KPMG

Aerospace & Defence Insights

A compendium of articles originally published in *Canadian Defence Review* Magazine highlighting the opportunities and challenges facing the A&D sector.

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KPMG in Canada aerospace and defence practice

At KPMG, we are committed to helping aerospace and defence organizations, from primes to small and medium enterprises, plan for today and into the future. Our team of professionals have deep technical and industry experience that can provide practical insights to businesses. We work closely with our clients to unlock their true value and navigate the ever-evolving nature of global operations, innovation, and value chains.

Through our global network of member firms KPMG also brings international leading practices to every engagement, drawing on a world-wide pool of skills and industry knowledge A&D companies need to better understand their options and the potential outcome of business decisions.

About this compendium

KPMG in Canada along with member firms around the globe have the deep expertise and reach to assist both government and industry with their most critical aerospace and defence challenges. As trusted advisors, KPMG practitioners understand the unique challenges facing the Aerospace and Defence (A&D) industry and government departments around the world. We leverage our A&D Industry and Government Defence practices through our experience, insights and lessons from other countries that have experienced similar issues.

In this compendium, we present the views of our Canadian A&D and Government Defence sector leaders on current issues of importance. These articles were originally published in *Canadian Defence Review* Magazine, in the "Business of Defence" column, with publishing dates noted.

Transforming the business of defence offers a review of Canada's defence policy launched by the federal government in spring 2016.

Canada's M&A advantage highlights approaches and guidance that many A&D companies need to consider, to unlock greater potential by taking advantage of M&A as a key element of their growth strategy.

Breaking the innovation barrier argues that the future of the aerospace and defence (A&D) sector will belong to those with the will to innovate.

Shoring up cyber defences highlights the need for investment in cyber security in an era of data breaches, IP thefts, and system hijackings.

Adapting the SCOR offers unique considerations that the DND must make when applying a typical supply chain operations reference (SCOR) model.

Next steps for Canada's modern defence policy looks at Canada's new defence policy entitled Strong, Secure and Engaged and articulates the capabilities and resources needed by the Department of National Defence (DND) and the Canadian Armed Forces (CAF) to meet the pivotal role they play.

Re-focusing on the business of defence looks at the Government of Canada's 100+ new initiatives to enable a bold new vision and approach to defend Canada and contribute to a more peaceful world.

Making the move to Industry 4.0 dispels the hype of "Industry 4.0".

What future for intelligent automation in Aerospace and Defence considers changes and opportunities in the A&D sector impacted by innovation, such as unmanned systems, cyber services and predictive analytics.

Making the most from your i4.0 investments highlights the pressure on companies to adapt and compete in what's been coined as the fourth industrial revolution – the era of Industry 4.0 (i4.0), which includes artificial intelligence, the Internet of Things, robotics and big data.

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Transforming the business of defence

This article was originally published in *Canadian Defence Review* Magazine in October 2016

Efforts are underway to review Canada's defence policy, inviting all Canadians to provide input on the way that our country uses its military resources both at home and beyond its borders. Launched by the Liberal government in spring 2016, the review included consultations with civilians, industry experts, and organizations across Canada – a process through which KPMG was proud to lend its voice.

This year's review not only marks the latest Defence Policy Review since the Canada First Defence Strategy was published in 2008, it arrives at a critical time in Canada's history. In light of global threats, economic challenges, and digital transformations, it addresses an urgent need to explore new strategies, re-fresh old strategies, and re-examine the role of Canada's Armed Forces (CAF).

$1.2 billion in operational savings

At the same time, the Department of National Defence (DND) and the CAF are three years into a renewal program launched in 2013 to uncover upwards of $1.2 billion in "operational savings" and put those dollars to better use. The renewal program is focused on transforming the business of defence, which so often takes a back seat to the defence business.

Surely, defence is a business – and a complex and expensive one at that. Canada's military is a system of systems stretched over 20 divisions; and one that marches to the beat of numerous leaders, decision levers, accountabilities, and objectives. Understanding this, KPMG put forward a submission in July 2016, outlining its recommendations across four key pillars:

– Fostering greater performance management

– Enabling decision rights and management levers for functional authorities

– Establishing single points of accountability for core elements of the business of defence

– Taking an enterprise approach to information management and business intelligence.

It's important to emphasize that Canada has much to be proud of when it comes to the handling of its military – and certainly, the global reputation of its forces. However, just as the Defence Policy Review is intent on identifying the roles and tasks that Canada's military should play, it is equally focused on ensuring the right investment is made to shore up its operations and identify operational savings. To support both needs, adopting a stronger business culture founded on performance management needs to be at the top of its agenda.

Like many government organizations, significant investments have been made in enabling technologies. Yet, all too often, the value of those enabling technologies are not fully realized because there is a lack of an enterprise capability to use that technology and data both efficiently and effectively.

Enterprise resource planning

Defence organizations are highly dependent upon enterprise resource planning (ERP) systems for the back office and, increasingly, the battlefield. With billions of dollars invested in ERP, these systems have become a central part of the modern defence landscape, speeding up transactions and informing quick, decisive action. ERPs are not a complete solution. In most cases, they are part of a suite of complementary technologies that combine to give defence organizations the data they need, and when they need it via a common, shared data platform.

The demand for coordinated and reliable information needs to be solved from an enterprise perspective. That said, most deployed defence ERP systems are unable to support the unique challenges of a mobile battlefield, where latency is high, bandwidth

is low, and tactical communications networks are often disrupted. They rarely have fully integrated demand/deployment planning capabilities and often require manual intervention. Consequently, many combat ERP systems must be augmented or replaced by bespoke versions, which leads to data and system duplication. It's not efficient (or cost-conscious) to approach data management 20 different times for each division. The DND/CAF needs more robust data management capabilities that drive towards a single source of truth which, in turn, will enable an enterprise view of what's really going on.

Rooting out bureaucracy

We realize none of KPMG's recommendations can occur overnight, but nonetheless we are confident these suggestions can join other public and private insights in improving the business of defence. Already, our discussions with senior leaders have revealed a genuine willingness at the highest levels to see improvements like these through and take full advantage of the Defence Policy Review's public consultations. Royal Canadian Navy Vice-Admiral Mark Norman has also expressed his desire for transformation, telling the Globe and Mail, "I intend to root out unnecessary and non-value added bureaucracy and process inside our own lines here at National Defence."

The Defence Policy Review holds plenty of promise, and it's this potential that KPMG hopes to help realize by drawing on our global collective experience in the defence space to contribute to its findings. We're confident that DND/CAF is listening, and through consultations with Canadians like us, it will reach its ambitious targets.

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Canada's M&A advantage

This article was originally published in *Canadian Defence Review* Magazine in December 2016

Canada's Aerospace and Defence (A&D) companies have an appetite for mergers and acquisitions (M&A) and certainly, the conditions are prime for making such a move. With the right considerations, approaches, and guidance, many stand to unlock greater potential by taking advantage of M&A as a key element of their growth strategy.

A number of factors are driving Canadian M&A interest. Broadly, Canadian firms are compelled by a stable financial market, a period of relatively low volatility (compared to UK and Europe), and a 15 percent growth in aerospace exports within the last year alone. Firms are also motivated by industry "wins" such as Bombardier's deal with Delta airlines for 75 C-Series Jets, General Dynamics Land Systems' multi-billion export arrangement, and the government's National Shipbuilding Strategy – all of which are bolstering the country's brand and economy in their unique way.

In short, Canadian A&D firms are confident in their prospects for growth and recognize the role M&A has to play in moving beyond established markets and realizing their global potential. In fact, I'm told by CEOs that the interest in buying and selling is so high – and the interest rates so low – they don't mind paying a bit more when multiples are up if the value-add benefits are apparent.

Reserved but optimistic

That's not to say there aren't reservations. Despite their optimism, the same A&D CEOs balance their views with a number of concerns. Canada's relatively small economy, for one, has led some to think Canada is slim for the pickings, and that anything that is available for purchase is destined to be scooped up by global interests with deeper war chests. True, with major players like the US, UK, and Israel competing for a piece of our shipbuilding, fighter jet replacement, large vehicle and other program activity, Canadians face local and international competition – the combination of which can push valuations up on the pricing side. However, there are always deals to be made, and having the right insights and connections will uncover opportunities that others may miss.

Another concern I come across is that with the exception of a number of large primes (OEMs), Canada is largely made of up of small to medium enterprises (aka SMEs). Players who are looking to acquire will often tell us it takes the same level of effort to do a $5 million deal as a $50 million deal, so they are more inclined to invest in companies in the $50 - $250 million sweet spot, which means they may often need to look elsewhere.

Mixed with socio-political trends, economic uncertainties, and potential upheavals (e.g, Brexit), it's understandable why some are a touch hesitant about getting into the M&A game. What's more, even those that have the endurance to make it all the way from the first tire-kicking to the final handshake must contend with the due diligence, financing, and closing processes that come with the M&A journey. Even after all that, there's still the task of actually owning and operating your new purchase to ensure what you've bought is truly of value to your operation and can be successfully integrated.

After all, M&A is all about creating value. It's great to have additional top-line just because you bought something, but that's irrelevant if you haven't created the bottom line aspects that are going to make your shareholders happy at the end of the day. For this reason, one must always determine the motivation behind M&A activity.

Ask yourself: What is the synergy or tuck in? Why is it a piece that I need? What is the payback and over what period?

The payback may be worth the daunting challenges

M&A can be daunting, and the challenges and risks are real. However, losing out on opportunities for growth presents a greater risk.

Despite perceived challenges, there is much to be gained from M&A activity. In its 2016 KPMG Canadian Manufacturing Outlook, just over one-quarter of manufacturers said they had engaged in M&A activity over the last two years; 67 percent reported achieving some, most, or all of their growth objectives in the process; and 12 per cent even surpassed their growth objectives.

M&A has also provided the means for many Canadian firms to innovate on a larger scale, bring in new capabilities and technologies, and adopt a more global perspective and presence. And while there isn't a one-size-fits-all strategy to guide the way, the common denominator among all successful M&A deals has been entering with the right knowledge, perspectives, and connections.

CEOs tell us that for every 10 deals brought to their desk, they're lucky to close on one. Nevertheless, that one deal can pay off in new synergies, efficiencies, top-line benefits and – ideally – a stronger bottom line. It's worth it in the end, but it takes time, effort, and initiative to last the M&A marathon.

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Breaking the innovation barrier

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The future of the aerospace and defence (A&D) sector belongs to those with the will to innovate. And while the spirit of innovation lives among Canada's A&D manufacturers, it will take a greater push to thrive both at home and abroad.

The good news is we are on the right path. A competitive Canadian dollar has helped fuel aerospace export activity by 15% in the last year alone, and the sector continues to attract global interest. Our primes and other members of the domestic supply chain are driving the industry forward in new and exciting ways, and our country's affinity for nurturing innovative activities also brings great value to global A&D supply chains.

This drive to evolve and supply the Canadian Armed Forces with the most advanced equipment and services has made Canada a true innovator in the research and development (R&D) space. However, we are not alone. As new products, services, and other innovations enter the fray, Canada must continue to hone its competitive edge.

The dawn of a new day

Global A&D manufacturers are responding to the demand for innovation. According to KPMG's 2016 Global Aerospace and Defense Outlook, close to half of international A&D players are planning to launch one or more products within the next two years, and similar numbers are investing more than six percent of their revenue in R&D and innovation over that same period.

The survey also reveals an urgency among global A&D players to strengthen innovation by:

– Identifying partners who can help reduce the cost, improve the pace, and unlock commercialization of their innovation investments;

– Exploring opportunities to adapt and leverage commercial capabilities to dramatically transform the development process; and

– Prioritizing initiatives that can be leveraged across the enterprise or in multiple markets and lines of business.

Canadian A&D manufacturers share that urgency; and, like their global counterparts, they are also motivated by a need to stay competitive and combat today's increasingly sophisticated threats. This focus is reflected in our country's array of R&D incentive programs, including the Strategic Aerospace and Defence Initiative (SADI), and a tax regime that makes Canada one of the most business-friendly countries in the world. It is support like this that keeps Canada on the A&D radar, despite our relatively smaller economy, and in competition with larger entities from the US and UK.

Forging alliances

Wherever we go, one thing is clear: we should consider not simply doing it alone. The A&D industry is often a collaborative one, and many players are exploring alliances and consortiums with the understanding that what makes a fierce competitor one day can make a critical partner the next. This is something Innovation, Science and Economic Development (ISED) – formerly Industry Canada – also encourages through its Innovation Agenda, suggesting that the private sector, academia, the not-for-profit sector and others collaborate to help drive innovation and growth.

Canada can also take cues from outside its borders when it comes to creating innovative approaches. Mexico's aerospace industry, for one, has flourished thanks in part to its moves to create pockets of collaboration where training and technical schools, R&D facilities and A&D manufacturers work in close proximity to foster talent and new ideas. Centres like these are drawing interest and investment from around the world, and Canada lays claim to similar regions, including AeroMontreal in Quebec and Downsview Park in Ontario, amongst others. Looking ahead, both government and industry leaders have a vested interest in encouraging similar development.

Learning from emerging nations

The pursuit of innovation can also be considered with an eye on emerging markets. Regions like India are bringing future talent and IT expertise to the fore, and it's in our manufacturers' best interest to tap into that potential, either by controlling interests, investing with partners, or replicating some of those innovative strategies and technologies at home. After all, we have much to learn from emerging nations who have often had to work hard to find their footing in the industry. While it may not be possible to replicate all of those variables, there remains some which can unlock greater competitive potential if we take the time to look.

Canada has much to be proud of when it comes to A&D innovation. Yet as the industry evolves, and the global competition increases, we cannot just rest on our past successes. For our A&D industry to continue to thrive, it must be willing to nurture homegrown ideas, explore ways to collaborate and keep pushing forward into the global arena.

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Shoring up cyber defences

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For Canada to remain a leader in aerospace and defence, it must shore up its cyber security. More than ever, the threat of data breaches, IP thefts, and system hijackings loom heavy over the A&D sector, and while the most obvious risks are financial and reputational in nature, the greater risk to public safety cannot be understated.

Stealing designs and proprietary information is one thing, while corrupting defence systems and assuming control of military equipment (e.g., drones) carries a whole different range of consequences. The industry must now be on high alert, given that – as has been reported in the media – some military equipment including drones have been hacked and highly sophisticated hacking tools are being made available online.

Combating risks

The US, for example, has taken unprecedented measures to defend its A&D sector against cyber threats. Commercial aerospace manufacturers have placed a greater focus on closed systems which effectively wall off critical operational systems from others to prevent direct hacking. The defence sector has raised its security protocols and digital defences to protect state secrets, military schematics, financial data, and other data "jewels."

Canada is taking the same precautions but faces unique challenges. Its A&D community, for one, consists primarily of small to medium enterprises (SMEs) which often have access to fewer cyber defence resources and capabilities than their primes and multinational competitors. This can contribute to an overall perception that Canada may be more vulnerable to cyber-attacks, even if that is far from the case.

Canadian A&D players must also stretch what resources they do have to combat cyber criminals on two fronts: both within their organizations and outside their walls.

Internally, there is a rising need to install greater employee screening measures and checks and balances to ensure they are not creating vulnerabilities for the company and, by extension, its partners.

Cyber vulnerabilities can be caused unintentionally by employees who corrupt the system from within. In many cases digital incursions are performed unwittingly by employees who mistakenly download malware from the internet or introduce malicious code into their work computers by plugging in unknown devices. In both cases, lack of proper oversight or training can lead to the corruption – or worse, unauthorized control – of key A&D systems.

The external risk is just as concerning. Not a day passes without news of cyber-attacks and data breaches from other countries making the headlines (e.g., Russia's alleged influence on the US election). At the same time, there is no shortage of domestic hacktivists and digital vigilantes who are eager to leave their mark and make a quick buck through ransomware or other means.

Added to these risks are the challenges Canadian A&D companies will soon face when it comes to protecting their corporate reputation. Until now, our industries have operated outside the breach reporting laws that have obligated those in countries like the UK and US to publicly disclose data security breaches when they occur. That will soon change with the arrival of Canada's own Mandatory Breach Reporting regulations which will demand organizations to take specific actions when a cyber-attack occurs.

These actions include determining the full extent of the risk, notifying individuals and third parties who may be impacted by the breach, quickly reporting details of the event to the Privacy Commissioner, and maintaining a record of all breach events. The new reporting regulations are due to come into effect during 2017, although the exact date has not yet been announced.

A united front

The risks are many, and the threats are real. Now, more than ever, it's important for Canada's A&D sector to proactively come together to defend against evolving cyber threats. That means sharing best practices, combining prevention resources, and raising awareness.

This collaborative approach must also be taken within individual organizations. It's no longer enough to let IT departments shoulder the burden of cyber security alone. Security tactics must be embedded at all levels and functions of an organization – from HR's hiring practices to procurement and supply chain management – to foster a cross-organizational defence.

And yet, for years the A&D sector's motto has been "compete today and collaborate tomorrow." That may have worked until now, but it's time to recognize that industry competition may not be the greatest threat. With cyber criminals, always on, we must determine what we can do as a collective team to be ready for them and begin by shoring up our cyber defences today.

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Adapting the SCOR

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There are unique considerations the DND itself must make when applying a typical supply-chain operations reference (SCOR) model to an atypical environment.

There are certainly more factors at play in a DND supply chain. Greater scrutiny must be applied to the sourcing, storing, distribution, and disposal of items; and the lifespan of those items can include years of redeployments, repair, and upgrade programs.

Take, for example, the journey of two generators. In a commercial supply chain, the generator would be purchased as part of a batch run by a hardware company, shipped to a hardware store location, and sold to an end-user who would only return it if it's defective or being exchanged. By contrast, in a DND supply chain, that generator would be purchased from heavily vetted suppliers, delivered to a long-term storage facility, and rotated through multiple end-users (units) while also being cycled through a regular maintenance routine.

The variances between military and commercial supply chains are even more pronounced for higher-value equipment. A ship, for instance, will be subject to numerous modifications and retrofits over its 30-plus year

life span, whereas an aging commercial vehicle is more likely to be sold off and replaced with a newer model.

Reverse logistics can be important

Lastly, in many cases, commercial items can simply be thrown away or resold. Within the DND, it's not so simple. Ensuring sensitive military technology does not end up in the wrong hands often means 'demilitarization' prior to selling, while there may be many environmental or legislative barriers to outright disposal. It's for these reasons that reverse logistics is extremely important to the DND since the product cycle is not just about deploying goods to regions across the globe, but ensuring they are safely brought home for a planned disposal activity.

Canada's DND has managed these supply chain complexities well. However, there is an opportunity to achieve greater efficiencies by looking at how other countries have amended their SCOR frameworks to better reflect the realities of the military.

Specifically, the UK was instructed by its National Audit Office to reduce its military inventory holdings by upwards of 25 percent over five years following the end of its Afghanistan involvement. It responded by launching a review of its military SCOR framework and formalizing a number of subtle, yet critical, considerations.

Among the most visible upgrades is that the UK's SCOR framework replaces "supply chain" with "support chain" in recognition of the embedded maintenance/engineering components. Moreover, the UK's SCOR framework places more emphasis on the research and development stages of product development, and its sourcing process favours integration and interoperability.

This is an important change, as it recognizes the need to be able to modify existing capabilities as well as share parts and systems with allies. After all, no one goes it alone.

Inventory management at DND

Lastly, UK's revised SCOR framework demonstrates an awareness that military operations often require larger and more storage areas than commercial operations, as well as ones that can store inventory for extensive periods of time while items are deployed back and forth for use, maintenance, upgrades and disposal activities. Moreover, it recognizes that military warehouses and their supporting bases must often be packed up and returned home at a moment's notice.

While Canada's military personnel are no strangers to these challenges, the DND's SCOR framework has yet to recognize them in a formal way. This may be because Canada isn't subject to quite the same pressures as the UK, or that it has no burning platform from which to act. Granted, Canada's Standing Committee on Public Accounts recently tabled similar concerns over DND's inventory management in November 2016, which may create some additional pressure.

Nevertheless, there is an argument to be made for following the UK's lead. And while the primary difference between the UK and Canada's military SCOR framework is an official recognition of what makes military supply chains unique, documenting it here in Canada could enhance how DND provides for its men and women on the ground.

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Next steps for Canada's modern defence policy

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Canada's new defence policy clarifies its long-term vision for Canada's Armed Forces. Entitled Strong Secure Engaged: Canada's Defence Policy, the June 2017 policy articulates the capabilities and resources needed by the Department of National Defence (DND) and Canadian Armed Forces (CAF) to meet the pivotal role they play within our borders and in multiple theatres of operation abroad.

To that end the policy is comprised of 111 initiatives that focus on providing greater support to CAF forces and their families; rebuilding core capabilities and investing in future defence technologies, talent, and capabilities. The policy also recognizes that continued effort is needed to enable a modernized business of defence that is responsive to Canada's needs, including a more transparent and streamlined procurement process.

Making good on those initiatives will not be simple – even with plans to increase defence funding from $18.9 billion in 2016–17 to $32.7 billion in 2026–27. In view of that, Strong Secure Engaged recognizes that a new approach to defence is needed; one that, "values the ability to anticipate new challenges, adapt to changing circumstances, and act with exemplary capability and professionalism while supporting peace and security around the world."

In brief, if Canada hopes to see its initiatives through, the business of defence will need to:

– Anticipate: Ensure decision makers have access to accurate, timely, and relevant information to make the right decisions in real time. Initiatives include acquiring next-generation surveillance systems, increasing investments in defence intelligence expertise and capacity, and leveraging external defence experts.

– Adapt: Bring in modern technologies and methods that will evolve the ways in which people are managed and employed, the procurement process is handled, and innovation is supported.

– Act: Leverage real-time data and modern technologies to act decisively in multiple theatres of war, while also strengthening disaster relief and peace keeping efforts and renewing Canada's commitment to NORAD and NATO.

This modernized policy is to be commended for acknowledging the complex nature of today's threats, both on the world stage and online. It should also be lauded for recognizing that CAF must not only make use of the latest tools, but recruit and support the people who can wield those tools effectively.

However, to say this new direction is ambitious would be an understatement. As one of the largest modernization efforts of Canada's defence capabilities in decades, Strong Secure Engaged puts forward a wealth of initiatives that must now be carried out across the whole of the Defence team.

This is easier said than done – especially considering the defence sector, government, and industry alike continue to face challenges managing the complex cycle through which defence assets are procured, acquired, and deployed. A current lack of organizational capacity at all levels and outdated whole of government policies often leaves defence teams with the inadequate means to manage escalating costs, maximize the value of output, and pursue innovative solutions that might reduce capital costs or increase efficiencies during the operational phase.

Herein, for the government to see its new defence strategy through, it must adopt an enterprise performance management (EPM) approach. This is one which integrates and digitizes financial and operational information in a common framework to allow DND/CAF to:

1   Focus on the right measures and indicators to execute strategies and optimize performance;

2   Create an integrated business and financial plan with targets that are reflective of the organization's strategies and objectives;

3   Ensure plans are executed across all domains;

4   Continually compare the plan to actual progress via data analytics and advanced reporting; and

5   Adjust plans accordingly on an ongoing basis

The way forward

The mission is clear and the route is set. With clarity of vision, the government needs to invest not just in the defence business but equally in the right talent and business capabilities if it truly intends to realize on the Defence Policy.

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Re-focusing on the business of defence

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By now, we've all had time to read (or at least review) the Government of Canada's 111 new initiatives to enable a bold new vision and approach to defend Canada and contribute to a peaceful world. And if there is one takeaway from summer 2017's policy, Strong Secure Engaged (SSE), it is that Ottawa acknowledges the need to equip the women and men of our Canadian Armed Forces (CAF) with the modern capabilities, resources, and systems they need to succeed on operations and be supported in theatres across the globe and at home.

Among the policy's rallying cries for stronger investments and a "transformative innovation agenda", is an equally important – albeit quieter – call for the Department of National Defence and the Canadian Armed Forces (DND/CAF) to "work tirelessly to modernize the business of defence" by maximizing operational output and "[ensuring] every defence dollar is put to the best use in achieving our objectives."

This particular objective may only get a small mention in the 113-page document, but it is arguably one of the most important requirements. Certainly, if the DND/CAF is to see this modernized vision through – it must be able to meet the commitment made to transparency, results and accountability and address the real business challenges that have plagued defence in effectively maintaining existing and investing in new military capabilities. Ultimately, it must better manage the billions of dollars invested in military capabilities over the long term.

Looking upstream instead of down

This is easier said than done. Under the DND/CAF's current structure, decisions regarding the procurement, storage,

maintenance, and disposal of goods are largely made independent of one another. Those purchasing supplies, for example, aren't always considering how they will be stored or maintained, while opportunities to order in bulk are being missed due to a tendency for departments to look upstream instead of down. The result is a network of disparate systems that lack a holistic view of how their inventory, the condition of goods, and how they can best be used.

In previous Defence Business columns, my colleagues and I have championed a number of methods to achieve that holistic view. Adopting Enterprise Performance Management (EPM) is one such solution, while another is adapting the current supply-chain operations reference (SCOR) model across the DND/CAF environment. Applying these solutions allows DND/CAF to address the challenges of the past and to enable Material Total Asset Visibility (MTAV), which is a systematic approach to defence inventory management that facilitates better linking, tracking, and monitoring of material from requirements to contracting, procurement, storage, transit, use, and disposal.

These are all viable solutions and, to its credit, DND/CAF has already implemented a deliberate, integrated, and systemic approach to improve its inventory management practices. In so doing, it has received favourable mention in the Office of the Auditor General reports. In their comments on consolidated financial statements for the year ended 31 March 2017, it is noted that defence appears to be on track to complete the action plan it presented to SCOPA. It is also noted that the department needs to improve the way it counts inventory in locations other than at major depots, pricing, recognition of obsolete inventory, and classification of items as an inventory of asset-pooled items (API).

While understated in the SSE, modernizing Canada's approach to defence hinges on transforming and modernizing the Business of Defence. Only then will DND/CAF benefit and realize the full potential of the long-term investment that has been committed.
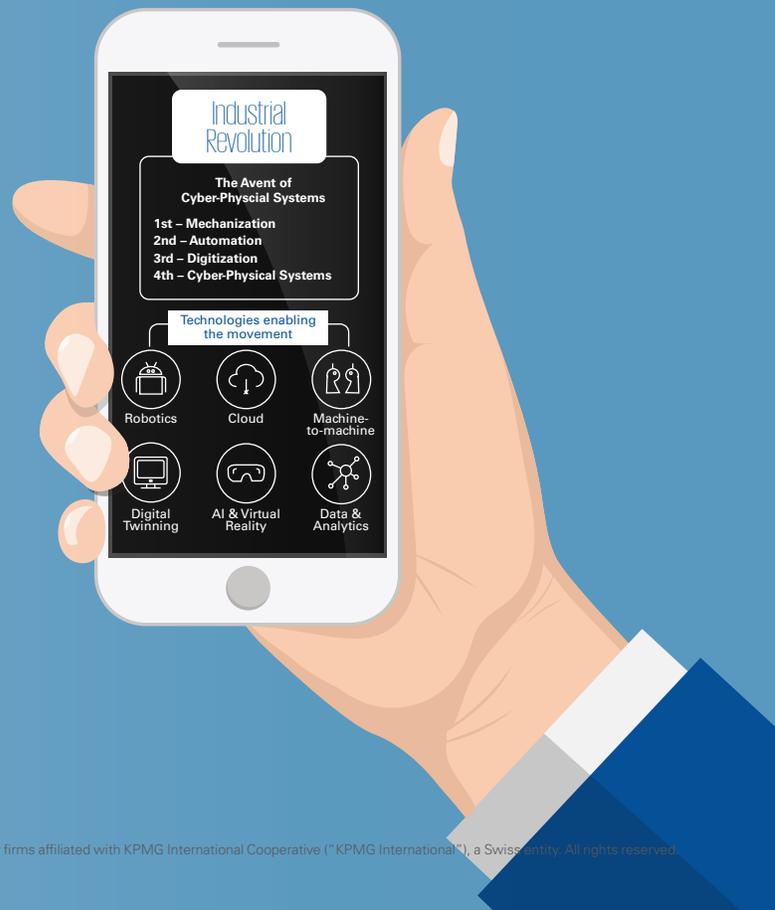
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Making the move to Industry 4.0

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Industrial
Revolution

**The Avent of
Cyber-Physcial Systems**

1st – Mechanization
2nd – Automation
3rd – Digitization
4th – Cyber-Physical Systems

**Technologies enabling
the movement**

Robotics

Cloud

Machine-
to-machine

Digital
Twinning

AI & Virtual
Reality

Data &
Analytics

We deal with a number of opportunities for innovation in our industry, yet few resonate as deeply with defence manufacturers today as "Industry 4.0" (or i4.0). It's an enticing term, but what does it really mean? More importantly, where does the hype for i4.0 end and the realities (and limitations) of a new revolution begin?

Industry 4.0 refers to the fourth industrial revolution – an incoming era of cyber-physical systems powered by artificial intelligence (AI), the Internet of Things (IoT), autonomous machines, and big data. It is the next evolutionary step up from our current "digital" revolution into a new age of connected technologies and data-driven insights.

Certainly, i4.0 promises big things for manufacturers across all industries. That includes Canada's defence sector where trailblazing manufacturers in the commercial and military space are already advancing the production of autonomous vehicles for land, sea, air, and space environments. As a result, they are beginning to see the promised cost-saving benefits and performance improvements that come with removing the man from the machine. As more manufacturers invest in smart, connected, and self-maintaining production equipment, we can expect the cost of ownership to shrink and the barriers to market entry begin to erode.

These technologies go hand-in-hand with advancements in data analytics, cloud computing, and artificial intelligence. With these pillars of i4.0, manufacturers will have the means to more accurately predict and respond to CAF/DND supply needs, achieve smarter resource management, and use chips and sensors to better track and manage inventory and other assets. Ultimately, investments in the digital supply chain elements of i4.0 will improve speed to market, lower production costs, and facilitate more collaborative innovation. And considering that a significant share of aerospace and defence products are supplier developed, it is investments like these that will prove to be critical enablers for industry leaders.

It's also fair to say i4.0 will change the way manufacturers approach their business. Already, innovations in tech and data analytics are giving way to creative platform businesses such as intercity air travel (think UberElevate), and we are seeing increased investment, as IoT, data, and customer-facing systems become more common in the i4.0 space. No doubt, fostering greater connectivity between the production of kit for CAF/DND and their end users, and measuring the data from those connections, will open the doors for more service-driven business models.

The future is indeed bright. So the question is, how do we actually get there?

Rough estimates say the i4.0 market could exceed US$ trillions in just a few years' time. However, this will require manufacturers to make bold investments in the equipment, integrated systems, training, and organizational capabilities needed to truly embrace the i4.0 revolution. Here are seven steps to consider:

1   **Learn what Industry 4.0 really means**
Do the work to separate hype from reality. Reach out to industry experts, learn what others in your space are doing, and begin building a network of partners who can offer their own insights and expertise into i4.0 implementation.

2   **Develop an Industry 4.0 implementation plan**
You can't throw money at i4.0 and expect your work to be done. Unlocking the benefits of i4.0 means taking stock of your capabilities, understanding your specific goals, and drafting a smart strategic roadmap. Be honest about what can be done now and how to best position for the future.

3   **Identify the benefits**
The value of i4.0 will differ for each organization depending on their products, their customers, and desired outcomes. For partners in the defence supply chain, that means exploring how i4.0 tech (including cloud computing, big data, 3D printing, AI, virtual reality) can advance CAF/DND operations and how your organization can lead the charge.

4   **Assess the risks**
Investing in i4.0 can help your organization disrupt the industry and overtake competition. However, as it is disruptive, it can also cause operational disturbances, stakeholder backlash, and delays. Measure the potential risks of each i4.0 technology and plan from there.

5   **Design a pilot project**
Implement i4.0 fundamentals in smaller, containable trials. Remember, however, that pilots and discrete projects will not necessarily deliver sustainable performance improvement until greater scale is achieved.

6   **Evaluate your projects**
Measure the performance results from your i4.0 initiatives and use that data to change course or achieve even better outcomes.

7   **Set up a wider Industry 4.0 implementation framework**
Pursue i4.0 on a larger scale through more strategic planning. Think holistically instead of functionally and assess your current i4.0 maturity through multiple lenses.

These steps can better prepare your business for the inevitable changes we see coming. While there's always the option of letting i4.0 pass you by, in the defence industry, which is dependent on cutting-edge technology and efficient supply chains, this means running the risk of losing ground to the competition and missing the mark on customer expectations.

Ready or not, i4.0 is here. Will you lead the revolution, or get lost in the movement?

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What future for intelligent automation in aerospace and defence?

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The Aerospace and Defence (A&D) sector is on the brink of unprecedented change and opportunity in an era defined by rapid advancements in technology. Like other sectors of the economy, the A&D industry is being redefined by innovation-fueled competition as manufacturers build up new portfolios of products and services-such as unmanned systems, cyber services and predictive analytics-to keep pace with a fast-changing business environment.

Advances in artificial intelligence (AI) have been significant. Notably, the integration of AI and computational power has pioneered "intelligent automation" and its most advanced category, "cognitive automation". This technological leap brings significant implications to the products and services strategies of major A&D players. Businesses who rethink their current and future capabilities amid disruption will be better positioned for growth in the digital age. In the previous issue of *Canadian Defence Review* we described the impact of Industry 4.0. We now turn to the opportunities and challenges in intelligent automation.

The intelligent (r)evolution

Intelligent automation is the convergence of robotic process automation (RPA) and cognitive technologies, including natural language processing, machine learning, data analytics and probabilistic reasoning. Cognitive software can now mimic human activities and, when combined with RPA, these systems can be trained to execute judgment-intensive tasks and perform tasks that have historically required human intelligence and situational analysis.

The A&D sector already has a track record of using intelligent automation, including so-called "smart" weapons by top-tier militaries or space programs driven by advanced technologies. That innovative spirit will continue to drive the development of new and exciting ways to bring value to domestic and global A&D supply chains. Indeed, the use cases of intelligent automation are impressive, from using deep neural networks to process and translate reams of data into valuable analytics, to guiding autonomous vehicles (AVs) and advanced robots.

KPMG's 2017 Global CEO Outlook discusses how disruption has become a fact of life for CEOs and their businesses as they respond to heightened uncertainty. Titled Disrupt and Grow, the report notes that 60 percent of executives worry about integrating cognitive processes and AI into their businesses. To stay ahead of the curve, the majority of CEOs surveyed plan to add headcount and boost related investments within three years.

Journey to automation: Going big on innovation

A&D organizations are gearing up for the future in a technology-driven industry. According to KPMG's Accelerating Automation report, more than half (55%) of global corporations are exploring new automation opportunities. Businesses will pursue different types of automation to achieve different objectives, but in all cases thorough planning is critical. Implementing intelligent automation is about more than just technological change; it could affect components across a company's operating model. The report suggests a 100-day action plan to introduce automation and scale it up to production. A summary of milestones along the journey to automation includes:

– Days 1-30: Engage a strong sponsor to raise awareness, align functions and mobilize;

– Days 30-60: Assess initial opportunities and conduct proof-of-concept; and

– Days 60-100: Assess results from the proof-of-concept, build governance capability and agree on a roadmap to begin development at scale.

As competition increases, innovation becomes a critical differentiator to gain market leadership. A&D businesses must remain at the leading edge of product and services development. Through targeted investments in intelligent automation, organizations can:

– Free up the workforce from doing significant transactional work in order to focus on higher value work and innovation;

– Streamline transactional work with improved quality and outcome consistency, while also reducing delivery costs; and

– Enhance core business process service delivery models.

Trust in the digital age

As businesses deploy intelligent automation, the need for strategic approaches and proactive governance to build and maintain trust increases exponentially. Trust is a defining factor in a company's success or failure as it underpins reputation, customer satisfaction and loyalty. In the digital era, the trustworthiness of data and analytics (D&A) is paramount.

In a 2018 report titled Guardians of Trust, KPMG Global Lighthouse, our Center of Excellence for Intelligent Automation and Data & Analytics, surveyed almost 2,200 executives across nine countries. The study shows that executives are struggling to build trust amid fears and uncertainties due to data breaches, machine-based decisions, and the rise of robotics and fully automated decision-making. Interestingly, 61 percent of executives see building trust as a top three priority for their organization; yet only 35 percent of IT leaders have a high level of trust in their organization's analytics.

The governance of machines has become a core part of governance for the whole organization. Intelligent automation will push the boundaries of possibility, but with that comes a responsibility to protect data in a digital world fraught with risk. *The question is, are you ready?*

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Making the most from your i4.0 investments

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The pressure on companies to adapt and compete in the era of Industry 4.0 (i4.0) is tremendous. The advanced technologies that underpin the fourth industrial revolution – including artificial intelligence, the Internet of Things, robotics and big data – are fundamentally transforming the traditional value chain by opening new revenue streams and driving a sea change in business performance.

While many aerospace and defence (A&D) companies are investing in i4.0 capabilities and technologies, not all achieve the scale and integration required to drive full enterprise value from their i4.0 investments. To fully unlock the transformative potential of i4.0, more companies need to apply i4.0 capabilities across all aspects of their operation. This article addresses the steps leaders in i4.0 are taking to narrow the gap between executive ambition and transformative action by taking a more integrated approach.

Move boldly and think holistically

Organizations which take a structured approach to prioritize and roadmap the best return on their i4.0 investments are more successful at moving from oneoff, targeted implementations to full-scale adoption across a holistic framework.

What are leading industrial manufacturers doing to drive i4.0 adoption and create value? KPMG's Beyond the Hype report offers a realistic perspective on the current state of i4.0 adoption and readiness based on in-depth benchmark discussions with global manufacturers. The best practices of leaders who are making the most of their i4.0 investments are outlined below.

Strategy: Focusing on performance

– Develop business-aligned strategies and roadmaps. View i4.0 as a strategic advantage and an opportunity for competitive differentiation; have a clear understanding of the impact on financial and business models; and create strong alignment between investments and corporate strategy.

– Assess 'time to value' on i4.0. Management, shareholder and customer expectations for payback may be at odds with the reality of 'time to value'. Focus on implementing concrete, short-term measures to realize value from i4.0, including reductions in your costs of goods, order lead times and inventory levels.

– Support decisions with the right measurements, monitoring and reporting. Look at new data sources and KPIs in order to visualize the cross-enterprise benefits from a holistic rollout of i4.0 investments. Rather than focusing on pure ROI, assess other potential value drivers, including performance outcomes, impact on innovation and improved collaboration, which influence organizational performance. Value: Scaling up

– Focus on breaking down silos. Work across R&D, purchasing, operations, and sales and marketing to identify opportunities for collaboration and mutual value generation. Engage in cross-border work aimed at creating an integrated i4.0 landscape, while also integrating customers' perspectives into core processes.

– Improve the agility of your IT infrastructure. Facilitate the integration of i4.0 processes and gauge the potential process impacts across the wider organization.

– Think holistically about the interdependencies. Take a more strategic view of the related impacts and potential consequences of i4.0 initiatives. Develop the necessary competencies across the enterprise and within the value chain, while also considering the impacts of i4.0 projects on financial and business models.

Change: Managing the impacts

Think carefully about future capability requirements. Consider which competencies would be necessary to support future i4.0 solutions and start embedding these considerations into the strategic roadmap. Update talent strategies and partner with outside organizations to diversify recruitment pools.

– Drive the change agenda. Create robust change management plans and think carefully about the people, governance and cultural impacts of decisions. Proactively communicate with employees to raise awareness, engagement and confidence, and articulate and execute on a clear vision for the future.

– Focus on value, not cost. Approach i4.0 as an opportunity to improve value and performance, not as a cost and headcount reduction initiative. Invest in training and redevelopment of employees to enjoy growth without adding headcount, and shift resources to more value-add tasks.

Products: Smart products and smart processes

– Use product data to improve end-to-end value. Use both customer data and field data from products to improve the way products are designed, developed and manufactured. Focus on improving and prioritizing the reliability and relevance of customer data sources, and formalize data ownership frameworks and security.

– Improve integration between customers and products. Use smart products to drive stronger relationships with customers and see i4.0 as a basic requirement for improved customer communication. Where it makes sense, connect customers to suppliers and product development through the cloud.

– Move from products to services. Understand the significance of D&A and see the potential to leverage product and customer data to create "data as a service" which can help drive additional revenue. The most advanced organizations are moving into predictive solutions, using analytics capabilities and deep product knowledge to provide additional insights to customers.

Supply chain: Enhancing i4.0 value

– Focus on integration. Move quickly to integrate suppliers and customers into a demand-driven supply chain. Building an interconnected network is the key to future competitive advantage.

– Create the right environment. Assess both the opportunities and risks of greater value chain integration; use sensors to predict various supply chain integration; and improve controls to reflect increased cyber security and data privacy risks.

– Look for new opportunities to drive performance. Rethink traditional supply chains and networks to eliminate unnecessary processes and remove waste. Work collaboratively with suppliers to identify new ways of working and streamline existing processes.

With these steps now top of mind, are you ready for a whole of enterprise approach to i4.0? It's time to review your own state of readiness, or risk being left behind.

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Further reading

Growing Pains: 2018 Canadian CEO Outlook

KPMG conducted a survey of 50 Canadian CEOs, and nearly 1,300 from around the world, to uncover their growth outlooks, strategic priorities, business concerns and investment objectives for the next three years. The *2018 Canadian CEO Outlook* goes beyond the headline numbers to provide Canadian decision-makers with practical insights into how today's trends will impact tomorrow's business environment. Our practice leaders leverage their experience to provide context to the data and help define what the results mean for your business.

kpmg.ca/CEOoutlook

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kpmg.ca/publicsector

Beyond the hype of i4.0

This report offers a realistic perspective on the current state of i4.0 adoption and readiness across the market. It is based on a series of in-depth benchmarking exercises with leading industrial manufacturers around the world. And it identifies how today's market leaders are taking advantage of comprehensive i4.0 strategies to make changes to their business models, operating models and value chains.

kpmg.com/insight

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