"*Delivering Military Advantage through multi-national geospatial interoperability*"

DGIWG 933-1

DGIWG Geospatial Reference Architecture (DGRA) Synopsis

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Abstract: The DGIWG Geospatial Reference Architecture (DGRA) is a framework for achieving interoperability in the military geospatial domain, enhancing data exchange and use across international military systems and equipment. It provides direction and best practices for improving geospatial data and systems for new capabilities.

The DGRA Synopsis explains what the DGRA is, how it should be used to improve interoperability, its intended audience and how people can best contribute to its maintenance and update.

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iv. Revision history

Date	Edition	Primary clauses modified	Description
06 Aug 25	1.1	N/A	First edition of the Synopsis. It has been numbered as v1.1 because this aligns with v1.1 of the DGRA. No synopsis was published for DGRA v1.0

1 Document Purpose

This document explains what the DGIWG Geospatial Reference Architecture (DGRA) is, how it should be used to improve interoperability, its intended audience and how people can best contribute to its maintenance and update. The DGRA (DGIWG 933-2) can be found on the DGIWG portal (*https://dgiwg.org/documents/roadmaps/*).

2 The DGRA

The DGRA is a comprehensive framework that aims to achieve interoperability in the military geospatial domain. It defines how technical standards, implementation guides, and industry best practices work together to enable the interoperable exchange and use of geospatial data, services, and products across a national or coalition environment. It follows established industry standards and guidelines for designing and developing interoperable geospatial systems. It provides a structured approach to designing interoperable solutions by incorporating standardised components, protocols, data formats, and interfaces.

The DGRA is designed to be flexible and adaptable to different situations and requirements. It can be used by organisations of all sizes and types, from small teams working on specific projects to large multinational coalitions. It provides a common language and set of principles that enable different organisations to work together effectively, even if they are using different systems or technologies.

A key benefit of the DGRA is that it helps reduces complexity and improves manageability. By following its principals, organisations can ensure that their solutions are developed in a consistent and effective manner. This makes it easier to integrate different systems and technologies, reducing the risk of errors or problems.

Overall, the DGRA is an essential tool for anyone involved in planning or developing geospatial solutions in the military domain. Its comprehensive guidance helps ensure that solutions are interoperable with other systems, reducing complexity and improving manageability while enabling effective collaboration between different organisations.

3 Purpose and Approach

The purpose of the DGRA is to provide a best practice guide for enhancing interoperability in the military geospatial domain using open standards. It provides high-level guidance on the appropriate use of open standards to overcome the constraints associated with the collection, discovery, dissemination and exploitation of geospatial information in a military environment.

The DGRA promotes interoperability of geospatial systems by:

- Describing the components and standards required to realise geospatial systems.
- Providing a practical guide to better enable geospatial information sharing, analysis, and exploitation by all consumers of geospatial data through the development, procurement, and operationalisation of interoperable standards-based capabilities.
- Provides users and developers with a deeper understanding of the relationship between the standards DGIWG delivers and the functions that they enable.

The DGRA does not attempt to provide:

- Detailed blueprints or specific technology solutions.
- Guidance on the underlying technology infrastructure on which the DGRA would be implemented.

- Guidance on the specific software used to deliver the standards and functionality described by DGRA.

The DGRA was constructed in accordance with the approach outlined in International Organisation for Standardisation (ISO) 10746 Information Technology - Open Distributed Processing - Reference Model [1]. This provides a robust framework for developing reference architectures. The DGRA does not attempt to provide detailed blueprints or propose specific technology solutions.

4 Intended Audience

The intended audience for the DGRA includes military organisations, government agencies, contractors, and other stakeholders involved in geospatial data management and dissemination. It provides guidance on how to implement the DGRA framework to achieve geospatial interoperability in the military coalition context. The DGRA is targeted towards a wide audience, from senior decision makers to system developers, for example:

- Senior Decision Makers: Serves as a valuable resource for senior decision makers by providing guidance that informs strategic planning, supporting governance and compliance, supporting technology evaluation and solution selection, facilitating risk management, and promoting collaboration and communication across the organisation. The DGRA assists decision makers in making informed choices that align with the organisation's goals, support coalition interoperability, standards, and long-term vision.
- System Developers: Assists system developers by providing design guidance, accelerating development through reusable components, ensuring interoperability and integration using open standards, promoting consistency and collaboration among developers, and aiding in risk mitigation. It serves as a valuable resource that helps to streamline the development process, reduces complexity, and helps deliver interoperable systems.

5 The Importance of the DGRA

The DGRA is necessary to achieve interoperability in the military geospatial domain. Interoperability is the ability of different systems to work together seamlessly, even if they are developed by different organisations or use different technologies. In the military context, interoperability is critical for effective communication and coordination between different units and organisations.

The DGRA enables the consistent implementation of DGIWG standards and practices across the international and domestic military communities. This consistency ensures that different systems can work together seamlessly, even if they are developed independently.

Without a reference architecture like the DGRA, achieving interoperability would be much more difficult. Different organisations would likely develop their own solutions independently, using their own standards and technologies. This would result in a patchwork of incompatible systems that cannot work together effectively. The DGRA provides a common framework that enables interoperability across different systems, making it easier for military organisations to communicate and coordinate effectively.

6 DGRA Content

The DGRA is divided into several architectural viewpoints that cover different aspects of achieving interoperability.

- Enterprise Architectural Viewpoint: Summarises the DGRA's goals and provides an overview of the architecture and its components. It also defines the DGRA Standards Model (DSM), an important DGRA tool that maps key system functions to DGIWG standards.
- Information Architectural Viewpoint: Describes how to structure and manage data within the DGRA by providing high-level descriptions of the structure, information models, exchange formats, and maintenance processes associated with the various types of data described throughout the DGRA, including Vector data, Imagery data, Metadata, and Portrayal data, as well as the standards that apply to them.
- Computational Architectural Viewpoint: Describes how the DGRA's components interact by breaking down the main system process into the standards that connect the components and the individual operations that each standard uses to enable specific functionality.
- Engineering Architectural Viewpoint: Describes the technical approach and technological components required to support interoperability and enable the collection, discovery, dissemination, and exploitation of geospatial information. It describes how to use these components to create solutions that work with other systems.

7 Utilising the DGRA to Improve Interoperability

Utilise the following general steps to implement an interoperable geospatial system using the DGRA:

1. Define requirements for interoperability: Identify the specific requirements for your geospatial system to be interoperable with other systems. This includes identifying the types of data, services, and products that need to be exchanged with other systems.
2. Select appropriate standards and implementation guides: Identify the relevant technical standards and implementation guides that are required to achieve interoperability. The DGRA Standards Model (DSM) should be used to identify what functions you require from your systems and map these to the relevant DGIWG standards.
3. Design solutions that conform to DGIWG standards: Use the DGRA principals as a guide to design your geospatial system in a way that conforms to the defined standards and implementation guides. This includes:
    - Ensuring Interoperable data: Use the guidance provided Information Architectural viewpoint of the DGRA to understand how data should be structured and managed within your geospatial system. This includes defining data models and formats and product specifications for storing and disseminating data and ensuring that the correct metadata management practices are in place to ensure the consistency of data across your system and those connected to it.
    - Identifying the relevant software components required by your system: Use the guidance provided in the Engineering Architectural viewpoint of the DGRA to identify the appropriate software components that will enable your system to collect, discover, disseminate or exploit geospatial information in an interoperable manor.
    - Integrating data and components using interoperable services: Use the guidance provided in the Computational Architectural viewpoint of the DGRA to understand where and how services interfaces will be used within your geospatial system to enable the various software components to interact with

each other and other elements of the military enterprise. This includes defining interoperable service interfaces, managing service metadata, and ensuring service quality etc.

4. Decide what administrative roles you require to support your system: Use the DGRA guidance to understand how your system will be utilised and identify what technical roles are required to support it and ensure can successfully meet its objectives.
5. Test interoperability: Conduct testing with other systems to verify interoperability. Utilise the conformance tests provided with the DGIWG standards to conduct testing with other systems to verify interoperability, identify any issues or areas for improvement or make necessary adjustments to your system to ensure interoperability.

By following these steps and using the guidance provided in the DGRA, you can implement an interoperable geospatial system that conforms to industry best practices for achieving interoperability in military contexts.

8 Influencing the Development of the DGRA

The DGRA is a living document that is updated periodically to reflect changes in technology, standards, and best practices. This is important because it ensures that the framework remains relevant and effective in meeting the evolving needs of the military geospatial domain. As new technologies and capabilities emerge, it is important to consider how they can be integrated into the DGRA to support interoperability and collaboration between different organisations.

By engaging with the future development of the DGRA, stakeholders can provide feedback on how well it is working in practice and suggest improvements or additions that could enhance its effectiveness. This feedback can help ensure that the DGRA remains up-to-date and responsive to changing requirements.

Furthermore, engaging with the future development of the DGRA can help organisations stay informed about emerging trends and best practices in geospatial technology. This can help them make more informed decisions about which solutions to develop or procure, reducing risk and improving outcomes. There are several ways of influencing the development of the DGRA these are:

- Submitting a suggestion to the DGRA development team: If you have suggestions for improving the DGRA, you can submit them to the DGIWG for consideration by using the following steps:
  - Identify the area of the DGRA that you would like to improve: Determine which section or component of the DGRA you would like to see changes made to.
  - Develop a clear and concise suggestion for how the DGRA could be improved. Provide specific details and examples to support your suggestion.
- Participate in the DGRA development group: Consider participating in in the DGRA development working group or other DGIWG working groups forums where you can collaborate with other stakeholders and contribute to ongoing efforts to improve the DGRA.

Contact the DGIWG Secretary or the DGRA lead via the DGIWG website (*https://dgiwg.org/contact/* / *secretariat@dgiwg.org*) to submit your suggestion or request to participate in the DGRA development group.

By submitting your suggestions or participating in the DGRA development working group, you can help ensure that the DGRA remains a relevant and effective framework for achieving interoperability across international and domestic military communities.

9 References

[1] International Organization for Standardization (ISO), “ISO/IEC 10746 Information Technology - Open distributed processing - Reference model: Parts 1-3 Architecture,” 2009. [Online]. Available: http://www.iso.org/standard/55724.html. [Accessed 20 02 2023].

10 Abbreviations and Acronyms

Acronym	Definition
DGIWG	Defence Geospatial Information Working Group
DGRA	DGIWG Geospatial Reference Architecture
DGSB	DGIWG Geospatial Standards Baseline
DSM	DGRA Standards Model
ISO	International Organization for Standards