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# DEFENCE ENTERPRISE ARCHITECTURE:
# A FOUNDATION FOR STRATEGIC MANAGEMENT

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*I am convinced that the nations and people who master the new sciences of complexity will become the economic, cultural, and political superpowers of the next century.*

- Heinz Pagels

The Winchester Mystery House is a unique marvel of craftsmanship and building construction. Sarah Winchester funded its constant construction for nearly 40 years, after inheriting the fortune of her husband, the firearms manufacturer[1]. The sprawling, opulent mansion, with its dead-end halls and stairs-to-nowhere, is noteworthy because its lack of architecture is glaringly obvious.  In the construction of buildings, this is immediately recognized as folly; yet, in our enterprises the lack of a clear, overarching architecture is common place.[2] The truth is: we don't actually know everything that goes on in our large organizations and, often, how they are put together.

In Defence, the absence of a set of strategic enterprise blueprints has led to undesired results, such as conflicting policies, ambiguous lines of responsibility, a maze of systems, duplications of effort and many wasted resources. The practice of Enterprise Architecture (EA) offers an alternative, where the strategic management of the Defence can gain greater clarity and make more informed decisions.  However, for it to effectively support strategic management, EA must be enabled at the strategic level and accepted as the foundation for strategic management in Defence. A new paradigm for EA must be adopted in the Department of National Defence (DND) and the Canadian Armed Forces (CAF), one where the Defence EA is viewed as the backdrop to all strategic level decision making.

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[1] State of California, Office of Historic Preservation, "Winchester House", accessed 12 May 2018, http://ohp.parks.ca.gov/ListedResources/Detail/868.

[2] Ronald E. Giachetti, "Design For The Entire Business", *Industrial Engineer*: IE41 no. 6: 40.

In making the case that EA is not only a useful but an essential tool for strategic management, the first area to be examined will be the general relevance of EA to the problem of managing complexity. Second, by looking at the current state of the EA Program and how it is currently being applied, Defence can be shown to be well positioned to take advantage of EA as a tool to support strategic management. Third, the current trends will show that the practice of EA has evolved from its roots to better meet this strategic need, and that this evolution is ongoing. Finally, the major implications of employing EA in direct support of strategic management on the current Defence EA Program will be described.

As our systems become more interconnected, our partnerships more diverse and more global, and social media pervades nearly aspect of life, the complexity that is now inherent in organizations and in their environments is already at a significant level and continues to increase. This increase in complexity in an ever more dynamic environment poses a particular set of challenges to those that must exercise control.[3] Generally, organizations have had "difficulties in bringing strategy to execution and suffer from a lack of structure and transparency in corporate strategic management."[4] And, while this often recognized as a challenge, in a general sense, it is rarely acknowledged in one's own organization.  This is also true of the Defence institution, and it is manifest in the complexity and disharmony found in our policies, processes, systems and transformation efforts.

This increase in complexity, accompanied by a lack of awareness at the strategic level, is in sharp contrast with the desire for more transparency and a greater understanding of where

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[3] Michał Bijata and Kazimierz Piotrkowski, "Enterprise Architecture as a Tool to Support the Strategic Management Processes in an Organization." *Hyperion International Journal Of Econophysics & New Economy* 7, no. 1 (June 2014): 178.

[4] Daniel Simon, Kai Fischbach, and Detlef Schoder. "Enterprise Architecture Management and Its Role in Corporate Strategic Management." *Information Systems And E-Business Management* 12, no. 1 (February 2014): 5.

resources are going and what is being achieved. Today, the emphasis is on evidence-based decision making, driven by the Liberal promise for open and transparent government.[5] A new, revamped Departmental Results Framework (DRF), based on concepts of *Deliverology*[6], is at the foundation of this promise. But, how can Canadian government institutions communicate effectively in an open and transparent manner, when they themselves are challenged to achieve a common, shared understanding of their own organizations? In their insightful paper, A Living Enterprise Model, published in 1997, Lawrence Whitman and Brian Huff write:

> A common understanding of the enterprise is critical for any improvement effort. Modeling is an approach to providing a common understanding of the enterprise and how to achieve its desired future condition. Models are useful to: provide a focus for discussion, provide a means for communicating the enterprise, provide a basis for the analysis and design of a new process, act as a baseline for continuing process improvement, and facilitate the control of the real world process.[7]

The main objective of EA is to establish a common, shared understanding of the enterprise. While this includes its structures, systems and resources, it also describes the desired outcomes, policies and constraints. In essence, it describes the enterprise and its relationship to the environment it operates in[8]; for the Defence enterprise, this encompasses DND and the CAF as well as their relationships to the Government of Canada, alliance partners, external suppliers and the Canadian public.

There has been an EA Program in Defence for many years. As a result of the 2001 Defence Planning Guidance, the Directorate of Enterprise Architecture (DEA) was established in

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[5] Liberal Party of Canada, "Openness and Transparency", accessed 29 May 2018, https://www.liberal.ca/openness-and-transparency/
[6] Deliverology is an approach to managing reform initiatives, pioneered in the UK, which became popular with the government of Ontario before it was embraced by Prime Minister Trudeau.
[7] Lawrence E. Whitman and Brian L. Huff, *A Living Enterprise Model*. Miami Beach, FL.(1997): 2-6.
[8] National Defence, *DND/CF Architecture Framework - Version 1.8.1, Volume 1* (23 January 2013): 2.

2001, under the authority of ADM(IM), within the IM Group.[9] The initial effort to establish an EA function for Defence was reinvigorated when, in examining the state of C4ISR in the Fall of 2004, the Auditor General recommended that "National Defence should complete its enterprise architecture as a priority"[10]. This refocused the DEA team from an EA effort largely applied to systems, instead, to one that had a much broader scope. The first official version of the DND/CF Architecture Framework (DNDAF) was published in 2007[11]; and in 2008, a Canadian Forces General Order (CANFORGEN) was issued that directed all new projects to use the DNDAF to document their solutions.[12] However, the EA Program at this time was still without a common means or system to support the construction of architecture. In 2011, the program can be said to have reached a significant milestone with the acquisition of a software system to support the construction and management of EA. The acquisition was significant because the effort was made to acquire a single common tool with enterprise-wide licensing, and the implementation of the software tool provided the capability that was necessary to model and manage the architecture. This realized the theory and practice of EA, and removed one of the barriers to achieving a common Defence EA.

DEA's focus, from the very start, was to establish a program to enable the documentation and management of departmental architecture by the various business owners. Early on, there was a realization that a small team, situated within the IM group, would never have enough resources to be able to build out the whole architecture for Defence; the volume of knowledge would simply be too vast for a small team Also, ADM(IM)'s influence across the organization

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[9] National Defence, *Defence Planning Guidance 2001* (11 April 2000): para. 206(h).
[10] Office of the Auditor General of Canada, "Chapter 4 – National Defence", *2005 April Report of the Auditor General of Canada*, para 4.59.
[11] National Defence, *DNDAF Vol 1*: 8.
[12] CANFORGEN 017/08

remained challenged, despite being a horizontal function, and it would have been inconceivable

for ADM(IM) as Chief Architect, to tell other L1's how to conduct their business.[13]  So the EA

Program adopted a service-based approach, where clients of the program were able to access

services that provided training, guidance and assistance in the use of the tools and standards to

build out the areas of the EA that were pertinent to the client's problem space.  While this

approach served the Defence community well, it did not effectively support the strategic

management of Defence; and so, fell short of the promise of true EA. The need to build out

strategic and overarching business architecture for all of DND/CAF was evident, but it could not

come from within the IM Group. So, under the leadership of then Director General of IM

Technology and Strategic Planning, Kevin Radford[14], the effort began to "elevate EA to a

strategic function".[15]

Throughout this time, joint C4ISR architecture remained a complex core issue in

Defence, and the military was looking for a "joint bubba"[16]. The Army, Navy and Air Force had

each developed and were using their own command and control systems.  The joint project for

the CF Command System (CFCS) continued to struggle.[17]  Having been exposed to the potential

benefit of the EA Program during the semi-annual C4ISR workshops, and through the work of

Kevin Radford, Rear Admiral Lloyd, the Chief of Force Development (CFD) became interested

in the capabilities of the EA Program and the resources that were under ADM(IM).

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[13] Stephen D. Challinor, conversation with the Director of Enterprise Architecture, 8 May 2018.

[14] Kevin Radford was the Director General of IM Technology and Strategic Planning from 2008 to 2011 and owned the EA function within the IM Group.

[15] Challinor.

[16] Walter Wood, "Observations From A Former CFSCE Commandant", *The Communciations and Electronics Branch Newsletter* 60, no. 4 (Winter 2014), 8.  The term "joint bubba" has been used in the C4ISR community since the dissolution of the DCDS, during the General Hiller's CF Transformation.  It describes the concept that there should be one overarching office with the authority to ensuring systems-of systems integration across all environments.

[17] Challinor.

Consequently, he sought to have the DEA team transferred to the VCDS Group.  The EA Program came under functional control of CFD in April of 2013 and was officially part of CFD in April 2015.[18]  This move to the VCDS group was significant because it lifted additional barriers to the EA Program. Now that the EA Program belonged to the VCDS, it was viewed as more authoritative by the other L1s, some of which had previously disregarded it.  However, the EA Program was largely left to continue as it had done previously – as a service offering to those that saw the benefit of taking an architected approach to their business and transformation initiatives.  While the EA Program has grown and matured significantly in the last decade, through refinements of the Framework, establishment of a robust system to support EA, and the leveraging of partnerships external to Defence and Canada, no further direction has been issued internally to direct the use of EA since the CANFORGEN of 2008. Although considered a success by both internal and external audiences, it remains a program where the principal driver to onboarding new participants is done through influence and the interest of the willing.

The discipline of EA, itself, has evolved over the last decades as well.  John A. Zachman, often considered the father of EA frameworks, had well established the core concepts of modern EA thinking by 1993[19].  Unfortunately, his audience largely failed to grasp his full meaning and remained focused on the domain of IT for another decade.[20] Consequently, it has taken organizations that implement EA considerable time to move the function from the IT and enterprise systems domain to the realm of the business.  Even today, the giant research and consulting firm Gartner, which reflects the general consensus of organizations worldwide, lumps

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[18] Challinor.

[19] John P. Zachman, "The Zachman Framework Evolution", accessed 30 May 2018, https://www.zachman.com/ea-articles-reference/54-the-zachman-framework-evolution.

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EA in with the business of IT[21] and often describes it as a responsibility of the Chief Information

Officer (CIO). However, the thought leaders in the EA discipline have been preaching a

business focus for some time and, significant change is seeping in, as practitioners now target

other CXOs[22] as principal offices for the building of the enterprise's architecture.[23]

A recently published work, entitled the Business Agility Manifesto[24], is the work of John

Zachman, Roger Burlton and Ron Ross. In it they describe the need for the business to be in

control of its own architecture, and that this architecture is the foundation for *Business Agility*.[25]

They describe *Business Agility* as the ability of the organization to dynamically modify its

concepts and structures in adapting to change and complexity in an uncertain operational

environment.[26] Given the way in which our environment is changing, ever more quickly, this is

highly attractive to military, public and private organizations alike. The Manifesto's authors state

that *Business Agility* can only be achieved with a solid *Business Knowledge-Base*. They describe

the knowledge-base not as a normal IT system, but as "mandatory business asset for the

Knowledge Age"[27] that must be come under the authority and control of strategic management.

This must have asset "is the end result of transforming tacit (mental) knowledge to explicit

(stored, common, sharable) knowledge."[28] These are not exactly new ideas. For example, the

Office of Management and Budget, in the United States, stated in 2000 that "[a]n EA is the

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[21] Gartner, "ITScore Overview for Enterprise Architecture and Technology Innovation", accessed 29 May 2018, https://www.gartner.com/doc/3574317?ref=SiteSearch&sthkw=Enterprise%20Architecture&fnl=search&srcId=1-3478922254.

[22] CXO refers to any office at the C Level, including the CEO, COO, CFO.

[23] Gary Doucet, John Gotze, Pallab Saha and Scott Bernard, *Coherency Management* (Bloomington: AuthorHouse, 2009): 383.

[24] Roger T. Burlton, Ronald G. Ross, and John A. Zachman, *The Business Agility Manifesto*, accessed 28 May 2018, https://busagilitymanifesto.org/.

[25] *Ibid*.: para X.

[26] *Ibid*., "Management Imperatives": Foreword.

[27] Ibid: para. VII.

[28] Ibid.

explicit description and documentation of the current and desired relationships among business and management processes [as well as] information technology"[29]  However, the technologies and practices that support information and knowledge management today are significantly improved from what existed twenty years ago.  Today, the ability to dynamically model, link data and create visualizations has advanced significantly, and where there was a dearth of EA capability, the market is now full of options for building an EA management system, and the technological barriers that blocked the achievement of the vision have been lifted.  Current enterprise architecture tools have merged two concepts: the understanding achieved through visual diagrams and the knowledge potential of a database.  But, it's not only the technology that has evolved, the common understanding of EA's purpose has changed as well.  Where in the past traditional business architecture efforts focused on capturing business requirements to build solutions that were aligned to the business, the view today is that business architecture is purposed to design the organization that is best achieves the desired business outcomes[30]

Another difference in the way architecture is being looked at is in the approach to its construction.  Zachman is famous for saying that "one day, you'll want an enterprise wide architecture, to an excruciating level of detail"[31].  Zachman's framework has been described as "an open-ended problem space that includes nearly everything that might conceivably be considered for inclusion in the enterprise architecture."[32] This has led many architecture practices to adopt an approach that can best be described 'boiling the ocean', and it is one of the most common reasons given for the failure of many organization's efforts to establish an EA

[29] Office of Management and Budget, Circular No.A130 Transmittal Memorandum #4, Management of Federal Information Resources, 28 Nov 2000.

[30] Gary Doucet. Enterprise Architecture at the Government of Canada. (presentation delivered April 2008): 14.

[31] John A. Zachman, delivered during his framework courses, keynote speeches and various engagements.

[32] J. Michael Harrell and Andrew P. Sage, "Enterprise architecture and the ways of Wickedness", *Information Knowledge Systems Management* 9 (2010): 205.

Program.[33]  Today, buzzwords such as "just in time architecture" and "fit-for-purpose

architecture" indicate that architecture work is no longer viewed as an ivory tower exercise, but

instead used to tackle real, relevant problems.  This approach focuses in building out enough

architecture to solve a pressing, localized problem, but then adding this work to the knowledge-

base or repository, so that over time, more of the knowledge is captured, making it an ever

increasingly useful asset to decision-making.  This approach depends on two things. The first is

the integration of new work with pre-existing architectural work.  The second is that the pre-

existing work is curated and managed; in other words, decisions that are made in the

organization are reflected in the architecture.  In this way the architecture continually describes

the current state of the business – at least that portion of the business that has been captured –

until a new area is added.

Currently, EA is in heavy use throughout the Materiel Management Group (ADM(Mat))

and in the Royal Canadian Navy (RCN), both of which have had a strategic interest in EA for

some time.  EA is also in use for projects and initiatives that cover many other areas of Defence;

including CJOC, CANSOFCOM, the RCAF, ADM (IE) and ADM (IM).[34]  However, EA in

Defence remains largely a service offering for those that wish to take advantage of the benefits it

can bring, and the VCDS Group is notably lacking from the previous list of EA clients.

As previously shown, the real promise of EA comes when it is aligned more closely to

the strategic management function of the organization. To date, the EA Program has focused on

getting its clients "up and running" with the right capabilities to describe their domain and build

out their portions of the knowledge base to suit their specific purposes. But, a key group that has

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[33] Ibid: 212.
[34] Stephen D. Challinor, presentation delivered to the DND Architecture course, Gatineau, Québec, 23 April 2018.

not yet leveraged the EA Program is that of the VCDS; the group that designs and executes the

processes of strategic management – despite the VCDS's decade long endorsement of the EA

Program. Thus, a key task for the EA Program is to actively engage relevant areas of the VCDS

and ensure that the domain of strategic management is captured.  This is particularly topical as

Defence pursues the implementation of a Business Analytics capability[35], under the purview of a

new position of Chief Data Officer[36], which aims to inform the strategic management of Defence

from data gathered in the many information systems of the enterprise, not all of which belong to

ADM(IM).

Another key task for the EA Program is that it must ensure, either through a VCDS client

or with its own resources, that the absent strategic layer of the Defence EA is assembled and

published. By assembling a coherent picture of how the Departmental Results Framework

(DRF)[37], the Defence Policy (SSE) and the organizational Authorities, Responsibilities and

Accountabilities (ARAs) are linked, the EA Program will greatly enhance the transparency of the

organization. Significant value will also be derived as the various L1 architecture work will

finally be able to "connect upwards" to the overarching EA for Defence.

The simple presence of models is not sufficient to ensure that the EA will serve the

strategic management of Defence.  To be useful, they must be maintained and kept current.

Strategic management must also see the value in the models as the backdrop to making

decisions.  Volume 2 of the DNDAF describes the relevance of EA to the several phases of the

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[35] National Defence, *Defence Plan 2018-2023*, last modified 18 May 2018, https://www.canada.ca/en/department-national-defence/corporate/reports-publications/defence-plan-2018-2023.html: 5.

[36] *Ibid*.

[37] The DRF is mandated by TBS' Policy on Results and replaces the now obsolete Program Activity Architecture (PAA).

Project Approval Process (PAP)[38]; however, the PAP, itself, makes no mention of the need for architectural products. Even were it to do so, projects bringing forward their architectures would find that without an overarching EA, their products would only be of limited. As an example, in 2016, the VCDS, Lieutenant-General Guy Thibault, was provided a detailed account of each of the 109 capital projects in the C4ISR portfolio. In his concluding remarks, he stated: "Thank you, I now know how all the projects are doing, but how do I know which projects are the right ones?"[39] It is telling that the information conveyed to the senior leadership provides details on how well the organization is doing in all its endeavours, but that the overall picture lacks fidelity. Thus, to support strategic management in providing decision support, the EA Program must integrate much more closely with the PAP and other strategic management processes, so that these might be able to leverage the enterprise knowledge-base more effectively.

Finally, and perhaps more importantly, the EA Program must be mandated across Defence. Since CANFORGEN 08/17, mandating the use of DNDAF to projects, there have been no further directives or orders requiring Groups to build out their portions of the EA. And, as the project approval process does not leverage the architectural products, many projects only pay lip service to the order. With the implementation of the DRF and the Defence Program Analytics (DPA) in the enterprise, the time is right to require that L1s embark on the task of building clearer pictures of their business and how they operate.

In conclusion, the advent of modern information technologies to better support EA and the transfer of DEA out of the IM group, into the more central and strategically-placed VCDS group, have better situated the EA Program to support the strategic management of Defence. Yet, the strategic management function in Defence has not been as effectively supported by the

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[38] National Defence, *DNDAF Vol. 2*: 11.
[39] Challinor.

EA Program as the many and varied clients it has, across DND and the CAF. Given that the EA

Program has worked extensively to build an appreciation for the value of EA in Defence, trained

over 800 personnel[40], and built a system to support EA management, it is well poised to take EA

to the strategic level. To effectively support strategic management, the EA Program must first

engage actively with the VCDS Group to build out the architecture for the business of strategic

management. Second, it must work with the same teams to build out the overarching strategic

level of the enterprise architecture. Finally, it must pursue a stronger mandate to compel

organizations within Defence to capture and manage their architectures as they begin to adapt to

the requirements imposed upon them by the Departmental Results Framework and implement

Defence Program Analytics.  In so doing, the strategic management of Defence will gain a more

coherent, common and shareable understanding of the Defence enterprise, which will better

support strategic level decision-making and the collective goals of Defence.

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[40] Challinor.

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