# 2035 GEOINT CONOPS

Community-Written Document

**NATIONAL SYSTEM FOR GEOSPATIAL INTELLIGENCE**

STRENGTH THROUGH COMMUNITY

Approved for public release, 21-637

# Contents

# Message from the GEOINT Functional Manager

The National System for Geospatial Intelligence (NSG) must provide fast, assured, connected, persistent, and resilient geospatial intelligence (GEOINT). These capabilities are vital to counter threats and enable decision advantage to the warfighters, first responders, and policymakers to ensure success in a world of great power competition. As we witness the technological evolution to our systems and capabilities over the next 15 years, the NSG will strengthen our GEOINT Enterprise by continuing to focus on being more professional, unified, and interoperable; forging a common path for GEOINT to shape the future. The 2035 GEOINT Concept of Operations (CONOPS) is a pivotal step in this process. The CONOPS provides the NSG with a roadmap to sustain GEOINT excellence and hold our adversaries at bay by focusing on three desired future end states: Sensor to Effect (S2E), Integrated GEOINT Operating Environment (IGOE), and GEOINT Superiority from Space (GSS).

The CONOPS illustrates the strategic vision for GEOINT in the next 5, 10, and 15 years and aligns with the priorities detailed in the NSG Strategy 2021-2025, as well as the 2019 National Intelligence and 2018 National Defense Strategies. This document serves as a guide for NSG members and partners but does not serve as programmatic guidance, and implementation may vary based on individual organization priorities, guidance, resources, and directives. By remaining focused on the recommendations and milestones laid out in the CONOPS, we will maintain our competitive advantage as the world leader of GEOINT in 2035.

I am proud to present the 2035 GEOINT CONOPS, written by the NSG for the current and future GEOINT Enterprise.

**Robert D. Sharp**
VADM, USN
GEOINT Functional Manager

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# Executive Summary

The 2035 GEOINT CONOPS was developed by representatives of the NSG to provide recommendations for unified development. Streamlined development drives the GEOINT Enterprise toward a collective and interoperable vision capable of meeting objectives that support the National Security Strategy.

The end states, drivers, milestones, and recommendations in this document are the result of collaboration across the GEOINT Enterprise *(reference Annex A3- CONOPS Development Methodology)*. Through extensive research, sensing sessions, data analysis, and consensus during a two-day offsite, the GEOINT Enterprise prioritized three desired end states to achieve a desired future for GEOINT that is fast, assured, connected, persistent, and resilient: S2E, IGOE, and GSS. S2E is vertically integrated, with a focus on sensors and the delivery to a wide range of external customers, while IGOE is horizontally integrated, with an internal focus on the systems and processes of transferring information across domains.

- **S2E** describes a fully automated GEOINT future with streamlined tasking, collection, processing, prioritization, exploitation, and dissemination of GEOINT and geospatial information across the NSG for informed and near real-time delivery to the end user.
- **IGOE** enables seamless interoperability and collaboration across multiple domains in the NSG.
- **GSS** provides a web of government, commercial, and foreign remote-sensing resources that cover the planet in a near real-time stream of images and geospatial data.

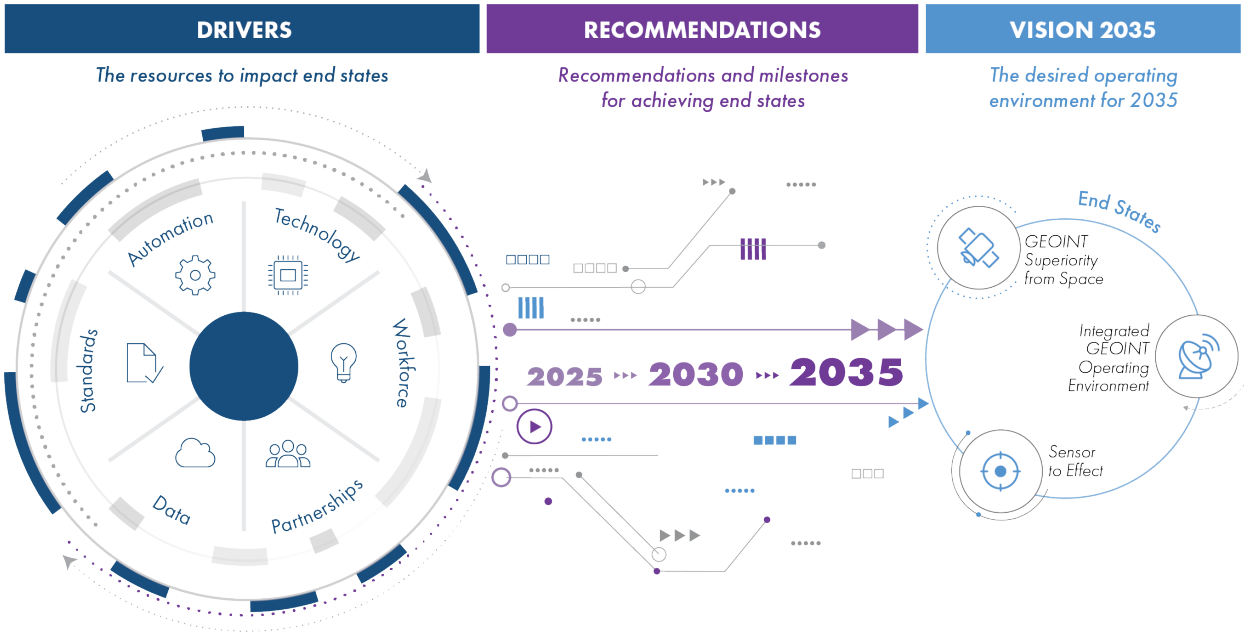


Figure: Roadmap to 2035

These end states are desired future outcomes and are not intended to capture the full range of challenges the GEOINT Enterprise will confront over the next 15 years. Rather, this publication focuses on the steps the NSG members can take together to shape its collective future. The CONOPS highlights three of the most desired futures that must be reached to maintain superiority in the 2035 environment. Throughout the CONOPS development process, the NSG recognized the need for exceptional competence in distribution of GEOINT data directly from sensor to end user, integration of GEOINT across domains, and superiority of sensors from space. These were the most salient pieces to sustaining GEOINT excellence in the future. By reaching the future end states detailed in S2E, IGOE, and GSS, the NSG can achieve its 2035 Vision.

The 2035 GEOINT CONOPS is intended to be a living document, with a review process to validate and adjust course, as necessary, as the NSG moves closer to 2035. The CONOPS details imperatives for change, barriers the NSG may face implementing those imperatives, specific recommendations to overcoming those barriers, and key achievements or milestones to reaching the 2035 Vision. The imperatives for and barriers to change are organized under drivers of change: automation, technology, partnerships, data, workforce, and standards. Each driver is a crucial and unique part of the future of GEOINT. These drivers are the tangible resources the NSG must use to influence the S2E, IGOE, and GSS end states and achieve the overarching 2035 Vision. The key milestones provide benchmarks to chart the progress in five-year increments leading up to 2035.

## Next Steps Forward

The NSG should use this CONOPS for achieving the unified GEOINT 2035 Vision. The NSG should reference the recommendations as a guide when crafting strategies, ensuring alignment to the shared vision. The milestones presented should be referenced in decision-making processes, ensuring tactical-level decisions result in achieving the benchmarks. It is recommended that the NSG, using the existing National Geospatial Intelligence Committee (GEOCOM) governance mechanisms, create a five-year Plan of Actions and Milestones (POA&M). This will be monitored in a biennial review process to validate and adjust the focus areas in the CONOPS as needed.

# Vision for 2035

## GEOINT in 2035 is Fast, Assured, Connected, Persistent, and Resilient

To maintain superiority through 2035 and beyond, GEOINT must be fast, assured, connected, persistent, and resilient. GEOINT must be available for rapid access by the end user to keep pace with the automated warfighter and keep up with the requests of the 2035 civilian customer. With the expansion of operational domains and nontraditional producers, GEOINT data, products, and services must be assured for the end user to trust the veracity of intelligence in making quick, life-threatening decisions that have serious ramifications to US national security. In an increasingly automated and connected world, GEOINT must further be resilient to physical, electronic, and cyber warfare and be available to the customer in a disconnected operational environment. The warfighter, first responder, and policymaker of tomorrow require continuous, interconnected, reliable GEOINT available at accelerated operational speeds to tackle the most challenging problem sets, and the NSG must adjust the course of both its capabilities and operational policies now to ensure the United States and allies are protected.

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# *End State:* **Sensor to Effect (S2E)**

## Summary

S2E is essential to GEOINT success in 2035, as the NSG must innovate with the end user or desired effect in mind to expand its influence on the growing number of both traditional and nontraditional GEOINT customers. S2E describes a fully automated GEOINT future with streamlined tasking, collection, processing, prioritization, exploitation, and dissemination of GEOINT and geospatial information across the NSG for informed and near real-time delivery to end users from the national level down to the tactical edge. *This vertical integration of sensor transmission directly to the end user is critical to the 2035 Vision. In the near term, adversaries are expected to have adopted automated processes. To maintain competitive advantage, the customer cannot afford time-consuming "human-in-the-loop" practices, thus encouraging the operating environment to adapt to more immediate transmission of GEOINT and geospatial information to the customer.* The S2E end state for 2035 is unique in that information will securely transmit from diverse sensors through multiple systems at rapid speeds, due to advances in artificial intelligence (AI) and machine learning (ML) to ultimately reach a more diverse group of end users.

As GEOINT becomes more widely used, from enhancing kinetic impacts on the battlefield to providing faster and more detailed warnings of civil disasters at home, the number of end users will expand. S2E assumes the end users in 2035 will require data and intelligence analysis at such a rapid speed that they become the direct recipients of information when possible. The NSG must focus on how the end user will utilize GEOINT in 2035 and ensure the customer understands the legal and ethical standards required to use and disseminate GEOINT, particularly when new users of GEOINT are integrated into the process. The US and its partners must consider the ethical concerns over the expanded use of automation and limited "human-in-the-loop" practices, especially when the end user could be a non-human decision-maker. As the user base expands and as human interaction within the delivery process diminishes, the GEOINT Enterprise must also consider the investments and policy changes necessary for GEOINT to succeed. The metric for success in S2E is an improvement in speed, accuracy, and automation across the network of NSG systems, not only in fulfilling requests, but also in anticipating demands of GEOINT customers and sensors operating nearly independent of centralized NSG processing.

## S2E in 2035

In a matter of minutes, what began as a small blaze erupted into a large uncontained wildfire spreading across the west coast, threatening Travis Air Force Base (AFB) and nearby residents. GEOINT sensors with automated processing detected the spread within minutes, immediately sending alerts to local authorities, Travis AFB command, and the National Interagency Fire Center.

Residents received alerts on their phones with GEOINT data highlighting the areas in danger. Unmanned aerial systems (UASs) deployed immediately to the region upon notification from the sensors. Emergency managers focused on public messaging and emergency response. Local partners readied their shelters, businesses, and medical units to respond to residents' needs.

By 2035, the availability of sensors will enable emergency notifications and rapid response times to crises around the world. These devices will activate an automated process where information is instantaneously sent on countless platforms to stakeholders in order to accomplish each partner's related, yet disparate, mission or effect. Whether that effect activates a weapons system overseas, launches military action, or saves lives by notifying civilians of potential dangers, S2E in 2035 means utilizing all forms of GEOINT to save more lives—faster.

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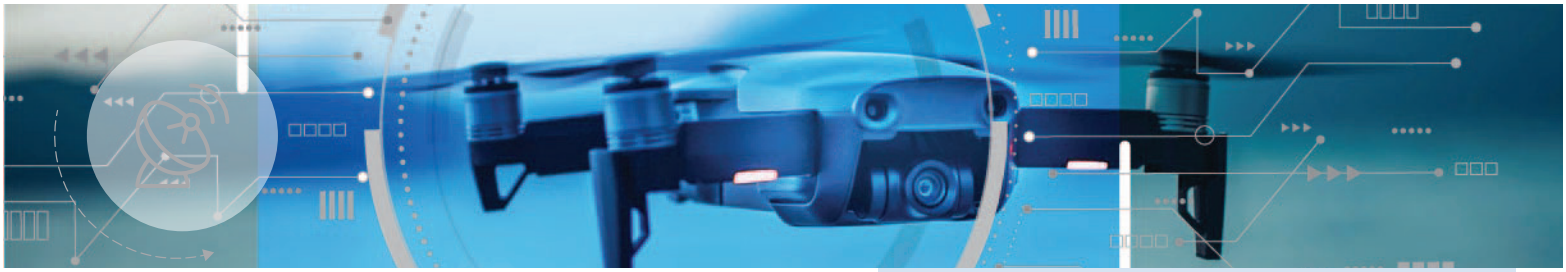
# *End State:* **Integrated GEOINT Operating Environment (IGOE)**




## Summary

The IGOE creates the conditions for interoperability, enabling seamless coordination through fully leveraged automation, trusted and accessible data, a diverse and skilled workforce, strategic partnerships, and common GEOINT standards. Streamlined, interoperable systems, enabled by Department of Defense (DoD) and Intelligence Community (IC) efforts, orchestrate rapid collection, automatic cross-cueing, and improved access and assured GEOINT to users across security domains. Interoperability increases GEOINT Enterprise performance in its ability to act together coherently, effectively, and efficiently, thereby reducing unnecessary duplication, enabling communication across security domains, increasing collaboration, and enhancing delivery of accurate GEOINT to the customer in near real time. *This horizontal integration of information transmitted across domains is critical to the 2035 Vision. The global market is rapidly expanding capabilities into emerging domains, challenging the warfighter, first responder, and policymaker to surpass competitors with superior interoperability.*

The NSG is currently hindered by organizational stovepipes and resistance to sharing classified information with partner organizations. As more commercial partners join the GEOINT Enterprise, the availability of unclassified GEOINT will expand, as will the need for the NSG to navigate across security domains to enhance communication and cooperation. GEOINT data, products, and services must be coordinated securely, rapidly, in the desired format, and on the appropriate platform to achieve the 2035 Vision. The metric for success in IGOE is seamless interoperability and communication among all partners and their respective platforms; customers will wait only minutes for data transfer across the NSG–speeds significantly faster than the current operating environment.


## IGOE in 2035

A bright flash, deafening boom, and violent force hit the UAS on a routine intelligence collection mission overseas. The United States and its allies watched in shock as the video stream faded to black, fully cognizant of the highly sensitive, state-of-the-art sensors and tracking system onboard. The UAS, a valuable intelligence asset that had thus far managed to circumvent enemy counter surveillance, plummeted into adversarial territory. Using GEOINT was crucial to avoid the latest technology on the UAS falling into enemy hands.

Feedback from the UAS automatically streamed data to the US and its allies. As soon as the UAS was hit and drifted off course, the search and recovery protocol was immediately set into motion. Automated collection procedures retrieved data, from both classified and open-source elements, and overlaid the information with the terrain data collected from across the NSG. Meanwhile, automated analytical modeling provided context to recent imagery to inform decision-makers of potential geopolitical ramifications of the recovery mission. Decision-makers identified other government and commercial partners who had a need to know of potential repercussions in the region.

Before the decision-makers could interpret the images they received, the GEOINT relevant to the UAS's location was assembled and ready for the recovery mission. IGOE in 2035 means more partners working together using persistent and resilient GEOINT to communicate and safeguard vital intelligence assets.

# *End State:* **GEOINT Superiority from Space (GSS)**

## Summary

GSS is a crucial outcome in 2035, enabling the United States to lead the space domain by leveraging the power of space and near-space capabilities to provide data that answers multifaceted US and ally needs. GSS will provide a web of government, commercial, and foreign remote-sensing resources that cover the planet in a near real-time stream of images and geospatial data. *This end state is critical to the 2035 Vision since great power competitors are investing exponentially in space—a domain critical to providing the warfighter, first responder, and policymaker with on-demand GEOINT.* GEOINT from space is essential in providing all-weather, day and night, persistent surveillance of targets, as well as continued monitoring of the space domain.

The maturation of the US Space Force and the growth of space capabilities, by both allies and adversaries, will impact the ubiquity of remote-sensing data. GSS will connect satellite data with automated, long-dwell airborne platforms and encryption standards based on quantum technologies to better access location positioning, navigation, timing (PNT), and targeting data, high-bandwidth internet, and remote-sensing data. Government and non-government entities will continue to have greater autonomy within the space domain to make decisions with limited repercussions if international doctrine is not widely implemented, regulated, or enforced, impacting the location and placement of space sensors in a densely packed future space terrain. The NSG must determine how to navigate decision-making in space while maintaining a competitive advantage against adversaries. The metric for success for this end state is the continuous availability and production of GEOINT at accelerated operational speeds regardless of domain.

## GSS in 2035

"Alert! Code Silver. Code Silver." The automated voice overhead alerted the Joint Space Force and US Space Command (SPACECOM) Watch Floor of a US ally's spacecraft failure. It was not the first time Colonel Jane Smith, the Commanding Officer on the Watch Floor, had heard this alert.

As GEOINT signals and systems identified the potential cause, Colonel Smith considered the current climate that held many additional variables to consider since its expansion over the last 15 years. Not only were foreign countries advancing their own missions in space, but commercial and academic partners were also expanding their interest in the domain. The satellite failure could be the result of space debris or a geomagnetic storm, but Colonel Smith was not about to rule out more nefarious activity. In a few minutes she would have evidence from the GEOINT data and algorithms to consider the next steps. With the development of the US Space Force over the past 15 years, the United States in 2035 maintains superiority in space-based satellite surveillance and monitoring systems around the globe. Many allied nations and commercial partners rely on US capabilities for support.

In 2035, GSS means the ability to collect worldwide GEOINT on time and on demand with little to no adversarial interference. These capabilities ultimately provide warnings against complex, unique challenges posed by either a growing number of space-capable adversaries or natural events, while remaining connected through resilient, assured, space-based systems.

# Recommendations for Achieving End States

## AUTOMATION

- **Data Standardization:** Identify data curation and standardization mechanisms for current and future data sets for AI/ML automated processes.
- **Security:** Build safeguards for a growing automated future where algorithms and systems communicate with minimal human involvement.
- **Dataset Development:** Prioritize the development and acquisition of large, accurate training datasets that align with data standards.
- **Producing Results:** Identify common GEOINT services for data integration and machine-to-machine translation of automated results.

## TECHNOLOGY

- **Acquisition Process:** Modernize and fast-track the acquisition process of new technology, from initial request to research and development (R&D) to final capability delivery, in order to address areas for improvement at a speed equal to the evolution of technology.
- **Future Capabilities:** Assess feasibility and cost of greater onboard processing capabilities for future sensors with mission partners.
- **Development Priorities:** Advance ubiquitous data storage, quantum mechanics for better predictive modeling, high-speed wireless network bandwidth constraints and system interoperability, and synchronize budget and priorities with mission partners.

## PARTNERSHIPS

- **Interoperability across Classifications:** Bring partners together, led by the GEOINT Functional Manager (GFM), GEOCOM, and GEOINT Mission Managers, to pursue a unified, interoperable approach that provides the end user with user-friendly GEOINT at the lowest possible classification level.
- **Customer Needs:** Conduct a robust customer discovery effort or expand existing efforts to document the needs and acceptance of GEOINT end users, mission partners, and customers.
- **Define Roles:** Create a Decision Priority Framework for government, commercial, academic, and nontraditional GEOINT users that considers roles and responsibilities, acceptable risk tolerance, and the contribution of current and future partners of the GEOINT Enterprise.
- **Comparative Advantage:** Focus on building partnerships with technology groups that could address gaps in the GEOINT Enterprise's capabilities.

## DATA

- **Data Integrity:** Adopt data integrity as a shared mission imperative, and ensure data is appropriately protected and reliable throughout its life cycle.
- **Data Format Study:** Advance policies, standards, and a common language for a variety of data; this upper-level ontology will promote seamless data sharing, utility, and interoperability.
- **Strategy:** Develop and implement a strategy to manage and vastly augment structured datasets to optimize and scale automation, augmentation, and artificial intelligence (AAA) efforts.
- **Integration:** Automate and increase the pace at which new data is ingested into the ecosystem, fuses with foundational datasets to derive context and meaning, moves across security domains, and disseminates to end users.

## WORKFORCE

- **New Skills:** Develop and maintain a dynamic and multi-track talent development program to recruit and retain a highly skilled, data-proficient, AI-specialized, and domain-specific workforce across the NSG. Focus recruitment efforts on science, technology, engineering, and mathematics (STEM) skills.
- **Standardize Training:** Build standardized training programs across the NSG that foster partner support for a collaborative culture of innovation and a multi-disciplinary understanding of each stage of the GEOINT process.
- **Training Programs:** Advance education, training certification programs, and simulation capabilities that focus on data science, AI, space phenomenologies/sciences, and real-world operations.
- **Specialist Workforce:** Establish a cadre of AI specialists to guide the development of AAA, ML, computer vision, and human-machine teaming in order to better integrate automated systems across the NSG.
- **Mentoring Program:** Design and implement a widely accepted, cross-agency data mentoring program to foster technological cooperation between NSG members and partners.

## STANDARDS

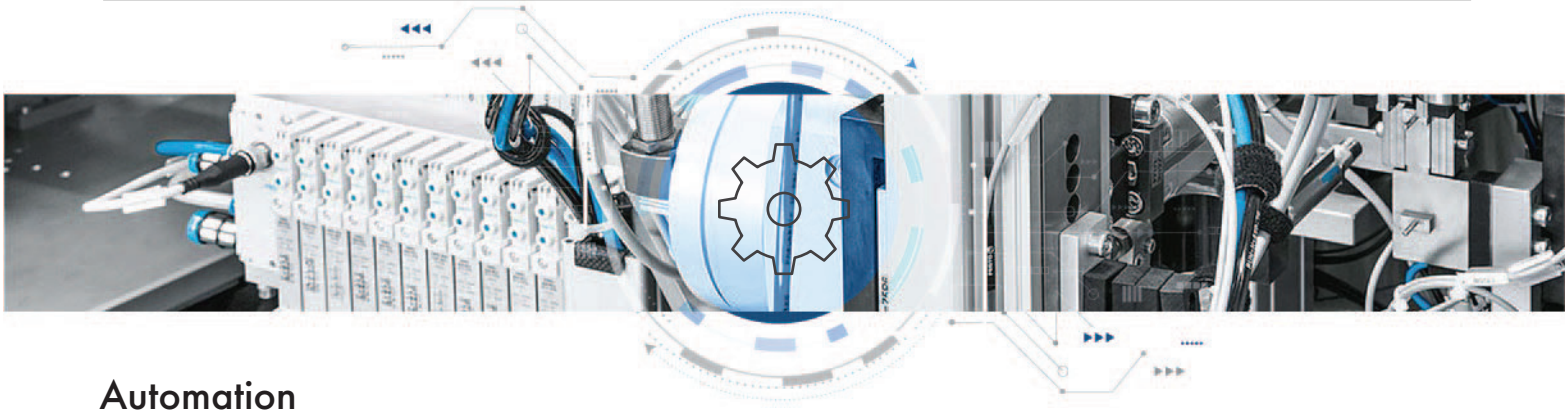
- **Implementation:** Actualize new capabilities in compliance with common GEOINT standards and those cited in the DoD IT Standards Registry. These should be in accordance with the DoD GEOINT Manager and IC GFM's guidance in supporting the Joint Enterprise Standards Committee.
- **Adaptability:** Fully integrate the GEOINT Enterprise using mandated standards, and position the GEOINT Enterprise for multi-intelligence collaboration.
- **Educate Community on Baseline:** Develop and publish a baseline of GEOINT standards that allows for increased transparency of customer requirements and ease of implementation during development, modification, and re-acquisition.

# Milestones


| DRIVER | 2025 | 2030 | 2035 |
|---|---|---|---|
| **Automation** | • **Automated processes** reach a milestone of **80% human interaction** and **20% automation.**[i, ii]<br>• NSG systems using **AI/ML cohesively operate at 35% interoperable efficiency.** | • **Automated processes** reach **50% human interaction** and **50% automation.**<br>• NSG systems using **AI/ML cohesively operate at 65% interoperable efficiency.** | • **Automated processes are run entirely by machines with limited human interaction.**<br>• NSG systems using **AI/ML cohesively operate at 85% interoperable efficiency.** |
| **Technology** | • **An expert panel** is created to focus on investing in and developing innovative technology for the NSG.<br>• Communication systems and platforms are impenetrable, protecting the **expansion of ubiquitous data storage.**<br>• An NSG and GEOINT Enterprise upgraded strategy is developed and implemented to field **new capabilities and upgrade legacy programs.** | • Wireless networks **rival broadband networks.**<br>• Ground-to-platform communications and onboard processors are **seamlessly integrated**.<br>• NSG, academia, commercial partners, and international entities cooperate toward a sustainable and predictive process for building, replacing, and **updating technology in line with fiscal planning cycles.** | • All processing is performed on **secure, resilient, virtual, wireless machines.**<br>• GEOINT systems use **onboard AI analysis and production** of near real-time GEOINT products.<br>• NSG technology maintains a **robust R&D program**, and technological advances are in line with fiscal planning. |
| **Partnerships** | • The NSG **collaborates** with partners to **prioritize** clear GEOINT data and product standards for the GEOINT Enterprise; the NSG shares standards with international, commercial, and academic partners to promote interoperability.<br>• The NSG builds and implements a **community framework** for evaluating and prioritizing partnerships across governments, the commercial sector, and academia. The framework assesses factors such as existing partner capabilities, critical intelligence needs, and technical needs. | • The NSG creates and implements a new **acquisition process** to allow for both the rapid procurement of mission critical capabilities that are compatible across mission partners and assistance in testing capabilities while collectively **advancing tradecraft and workflows among partners.**<br>• Enhanced future partner vetting processes ensure Defense Industrial Base partners meet emerging requirements intended to **secure the earliest R&D activities** through the entire acquisition life cycle, including disposal.<br>• **GEOINT training is standardized across the NSG** and informs Allied System for Geospatial Intelligence (ASG) training programs. Best practices are integrated and updated annually. | • Partners have **seamless access** to various levels of data, capabilities, tradecraft training, and collaboration resources, enhancing interoperability and transparency. Each partner has authenticated access to the right data for its mission and automatically connects to partners working similar missions.<br>• Uniform standards across partners create seamless interoperability and unification. **All partners can contribute real-time content.** |

| DRIVER | 2025 | 2030 | 2035 |
|---|---|---|---|
| **Data** | • The NSG revises **policies and processes** to enforce the integrity and interoperability of data. NSG leverages expertise across the commercial sector and academia to identify, implement, and scale data-protection capabilities.<br>• The NSG builds a common, **upper-level data ontology** and design testing and verification processes.<br>• The NSG rapidly accelerates the development of AAA focused on collection requirements and tasking, with the goal of **fully automating processes** by 2030. The NSG develops and implements a strategy to manage and augment shared training datasets, focusing analytic resources on priority regions and domains. | • The NSG makes Data Integrity Solutions **a program of record** to ensure dedicated and persistent monitoring, maintenance, and investment. The NSG creates **clear and agile policies** for evaluating data integrity and communicating associated risk.<br>• The NSG **fully automates collection** across space, air, maritime, and ground platforms, resulting in agile, near real-time tasking, collection, and data delivery that is tipped and cued by changes in structured observations, key intelligence questions, and time-sensitive tactical requirements. | • The NSG makes use of robust market research and collaboration with **commercial and academic** partners to augment testing environments and increase acquisition agility. Incorporating commercial partners shortens timelines and expands the solution space for discovering data defense capabilities and analyzing the effectiveness of ontology-driven interoperability.<br>• The NSG ensures data collected by space-based and autonomous platforms is processed and integrated in real time, rendering usable data. Data moves seamlessly and securely across security domains at machine speed, while users **instantaneously access and contribute** to the data ecosystem, irrespective of platform. |
| **Workforce** | • The NSG builds standardized **live or simulation** training programs that foster a unified, collaborative culture of innovation and a multi-disciplinary understanding of each stage of GEOINT.<br>• The NSG **advances data science, AI education,** and training certificate programs for the current workforce and new users of GEOINT.<br>• Significantly **reduced recruitment and clearance timelines** support quicker shifts in skill sets and work roles within the NSG. This supports recruitment of employees with a wide range of scientific and data skill sets. | • The NSG creates and maintains a dynamic and multi-track talent development program to **recruit and retain** a highly skilled GEOINT-, data-, and space-proficient workforce.<br>• The NSG **expands the cadre of AI experts and analysts** working on the development of operational AI algorithms.<br>• The NSG **develops an outreach program for middle and high schools** to cultivate larger talent pools and encourage STEM-based majors.<br>• AI/ML specialists **proliferate automation skills amongst traditional analytic processes** to replace a significant portion of manual tasks. | • All work roles in the NSG will involve **some level of automation.**<br>• The NSG has employed a sufficient **workforce of certified data and AI specialists.**<br>• The NSG continues to periodically **re-assess its allocation of human talent** based on the strengths and weaknesses of automated processes, refocusing on challenges requiring human judgment. |
| **Standards** | • The NSG **fully exercises existing GFM authorities** necessary to confirm the integration of standards and architectures into GEOINT and related systems.<br>• NSG overhauls older intelligence, surveillance, and reconnaissance (ISR) GEOINT standards to meet **new GEOINT phenomenologies,** capabilities, and modalities.<br>• **Additional GEOINT standards test tools** are developed to help programs perform testing more rapidly and improve conformance. | • **GFM Standards Assesment (GFMSA) is fully institutionalized.** All new and existing GEOINT acquisition programs are implementing the most current GEOINT standards and utilizing conformance tools throughout the acquisition life cycle.<br>• The NSG establishes and uses a collaborative GEOINT standards testing environment to **improve ease of testing and increase overall interoperability.** | • **NSG governance and policies are synchronized** in standards conformance.<br>• The scope of **Geodesy standards is expanded** beyond the Earth to include the geometries of the solar system.<br>• All systems are developed in conformance with **mandated standards**, greatly enhancing AAA capabilities within the NSG and ASG. |

# Drivers



## Automation

Automation will impact nearly every aspect of GEOINT in 2035, to include tasking, collection, processing, prioritization, exploitation, and dissemination. Automated algorithms will identify key adversary activity and equipment and will use business rules, logic, and automated tasking to collect GEOINT to address intelligence gaps. Textual and geospatial products will be automatically produced, classified, aggregated, and disseminated to all members and partners with a need to know, and human analysts will be notified of important updates and products almost instantaneously. The full extent of this process encompasses a vast range of automation types—from processing data from single sensors to complex judgment engines incorporating many data layers—all of which must work together. GEOINT will need to be conducted in concert with other mission sets, leveraging standardized communication protocols, assured and resilient ground stations, communication paths, and an innovative workforce able to quickly resolve challenges and cooperate with international partners. GEOINT users must adapt to become less reliant on a single centralized server. Leading up to 2035, the efficient and effective use of AI/ML must include standardized data formats and robust communications networks to allow for the electronic search, discovery, and retrieval of GEOINT data. These automated processes will be conducted with minimal human interaction, necessitating that machines adequately learn to produce recommendations for decision-making. These automated processes must be accurate, assured, precise, transparent, secure, and interoperable with all GEOINT users, where algorithms and systems communicate with each other to share data and make informed decisions.

| Imperatives for Change | Barriers to Change |
|---|---|
| The secure acquisition of data must increase in speed to meet customers' timeliness requirements. | Current domain-specific and proprietary AI/ML algorithms, models, and standards prevent efficient and effective integration of data. |
| Automated processes must be highly accurate, assured, precise, transparent, secure, and interoperable for use without human assistance to counter potential mistrust and adversarial attempts to disrupt algorithms. | Potential cyber threats disrupt information dissemination and processing infrastructures within the GEOINT supply chain. |
| Algorithms must be modular, whenever possible, to leverage AI/ML for a range of solutions for decision-making purposes. | Continuous creation, updates, and sustainment to ML training data, business logic rules, and machine-readable workflow processes require persistent attention and maintenance as well as a secure foundational infrastructure. |

## Technology

The GEOINT Enterprise will increasingly rely on technology that is secure, reliable, interoperable with existing and emerging partners and systems, and agile in its acquisition process. Commercial, national, and partner platforms will blanket the globe in GEOINT coverage spanning the electromagnetic spectrum and will process near real-time data that serves the warfighter, first responder, and policymaker. A variety of systems will serve as nontraditional GEOINT collection platforms, and new commercial, academic, and international partners will join the GEOINT Enterprise. Given the rate at which new technologies emerge, the NSG must upgrade its systems or partner with industries to provide the technological advantage necessary to improve mission execution, compete on the global stage, and remain resilient against adversarial targeting. The GEOINT Enterprise must prioritize technology updates to address shortfalls and leverage innovation during the earliest stages of the R&D process, including a thorough assessment to ensure any new technology is resilient against adversarial threats. The 2035 environment will not allow for a slow acquisition process but will instead require proactive planning to prioritize technology streams early and foster the growth of promising future innovations while ensuring resiliency against nefarious actors. By doing so, the NSG not only increases efficiency, but also remains ahead of adversaries by minimizing cyber and physical infrastructure threats.

| Imperatives for Change | Barriers to Change |
|---|---|
| The NSG must acquire technology through a faster acquisition rate than adversaries to ensure technological superiority. | Compatible technology requires coordination internally and externally with partnerships across varying missions and goals. |
| Current technology used in government systems and across the NSG must perform at a pace which is cutting edge and ahead of the innovation curve. | Current opaque cross-dependencies on legacy systems reduce productivity, prevent compliance with new standards, and risk security vulnerabilities. |
| Autonomous onboard computing and high-speed networks must continue to advance in order to hold adversaries at bay. | Key systems may rely on equipment or raw materials monopolized by adversaries, creating potential pressure points or back doors for exploitation. |
| To attract and retain key technologically savvy partners, the NSG must demonstrate its own technological strength, compatibility, and security. | Input from end users is not always considered when developing new technology. |

## Partnerships

In 2035, the GEOINT Enterprise will achieve interoperability with critical, strategic, traditional, and nontraditional partners, to include interoperable networks and shared standards for data, automation, training, and exercises. With more GEOINT data publicly available and more partners seeking information, GEOINT partnerships will face different challenges associated with risk. NSG members trust mission partners to secure sensitive information from malicious actors, but those same mission partners also rely on the free flow of information across network classification levels to operate quickly and effectively together. The confidence and trust in partner technology holdings and data processing will intensify in importance as the GEOINT Enterprise expands its partnerships and interoperability to execute mission objectives outside of centralized hubs and across new domains. The NSG should aim to close capability gaps and leverage the comparative advantages of partners. Such collaboration will deliver mission-ready data and capabilities to provide a competitive advantage to the entire GEOINT Enterprise.

| Imperatives for Change | Barriers to Change |
|---|---|
| The NSG needs agile policies and governance structures to securely and rapidly bring critical capabilities to bear, enable evolving relationships across industries, and hold partners accountable. | Years of operating within a single agency or office will require a cultural shift within the larger GEOINT Enterprise to foster an open exchange of methodologies and solutions to successfully enhance public-private GEOINT partnerships. |
| Given the growth of GEOINT providers and data availability, there must be common data and production standards to ensure interoperability. | Changing procedures and workflows that have long been ingrained in business protocols requires time, diligence, training, enforcement, and accountability for personnel and organizations. |
| Clear roles and responsibilities must be established among partners to decrease unnecessary duplication and maximize impact. | The GEOINT Enterprise currently lacks an efficient and collective means of reaching consensus on areas for improvement and assessments on the utility of new capabilities. |
| GEOINT partners must be willing to balance sharing information with partners across classification levels at a more rapid pace while still adhering to security protocols. | The growing prevalence of cyber attacks on any partner's infrastructure or communications system can disrupt the entire GEOINT Enterprise's ability to securely deliver GEOINT. |

## Data

To stay ahead of adversaries in the data-rich environment of 2035, the NSG must produce, manage, and share assured data with speed, accuracy, and precision. National, commercial, academic, civil, and foreign sensors will deliver high-quality, persistent, near-global coverage. The volume and variety of information and geospatial data will exponentially increase. Human and machine teaming will be crucial to disseminating relevant information in the data flow from partners. No matter their location, users will tap into an assured data ecosystem and easily identify usable information. They will then be able to filter data in standardized formats to provide insight and support to decision-making from tactical to strategic levels. Acceleration across all components of the tasking, collection, processing, prioritization, exploitation, and dissemination process, powered by automation and technological advances, will deliver timely, trusted, and curated GEOINT and geospatial information to users. The automation and seamless movement of data across security domains, rapid scaling of technical solutions, consistent and clear governance, data standardization, and a data literate workforce will promote rapid data accessibility and integrity across the GEOINT Enterprise.

| Imperatives for Change | Barriers to Change |
|---|---|
| The GEOINT Enterprise must ensure the integrity of data that enables GEOINT workflows. Without assured GEOINT, there is a significant risk of eroding confidence and trust in the GEOINT Enterprise. | Scaling, implementing, and maintaining data protection solutions across the GEOINT Enterprise is increasingly difficult and complex due to a growing influx of cyber attacks and disinformation. |
| Data must conform to standards for uniform communication across systems and domains for interoperability to succeed. | The absence of a GEOINT Enterprise data inventory increases the likelihood of data duplication and precludes a universal understanding of the breadth of usable data, to include data format, storage location, use restrictions, and data provenance. |
| The NSG needs significantly larger volumes of shared, structured data to optimize AAA efforts, scale capabilities across missions, and fuel future advances in AAA. | The GEOINT Enterprise lacks shared training goals, requirements, and resources needed to achieve a common level of data literacy and data integrity proficiency across all partners. |
| Maintaining decision advantage requires data to seamlessly and securely flow into and across the data ecosystem at increasingly faster speeds. The NSG must create resilience and trust in the automation of data technologies that enhance data volume, variety, velocity, and accessibility when disconnected from traditional networks. | A lack of knowledge of the existing governing data standards hinders communication across partners and users. |

## Workforce

The GEOINT workforce will require significant innovation to meet the challenge of exponential change in technology over the next 15 years. Every employee in the NSG must be equipped with superior critical thinking skills and robust data literacy to increase the rate of innovation and adaptability necessary to maintain a competitive edge. Exposure to cross-NSG missions and systems should be a deliberate learning objective for NSG personnel. By creating a governance structure that allows for mutual exchange of talent flowing between government, academia, and commercial partners, the Enterprise can more rapidly evolve as the systems and processes around it advance. Such cross-pollination strengthens partnerships in the GEOINT Enterprise. The strategic workforce planning should also be structured to support speed and fluidity. By 2035, AI/ML advances will open new opportunities to enhance the value of the highly skilled workforce. Machines and technology will replace some roles previously held by humans, a major shift in workforce roles that requires the NSG to consider how to maximize the skills of employees and enhance safeguards for any decisions now made with limited human interaction.

| Imperatives for Change | Barriers to Change |
|---|---|
| As automation and data increasingly become part of every work role in the NSG, breaking traditional barriers between technology providers and users, the workforce must be proficient with AI tools and technologies and the implicit ethical standards. | Many NSG structures currently separate technology providers and users bureaucratically, which limits technological collaboration between work roles and potentially constrains organizational change. |
| The NSG must shift its training methods from imagery and geospatial fundamentals to a broader range of analytical, scientific, and technological skills. | Traditional incentive programs are currently ineffective for competing with the commercial sector for recruiting and retaining a skilled workforce. |
| The NSG must be more competitive with the commercial sector to attract and retain cross-trained talent. | The rise of automation and data ubiquity challenges the recognized identities of existing work roles, especially as skill requirements shift in concepts of "expertise." |
| The NSG needs to expand its scientific and technological partnerships to remain competitive. | Current US government hiring and clearance processes are slow to adapt in near-term changes to talent needs. |

## Standards

Standards provide the basis for system interoperability and operational efficiency. By 2035, to be adaptable and effective, an overhaul of older ISR standards is required to meet new GEOINT phenomenologies. Burgeoning commercial, academic, and international partnerships will require the increasing use of agile standards that can adapt to changes in data systems, technological advances, and the ways in which the GEOINT Enterprise interacts with them. The GFM requires changes to existing doctrine and the ability to conduct assessments in order to maintain purview over all aspects of DoD, IC, allied, commercial, and academic partner efforts. By working together, GEOINT Enterprise members can avoid creating unnecessary barriers and time-consuming processes to fuse data across multiple networks of sensors and systems. The inability to modify proprietary software or coding standards destabilizes interoperability with national resources. The evolving nature of the drivers requires the GEOINT Enterprise to mandate and enforce data standards across governance, sharing, tradecraft and training, and acquisition requirements. In 2035, this will enable the GEOINT Enterprise's breadth of customers to confidently fuse GEOINT, access the sources securely, and trust the information at the lowest classification level possible.

| Imperatives for Change | Barriers to Change |
|---|---|
| The existing NSG governance structure must evolve as a deliberate, integrated, and efficient decision-making forum to effectively exercise GFM authorities in requiring assessments and enforcing standards compliance for all aspects of partner GEOINT efforts. | Lack of accountability or incentives and consequences for NSG organizations prevents the GFM from enforcing standards compliance through NSG governance. |
| The proliferation of unclassified and non-governmental sensor sources requires a shift to more publicly available and open standards with an ability to adapt to changes. | As GEOINT production expands, the ability to draft comprehensive standards enforceable across all partners, including commercial partners, will prove challenging. |
| The NSG alignment is the competitive advantage against all adversaries. Technology advancements can only be fully realized across the GEOINT and multi-intelligence Enterprises with the implementation of capability-based standards and associated metadata. | The lack of GEOINT standards awareness across the GEOINT Enterprise inhibits successful unification around published guidance, preventing appropriate consideration when looking to implement new policies. |

# Annex

## Scope

The 2035 GEOINT CONOPS, developed and authored by the NSG, provides a forward-thinking strategy for the 2035 GEOINT operating environment. This document is designed to prepare the warfighter, first responder, and policymaker for a future where GEOINT is fast, assured, connected, persistent, and resilient.

The 2035 GEOINT CONOPS provides:

- Three desired future end states (S2E, IGOE, GSS) that drive the NSG toward the 2035 Vision.
- Recommendations for the GEOINT Enterprise to take action and enable the desired future end states; and milestones in five-year increments of 2025, 2030, and 2035 to benchmark progress toward the desired end states.
- A roadmap for the NSG to apply the right skills, technology, and processes to prepare for future challenges while meeting the increased demands for GEOINT.

This 2035 GEOINT CONOPS will not provide detailed recommendations regarding specific budget or programming but will propose focus areas for future investment and acquisition. This CONOPS will not provide concrete staffing requirements in conjunction with its overall recommendations but will provide skill set and personnel priorities for future investment and growth. It is recommended these priorities are then used to create a five-year POA&M, under existing GEOCOM governing authorities, to validate and adjust the focus areas in the CONOPS as needed.

## Alignment to Enterprise Policy Objectives

This Enterprise-driven document was authored in conjunction with existing policies and directives across the DoD and IC, ensuring the recommendations for 2035 align with previously released strategies. The 2035 GEOINT CONOPS aligns with publications and policy objectives in circulation, to include NSG 2021-2025, 2017 National Security Strategy, 2018 National Defense Strategy, 2012 Department of Defense Directive (DoDD) 5105, 2014 NSG Directive 1100, 2019 National Intelligence Strategy, 2020 Defense Intelligence Strategy, and 2009 Intelligence Community Directive (ICD) 113. In mapping the strategic direction envisioned for people, process, technology, and infrastructure, this document encompasses over 100 direct alignments to previous directives.

Standards are consistently depicted with the intent of unifying the GEOINT Enterprise under joint doctrine. Authority to lead and provide functional management guidance to the NSG—including the issuance of doctrine, standards, policies, directives, and procedures—required for the NSG rests with the GFM through DoD 5101.[iii] The NSG Strategy 2021-2025 outlines standards as processes unified in efficient collaboration, synchronization, and delivery of GEOINT across the enterprise to create strategic advantage.[iv] The DoD has been mandated to establish strategic partnerships with US companies to align commercial sector resources to priority national security applications.[v] Barriers must be removed to capitalize on the full use of talent across the GEOINT Enterprise.[vi] The NSG Strategy 2021-2025 envisioned by the GFM reiterates the goals of professionalism, interoperability, and unification through the metrics of speed, accuracy, and precision. This previous strategy document personifies the 2035 GEOINT CONOPS drivers of workforce, partners, and standards through fast, assured, connected, persistent, and resilient means.

## Current Environment

The current GEOINT Enterprise is adapting capabilities to an increasingly commercialized and competitive sector. The drivers of future change (automation, technology, partnerships, data, workforce, and standards) are key to steer the GEOINT Enterprise toward its shared vision in 2035.

Over the past 15 years, the GEOINT Enterprise has faced a rapidly changing landscape, with a massive influx of new data and sources that has affected how GEOINT is delivered to customers. Change has been a constant theme in the GEOINT ecosystem since its inception, transitioning from wet film to digital remote sensing. Currently, GEOINT must adapt to process big data and transition into a more automated future. The GEOINT landscape will continue to rapidly change over the next 15 years, driven by advances in technology introduced by commercial GEOINT providers, increasing GEOINT data ubiquity, and the GEOINT posture of near-peer national competitors to the US and the ASG.

Encouraging emerging technologies through investment and partnership is a requirement to ensure the NSG remains the trusted source of GEOINT to the warfighters, first responders, and policymakers in the next 15 years. Collective Enterprise strategies and processes to accelerate acquisition of technology and the management of data will support advancement of the NSG.[vii] The GEOINT Enterprise's current capabilities to manage data are lagging with respect to the volume of data, infrastructure, and AI management. This is only expected to become more problematic as volume increases with new technology.

Through over 45 hours of sensing sessions, the NSG members depicted the GEOINT Enterprise as fractured, without enforceable standards from the GFM to synchronize processes and invest in appropriate workstreams across partners and systems. The CONOPS emphasizes interoperability through unified partnerships and mutual investments in technology development.[viii,ix] Interoperability will progress through enhanced collaboration with commercial and R&D entities, as well as academia, often on the cutting edge of GEOINT innovation, and by establishing formal processes and pipelines that enable employees to easily move between government and commercial sectors.[x,xi] Increasing GEOINT Enterprise interoperability is an overarching theme from the community sensing sessions. Hurdles must be overcome through strong, enforceable directives if the NSG hopes to remain competitive with adversaries while supporting the warfighters, first responders, and policymakers.

In order to expand GSS, realize S2E, and enhance the IGOE, the GEOINT Enterprise has reflected on its current state assessment with respect to the drivers that will guide progress. If GEOINT in 2035 is to be fast, assured, connected, persistent, and resilient, directives that are funded and enforceable across the enterprise must be continually evaluated and published.

## CONOPS Development Methodology

The 2035 GEOINT CONOPS was developed by adapting methodology from strategic foresight and futures-planning literature to design a custom methodology for assessing and projecting the future needs and challenges of the 2035 GEOINT operating environment.[xii] The method described below streamlined data collection and stakeholder engagement support to develop a project plan that promoted buy-in and investment from partners across the GEOINT Enterprise. The use of the strategic foresight method provided a clear process to measure and visualize imperative strategic changes that must occur across the GEOINT Enterprise to ensure GEOINT superiority and maintain competitive advantage over adversaries. Drawing on professional futures and foresight training, certification, and extensive research, the 2035 GEOINT CONOPS development team (CONOPS Team) developed a process for creating a strategic plan driven by NSG needs, desires, and expectations. The 10-step plan was designed to help the NSG craft a vision of the ideal 2035 GEOINT operating state and determine critical changes to make in order to reach the desired 2035 operating environment:

1. Assessment
2. Interviews/Open-Source Research
3. Data Analysis
4. Trend Determination
5. Enterprise Consensus
6. Outline and Writing Team Structure
7. Narrative Development
8. Enterprise Coordination
9. Revisions
10. Delivery

First, previously published future-planning documents were assessed and analyzed. It was determined these plans were largely composed without engaging the wider GEOINT Enterprise, leading to poor visibility and little to no adoption of the recommendations in those documents. With this context, the CONOPS Team designed a collaborative process that involved the GEOINT Enterprise to create a sense of ownership and enable partners to invest in the success of the effort.

Throughout the development of the CONOPS, the team operated based on the following assumptions:

- The United States will continue competing with traditional adversaries, with a rise in nontraditional competitors, such as sub-state actors.
- The commercial sector may increasingly gain access to commercial GEOINT capabilities through purchasing, brokerage agreements, or theft.
- The United States will face an increasingly complex battlespace that spans traditional domains of air, land, and sea and newer domains of cyberspace and space.
- Collateral damage will be progressively scrutinized; the demand for minimal civilian casualties will in turn drive the necessity for more accurate and assured GEOINT products.
- Global proliferation of technology and weaponry will continue in an increasingly connected world, as will the growth of more advanced sensors and processes in the GEOINT Enterprise.
- The end user will increasingly demand greater coverage and persistence of surveillance systems worldwide, leading to on-demand, real-time S2E capabilities.
- Warfare will become progressively more automated, with less need for "human-in-the-loop" overwatch. This will correlate to fewer troops on the ground in theater as the warfighter moves into an increasingly automated environment.
- Budgeting restraints will remain consistent with current levels.
- Outsourcing and partnership with commercial entities will grow substantially as government recognizes and leverages commercial supremacy.
- Military forces will operate in denied, degraded, intermittent, and limited bandwidth (D-DIL) environments for extended periods of time.

Second, the CONOPS Team constructed a database, collecting over 900 statements derived from over 40 hours of interviews with over 220 stakeholders across government, the commercial sector, academia, and allied partners. These interviews captured insights regarding needs, desires, challenges, and imperatives for change across the entire GEOINT ecosystem. Simultaneously, the team ran a rigorous open-source collection effort to capture statements from publicly available scientific research, commercial developments, and technology advances.

Using Python feature extraction and vectorization on the aforementioned database, the team identified key themes from the GEOINT Enterprise responses to fuse and display data from interviews and open-source research. Data was analyzed by processing quotations to provide fidelity and insight into GEOINT Enterprise sentiment. Data analysis helped the team determine the top 15 trends raised by the group during the data collection process. These trends were visualized and presented during a two-day offsite where representatives from across the GEOINT Enterprise convened to discuss the results and determine the key focus areas for the CONOPS document.

The team drafted a vision statement for 2035 based on feedback from the GEOINT Enterprise offsite, and the results drove the creation of the CONOPS table of contents. The table of contents was then used to design an organizational structure and project plan for the subject matter experts (SMEs) recruited from across the NSG to draft the recommendations for change and strategic emphasis. The overall data-driven approach removed biases and led to the adoption of recommendations that were actionable and incrementally achievable over the next 15 years.

SMEs participated in four workshops designed to encourage the incorporation of the foresight planning method into draft recommendations, employ storytelling as a means of brainstorming, and begin narrative development. A writing team of 24 SMEs drafted sections of the document, and the CONOPS development team assisted with the editing process to produce the document. Several versions of the document were circulated for GEOINT Enterprise feedback. The final draft was then distributed twice through the GEOCOM and Joint Staff Action Process for formal comment and approval by the GEOINT Enterprise, including the DoD, IC, and partnering agencies. The final product was delivered for signature to the GFM for the US government.

# Glossary of Terms

| | |
|---|---|
| **A** | |
| **Automation, Augmentation, and Artificial Intelligence (AAA)** | The Office of the Director of National Intelligence (ODNI) also refers to this as Augmenting Intelligence Using Machines, or AIM |
| **Automation** | The method or technique of making an apparatus, process, or system operate without a manual maneuver or driver |
| **Adversary** | A party acknowledged as potentially hostile to a friendly party and against which the use of force may be envisaged[xiii] |
| **Allied System for Geospatial Intelligence (ASG)** | The governance model to manage the GEOINT-sharing relationship of the allied partners, which are the Australian Geospatial-Intelligence Organisation, Canadian Forces Intelligence Command, GEOINT New Zealand, National Centre for Geospatial Intelligence, and National Geospatial-Intelligence Agency (NGA)[xiv] |
| **C** | |
| **Collection** | The acquisition of information and the provision of this information to processing elements |
| **Concept of Operations (CONOPS)** | CONOPS is defined within this context as a roadmap to sustain GEOINT excellence and counter adversaries by uniting the GEOINT Enterprise toward one collective vision. This document is the catalyst for subordinate organizations to craft their own specific strategies in achieving the overarching vision |
| **Customer** | A person, organization, or enterprise that commissions the engineering of a product or system; is a prospective purchaser of the end products of a product or system or portions thereof; or is an acquirer of a product or system[xv] |
| **Current State Assessment** | An examination of current GEOINT capabilities, including examining strengths and identifying opportunities |
| **Cyberspace** | A global domain within the information environment consisting of the interdependent networks of information technology infrastructures and resident data, including the Internet, telecommunications networks, computer systems, and embedded processors and controllers[xvi] |
| **D** | |
| **Data** | A representation of facts, concepts, or instructions, such as text, numbers, graphics, documents, images, sound, or video, in a form suitable for communication, interpretation, or processing, which individually may have no meaning by and in themselves[xvii] |
| **Desired Future** | The ideal future operating state of the GEOINT Enterprise in 2035, as agreed upon by the GEOINT Enterprise in sensing sessions and offsite facilitations |
| **Domain** | The operating environment or area of work, whether conceptual or physical, in which the GEOINT Enterprise communicates and executes its mission; a conceptual domain includes security domains such as the classified or unclassified space; a physical domain encompasses air, land, maritime, space, and cyberspace |
| **Drivers of Change** | Actions, capabilities, or organizational concepts that are catalysts for change; new developments in these areas are likely to disrupt or transform the GEOINT industry |
| **E** | |
| **End State** | A desired outcome, derived from GEOINT Enterprise consensus, regarding mission critical capabilities that must evolve to maintain or increase competitive advantage and succeed in the 2035 environment |

| | |
|---|---|
| **End User** | The consumer at the final stage of the GEOINT or geospatial information delivery chain; the warfighters, first responders, and policymakers who use products directly as they apply GEOINT in the decision-making process |
| **G** | |
| **The National Geospatial Intelligence Committee (GEOCOM)** | DNI-chartered forum for GEOINT that provides a venue for community members to discuss, coordinate, and vote on substantive issues of common concern; the GEOCOM administers subcommittees and working groups composed of SMEs from GEOCOM-member organizations[xviii] |
| **Geodesy** | The science of accurately measuring and understanding three fundamental properties of the Earth: its geometric shape, its gravity field, and its orientation in space, as well as the changes of these properties with time[xix] |
| **GEOINT Enterprise** | The combination of technology, data, people, policies, capabilities, doctrine, activities, and organizations necessary to produce GEOINT in any government, academic, or commercial environment in the US and partner countries;[xx] this includes all GEOCOM Members, Principal Partners, and nontraditional partners |
| **GEOINT Functional Manager (GFM)** | The authoritative advisor to the DNI and Secretary of Defense, through the Under Secretary of Defense for Intelligence, on GEOINT issues and resources; Executive Order 12333, "United States Intelligence Activities," as amended in 2008, legally designates the Director of NGA (D/NGA) as the GFM for the IC. DoDD 5105.60; "National Geospatial-Intelligence Agency," 2009, designates the D/NGA as the DoDD GEOINT Manager; the title GFM refers to both roles, thereby encompassing the IC and DoD[xxi] |
| **GEOINT Functional Manager Standards Assessment (GFMSA)** | The NSG Directive (NSGD) 3201[13] established the GFMSA program: "The GFMSA defines and implements NSG methods and processes to assess Information Technology (IT) and National Security Systems, referred to as IT, conformance with GEOINT data and service standards policies and standards as key enablers of interoperability with the DoD and/or the IC" |
| **GEOINT Superiority from Space (GSS)** | A web of government, commercial, and foreign remote-sensing resources that cover the planet in a near real-time stream of images and geospatial data |
| **Geospatial Information** | Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on or about the Earth[xxii] |
| **Geospatial Intelligence (GEOINT)** | Exploitation and analysis of imagery and geospatial information to describe, assess, and visually depict physical features and geographically referenced activities on the Earth; GEOINT consists of imagery, imagery intelligence, and geospatial information[xxiii] |
| **I** | |
| **Integrated GEOINT Operating Environment (IGOE)** | Seamless interoperability and collaboration across multiple domains in the GEOINT Enterprise |
| **Intelligence, Surveillance, and Reconnaissance (ISR)** | An array of systems used to acquire and process information for warfighters, first responders, and policymakers |
| **Interoperability** | The ability to act together coherently, effectively, and efficiently to achieve tactical, operational, and strategic objectives |

| | |
|---|---|
| **N** | |
| **National System for Geospatial Intelligence (NSG)** | The combination of technology policies, capabilities, doctrine, activities, people, data, and organization necessary to produce GEOINT in integrated, multi-intelligence, multi-security domain environments; it includes members and partners that produce and employ GEOINT across the full range of national, military, and civil domains[xxiv] |
| **NSG Member** | IC and DoD organizations that fall under GEOINT Functional Management authorities, as outlined in Executive Order 12333, DoDD 5105.60, and ICD 113. NSG Members include the IC, the Joint Staff, the Military Departments, and Combatant Commands (CCMDs) |
| **O** | |
| **Ontology** | A set of concepts in a particular subject area that shows its properties and the relations between them |
| **P** | |
| **Partnerships** | A formal or informal agreement between two or more entities who participate in a shared mutual mission to further benefit operational requirements, R&D, or other support functions of GEOINT |
| **Phenomenology** | The study of naturally occurring and measurable activity, especially as it refers to sensor technology, which allows discovery, observation, and characterization of natural and measurable occurrences[xxv] |
| **Platform** | The vehicle to which one or many sensors are attached; platforms include satellites, aircraft, and ground; and water-based platforms[xxvi] |
| **Positioning, Navigation, and Timing (PNT)** | The ability to accurately and precisely determine one's location and orientation in two or three dimensions |
| **S** | |
| **Sensor** | A technical device designed to detect and respond to at least one stimulus and that may record and/or transmit a resultant impulse for interpretation or measurement; two primary categories of sensors are electro-optical and radar, both of which have several types or variants, known as phenomenologies[xxvii] |
| **Sensor to Effect (S2E)** | A fully integrated, automated GEOINT future with streamlined tasking, collection, processing, exploitation, prioritization, and dissemination of GEOINT and geospatial information across the NSG for informed and near real-time delivery to the end user |
| **Standards** | Common and repeated use of rules, definitions, conditions, guidelines, or characteristics for products or related processes, procedures, and production methods and related management systems practices[xxviii] |
| **Space Capability** | The ability of a terrestrial-based asset to accomplish a mission in or through space[xxix] |
| **T** | |
| **Technology** | The tools, methods, or systems developed and used to enable or automate the production of goods or services toward an objective[xxx] |
| **U** | |
| **United States Space Command (USSPACECOM OR SPACECOM)** | SPACECOM conducts operations in, from, and to space to deter conflict and, if necessary, defeat aggression, deliver space combat power for the Joint/Combined force, and defend US vital interests with allies and partners |
| **W** | |
| **Workforce** | The personnel employed or supporting an agency, CCMD, or other entity within the GEOINT Enterprise |

# End Notes

i Current estimates place human reliance between 75 and 90% depending on the sector in the GEOINT Community.
ii Opportunities identified for automation of processes of routine tasks to allow analysts to focus on developing more complex products and verify the automation is working as expected.
iii Executive Office of the President of the United States, "2017 National Security Strategy," December 2017, p. 20.
iv National System for Geospatial Intelligence, "NSG Strategy 2021-2025."
v Executive Office of the President of the United States, "2017 National Security Strategy," December 2017, p. 21.
vi Ibid, p. 20.
vii Ibid, p. 29.
viii National System for Geospatial Intelligence, "NSG Strategy 2021-2025," p. 3.
ix Department of Defense, "2018 National Defense Strategy," January 2018, p. 8.
x National System for Geospatial Intelligence, "NSG Strategy 2021-2025," p. 3.
xi National System for Geospatial Intelligence, "Directive 1100," 2014, p. 4.
xii Houston Strategic Foresight, UK Government Office for Science, University of Houston foresight course.
xiii "DoD Dictionary of Military and Associated Terms," Jun. 2020, p. 9.
xiv NGA, International Activities: The Allied GEOINT Enterprise, https://www.nga.mil/resources/1600979386974_International.html.
xv US Department of Homeland Security, "DHS Lexicon," 2018, p. 140.
xvi "DoD Dictionary of Military and Associated Terms," Jun. 2020, p. 55.
xvii DAMA Dictionary of Data Management, "IC Data Management Lexicon," Apr. 2011, Derived From: (1) DAMA Dictionary of Data Management, April 1, 2011.
xviii NSG, GEOINT Basic Doctrine, Apr. 2018, www.nga.mil/assets/files/170901-038_GEOINT_Basic_Doctrine_Pub_1.pdf, p. 31.
xix National Geodetic Survey, Nov. 2020, https://www.ngs.noaa.gov/INFO/geodesy.shtml.
xx NSG, GEOINT Basic Doctrine, Apr. 2018, www.nga.mil/assets/files/170901-038_GEOINT_Basic_Doctrine_Pub_1.pdf, p. 35.
xxi Ibid.
xxii America, The United States of, United States Code § 467.5 ed., vol. Title 10.
xxiii NSG, GEOINT Basic Doctrine, Apr. 2018, www.nga.mil/assets/files/170901-038_GEOINT_Basic_Doctrine_Pub_1.pdf, p. 35.
xxiv Ibid, p. 38.
xxv Ibid.
xxvi Ibid.
xxvii Ibid, p. 39.
xxviii US Department of Homeland Security, "DHS Lexicon." 2017, https://www.dhs.gov/sites/default/files/publications/18_0116_MGMT_DHS-Lexicon.pdf, p. 616.
xxix "DoD Dictionary of Military and Associated Terms," Jun. 2020, p. 198.
xxx Ibid, p. 651.

# Publications Referenced


- America, The United States of, United States Code § 467.5 ed., vol. Title 10.
- Department of Defense, "Defense Space Strategy Summary," June 2020.
- Department of Defense, "Directive 5105," 2012.
- Department of Defense, "DoD Dictionary of Military and Associated Terms," 2020, https://www.jcs.mil/Portals/36/Documents/Doctrine/pubs/dictionary.pdf.
- Department of Defense, "2018 National Defense Strategy," January 2018.
- Earley, Susan, The DAMA Dictionary of Data Management, Technics Publications, 2011.
- Executive Office of the President of the United States, "2019 National Plan for Civil Earth Observations," December 2019.
- Executive Office of the President of the United States, "2017 National Security Strategy," December 2017.
- Houston Strategic Foresight, UK Government Office for Science, University of Houston foresight course, National Geodetic Survey, Nov. 2020, https://www.ngs.noaa.gov/INFO/geodesy.shtml.
- National Geospatial-Intelligence Agency, "NGA GEOINT CONOPS 2022," 2016.
- National Geospatial-Intelligence Agency, "NSG GEOINT Basic Doctrine," April 2018, www.nga.mil/assets/files/170901-038_GEOINT_Basic_Doctrine_Pub_1.pdf.
- Office of the Director of National Intelligence, "Intelligence Community Directive Number 113," May 2009.
- Office of the Director of National Intelligence, "2019 National Intelligence Strategy."
- Office of the Under Secretary of Defense for Intelligence, "2020 Defense Intelligence Strategy."
- National Air and Space Intelligence Center, "Competing in Space," December 2018.
- National System for Geospatial Intelligence, "Directive 1100," 2014.
- National System for Geospatial Intelligence, "NSG Strategy 2021-2025."
- US Department of Homeland Security, "DHS Lexicon," 2017, https://www.dhs.gov/sites/default/files/publications/18_0116_MGMT_DHS-Lexicon.pdf.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**NATIONAL SYSTEM FOR GEOSPATIAL INTELLIGENCE**

STRENGTH THROUGH COMMUNITY

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