WHITE PAPER | 1-2020

TECHNOLOGICAL ENABLEMENT OF THE INTELLIGENCE WORKFORCE IN AUSTRALIA

OCTOBER 2020

PREFACE

The Australian Institute of Professional Intelligence Officers (AIPIO) Inc is committed to growing the intelligence body of knowledge through fostering scholarship, professionalisation of practice, support to major intelligence research projects, and professional collaboration amongst practitioners at our events.

Each year, AIPIO promotes a theme to focus our thought leadership. In 2020, the theme was *'Intelligence Professionals in the 21st Century'* – which recognises that the intelligence workforce will be transformed as it adapts to a new operating environment marked by the unexpected and the unpredictable. AIPIO believes that thoughtful and measured technological enablement of the intelligence workforce will be core to successful adaptation.

Intelligence professionals will have new resources based on advances in data processing and other technologies. Technologies including artificial intelligence (AI), large dataset analytics, dynamic search tools, and interactive technologies are already allowing the intelligence workforce to process and integrate multiple sources of data far more quickly and efficiently than ever before. These technologies are also expanding opportunities for collaboration involving personnel and technology, and integration of new types of data. New knowledge, tools, and technologies with applications for understanding, forecasting, and mitigating security risks are continually emerging.

However, technology will be a necessary but not sufficient prescription for adaptation. Intelligence work will remain a fundamentally human endeavour. Technological enablement must not simply be a grab bag of solutions 'bolted on' to the intelligence workforce. Rather, we must see technological enablement through the lens of capability development, in service of better intelligence outcomes. We must prepare the intelligence workforce for assimilating new technologies and building practices that can anticipate and respond at will.

AIPIO distils and captures the insights generated each year into a White Paper series aligned to the annual theme. This White Paper (1-2020) — entitled *'Technological Enablement of the Intelligence Workforce in Australia'* — identifies the challenges and opportunities of technological enablement, offers insights around; desired 'business' outcomes, key focus areas, and the extent of technological enablement. Finally, this White Paper discusses several implications arising from technological enablement of the intelligence workforce, including the role AIPIO could play in advancing technological enablement.

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EXECUTIVE SUMMARY

The rate of innovation today in science, technology, and high-tech product development is unprecedented in history and continues to accelerate in all aspects of our lives. These advances are fostering a strengthening partnership between humans and technology. Every industry must now consider new ways of working to keep pace with the opportunities afforded by the rapid advance and diffusion of these emerging technologies.

The intelligence workforce is not immune from the challenges and opportunities of technological enablement, and the intelligence workforce is a key component of capability within the national intelligence enterprise (NIE). The intelligence workforce already reflects diverse and valuable technical and academic skills and experience, and people may join the workforce with specific disciplinary subject matter expertise or as graduates with minimum practical experience.

The new intelligence workforce — comprising operators, analysts, managers, and machines — will need to build on the skills they have always acquired, including technical skills, domain-specific knowledge, social intelligence, strong communication skills, and the capacity for continued learning, but they will also need to function in new ways. Domain expertise will remain crucial because it provides rich contextual background for making connections. Thus, this White Paper focuses on technological enablement to augment human capabilities, not to supplant them.

This White Paper outlines the challenges and opportunities of technological enablement through three lenses: the weight of the past, the push of the present, and the pull of the future. An analysis of these challenges and opportunities offers insights around: desired 'business' outcomes, key focus areas, the levels of technological enablement, and the extent of technological enablement. The White Paper offers a model for technological enablement and several implications arising from the model.

This White Paper finds technological enablement of the intelligence workforce should be less about using a tool to produce an output - the targeted application of a technology - and more about choosing the right technologies to sustainably elevate and advance the intelligence workforce. Technological enablement is as much about transforming organisational design and processes as it is about empowering people to work in new ways. The White Paper concludes with a discussion of how the Australian Institute of Professional Intelligence Officers (AIPIO) could support the technological enablement of the intelligence workforce in Australia.

INTRODUCTION

“...a strengthening partnership between humans and technology.”

Background

The rate of innovation today in science, technology, and high-tech product development is unprecedented in history and continues to accelerate in all aspects of our lives. Many of our daily human experiences and interactions involve machines or devices as an integral part of our lives. These advances are fostering a strengthening partnership between humans and technology. It is time to evaluate how we can better use the strengths of technology — while acknowledging its limitations — to augment our ability to understand and interact with the world around us.

On the current trajectory, it is inevitable that the future will be mediated by technology, with varying levels of autonomy. Every industry should now consider new ways of working to keep pace with the opportunities afforded by the rapid advance and diffusion of these changing technologies. The intelligence ‘business’ is not immune to this powerful driver of change, but we must position intelligence as the architect not the victim of change. In terms of the intelligence workforce, technology is changing the nature of work and the roles within it. Also, technology is having a significant impact on intelligence workflow, skills, and organisation, with intelligence professionals increasingly relying on a range of technologies to analyse and add value to information in a timely manner.

The need for technological enablement of the intelligence workforce has existed for some time, but the convergence of technologies evident in the ‘fourth industrial revolution’ (4IR) has amplified this driving force and provided the occasion and conditions for implementing change. The 4IR blurs the boundaries between the physical, digital, and biological worlds through a fusion of advances in artificial intelligence (AI), robotics, the Internet of Things (IoT), 3D printing, genetic engineering, quantum computing, and other technologies.

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What is Technological Enablement?

Technological enablement is the adoption of digital technologies to enhance a function through automation and augmentation. Enhancement is necessary for organisations wanting to grow, increase efficiencies and remain relevant amid times of innovation and change. One challenge is the difficulty of embracing the sheer volume of the opportunities provided by new and emerging technologies. However, successful technological enablement should be less about the application of individual technologies, and more about choosing the right technologies to sustainably elevate and advance a workforce. This approach requires deep insight about the business of intelligence, especially how technology underpins an organisation’s strategic goals.

More pragmatically, maximising the use of emerging technologies is not the primary challenge, as many organisations are struggling to sustain legacy technical infrastructure. The impatience and urgency that legacy issues create — exacerbated by the increasing rate of technological change — means that most large organisations are not well placed to make considered decisions relating to emerging technologies. As a result, they either defer such decisions or make short-sighted moves without examining downside consequences.

As a goal, technological enablement has its limits. Enabling the intelligence workforce is not just, or even primarily, about providing technical tools. Technological enablement is about professional training and development (especially uplifting of digital skills), reshaping the culture of organisations, and finding better ways to connect machines to intelligence practitioners and those practitioners to one another across the workforce. While technological tools can assist — especially the operator and analytical functions — the value-adding aspects of intelligence remain cognitive processes based on the application of human thought and judgement.

Structure of the White Paper

This White Paper outlines the challenges and opportunities of technological enablement through three lenses: the weight of the past, the push of the present, and the pull of the future. An analysis of these challenges and opportunities offers four insights around: desired 'business' outcomes, key focus areas, the extent of technological enablement, and combining humans and emerging technologies. The White Paper offers a model for technological enablement and a series of implications arising from the model. The White Paper concludes with a discussion of how the Australian Institute of Professional Intelligence officers (AIPIO) could support the technological enablement of the intelligence workforce in Australia.

Continuity and Change

The terms of reference for the 2017 Independent Intelligence Review asked whether capability gaps, including technological, are emerging and how these might be met. The Review recommended inter alia initiatives relating to specific outcomes:

- improve capabilities for the NIE to share and collaboratively analyse data;
- intensify the NIE's engagement with the Australian science and technology community, and with industry more generally, to facilitate innovation and the development of new capability;
- support the development of shared capabilities across the NIE; and
- improve the ability of the NIE to attract and retain its workforce.

In addition to the technological enablement driven by the Review, international activities such as the US Office of Director of National Intelligence (ODNI) AIM Initiative, and Center for Strategic and International Studies (CSIS) Technology and Intelligence Task Force, as well as the University of Melbourne Hunt Lab for Intelligence Research in Australia are driving broader intelligence capability development through digital means.

This White Paper acknowledges the progress already made and the momentum generated by the afore-mentioned initiatives but seeks to bring a sharper focus to challenges, opportunities, and implications arising from technological enablement of the intelligence workforce in Australia rather than broader technological enablement of intelligence practice.

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CHALLENGES AND OPPORTUNITIES

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The competing dynamics of the past, present and future contexts will shape challenges and opportunities for technological enablement of the intelligence workforce. The past contains weights, for example, those structural barriers that inhibit change and prevent us from achieving a particular push of the present of pull of the future. The present contains current trends, drivers, technologies, and decisions or acts of agents that make new things happen and push change forward. The future contains compelling images of the possible, which may serve as both inspiration and aspiration. In resolving these competing dynamics, the NIE should take advantage of opportunities and importantly avoid becoming obsolete as the broader socio-technical ecosystem moves on.

The Weight of the Past

Mindsets. Change, often rapid change, is a dominant feature of modern society and touches all aspects of our endeavours. Yet we seem to accept that the thinking, approaches, and tools that served us well yesterday will continue to do so tomorrow in a changing world. For example, intelligence production relies on harvesting ever-larger quantities of data but reliance on the volume of quantitative data at the expense of key qualitative understanding is dangerous. Professional practice is not immune from change, but the intelligence workforce will likely slowly give up the tried, tested and familiar. However, the intensity of recent operational experience may accelerate this process.

Procurement. NIE procurement is dogged by extended and inflexible policies and practices that slow progress and innovation. Also, many incumbent contractors have deeply embedded cultures and ways of working. They are accustomed to a traditional procurement model in which the NIE sets requirements and they develop products to meet those requirements. That approach worked for decades, but it is no longer enough; however, agile approaches and the introduction of many new industry actors may stimulate change. Today, procurement needs to anticipate disruption and, ideally, disrupt itself through new approaches, applications, and technologies. Procurement must develop strong scenario-planning functions that allows it to project ahead to new kinds of problems and challenges that the NIE will face in the future.

Technical Infrastructure. Due to security and the technical realities of intelligence and data architectures, much of the NIE relies on technology systems that are 10 to 15 years old, runs on premises, and has a significantly higher maintenance and total cost of ownership than cloud-based alternatives. These technology platforms often reflect outdated requirements; are hindered by legacy design compromises; and miss out on the latest technology advances, such as in-memory computation, data virtualization and user-friendly interfaces. Over time, the heavy customisation of these systems to follow bespoke practices has limited the ability to take advantage of best of breed solutions that make use of emerging technologies.

The Push of the Present

Changing Threat Context. Today, the intelligence workforce must navigate a much-changed global security environment characterised by the diffuse, evolving and often ambiguous nature of threats. VUCA is an acronym developed by the US military to describe the dynamics of this modern multipolar world: volatile, uncertain, complex, and ambiguous. Where once the NIE could count on the seeming certainty and predictability of binary choices — capitalism versus communism, democracy versus autocracy — choices and consequences are now far less clear. There are too many elements beyond the control of traditional centres of power and authority. It is a network phenomenon and cannot be mastered through traditional intelligence structures and practices. Without systemic changes we will likely end up doing the same things in different guises, which is unsustainable as the NIE confronts a VUCA world, especially with the growing cyber threat. VUCA is demanding a higher level of organisational agility.

Big Data. The intelligence workforce is challenged by the growing volume of source data, and the speed with which this data is created and distributed during policy development, planning, and operations. Increasingly, big data is having a significant impact on intelligence workflow, skills, and organisation, with the intelligence workforce using a range of technologies to ingest, analyse and add value to information in a timely manner. Exploiting big data's opportunities and mitigating its risks will entail recruitment, training, and industry partnership challenges not only to cultivate a cadre of skilled data scientists but also to train the intelligence workforce on the uses and limits of data analytics. For example, the pairing of human and machine analytics with a mix of structured and unstructured data has resulted in state-of-the-art data visualization techniques that allow for powerful and actionable conclusions that otherwise would not be attainable.

Generational Change. The intelligence workforce of tomorrow — dominated by digital natives — will support technological enablement as they naturally embrace technology as a driver of work, especially remote work. For example, millennials will make up 75 percent of the global workforce by 2025. Also, millennials embrace new norms of learning that are continual, flexible, and customized. Traditional educational institutions will find themselves increasingly misaligned with the future of work. Education is being transformed to become truly lifelong as the adoption of educational technology is empowering students to learn in customizable ways and putting lecturers to their best use. The NIE will play a role in this new learning paradigm as it is expected to support the cost of lifelong learning and retraining programs for the intelligence workforce.

The Pull of the Future

Digital Transformation. Digital transformation focuses on a broad variety of new technologies such as artificial intelligence (including its subset machine learning), data analytics, and robotic process automation to enable better human-machine collaboration. It is not about taking automating old manual practices; it is about solving problems better, with more creativity and power, while working across organisational boundaries. Leading organisations are exploiting digital transformation to organize and develop workforces, improve operations, and enable workplace innovation. Successful digital transformation will see structures put in place across the NIE that integrate technology, data, people, processes, skills, and the operating models to thrive as a connected enterprise.

"...digital transformation will see structures put in place across the NIE that integrate technology, data, people, processes, skills, and the operating models to thrive as a connected enterprise."

Technological Diffusion. The 'Fourth Industrial Revolution' (4IR) — mentioned earlier in this White Paper — is different in scale, scope, and complexity from any that have come before in two ways: it is accelerating the diffusion of technology and seeking to ensure technology empowers people rather than replaces them. The challenge, and the opportunity of the 4IR is that while machines will take over some of the routine and dangerous tasks that can be automated, our products and services will be reliant on us to make them human, to deliver the nuances that make the NIE work for intelligence consumers. Of course, technological diffusion is a phenomenon also working to the advantage of our adversaries.

Analytic Contestability. The fallibility of intelligence could be brought into sharper relief as intelligence professionals seek to navigate the 'new normal.' Especially where the new normal features heightened tempo, and diverse demands from a growing number of intelligence consumers competing for the time and attention of the intelligence workforce, as well as access to raw intelligence material. Prioritization with limited resources may lead to some consumers' needs being unmet, imperfectly met, or ignored. Subjecting analytic judgements to rigorous challenge is essential for effective intelligence; however, this challenge is commonly engineered within agencies or across agencies in the NIE, and no further. The democratisation of traditional intelligence sources and methods offers the prospect of growing contestability beyond the boundaries of the NIE. Also, technological enablement will enable more automated analysis, potentially providing de facto red team perspectives within the NIE.

“A lingering challenge will be finding and asserting the distinct value proposition of the human intelligence professional.”

Net Impact

The weight of the past may limit the absorptive capacity of the NIE to exploit new technologies. The push of the present — especially big data — poses challenges for scaling the processes of intelligence production by human resources alone. Finally, the pull of the future makes technology a natural and pervasive feature of the future of work in the NIE workplace. Technological enablement will have the most impact and lasting value when it is part of the common, everyday professional activity of the intelligence workforce at all levels, when they engage with emerging technologies together across the NIE and beyond. A lingering challenge will be finding and asserting the distinct value proposition of the human intelligence professional.

ANALYSIS AND INSIGHTS

“...technological enablement... should begin with a sense of the desired outcomes for our people, practices, and production.”

Any consideration of the technological enablement of the intelligence workforce should begin with a sense of the desired outcomes for our people, practices, and production. Amid the plethora of technological opportunities, some technologies offer advantages given the nature of intelligence work and the maturity of the technology; however, any listing here remains subjective. There should also be a mechanism for determining how best to use the technology — from substitution to redefinition — to best serve the intelligence workforce and intelligence practices. Finally, in realising an intelligence workforce combining people and technology, there should be an operating model for collaboration that blends the respective strengths of humans and technology.

Desired Outcomes of Enablement

People. Technological enablement should ensure more effective and efficient recruitment, professional development, and management of a ‘blended’ intelligence workforce comprising a mix of traditional full-time employees, joint ventures with academia, contractors, freelancers, crowds, and intelligent robotic assistants. Virtual teams drawn from a mix of these actors will work together across organisational boundaries, regardless of their geographic location, to achieve NIE goals.

Practices. Technological enablement should unlock deeper and wider data-driven insights and deliver them at greater speed, scale and specificity for consumers while minimising cognitive load and mitigating analytic pathologies such as ‘group think.’ Technological enablement also will stimulate innovation and accelerate learning and development around practices.

Production. Technological enablement should ensure intelligence production can scale to meet the tempo of growing and more diverse consumer need – coupled with the ambiguity of data inputs - by dynamically reallocating human and machine resources as required across the NIE. Technological enablement also will ensure better consumer experience by making the value of intelligence products and services immediately recognisable amid a plethora of inputs available to consumers.

“ML...offers a solution to the emerging problem of scalability while attempting to flex to the new normal.”

Technological Opportunities for Enablement

Artificial Intelligence. Artificial intelligence (AI) is a core technology of the digital revolution. AI helps the intelligence workforce to obtain widely dispersed information related to their needs, dramatically reducing the amount of time and energy now spent trying to find relevant information and insights in a rapidly growing volume of data for the purpose of developing actionable intelligence. Machine learning (ML) — a subset of AI — offers a solution to the emerging problem of scalability while attempting to flex to the new normal. ML aids intelligence production in four ways: structuring data into ontologies and events, structuring text across multiple languages with natural language processing (NLP), prioritizing events and alerts, and creating predictive models. One possible solution to the problem of scale and expertise is the application of ML techniques to evaluate large sets of data.

Augmented Reality. Augmented reality (AR) is the expansion of the physical world by adding layers of digital information onto it such as text, graphics, video, and sounds. Unlike Virtual Reality (VR), AR does not create the whole artificial environment to replace the real world with a virtual one. Many modern digital devices such as smartphones, tablets, and gadgets like Google Glass or handheld devices already support AR. AR may complement the everyday activities of the intelligence workforce especially through analytical support and training.

Automation. The trend of automation — machines substituting human labour — is quickening. Automation will be applied to frequent, high-volume, routine, and dangerous activities, while humans will focus on abstract activities requiring human interaction, creativity, and judgment — although AI is making progress in the creative space. Reducing the number of person-hours spent on repetitive tasks — which can easily be done by technology — is key to raising productivity. For example, technologies such as AI, AR, and robotic process automation (RPA) allow some work to be outsourced to robots. Automation could help the NIE address the imbalance between depth and coverage by permitting it to realign resources differently by allowing organisations to shift resources to their greatest need, dynamically. While automation will ultimately affect many workers, it is unlikely to influence the demand for intelligence professionals.

"Reducing the number of person-hours spent on repetitive tasks — which can easily be done by technology — is key to raising productivity."

Data Science. Data science has boomed over the past decade, following advances in mathematics, computing capability, and data storage. Advances in computing technology and information storage mean volumes of past and real-time data being created at high velocity are now exploitable. A key focus could be the development of knowledge engineering and knowledge discovery techniques to address the issue of 'big data.' Scalable technology solutions now available can pair intelligence professionals and data scientists to analyse these complex and high volumes of data and autonomously translate those insights into plain English.

Crowdsourcing. The rise of platform technologies has made it easier for organisations to better connect people on both sides of the organisational boundary and use crowdsourcing to tackle tough challenges. Crowdsourcing effectively puts a problem out to bid, using platforms to engage the talents and capacity of an entire population, experts, and non-experts to produce a better solution than a team of in-house experts – and will do so more quickly and less expensively. Aligned with crowdsourcing is collective estimation, which uses a 'crowd' to generate an estimate about some development in the future, or where the available data are sketchy and unreliable. Crowdsourcing and collective estimation are just two of many technology-intensive alternatives for intelligence teams; however, they work only for certain types of tasks. Crowdsourcing works best when it is reasonably certain a solution exists, but its location is unknown; while collective estimation works best when many people have a little something to contribute but no one has very much.

Digital Twins. A 'digital twin' is a virtual model of a person, process, product, or service. This pairing of the virtual and physical worlds allows analysis of data and monitoring of systems to head off problems before they even occur, prevent downtime, develop new opportunities, and even plan for the future by using simulations. A digital twin serving as an intelligent assistant in the workplace is often considered part of RPA technologies. Digital twin technologies will lead to new collaboration opportunities among intelligence professionals and data scientists whose jobs are to understand what data tells us about the operational environment. Digital twins may allow the intelligence workforce to surge to meet expanded demands in space and time.

"Digital twin technologies will lead to new collaboration opportunities among intelligence professionals and data scientists ..."

Remote Collaboration. The COVID-19 pandemic has been a catalyst for changing patterns of collaboration. As social distancing becomes part of the new normal, entire workforces have needed to connect as well as collaborate remotely. In normal times, organisational boundaries within the NIE impose three types of 'distance' in remote collaboration: physical (place and time), operational (team size, bandwidth, and skill levels), and affinity (values, trust, and interdependency). The best way to drive team performance through remote collaboration is to equip 'virtual teams' with the right technological support for this reimagined workplace.

"...the SAMR model offers a useful analytic framework for determining how best to use technology to serve the intelligence workforce and intelligence practices."

Extent of Enablement

The Substitution, Augmentation, Modification, and Redefinition (SAMR) model is a four-level, taxonomy-based approach for selecting, using, and evaluating technology in K-12 settings. However, the SAMR model offers a useful analytic framework for determining how best to use technology to serve the intelligence workforce and intelligence practices. At least, the SAMR model can provide a guide for navigating a complex landscape of technological opportunity. At the Substitution level, technology is substituted for analogue technology, but the substitution generates no functional change. At the Augmentation level, technology is exchanged, and the function of the task or tool positively changes in some way. At the Modification level, technology integration requires a significant redesign of a task. Finally, the Redefinition level is achieved when technology is used to create novel tasks.

Outcome	Substitution	Augmentation	Modification	Redefinition
Workforce Recruitment	Automatic extraction of information from interviews and resumés	Measurement of a broader range of attributes for scoring algorithms		
Intelligence Analysis	Automatic translation of foreign language resources	Near real-time assessment of actors' intentions through big data	Contestability of human predictions with AI predictions	Human-machine ecosystem as the core component of intelligence analysis
Intelligence Production	Bridging the looming gap between the supply and demand of information	Assessing the quality of intelligence reports	Producing intelligence reports through NLP	Providing an audit trail of how, when, and why decisions were made
Workforce Development	Enabling NIE-wide competency accreditation and certification management	Enabling customised learning at speed and at scale	Mitigating cognitive biases (such as recency and anchoring) through regulating information flows	Increasing the diversity of team composition to include 'digital twins'
Workforce Management	Offering insights into what motivates employees and how they can help them succeed	Assessing and mitigating issues related to the effects of work in the high-stress environment	Predicting when employees are about to resign	

Table 1: *Illustrative Extent of Technological Enablement for the Intelligence Workforce.*

Combining Humans and Emerging Technologies

Collaboration. Collaboration between humans and technology is the best way to utilize either's strength optimally. Technology will play a growing role over the next ten years, but humans will likely make the difference. For example, for some kinds of storytelling, processing power, alone, may be insufficient despite technological advancement. Humans offer many valuable inputs such as impressions and judgments, but poor curation of these inputs can add 'noise' in a problem space. Technology may perform better than humans in decision making around bounded problems because it can filter out background influences on decision making, such as 'noise' and possibly biases. Skill-based behaviours seem to be the best candidates for automation, but rule and knowledge-based reasoning are better suited for closer human-computer collaboration. Allocating roles and functions between the human and technology will be critical in defining an efficient and effective blended intelligence workforce.

"Skill-based behaviours seem to be the best candidates for automation, but rule and knowledge-based reasoning are better suited for closer human-computer collaboration."

Human Expectations. The intelligence workforce will want an effortless experience with technological enablement not unlike their experience at home with modern consumer technologies. Employees often struggle to use new technologies in the workplace because organisations are not doing enough to meet heightened expectation of user experience. The challenge of meeting user expectations becomes more difficult with a growth in automation, which will increase technology touchpoints, without necessarily reducing employee effort. The growing capabilities of advanced technologies have fuelled widespread fears of humans being replaced, with the oft-quoted 'statistic' that 47 percent of jobs could be automated, helps to embed the idea that we all are engaged in a 'race against the machine.' Yet this should not be and is not a story of humans versus machines. It is one of humans and machines together being more than they possibly could individually.

Human Expertise. Good, actionable intelligence takes expertise to develop. But humans are challenged at integrating information in a reliable and robust way, which is what algorithms are designed to do. Analysts' domain expertise will remain crucial because it provides rich contextual background for making connections, and thus the goal of technological enablement is to augment human discovery capabilities, not supplant it. Human reasoning is superior to machines but can be aided by using the machine as a partner.

Legislative and Legal Lag

This White Paper has focused on organisational lag as a key impediment of technological enablement. However, legislative, and legal reform — which moves slower than technological progress and organisational reform — could potentially constrain technological enablement. Also, the development of ethical frameworks for the wider employment of AI are embryonic. For example, the insights generated by AI may be flawed based on the algorithms or the test data it is using as the basis for its assertions.

"...legislative, and legal reform — which moves slower than technological progress and organisational reform —could potentially constrain technological enablement."

On 30 May 2018, the Federal Attorney-General announced that the government had commissioned a comprehensive review of the legal framework governing the National Intelligence Community — the 'Richardson Review.' The review examined the effectiveness of the legislative framework governing the National Intelligence Community and prepared findings and recommendations for reforms. As at the time of publication of this White Paper, the unclassified version of the Richardson Review has not been released by the Federal Government.

IMPLICATIONS

"...the NIE must navigate the emergence of new technologies and the attendant challenges in productive ways..."

"...technological enablement should address a changing continuum of interaction over time."

"Our goal should be 'augmented intelligence' because this term signifies how humans and machines will work together to produce abilities 'greater than human or machine.'"

Any change across the NIE likely comes at substantial cost, and we need to be able to demonstrate — both to the intelligence workforce and external scrutiny — that the benefits outweigh the costs. In so doing, the NIE must navigate the emergence of new technologies and the attendant challenges in productive ways: to foster technological enablement of the intelligence workforce that is proactive and able to augment the capacities of human analysts and, more broadly, to respond effectively to the security threats of the coming decades. The optimal solution would:

- take advantage of the strengths of both humans and machines;
- allow humans to collaborate productively with machine partners;
- support more rapid assessment and forecasting of human activity;
- avoid serious unintended practical and ethical consequences; and
- develop more robust partnerships with industry and academia partners.

Technology Enablement Roadmap

Enablement Thresholds. Like most technological advances, incorporating new technology into business processes requires significant leadership and effective direction that all stakeholders can easily understand. The pathway towards an intelligence workforce combining humans and machines will likely progress from machines being useful but dumb work adjuncts to machines being intelligent and integrated with the intelligence professional. So technological enablement should address a changing continuum of interaction over time. An indicative continuum of interaction could embrace at least four thresholds:

- **Threshold One.** At this lowest level, technology is there to assist the human in performing basic tasks rapidly, such as viewing, storing, and routing data.
- **Threshold Two.** Technology begins to interact with the human. Data can be manipulated and displayed in new ways, yielding analytic results not previously possible. The machines notify humans about emerging patterns and anomalies in big data.
- **Threshold Three.** Technology can collaborate with humans by tracking their needs and preferences, then alert-them to new opportunities.
- **Threshold Four.** Technology anticipates humans' wants and needs, proposes analytic judgements, or courses of action, and makes rational decisions on their behalf, if desired.

Experimentation. The NIE should focus on controlled, safe deployments emphasizing transparency, openness, and utility. AI will likely help free resources that can then be applied to greater innovation, and that the development of new products and services will generate demand for new jobs. Other jobs that exist today may exist in other forms tomorrow. Human-machine interactions, rather than AI alone, appear to be most promising. Our goal should be 'augmented intelligence' because this term signifies how humans and machines will work together to produce abilities 'greater than human or machine.' Ongoing training of the systems will likely require extensive human involvement, updating them with new information, particularly as the complexity of the problem space increases.

Workforce Planning

Recruitment. Technological enablement will broaden the talent continuum giving the NIE an opportunity to engage in a multi-channel workforce strategy that leverages a mix of traditional full-time employees, joint ventures, contractors, freelancers, crowds, and robots. Without further technological enablement, the NIE is unlikely to attract, or will soon lose, digital natives if it does not accommodate how they think and learn.

Professional Development. The NIE should develop a technology-fluent workforce with sufficient digital acumen to capture value from technology investments. The ability to acquire new digital acumen will be necessary to adapt. From the individual's point of view, people who can apply both 'hard' technical and 'soft' interpersonal skill sets can thrive and potentially find much opportunity in the new intelligence workforce. The NIE and other stakeholders need to be investing in meeting these workforce needs, especially through public-private partnerships (PPP) to draw upon a wider supply of expertise. A strategic challenge will be getting the private sector, the public sector at all levels, and the education system to work together to address a shifting workforce and help ensure that people have the right skills and the right jobs.

"The NIE should develop a technology-fluent workforce with sufficient digital acumen to capture value from technology investments."

Allocation of Work. The NIE needs to be designed for machines to work with and to support humans, not to replace them. Other technological revolutions have occurred throughout history, but technological change has shifted rather than diminished jobs. It is more likely that tasks rather than jobs will be replaced by automation, particularly as the operator and analysis tasks performed by the intelligence workforce become increasingly automated through improved machine learning. The new intelligence workforce will be focused on problem solving, intuition, creativity, and situational adaptability — which are uniquely human skills. Technological enablement will have its greatest value in freeing up time for the intelligence workforce to think.

Enterprise Agility

Sense and Respond. The NIE should engineer the right mix between people and technology to scale impact and accelerate growth not simply to create efficiencies and cut costs. Technological enablement that empowers the intelligence workforce and simplifies processes will enable the NIE to sense and respond more quickly to changes in its operating environment and improve the prospects for long-term success. Technological enablement can also help the NIE learn effectively, at speed, and at scale but the learning and development function itself needs transformation.

"The NIE should engineer the right mix between people and technology to scale impact and accelerate growth not simply to create efficiencies and cut costs."

External Engagement. Leading technologies are no longer proprietary to intelligence, and in some cases, they are no longer classified. The NIE should be more willing to look at commercial technology, to work with non-traditional contractors, and to acquire products and services in new ways. Space is a good example, with multiple players competing to offer services to government procurement.

Competitive Advantage. The democratisation of emerging technologies is making advanced intelligence capability readily accessible to hostile actors. Technological advantage is no longer guaranteed to Five Eyes (FVEY) partners. Determined technological enablement of the intelligence workforce will mitigate competitor threats but not eliminate them.

"...The benefits of technological enablement may be more apparent than real..."

Potential Dilemmas

The benefits of technological enablement may be more apparent than real and contain within them the seeds of dilemmas that will need to be addressed if technological enablement of the intelligence workforce is to have optimum impact. For example, improvements in technical collection means such as imagery intelligence (IMINT) and signals intelligence (SIGINT) during the 1960's created a data management challenge and did not compensate for the absence of human intelligence (HUMINT) from denied areas.

Social Relationships. Research into the effects of social and mobile technologies on our thinking and behaviour suggests technology is profoundly changing how we think. Yet while we have all experienced the dramatic effect that social media and smartphones have on behaviour and cognition, there could be even broader effects from human-augmentation technologies. For example, AI could potentially harm social relationships in the workplace by performing many of the functions now performed by people.

Decline of Expertise. Technological enablement could 'outsource' too much of our thinking by shifting the location of institutional expertise and memory from the human elements to the machine elements of the intelligence workforce. The intelligence professionals' loss of the monopoly on expertise could affect the way humans work amid technology addictions and dwindling attention spans. The NIE should integrate technologies effectively to harness the value they provide without undermining the ability of the intelligence workforce to think for itself.

AIPIO and Technological Enablement

"...to identify the needs of the intelligence workforce..."

Needs Assessment. AIPIO could facilitate a systematic process to identify the needs of the intelligence workforce and survey the larger defence and intelligence market for potential initiatives that could meet these needs. The NIE could engage AIPIO professional services to follow innovations through to technology insertion and user adoption. This initiative would enable an NIE-wide effort to leverage common needs and solutions on a cost-effective basis.

"...host a multi-sided marketplace..."

Industry Engagement. AIPIO could host a multi-sided marketplace to inventory, showcase, and raise awareness of innovations and their applications for the NIE, which would provide a full knowledge of emerging opportunities and sharpen the focus on what technological enablement the NIE could do itself and what it should outsource.

"...hosting NIE-wide experiments..."

Experimentation. AIPIO could help shape and focus technological enablement by hosting NIE-wide experiments that bring disparate elements of the enterprise together around common problems in a way that leverages AIPIO industry connections while emphasizing alternative approaches to intelligence production.

"...develop customised offerings to complement higher education sector programs."

Skills Development. AIPIO could work with the NIE to identify any gaps created by the shifts in academia; for example, the erosion of fundamental skills in the Humanities such as critical thinking and analytical skills, and develop customised offerings to complement higher education sector programs.

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LIST OF ACRONYMS AND TERMS

4IR	Fourth Industrial Revolution.
AI	Artificial Intelligence
AIM	Augmenting Intelligence using Machines
AIPIO	Australian Institute of Professional Intelligence Officers
FVEY	Five Eyes Alliance
HUMINT	Human Intelligence
IMINT	Imagery Intelligence
ML	Machine Learning
NIE	National Intelligence Enterprise
NLP	Natural Language Processing
OSINT	Open Source Intelligence
PPP	Public private Partnerships
SAMR	Substitution, Augmentation, Modification, and Redefinition
SIGINT	Signals Intelligence
USIC	United States Intelligence Community
VUCA	An acronym to describe key features of our modern world: volatile, uncertain, complex, and ambiguous

About AIPIO

Established in 1991, AIPIO is the peak representative body for the intelligence profession in Australia. Through leadership, advocacy, and innovation, AIPIO will advance the professionalisation of intelligence practice across all domains, ensuring the Institute remains relevant and attuned to the evolving nature of the intelligence professions, the needs of its members, and key stakeholders.

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