pathways for an individual's career progress. A young person or a new entrant who may be looking at the industry for employment will recognize not just a job opportunity, but a career opportunity, one that can offer them the prospect of growth and advancement along a 'ladders' and 'bridges' route* by leveraging their acquired experience.</p> <p>*A well-defined path (a ladder) with ways to bridge to other related paths (bridges)</p>

Actions	Support a 'competencies-based, outcomes-driven' approach to nurturing talent in aerospace through federal programs.
Recommendation 3	Support the Forum in developing and implementing nationwide initiatives to transfer knowledge and skills across the supply chain, particularly to SMEs and Tiers 2 and 3
Rationale	While Canada is strong in state-of-the-art technical skills and sophisticated organizational skills, and has an integrated cluster that can accelerate learning in both, best practices need to be better shared. OEMs and major maintenance, repair, and operations firms (MROs) generally have systems in place for up-skilling current employees. However, SMEs struggle with up-skilling efforts partly due to cost, and partly due to the inability to capture prior learning and best practices for use in their own companies. As a result, SMEs are often bypassed as preferred suppliers to major OEMs. To improve up-skilling practices in SMEs, OEMs and major MROs need to better share their best practices with schools, which will in turn pass these skills onto SMEs. OEMs would benefit from better deals and partnership with schools; schools would benefit from developing their expertise in skills training; and SMEs would benefit from accessing state-of-the-art skills in line with an organizational performance strategy. This system would bring the Canadian aerospace industry to the next level in terms of partnership for skills development: we would capitalize on the natural strengths of OEMs, major MROs, and schools by structuring their collaboration to benefit the entire industry.
Actions	<ul style="list-style-type: none"> ▪ Extend a concept similar to the MACH Initiative²⁵ in Montreal to a Canada-wide initiative that would foster cross-cluster collaboration. ▪ Federal tax credits or funding support should be provided to support this initiative, and more generally, to support pilot projects and other strategies to promote technical and organizational skills upgrading. For example, several jurisdictions, including France, Japan, Algeria and many Scandinavian countries, apply a 1-1.5% payroll levy to motivate investments in up-skilling. In Québec, the <i>Loi favorisant le développement et la reconnaissance des compétences de la main-d'œuvre</i> explicitly encourages organizations to invest the equivalent of 1% of their salary mass in learning activities for their employees. In aerospace, major OEMs and MROs invest significantly more than this to remain competitive. Organizations that do not invest are penalized at the same rate and the fees put into a fund to support competency development across the province. Similarly, to maximize our international competitiveness, the Government of Canada must recognize the importance of both technical and organizational skills development for aerospace and encourage organizations to invest in both, through policies that can be implemented at the federal level.
Recommendation 4	Support the Forum in forging stronger partnerships between industry and academic institutions
Rationale	<p>Students in Canadian aerospace programs must be provided with hands-on research experience and other practical learning opportunities that will allow them to develop the technical and organizational skills, as well as the flexibility, that are in growing demand. Stronger partnerships between industry and Canadian educational institutions will also ensure that curricula include behavioural competencies such as teamwork and organizational skills; reflects the requirements of SMEs; and permits a rapid upgrade of skills or development of new competencies. In addition, it is critical for specialized industry knowledge to be transferred to students before it is lost due to retirement. The Forum will provide the opportunity to accelerate the exchange of best practices and develop nationwide, innovative strategies.</p> <p>At the provincial level, excellent examples of programs that provide for work terms, case studies, and industry-driven collaborative research include: Québec's Consortium for Research and Innovation for Aerospace in Québec (CRIAQ); Comité sectoriel de main-d'œuvre en aérospatiale (CAMAQ); the Montreal Aerospace Institutes; the Manitoba Aerospace Association's Engineer in Residence program; and the Ryerson Institute for Aerospace Design and Innovation (RIADI). Industry is a key partner in these initiatives, contributing cash and in-kind support and offering placement opportunities.</p>
Actions	<ul style="list-style-type: none"> ▪ Support the Forum in applying innovative, industry-driven programs such as CRIAQ on a

	<p>nationwide scale, to provide more collaborative research opportunities for engineers, technicians and technologists;</p> <ul style="list-style-type: none"> ▪ Support academic-industry ‘exchanges’, such as industry participation in teaching and research, and professor sabbaticals in industry. In addition, support the Forum in piloting innovative projects to transfer knowledge from industry experts to students; ▪ HRSDC funding, provided to the Canadian Council for Aviation and Aerospace (CCAA) through the Sector Council Program to create voluntary, industry-driven national standards, has been beneficial and must be sustained. These standards provide important guidance for developing aerospace-related curricula for training institutions, and for helping industry—particularly SMEs—in verifying that workers have requisite skills. They must be updated regularly, given the rapid pace of technological change and innovation in workplace practices.
Recommendation 5 Support, through the Forum, development of an aerospace labour market information database	
Rationale	<p>Cyclical variations in industry business volumes and employment have historically caused challenges in coordinating the supply and demand of appropriately trained and experienced personnel across more than one business cycle. While regional labour market information is provided in Québec and Manitoba, there is a dearth of similar information at a national level. Labour market information is valuable as it helps to align supply and demand across Canada and facilitates the recruitment of foreign trained labour. Some labour market information, including occupational projections, is available from the federal ‘Working in Canada’ website, but is not detailed enough to quickly verify what is occurring in specific aerospace occupations, and what can be projected in the future.</p>
Action	<p>Federal support would help develop a real-time database on national labour supply and demand to assist with domestic aerospace sourcing. HRSDC’s Sector Council program has supported CCAA in developing a useful national database for the aviation sector. Funding for a database on the aerospace sector would be beneficial.</p>
Recommendation 6 Support outreach strategies through the Forum	
Rationale	<p>An adequate and sustained supply of human capital is needed to support the industry, and young Canadians are a major source of this supply. Innovative tools developed for this purpose must be kept relevant over time to engage with youth more widely and at younger ages. Material for high school guidance counsellors on career opportunities in aerospace, collaborative research projects, and outreach days for grade 5/6 students can make all the difference in attracting young people to the field. The CCAA’s Aviation Maintenance Orientation Program, supported by the Sector Council Program, is a key example of successful outreach to youth.²⁶ Industry, provincial governments, and academic institutions all have a role to play, but the Federal Government’s continued engagement and leadership is important, particularly in reaching out to girls, women, and Aboriginal youth to find ways to interest them in a career in aerospace. The Aboriginal community is the largest untapped labour pool in Canada, and an estimated 400,000 Aboriginal Canadians will reach the age to enter the labour market over the next decade.²⁷</p>
Actions	<p>To ensure that Canada has a steady supply of skilled human capital over the long term, and is fully accessing the potential of the Canadian workforce, the following are needed:</p> <ul style="list-style-type: none"> ▪ Outreach programs to youth and their teachers, to raise awareness of the opportunities in aerospace, particularly on the shop floor, and programs to help bridge young people into the aerospace workforce; ▪ Strategies to attract and retain females in this sector; ▪ Strategies to engage with Aboriginal youth to encourage their participation in this sector. <p>While it is recognized that youth employment initiatives and other skills development programs offered by HRSDC are not generally aimed at specific sectors, targeting federal support to aerospace is vital if we are to react rapidly to market demand and reach the industry’s full potential for growth. In addition, the Federal Government is uniquely positioned to assist industry in engaging with the Aboriginal community. Such programs must have adequate and</p>

	sustained federal funding, with input from the industry, the Aboriginal community, and training institutions.
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The Forum's work would be supported by the following four discrete federal measures.

Recommendation 7	
Realign NSERC programs to target aerospace	
Rationale	NSERC programs are viewed as highly effective, and industry and training institutions would welcome broader and more strategically targeted assistance from this source. Currently, there is little visibility of the aerospace sector, and the funding allocated to aerospace is relatively low.
Actions	<p>Realignment of NSERC programs to target aerospace as a strategic sector would entail:</p> <ul style="list-style-type: none"> ▪ funding for aerospace research activities to allow for more focused support for practical training experiences in aerospace at the graduate and, more importantly, undergraduate levels; ▪ new funding programs that focus on supporting burgeoning undergraduate aerospace training partnerships between university and industry, such as the Montreal Aerospace Institute, and the Ryerson Institute for Aerospace Design and Innovation; and ▪ robust support for applied R&D programs through colleges and polytechniques that support the development of highly skilled personnel (HSPs) – technical graduates who know and understand the innovation and commercialization process.
Recommendation 8	
Modernize the Apprenticeship Job Creation Tax Credit	
Rationale	Employers can currently claim an Apprenticeship Job Creation Tax Credit (AJCTC) for each eligible apprentice. This is the only federal credit available to employers related to skills, and is too narrow in scope. The AJCTC applies only to designated apprenticeable trades and since aerospace does not have many of those, the sector does not benefit much from this incentive. Internships, co-ops, and other types of paid experiences do provide the type of learning essential for developing relevant aerospace skills, yet tax policy has not kept pace with this development.
Action	Expand the eligibility of claims under the AJCTC to cover other forms of structured practical learning opportunities on the shop floor in the aerospace sector.
Recommendation 9	
Support regional aerospace centres of excellence	
Rationale	It is very expensive ²⁸ for technical schools and university engineering departments to deliver aerospace programs as they entail heavy capital expenditures and ongoing investment in intellectual property and simulators. If Canada is to compete at the high value-added end of the aerospace spectrum with a transformational 'competencies-based, outcomes-driven' approach, aerospace training facilities must be streamlined towards a critical mass to avoid costly duplication and competition within Canada. Institutions must have the capacity to provide education/training around emerging technologies to help the industry retain a strategic advantage over the next two decades. In addition, OEMs must be encouraged to give access to their technologies and products to students within schools, so that the entire cluster can benefit from highly skilled graduates.
Actions	<ul style="list-style-type: none"> ▪ Establishing a selected number of regional centres of aerospace excellence will promote superior training as well as prestige among students that they have been chosen to study at such an institution. Students tend to attend schools that are nearby and affordable and companies prefer to hire students that are close to their facilities. It is recognized that education is under provincial jurisdiction but the Federal Government can assist with funding and with facilitating a governance structure for these centres of excellence that takes into account regional needs. ▪ Encourage industry in its efforts to provide access to these regional centres to the newest technologies and products, through tax incentives or other forms of support.
Case Studies	<ul style="list-style-type: none"> ▪ To concentrate results at the federal level, a program similar to Industry Canada's Knowledge Infrastructure Program could be focused on these centres of excellence, such as the Aerospace Hub at Downsview Park in Ontario.

	<ul style="list-style-type: none"> ▪ Bombardier Aerospace's CL300 Integrated Systems Test Rig (LESIAQ) will enable practical labs on systems integration. This shared lab will be used by engineering students of six universities and will be unique in the world. Federal support for this project as a centre of excellence would be extremely helpful, particularly since this project will develop the high level of aerospace competencies where Canada is carving its competitive international niche. Other examples are provided in Annex 8.
Recommendation 10	Expedite entry of experienced workers and professionals from abroad
Rationale	<p>Industry has relied on the Temporary Foreign Worker Program (TFWP) to recruit experienced aerospace engineers, but red tape and delays, particularly in the Labour Market Opinion (LMO) process administered by HRSDC, became a serious irritant in recent years. Time is of the essence when recruiting these professionals, who are in high demand worldwide for short-term projects. Changes announced in Budget 2012 to implement an accelerated LMO process for employers with strong track records are important and partially address these concerns. However, the Government of Canada must continue to accelerate the temporary recruitment of foreign skilled engineers given urgent need, and ensure that the TFWP reflects industry practices and skill sets. Given the projected skilled labour shortages in Canada, it is important that the Government continue to be responsive to the labour market needs of this highly skilled industry, as the use of both temporary and permanent immigration programs may be needed to recruit skilled workers and professionals.</p>
Actions	<ul style="list-style-type: none"> ▪ Ensure that the accelerated LMO process includes all aerospace skills. ▪ Recognize 'third party employers' to enable providers of temporary engineers to act for clients in acquiring LMOs. ▪ Work with provinces to establish a single point of contact for work permit applications. ▪ Continue the Federal Government commitment to ensure that employers with strong track records can rapidly recruit temporary and permanent skilled labour from abroad, as necessary to meet demand.

7. Advice to Head of Review

Aerospace must be championed by the Government of Canada given its importance to the economy, to employment, and to its position in world markets. These ten recommendations were carefully selected to provide a national approach to human capital for aerospace to 2030.

Annex 1: National Strategies of Competitors

A number of jurisdictions have adopted a strategic framework for aerospace, or an incentive package to attract major aerospace projects, that includes support for developing and upgrading the skills of the workforce. Some key elements include: training programs; skills councils; repayable grants; talent retention programs; and tax incentives.

Training Programs

Mexico: *Querétaro:* Broadly speaking, Querétaro offers customized training incentives, whereby the state offers financial support to bring trainers and educators to a given company, or to enable the company to send trainers abroad. Bombardier's Fast Track Training Program, is an example. An agreement between the Canadian and the Mexican governments created a partnership between Montréal Aerospace Trade School (EMAM) and the Querétaro Technical University (UTEQ). Together, EMAM and UTEQ created the Fast Track Training Program for Bombardier, which resulted in the training of the first 1,000 technicians for their facilities in Mexico. Based on a school-factory concept, the program is designed to train workers in electrical and structural assemblies within 16 weeks.

The Monterrey Institute of Technology's aviation program includes four regional research centers that work with aerospace companies on workforce training. The Institute's Aerospace Industry Development Center assembles experts to conduct research in areas such as lean supply chain, lean manufacturing, and supplier development. Under another program, engineering students serve as interns with aerospace manufacturers, often going on to take jobs with those companies.

Brazil: To encourage organizations to hire STEM grads or conduct up-skilling initiatives in the aerospace labour market, Brazil conducts technical training missions to foreign countries (France, Sweden); and encourages cross-agency cooperation. There are also generic initiatives both at federal and state levels aimed at creating new technology colleges and institutes (FATECs) and aerospace engineering schools. The Institute of Aviation Technology (ITA) – responsible to the Department of Science and Technology of the Brazilian Air Force (DCTA)—is the main academic “cradle” of aerospace engineers in Brazil. Plans to expand ITA have been reported in the local press. ITA/DCTA is linked to the origins of Embraer and still remains strongly connected to the OEM.

USA: *Oklahoma:* Oklahoma's Training for Industry Program (TIP) helps aerospace companies that are new to the state or expanding by creating a customized workforce that is ready for operations from opening day. TIP, which is administered by the Oklahoma Department of Career and Technology Education, is no-to-low-cost and delivered through Oklahoma's CareerTech system with 57 technology centers across the state. Training is customized to meet the specific needs at the company. Specialists work closely with clients to identify training or services necessary to meet established goals. Programs range from basic skills to the latest in organizational design and management training.

Washington: The Employment Resource Center was designed and implemented by Washington State to assess and train employees on production methods for the Boeing 787. Washington has also implemented a state-wide aerospace apprenticeship training program. The Aerospace Joint Apprenticeship Committee (AJAC) manages and facilitates the development and growth of the aerospace apprenticeship programs in Washington State. The AJAC committee is comprised of industry employers, employees, and the International Association of Machinists and Aerospace Workers (IAMAW).

Skills Networks/Councils

Mexico: COMEA, the Mexican Council of Aerospace Education, is a national network of academic institutions whose objective is to coordinate educational efforts in the aerospace industry. COMEA also sets standards to graduate technical operators and aeronautical, electrical, mechanical and software and electronic engineers to meet the industry's demands. Currently, individual institutions are trying to train enough skilled students to meet demand.

United Kingdom: The UK's Aerospace Growth Partnership, a strategic framework to enhance the global competitiveness of UK's aerospace industry, focuses on technology; business processes and supply chain improvement; sustainable aviation; and skills (through SEMTA - Sector Skills Council for Science, Engineering and Manufacturing Technologies).

SEMTA administers training programs for companies and apprenticeships for individuals seeking employment in the 'STEM' fields. SEMTA identifies skills priorities, leads strategy on behalf of employers and supports individual companies' growth and productivity through skills diagnostics, strategic workforce planning, consultancy, funding and other cost-effective training and qualifications programmes. SEMTA has a network of approved training providers.

The UK Employer Investment Fund, administered by the UK Commission for Employment and Skills, is a mechanism for sector skills councils such as SEMTA to offer training programs and talent retention initiatives to companies. SEMTA recently won three

bids via the UK Employer Investment Fund to kick-start sustainable skills improvements among supply chain companies and SMEs in the science, engineering and manufacturing sectors.

- The first work stream will enable training plans to be produced, companies to start on a High Performance Working journey and support employees to attain skills.
- The second work stream will increase the number of SMEs who recruit an apprentice from 11% currently to 20% by 2016.
- The third work stream will increase the number of SMEs who recruit a STEM graduate by improving employer and university links.

In addition, at the Farnborough International Airshow in July 2012, the Prime Minister stressed the importance of investing in and improving the skills base of the aerospace industries and pledged to increase help to the MSc programme by committing his Government to assisting industry with the introduction of 500 extra university places.

Repayable Grants

USA: *Arizona:* Arizona Job Training grants – a job-specific reimbursable grant program that supports the design and delivery of customized training plans for employers creating new jobs or increasing the skill and wage levels of current employees – is considered one of the best workforce training grant programs in the nation. The Federal and State Technology Partnership program includes education and grant programs that help technology entrepreneurs commercialize their technology.

Morocco: The Moroccan government offers grants reaching 6000 euros per employee to a maximum contribution of EUR 1.8 million.

Talent Retention Programs

United Kingdom: The Employment Investment Fund has supported development of the Talent Retention Solution, a website that holds details of engineering staff at risk of redundancy and vacancies in the engineering sectors. Companies can advertise vacancies or find individuals with the right skills and experience on the system.

Tax Incentives

Oklahoma: The Strategic Plan for the Growth of the Oklahoma Aerospace Industry includes tax credits in recognition of the high cost of developing new engineers and to encourage hiring in-state graduates. The aerospace companies hiring engineers in Oklahoma receive a tax credit of equal to 10% of the compensation paid to an engineer during the first five years of his or her employment if the engineer graduated from an Oklahoma college. If the engineer graduated from a college outside Oklahoma, the employer will get a tax credit equal to 5% of the compensation paid to the employee during the first five years. In addition, the law grants Oklahoma aerospace companies a tax credit in the amount of 50% of the tuition reimbursed to a new engineer graduate for the first four years of his or her employment. The tax credit is limited to 50% of the average annual tuition paid by an engineer at a public university in Oklahoma.

Mexico: Pro-Aéreo, Mexico's Strategic Aerospace Industry Program for 2012-2020, states that incentives for investment, training and R&D activities will be offered (No specific information is currently available).

Annex 2: People and Skills Group Members

a) Members of the People and Skills Working Group

Role	Name
Chair	Greg Yeldon, President, Esterline CMC Electronics
Vice Chair	Tony Burgess, President, TDM Technical Services
Secretary	Marcia Jones, Senior Analyst, Aerospace Review Secretariat
Writer	Rosanna Majeed, President, RMA Writers Inc.
AIAC	Maryse Harvey, VP, Public Affairs, Aerospace Industries Association of Canada
Industry	Vincent-Pierre Giroux, Bombardier Deborah Maynard, VP, Human Resources, Cascade Aerospace Jean-Denis Roy, VP Human Resources and General Counsel, CMC Electronics Daniel Guertin, Manager, Government Affairs, CMC Electronics MarieChantal Chassé, Présidente et Chef de la direction, JMJ Aeronautique Kevin Smith, VP, Human Resources, P&WC Claude Picard, P&WC Suzanne Coupal, P&WC Catherine Bedard, P&WC David Ayton, President & Chief Operating Officer, Rolls-Royce Canada Fiorino Carafa, Manager, Technical Training, Rolls Royce Canada John Leroux CD, Director, Technical Training and Development, StandardAero Robin Ambrose, Manager, Human Resources, Viking Air
Stakeholders	Suzanne Benoit, CEO, Aéro Montréal Martin Lafleur, Project Director, Aéro Montréal Dawn Cartwright, National Aerospace Director, CAW Rob Donald, President and CEO, CCAA Theresa Davis-Woodhouse, Senior Project Manager, CCAA Clément Fortin, Président directeur general, CRIAQ Chantal Vernier, Project Manager, CRIAQ Gerald Tremblay, Grand Lodge Representative, Machinists (IAMAW) Ken Webb, Executive Director, Manitoba Aerospace Association Rod Jones, Executive Director, OAC
Academia	Andrew Petrou, Centennial College Serge Brassat, Directeur général, Collège Édouard-Montpetit et directeur École nationale d'aérotechnique Zouheir Fawaz, Professor, Department of Aerospace Engineering, Ryerson Institute for Aerospace Design and Innovation Robert Fewes, Director, CIADI, Concordia University
Government Ex Officio Members	Human Resources and Skills Development Canada (HRSDC) Natural Sciences and Engineering Research Council of Canada (NSERC) Citizenship and Immigration Canada (CIC)

b) Members of the People and Skills Sub-Groups

	Education	Experience
Skilled Workers	<p>Sub-Group 1 Adequately Educated Skilled Workers</p> <p>*Andrew Petrou (Centennial College, Association of Canadian Community Colleges) Serge Brassat (ÉNA, Association of Canadian Community Colleges) Robert Donald, CCAA (alternate – Teresa Davis-Woodhouse) Claude Picard, P&WC (alternate – Catherine Bedard) Robin Ambrose, Viking Air Gérald Tremblay, AIMTA – IAMAW Serge Tremblay, CAMAQ</p>	<p>Sub-Group 3 Adequately Experienced Skilled Workers</p> <p>*Vincent-Pierre Giroux, Bombardier David Ayton, Rolls-Royce John Leroux, Standard Aero Ken Webb, Manitoba Aerospace Association Marie-Chantale Chassé, JMJ Aéronautique</p>
	<p>Sub-Group 2 Adequately Educated Engineers/Professionals</p> <p>*Deborah Maynard, Cascade Aerospace Martin Lafleur, Aéro Montréal Norman Marcotte, NSERC Zouheir Fawaz, Ryerson University Clément Fortin, CRIAQ (alternate: Chantal Vernier) Robert Fews, Concordia University</p>	<p>Sub-Group 4 Adequately Experienced Engineers/Professionals</p> <p>*Rod Jones, OAC Tony Burgess, TDI Technical Services Jean-Denis Roy, Esterline CMC Electronics Daniel Guertin, Esterline CMC Electronics Jean-Paul Lemarquis, Bombardier Serge Tremblay, CAMAQ</p>
Engineers and Professionals		

*Chair

Annex 3: Examples of Program Support to Aerospace

a) Recent HRSDC Program Activity in the Aviation/Aerospace Sector

HRSDC Programs / Activities	Description of project / initiative	HRSDC Funding amount	Timeframe of funding agreement	Objectives of project / initiative Additional information
Direct program activity in aviation/aerospace				
Sector Council Program	Infrastructure (Current project)	\$1,500,000	2011/04/01 to 2013/03/31	<ul style="list-style-type: none"> Ultimately this project will ensure the Canadian Council for Aviation and Aerospace (CCAA) is able to support employers in the aviation and aerospace industry in developing the skilled workforce they need to be globally competitive.
	Transition and Student Workforce (Current project)	\$345,184	2010/04/19 to 2013/03/31	<ul style="list-style-type: none"> Increased understanding of the skills, knowledge and competencies gaps in transitioning demobilizing Canadian Forces into the industry. Facilitate an improved and enhanced training system with training providers. Enable an awareness of, and interest in, education in the industry. Assist industry to better match workers and jobs. Improve awareness, understanding and cooperation among key stakeholders.
	Skilled Workforce for the Future 2 (Current project)	\$890,568	2010/07/09 to 2013/06/28	<ul style="list-style-type: none"> Increased education and industry partnerships. Increased linkages between secondary schools and postsecondary schools (dual credits, advanced standing). Increased school boards and ministries of education awareness and linkages. Increased introductory training opportunities for future workforce. Increased industry's reach to workers undergoing a job transition and youth.
	Human Resources Action Plan for Employers and Training Organizations (Current project)	\$930,275	2010/12/20 to 2013/11/30	<ul style="list-style-type: none"> This project will assist CCAA in obtaining greater coverage of the aviation and aerospace industries that it does not currently serve. These include airports, flight crew, helicopters and a greater coverage of aerospace. There will be an increased involvement in CCAA projects from both the corporate and educational communities, and increased implementation of CCAA products and services across a broader spectrum of the industry.
	Aviation and Aerospace Short Course Development (Current project)	\$588,887	2011/05/02 to 2013/04/30	<p>CCAA will develop four efficient and affordable short courses that address specific skills deficits: Aviation Manager; Document Navigation / Air Regulations Introduction and Refresher course; Accountable Executives; Audit Management</p>
	Instructor Guide for Commercial Pilots and Composites Fabrication Curriculum (Current project)	\$515,520	2012/03/12 to 2013/03/31	<p>CCAA will develop:</p> <ul style="list-style-type: none"> A national standardized Instructor Guide for Commercial Pilots that aligns with adult learning techniques and principles with pilot training; and A Composites Fabrication Curriculum that aligns with the national occupational standards developed by CCAA.
	Essential Occupational Standards for New Industry Segments (Current project)	\$455,374	2012/03/12 to 2013/03/31	<ul style="list-style-type: none"> CCAA will develop two national occupational standards (NOS): 1) Transportation of Dangerous Goods Instructors and 2) Airside Airport Operations. Certification and accreditation frameworks will be developed to match these NOS. Airport authorities across Canada will be better equipped to develop and deliver training and to recognize qualified personnel. Transportation of Dangerous Goods training developers will be better equipped to develop and deliver training and to recognize qualified personnel. Finding work and workers in these occupations will be more efficient once systems are in place to train workers to a national standard and to recognize their skills.
	Professional Pilot Occupational Standard (Closed project)	\$431,232	2010/01/18 to 2011/12/31	<ul style="list-style-type: none"> CCAA developed an accepted definition of the skills, knowledge, attitudes and competencies required for Professional pilots; Up to date training programs using the aviation standard of Quality Management; Increased training and use of simulation for Air Operators; Enhanced industry capability to advance and promote pilots based upon standards of training and experience; and Improved mobility of professional pilots among air operators and flight training companies across Canada.
Aviation Maintenance Technician Curriculum Update (Closed project)	\$317,106	2010/01/18 to 2011/12/31	<p>Updating the Aviation Maintenance Technician Curriculum to:</p> <ul style="list-style-type: none"> Improve and enhance educational programs for training organizations; Increase awareness of and interest in education and careers within the aviation sector. 	
Career Focus (Youth Employment Strategy)	CCAA Career Focus Project	\$1,388,470	2009/07/27 - 2012/03/30	To help slow the skills gap in the sector, 130 participants (college or university graduates) were provided with opportunities to work in aviation/aerospace firms.
Skills and Partnership Fund	S.M.A.R.T project	\$374,511	2011/09/26 - 2014/07/31	The Native Council of PEI developed the S.M.A.R.T project which will provide skills development and training-to-employment opportunities to 20 Aboriginal clients through training opportunities and work experiences, including in the aerospace sector.
Aboriginal Skills and Employment Partnership program (2003 – 2012)	Aboriginal Aerospace Employment Initiative	\$5.2M	2008/11/24 – 2012/03/30	The Aboriginal Aerospace Employment Initiative project, through a formalized partnership with the Aboriginal community, industry (Boeing Canada Technology, Standard Aero and Bristol Aerospace Limited) and the Province of Manitoba, will provide at least 200 Aboriginal participants with the literacy, essential skills, vocational training and on-the-job training required to work in the aerospace industry.
Foreign Credential Recognition Program	Funding to the Canadian Aviation Maintenance Council (CAMC) (now CCAA) for the	\$1.5M	2004/10 - 2009/3	The project undertook the development of prior learning assessments and credential recognition/equivalency processes for domestic and foreign trained workers in the aviation and aerospace manufacturing sector.

HRSDC Programs / Activities	Description of project / initiative	HRSDC Funding amount	Timeframe of funding agreement	Objectives of project / initiative Additional information
	development of credential recognition processes.			
Work-sharing program	Income support to employees eligible for Employment Insurance benefits who work a temporarily reduced work week while their employer recovers	WS Employment benefits are paid to beneficiaries directly from the EI Operating Account. Total funding for work-sharing agreements in this sector not available at this time.	WS is an on-going Employment Insurance Part I program since 1977.	<ul style="list-style-type: none"> The program helps employers retain skilled employees and avoid the costly process of recruiting and training new employees when business returns to normal levels, and it helps employees maintain their skills and jobs by supplementing their wages with Employment Insurance benefits for the days they are not working. At the end of their agreement, employers must come back to normal business hours. Agreements are 26 weeks with extensions of 12 weeks. During the recession those agreements were extended several times. Since January 1, 2009, 88 WS applications have been received from employers working in the Aerospace Parts and Manufacturing sector. Of these 88 applications, 78 were approved for a Work-sharing agreement. The 78 agreements started in 2009 and currently, 6 of them are still in effect.
Indirect program activity in aviation/aerospace				
Interprovincial Standards Red Seal Program	Coordination and support to the Interprovincial Standards Red Seal Program, managed by the Canadian Council of the Directors of Apprenticeship (CCDA). Four Red Seal trades prominently employed in the aerospace sector include: <ul style="list-style-type: none"> Welder Machinist Industrial Electrician Millwright 		HRSDC functions as the national secretariat, providing administrative, operational and strategic support. This is supported through ongoing departmental operating funds.	Ongoing <ul style="list-style-type: none"> Encourages the harmonization of P/T apprenticeship training and certification programs by developing and maintaining interprovincial standards of qualification for Red Seal trades. 52 skilled trades have national occupational standards and certification exams promoting the mobility of skilled tradespeople across Canada by ensuring the recognition of their trade certificates without further examination.
Apprenticeship Grants	Apprenticeship Incentive (AIG) (2007) and Completion (ACG) (2009) Grants for 4 Red Seal trades employed by the aerospace sector : <ul style="list-style-type: none"> Welder; Machinist; Industrial Electrician; Millwright 		\$41M for the 4 trades from 04/2009 – 03/2012 (04/2011-03/2012: \$114.5M for all trades)	Ongoing <ul style="list-style-type: none"> Grants of up to \$4,000, which aim to encourage more Canadians to access and complete apprenticeship training in the Red Seal trades. From 04/2009 to 03/2012: <ul style="list-style-type: none"> 20,285 AIG issued for these 4 trades (13% of total) 10,393 ACG issued for these 4 trades (15% of total) (From 04/2011 to 03/2012: <ul style="list-style-type: none"> 49,483 AIG issued for all trades 25,482 ACG issued for all trades)
Temporary Foreign Worker Program	Labour Market Opinions (LMO) required by CIC to issue Work Permits		Total program spending: \$149.5M over 5 years (2007-2008 to 2011-2012) and \$35.5M on-going	Ongoing <ul style="list-style-type: none"> Helps Canadian employers hire foreign workers on a temporary basis to fill immediate skills needs when Canadians and permanent residents are not available. HRSDC assesses the labour market impact of hiring TFWs and issues LMOs, which are often required by CIC for the purpose of issuing work permits. Number of positions requested on LMO applications for employment in the aerospace industry sector (NAICS 3364) from 2007 – 2011: 2109
LMA / LMDA	Funding to the P/Ts for labour market programming that responds to local priorities.		LMAs: \$500M in annual funding LMDAs: \$1.95B in annual funding	Ongoing <p>Through these agreements, Government of Canada funding enables provinces and territories to design, deliver and manage skills and employment programs for unemployed Canadians. These agreements give P/Ts the flexibility to target specific industries/sectors.</p>

b) Sample of Recent Government Programs Accessed by Industry

Industry (6 responses)		
Esterline CMC Electronics Rolls-Royce Canada Bombardier Aerospace Manitoba Aerospace Association Pratt & Whitney Canada TDM Technical Services		
Type	Federal Programs	Provincial Programs
Skills Development	<ul style="list-style-type: none"> HRSDC Career Focus – federal (funds limited and we have not always received the full amount allocated). HRSDC Workplace Skills Initiative (WSI) – Submitted a proposal but was rejected FedDev Ontario - Achieving Innovation and Manufacturing Excellence (AIME) initiative - via the Yves Landry Foundation 	<p><u>Québec</u></p> <ul style="list-style-type: none"> Emploi Québec: Projet d'envergure; non-reimbursable grants to support training The Commission des partenaires du marché du travail and Emploi-Québec implement measures aimed at harmonizing workforce skills. Emploi-Québec: Subvention pour cours de français en milieu de travail pour les employés (syndiqués principalement) Loi 90: Loi favorisant le développement de la formation de la main-d'œuvre – requires employers to invest a minimum of 1% of their payroll in training for their employees. Programme d'apprentissage en milieu de travail Programme de Formation sur mesure Investissement Compétence Crédit d'impôt en milieu de travail Co-op programs – 30% of student's salary is paid for four month internship; coverage of supervisor's salary as well Educational programs from Ecole des Métiers de l'Aérospatiale de Montréal, École National d'Aérotechnique, Institut de Formation Aérospatiale, Centre de Formation Professionnelle des Moulins, École des Technologie Supérieur, Centennial, and others (Some of these schools provide initial training that is mandatory to get a job at Bombardier Aerospace) There are other measures and programs under the Quebec government to support labor during economic slowdown situations (programme SERRÉ is one of them) <p><u>Manitoba</u></p> <ul style="list-style-type: none"> Provincial funding is provided in support of training and development through Industry Workforce Development (IWD) division of the provincial government – no funds available at federal level Manitoba also has a number of incentives for employers and apprentices for those companies participating in the apprenticeship program.
Immigration	Montreal International (not for profit organization), receives federal and provincial funding; mandate includes attracting and retaining foreign talent. Those services accessed are centered on helping MI member companies in attracting foreign workers to Montreal, fast track of immigration formalities (visas, work permits), consulting to help spouses find jobs, etc.	<p><u>Québec</u></p> <ul style="list-style-type: none"> Fiscal programs from the Economic Development, Innovation and Export Ministry (MDEIE). Those programs provide fiscal advantages to foreign workers attracted to Quebec. In summary, selected foreign workers enjoy substantial provincial tax relief over 5 years. IPOP (Intégration en emploi de personnes formées à l'étranger par un ordre professionnel) Montreal International – federal and provincial funding (see federal column)
Other (Technology/Business Development)	<ul style="list-style-type: none"> NRC- IRAP (funds to support supplier development initiative) Western Economic Diversification funding 	No input received
Sectoral (1 response): Canadian Council for Aviation and Aerospace		
Skills Development	HRSDC Sector Council Program	N/A
Educational Institutions (1 response): École Nationale d'Aérotechnique (ENA)		
Skills Development (Continuing Education through ENA)	No direct access to federal funds such as those offered by HRSDC; funds are allocated to non profit organizations such as the CCAA and ACCC	<ul style="list-style-type: none"> Funding through the Ministère de l'Éducation, du Loisir et du Sport (MELS) – various funding envelopes (regional; priority funding; la Table d'éducation interordres de la Montérégie) Emploi-Québec - Mesures MFOR Entreprises Emploi-Québec- Programmes Investissements-Compétences (CPMT) Immigration et Communautés culturelles Québec - Programmes de francisation pour entreprises.
Skills Development	NSERC College and Community Innovation Program	<ul style="list-style-type: none"> Programme d'aide à la recherche technologique (PART) Renforcement de la capacité de recherche et d'innovation des CCTT le Programme de recherche pour les enseignants de collège¹

Annex 4: Labour Statistics Surveys

CCAA: CCAA recently conducted an aerospace labour market information study for the Department of Foreign Affairs and International Trade Canada (DFAIT) entitled *Skilled Labour in the Canadian Aerospace Manufacturing Sector* (March 30, 2012), which indicated skills shortages in a number of aerospace occupations.

CAMAQ: A census completed by the Comité sectoriel de main-d'œuvre en aérospatiale (Québec) anticipates increases over the next year ranging from 2.5% for administrative personal; 3.9% for manufacturing; 7.7% for technical and 9.5% for scientific. In total, the aerospace workforce for firms in the Montreal area is expected to increase from 44,331 in January 2012 to 46,479 in January 2013.

<i>Catégories de personnel</i>	<i>Emplois au 1^{er} janvier 2011</i>	<i>Emplois au 1^{er} janvier 2012</i>	<i>Emplois au 1^{er} janvier 2013</i>
<i>Personnel scientifique</i>	11 253	12 438	13 228
<i>Personnel technique</i>	8 376	9 079	9 603
<i>Personnel dans les métiers</i>	15 484	16 110	16 766
<i>Personnel administratif</i>	6 574	6 704	6 882
Total	41 687	44 331	46 479

Source: CAMQ: http://www.camaq.org/docs/camaq_Recensement_2011-13.pdf

MAHRC: The current staffing complement of Manitoba Aerospace companies is 5,000 persons. An informal survey of companies in January 2012 by the Manitoba Aerospace Human Resources Council indicates a projected increase for 2012 of 4.8% (236 workers). This includes the recent closure of the Winnipeg AVEOS facility. These workers are needed to fill positions in:

- Engineering
 - Mechanical, Electrical, Aerospace, Electronic, Manufacturing, Industrial
 - Sub specialties of engine testing and certification, vibration analysis, data acquisition, satellite systems, system integration, advanced materials, joining and bonding, quality assurance
- Engineering Technologists
 - Mechanical, Aerospace, Electrical, Mechatronics, Instrumentation, NDI, Manufacturing
 - Subspecialties similar to Engineering (above)
- Skilled trades
 - Gas Turbine Technicians, Machinists, CNC Operators, welders, painters, NDI, Composites Technicians, structures.

HRDC Canadian Occupational Projection System (COPS): The COPS projections for the non-automotive transportation equipment industry employment, which includes aerospace, railroad, ship and boat building and various transportation equipment is of an average annual growth rate of 2.4% over the 2011-2020 period. The aerospace industry represented about 75% of employment in the non-automotive transportation equipment in 2011.

Annex 5: Cost of Delivering Aerospace Programs

Example provided from a major trade school in Canada.

COSTS ASSOCIATED WITH CURRENT AVIATION PROGRAMS (Aircraft Maintenance / Avionics)				
Program area	Eg of Cost groups		2009-2012 costs	
Maintenance	Engines + cores		197,000.00	e.g. cores - 4 units per section - 4 sections per program = 16 required
	Aircraft - new purchase (used)		50,000.00	R22 piston helicopter
	Aircraft - repair		92,250.00	Repair, replacement of hardware, components, etc
	Hangar		146,000.00	Repair, replacement, tooling, stores, equipment, etc
Avionics	Avionics		185,000.00	Replacement of equipment, components
Sheet Metal	Structures		87,500.00	Refit of lab, replacement of equipment, tooling
Sub-total			757,750.00	
	Operating	\$100K p/yr	400,000.00	Does not include salaries, etc
			1,157,750.00	Over 4 year period
Human Resources	Lab hours per week x semester length	Average Student to Faculty ratio	Semester totals	
Other SOT programs	e.g. 2nd year = max 10h x 15wks	18 : 1	150 hours	per student, per semester (e.g. 160 students)
Aviation programs	e.g. 2nd year = av 20h x 20 wks	20 : 1	400 hours	per student, per semester (e.g. 160 students)

Annex 6: NSERC Programming

Undergraduate Support

- Industrial Undergraduate Student Research Awards in Industry – about 1,000 are offered every year. Support internships of 4-16 weeks. NSERC provides up to \$4,500. Industry provides at least \$1,125.

Graduate Support (Master’s and Ph.D.)

- Industrial Post-Graduate Scholarships include one specific component just for Québec. NSERC supports about 500 per year for up to 3 years. NSERC provides \$15,000 per year. Industry provides at least \$6,000.
- Industrial R&D Internships (through Network of Centers of Excellence). 1,000 graduate students and post-graduate fellows supported yearly. Supports Internship of up to 4 months. Provides \$7,500 to be matched by industry.

Post-Doctoral Support

- Industrial R&D Fellowships. NSERC support 300 IRDF per year for up to 2 years. NSERC provides \$30,000 per year while industry must provide at least \$10,000 per year.
- Industrial R&D Internships (through Network of Centers of Excellence). 1,000 graduate students and post-graduate fellows supported yearly. Supports Internship of up to 4 months. Provides \$7,500 to be matched by industry.

All Levels

- Industrial Collaborative Research and Training Experience. (CREATE). Up to 10 new Industrial CREATEs per year. Valued at \$1.65M over 6 years. Supports about 30 Highly Qualified People over the course of the six years.

Annex 7: The Jenkins Report

Concerted Federal Strategy

As referenced in this report, the Jenkins Report recognizes the importance of a strong workforce to innovation, but determines that current federal policy is unfocused and uncoordinated in the area of workforce development. The Report states, "A talented and adaptable workforce is at the heart of innovative economies. Every part of the economy therefore has a stake in educating, training and effectively integrating highly qualified and skilled Canadians into the workforce, and in attracting and retaining talented individuals to Canada. While the development of talent is the responsibility of the provinces, the Government of Canada plays an important role through the granting councils and can have a particular focus on the deployment of talent in support of business innovation. Unfortunately, federal efforts are unorganized, and federal programs are subscale and uncoordinated." (p. 5-14)

Similar to this report, Jenkins flags the need for a concerted federal strategy to develop a skilled and talented workforce. The Jenkins Report recommends that a new arm's-length funding and delivery agency be created with a clear mandate to support business innovation (Industrial Research and Innovation Council (IRIC)). This federal agency would, among other things, "lead the development of a federal innovation talent strategy, working closely with the provinces and relevant federal departments and agencies, focussed on increasing business access to, and use of, highly qualified and skilled personnel." (Recommendation 1.4, p. E-9).

The proposed concerted federal strategy, led by the proposed IRIC, would involve the following elements:

- Working with federal partners to consolidate federal industrial internship and youth employment programs, creating a larger, more flexible program open to all senior undergraduate and graduate students and post-doctoral fellows from across post-secondary educational institutions (this relates to the proposal that there be a visible, single point of access for federal programming related to aerospace, as well as federal support for practical opportunities at all levels - the skilled worker, technician, technologist, undergraduate and graduate levels).
- Addressing gaps in the current suite of business-oriented talent programs, such as creating opportunities for entrepreneurship mentoring, addressing Canada's underperformance in deploying its most highly skilled and highly trained PhD graduates, and developing the full range of industrially relevant research, development and commercialization skills for trainees, including both technical and professional "soft" skills (this is analogous to our recommendation to the federal government to support the development of initiatives that address various gaps in the aerospace workforce-- such as transferring knowledge and skills to tier 1 and 2 and SMEs; providing opportunities to transfer knowledge to new employees; and funding partnerships between industry and academia to cover technical skills and behavioural competencies).

Jenkins notes that the federal strategy should be designed to meet clearly defined objectives, over time, centring on the increased use by business of highly qualified and skilled personnel. The Report also recommends that the strategy make use of proactive and flexible delivery mechanisms by engaging stakeholders and civil society in the design and delivery of its talent initiatives, where appropriate.

To obtain the right mix of the quantity and quality of talent to close the innovation gap in Canada, the Report also calls for a "collaborative approach that brings together our post-secondary institutions, federal and provincial agencies as well as industry and other partners to ensure appropriate recruitment, training and deployment for federal innovation needs." (p. 2-14). Again, this collaborative, multi-jurisdictional approach reflects the direction in which our report is heading.

Other Relevant Themes

- *Collaborative research opportunities:* "Students learn not only through traditional classroom experiences, but also through hands-on research experience that exposes them to the realities of the business world and teaches the professional and entrepreneurship skills needed to fully contribute to their eventual workplaces. Employers see programs that encourage postsecondary student participation in research projects with business as having a number of benefits, including (i) the chance to identify the best recruits, (ii) the ability to influence curricula to be more industry-relevant, (iii) exposure to new ideas and specialized equipment in educational institutions and (iv) access to a flexible workforce." (p. 2-15).
- *Access to immigration programs to recruit skilled workers:* "While domestic production of innovation workers is an imperative, demographic realities dictate that this is not sufficient to meet the expected industry demand; by some estimates, within 20 years there could be almost two million vacancies for skilled knowledge workers in Ontario alone (Miner 2010). An immigration system that targets necessary skill sets presents Canada with an opportunity to leverage the skills, insights and entrepreneurial talents of those born in other countries who come to Canada" (p. 2-15).

Annex 8: Case Studies

Case Studies for Recommendation 9: Support regional Aerospace Centres of Excellence

- a) Bombardier Aerospace's CL300 Integrated Systems Test Rig
- b) Centennial College aerospace engineering and technical programs
- c) Comité sectoriel de main-d'œuvre en aérospatiale (CAMAQ)
- d) Concordia University aerospace engineering and technical programs
- e) Consortium for Research and Innovation for Aerospace in Québec (CRIAQ)
- f) Ecole Nationale d'Aerotechnique aerospace engineering and technical programs
- g) Ecole Polytechnique aerospace engineering and technical programs
- h) Industry Canada's Knowledge Infrastructure Program
- i) Manitoba Aerospace Association's Engineer in Residence program
- j) Montreal Aerospace Institutes
- k) Red River College Center for Aerospace Technology and Training (CATT) and Centre for Non Destructive Inspection (CNDI)
- l) Ryerson Institute for Aerospace Design and Innovation (RIADI)

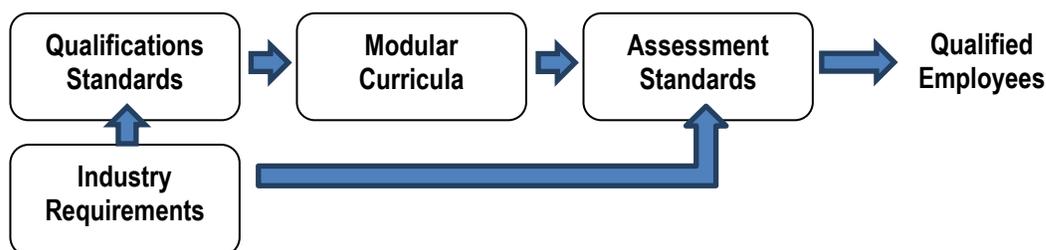
Annex 9: Competencies-Based, Outcomes-Driven Approach to Human Resources

Approach:

Establish 'competencies-based, outcomes-driven' principles as the foundation for:

- a. **defining industry positions and conducting individual employee assessments to identify competencies gaps, and directing employee ongoing training and development**
- b. **defining learning requirements for new graduates and for ongoing training and development of current employees.**

The essentials of a system for implementing these principles would be as follows:



The objective of this approach is to develop a valid and reliable 'competencies-based, outcomes-driven' system that will augment and strengthen existing efforts to define occupational standards and expand the assessment and qualification standards for the aerospace industry, which in certain respects are incomplete today. The intent is to provide companies with a highly efficient and effective approach to developing and advancing current employees, and equally for bringing new people into the industry. It will establish a 'Common Currency' for the industry in communication and development of critical competencies across the entire workforce and in every province/region, and will provide a common language within the industry, with educators and with other strategic partners.

Outcomes

Some of the most valuable outcomes that could be achieved by this 'competencies-based, outcomes-driven' approach include:

- Companies can be confident that newly-hired employees will perform well within a short period of time, be satisfied in their position, stay and advance with the company.
- Employees will perform well in their positions, will be satisfied with their work and their opportunities to progress their careers, and will advance with the company.
- Enables the ultimate development of aerospace industry recognition of experience and learning, providing 'ladders & bridges' whereby employees can enhance their performance and advance their careers.
- Outcomes from employee development programs to fill competency gaps are measurable on both company and employee levels.
- Enables educational institutions to apply their best ideas and methods to educate people (at all levels) to achieve required competencies – curricula are not prescribed; only 'outcomes' are measured.

The Federal government could support the industry-led, industry-driven Forum in carrying out an evaluation and implementation of this approach.

Sources and Notes

- ¹ Deloitte and Touche, LLP, *The Strategic and Economic Impact of the Canadian Aerospace Industry*. October 2010. http://www.aiac.ca/uploadedFiles/AIAC_ExecSummary%20-%20Final%20_2_.pdf (accessed May 28, 2012), p. 21.
- ² As predicted in the 2010 Deloitte report.
- ³ The term 'skilled workers' as used in this report refers throughout to technologists, technicians, and skilled tradespersons
- ⁴ The term 'professionals' as used in this report refers throughout to engineers, management and financial personnel
- ⁵ ClearWater, *Aerospace Global Report*. 2011:10. http://www.imap.com/imap/media/resources/Aerospace_8_1FED752787A1E.pdf (accessed June 2, 2012).
- ⁶ Conference Board of Canada, *How Canada Performs: A Report Card on Canada*. <http://www.conferenceboard.ca/hcp/Details/education.aspx>
- ⁷ Canadian Council for Aviation and Aerospace, *Skilled Labour in the Canadian Aerospace Manufacturing Sector*, prepared for the Department of Foreign Affairs and International Trade Canada, March 30, 2012.
- ⁸ Deloitte and Touche LLP, *Global Aerospace Market Outlook and Forecast, AIAC Phase 3 Report*, October 2010. See especially Chapter 9, "Policy Scenarios".
- ⁹ It should be noted that many issues considered by the Group are long-standing. In 1989, the Canadian aviation maintenance industry was facing a critical shortage of skilled personnel and a lack of standards for most occupations in the sector. A comprehensive human-resource study was commissioned. The study, undertaken by Price Waterhouse between 1988 and 1991, was the first one ever conducted on the industry. The study recommended action in four areas: defining occupational standards for the industry; establishing training programs and core curricula for post-secondary training organizations; recruiting new workers for the industry; and developing mechanisms for industry-wide resource planning. The same four recommendations still hold true today.
- ¹⁰ Out of 75 companies surveyed by the AIAC (2011) on the issue of skills shortages in the next five years, 42.7% indicated shortages in engineering and scientific staff, 30.7% in technicians and technologists, 26.7% in production staff, and 13.3% in other types of employees.
- ¹¹ Rick Miner, *People Without Jobs, Jobs Without People: Canada's Labour Market Future*, March 2010, Miner Management Consultants. http://www.collegesontario.org/research/research_reports/people-without-jobs-jobs-without-people-final.pdf (accessed June 5, 2012).
- ¹² See, for example, Roslyn Kunin & Associates, Inc. "Report of the Labour Market Information Survey of the Aerospace Industry in British Columbia," June 15, 2011. http://www.tcda.ca/files/pdfs/Report_of_the_Labour_Market_Information_Survey_of_the_Aerospace_Industry_in_British_Columbia.pdf (accessed June 23, 2012).
- ¹³ Citizenship and Immigration Canada, *Temporary Foreign Worker Program*, June 15, 2012. <http://www.cic.gc.ca/english/resources/publications/employers/temp-foreign-worker-program.asp> (accessed July 17, 2012).
- ¹⁴ Human Resources and Skills Development Canada, *Labour Market Opinion*, April 12, 2012 http://www.hrsdc.gc.ca/eng/workplaceskills/foreign_workers/ei_tfw/lmi_tfw.shtml (accessed July 17, 2012).
- ¹⁵ Canada Revenue Agency, *Apprenticeship Job Creation Tax Credit*, February 8, 2012. <http://www.cra-arc.gc.ca/tx/ndvds/tpcs/nsm-tx/rtrn/cmpltng/ddctns/Ins409-485/412/jctc-eng.html> (accessed May 25, 2012).
- ¹⁶ Human Resources and Skills Development Canada, *Sector Council Program*, May 19, 2011. http://www.hrsdc.gc.ca/eng/workplaceskills/sector_councils/faq.shtml (accessed May 18, 2012).
- ¹⁷ Canadian Aviation Maintenance Council, *Aviation Maintenance Orientation Program*. <http://www.camc.ca/yip/amopschools.php> (accessed May 29, 2012).

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- ¹⁸ Service Canada, Youth Employment Strategy, February 16, 2012. <http://www.servicecanada.gc.ca/eng/epb/yi/yep/newprog/yesprograms.shtml> (accessed June 15, 2012).
- ¹⁹ National Research Council, Industrial Research Program, Youth Employment Program, December 1, 2011, <http://www.nrc-cnrc.gc.ca/eng/services/irap/youth-initiatives.html> (accessed July 17, 2012).
- ²⁰ Both supply (school enrolments/graduates) and demand data are required. The Canadian Aerospace Labour Market Survey, undertaken in 2000-2001 for CAMAQ, MAHRCC and OAC, is an example of the type of labour economic research and forecasting that must be undertaken periodically to generate such data for the aerospace sector. This will assist in aligning labour supply and demand across Canada, including where training occurs and where opportunities are located.
- ²¹ <http://www.workingincanada.gc.ca/home-eng.do?lang=eng>
- ²² Industry Canada, Knowledge Infrastructure Program, 19 March 2012. http://www.ic.gc.ca/eic/site/696.nsf/eng/h_00009.html (accessed June 15, 2012)
- ²³ National Sciences and Engineering Research Council of Canada, Students and Fellows, June 6, 2012, http://www.nserc-crsng.gc.ca/Students-Etudiants/index_eng.asp (accessed July 17, 2012).
- ²⁴ Expert Panel (Jenkins) Report, Innovation Canada: A Call to Action (submitted October 17, 2011). http://rd-review.ca/eic/site/033.nsf/eng/h_00287.html (accessed June 15, 2012)
- ²⁵ Aéro Montréal, *MACH Initiative*. 2012. <http://www.aeromontreal.ca/mach-en/> (accessed June 20, 2012).
- ²⁶ Other successful outreach programs for developing the workforce of the future include the Québec Ministry of Education (MELS) programs: “Projet personnel d’orientation” and “Exploration de la formation professionnelle”, and “The Sky is the limit”, an Aero Montreal initiative, which assist industry in targeted outreach to as early as grade 5/6. In Manitoba, youth outreach programs, with the partnership of the Manitoba Aerospace Human Resource Council, include the Aerospace & Aviation in Manitoba (AAIM) Day; WinCube; and the Aerospace Manufacturing Machining and Maintenance Orientation Program (AMMOP) at Tec-Voc high school.
- ²⁷ Canadian Chamber of Commerce, *Top Ten Barriers to Competitiveness: Skills Discussion Paper*. March 2012:4.
- ²⁸ Au lieu d’essayer de calculer nos coûts, on pourrait se baser sur le financement du MELS, qui lui est basé sur des études détaillées des coûts par programme. Pour le financement du A, en regardant le budget 2012-2013 et les budgets des Pes, on peut calculer en divisant le financement des activités à Longueuil par le nombre de Pes brutes (période enseignement semaine) que le MELS finance pour les activités à l’enseignement (fournitures, laboratoire, etc.) à 34,88\$ (8 775 244\$/251 560 Pes brutes) par heure de cours. Si on fait le même exercice pour l’ÉNA (2 670 456\$/44 288 Pes brutes) on arrive à 60,30\$ par période de cours. On le voit car en moyenne à l’ÉNA pour chaque Pes brute, le Ministère finance 51,89 Pes pondérées alors qu’à Longueuil, le ratio est de 16,84 Pes pondérées par Pes brute.