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# THE LONG GAME: INSTITUTIONAL TRANSFORMATION WITHIN THE AIR MAINTENANCE COMMUNITY

LCol Aleem Sajan

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## INTRODUCTION

Aircraft maintenance remains a human endeavour that traces its roots all the way to the Wright Brothers and provides an ability to look back to aviation's rich history in inspiring the future. From fitters affectionately known as grease monkeys and engine bashers, airframe bods or riggers, to modern aircraft technicians, there is a the long history of the unsung heroes who have and will continue to enable air power. Like those who came before, today's aircraft technicians continue to be the backbone of the Air Force and ensure airworthy aircraft. Reason and Maddox remind us of the imperfections with human endeavours, and the continued challenges that they are prone to and account for "the majority of aviation-maintenance related quality lapses, incidents, and accidents."[1] It is clear that although aviation draws upon the strength, ingenuity and innovation of those within, it is also susceptible to human mistakes and therefore requires a carefully curated profession. The profession faces the challenges of continually evolving with technological advances to overcome vulnerabilities and endeavours to constantly be at the forefront of transformative initiatives. It is not a surprise that the Royal Canadian Air Force (RCAF) has enshrined within its doctrine a call to continually evolve and transform to ensure relevance of the technician professions in meeting the requirement of delivering air power within an evolving aerospace landscape.[2]

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[1] James Reason and Michael Maddox, "Chapter 14 – Human Error", in *Human Factors Guide for Aviation Maintenance*, (FAA, 2005), 1.

[2] Department of National Defence, B-GA-400-000/FP-000, *Canadian Forces Aerospace Doctrine* (Ottawa: DND Canada, 2010), 1.

Aircraft Technicians within the RCAF must embrace this need to evolve and embrace transformation. The focus of this paper will be to understand the unique culture within the RCAF Air Maintenance (AM) community and examine the challenges faced in effectively implementing change. Air technician transformation initiatives such as the Military Occupation Structure Analysis, Re-design and Tailoring (MOSART) and the subsequent Air Occupation Enhancement (AOE) will be examined through theoretical institutional analytic frameworks such as the one presented by W. Richard Scott and organizational transformation and change model presented by J. Palthe. The paper will prove that because the Air Maintenance community is a distinct and culturally unique community within the RCAF, it requires a targeted strategy for change management; transformative change is possible with a targeted long-term strategy. The primary focus will be on past AM community trade restructures in order to provide context in a contemporary period. The objective is to first understand what elements uniquely define the AM community as a "community of practice" within the RCAF and how adaptively it embraces institutional and transformative change. Second, it is to determine what the most effective strategy to implement transformative change in the past was and whether this was used in in the implementation of unification to MOSART and AEO. Underpinned with theoretical frameworks of Scott and Palthe, the two objectives will support the notion of culturally unique community that can be transformed as demonstrated through historical initiatives such as unification, MOSART and AOE.

## THEORETICAL FRAMEWORK

### Institutions Defined

Institutions are complex social structures "comprised [of] regulative, normative, and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning"[3] Given the social context, institutional analysis is predominantly a sociological approach and looks at the overall impact of social order within an institution.[4] Scott states that institutionalists place a special emphasis on knowing the history of the decisions of those who have came before them in order to inform their present and future approaches to solutions within the institution.[5] This ensures that there is continuity and decisions are logically linked and in turn establishes legitimacy within this social order. According to Scott, this approach ultimately allows for institutional decisions to be sustainable in the long-term.[6] Institutions are inherently inclined to control and constrain those within and will often demark boundaries through legal, moral and cultural mechanisms in order to clearly distinguish appropriate from inappropriate behaviours.[7] To further support this, institutions also ensure appropriate recognition for desired outcomes through stimulus and resources to empower positive behaviours.[8] Wenger further elaborates that institutions are able to "… define roles, qualifications, and the distribution of authority…establish relations of accountability…[and]

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[3] Richard W. Scott, *Institutions and Organizations: Ideas, Interests, and Identities*. 4th ed. (Washington DC: SAGE Publications, 2014), 56.

[4] D. Conley and E. Ouellet, "The Canadian Forces and Military Transformation: An Elusive Quest for Efficiency," *Canadian Army Journal* 14, no. 1 (2012): 71–83, Accessed on 15 April 2018 from http://publications.gc.ca/collections/collection_2012/dn-nd/D12-11-14-1-eng.pdf

[5] Richard W. Scott, *Institutions and Organizations: Ideas, Interests, and Identities*. 4th ed. (Washington DC: SAGE Publications, 2014), 55.

[6] *Ibid.,* 71.

[7] *Ibid.,* 58.

[8] *Ibid.*

provide a repertoire of procedures, contracts, rules, processes and policies….".[9] Wenger

juxtapositions institutions with communities of practice, as the informal relationships that are

established within like-minded communities may help institutions strengthen their

effectiveness.[10] This notion of institutions with numerous communities of practice provides an

interesting perspective of the dynamics within an institution.


**Air Maintenance Community Defined**

The Air Maintenance community consists of aerospace engineers (AEREs) and aircraft

maintenance technicians who support maintenance of RCAFs aviation assets and strive to fully

embody both the institutional structures within the larger Canadian Armed Forces (CAF) and the

RCAF. As articulated by LGen Blondin, former RCAF Commander, the Air Forces Vectors

(AFV) are essential in connecting the RCAF to the larger CAF with a unifying vision of "[a]n

agile and integrated air force with the reach and power [is] essential for CAF operations." [11]

These AFV's are not only essential in bridging the RCAF with the larger CAF, but also

important in identifying the unique institutional parameters within an Air Force. Central to an air

environment is the impetus to continuously transform and remain agile for future challenges and

technological advances. The AM Community has indoctrinated the AFVs through a

demonstrated effort to continuously evolve. This has been historically proven through MOSART

and AEO, and numerous initiatives toward continuous improvement initiatives of the

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[9] Etienne Wenger, *Communities of Practice: Learning, Meaning, and Identity* (New York: Cambridge University Press, 1998), 244.

[10] *Ibid.*, 7.

[11] Department of National Defence, A-GA-007-000/AF-008, *Air Force Vectors: Agile, Integrated, Reach and Power* (Ottawa: DND Canada, 2014), 13, http://publications.gc.ca/collections/collection_2014/mdn-dnd/D2-300-1-2014-eng.pdf

Airworthiness Program. These include the AF9000+, RCAF's Quality Management System and the Flight Safety Program. These practices are well engrained in the community and its overall safety and continuous improvement culture.

The nature of aircraft maintenance requires specialized knowledge in airframes within their operational environments and is predisposed to stovepipes and communities of practice. As demonstrated by English and Westrop, there are unique challenges within the AM Community, as it is imbedded in the operational organizations of Tactical Aviation, Air Mobility, Long Range Patrol, Search and Rescue and Maritime Helicopter. These communities have unique mission sets and over-time have developed communities of practice as defined earlier by Wenger, with their own sub-cultures. [12] However, this diversity is continuously harmonized through following common Technical Airworthiness Manual, the following of AM policies, Flight Safety and Quality Management Systems defined within the larger AM community and the RCAF Institutional framework. Organizations, such as the A4 Maint, who reports to Comd 1 Canadian Air Division (Comd 1 CAD), the RCAF's Operational Airworthiness Commander, continue to ensure that common airworthiness standards are applied across all communities of practice. As English and Westrop discovered, the Senior Occupational advisors and others within the A4 Maint team purposefully pursue efforts to unify the AM community towards fostering "[a] predominant culture in the aerospace maintenance community is the duty of care for the well being of their subordinates that is engrained in all supervisors."[13]

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[12] Allan English and John Westrop, *Canadian Air Force Leadership and Command: The Human Dimension of Expeditionary Air Force Operations*, Trenton ON: DND, 2007, 225, retrieved on 25 Mar 18 from http://publications.gc.ca/site/eng/9.690010/publication.html
[13] *Ibid.*, 167.

**ANALYSIS FRAMEWORK**

There are numerous approaches to institutional analysis; however, the dominant approach used here will focus on institutional analysis framework presented by W. Richard Scott. It is felt that this framework is the most relevant given its comprehensive approach, which accounts for numerous complexities within an institution. Scott's framework looks at the three pillars of institution being regulative, normative and cultural-cognitive systems as the key foundations of institutions. Scott proposes five lenses in which to look at the three pillars, to get a sense of how to analyse the institution; Basis of compliance, Basis of order, Mechanisms Logic Indicators, Affect and Basis of legitimacy.[14] As foreshadowed by Reay and Hinings, it is proven that competing logics can co-exist and still allow for effectiveness of institutions to implement transformation initiatives. They propose that rather than a dominant logic, the secret ingredient to institution transformation is truly the pragmatic collaborations between actors within an institution.[15] Thus the framework used here will be to look not distinctly at Scott's three pillars, but rather, look at the collaboration within an institution as it applied to the change initiatives in the past. In this perspective, it is anticipated that aspects of the regulative, normative and cognitive pillars will intertwine to influence those within. Palthe uses Scott's framework in the context of organizational change as articulated in figure 1. The overall drive toward organizational change is a careful balance of organizational members that would react to the regulative sentiments of the want to change, those that would react to the adjusted norms and ought to change and finally those that have changed their values and genuinely want to change.[16]

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[14] Richard W. Scott, *Institutions and Organizations: Ideas, Interests, and Identities*. 4th ed. (Washington DC: SAGE Publications, 2014), 60.
[15] Trish Reay and C. Robert Hinings. "Managing the rivalry of competing institutional logics." *Organization studies* 30, no. 6 (2009): 647.
[16] Jennifer Palthe, "Regulative, normative, and cognitive elements of organizations: Implications for managing change," *Management and organizational studies* 1, no. 2 (2014): 60.

Ultimately all three are very human reactions to change and in many cases, work collaboratively toward the larger organization's change. Palthe argues that there is a careful balance between the capacity and resistance to change and the dissatisfaction to the status quo that ultimately leads to organizational change.[17]
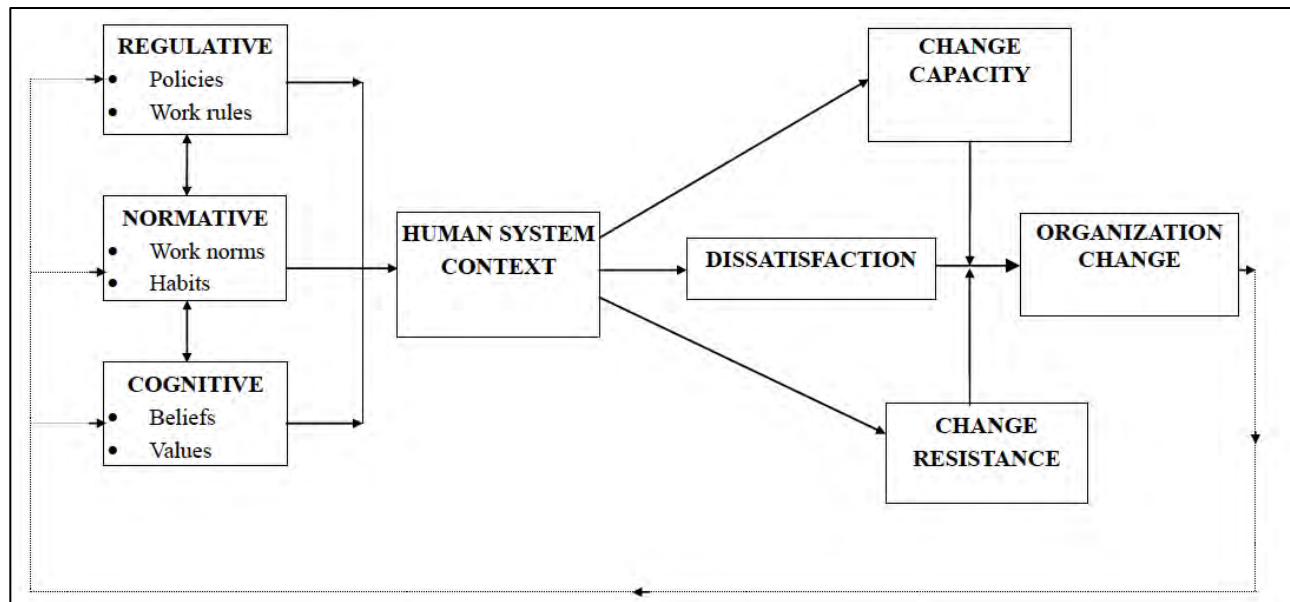


**Figure 1.1 -- Conceptual Model of the Influence of Regulative, Normative and Cognitive Elements on Organizational Change**

Source: Palthe, *Conceptual Model of the Influence of Regulative, Normative and Cognitive Elements on Organizational Change,* 60.

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[17] *Ibid.*

**The Regulative Pillar**

In the broadest terms, the regulative pillars encompass all the regulative aspects that are designed to control behaviours of those within to ensure expediency of compliance, using appropriate mechanisms to enforce rules or sanctions that are legally sanctioned. As Scott articulates, the regulative pillar is simply "[i]ndividuals craf[ting] laws and rules that they believe will advance their interests, and individuals conform to the laws and rules because they seek the attendant rewards or wish to avoid sanctions."[18] The regulative mechanisms applied to the earliest transformation initiatives of the RCAF and subsequently the AM community can be traced back to the mid 1960s. Under former Minister of National Defence (MND) Hellyer, the RCAF underwent significant transformation that saw its organizational restructured through unification. Under the 1964 Defence White Paper, Hellyer envisioned a complete overhaul of the three separate services to one.[19] The enactment of Bill C-90 was designed to usher in change to the National Defence Act and lay the groundwork for Bill C-243 that ultimately pushed through the envisioned changes within the Defence White Paper. Prior to this, the RCAF, similar to the Navy and Army, oversaw its own recruitment, fully trained its own personnel, and controlled its own supply and procurement.[20] Capital equipment purchases saw each service chief being at odds with the other in competing for resources and often led to lobbying to the MND. Hellyer saw the services as separate organizations that were not collaborative and often very inefficient due to redundancy within each service. This transformation began a continued pursuit for

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[18] Richard W. Scott, *Institutions and Organizations: Ideas, Interests, and Identities*. 4th ed. (Washington DC: SAGE Publications, 2014), 62.

[19] Department of National Defence, *White Paper on Defence* (Ottawa: DND Canada, 1964), Accesses on 15 April 2018 from http://publications.gc.ca/collections/collection_2012/dn-nd/D3-6-1964-eng.pdf

[20] Ross W. Ermel, "The Impact of Organizational Culture: A Study of Selected Strategic Change Initiatives in the Canadian Forces," Applied Research Project Paper, Athabasca University, 2010, 19, accessed on 14 April 2018 from http://dtpr.lib.athabascau.ca/action/download.php?filename=mba-10/open/ermelross.pdf

organizational efficiency that could follow for many decades to come.[21] The loss of traditions

and identity were a great deal of concern for RCAF leadership and resulted in many resignations,

including Air Commodore Birchall, a beloved war hero, who refused to be associated with the

concept.[22] In this regard, it was clear that members had to change or make the difficult choice of

leaving the RCAF. As Ermel highlights, unlike other services in the 1960s, the RCAF was

already very outwardly focused and had transitioned most of its structure to be focused on the

United States Air Forces models with priority being in continental defence.[23] The unification

efforts led to the Canadian Air Force shifting its focus internally in the search of efficiency and

trying to optimize the occupational structures with the same spirit of efficiency and elimination

of redundancy through creation of numerous surveillance mechanisms.

Numerous review boards were conducted to determine the progress of reform within the

AM community. These clearly aligned with the formal and informal surveillance mechanisms

within the analytical frameworks regulative pillar. The 1986 Air Command Functional Review

of AM Community surveyed maintenance personnel at all levels and deduced that improvements

could be made through the reduction and amalgamation of certain trades and broadening of their

trade boundaries.[24] Davies argued that the impetus for change within the air maintenance

occupations had largely been driven by regulated periodic occupational analysis intended "to

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[21] D. Conley and E. Ouellet, "The Canadian Forces and Military Transformation: An Elusive Quest for Efficiency," *Canadian Army Journal* 14, no. 1 (2012): 72, accessed on 15 April 2018 from http://publications.gc.ca/collections/collection_2012/dn-nd/D12-11-14-1-eng.pdf

[22] Royal Military College of Canada, "2364 Air Commodore Leonard Joseph Birchall, CM, OBE, DFC, O.Ont, CD, 1915-2004," last accessed on 30 April 2018 from https://www.rmc-cmr.ca/en/college-commandants-office/leonard-joseph-birchall

[23] Ross W. Ermel, "The Impact of Organizational Culture: A Study of Selevted Strategic Change Initiatives in the Canadian Forces," Applied Research Project Paper, Athabasca University, 2010, 22, accessed on 14 April 2018 from http://dtpr.lib.athabascau.ca/action/download.php?filename=mba-10/open/ermelross.pdf

[24] Peter J. Davies, "Ex New Horizons: Consolidation of the Air Maintenance Occupations," Canadian Forces Command and Staff College, 1990, 1.

optimize the grouping of skills and knowledge required for each occupation."[25] Davies cited the

evolution of aircraft began primarily of engines and airframes driving the era of "holistic

craftsmanship" and then gradually evolved to increasingly complex aircraft systems. These

technological advances demanded an increasingly complex and diverse set of occupations,

resulting in the 90s era with over thirteen aircraft technician occupations.[26] The 1990 Global

Proposal for Restructuring MOC 500 and the 1991 Avionics Survey once again highlighted the

strengths and weaknesses within the occupations and the overall need to continuously evolve the

occupations to meet modern technological evolutions and served as the framework for the

follow-on MOC 500 Task Force.[27] The MOC 500 task force was mandated through Air

Command in early 1992 in response to a MOC 500 Standing Steering Committee.[28] This

verification effort once again highlighted the pressures on the AM community to prove its ability

to stand-up to scrutiny in providing "effective, efficient and economic support to air

operations."[29] The task force highlighted the need to change following the end of the Cold War

and the realities of mandated Force Reduction Program (FRP) and regulated budget constraints.

Of particular distinction for the AM community, which at the time accounted for a significant

portion of budget expenditures within the RCAF. The final recommendation from the task force

was to look at amalgamating the thirteen occupations into three trades, with responsibilities re-

aligned or divested to other trades. The three occupations recommended were Aviation Systems

Technician (AVN), Avionics Systems Technician (AVS) and Aircraft Structures Technician

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[25] *Ibid.*, 5.
[26] Peter J. Davies, "*Ex New Horizons: Consolidation of the Air Maintenance Occupations*," Canadian Forces Command and Staff College, 1990, 5.
[27] Department of National Defence, *MOC 500 Task Force: Final Report to MOC 500 Standing Steering Committee*, 1992, 7.
[28] Department of National Defence, *Annex A to MOC 500 Task Force: Final Report to MOC 500 Standing Steering Committee*, 1992.
[29] Department of National Defence, *MOC 500 Task Force: Final Report to MOC 500 Standing Steering Committee*, 1992, 1.

(ACS).[30] It proposed taking the Explosive Ordinates Disposal (EOD) and Air Weapons Range functions to be transitioned to Ammunition Technicians and the ammunition storage be transitioned to Ammunition Technicians. It also recommended that an Air Maintenance Superintendent (AM Sup) occupation be introduced for Warrant Officers to Master Warrant Officers.[31] The MOC 500 Task Force was an urgent call after years of attempts to set a clear path forward for transformation of the AM Community and would lay out a path on the future pursuit. Although the initial work began through direction from headquarters, the final product was clearly intended to look at the best practices within the aerospace industry and included an analysis of how our allies moved forward within their respective AM Community transformations.

In the early 90s, the preceding work done by the AM community positioned it ahead of the Army and Navy within the CAF. When the MOSART project was enacted in 1999, it mandated the modernization of the Military Occupation Structure and bringing the CAF HR management system to the 21st century.[32] Driven at the strategic level, it was a timely initiative for the AM community to work collaboratively amongst its managers to analyse the ACS, AVN, AVS and Non Destructive Testing (NDT) technicians. The bulk impetus of the work that inspired modern MOSART and subsequent AOE initiatives began with the frequently referred problem definition paper produced in 2005.[33] It highlighted the fundamental issues and gaps that were present as a result of the 90s attempt to amalgamate over thirteen occupations into four. It also highlighted issues with an imbalance of the number of AVN and AVS and problems arising

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[30] *Ibid.*, 93.
[31] *Ibid.*, 94.
[32] Yann Hidiroglou, "Letter to the Editor: MOSART Project and CF Leadership," *Canadian Military Journal* (Winter 2006-2007): 6, Accessed on 15 April 2018, http://www.journal.forces.gc.ca/vo7/no4/doc/letters-lettres-eng.pdf
[33] D.B. Millar, *Problem Definition Paper: Air Technician Occupations*, (1 Canadian Air Division: file 5076-14 (A4 Maint)), 5 October 2005.

from accelerated implementation of the amalgamation. It uncovered the unrealistic burden that was placed on the shoulders of first line units who did on-job-training programs (OJTP) and conversion training to make amalgamation work. It also talked about the secondary and tertiary problems arising from an accelerated approach to the amalgamation with respect to dilution of standards, and lowered effectiveness of the AM community to support the RCAF. This problem definition paper set off a series of Sponsor Advisory Groups (SAGs) which were subsequently mandated to bring together stakeholders and used key regulative pillars to tediously study the issues that were presented by the occupations. Reviewing the mandate from SAGs, it is clear that the collaborative approach being used over a number of years was designed to provide the Chief of the Air Staff (CAS) the ability to mandate through regulation and orders, the implementation of AOE and further enhance the amalgamation of the AM occupations.[34]

Concurrent with the on going transformation of organizational structure within the AM community in the 90s was inception of the Aeronautics Act and the MND directive to DND in establishing clear accountabilities for the Airworthiness Program. This direction called on the Chief of Defence Staff (CDS) and the Deputy Minister (DM) to create and operate an Airworthiness Program and provide competent individuals to act as the Airworthiness Authority (AA), the Technical Airworthiness Authority (TAA), the Operational Airworthiness Authority (OAA), and the Airworthiness Investigative Authority (AIA).[35] To support the larger effort, the AM Community would naturally be governed by the TAA and would have to be in compliance

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[34] T.E. Flynn, *Executive Summary: Air Technician Occupation Enhancement*, (1 Canadian Air Division: file 5076-14 (A4 Maint OC AMSET)), 15 February 2008.

[35] Arthur C. Eggleton, *Ministerial Direction Regarding DND/CF Airworthiness Program*, (Minister of National Defence: file11500-568-100-2 (MDN)), 16 September 1998.

with the Technical Airworthiness Manual (TAM).[36] The TAM "…[r]egulates technical aspects

of military aviation safety and provides an acceptable level of safety for aeronautical products in

compliance with the applicable design, manufacturing, maintenance and materiel support rules

and standards."[37] Within it, the TAA is directed to establish clear accountabilities and roles

within the organizations through the establishment of Air Maintenance Policies designed to

ensure standardization of the execution of first and second line maintenance within the RCAF.[38]

The regulative aspects of accountability are further elaborated within the Maintenance Policy,

which specifies distinct responsibilities that the TAA delegated to the Senior Maintenance

Manager (SMM), normally an Aircraft Maintenance Engineering Officer (AMEO).[39] The SMM

also appoints the Senior Aircraft Maintenance Superintendent (SAMS), normally an AM Sup,

who provides oversight over the authorization of technicians within the Aircraft Maintenance

Organization (AMO).[40] The SAMS on behalf of the SMM, ensures that the critical airworthiness

functions of Weapon System Release (Level C), Maintenance Release (Level A) and

Performance of Maintenance (POM) are appropriately granted to individuals who meet the

expected standards.[41] This ensures that there is are clear delineations of accountabilities from the

Aeronautics Act, through to ministerial delegation to the AA, subsequent technical delegation to

the TAA and accountability of oversight by the SMM through to the SAMS, Level C, Level A

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[36] Department of National Defence, *C-05-005-001/AG-001 Technical Airworthiness Manual* Change 7 (Ottawa: DND Canada, 2015), 1-1-1-3.
    [37] Department of National Defence, C-05-005-001/AG-001Technical Airworthiness Manual Change 7 (Ottawa: DND Canada, 2015), 1-1-1-3.
    [38] *Ibid*.
    [39] Department of National Defence, *C-05-005-P02/AM-001 Maintenance Policy: Aircraft Weapons Systems Maintenance Aerospace Engineering and Maintenance Program Management* Change 4 (Ottawa: DND Canada, 2017), 2-12.
    [40] *Ibid.*
    [41] Department of National Defence, *C-05-005-P03/AM-001 Maintenance Policy: Aircraft CF Maintenance Activity Authorizations and Training Standard* Change 7 (Ottawa: DND Canada, 2017), 1-31.

and POM in the execution of maintenance. The AM Policies effectively applied regulative pillar

and continued to an auditable trial that can be verified by independent airworthiness auditors and

hold those assigned airworthiness authorities and accredited maintenance organizations to be

held to account.

**The Normative Pillar**

The normative pillar is heavily reliant on social obligations to ensure compliance to a set

of norms and values that are understood within an institution.[42] Within this pillar, expectations,

appropriateness, certification and accreditation mechanisms are often used and there is a heavy

reliance on the moral dimensions to project influence.[43] As Scott highlights, when confronted,

normative systems bring out emotional reactions and visceral feelings of shame and disgrace.

Conversely, when complimented, they often project feelings of honour and respect. [44] The AM

community's transformation from Hellyer to trade amalgamation in the 90s and MOSART and

AEO are latent in the social obligation to effectively and efficiently use precious resources. From

Hellyer's 1960 Defence White Paper, the 1986 Air Command Function Review, the 1990 Global

Proposal for Restructuring MOC 500, the 1991 Avionics Survey, 1992 MOC 500 Task Force,

SAG's, 2005 Problem Definition Paper, to the MOSART and AOE mandates, they all call for a

better way of institutional organization towards improved support to the RCAF and the CAF.

There are distinct mechanisms within each of the reports that specifically target the normative

pillar. As Davies highlighted, the trade occupations of the 70s through the 90s served the Air

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[42] Richard W. Scott, *Institutions and Organizations: Ideas, Interests, and Identities*. 4th ed. (Washington DC: SAGE Publications, 2014), 64.
    [43] *Ibid*., 60.
    [44] *Ibid*., 65.

Force well, but despite its success "…there is a growing believe that the occupation structure [was] inefficient, both in economic terms and in its ability to respond to changes in technology."[45] The MOC 500 Task Force specifically argued that there was a changing imperative to no longer accept inefficiency within the AM community and a social obligation to transform occupations to reflect the fiscal responsibility called for within defence. It also argued that senior maintenance managers within the AM community had a personal obligation to look at these transformative proposals with some seriousness, as not doing so would result "…in an uncontrolled and order-less…" change.[46] In this manner, the framework presented within the MOC 500 Task Force was very much of introducing social obligation for AM community ought to embrace the change out of their obligation to maintain a sense of ownership.

In 1996, the Quality Management System (QSM) known as AF9000+ was introduced into the AM Community.[47] With the hindsight of over twenty years, it has become a testament to the enduring ideas for self-improvement and a mechanism of capturing best practices in the execution of maintenance at the unit level. At its core is the accreditation process that is led by 1 CAD A4 Maint. The Air Maintenance Standards and Evaluation Team (AMSET) are empowered to oversee the AF9000+ accreditation for all RCAF 1st and 2nd line units that conduct maintenance on aeronautic products. At its core, is the mandate to empower the unit and its leadership in setting quality objectives to strive towards and purposefully emphasizes self-

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[45] Peter J. Davies, "*Ex New Horizons: Consolidation of the Air Maintenance Occupations*," Canadian Forces Command and Staff College, 1990, 1.

[46] Department of National Defence, *MOC 500 Task Force: Final Report to MOC 500 Standing Steering Committee*, 1992, 2.

[47] G. E. (Joe) Sharpe and Terry Leversedge, "A Knowledge Management Proposal," *The Royal Canadian Air Force Journal*, Vol.3 no.2 (Spring, 2014), 46. Accessed on 15 April from http://www.rcaf-arc.forces.gc.ca/assets/AIRFORCE_Internet/docs/en/cf-aerospace-warfare-centre/elibrary/journal/2014-vol3-iss2-07-a-knowledge-management-proposal-for-the-rcaf.pdf

improvement.[48] The notion of quality in the level of work and the pride in maintain accreditation through an independent audit cycle clearly supports the moral expectations of self-improvement and supports the normative pillars within the AM community. The overall mandate in the execution of duties and responsibilities is well articulated with the four principles in the TAM; authorized individuals, within acceptable organizations using approved procedures, must complete maintenance to acceptable standards.[49] It is the responsibility of each and every members of the AM Community to ensure that this ought to happen.

The RCAFs Flight Safety Program has also been central to supporting an obligation to safety of flight and a key enabler to support operations undertaken by the RCAF.[50] Its non-punitive aspects are focused at elevating flight safety (FS) as the priority and strive to eliminate potential barriers in reporting through the protection of the investigative mechanisms.[51] In this sense, the FS program calls upon members of the AM community to highlight issues implicating safety of flight with a promise of anonymity through the protection of the FS investigations not to be used for punitive measures and promoting a "just culture". However, it is also clear that both QSM and the FS Program also have legislative aspects to them and support the RCAF Comd, who has been delegated the overall Airworthiness Authority (AA) from the MND. In this sense, the two programs also support Reay and Hinings notion of collaboration between Scott's three pillars. It is clear through these foundational programs that the pursuit of excellence has been instilled within the AM community.

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[48] Department of National Defence, *C-05-005-P11/AM-001 Maintenance Policy: A Quality Standard for Aerospace Engineering and Maintenance (QSAEM) AF 9000 Plus* Change 3 (Ottawa: DND Canada, 2018), 4-14-2.
    [49] Department of National Defence, *C-05-005-001/AG-001 Technical Airworthiness Manual* Change 7 (Ottawa: DND Canada, 2015), 1-1-1-4.
    [50] Department of National Defence, *A-GA-135-001/AA-001 Flight Safety for the Canadian Armed Forces,* Change 3 (Ottawa: DND Canada, 2018), 1-1/11.
    [51] *Ibid.*, 1-5/11

**The Cognitive Pillar**

The notion of culture is much more difficult to articulate and encompasses the values,

beliefs and assumptions that bind the institution together. As Scott highlights, cultural systems

span shared definitions, common beliefs, the imbedded organizational logic, shared political and

economic systems.[52] As Palthe articulates, central to the cognitive pillar are the values, beliefs

and assumptions, with change being driven by a personal desire to want the change that is

sustained by the social identity within the organization.[53] Essentially, "…members choose to

adopt and support a change because they believe in it and personally want to support it, even if it

is not enforced through organizational policy (regulative) or workplace norm (normative)."[54] It is

clear that Hellyer's transformation initiatives were not internalized within the RCAF and were

very weak in the cognitive pillar. The prominent evidence being, the requirement in heavily

using the regulative mechanisms to essentially force the desired changes and the departure of key

leadership that resisted the change within the CAF and the RCAF. However, the notion of

efficiency and finding better ways to do business has clearly been engrained within the AM

community. They have been carefully cultivated and enforced through numerous studies since

unification and embedded within the QMS. Admittedly, there is work to be done still in the

introduction of innovation within the RCAF and the AFV's articulate the desire for their

continued pursuits in supporting change within.

It is clear that the most powerful and unquestionable belief that unifies the AM

community is undoubtedly Airworthiness. Irrespective of the communities of practice, the

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[52] Richard W. Scott, *Institutions and Organizations: Ideas, Interests, and Identities*. 4th ed. (Washington DC: SAGE Publications, 2014), 68.
[53] Jennifer Palthe, "Regulative, normative, and cognitive elements of organizations: Implications for managing change," *Management and organizational studies* 1, no. 2 (2014): 61.
[54] *Ibid.*

attention given to Airworthiness is at the heart of the AM community. Naturally, the Airworthiness Program is engrained using the regulative, normative and cognitive pillars; but the focus here will be to focus on the cognitive aspects. As Passanier et al. discovered "…the commitment to safety of maintenance technicians and maintenance teams is an essential aspect of safety culture, which presumably has a strong effect on safety of maintenance operations."[55] This safety culture is carefully nurtured early on in the training cycle. Of note is the Technician's Creed, an oath taken by every technician in front of their peers prior to graduation from the Canadian Forces School of Aerospace Technology and Engineering (CFSATE):

> Upon my Honour, I swear that I hold in sacred trust the rights and privileges conferred upon me as a qualified technician. Knowing full well that the safety and lives of others are dependent upon my skill and judgment, I will never knowingly subject others to risks which I would not be willing to assume for myself.

> In discharging the trust, I pledge myself never to undertake work or approve work which I feel to be beyond the limits of my knowledge; nor will I allow anyone to persuade me to approve aircraft or equipment as serviceable against my better judgment; nor will I permit my judgment to be influenced by personal comforts or advantages; nor will I approve as serviceable aircraft or equipment about which I am in doubt, either as result of direct inspection or uncertainty regarding the ability of others who have worked on it to accomplish their work satisfactorily.

> I realize the grave responsibility, which is mine as a qualified technician, to exercise my judgment on the condition of aircraft and equipment. I, therefore,

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[55] D. Passenier, C. Mols, J. Bim, and A. Sharpans'kykh,"Modeling Safety Culture as a Socially Emergent Phenomenon: A Case Study in Aircraft Maintenance," *Computational & Mathematical Organization Theory* 22, no. 4 (2016): 4.

pledge unyielding adherence to these precepts for the advancement of aviation and for the dignity of my profession.[56]

The reality of limited resources within air operations poses significant pressures on maintenance technicians and the errors are often discovered when there is a problem exhibited and can often pose a threat to the safety of flight. A good safety culture within an organization pushes back on these pressures to ensure that there is an imbalance in favour of practices that enhance safety rather than getting the job done quickly and compromising safety.[57] The technician's creed offers us a glimpse on an effective attempt to overcome the future demands presented from a high air operational tempo environment that will push technicians to deliver air assets for flying operations. The creed has no doubt elements of regulative and normative pillars, through the emphasis of the legal dimensions and the emphasis of the technician's duties and responsibilities. However, it also invokes a sense of belonging to the AM community, where there are common values, beliefs and assumptions, and there is emphasis on establishing a strong social identity amongst technicians. This safety culture is re-enforced by the flight safety program, where reporting is encouraged and anonymity is provided to ensure that the focus is less punitive and emphasize is placed on reporting of mistakes and prevention of accidents. Wakelam described the origins of the flight safety program that began in 1949 as one of enhancing lessons learned with a focus of remaining vigilant, learning from mistakes of others, and progressively working towards enhancing safety of flight. [58]

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[56] Canadian Forces School of Aerospace Technology and Engineering, n.d., n.p.

[57] Jason Edwards, Jeremy Davey, and Kerry Armstrong, "Returning to the roots of culture: A review and re-conceptualisation of safety culture," *Safety science* 55 (2013): 72.

[58] Randall Wakelam, "Chapter 12: The Air Force and Flight Safety: A Culture of Tolarated Disobidience?, " in *The Insubordinate and the Non-compliant*, ed. by Howard G. Coombs (Kingston: Canadian Defence Academy Press, 2007), 349.

At odds with the regulative and normative pillars of the Airworthiness Program and its established hierarchy of the SMM, SAMs, Level C, Level A and POM is the overall military culture of seniority and rank. The notion of following orders that flow from higher ranks is often at odds with aircraft maintenance, where there is more importance placed on ensuring the appropriately qualified and authorized individual, irrespective of their rank is the one that is leading the repair and providing the appropriate mentorship and training. This means that there are times, when a Corporal will oversee the work being performed by a Master Corporal, or Sergeant. It is here where the Airworthiness culture dominates and the overall focus is to ensure the best person for the job is the one performing the task based on their airworthiness qualifications and authorizations. The friction between the CAF ranks structure and the requirement to ensure compliance to the AM policies is general overcome by the overall understanding of the importance of knowledge and experience. It is well understood within the AM Community, that fostering a collaborative environment often overcomes this friction. The cultural implications of MOSART and AEO have contributed to well defined job descriptions that clearly delineate responsibilities and provide training to appropriate technicians and add to the overall social identity of the professional technician and have certainly ensure that change initiative that make sense and are for the betterment of supporting air operations are often considered with a strong desire from technicians to want to change to ensure what is best for the RCAF.

**CONCLUSION**

It is evident that over fifty years of collaboration between the regulative, normative and cognitive pillars set the conditions for the AM Community's transformation. Well supported by

Reay and Hinings and embodied in the conceptual model by Palthe, and demonstrated by the

AM Community, it is truly this collaboration between the three pillars that has lead to setting the

conditions for transformative change. The AM community is a truly distinct and culturally

unique within the RCAF and a long-term regulative, normative and cognitive strategy over a

long period of time has unquestionably led to transformation. Thus, it is clear from the evidence

presented, that the most effective strategy to implement transformative change is to carefully set

the human system context supported by Scott's three pillars. From a regulative perspective, there

has been a long-term infusion of legislation traced back to Hellyer's unification strategy in the

1960's. The on-going restructure of the AM occupations that historically began during the

unification period, evolved in the 90s coinciding with the introduction of the Airworthiness

Program by the MND directives. There has been an active effort in aligning military aviation

with the Aeronautics Act and gradually legislating the AM Community with clear delineation of

authorities connected directly from the MND. Recommended by the CDS, RCAF Comd has

been delegated overall AA, and recommended appropriate TAA to the MND. The TAA has

subsequently appointed an SMM, who has authorized a SAMS, Level C, Level A and a POM.

The Flight Safety program has also offered legislated protections to ensure non-punitive and

anonymous reporting environment designed to enhance reporting and learn from mistakes. These

legislative aspects have empowered technicians with the delegated authorities to enable air

operations. There is not question that this sense of regulative empowerment has professionalized

technicians and ensured that they have been appropriately trained, qualified and authorized.

Similarly, there is no question that the normative pillar has played an integral role in the

transformation of the AM community. The AM community has established a strong sense of

duty and obligation to continue to strive for evolving the occupations to better support the RCAF

and CAF. They continue to do so with a clear focus on increasing efficiency and trying to find a better way to do business. The pursuit of gaining airworthiness accreditation by AM community and desire to continuously improve through AF9000+ are all normative aspects that have contributed to the transformation. From a cognitive perspective, the AM Community has also taken measures to enhance its beliefs and values. There is no question that airworthiness is at the forefront and technicians have developed a strong culture in supporting its principles. Any change that demonstrates support for these principles stands a very good possibility of being implemented.

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