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RISKY OR REWARDING?
NAVIGATING DIVERSITY IN CONTEMPORARY INTELLIGENCE, SURVEILLANCE, AND RECONNAISSANCE (ISR)

Policy Report
March 2022

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Executive Summary

With an international focus, this brief examines contemporary Intelligence, Surveillance, and Reconnaissance (ISR) trends. The brief concludes that substantially greater diversity in ISR is reflected overall, thanks in part to the increasing adoption of emerging technologies, such as automation and artificial intelligence (AI), which impact several changes influentially. Many rewards figure, notably “information advantage”. Less desirably, multiple pressing challenges and persistent uncertainties remain in the form of attendant risks, hazards, and other vulnerabilities. Continuing to be represented in a prominent manner, they are worthy of their constant, close, and careful evaluation into the future in overall ISR enterprises. Those efforts extend towards advancing further sustainable command-and-control-related management and addressing via “safeguards” and similarly-guiding “tools” to “frameworks” during navigation. Intelligence Engineering increases. Both regionally to globally, many corresponding implications for operations to strategies prevail, as well as for war to peace more broadly, as significant disruptors continue nearby.

Introduction

When considering Intelligence, Surveillance, and Reconnaissance (ISR) and its closely associated emerging technologies in relation to contemporary defence enterprises and/or ISR advancement relating to specific regions, such as in the Indo-Pacific, arguably a degree of dearth exists. As authored back in 2018: "When surveyed overall, no landmark, entirely comprehensive, book-length studies appear to particularly standout," focused on ISR.[1]

More recently, in 2021, War and Defence Studies scholars, such as Robert Johnson, Director of the Changing Character of War Centre at Pembroke College, University of Oxford, and Martijn Kitzen and Tim Sweijs from the Netherlands Defence Academy in Breda, have noted that: "Command, control, communications, computers, intelligence, surveillance, and reconnaissance (C4ISR) capabilities are essential to contemporary war fighting." However, as they go on to remark: "Surprisingly, some aspects of how technological advances in C4ISR are changing the conduct of conflict, and disrupting tactical and strategic actions, remain understudied."[2]

Furthermore, along with adding cyber for C5ISR, extending beyond merely more academic domains of concern and into more practitioner circles — such as reflected, by way of an example, in defence analysis reports produced by Canadian Defence in recent years — there clearly is greater appetite for, and indeed momentum behind, further research work and its communication focused on ISR and its closely-related considerations.[3]

That agenda persists as well as how ISR relates to wider full-spectrum ranging issues, problems, risks, hazards up and across to threats, together with considering associated broader, even grander, challenges, such as with regard to (geo)strategy, war, peace, and other critical entities beyond.

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[1] Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In *Routledge Handbook of Defence Studies*, edited by D. J. Galbreath, and J. R. Deni, 272. London: Routledge, 2018.

[2] "Introduction." In *The Conduct of War in the 21st Century: Kinetic, Connected and Synthetic,* edited by R. Johnson, M. Kitzen, and T. Sweijs, 8. London: Routledge, 2021.

[3] Lichacz, F. M. J., and Jassemi-Zargani, R. *Human Factors and Intelligence, Surveillance*, *and Reconnaissance (ISR): Making the case for a Human Factors Capability in the ISR Concept Development & Evaluation (CD&E) Process.* Ottawa, ON: Defence Research & Development Canada, April 2016. https://cradpdf.drdc-rddc.gc.ca/PDFS/unc227/p803814_A1b.pdf; Gladman, B. *The Future of Allied Air Power: The North Atlantic Treaty Organization.* Defence Research & Development Canada – Centre for Operational Research & Analysis and Royal Canadian Air Force Aerospace Warfare Centre, June 2021. https://cradpdf.drdc-rddc.gc.ca/PDFS/unc360/p813120_A1b.pdf

Amid much persisting uncertainty, many questions continue in a dominant manner relating to how those last fundamental entities are formulated, conducted, progressed, and so forth.[4]

Contemporary ISR Developments

A greater case can readily be made for the enhanced use, and hand-in-glove understanding, of ISR.[5] Beyond that case already introduced, more recently in June 2020, and at least in and for the United States and its global-reaching ISR efforts that boast generalisable insights, a US Congressional Research Service (CRS) report observed that, in particular: "The House and Senate Armed Services Committees have both taken an increasing interest in U.S. military ISR capabilities vis-à-vis China and Russia."[6]

As current paucities sought to be addressed and in-line with broader "multi-domain" trends being universally advanced across the world, the CRS report went on to detail: "More specifically, the Department of Defense (DOD) aims to connect ISR sensors across all warfighting domains (space, air, land, sea, and cyber) directly with commanders and weapon systems, sharing data at an accelerated speed. This will enable U.S. and allied forces to outthink, outpace, and outmaneuver its adversaries." [7]

Moreover, granting an insight into — again, at least American — ambitions in the contemporary ISR arena: "To meet the demands of the new global strategic environment, the DOD ISR enterprise intends to shift from a manpower-intensive force optimized for operations within a permissive environment to an automation-intensive force capable of defeating a peer adversary within a highly contested environment." Maintaining that:

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[4] See also Kollars, N., and Poznansky, M. "Statecraft and Strategy Under the Eroding Monopoly of Cyber Intelligence." *US Council on Foreign Relations,* August 31, 2021.

[5] See, for instance, Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance (ISR): A federation/system of systems-based agent of and for change?" Presented as part of an International Security Studies Section (ISSS) panel at the *International Studies Association (ISA) 58th Annual Convention,* Baltimore, USA, February 2017; and Svendsen, A. D. M. "Parsing future security challenges: Intelligence, Surveillance and Reconnaissance (ISR) as an important system of systems-based agent of & for change." Paper presented in the War Studies track of the *International Society of Military Sciences (ISMS) Annual Conference*, War Studies University, Warsaw, Poland, November 2018.

[6] "Summary." In *Intelligence, Surveillance*, *and Reconnaissance Design for Great Power Competition*. Congressional Research Service, June 4, 2020.

[7] *Ibid.;* see also Nash, Trevor. "USAF expands intelligence training provision." *Shephard Media,* January 20, 2022. https://www.shephardmedia.com/news/training-simulation/usaf-expands-intelligence-training-provision/

> To achieve operational success within a high threat environment, the [US military] Services have indicated they would like to invest in resilient and collaborative ISR capabilities that enhance situational awareness, aid rapid decision-making, and reliably find, fix, and target elusive targets deep within enemy territory. The objective is to generate an information advantage for U.S. military forces, which is paramount to effective operations both in the grey zone and highly contested environments.[8]

By early 2021, agreement on the importance of ISR in currently confronted and contested environments and circumstances was broadly recognised. As argued elsewhere: "Whether countering the People's Republic of China (PRC) moves in the South China Sea, interdicting Russian Long-Range Aviation flights, or providing a continued deterrence of North Korea, ISR is vital." Continuing: "While ISR is integral to war fighting, it is also the capability that is absolutely critical during competition as well as Phase 0 and Phase I shaping and deterring operations."[9] When navigating globalised strategic risk, more broadly "multiplexity" (essentially involving "multiple complexities" or even encountering forms of "everything") is experienced.[10]

Alongside greater movements towards anything from sensor to platform automation, miniaturisation, and the like, emergent developing Artificial

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[8] "Summary." In *Intelligence*, *Surveillance, and Reconnaissance Design for Great Power Competition*. Congressional Research Service, June 4, 2020; see also Pomerleau, M. "Air Force testing how to do intelligence in disconnected environments." C4ISRNet, September 21, 2021. https://www.c4isrnet.com/information-warfare/2021/09/20/air-force-testing-how-to-do-intelligence-in-disconnected-environments/; Mahshie, A. "[US Space Operations Command] SpOC Commander Seeks More Intelligence Capability in Response to China." *Air Force Magazine,* September 20, 2021. https://www.airforcemag.com/spoc-commander-seeks-more-intelligence-capability-in-response-to-china/

[9] Holmgren, Col. J. J. "Expanding Cooperative Intelligence, Surveillance, and Reconnaissance with Allies and Partners in the Indo-Pacific." The *Journal of Indo-Pacific Affairs - US Air University,* January 15, 2021. https://www.airuniversity.af.edu/JIPA/Display/Article/2473957/expanding-cooperative-intelligence-surveillance-and-reconnaissance-with-allies/; see also Garman, L. "Intelligence, surveillance and reconnaissance in an increasingly unstable world." *Defence Connect,* April 1, 2021. https://www.defenceconnect.com.au/strike-air-combat/7831-intelligence-surveillance-and-reconnaissance-isr-in-an-increasingly-unstable-world; Hornung, Jeffrey W., Scott Savitz, Jonathan Balk, Samantha McBirney, Liam McLane, and Victoria M. Smith, Preparing Japan's Multi-Domain Defense Force for the Future Battlespace Using Emerging Technologies. Santa Monica, CA: RAND Corporation, 2021. https://www.rand.org/pubs/perspectives/PEA1157-1.html.

[10] Svendsen, A. D. M. "Addressing "Multiplexity": Navigating "multi-everything!" via Intelligence Engineering." *Stratagem*, October 12, 2021. https://www.stratagem.no/addressing-multiplexity-navigating-multi-everything-via-intelligence-engineering/; Svendsen, A. D. M. "Getting Somewhere? The Utility of "Multiplexic Thinking" in Connecting International Relations to the Study and Doing of Intelligence." *Journal of European and American Intelligence Studies (JEAIS)*, 2018; see also Galeotti, M. *The Weaponisation of Everything: A Field Guide to the New Way of War.* USA: Yale University Press, 2022.

Intelligence (AI) technologies are similarly being increasingly harnessed in the ISR domain.[11] As acknowledged, for example, at higher-levels amongst US political representatives: "In the military domain, AI will help our service members more effectively identify and engage targets, streamline our [ISR] systems, and assist in everyday human operations."[12]

Already suggesting many ramifications expected to persist with long-endurance, the greater consideration of individuals, as well as their enhancement, was also articulated. Equally invoked was the contemporary and anticipated future, technical or technological, even biological, empowerment and augmentation of individuals as "super-soldiers", such as via "wearable-tech" and related trends.[13]

While evidently with implications-full impact and boasting considerable influence — for instance, in terms of breaking-through into several different areas, heading in various directions, and occurring on many different trajectories — AI adoption in the ISR domain continues to proceed somewhat cautiously. Amid highly demanding rollouts that substantially negate the feasibility of taking or making programmatic shortcuts, conditions of hype and their cycles become more smoothed or bypassed as developers to deployers remain essentially mindful of the substantial array of vulnerabilities to risks — and not only those of a strong ethical to cyber nature — that exist in parallel.[14]

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[11] Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In *Routledge Handbook of Defence Studies,* edited by D. J. Galbreath, and J. R. Deni, 278. London: Routledge, 2018.

[12] Stefanik, Rep. E. "Opinion: Advancing AI leadership in the [US] NDAA." *C4ISRNet,* January 12, 2021. https://www.c4isrnet.com/2021/01/12/advancing-ai-leadership-in-the-ndaa/; see also Laird, R. "C2, the Kill Web and Concepts of Operations." *Second Line of Defense,* March 10, 2021. https://sldinfo.com/2021/03/c2-the-kill-web-and-concepts-of-operations/; "How is artificial intelligence changing the face of modern warfare? (Studio)." *Shephard Media,* July 22, 2021. https://www.shephardmedia.com/news/digital-battlespace/how-artificial-intelligence-changing-face-modern-w/; Vaynman, J. "Better Monitoring and Better Spying: The Implications of Emerging Technology for Arms Control." *Texas National Security Review* 4, iss. 4 (Fall 2021): 33-56. http://dx.doi.org/10.26153/tsw/17498

[13] See also, for example, as discussed in Svendsen, A. D. M. *Intelligence Engineering: Operating Beyond the Conventional.* New York: Rowman & Littlefield / Security and Professional Intelligence Education Series - SPIES, 2017, p.105; see also, more recently, sources, such as those focused on "super-soldier" concepts, Stilwell, B. "The Future US Military 'Super Soldier' May Be Closer Than We Think." *Military.com.* https://www.military.com/off-duty/future-us-military-super-soldier-may-be-closer-we-think.html; Bulletin of the Atomic Scientists. Mecklin, J, ed. *At Doom's Doorstep: It is 100 seconds to midnight.* Bulletin of the Atomic Scientists, January 2022, p. 7. https://thebulletin.org/wp-content/uploads/2022/01/2022-doomsday-clock-statement.pdf; see also Davidovic, J., and Crowell, F. S. "Operationalizing the Ethics of Soldier Enhancement." *Journal of Military Ethics,* 20 (January 19, 2022): 180-199. https://doi.org/10.1080/15027570.2021.2018176

[14] Mitchell. B. "EMERGING-TECH: As Air Force adopts AI, it must also defend it, intelligence chief says." *FedScoop,* September 22, 2021. https://www.fedscoop.com/air-force-artificial-intelligence-algorithm-defend-intelligence-chief-mary-obrien/; Williams, B. D. "In Artificial Intelligence, 'We Need To Be More Precise': Lt. Gen. O'Brien." *Breaking Defense,* September 23, 2021. https://

Naturally, despite its widespread impact across the world and generally in the ISR domain, these concerns are not solely those of and emanating from large states and "big" powers, such as the United States. The concerns are shared well beyond by others. Differently-scaled and arranged countries, including more widely even other types of actors positioned elsewhere, also take close and increasing note. For example, located in the Indo-Pacific region, at the end of 2021, Singapore's Defence Minister, Ng Eng Hen, emphasised the persistent general requirement for "Guiderails for emerging technologies".

He highlighted that: "COVID-19 accelerated the trend of digitization and connectivity, but also our vulnerability to cyberattacks," combined with the fact that "[t]he need for frameworks to prevent catastrophic failure of critical infrastructure, such as hospital systems, water plants and transport grids, has become more urgent."[15] Alongside, frequently overlooked and related "Intelligence Engineering" paradigms again move to the foreground, extending practically and operationally beyond merely their analytic and strategic activities. [16]

Continuing, Ng Eng Hen observed that: "In emerging technologies such as artificial intelligence, autonomous technologies and germ line genetic manipulations, adequate safeguards and monitoring are needed to prevent irresponsible use and ethical breaches." He was equally clear where pathways forward into the next decade are located, for instance, noting: "International collaboration via the [United Nations (UN)] and other multilateral frameworks, such as the AI Partnership for Defense, are necessary and should formulate guiderails and narrow corridors."[17]

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breakingdefense.com/2021/09/in-artificial-intelligence-we-need-to-be-more-precise-lt-gen-obrien/; Tucker. P. "Vulnerabilities May Slow Air Force's Adoption of Artificial Intelligence." *Defense One,* September 23, 2021. https://www.defenseone.com/threats/2021/09/vulnerabilities-may-slow-air-forces-adoption-artificial-intelligence/185592/

[15] Hen, Ng Eng. "Outlook - Singapore's defense minister: 7 wishes for the remainder of the decade." *Defense News,* December 6, 2021. https://www.defensenews.com/outlook/2021/12/06/singapores-defense-minister-7-wishes-for-the-remainder-of-the-decade/

[16] See, for instance, Kwa, C. Guan. "Postmodern Intelligence: Strategic Warning and Crisis Management." In *Perspectives on Military Intelligence from the First World War to Mali: Between Learning and Law*, edited by F. Baudet, E. Braat, J. van Woensel and A. Wever. The Hague, NL: Asser Press/Springer, 2017; see also Svendsen, A. D. M. *Intelligence Engineering: Operating Beyond the Conventional.* New York: Rowman & Littlefield / Security and Professional Intelligence Education Series - SPIES, 2017; Svendsen, A. D. M. "Addressing 'Multiplexity': Navigating 'multi-everything!' via Intelligence Engineering." Stratagem, October 12, 2021. https://www.stratagem.no/addressing-multiplexity-navigating-multi-everything-via-intelligence-engineering/

[17] Hen, Ng Eng. "Outlook - Singapore's defense minister: 7 wishes for the remainder of the decade." *Defense News,* December 6, 2021. https://www.defensenews.com/outlook/2021/12/06/singapores-defense-minister-7-wishes-for-the-remainder-of-the-decade/; see also Claesson, M., and Carlander, Z. "Commentary: Are New and Emerging Technologies Game-Changers for Smaller Powers?" *War On The Rocks*, December 29, 2021. https://warontherocks.com/2021/12/are-new-and-emerging-technologies-game-changers-for-smaller-powers/

With appropriately fine-tuned command-and-control "safeguards" moving higher up agendas, degrees of incrementalism are again observed surrounding these shifts as well as occurring elsewhere. More explicitly, improved metrics and indicator-based mechanisms for measuring ISR use and its performance to effectiveness have simultaneously been witnessed as being better developed during 2020-21.[18]

That last work has occurred alongside continuing to overcome "misunderstandings" over what ISR and its platforms and sensors can, and, equally, cannot, realistically achieve, for example, in both physical to technical terms. Notably, the conventional scientific "Rules of Physics" still apply, as they continue to be adhered to in ISR contexts.[19]

Furthermore, from a commercial perspective, the ISR market has continued to reflect substantial growth as, in parallel, official ISR strategies have undergone further refinement and changes in the form of updating and upgrading steps.[20] Costs figure intimately alongside value gains on overall balance-sheets.

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[18] See, for example, Luckey, David, Bradley Knopp, Sasha Romanosky, Amanda Wicker, David Stebbins, Cortney Weinbaum, Sunny D. Bhatt, Hilary Reininger, Yousuf Abdelfatah, and Sarah Heintz, Measuring Intelligence, Surveillance, and Reconnaissance Effectiveness at the United States Central Command. Santa Monica, CA: RAND Corporation, 2021. https://www.rand.org/pubs/research_reports/RR4360.html; see also Tingstad, Abbie, Dahlia Anne Goldfeld, Lance Menthe, Robert A. Guffey, Zachary Haldeman, Krista Langeland, Amado Cordova, Elizabeth M. Waina, and Balys Gintautas, Assessing the Value of Intelligence Collected by U.S. Air Force Airborne Intelligence, Surveillance, and Reconnaissance Platforms. Santa Monica, CA: RAND Corporation, 2021. https://www.rand.org/pubs/research_reports/RR2742.html; Lingel, Sherrill, Carl Rhodes, Amado Cordova, Jeff Hagen, Joel Kvitky, and Lance Menthe, Methodology for Improving the Planning, Execution, and Assessment of Intelligence, Surveillance, and Reconnaissance Operations. Santa Monica, CA: RAND Corporation, 2008. https://www.rand.org/pubs/technical_reports/TR459.html.

[19] See, for instance, as described in McCoy, K. "Building the Next Generation of Boyds, Hoppers, Krulaks and Pattons." *Modern War Institute - West Point,* March 2, 2021. https://mwi.usma.edu/building-the-next-generation-of-boyds-hoppers-krulaks-and-pattons/

[20] "Intelligence Surveillance and Reconnaissance Market and Factors Behind its Growing Landscape – Industry Analysis by Top Vendors, Size, Growth Factors and Forecast to 2027." OpenPR, January 28, 2021. https://www.openpr.com/news/2232567/intelligence-surveillance-and-reconnaissance-market; Hitchens, T. "New Air Force ISR Strategy Ready, Including MQ-9." Breaking Defense, February 26, 2021. https://breakingdefense.com/2021/02/new-air-force-isr-strategy-ready-including-mq-9/; Laird, R. "Shaping a Way Ahead for Pacific Defense: The Evolving Role of the USAF." *Second Line of Defense,* September 21, 2021. https://sldinfo.com/2021/09/shaping-a-way-ahead-for-pacific-defense-the-evolving-role-of-the-usaf/

Greater ISR Diversity and its Navigation

When "strategy" is defined in terms of consisting of "ways", "means", and "ends", as demonstrated, gradually more diverse strategies do relate increasingly appropriately to ISR and its contemporary development.[21] ISR therefore reflects greater diversity overall, which has many implications.

Together with any of the observed advantages, several pressing challenges remain for ISR. They are deserving of their continued close scrutiny and command-and-control-related management (containment) to addressing (rollback) going forward into differently-ranging futures. Again, at least instructively internationally from another generalisable US-centric perspective, as Washington CSIS analysts, Jake Harrington and Riley McCabe have articulated recently over the summer of 2021: "Many [ISR] capabilities, particularly uncrewed aerial vehicles (UAVs), are shared assets in high demand."

Going beyond these hard-to-erode quantitative or volume and prioritisation-related problems, characteristic of the often "super-sized" US approach to ISR, continuing their analysis: "For the United States to overcome this resourcing challenge and strengthen its ability to persistently monitor for global threats, it must embrace an ongoing revolution in emerging technology and commercial data." In order to compensate, they asserted: "In particular, [the US] should expand its use of open-source intelligence (OSINT) as well as collection conducted with expeditionary edge computing capabilities and low-cost attritable UAVs."[22]

Yet, many, at least potential, pitfalls are sustained alongside those last more qualitative moves: "Paradoxically, this approach requires already data-saturated intelligence organizations to collect even more information in pursuit of the 'information advantage' that is increasingly at the center of U.S. Military planning."[23]

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[21] Lykke, A. F., ed. *Military Strategy: Theory and Application.* Carlisle, PA: U.S. Army War College, 1998.

[22] Harrington J., and McCabe, R. "Modernizing Intelligence, Surveillance, and Reconnaissance to 'Find' in the Era of Security Competition." *Center for Strategic and International Studies*, August 6, 2021. https://www.csis.org/analysis/modernizing-intelligence-surveillance-and-reconnaissance-find-era-security-competition; see also Galdorisi, G. "A New Generation of Military Unmanned Vehicles." *Second Line of Defense*, September 23, 2021. https://sldinfo.com/2021/09/a-new-generation-of-military-unmanned-vehicles/; "[Sponsored Post:] Swarms of attritable UAS can create the ISR picture the Air Force wants." *Breaking Defense,* December 13, 2021. https://breakingdefense.com/2021/12/swarms-of-attritable-uas-can-create-the-isr-picture-the-air-force-wants/

[23] Harrington J., and McCabe, R. "Modernizing Intelligence, Surveillance, and Reconnaissance to 'Find' in the Era of Security Competition." *Center for Strategic and International Studies,* August 6, 2021. https://www.csis.org/analysis/modernizing-intelligence-surveillance-and-reconnaissance-find-era-security-competition.

Amidst much recorded uncertainty, more sophisticated navigation clearly requires continued advancement. Closely related to diversification, investing in that approach persists together with the greater use of a broad-range of public-private-partnership (PPP) approaches being widely encouraged to, again at least partially, compensate in terms of ISR capability and capacity shortcomings that have been both encountered to experienced contemporaneously, as well as relating to those already anticipated ahead in the future.[24]

More filtering is needed. As argued elsewhere from the US context, with further rich emulation potential: "'Intel drives ops,' [US Special Operations Command (SOCOM)] Commander Gen. Richard Clarke said at a recent Senate Armed Services Committee hearing. 'In order for us to compete more effectively in the future, we have to modernize both our precision strike and ISR … so that [special operators] can quickly see and sense the battlefield that they may have to be fighting in.'"[25]

Again, extending beyond merely the US and with at least greater generalisability portent, a whole range of actors — whatever the precise scale and size or type of their ISR approach, as well as wherever they are precisely located — can equally continue to learn advantageously from these developments. Simultaneously, they can also effectively take into account more disruptive factors methodologically. That includes whether the disruption is expressed both legitimately or alternatively — in some other remarkable cases — on and coming from more nefarious bases.[26]

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[24] Andrews, E. L. "Re-Imagining Espionage in the Era of Artificial Intelligence." Stanford HAI, August 17, 2021. https://hai.stanford.edu/news/re-imagining-espionage-era-artificial-intelligence; Yates, D. "Bash". "The ISR Traffic Jam: How to Improve ISR Operations in INDOPACOM." Over the Horizon, August 30, 2021. https://othjournal.com/2021/08/30/the-isr-traffic-jam-how-to-improve-isr-operations-in-indopacom/; "Triton Begins Multi-Intelligence Capability Phase." Second Line of Defense, August 10, 2021. https://sldinfo.com/2021/08/triton-begins-multi-intelligence-capability-phase/; "Multi-intelligence sensors version of MQ-4C long-range reconnaissance unmanned aircraft flies for first time." Military Aerospace, August 19, 2021. https://www.militaryaerospace.com/sensors/article/14208867/unmanned-reconnaissance-sensors; see also Barnes, J. E. "Intelligence Agencies Pushed to Use More Commercial Satellites." The New York Times, September 27, 2021. https://www.nytimes.com/2021/09/27/us/politics/intelligence-agencies-commercial-satellites.html; see also Spearin, C. "Russian Private Military and Security Companies and Special Operations Forces: Birds of a Feather?" Special Operations Journal 7, iss. 2 (2021): 152-165. https://doi.org/10.1080/23296151.2021.1983944

[25] Harper, J. "Shadow Warriors Pursuing Next-Gen Surveillance Tech." National Defense Magazine, May 7, 2021. https://www.nationaldefensemagazine.org/articles/2021/5/7/shadow-warriors-pursuing-next-gen-surveillance-tech; see also Higgins, J. "TITAN Brings Together Systems For Next Generation Intelligence Capabilities." DVIDS News, August 25, 2021. https://www.dvidshub.net/news/404628/titan-brings-together-systems-next-generation-intelligence-capabilities

[26] See, for example, activity ranges as discussed in Svendsen, A. D. M. "Sharpening SOF tools, their strategic use and direction: Optimising the command of special operations amid wider contemporary

Ultimately, the rationale for engaging in ISR work in the first instance, such as for "information advantage" purposes, constantly benefits from being recalled, held close, and frequently revisited. Advancing that approach, together with a continuing strong focus on diversification and countering to re-balancing movements, is so that objectives and overall "strategic ends" to conditions of overarching "mission accomplishment" do not instead get more lost in overwhelming "noise" among the waves of data-deluges.[27] Amid many situations and conditions of having to weather various strategic-to-crisis episodes, events, up and across to developments, command-and-control concerns and considerations remain firmly established as a necessary top priority for ISR, both now and in the future.

Conclusions: Risks and Rewards Co-exist

Much is apparent in general terms related to ISR. While, for illustrative purposes and due to sheer size/scale-of-effort reasons, this brief has mostly focused on the example of the United States and its global-ranging ISR, evidently other countries, indeed other actors internationally — ranging from small- to mid- and large-sized states and/or powers, even down and across to technology-empowered individuals — are naturally not immune to similarly burgeoning trends, re-organisations, challenges, and so on, especially close US allies.[28]

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defence transformation and military cuts." Defence Studies 14, no. 3 (2014): 284-309. https://doi.org/10.1080/14702436.2014.890341; see also Henningsen, T. Burchall. "Frogmen and Pirates: The Utility of Special Operations Forces for Small States against for-profit, illicit networks." Defence Studies 21, no. 3 (2021): 292-311. https://doi.org/10.1080/14702436.2021.1922082; also more widely, Finlan, A. "A dangerous pathway? Toward a theory of special forces." Comparative Strategy 38, iss. 4 (2019): 255-275. https://doi.org/10.1080/01495933.2019.1633181; see also Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In Routledge Handbook of Defence Studies, edited by D. J. Galbreath, and J. R. Deni, 280. London: Routledge, 2018.

[27] Kahneman, D., Sibony, O., and Sunstein, C. R. *Noise: A Flaw in Human Judgement.* London: Collins, 2021.

[28] Jennings, G. "RAF stands up new ISTAR Air Wing." *Janes*, May 18, 2021. https://www.janes.com/defence-news/news-detail/raf-stands-up-new-istar-air-wing; D'Urso, S. "RAF E-3D Sentry Return To Waddington After Final Operational Mission." *The Aviationist*, August 13, 2021. https://theaviationist.com/2021/08/13/raf-e-3d-sentry-finale/; Nilsen, T. "Norway's new 'eyes and ears' in the north performs maiden flight." *The Barents Observer,* August 11, 2021. https://www.arctictoday.com/norways-new-eyes-and-ears-in-the-north-performs-maiden-flight/; "GA-ASI SeaGuardian Flies from UK to the Netherlands." *General Atomics Press Releases*, September 2, 2021. https://www.ga.com/ga-asi-seaguardian-flies-from-uk-to-the-netherlands; see also Sadat M., and Sinclair, M. "The not-so-secret value of sharing commercial geospatial and open-source information." *Brookings Institution - Order from Chaos*, March 31, 2021. https://www.brookings.edu/blog/order-from-chaos/2021/03/31/the-not-so-secret-value-of-sharing-commercial-geospatial-and-open-source-information/

Clearly, neither are US competitors exempt, extending to its more visceral adversaries.[29] A wealth of both "top-down" and "bottom-up", extending to "original" and/or "imported", ISR approaches and methodologies, as well as their relatives or close associates to derivatives, all exist and strive to succeed — however they are precisely defined and wherever they are most specifically located.[30]

Many risks and rewards prevail side-by-side, and therefore co-exist in their plurality. With much mirroring evident, several different (even multi-) stakeholders, including the North Atlantic Treaty Organisation (NATO), the European Defence Agency (EDA), the United Nations (UN), and many others beyond, both regionally and globally — spanning from the Americas to Europe and Asia — can explicitly learn a plethora of readily transferable lessons and gain significant advantages from what ISR work has to offer and can communicate.[31]

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[29] Gressel, G. "Waves of ambition: Russia's military build-up in Crimea and the Black Sea." *European Council on Foreign Relations Policy Brief,* September 21, 2021. https://ecfr.eu/publication/waves-of-ambition-russias-military-build-up-in-crimea-and-the-black-sea/; Yan, M. H. "Chinese Official Calls For Upgrade to Nationwide Security Network." *Radio Free Asia,* September 24, 2021. https://www.rfa.org/english/news/china/network-09242021143045.html; Kirton, D. "China unveils 'loyal wingman' armed drone concept." *Reuters,* September 29, 2021. https://www.reuters.com/business/aerospace-defense/china-unveils-loyal-wingman-armed-drone-concept-2021-09-29/; for contemporary sub-/non-state actors (or actors of other categories than representing conventional states), such as terrorists and insurgent groups, seeking to have, for example, an asymmetric impact on overall developments and directions, see, for instance, the activities of Islamic State or Daesh as discussed throughout Svendsen, A. D. M. "Developing international intelligence liaison against Islamic State: Approaching "one for all and all for one"?" *International Journal of Intelligence and CounterIntelligence* 29, iss. 2 (2016): 260-277. https://doi.org/10.1080/08850607.2016.1121042, as well as referenced elsewhere throughout this brief; see also, for example, for the impact of 'proxies', "IntelBrief: Iran Sponsors Attacks and Escalates Tensions throughout the Region." *The Soufan Center,* January 11, 2022. https://thesoufancenter.org/intelbrief-2022-january-11/

[30] See also, for example, wider, contemporary developments, such as discussed in Hurst, D. "Under the radar: the Australian intelligence chief in the shadows of the Aukus deal." *The Guardian,* October 24, 2021. https://www.theguardian.com/australia-news/2021/oct/25/under-the-radar-the-australian-intelligence-chief-in-the-shadows-of-the-aukus-deal

[31] For discussion of NATO and ISR, see, for example, Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In *Routledge Handbook of Defence Studies,* edited by D. J. Galbreath, and J. R. Deni, 274. London: Routledge, 2018; see also NATO. "Joint Intelligence, Surveillance and Reconnaissance." Last updated March 12, 2021. https://www.nato.int/cps/en/natohq/topics_111830.htm; for European Defence Agency (EDA) ISR interest, see Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In *Routledge Handbook of Defence Studies,* edited by D. J. Galbreath, and J. R. Deni, 274. London: Routledge, 2018; see also European Defence Agency. "Strategic Context Cases (SCCs)." October 25, 2019. https://eda.europa.eu/docs/default-source/eda-factsheets/2019-10-25-factsheet-scc; for the United Nations (UN), see, for example, the UN *Peacekeeping-Intelligence, Surveillance and Reconnaissance Staff (PKISR) Handbook*. September 2020.

The overall developments confer a number of rewarding advantages. That is especially the occasions when these trend adoptions are suitably caveated and managed with the earlier invoked "safeguards". For instance, that work includes fashioning "guiderails" to adroitly navigate anticipated disruptions, as well as for dealing with those that are less foreseen. Additionally, when adequately harnessed, those last qualities go beyond merely considerations of power and its (at least potential) generation to its subsequent and consequent projection.[32]

However, the times when the ISR command-and-control-related "checks and balances" are more lacking or neglected — again whatever the precise contextual or case details that might feature — then there are greater risks of more disadvantageous ISR deployment and employment, as well as, most notably, paramount "information advantage" statuses being more lost. That emerges as a scenario which includes closely associated ISR technologies and techniques, wherever they might specifically reside, publicly and/or privately, or else whether they are implemented more secretly. Counterproductive conditions and situations of "over-reach" and/or "under-reach" are equally variously reflected. Cost and value calculations again figure significantly with regard to ISR and its use, intimately including more reflexive movements.[33]

Formulations matter. Reflecting back, in 2018, some overall conclusions that came to the fore then, and that remain sufficiently pertinent in their relevance to continue to take into account today when coming more up-to-date and then looking further ahead in projections, include:

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[32] See also, especially with examples from the small Baltic States: Rudzīte-Stejskala, K. "New Emerging Disruptive Technologies in Defence Offer a Chance of Success for Small States." *International Centre for Defence and Security, Tallinn, Estonia,* December 1, 2021. https://icds.ee/en/on-edt-in-defence-and-small-states/

[33] See, for instance, similar concepts as discussed in Svendsen, A. D. M. "Buffeted not Busted: The UKUSA 'Five-Eyes' after Snowden." *E-International Relations,* January 8, 2014. https://www.e-ir.info/2014/01/08/buffeted-not-busted-the-ukusa-five-eyes-after-snowden/; see also, *inter alia,* Hausle, B., and Montazzoli, M. "Finding the Appropriate Balance of Risk in Over-the-Horizon Strikes." *Lawfare,* November 21, 2021. https://www.lawfareblog.com/finding-appropriate-balance-risk-over-horizon-strikes; Khan, A. "Hidden Pentagon Records Reveal Patterns of Failure in Deadly Airstrikes." *The New York Times,* December 18, 2021. https://www.nytimes.com/interactive/2021/12/18/us/airstrikes-pentagon-records-civilian-deaths.html; Bagshaw, S. "Civilian Casualties in U.S. Air Wars: A Wake-up Call for Canada and its Future Use of Armed Drones?" Just Security, January 4, 2022. https://www.justsecurity.org/79633/civilian-casualties-in-u-s-air-wars-a-wake-up-call-for-canada-and-its-future-use-of-armed-drones/; Stewart, P. "[RAND] Study faults U.S. military on civilian casualties; Pentagon plans review." *Reuters,* January 28, 2022. https://www.reuters.com/world/study-faults-us-military-civilian-casualties-pentagon-plans-review-2022-01-27/

> With the considerably high and widespread operational-to-strategic demands placed on key ISR, are we witnessing [Strategic Intelligence (STRATINT)] and [Tactical to Operational Intelligence (TACINT-OPINT)] imbalances, including their exacerbation, as arguably seen, for example, in the case of the [global-ranging, 2014-to date] anti-[Islamic State (IS/ISIS/ISIL/Daesh)] campaigns? Are there also sustained, long-standing [Technical Intelligence (TECHINT)] over [Human Intelligence (HUMINT)] biases and downsides?

Continuing:

> Furthermore, with highly demanding, resource and time-consuming ISR counter-terrorism (CT) and counter-insurgency (COIN)-related missions dominating globally, concerns abound that mission-critical entities, such as the US Air Force, are becoming "rusty" at doing differently focused and other-scaled [Anti-Access/Area-Denial (A2/AD)] across other forms of war (e.g., "high-end warfare") amid their overall defence responsibilities.[34]

Evidently, as introduced and discussed throughout this brief, at least some progress, for instance, in the form of several important changes relating particularly to emerging technologies, has been made to date towards tackling those above areas of ISR concern articulated earlier. In terms of ascertaining their current statuses, those changes remain on a continuum of several different trajectories, occurring at several different rates and tempos of progression to turnaround, and are foreseeably expected to stay thus. Diversification processes once more emerge as important, including also helping determine what thrives — and, equally, not — closely involving questions of when, where, how, and so on.[35]

While several IS/ISIS/ISIL/Daesh CT/COIN operations firmly persist in their conduct throughout 2021-22, there has simultaneously been greater witnessed focus — for example, by the US Air Force and other interested parties — on Russia and China. Therefore, more of an emphasis both on and towards "high-end warfare" considerations in the overall balances being struck is judged as having been further accorded. Closely responding to current and projected needs, and as some re-tooling to framework refinement is underway — including regular strategy updates — continuing "works-in-progress" are reflected overall in the ISR domain as increasingly direct "sensor-to-shooter"

[34] Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In *Routledge Handbook of Defence Studies,* edited by D. J. Galbreath, and J. R. Deni, 281. London: Routledge, 2018.

[35] See, for example, especially as discussed under the heading: 'Contemporary ISR developments', above.

ambitions are maintained.[36] Likewise, wider-impacting concepts, such as "Intelligence Engineering", and their growth cannot be more ignored, denied, or passed over, either analytically to strategically, and/or more practically to operationally.[37]

Noteworthy sustained concerns extend further: "Simultaneously, worries exist about the potential over-reliance of [Special Operations Forces (SOF)] on ISR, about the reliability and safety of ISR assets, and on what soldiers to decision-makers will do if they 'go dark' or 'blind'."[38]

Many of those last difficult-to-surmount prevailing concerns are once more deserving of being kept at the forefront of minds. That remembering is not least as they persist, albeit in differing variations or calibrations over time, and as, at least anticipatory, efforts continue to be made towards both their greater navigation to addressing ahead into 2022 and beyond. Those efforts also reflect management modes that respectively extend from conditions of "containment" to more substantial "rollback" in their configurations. Requiring their constant sustainment through their creation and subsequent maintenance or regular update going forward, the "safeguards" again emerge prominently, performing an important and persistent role.

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[36] Barghouty, L. "Threats from Russia more immediate, but threats from China greater: report." *Military Times,* September 28, 2021. https://www.militarytimes.com/flashpoints/2021/09/28/threats-from-russia-more-immediate-but-threats-from-china-greater-report/; Kirton, D. "China's high-end military technology touted at biggest air show." *Reuters,* September 30, 2021. https://www.reuters.com/world/china/chinas-high-end-military-technology-touted-biggest-air-show-2021-09-30/; "Coalition Welcomes New Commander, Continues Mission." *U.S. Central Command News,* September 10, 2021. https://www.centcom.mil/MEDIA/NEWS-ARTICLES/News-Article-View/Article/2771191/coalition-welcomes-new-commander-continues-mission/; Wasser, Becca, Stacie L. Pettyjohn, Jeffrey Martini, Alexandra T. Evans, Karl P. Mueller, Nathaniel Edenfield, Gabrielle Tarini, Ryan Haberman, and Jalen Zeman, The Air War Against the Islamic State: The Role of Airpower in Operation Inherent Resolve. Santa Monica, CA: RAND Corporation, 2021. https://www.rand.org/pubs/research_reports/RRA388-1.html; Abdul-Zahra, Q., and Deeb, S. E. "US carried out airstrikes in Syria against ISIS." *Military Times,* January 21, 2022.

[37] See also Svendsen, A. D. M. and Dandan, S. "Intelligence Engineering: The Spymaster's Guide To the 21st Century." *The National Interest,* April 12, 2020. https://nationalinterest.org/blog/buzz/intelligence-engineering-spymasters-guide-21st-century-143522

[38] Svendsen, A. D. M. "Intelligence, Surveillance and Reconnaissance." In *Routledge Handbook of Defence Studies*, edited by D. J. Galbreath, and J. R. Deni, 281. London: Routledge, 2018.

Recommendations

Advancing greater clarity with regard to ISR — and indeed relating to its closely associated concepts, as well as their collective wider understandings — benefits from continued extension. As a significant product of ISR's far-ranging complexity (even multiplexity) to constantly sustained dynamism, inevitably more work can always be done. There is never complete closure as ISR trends continue to be manifest and have to contend with "everything". Since they are not mutually exclusive in the ISR domain, both "risks" to "rewards" are again constantly encountered and experienced during navigation.

Further insights become apparent. Building (a) in a "following-on" manner from the basis of some previous more handbook-styled introductory insights, together with (b) becoming deserving of again being reiterated here and being further concentrated upon in an updating way for their extended consideration to prioritisation in the context of this brief examining contemporary ISR "risks" and "rewards" in the early-2020s, and as (c) ISR trends simultaneously continue to extend and expand significantly in their advancement to enhancement over time on both regional — such as including in the Indo-Pacific — up and across to global bases, three more explicit policy- and strategy-orientated recommendations now follow:

- ISR "alternatives" to "contingencies", and more broadly the concept of ISR "resilience", remain key as diversification-related approaches on which to constantly maintain focus and to adopt in as long-term sustainable and systematic manners as possible going forward.[39]

- Reflecting ISR's substantially combined military headquarters department-related "G/J2 Intelligence" + "G/J3 Operations/Training" nature, operators do well to sustain: (a) both "wait-and-watch" (intelligence methodology) to "see-and-strike" (military/security/law-enforcement methodology) ISR approaches; as well as: (b) continue to strive for effective balances between those approaches in both time (tempo/rate/timeliness) and space (spatial/place/location) terms, operationally up and across to strategically.[40]

[39] See, for example, these concepts as introduced in *ibid.*

[40] For instance, see these different 'methodologies' and 'approaches', as discussed in *ibid.*, pp.277-278.

- Beyond being enacted on merely reactive bases, ISR ultimately persists as an area worthy of continuing to watch closely and to consider more proactively, well into the future. Ensuring that sufficiently appropriate conditions of transparency and accountability also endure when “keeping ahead,” not only for most functional purposes, ISR furthermore deserves its greater to collaborative engagement by both practitioners (operators) and analysts (observers), together with other stakeholders — such as decision-/policy-makers to the public themselves — being kept at least variously involved.

Finally, again keeping “Intelligence Engineering” substantially in mind, any area of ISR neglect cannot be afforded, wherever stakeholders may precisely sit or stand. Otherwise, guaranteed detriment will occur, particularly if command-and-control and other resources (staff/personnel or budgetary/financial) are more lacking — even are alternatively more mis-calibrated and/or mis-configured in their devotion — ultimately resulting in the counter-productive overarching mis-direction of ISR. Together with their attendant diversification involving their strategies, ISR enterprises once more benefit from most expeditious balances being struck overall. Sensitivity with imagination delivers in dynamic ISR.

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