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RCAF FUTURE PERSONNEL MANAGEMENT: THE CASE FOR IMPROVED SUSTAINABILITY OF AIRCRAFT ENGINEERS

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AIM

1. As technology becomes omnipresent, recruitment and retention of highly technical, qualified and experienced Royal Canadian Air Force (RCAF) Aircraft Engineers will remain a significant challenge. This situation will become strained through the introduction of new platforms as well as the consideration of a fifth-generation fighter, all within a period of low unemployment in Canada.[1] This service paper will consider the implications on aircraft engineer retention and recruitment and through assessment of allies' studies, make recommendations that the RCAF should proactively implement.

INTRODUCTION

2. The Canadian Armed Forces (CAF) operates within a global economic environment and its key asset, personnel, are affected by both national and international factors which impact workforce availability. Strong, Secure, Engage (SSE) provides measures to counter general personnel issues, aimed at improving recruitment and retention,[2] and further, policies are anticipated in the *Journey*. However, the CAF should remain mindful of the need to pay attention to specific cohorts in order to ensure and sustain future capability. The Canadian Government has recognised the lack of participation of students in Science, Technology, Engineering and

[1] Andy Blatchford, "Canada's unemployment rate drops to 4-decade low at 5.8%," *Global News*, last accessed 12 October, https://globalnews.ca/news/4380426/canadas-unemployment-rate/

[2] Department of National Defence. *Strong Secure Engaged: Canada's Defence Policy* (Minister of National Defence, 2017), 18-31.

Maths (STEM) subjects and has introduced several initiatives in an attempt to meet industry's increasing demand for a workforce containing these skills.[3] Additionally, an increasing deficiency of aircraft engineering skills workforce has widely been acknowledged across the developed world, which is impacted by aging populations and a desire to drastically increase commercial airline travel, as recognised by the International Civil Aviation Organization.[4] This then creates a supply and demand issue that could impact RCAF's ability to meet its future commitments.

3. When compared to near peer forces such as the Royal Air Force (RAF) and Royal Austrian Air Force (RAAF), the RCAF is slower to replace its aging aircraft fleet as has, to date, yet to fully commit to fifth-generation programmes such as F-35. Therefore, through review of external studies and consideration of strategies implemented by other nations, it will be possible to decide what personnel plans for aircraft engineers ought to be implemented by the CAF in order to maintain the Air Force's capabilities and sustain its interoperability with Canada's allies.

DISCUSSION

Global and National Aircraft Engineer Workforce Requirements

4. An aging population is a global concern in many developed nations and is an issue that influences Canadian immigration policy.[5] Further, Forbes published a review conducted by Oliver Wyman consultancy in 2017, projecting that those leaving the aircraft maintenance

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[3] Government of Canada, "The government of Canada and STEM," last accessed 13 October 2018, *https://www.ic.gc.ca/eic/site/013.nsf/eng/00014.html*

[4] International Civil Aviation Organization, "ICAO Addresses Shortage of Skilled Aviation Professionals," last accessed 12 October 2018, https://www.icao.int/newsroom/pages/icao-addresses-shortage-of-skilled-aviation-professionals.aspx

[5] The Conference Board of Canada, "Immigrating will help alleviate Canada's Aging Population Challenges, But not solve them," (October, 2016), last accessed 11 October 2018, https://www.conferenceboard.ca/(X(1)S(fpmagktmhqctto1rnzqf2mu2))/press/newsrelease/16-1006/Immigration_Will_Help_Alleviate_Canada_s_Aging_Population_Challenges_But_Not_Solve_Them.aspx?AspxAutoDetectCookieSupport=1

technician workforce would be greater than those joining over the next decade, leaving a 9% deficiency in the US workforce. The review also detailed that part of the problem "stems from aviation mechanics' current wages, benefits, and perks".[6] This in term can create a supply and demand issue, and thus the future prospects for aerospace engineers appears positive with Canadian Business placing this sector at number 21 within 'Canada's Best Jobs in 2018'.[7] The subsequent impact of rising wages raises concerns for government organisations, expressed within a Skies Magazine article reproduced on the RCAF website, detailing "But the lure of commercial pay cheques, especially for maintainers, may challenge an air force's ability to hold on to its people while managing a normal rate of attrition".[8]

5. Studies in 2018 within the US helicopter manufacturing industry highlighted that not only were 67% of companies having greater difficulties in finding experienced technicians but "more than 60% reported hiring mechanics with less experience than they hired in previous years".[9] Reported by Global News in 2016, Transport Canada also predicted aging workforce issues, detailing that 46% of aircraft mechanics were between 50 and 79 years old.[10] The impact of this aging workforce is compounded by the increase in demand for commercial aircraft, Transport

[6] Brian Prentice and Derek Costanza, "Aging Baby Boomers Cause Aircraft Mechanics Shortage As Global Fleet Expands, Modernizes," *Forbes*, (April, 2017), last accessed 11 October 2018, https://www.forbes.com/sites/oliverwyman/2017/04/24/looming-aircraft-mechanic-shortage-may-threaten-the-growth-of-the-global-fleet-and-raise-costs/#718b7e564984

[7] Claire Brownell, "Canada's Best Jobs 2018: The Top 25 Jobs in Canada," *Canadian Business*, (September, 2018), last accessed 11 October 2018**,** https://www.canadianbusiness.com/lists-and-rankings/best-jobs/best-jobs-2018-top-25/

[8] Chris Thatcher, "Managed Shortfall," *Skies Magazine*, (April, 2018), last accessed 11 October 2018, http://www.rcaf-arc.forces.gc.ca/en/article-template-standard.page?doc=managed-shortfall%2Fjg2k237m

[9] Aerospace Manufacturing and Design, "Addressing the Aviation Mechanic Shortage," last accessed 14 October 2018, http://www.aerospacemanufacturinganddesign.com/article/addressing--the-aviation--mechanic-shortage/

[10] Stu Gooden, "Canada faces impending shortage of aircraft mechanics and pilots," *Global News*, (December 2016), last accessed 11 October 2018, https://globalnews.ca/news/3111765/canada-faces-impending-shortage-of-aircraft-mechanics-and-pilots/

Canada's 2016 report forecasts an annual 3.1% rise to 2025 in Canadian air transport,[11] fuelled in part of predictions by 2031 of nearly half of Canadians aged 15 or over being foreign born or having at least one foreign born parent.[12] The totality of these global and national issues presents perhaps a positive for those that become aircraft maintainers who will be in high demand, but a concern economically for Canada's airline industry and a greater concern for the CAF who may find it difficult to compete for an in-demand workforce while also trying to grow its own future capabilities.

RCAF Aircraft Engineer Workforce Requirements

6. In contrast to this grave outlook, the present RCAF engineer manning situation appears healthy with 98% of engineer officer and 96% of maintenance technician posts filled, although this average masks areas such as aircraft structures trade that is only 87% manned.[13] However, these headline statistics could provide a false sense of security as the RCAF is "hitting a demographic bubble..." where "…about 20 percent of the Canadian Armed Forces…are in that retirement zone".[14] The mitigation of this impending Suitably Qualified Experience Personnel (SQEP) bubble is not one that can be easily addressed through increased recruitment, which can bring its own issues of creating a junior inexperienced workforce and an unmatched training capacity. To meet present recruitment targets the CAF will need to continue to focus on the

[11] Transport Canada, "Transportation in Canada 2016," last accessed 11 October 2018, https://www.tc.gc.ca/media/documents/policy/comprehensive_report_2016.pdf

[12] Transport Canada, "Transportation in Canada 2011 Outlook Trends and Future Issues," last accessed 11 October 2018, https://www.tc.gc.ca/eng/policy/anre-menu-3024.htm

[13] Chris Thatcher, "Managed Shortfall"…

[14] *Ibid.* Quote from Lieutenant-Colonel Elisa Cass, who works for the Directorate of Air Personnel Strategy responsible for attraction, in-service selection, research and retention.

intake of engineers, and it is perhaps not surprising that on the CAF jobs website, four from the top six adverts are for engineering trades and the first being avionics technicians.[15]

7. Akin to the commercial sector the RCAF has an aging workforce issue within the context of a requisite to grow capabilities and modernise. SSE details the RCAF's intent: replacement fighter capability; next gen multi mission programme; medium altitude remotely piloted systems; next gen strategic air tanker transport capability; and utility transport aircraft.[16] Moreover, similar to the commercial sector if nothing is conducted to address the SQEP bubble then aspirations would need to be curtailed and or risk taken against aircraft safety. However, unlike the commercial sector who could continue to operate older aircraft and take a reduction in efficiency and thus profit, the RCAF already has areas of aging capabilities that are ready for updating in order to be able to continue to meet its present commitments, notwithstanding future areas it may wish to expand into. These issues were recognised through the Assistant Deputy Minster (Review Services) Evaluation of Air Force Readiness:

> . . . the RCAF will continue to be affected by resource pressures. Over the evaluation period, RCAF capabilities have increased significantly without overall increases in personnel or baseline funding…While ongoing initiatives to address many personnel issues are encouraging in the short term, the critical shortages of specific aircrew occupations and technician trades, and Reserve Force (Res F) personnel in general, has strained the existing RCAF establishment. Furthermore, the replacement or upgrade of several aging RCAF aircraft fleets will be required in the coming years…In general, without further progress in addressing its personnel and equipment requirements, the RCAF will be increasingly challenged to sustain its readiness capabilities in the future.[17]

Furthermore, the Evaluation provided several high level recommendations, which included validating human resource requirements and re-establishing and re-balancing personnel

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[15] Government of Canada, "Jobs available now in the Canadian Armed Forces," last accessed 11 October 2018, https://www.canada.ca/en/department-national-defence/campaigns/in-demand-jobs/available-jobs.html

[16] Department of National Defence. *Strong Secure*… 39.

[17] National Defence and the Canadian Armed Forces, "Evaluation of Air Force Readiness," *(May 2017),* last accessed 11 October 2018, http://www.forces.gc.ca/en/about-reports-pubs-audit-eval/288p1258-3-005.page#exec

baselines. This service paper will examine how to support and augment these recommendations by reviewing studies and actions implemented by near peer allies.

Royal Air Force - Engineer Officer and Aircraft Technician Retention Initiatives

8. The United Kingdom also has a widely recognised engineer workforce supply versus demand issue with a report from Engineering UK[18] stating "Engineering graduate supply falls well short of demand: we conclude from the report, a shortfall of at least 20,000 annually".[19] With increasing engineering workforce gaps and looming SQEP bubbles, the RAF initiated sustainment studies to consider action, which resulted in Papers of Evidence (PoE) for the retention of aircraft technicians[20] and engineer officers.[21]

9. While both RAF studies were conducted independently, had subtly different issues and produced separate recommendations, there were several similarities across the papers summarised as follows. Firstly, although it was recognised that recruitment was essential and challenging, recruiting requirements had increased significantly, 100% for some aircraft technician trades over the proceeding 5 year period; the PoE's established that any further increase in recruiting would exacerbate skills dilution at the base rank, creating an unsustainable supervisory burden and cause training capacity issues.[22] Secondly, that there were multiple reasons for personnel wanting to leave the RAF, thus a range of complementary remunerative

[18] UK not-for-profit organisation, which works in partnership with the engineering community to inspire tomorrow's engineers and increase the talent pipeline into engineering.

[19] Robin Mellors-Bourne, The Sate of Engineering, *Engineering UK 2017*, last accessed on 11 October 2018. *https://www.engineeringuk.com/media/1355/enguk-report-2017.pdf*

[20] Ministry of Defence, *Royal Air Force Trade Group 1 Aircraft Technicians' Financial Retention Incentive* (February 2018). Attainable through SO1 Engineer Branch and Trades Advisor, Air Command, RAF High Wycombe.

[21] Ministry of Defence, *Royal Air Force Engineer Officers' Retention Measures* (May 2018). Attainable through SO1 Engineer Branch and Trades Advisor, Air Command, RAF High Wycombe.

[22] *Ibid*., 4.

and non-remunerative measures were required to address the situation.[23] Thirdly, that the non-remunerative measures would take time to reduce voluntary outflow rates, therefore, remunerative measures were required in the short term.[24] Additionally, that the cost of training SQEP, an often overlooked factor, was significant, thus supported the viability of short to medium term remuneration which would strengthen proposals made to Her Majesty's Treasury.[25] Also, because of the training cost and the inherent bottom-fed nature of many armed forces, the Ministry of Defence should accelerate its implementation of lateral entry policy[26] and consider how personnel may interchange in and out of the Services easier.[27] In addition, the ability to provide greater family stability by allowing personnel to extend longer in location while providing greater continuity by keeping experience on specific platform types.[28] Lastly, increasing the number of career managers to provide capacity to understand individual needs better, through providing a more bespoke service to reduce frustration and voluntary outflow rates.[29]

10. The resultant effect of the remuneration elements of the PoEs combined with the studies that led into a wider Defence Engineering Remuneration Review, was recognised by the Armed Forces Pay Review Body in the 2018 report which agreed: an award for all engineers that attained professional registration; [30] acceptance to review an RAF-led case for a bespoke tri-Service professional engineering pay spine for officers; the consideration to better target core

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[23] *Ibid*., 6-8.
[24] *Ibid*. B-1, B-2.
[25] *Ibid*., A-4.
[26] A policy that allows personnel with appropriate experience and education to join the organization at a higher level.
[27] *Ibid*., B-2.
[28] *Ibid*., B-1.
[29] *Ibid.*
[30] Professional Registration is awarded by the UK Engineering Council for Engineering Technician, Incorporated Engineer and Chartered Engineer.

pay for engineers and possible Financial Retention Incentives for RAF technicians and officers.[31] The accumulative affect of the RAF's actions will improve the immediate problem of lack of SQEP, but it also acknowledges the wider skills shortage issues and begins to provide a bedrock to ensure sustainment of capability, through maintaining sufficient aircraft engineers. As the RCAF replaces and brings in new capabilities, sustainability of aircraft engineering SQEP will also be a key requirement, thus understanding the steps undertaken by the RAF will be imperative.

Royal Australian Air Force - Plan Jericho - Technology Transforming Strategy

11. Unsurprisingly, Australia also has concerns surrounding the future of aircraft maintenance workforce as presented in a 5-year study conducted by the University of New South Wales Business School that provided a number of recommendations on reform, including ways to address the workforce shortfall.[32] This issue is likely to impact the Australian Defence Force, and the Royal Australian Air Force (RAAF) has taken a more holistic view to supporting its future into a fifth-generation force and the information age. Plan Jericho is "a strategy designed to transform the [RAAF] by capitalising on future high technology systems" and empowers the RAAF to change "ways of working in order to take advantage of advance technology and aircraft capabilities."[33] Air Chief Marshall Leo Davies, RAAF Chief of Air Force, when referring to the "largest technological upgrade" in the RAAF states ". . . will demand more from our people,

[31] The Armed Forces Pay Review Body, *The Armed Forces Pay Review Body Forty Seventh Report: 2018, ISBN 978-1-5286-0435-2, Cm9677, (2018)*, xiii, last accessed 11 October 2018, https://www.gov.uk/government/publications/armed-forces-pay-review-body-forty-seventh-report-2018

[32] University of New South Wales, *The Future of Aircraft Maintenance in Australia: Workforce Capability, Aviation Safety and Industry Development*, (October 2015), last accessed 12 October 2018, https://www.business.unsw.edu.au/research-site/industrialrelationsresearchcentre-site/Documents/FutureAircraftMaintenanceReport.pdf

[33] Royal Australian Air Force, "Plan Jericho," last accessed 14 October 2018, https://www.airforce.gov.au/our-mission/plan-jericho

operating concepts, training, support and systems and sustainment. All of these will need to be transformed to match the capacity of our aircraft".[34] Within this service paper it is the people aspect of the Plan that will be focussed upon and what CAF can learn to prepare for a next generation air force.

12. Air force trade structures slowly evolve overtime and should remain subservient to the technology they support; moving towards fifth-generation aircraft and beyond will see another evolution. Plan Jericho recognises this within its Theme 2 "Develop an Innovative and Empowered Workforce" stating "We must develop contemporary trade structures and organisations that reflect the requirements of the future . . .".[35] In the aircraft maintenance environment Jericho is set to build upon the foundations of the RAAF Maintenance Productivity Improvement Programme where one of its directed Outcomes was to "improve maintenance productivity", bringing together several key strands including "Cross-Trade Employment".[36] However, Plan Jericho's mandate goes further to capitalise on innovation at all levels of the organisation to enable and encourage junior staff to make genuine change to the business. To achieve this, the RAAF recognises that it must "evolve our education, professional development and flexible career management processes". A crucial factor when evolving systems, processes and people through innovation and empowerment is the acceptance of risks, recognised by Plan Jericho with the caveat ". . . where it is warranted without compromising the safety of our personnel".[37]

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[34] Royal Australian Air Force, *Air Force Jericho Connected, integrated*, 1, last accessed 14 October 2018, http://airpower.airforce.gov.au/APDC/media/PDF-Files/Air%20Force%20Publications/AF14-Plan-Jericho.pdf

[35] *Ibid, 7.*

[36] Moyle, Nic, WGCDR, *MPIP & DASR Implementation: Concurrent Reform*, DD MPIP Program Management Office Royal Australian Air Force, 4,10, last accessed 12 October 2018, http://www.defence.gov.au/DASP/Docs/AgencyConferenceDocumentation/CAC/2016/23WGCDRNicMoyle(DD%20MPIP)ImplicationsandTieswithDASRs.pdf

[37] Royal Australian Air Force, *Air Force Jericho Connected…*

13. Many armed forces have adopted a whole force approach to capability procurement and in service support, through working alongside Civil Servants and partnering with industry. As resources become tighter and greater demand is paced upon a limited engineering workforce, as previously described, there will be a need to work more closely and imaginatively with industry. Within Jericho's Theme 3 "Change the Way we Acquire and Sustain Capability" it recognises the need "to work in partnership across Defence and with defence Industry to accomplish this, strengthening relationships and facilitating interaction through simplified processes".[38] Individually, Plan Jericho's mandates are not necessarily revolutionary, but collectively they do provide a sound holistic approach and framework. The Plan provides a guide for a fifth-generation force, so that force may become agile and adaptive to make the most of future capabilities and crucially the people that support them. Creating a holistic approach and leveraging the workforce to obtain efficiencies will be a key factor as the RCAF moves into fifth-generation technology and thus ways of working could be garnered from Plan Jericho.

CONCLUSION

14. Much of the developed world has begun to observe a technical skills shortage that is estimated to widen over the next two decades. As the present aging population begins to retire there will be paucity in both size, due to less people, and skills, due to career choices. These issues will be compounded for the aircraft-engineering workforce due to the predictions of significant increase in global air travel, increasing the demand for technical skills. Further, present aircraft technology is evolving which exasperates the requirement to sustain appropriate SQEP, while new recruits are trained to support future capabilities.

[38] *Ibid.*, 9.

15. The RAF has recognised threats to sustaining its engineering workforce in a highly competitive, technological environment and has begun to initiate remunerative and non-remunerative mitigation; recognising that providing remuneration for the retention of SQEP in the short to medium term is a superior approach than increasing recruitment further. The RAAF has similar concerns supporting next generation capability as the UK and has implemented a holistic framework to tackle the problem; focusing on different ways of working and empowerment to drive efficiencies that will help sustain and realise opportunities in future technology. As the RCAF resides within a comparable economic environment to the RAF and RAAF, it will undoubtedly face similar issues as it strives to grow and advance its capabilities.

16. The CAF has interoperability with allies embedded as a core element within SSE, which influences procurement, training and processes to be able to engage effectively in and outside of Canada. While much focus is rightly placed upon combined exercises and operations, it is business as usual within the strategic environment that should be exploited further. Therefore, the CAF would benefit learning from the approaches employed by its near peers so that it may proactively implement its own bespoke strategies, to ensure future technological capabilities, through sustainability of the aircraft engineering workforce, are maintained.

RECOMMENDATION

16. In recognition of a highly likely impending aircraft engineering skills shortage, CMP is invited to endorse the following recommendations:

a. Allocate resource to gain and share personnel management information with key allies, to obtain best practices so that proactive personnel strategies can be considered and implemented.

b. Implement a study for the future of RCAF aircraft engineers to consider what bespoke mechanisms are required to sustain this cohort, to ensure a fully supportive provisioning and alignment within procurement programmes.

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