



Geospatial Intelligence & AI/ML Progress During a Pandemic

How the IC Has Adapted to the Challenges of COVID-19

The recent global working climate, altered by COVID-19, has driven considerable change in how the geospatial community delivers support and new capabilities for artificial intelligence and machine learning (AI/ML). The pandemic forced analysts to work from home without the advanced infrastructure required for ML, but the high demands of mission requirements remained. The geospatial community had to adapt. New technologies are accommodating workflow gaps, existing technologies are being leveraged in new and innovative ways, and from an operational and cultural perspective, teams are embracing new approaches to their work. The United States Geospatial Intelligence Foundation (USGIF) reached out to its members in the community to understand this impact, assess the benefits and challenges, and ask the question: What can we expect moving forward?

Advances and Innovations in Technology

In classified environments, such as with the National Geospatial-Intelligence Agency (NGA), a large investment in higher-performance data processing environments was made for AI/ML. Historically at NGA, there is a limited need for AI/ML solutions in the unclassified space. However, due to the pandemic, working from home has left many without the infrastructure to keep up with AI/ML delivery. Donald Polaski, chief technologist with Booz Allen Hamilton, reports that he and his team have been working with NGA to maximize the utility of existing unclassified environments in response to COVID-19. This “develop low, deploy high” mentality provided a strong foundation for continuing development of AI/ML initiatives in the wake of COVID-19. Over the past four years, Booz Allen Hamilton has leveraged a cross-domain development approach. This approach enables development in unclassified environments and deployment into classified environments using end-to-end cross-domain pipelines. They have rapidly developed new technology, leveraged unclassified developers who were previously unable to support NGA’s mission due to clearance requirements, and ensured the low-side and the high-side environments were mirror images by employing a modern DevSecOps approach. With these cross-domain environments already in place, some NGA users and analysts have experienced an easier transition as those environments were repurposed to accommodate working from home. Analysts were able to sustain cross-domain development workflows, ensuring that model development and testing that occur in unclassified environments can be seamlessly transitioned to the classified space.

Maxar is also working with NGA to expand adoption of telework-friendly, collaborative mapping tools and commercial satellite imagery. The NGA Open Mapping Enclave (NOME) has been supporting the remote workforce to advance the production of Foundation GEOINT to support missions across the U.S. government, which grew in adoption since the onset of the pandemic. Using NOME, trusted users with a browser and internet service can leverage a combination of AI/ML models, automation tools, and human expertise to improve the volume and quality of foundational maps throughout the world. NOME leverages current, accurate, and unclassified data delivered through NGA’s Global Enhanced GEOINT Delivery (Global EGD) program.

Accessibility and connectivity to imagery during the pandemic are certainly challenges to AI/ML progress in the

geospatial community, especially in a telework environment. William Astore, chief operations officer of Skyris LLC, states that the incorporation of Open Source Intelligence (OSINT) as context to commercial imagery—which analysts utilize on classified systems—was also at risk due to the shifting work environment. Prior to the pandemic, Skyris developed a commercial data-as-a-service solution called ODIN, which uses AI/ML to sift rapidly through vast amounts of open content 24/7 and delivers processed and formatted open-source content to analysts in their classified operating environment. During COVID-19, with the absence of classified resources for analysts, the ODIN technology has been adapted to serve as a tipping-and-cueing situational awareness tool alongside NGA-developed systems to access commercial imagery and common collaboration tools for team coordination and reporting. ODIN is being used to support teleworking in two NGA offices, five divisions, at least seven branches, and it’s still growing. Teleworking analysts access the portal via the SBU. They can use the portal visualization to search and discover OSINT items of interest and download products.

Technology, being one of the primary influencers of AI/ML delivery, is clearly adapting to accommodate the geospatial community. The examples above show that vendors are not only maximizing technology to support several facets of AI/ML in teleworking environments, but also utilizing AI/ML methods in those technology enhancements and innovations. Practitioners in the geospatial community have noticed this trend and are looking to adapt as well. David Gleason, solutions architect with Amazon Web Services (AWS), reports that AWS has seen an increased demand for unclassified AI/ML environments, training on latest technologies, and managed services for AI/ML for data labeling, training, and deploying solutions.

Operational and Cultural Shifts in Delivery

The COVID-19 pandemic has not only encouraged the geospatial community to repurpose and enhance technology and infrastructure to support AI/ML endeavors offsite but is also pushing them to reimagine how teams work toward AI/ML solutions. The shift in how technology is utilized in this new environment alone is enough to warrant a look into how teams are adapting their operations toward efficiencies in delivery.

The IC’s, project MAVEN utilized teleworking analysts to significantly improve the training data for ML models. Analysts were able to annotate, tag, and label imagery in an

unclassified environment, which greatly improved computer vision models across the board. In a pre-pandemic environment, this focused exercise may not have been prioritized. But with limited capabilities in the unclassified network, analysts were able to dedicate resources and bandwidth to dive deep into data labeling, which shifted from the norm and eventually became a game-changing approach.

In the pandemic environment, which has analysts and practitioners working from their homes, more emphasis has been put on training as part of a daily and regular workflow. Booz Allen Hamilton utilized unclassified training resources to enable analysts to learn new tools while being impacted by COVID-19. By translating classified use cases to unclassified analogs, their teams deliver relevant mission-focused training even when trainees cannot access SCIF environments. This has enabled analysts to independently develop operational systems skills that normally would only be available in a classified environment. Additionally, Don Widener from BAE Systems Intelligence & Security Sector's Advanced Analytics Lab reports that telework environments have allowed for a major upskill training push with Robotic Process Automation (RPA). RPA enables analysts with a limited programming foundation to build automation models or "bots" to address repetitive tasks. Don reports that geospatial open-source intelligence analysts have been utilizing RPA for data collection and processing, further driving efficiency in AI/ML delivery.

Challenges in Adapting

Adapting to the workforce impacts of COVID-19 has had some benefits to AI/ML delivery. It has led organizations to redefine near-term objectives. There are several goals and tasks that can only be performed "inside the building" in the geospatial community for AI/ML delivery. During this crisis,

part of NGA's efforts have centered around getting people to think differently about their daily workflow and operation, and how they can do productive work that may differ from their "normal" structure pre-COVID. Another benefit is the surge in skills development. Since COVID-19 began to impact the workforce, an increase in the availability of unclassified training material allowed the community to train many analysts in a variety of tools. The training will continue to benefit the workforce and will carry through as workers and analysts return to the office.

Per the examples above, change in technology and culture have their benefits. But in that change, there are certainly challenges. As work shifted to the unclassified environment, one challenge is the changing risk posture of organizations as they increase the number of client endpoints (laptops, OS, applications, etc.). Organizations had to re-assess and re-examine processes and technologies to apply the appropriate controls and balance risk. Also, many organizations initially struggled (and some continue to struggle) to efficiently communicate with staff and analysts working remotely while a small (but growing) number operates on-site. Even as meeting, video conference, and collaboration tools become the standard, adopting forums for communicating between the environments has proven a challenge.

A Path Forward

While COVID-19 caused many initial concerns, the geospatial community has adapted technologically and culturally to continue progress with AI/ML initiatives and efforts. Time will tell as the "new normal" dynamically changes during eventual reconstitution phases. But the path forward can certainly build from lessons learned to overcome the challenges and maximize the benefits of the COVID-19 work environment.

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About USGIF

The United States Geospatial Intelligence Foundation (USGIF) is a 501(c)(3) nonprofit educational foundation dedicated to promoting the geospatial intelligence tradecraft and developing a stronger GEOINT community with government, industry, academia, professional organizations, and individuals who develop and apply geospatial intelligence to address national security challenges. USGIF achieves its mission through various programs and events and by building the community, advancing the tradecraft, and accelerating innovation.

About the Machine Learning & Artificial Intelligence Working Group

The Machine Learning & Artificial Intelligence Working Group is a community of interest within USGIF focused on the following topics:

- Near-term hard problems of interest to the USGIF community, which might be addressed by ML and AI technologies and methods
- Current and emerging ML and AI capabilities that have yet to find wide adoption in the USGIF community or application to problems of interest
- Improvement in the productivity of analysts and decision-makers, and finding more efficient and effective ways to keep up with the growing amount of data to be processed and analyzed
- Identification of the impacts of ML and AI to community workforce training and development needs

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