NATO STANDARD

AGeoP-11

NATO GEOSPATIAL INFORMATION FRAMEWORK (NGIF)

Edition B Version 1

OCTOBER 2018

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED GEOSPATIAL PUBLICATION

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

22 October 2018

1. The enclosed Allied Geospatial Publication AGeoP-11, Edition B, Version 1, NATO GEOSPATIAL INFORMATION FRAMEWORK (NGIF), which has been approved by the nations in the Military Committee Joint Standardization Board, is promulgated herewith. The agreement of nations to use this publication is recorded in STANAG 2592.

2. AGeoP-11, Edition B, Version 1, is effective upon receipt and supersedes AGeoP-11, Edition A, Version 1, which shall be destroyed in accordance with the local procedure for the destruction of documents.

3. AGeoP-11, Edition B, Version 1, incorporates the relevant content of the cancelled STANAGs 2251, 3666 and 3677.

5. This publication shall be handled in accordance with C-M(2002)60.

Zoltán GULYÁS
Brigadier General, HUNAF
Director, NATO Standardization Office

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RESERVED FOR NATIONAL LETTER OF PROMULGATION

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RECORD OF RESERVATIONS

CHAPTER	RECORD OF RESERVATION BY NATIONS

Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.

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RECORD OF SPECIFIC RESERVATIONS

[nation]	[detail of reservation]
FRA	France will be guided by the future “baseline” version (MGCP TRD to DGIF mapping table) for the MCGP (Multinational Geospatial Coproduction Program) to be better taken into account. France does not undertake to automatically implement documents that are not finalized and recorded in the document that has been ratified to date.
LVA	LVA as a military geospatial information producer will implement resulting requirements after the necessary tools and standards will be developed, gradually and according to LVA national geospatial information development plans and production cycles
NLD	NLD will take a stepwise approach as to the implementation of NGIF. The NLD Military Topographical (Vector) Foundation Data will be upgraded to AGeoP-11 Edition B version 1 in 2019. As foreseen in Summer 2018, the NGIF Topographical Map 1:50.000 and NGIF Joint Operational Graphic Air 1:250.000 may follow in the years thereafter. Geospatial Maritime Data will be interoperable with NGIF according to STANAG 6523.
USA	The implementation of this STANAG is limited to the generation and exchange of geospatial products cited in AGeoP-11 ED B. Application of this STANAG to generate and exchange geospatial data is to be assessed and determined on a case-by-case basis.
Note: The reservations listed on this page include only those that were recorded at time of promulgation and may not be complete. Refer to the NATO Standardization Document Database for the complete list of existing reservations.	

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TABLE OF CONTENTS

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Allied Geospatial Publication 11

(AGeoP-11(B))

NATO Geospatial Information Framework

Volume 1

Introduction and management

OCTOBER 2018

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CHAPTER 1 INTRODUCTION

1.1. BACKGROUND

It is recognized that the geospatial support to NATO needs to evolve due to lessons identified on operations such as KFOR and ISAF. This has led to a re-evaluation of interoperability requirements between participating nations with other NATO agencies which support NATO exercises and operations. In particular, NATO has been missing a common data model for geospatial data and common product specifications for geospatial products (datasets and maps).

1.2. WHAT IS NGIF?

The NATO Geospatial Information Framework (NGIF) is the geospatial information architecture used for the generation and exchange of standardized geospatial products and services to enhance interoperability within NATO and with its partners. NGIF provides a set of artifacts which facilitates the interoperability of geospatial information exchange and enables the provision of common products and services throughout NATO, as stated in MC 0296/3, NATO Geospatial Policy. The artifacts defined in the framework provide the basis for the development of a common product line with the flexibility to rapidly define and create mission specific data and products in response to time dependent operations.

The standards which are part of the document architecture address geospatial information that may be required for specific operational or intelligence purposes, but is not normally included in standard designated products, or otherwise known as Military Geographic Information and Documentation (MGID). MGID includes:

1. Military Geographic Information (MGI) - geographic information which is necessary for planning and operations.

   Note: MGI may be in any form available to national authorities and will not necessarily be translated into NATO languages.

2. Military Geographic Documentation (MGD) - MGI which has been evaluated, processed, summarized and published in standardized format in order to meet a military requirement.

   Note: MGD produced for use of NATO Forces must be in a standardized form suitable for immediate use by the NATO Forces, nations and commands when required. The term "documentation," in this context, means any document on this subject, which is a complete publication in itself, be it text, table, diagram,

photograph, map, automatically generated data or other medium recording information, or a combination of two or more of these elements.

3. Selected National Documentation (SND) - documentation on MGI which has been produced for national purposes and for selection by Major Subordinate Commands for use within NATO as meeting a military requirement, or at the request of a NATO Commander.

Note: SND is not necessarily produced in a standardized NATO form, but should, whenever possible, be provided with sufficient details in appropriate NATO languages to permit its use by forces likely to be involved. One of the languages shall be English.

Together with STANAG 2586 – NATO Geospatial Metadata Profile and STANAG 6523 – Defence Geospatial Web Services, NGIF builds the basis for the interoperable exchange of geospatial information for NATO.

NGIF is based on the Defence Geospatial Information Framework (DGIF) which is a suite of specifications encompassing different types of geospatial information. The DGIF is the result of effort of working groups and teams within the Defence Geospatial Information Working Group (DGIWG), an international Standards Developing Organization (SDO) and key NATO partner regarding Geospatial expertise. DGIWG will maintain and further develop the framework based on identified NATO priorities and requirements.

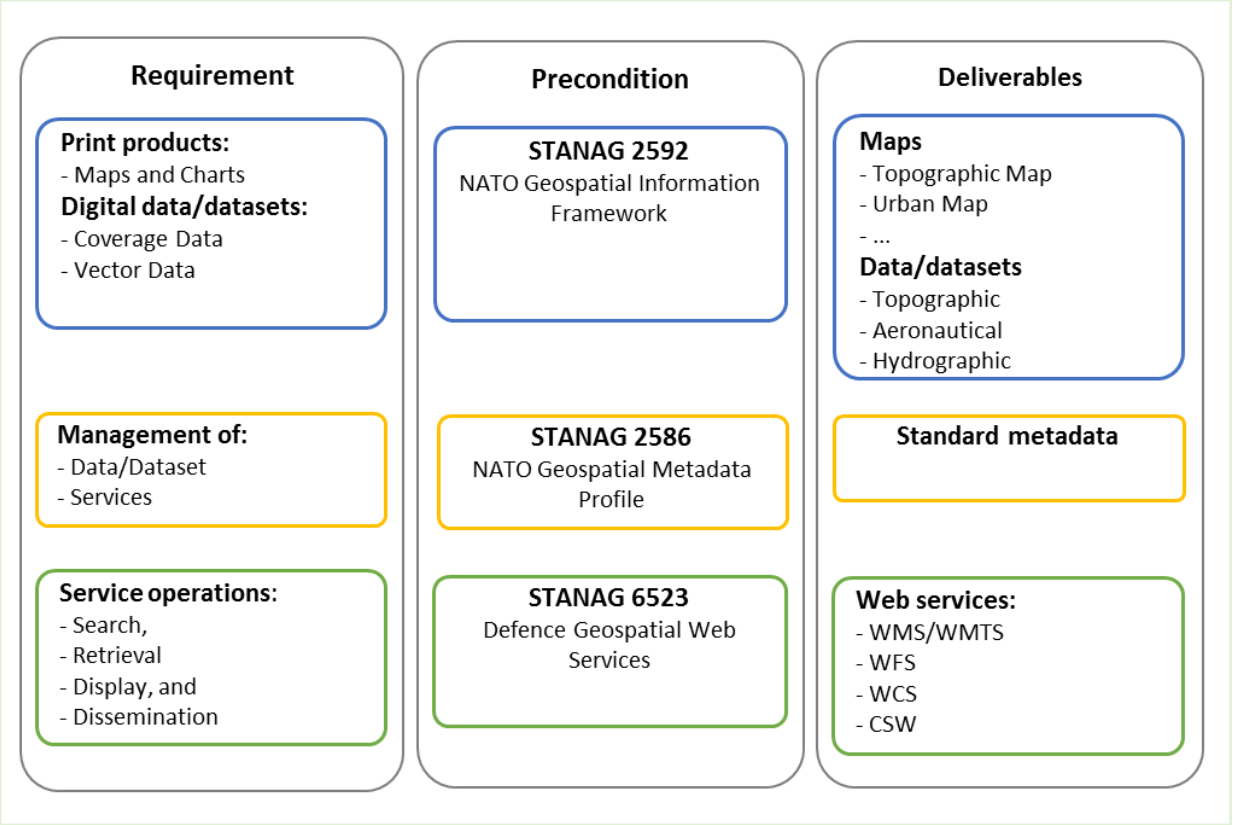

Figure 1: STANAG 2592, 6523 and 2586 the "Big Three"

1.3. INTEROPERABILITY REQUIREMENT AND INTENDED AUDIENCE

NGIF supports the requirement to "operate off the same map" as stated in NATO Geospatial Policy, MC 0296/3. NGIF also addresses the key interoperability deficiencies identified in the NATO Geospatial Deficiencies Matrix (NGDM).

NGIF provides the framework to create a coherent set of digital and printed geospatial products for all users, which will meet the operational requirements from the strategic to the tactical levels, across all staff branches.

NGIF aims at supporting all operational domains (Joint, Land, Maritime and Air) that require geospatial information. It is designed to be a generic solution to be used by all NATO services and organizations and the Force Elements of Troop Contributing Nations for any North Atlantic Council (NAC) approved activities. Nations will be able to ensure their national production data schemas are shareable throughout NATO.

Note: this standard does not address collection criteria and methodologies that are used in field operations. Such information is to be provided by the organization, which implements this standard.

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CHAPTER 2 GENERAL INFORMATION

2.1. AIM

The aim of this AGeoP is to specify a common geospatial information architecture that is to be used for the generation and exchange of standardized geospatial products and services to enhance interoperability within NATO and with its partners.

In the longer term, this framework will facilitate interoperability between Nations, Strategic Commands and deployed operations facilitating a service oriented architecture supporting the concept of the NATO Network Enabled Capability (NNEC).

NATO and contributing nations need to deliver a coherent set of digital and paper based geospatial products to achieve the maxim “Operating off the same map”. This framework will support current and future operations based on lessons learned.

With NGIF, new geospatial products implementing new technologies, methods and processes become less time-consuming and consequently less expensive.

2.2. DEFINITIONS

1. Artifact - A technical document (standard, specification...) required to enable interoperability of data, products or services.
2. Application Schema - Conceptual schema for data required by one or more applications.
3. Geospatial - Of or related to any entity whose position is referenced to the Earth (as specified in NATO Term).
4. NATO Geospatial Information Framework (NGIF) - The geospatial information architecture used for the generation and exchange of standardized geospatial products and services to enhance interoperability within NATO and with its partners (as specified in NATO Term).
5. Defence Geospatial Feature Concept Dictionary (DGFCD) - A structured collection of feature information (feature concepts, attribute concepts, and ancillary data) whose schema conforms to the conceptual model of a feature concept dictionary.
6. Defence Geospatial Information Model (DGIM) - A structured collection of feature information (features, attributes, associations, and ancillary data) which has a metamodel that conforms to the general feature model.
7. Product - Geospatial datasets or cartographic materials that are conformant with a product specification [derived from ISO 19131:2007].

8. Product Specification - Detailed description of a dataset**,** or cartographic material, together with additional information that will enable it to be created, supplied to, and used by another party [derived from ISO 19131:2007].
9. Real World Object - An existing geographic (or geospatial) occurrence whose characteristics can be described/identified e.g. a wooden bridge, a mosque, a divided highway.

2.3. RELATED DOCUMENTS

Reference Documents

1. DGIWG 200: Defence Geospatial Information Framework (DGIF) Overview – dated November 2017. Defines and describes the key standardization artifacts which constitute the DGIF.

   (https://portal.dgiwg.org/files/?artifact_id=68061&format=pdf)

2. DGIWG 205: Defence Geospatial Information Model (DGIM) – dated November 2017. Describes the overall information model, content and structure of any geospatial vector information.

   (https://portal.dgiwg.org/files/?artifact_id=68062&format=pdf)

3. DGIWG 206: Defence Geospatial Feature Concept Dictionary (DGFCD) – dated November 2017. Describes the vocabulary of the model (features, attributes, data types, units of measurement).

   (https://portal.dgiwg.org/files/?artifact_id=68063&format=pdf)

4. DGIWG 207: Defence Geospatial Real World Object Index (DGRWI) – dated November 2017. An index to find stuff, also implicitly modelled subjects (index for organizing and browsing of DGIM).

   (https://portal.dgiwg.org/files/?artifact_id=68064&format=pdf)

5. DGIWG 101: Defence Geospatial Information Working Group (DGIWG) profile of ISO 19131 - Geographic information – Data product specification. Defines requirements for the specification of geographic data products based upon the concepts of ISO 19100 and DGIWG standards.

   (https://portal.dgiwg.org/files/?artifact_id=68304&format=pdf)

6. DGIWG 208: Defence Geospatial Information Framework Encoding Specification - Part-1: GML – dated November 2017. Describes a schema using the Geography Markup Language for exchanging data for application schemas of the Defence Geospatial Information Model.

   (https://portal.dgiwg.org/files/?artifact_id=68065&format=pdf)

International Standards:

7. ISO 19131:2007 Geographic information – Data product specifications
8. ISO 19109:2005 Geographic information – Rules for application schema
9. ISO 19126:2009 Geographic information – Feature concept dictionaries and registers

Other related documents:

10. MC 0296/3, NATO Geospatial Policy
11. AAP-06(2017) - NATO Glossary Of Terms And Definitions (English And French)
12. STANAG 2586 Ed. 2 – AGeoP-08 Ed. B Ver. 1, NATO Geospatial Metadata Profile (NGMP).
13. STANAG 6523 Ed. 1 – AGeoP-26 Ed. A Ver. 1, Defence Geospatial Web Services.

2.4. ACRONYMS

AAP	Allied Administrative Publication
AGeoP	Allied Geospatial Publication
ASRP	ARC Standard Raster Product
CADRG	Compressed ARC Digitized Raster Graphic
CIB	Controlled Imagery Base
CSW	Catalogue Service
DFDD	DGIWG Feature Data Dictionary
DGFCD	Defence Geospatial Feature Concept Dictionary
DGIF	Defence Geospatial Information Framework
DGIM	Defence Geospatial Information Model
DGIWG	Defence Geospatial Information Working Group
DGRWI	Defence Geospatial Real World Object Index
DPS	Data Product Specifications
DTED	Digital Terrain Elevation Data
DTM	Defence Topographic Map
DTOX	Defence Topographic Exchange
FAS	Functional Area Service
GIS	Geospatial Information System
GML	Geographic Markup Language
ISAF	International Security Assistance Force
ISO	International Organization for Standardization

JCGISR	Joint Capability Group on Intelligence, Surveillance and Reconnaissance
KFOR	Kosovo Force
MC	Military Committee
MGCP	Multinational Geospatial Co-production Program
MGD	Military Geographic Documentation
MGI	Military Geographic Information
MGID	Military Geographic Information and Documentation
NAC	North Atlantic Council
NATO	North Atlantic Treaty Organization
NCS	NATO Command Structure
NFS	NATO Force Structure
NGDM	NATO Geospatial Deficiencies Matrix
NGFCD	NATO Geospatial Feature Concept Dictionary
NGIF	NATO Geospatial Information Framework
NGIM	NATO Geospatial Information Model
NGMP	NATO Geospatial Metadata Profile
NGRWI	NATO Geospatial Real World Object Index
NNEC	NATO Network Enabled Capability
NSIF	NATO Secondary Imagery Format
NSO	NATO Standardization Office
OGC	Open Geospatial Consortium
SDO	Standards Developing Organization
SHAPE J2 GSP	Supreme Headquarters Allied Powers Europe J2 Geospatial Branch
SND	Selected National Documentation
SRD	Standards Related Document
TEM	Terrain Elevation Model
TRD	Technical Reference Documentation
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WMTS	Web Map Tile Service
XML	Extensible Markup Language

2.5. ORGANIZATION OF INFORMATION

This AGeoP defines the standards and standardization artifacts that form the framework of geospatial standards required to create, exchange, and use geospatial data, product, and services for NATO lead operations and exercises. For Edition B of this standard, the information is structured into three volumes, and supported by standard related documents (SRDs) which provide additional guidance and instruction. Figure 2 illustrates this structure.

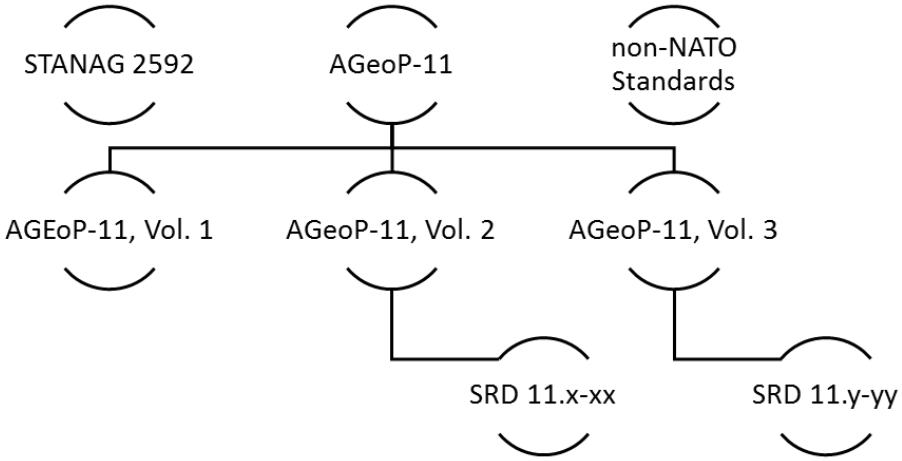

Figure 2: NGIF Architecture

Volume 1 – Introduction and management

This volume introduces basic concepts, provides the management framework for the configuration control and the process for handling requests for change proposals.

Volume 2 – Vector data

This volume addresses the fundamental concepts of vector data and its utilization in the creation and use of NATO products.

Volume 3 – Imagery and gridded data

This volume addresses the fundamental concepts of imagery and gridded data and its utilization in the creation and use of NATO products.

NOTE: It is anticipated that additional Volumes will be added as this standard evolves over time.

CHAPTER 3 DATA AND PRODUCT OVERVIEW

3.1. RELATIONSHIP OF NGIF ARTIFACTS TO DGIF ARTIFACTS

The NGIF is an adoption of the Defence Geospatial Information Framework (DGIF) which is a suite of specifications encompassing different types of geospatial information. The DGIF is the result of effort of working groups and teams within the Defence Geospatial Information Working Group (DGIWG), an international Standards Developing Organization (SDO) and key NATO partner regarding Geospatial expertise. DGIWG maintains the framework and underpinning artifacts based on requirements from the Defence community, to include those from NATO and NATO Nations. In select cases, NATO may create profiles of these standards to address specific constructs only applicable within the NATO enterprise.

The DGIF provides a common solution allowing for a standardized information exchange and the generation of standardized geospatial products based on a common vector data model. These DGIF standards will provide interoperability bridges between the data schemas of nations involved in coalition exercises and operations, guaranteeing consistent data products and services for the end user of geospatial information.

The DGIF profiles and artifacts are the basis for this NATO standard and thus NATO endorses the use of DGIF artifacts. NATO therefore acknowledges that all DGIF terms are suitable for NGIF unless otherwise stated.

3.2. DGIF ARTIFACTS

Artifacts are developed and maintained to establish the overall model and therefore the scope of the geospatial information covered by the DGIF. The Defence Geospatial Information Model (DGIM) is the base component of the DGIF, defining the data model and the rules and restrictions for geospatial data. The DGIM is accompanied by a dictionary providing the “language” and the definitions for the DGIM. This dictionary is called the Defence Geospatial Feature Concept Dictionary (DGFCD). An index, the Defence Geospatial Real World Object Index (DGRWI), supports a human-friendly understanding of concepts within the DGIM.

These three artifacts build the foundation of the vector data part of the DGIF. DGIM, DGFCD and DGRWI are not meant to be directly provided to, or used by, the end user. Therefore, the references to them are only provided here for information purposes.

- DGIWG – 205 - Defence Geospatial Information Model (DGIM)
- DGIWG – 206 - Defence Geospatial Feature Concept Dictionary (DGFCD)

- DGIWG – 207 - Defence Geospatial Real World Object Index (DGRWI)

The artifacts can be downloaded from the public website of the Defence Geospatial Information Working Group

(https://www.dgiwg.org/dgiwg/htm/documents/standards_implementation_profiles.htm)

3.3. UTILISATION OF STANDARDS RELATED DOCUMENTS

The DGIM is a large complex model describing the geospatial information elements that meet geospatial information requirements stated by NCS and NATO Nations. It is therefore not meant to be implemented directly or used in an operational environment. The complex design of the NGIM may overwhelm existing commercial GIS software products.

In order to facilitate implementation of DGIM, this standard uses standard related documents, otherwise known as SRDs. A SRD is a standardization document that facilitates the understanding and implementation of an Allied standard. SRDs associated with this standard are numbered in order of completion.

3.4. DATA PRODUCT SPECIFICATIONS

Artifacts and specifications for the end user are profiled and customized in Data Product Specifications (DPS). These consist of artifacts on their own that are derived from the foundation artifacts as stated in paragraph 3.2. A DPS may exist for digital and print products. In the case of digital data/datasets, a common application schemas may be developed to support machine-to-machine exchange. Artifacts for a DPS that define digital or hardcopy products are for instance a Feature Catalogue and a Portrayal Catalogue. Depending on the DPS an Annotation Catalogue could also be provided. The composition and structure of a DPS is defined in the Defense Geospatial Information Working Group Profile of ISO 19131:2007/Amd 1, Geographic information – Data product specification.

DPS are developed and published as associated SRDs to this standard. A DPS defines the structure, content and (optionally) the representation of a data set. For example, a DPS could serve as an instruction for the creation of an analogue map, for the provision of geospatial data using web services or the exchange of geospatial data using data files.

Additional DPS can be developed with the support of DGIWG in accordance with NATO requirements. This approach ensures the flexibility and agility to respond to a changing operational environment in a timely manner. Standards compliance is assessed and measured at the product level.

Three different types of products are provided for different use cases:

- Paper (or Print) Products: Analogue products which are graphical representation of digital data on paper.
- Digital Products: Digital products which are graphical representation of digital vector data using rules and symbols on the screen.
- Data Exchange Schemas: Dataset descriptions for the exchange of data between different organizations, systems or databases. Content of a map product or digital product may be exchanged with an exchange product.

NOTE: See Volumes 2 (Vector) and 3 (Imagery and gridded data) for a listing of respective DPSs.

3.5. STANDARD SCALES FOR PRINT

3.5.1 LAND MAPS

The standard scales listed below are to be used for all military land maps where the choice of scale is unencumbered by considerations of antecedent mapping in the area. Where the choice of scale is affected by such considerations, a decision on the scale to be used will be reached by agreement between the Strategic Commands and the authorities of the nation concerned.

Standard Scales. The standard scales shall be:

- 1:1,000,000
- 1:500,000
- 1:250,000
- 1:100,000
- 1:50,000
- 1:25,000

It will often not be possible or expedient to provide maps at all the agreed scales; the choice of which to produce will be governed by military and production considerations.

Other Scales. No standard scales are required for maps at scales smaller than 1:1,000,000 since these maps are usually designed for specific purposes rather than general use and are not susceptible to standardization. Military mapping agencies of the NATO nations should undertake, however, to keep each other informed concerning the projects in this range in order to ensure the maximum use of available effort.

No standard scale larger than 1:25,000 has been agreed since, for maps and plans of this type, the scale is a factor of relatively small importance and must be subordinated to other factors.

It is recognized that from time to time special purpose military maps at nonstandard scales will be needed.

3.5.2 AERONAUTICAL CHARTS

Standard Scales. Where scale is not otherwise dictated by specific operational requirements, special operating techniques or aircraft equipment, the standard scales for aeronautical charts shall be:

- 1:2,000,000
- 1:1,000,000
- 1:500,000
- 1:250,000

Other Scales. No standard scale for aeronautical charts smaller than 1:2,000,000 has been agreed. Charts in this category are generally produced for planning or long-range navigation purposes when scale may be determined by such considerations as location of terminal airfields, paper and printing sizes, etc. It is agreed that such charts shall not be subject to standardization.

It is recognized that from time to time special purpose aeronautical charts at non-standard scales will be needed.

3.6. MAXIMUM PRINT SIZE

The maximum size for land maps, aeronautical charts and geospatial products (excluding nautical charts) shall not exceed 1100mm x 1500mm.

It must be understood that to allow for the mechanics of printing, it is recommended that the actual print area available on a sheet of paper measuring 1100mm x 1500mm, is actually 1085mm x 1500mm.

Given printing constraints of the actual content area, owing to the mechanics of printing, the following criteria shall be used:

a. For land maps:

(1) At scales of 1:250,000 and larger (other than military city maps/street plans) the maximum sheet size should not normally exceed 900mm x 1000mm.

(2) Military city maps and military city street plans should not exceed a maximum sheet size of 1100mm x 1500mm.

b. For aeronautical charts the maximum chart size should not exceed 1100mm x 1500mm.

c. All other printed geospatial products, when folded, must not exceed 570mm x 750mm.

3.7. METADATA

Metadata is essential for dealing with geospatial data. On printed maps the user can find information about the content, its product specification, the currency of the data sources, the producer, the distributor and other relevant data important for the usage of the map.

Metadata is information which involves the basic characteristics of a geospatial resource. It represents the "*who*", "*what*", "*where*", "*when*", "*why*" and "*how*" of the resource. The metadata includes information about the identification, constraint, extent, quality, spatial and temporal reference, distribution, lineage, and maintenance of the digital geographic dataset.

Metadata is used in the NGIF to specify the structure of, and characteristics about, geospatial data. Each dataset and/or geospatial feature within a dataset is assigned metadata information. These include in particular information on accuracy, sources and dates.

In NGIF, metadata will be handled on two levels:

- Dataset, i.e. a consistent spatial data product instance. In this context the metadata will have to conform to STANAG 2586, NATO Geospatial Metadata Profile.
- Features as properties defined in the application schema.

3.8. WEB SERVICES

Web services will be utilized to facilitate search and discovery, access, and use of geospatial data and products stored in NATO repositories as well as those in national environments. The web services standards, and implementation profiles that are used within the NATO construct are defined in STANAG 6523, Defence Geospatial Web Services.

3.9. CONFORMANCE

Product specifications that claim conformance to this standard shall include conformance clauses, which enable to adequately determine one's compliance through subsequent test and evaluation of the implementation. Annex A contains the abstract test suite for evaluating conformance to this AGeoP.

3.10. CERTIFICATION

Certification is a process which generally involves conformance and quality insurance tests. The conditions by which a product is stamped conformant to this AGeoP may be as simple as passing the conformance tests, but may involve additional qualification criteria to be documented.

The ability of software to produce, exchange, and use a single product does not demonstrate its ability to conform repeatedly to this AGeoP, nor does it sufficiently demonstrate that it is interoperable with other software implementing this AGeoP.

The certification of software requires additional testing, possibly involving already certified NGIF software, in order to evaluate its ability to interoperate in a specific context, e.g. between a service provider like NATO Core GIS and a data consumer like a Functional Area Services (FAS).

Different levels of interoperability may be targeted involving each additional testing:

- Level 1 is the ability of software to produce, import and export, and use data and products, which is conformant to this standard.
- Level 2 is the ability of software to manage the standardization artifacts, covered by this standard.
- Level 3 fulfills the criteria of Level 1 and 2.

ANNEX A

ABSTRACT TEST SUITE
(Normative)

A.1. Introduction

This normative Annex presents the abstract test suite for evaluating conformance to this AGeoP. This abstract test suite contains modules for:

- A test module for the conformance of a product (A.2.).
- A test module to assess a software ability to produce, exchange, and use data/dataset and products (A.3.).
- A test module for the conformance of a product specification with this AGeoP (A.4.).

A.2. Product

A.2.1. Test module for a candidate product

Information for the test module is as follows:

a. Test Purpose: verify that the product conforms to its defined product specification[1].

b. Test Method: perform the tests defined in the product specification.

c. Test Type: capability.

A.3. Software capable of handling data and products

A.3.1. Test module to demonstrate the capacity to produce and export data and products

Information for the test module is as follows:

a. Test Purpose: verify the capacity to produce and export a product at level 1.

b. Test Method: perform test A.3.3.1.

c. Reference: A.3.3.1.

d. Test Type: capability.

[1] A Product Specification shall be conformant with the criteria of this AGeoP.

A.3.2. Test module to demonstrate the capacity import and use data and products at level 1

Information for the test module is as follows:

a. Test Purpose: verify the capacity to import and use a product at level 1.

b. Test Method: perform test A.3.3.2.

c. Reference: A.3.3.2.

d. Test Type: capability.

A.3.3. Test cases

A.3.3.1. Test cases: produce and export

a. Test Purpose: to determine the capacity to generate a product.

b. Test Method:

1) according to the software documentation proceed to the generation of a product,

2) apply test module A.2.1 to evaluate the conformance of the output product.

c. Reference: A.2.1.

d. Test Type: Basic.

A.3.3.2. Test cases: import and use

a. Test Purpose: to determine the capacity to import and use a product.

b. Test Method:

1. according to the software documentation proceed to the import and use of product,
2. check that the data can be properly used or have been properly imported.

c. Test Type: Basic.

A.4. Product Specification

A.4.1. Test module for a candidate Product Specification

Information for the test module is as follows:

a. Test Purpose: verify that a product specification is conformant with the criteria of this AGeoP.

b. Test Method: perform the test cases A.4.2.1. to A.4.2.12.

c. Test Type: capability.

A.4.2. Test cases

A.4.2.1. Test case: presence of the overview elements

a. Test Purpose: to determine the presence of the overview elements.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 7, requirements with respect to the documentation of the overview elements.

c. Test Type: Basic.

A.4.2.2. Test case: specification scope

a. Test Purpose: to check the conformance of the specification scopes.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 7, requirements with respect to the documentation of the specification scopes.

c. Test Type: Basic.

A.4.2.3. Test case: data product identification

a. Test Purpose: to check the conformance of the data product identification.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 8, requirements with respect to the documentation of the data product identification.

c. Test Type: Basic.

A.4.2.4. Test case: data content and structure

a. Test Purpose: to check the conformance to the data dictionary and data model.

b. Test Method: check that the concepts used in the product specification are part of the Defence Geospatial Feature Concept Dictionary (DGFCD), and the concepts and relationships conform to the data model (i.e. DGIM).

c. Test Type: Basic.

A.4.2.5. Test case: reference systems

a. Test Purpose: to check the conformance to the spatial and temporal reference system requirements.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 10 requirements with respect to the documentation of the spatial and temporal reference system requirements.

c. Test Type: Basic.

A.4.2.6. Test case: data quality

a. Test Purpose: to check the conformance to the data quality requirements.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 11, requirements with respect to the documentation of the spatial data quality requirements.

c. Test Type: Basic.

A.4.2.7. Test case: data capture

a. Test Purpose: to check the conformance to the data capture requirements.

b. Test Method: check that the product specification defines or refers to inclusion criteria, in accordance with ISO 19131, Clause 12, defining the extraction or inclusion criteria applicable to the resolution of the product.

c. Test Type: Basic.

A.4.2.8. Test case: data maintenance

a. Test Purpose: to check the conformance to the data maintenance requirements.

b. Test Method: check that the product specification conform to ISO 19131, Clause 13, requirements with respect to the documentation of the data maintenance.

c. Test Type: Basic.

A.4.2.9. Test case: portrayal

a. Test Purpose: to check the conformance to the portrayal requirements.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 14, requirements with respect to the documentation of the portrayal.

c. Test Type: Basic.

A.4.2.10. Test case: metadata

a. Test Purpose: to check the conformance to the metadata requirements.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 16, and applies the dataset metadata in accordance with AGeoP-08, and where applicable, defines the permissible values for the metadata elements.

c. Test Type: Basic.

A.4.2.11. Test case: additional information

a. Test Purpose: to check the conformance to the additional information requirements.

b. Test Method: check that the product specification conforms to ISO 19131, Clause 17, requirements with respect to any additional information applicable to the product.

c. Test Type: Basic.

A.4.2.12. Test case: data content specification

a. Test Purpose: to check the conformance of the data content specification.

b. Test Method: check that the product specification conforms to ISO 19131 requirements with respect to the data content specification.

c. Test Type: Basic.

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Allied Geospatial Publication 11

(AGeoP-11(B))

NATO Geospatial Information Framework

Volume 2

Vector Data

OCTOBER 2018

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CHAPTER 1 VECTOR DATA AND PRODUCTS

1.1 INTRODUCTION

Volume 2 of AGeoP-11 defines and describes the standardization artifacts required to create, share, and use vector data, datasets, and print products. Standardization artifacts covered by this AGeoP may include NATO STANAGs, Allied Publications, and Standards Related Documents (as well as standards from geospatial standardization organizations).

1.2 SCOPE

The scope of this volume includes:

- Identifying the standards and standardization artifacts that are required to facilitate and ensure the provision of interoperable vector-based data, datasets, and print products throughout the NATO enterprise.
- Define specific criteria applicable to implementation of these artifacts

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CHAPTER 2 VECTOR STANDARDS

2. STANDARDS

The Defence Geospatial Information Model (DGIM) is the primary standard for defining data used to create digital and print products. Geospatial products that are created for use within NATO are to be in compliance with data concepts cited in the data model, and the “language” cited in the Defence Geospatial Feature Concept Dictionary (DGFCD).

2.1 MAPPING AND LINEAGE TABLES

Mapping and lineage tables provide the means for converting vector data from an existing schema or dictionary to DGIF/NGIF and support the transfer in DGIF/NGIF compliant data formats.

To support users with conversion of vector data and data transfer, a set of mapping and lineage tables are provided in

AGeoP – 11.2 – NGIF 2.0 Mapping and Lineage Tables. This document defines the following mapping or lineage tables:

- DGIF – Overview – SD1: NGIF v1.0 to DGIF v2.0 (https://portal.dgiwg.org/files/?artifact_id=68607)
- DGIF – Overview – SD2: DFDD 2013-1 to DGIF v2.0 (https://portal.dgiwg.org/files/?artifact_id=68605)
- DGIF – Overview – SD3: MGCP TRD 4.x to DGIF v2.0 (https://portal.dgiwg.org/files/?artifact_id=68606)

2.2 VECTOR DATASETS AND PRODUCTS

This section lists product specifications that are compliant with this standard.

- **AGeoP – 11.1 – Defence Topographic Exchange (DTOX) DPS -** This is a DPS for data exchange. An exchange product is not meant for the graphical representation of data to the end user. It allows for the provision of the full content of a vector dataset, preferably without loss of complexity through a GML application schema. It is based on the document "DGIWG 253: Defence Topographic Exchange (DTOX) Data Product Specification (DPS)".

  (https://portal.dgiwg.org/files/?artifact_id=68739)

- **AGeoP – 11.4 – Defence Topographic Map for 1:50,000 Scale (DTM50) Data Product Specification (DPS) -** The current baseline of NGIF comprises a DPS for the Topographic Map for 1:50,000 Scale (TM50). It is based on the document

"DGIWG 252: Defence Topographic Map for 1:50,000 Scale (DTM50) - Data Product Specification (DPS)".

(placeholder: https://portal.dgiwg.org/files/?artifact_id=xxxxx)

2.3 STANAGs

For Edition B of this volume, users should refer to the geospatial STANAGs listed below for additional vector themed standards and specifications not covered by this standard.[2] As this standard evolves, the STANAGs cited below will be superseded and canceled in lieu of standards and specifications that are in compliance with this standard.

- **3600 Ed. 3 Topographical land maps and aeronautical charts 1:250,000 for joint operations**

The aim of this agreement is to define the basic specification requirements for topographical land maps and aeronautical charts 1:250,000 scale having the same topographic base for use in joint operations and such other military operations as are appropriate.

- **3675 Ed. 2 Symbols on land maps, aeronautical and special naval charts**

The aim of this agreement is to standardize the basic symbols used on topographic land maps, aeronautical charts and special naval charts.

- **3710 Ed. 1 Military city maps**

The aim of this agreement is to standardize sufficiently Military City Maps prepared for use by NATO Armed Forces to enable forces familiar with such maps, prepared by one member nation, to use those prepared by another member nation without additional training or extensive interpretation.

- **7072 Ed. 2 Vector Map (VMap) level 0**

The aim of this agreement is to register national acceptance of US MIL-PRF-89039, Vector Map (VMap) Level 0.

- **7163 Ed. 1 Vector Map (VMap) Level 1**

The aim of this agreement is to register national acceptance of US MIL-PRF-89033, Vector Map (VMap) Level 1.

[2] Refer to https://nso.nato.int/nso/ for a complete listing of geospatial STANAGs and related status as this list may change prior to the next issue of this standard.

Allied Geospatial Publication 11
(AGeoP-11(B))

NATO Geospatial Information Framework

Volume 3

Imagery and Gridded Data

OCTOBER 2018

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CHAPTER 1 IMAGERY AND GRIDDED DATA AND PRODUCTS

1.1 INTRODUCTION

Volume 3 of AGeoP-11 defines and describes the standardization artifacts required to create, share, and use imagery and gridded data, datasets, and hardcopy products. Standardization artifacts covered by this AGeoP may include NATO STANAGs, Allied Publications, and Standards Related Documents (as well as standards from geospatial standardization organizations).

In Edition B of this Volume the technical description and design is not addressed. This information is to be included in future versions.

1.2 SCOPE

The scope of this volume includes:

- Identifying the standards and standardization artifacts that are required to facilitate and ensure the provision of interoperable imagery and gridded data, datasets, and hardcopy products throughout the NATO enterprise.
- Define specific criteria applicable to implementation of these artifacts.

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CHAPTER 2 IMAGERY AND GRIDDED DATA STANDARDS

This standard addresses the fundamental concepts behind imagery and gridded data, and defines the standards that enable its creation, sharing, and use across the NATO enterprise. The application and use of these standards will increase interoperability of data and products across the civil and defence communities.

2.1 IMAGERY DATA

The principal requirement for imagery standards is for the exchange and use of following types of data types:

- Raster
- Orthoimagery.

Non-georeferenced imagery (e.g. Sensor imagery) is addressed by STANAG 4545 (NSIF), and within the scope of JCGISR works.

2.2 GRIDDED DATA

The principal requirement for gridded data are for profile(s) or recommendations for the exchange and use of georeferenced gridded data (height, depth ...) with associated metadata, allowing:

- high resolution terrain elevation model (horizontal spatial resolution of 0.4 arc seconds of longitude at the equator and higher resolution levels,
- multi-resolution terrain elevation model (TEM), allowing high resolution patches over lower resolution TEM.

2.3 PRODUCT CATEGORIES

Imagery and gridded data include two types of data:

- Any georeferenced imagery and gridded data with associated metadata and georeferenced information
- Sensor imagery with associated metadata and sensor geopositioning model.

2.3.1 RASTER PRODUCTS

Raster products are topographic and image maps in raster mode and format, either scanned or rasterized from vector topographic products.

2.3.2 ORTHOIMAGERY PRODUCTS

Orthoimagery products are georeferenced imagery adjusted for topographic relief (on the basis of a terrain elevation model), conforming to an orthoimagery product specification.

2.3.3 ELEVATION PRODUCTS

Topographic elevation products address terrain elevation models and elevation surface models (elevation on top of vegetation or structures or buildings), conforming to an elevation product specification.

For maritime domain, elevation data is bathymetric data, providing depth instead of elevation.

2.4 STANDARDS ASSESSMENT

This clause provides assessment information for the identified civil and military standards and provides guidance and recommendation for implementation of imagery and gridded data standards.

2.4.1 IMAGERY AND GRIDDED DATA REFERENCE MODELS

The imagery and gridded data reference models should be based on ISO 19101 and ISO/TS 19101-2, with the framework vision of ISO/TS 19129.

There is no specific military imagery data reference model, nor any requirement for its development.

2.4.2 RULES FOR APPLICATION SCHEMA

ISO 19109 – Rules for application schema is the specification defining how to go from the concepts to implementation specification, promoting an automated approach.

Imagery experts have expressed a multitude of conceptual and physical representations of an image. ISO 19123 defines a single concept of coverage which summarizes the different conceptual representation of an image, going further by enlarging the spectrum of geospatial information that can be represented this way.

OGC GMLCOV is the implementation schema for coverages now used in OGC web services and emerging GMLJP2 2.0.

2.5 METADATA

The set of ISO 19115 (and 19139 for XML encoding – including metadata rules for application schema) standards are the base metadata standard for geospatial data.

The NATO Geospatial Metadata Profile (STANAG 2586) which standardizes the content and encoding of the metadata describing geospatial data and services used by NATO armed forces has been ratified. It is considered a NATO restriction of DGIWG's Metadata Foundation (DMF) document, which in itself is a profile of ISO 19115. Edition 2 (release in 2017) of the DMF contains extensions for sensor imagery metadata.

The DMF specification is the reference metadata standard to be used for imagery and gridded data, on the basis of its Data and Data+ conformance classes, for the description of Coverage data. It handles the mapping with ISO TC211 metadata standards.

2.6 USE OF OPEN GEOSPATIAL CONSORTIUM (OGC) STANDARDS

The defence community must leverage, particularly WCS (Web Coverage Service), for use in the exchange and use of imagery products or other gridded data. STANAG 6523 defines such a WCS profile for georelated datasets. Defining a WCS profile focusing specifically on MetOc use cases is under consideration.

An Imagery Georeference Web Service (IGS) for accurate georeferencing of sensor images provided by a geospatial imagery server is another topic of interest and potential future requirement.

2.7 IMAGERY AND GRIDDED DATASETS AND PRODUCTS

This section lists product specifications that are compliant with this standard.

- **AGeoP – 11.3 – GeoTiff Raster Format Standardization for NATO -** This SRD standardizes the submission of GeoTiff files for raster geospatial products (standard maps and orthorectified imagery) provided to SHAPE J2 GSP as part of the annual Coordinating Nation/Participating Nation data provision process. (https://portal.dgiwg.org/files/?artifact_id=68102)
- **AGeoP – 11.4 – Defence Geospatial Elevation Data**

  (https://portal.dgiwg.org/files/?artifact_id=68674)

2.8 STANAGs

For Edition B of this volume, users should refer to the geospatial STANAGs listed below for additional imagery and gridded standards and specifications not covered by this standard.[3]

- **3809 Ed. 4 Digital Terrain Elevation Data (DTED) Exchange Format**

The aim of this agreement is to register national acceptance of STANAG 3809, based on US Performance Specification 89020B dated 23 May 2000.

The Defence Geospatial Information Working Group's Elevation Surface Model (ESM) profile, provides models for elevation data adapted to the military requirements and are supported by the following encodings: GeoTIFF, GMLJP2, and NSIF.

The ESM does provide a conversion table for DTED Level 0/1/2 to Defence Gridded Elevation Data Product Implementation Profile (DGED) Level 0/1/2 metadata.

- **4387 Ed. 1 ARC Standard Raster Product (ASRP)**

The aim of this agreement is to register national acceptance of AGeoP-05.

Companion AP: AGeoP-05, dated April 1998

- **7098 Ed. 2 Compressed ARC Digitized Raster Graphics (CADRG)**

The aim of this agreement is to define requirements for preparation and use of the CADRG product, which is composed of computer-readable digital maps and chart images.

- **7099 Ed. 2 Controlled Imagery Base (CIB)**

The aim of this agreement is to register acceptance of STANAG 7099, based on US Performance Specification 8904A dated 28 March 2000.

- **7169 Ed. 2 NATO Specifications for Image Maps**

The aim of this Allied Geospatial Publication is to sufficiently standardize Image Maps prepared for use by NATO armed forces, in both hard and soft copy products; to enable forces familiar with such image maps prepared by one member nation, to use those prepared by another member nation without additional training or extensive interpretation.

Companion AP: AGeoP-10, Ed.A Ver.1

[3] Refer to https://nso.nato.int/nso/ for a complete listing of geospatial STANAGs and related status as this list may change prior to the next issue of this standard.

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