NATO STANDARD

AGeoP-26

DEFENCE GEOSPATIAL WEB SERVICES

Edition A Version 1

MARCH 2020

NORTH ATLANTIC TREATY ORGANIZATION

ALLIED GEOGRAPHIC PUBLICATION

Published by the
NATO STANDARDIZATION OFFICE (NSO)

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NORTH ATLANTIC TREATY ORGANIZATION (NATO)

NATO STANDARDIZATION OFFICE (NSO)

NATO LETTER OF PROMULGATION

3 March 2020

1. The enclosed Allied Geographic Publication AGeoP-26, Edition A, Version 1, DEFENCE GEOSPATIAL WEB SERVICES, 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 6523.

2. AGeoP-26, Edition A, Version 1, is effective upon receipt.

3. This NATO standardization document is issued by NATO. In case of reproduction, NATO is to be acknowledged. NATO does not charge any fee for its standardization documents at any stage, which are not intended to be sold. They can be retrieved from the NATO Standardization Document Database ((https://nso.nato.int/nso/) or through your national standardization authorities.

4. 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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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	Due to difficulties (contradictions) related to the implementation of Requirement 3, the latter will not be implemented in French systems.
USA	1) The U.S. implementation of the geospatial web services covered by AGeoP- 26 (WCS, WFS, WMS, WMTS, and CSW) will be in accordance with National System for Geospatial Intelligence (NSG) profiles of Open Geospatial Consortium (OGC) standards, and OGC standards in cases where a NSG profile does not exist. These standards are: • NGA.STND.0062_1.0_WFS, NSG Web Feature Service 2.0 Implementation Profile • NGA.STND.0058_2.0_WMS, NSG Web Map Service 1.3 Interoperability Standard • NGA.STND.0063_1.1_ WMTS, NSG Web Map Tile Service 1.0.0 Interoperability Standard • OGC WCS 2.0, OGC Web Coverage Service (WCS) 2.0 Interface Standard-Core (incorporating Corrigendum), Version 2.0.1 • OGC CAT 2.0.2, OGC Catalogue Service for the Web 2.0 The standards/profiles listed above are currently cited as mandated within the DoD Information Technology Register (DISR) and are implemented within the NSG. Testing and evaluation is required to determine the level of interoperability between these standards/profiles and the profiles cited in AGeoP-26. Until such a time, the response will remain 'Ratifying Future Implementing w/Reservations.' 2) Furthermore, the U.S. does not support the inclusion of both the NCIA Service and Interoperability Profile (SIP) for Map Rendering and the Defence Geospatial Information Working Group (DGIWG) profiles for Web Map Service and the Web Map Tiling Service. Having two separate, and potentially non-interoperable solutions, should be avoided.

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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CHAPTER 1 INTRODUCTION

1.1 AIM

Geospatial web services are essential to the provision of timely and relevant data. In order to ensure the discovery, access, retrieval, and use of geospatial data/datasets, a common approach must be established by NATO and NATO nations.
The rationale is that web services should enable the delivery of information as described by both MC 0296 NATO Geospatial Policy and MC 0632 NATO REP Concept.
The aim of the document is to create a common approach for the definition and implementation of geospatial web services; thereby facilitating sharing and re-use of data/datasets. This becomes increasingly significant as nations use data, datasets and products in accordance with STANAG 2592 and other related standards.
This version of the document defines the following geospatial web services categories:

- Discovery services,
- View services,
- Feature Download services,
- Coverage Download Services.

1.2 DEFINITIONS

Interface	The shared boundary between two entities where their interaction is governed by a set of rules and conventions [NATOTerm].
	Named set of operations that characterize the behaviour of an entity [ISO 19119]
Service	In network architecture, the capabilities that a layer provides to the adjacent layer closer to the end user [NATOTerm].
	Distinct part of the functionality that is provided by an entity through interfaces [ISO 14252]
Client	Software component that can invoke an operation from a server.
Geospatial Product Specification	Detailed description of a geospatial dataset or dataset series together with additional information that will enable it to be created, supplied to and used by another party [*adapted from ISO 19131:2007*]. NOTE: A data product specification provides a description of the universe of discourse and a specification for mapping the universe of discourse to a dataset. It may be used for production, sales, end-use or other purpose.

NOTE: NATOTerm references the agreed NATO terminology (see https://nso.nato.int/natoterm/content/nato/pages/home.html).

1.3 ACRONYMS

AGeoP	Allied Geographic Publication
CSW	Catalog Service for the Web
DGIWG	Defence Geospatial Information Working Group
FAS	Functional Area Services
INSPIRE	Infrastructure for Spatial Information in European Community
NSO	NATO Standardization Office
OGC	Open Geospatial Consortium
SIP	Service Interface Profile
WCS	Web Coverage Service
WFS	Web Feature Service
WMS	Web Map Service
WMTS	Web Map Tile Service

1.4 RELATED DOCUMENTS

Reference Documents

1. DGIWG 125: Defence Profile of OGC Catalogue Service for the Web 2.0, version 1.0.1, dated 2018-03-01. It defines the requirements for setting-up a CSW Service

   https://portal.dgiwg.org/files/?artifact_id=68270&format=pdf

2. DGIWG 112: Defence Profile of OGC's Web Map Service 1.3, version 3.0.0, dated 2017-11-28. It defines the requirements setting-up a WMS Service.

   https://portal.dgiwg.org/files/?artifact_id=68226&format=pdf

3. DGIWG 124: Defence Profile of OGC's Web Map Tile Service 1.0, version 1.0.0, dated 2017-10-17. It defines the requirements setting-up a WMTS Service.

   https://portal.dgiwg.org/files/?artifact_id=68271&format=pdf

4. NCIA SIP for Map Rendering Services 1.0. It defines the requirements for setting-up a WMS and WMTS Service.

   https://reccen.nr.ncia/_layouts/15/DocIdRedir.aspx?ID=NCIARECCEN-4-128933 (link is limited to the NR network)

5. DGIWG 122: Defence Profile of OGC Web Feature Service 2.0, version 2.0.1, dated 2017-11-28. It defines the requirements for setting-up a WFS Service.

   https://portal.dgiwg.org/files/?artifact_id=68228&format=pdf

6. DGIWG 119: Defence Profile of OGC Web Coverage Service 2.0, version 1.0.0, dated 2017-11-28. It defines the requirements for setting-up a WCS Service.

   https://portal.dgiwg.org/files/?artifact_id=68227&format=pdf

7. DGIWG 101, Profile of ISO 19131 - Geographic Information - Data product specification, version 1.0.0, 2018-04-05. It defines the requirements for developing data product specifications.

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

International Standards:

8. ISO 19128:2005 Geographic information – Web map server interface equivalent to OGC WMS 1.3

   http://portal.opengeospatial.org/files/?artifact_id=14416

9. ISO 19142:2010 Geographic information – Web Feature Service equivalent to OGC WFS 2.0

   http://portal.opengeospatial.org/files/?artifact_id=39967

10. ISO 19143:2010 Geographic information – Filter Encoding equivalent to OGC FE 2.0

    http://docs.opengeospatial.org/is/09-026r2/09-026r2.html

11. OpenGIS Catalogue Service Implementation Specification, version 2.0.2

    http://portal.opengeospatial.org/files/?artifact_id=20555

12. OpenGIS Web Map Tile Service Implementation Standard, version 1.0.0

    http://portal.opengeospatial.org/files/?artifact_id=35326

13. OGC® WCS 2.0 Interface Standard - Core, version 2.0.1

    https://portal.opengeospatial.org/files/09-110r4

Other related documents:

14. MC 0296/3, NATO Geospatial Policy

15. AAP-06(2018) - NATO Glossary of Terms and Definitions (English and French) [NATOTerm]

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CHAPTER 2 CONCEPTUAL ARCHITECTURE (INFORMATIVE)

2.1 SCOPE

This chapter is informative. It describes a global architecture for geospatial web services in the Defence Community and links with related STANAGs and standards.

2.2 DISSEMINATION OF GEOSPATIAL PRODUCTS VIA WEB SERVICES

2.2.1 General

Following figure presents a possible use of geospatial web services in a global architecture. Web services are defined through their interfaces; they are connected on one side to the underlining data and on the other side to the clients/users.
This document categorizes the interfaces into four main groupings: Discovery Service, View Service, Feature Download Service, and Coverage Download Service.

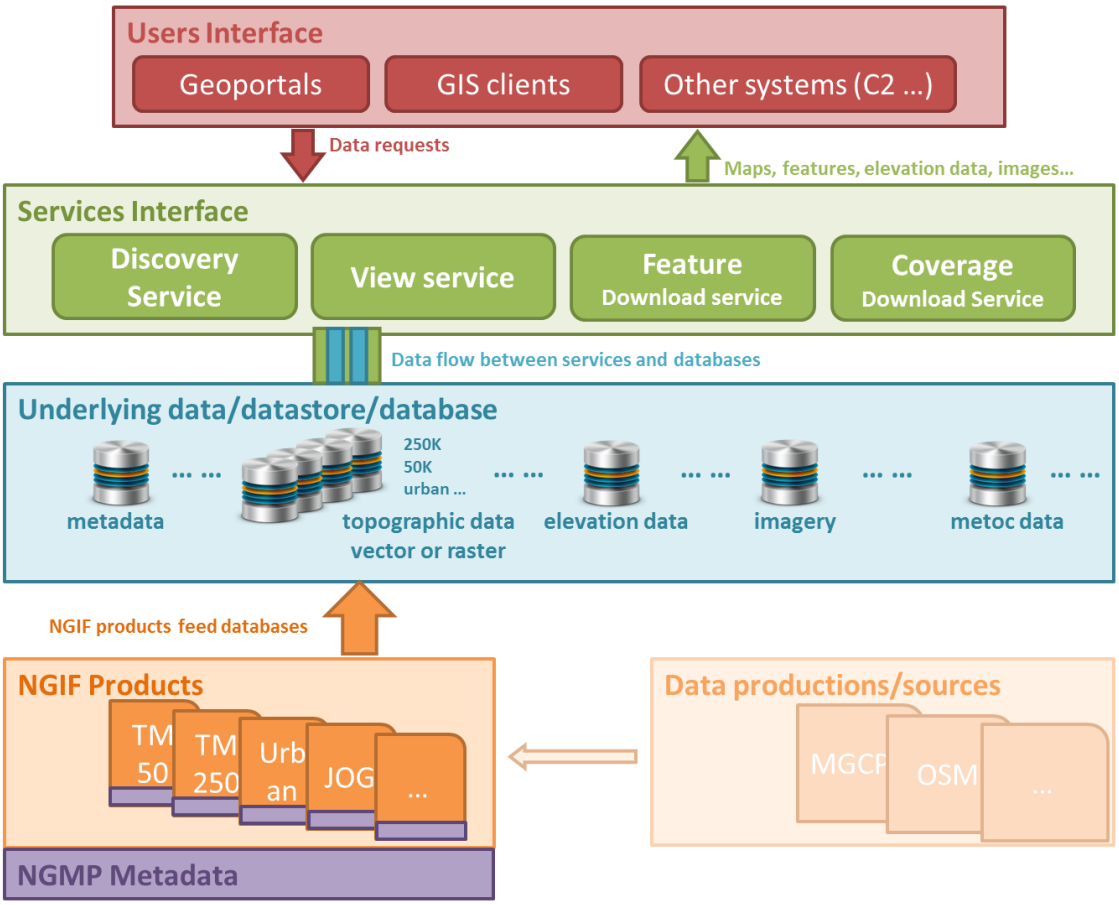

Figure 1 : Geospatial Web services in a conceptual architecture

These four main geospatial web service categories defined in the NATO context (Discovery Service, View Service, Feature Download service, and Coverage Download Service) are described with help of OGC and INSPIRE definitions.

Note: Despite the fact that the INSPIRE directive does not apply here, it helps for the definition of these web services categories. This will allow defining different services implementations sitting in these categories, over the time and versions of this document.

2.2.2 Discovery service

The OGC service interface for discovering data and services is defined in the Catalog Service specification.

OGC
"*Catalogue services support the ability to publish and search collections of descriptive information (metadata) for data, services, and related information objects. Metadata in catalogues represent resource characteristics that can be queried and presented for evaluation and further processing by both humans and software. Catalogue services are required to support the discovery and binding to registered information resources within an information community*."
Source OGC 07-006r1 - OpenGIS® Catalogue Services Specification v 2.0.2
http://portal.opengeospatial.org/files/?artifact_id=20555

INSPIRE
"*Discovery services search for spatial datasets and spatial data services on the basis of the content of corresponding metadata, and display the metadata content."*
Source: INSPIRE Directive, Article 11(1)

2.2.3 View services

OGC
View Services generate "maps of spatially referenced data from geographic information. A "map" to be a portrayal of geographic information as a digital image file suitable for display on a computer screen. A map is not the data itself. View services produced maps are generally rendered in a pictorial format such as PNG, GIF or JPEG, or occasionally as vector-based graphical elements in Scalable Vector Graphics (SVG) or Web Computer Graphics Metafile (WebCGM) formats."
Adapted from source OGC 06-042 - OpenGIS® Web Map Server Implementation Specification v 1.3.0
http://portal.opengeospatial.org/files/?artifact_id=14416

2.2.4 Download Service

INSPIRE
"*Download services enabling copies of complete spatial datasets, or of parts of such sets, to be downloaded*."
Source: INSPIRE Directive, Article 11(1)

Download services are categorized into two sub-categories based on OGC services

2.2.4.1 Feature download service

OGC
A Feature Download Service is "*a service that provides transactions on and access to geographic features in a manner independent of the underlying data store. It specifies discovery operations, query operations, locking operations, transaction operations and operations to manage stored parameterized query expressions*."
Adapted from source OGC 09-025r2- OGC® Web Feature Service 2.0 Interface Standard v 2.0.2
http://docs.opengeospatial.org/is/09-025r2/09-025r2.html

2.2.4.2 Coverage download service

OGC
A Coverage Download Service "*supports electronic retrieval of geospatial data as "coverages" – that is, digital geospatial information representing space/time-varying phenomena.*" It "*provides access to coverage data in forms that are useful for client-side rendering, as input into scientific models, and for other clients."*
Adapted from source OGC 09-110r4- OGC® WCS 2.0 Interface Standard- Core v 2.0.1
https://portal.opengeospatial.org/files/09-110r4

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CHAPTER 3 CONFORMANCE (NORMATIVE)

3.1 SCOPE

This chapter is normative. It defines conformance targets and conformance classes for defence geospatial web services.

3.2 CONFORMANCE

3.2.1 Introduction

This document defines two standardization targets:

- **Geospatial web service interface**

Requirements are defined for web services servers providing geospatial data/metadata in a defence environment;

- **Geospatial product specification**

Requirements are defined for content defined by a product specification, which is being delivered through geospatial web services.

NOTE: Standardization targets are the identified piece of software, document that aims at being standardized.

3.2.2 Geospatial web service interface

For the "***Geospatial web services interface***" target, the following conformance classes are defined:

- **Discovery service**,
- **View service**,
- **Feature download service**,
- **Coverage download service**.

Each of these conformance classes responds to specific operational requirements; they are defined independently. Implementation of one does not imply implementation of other(s); only one or all may be implemented.

For each of these conformances classes, specific requirements are defined:

Conformance class name	Web Service(s) Interfaces mapping (high level)	Requirements
Discovery service	OGC CSW	**Requirement 1Error! Reference source not found.**
View service	OGC WMS	**Requirement 2Error! Reference source not found.**
	OGC WMTS	**Requirement 3**
Feature download service	OGC WFS	**Requirement 4**
Coverage download service	OGC WCS	**Requirement 5Error! Reference source not found.**

Table 1: Conformance classes for a geospatial web service interface

3.2.3 Geospatial Product Specification

For the "geospatial product specification" target, one single conformance class is defined: **geospatial product specification**.
For this conformance class specific requirements are defined:

Conformance class name	High level information	Requirements
Geospatial Product Specification	An ISO 19131 product specification with additional requirements to web services dissemination	Error! Reference source not found. **Requirement 6, Requirement 7, Requirement 8, Requirement 9, Requirement 10**

Table 2: Conformance class for a geospatial product specification

3.3 STRUCTURE OF THE AGEOP

This document relies on a set of profiles, each one addressing a specific web service interface (e.g. WFS), or aspects of. The profile defines requirements and the technical details regarding the implementation of a geospatial web service to facilitate conformant implementations of the AGeoP by NATO and NATO Nations.

The following figure shows the relationship between the different conformance classes and the relating technical documents.

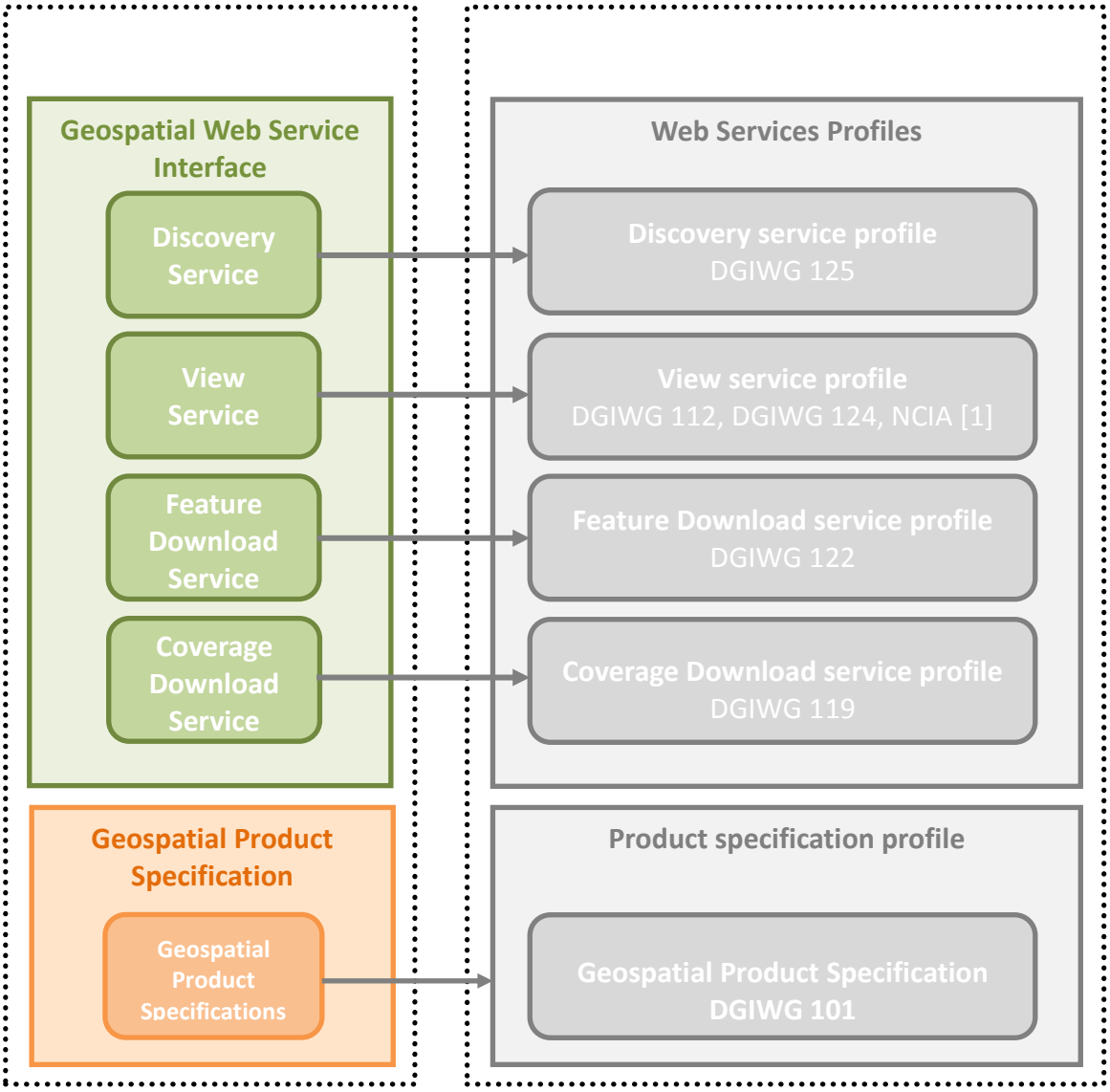

Figure 2: AGeoP-26 and related documents principle

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CHAPTER 4 GEOSPATIAL WEB SERVICE INTERFACE (NORMATIVE)

4.1 SCOPE

This chapter is normative. It defines requirements for the "Geospatial Web Service Interface" target. This chapter has one section for each web service interface profile; a profile (named exactly as the conformance class) provides requirements to be met by an interface seeking compliance to a specific conformance class.

4.2 DISCOVERY SERVICE PROFILE

The Discovery Service Profile defines the requirements for setting-up a CSW Service. It consists of one normative document:

- DGIWG 125, Defence Profile of OGC Catalogue Service for the Web 2.0, version 1.0.1, dated 2018-03-01)

  https://portal.dgiwg.org/files/?artifact_id=68270&format=pdf

Requirement 1: A Discovery Service shall implement the DGIWG Basic CSW (conformance class http://www.dgiwg.org/std/csw/1.0/conf/basic) from DGIWG 125).

4.3 VIEW SERVICE PROFILE

The View Service Profile defines the requirements for setting-up WMS and WMTS Services. It consists of three normative documents.

- **DGIWG-112** - Defence Profile of OGC's Web Map Service 1.3, version 3.0.0, dated 2017-11-28 → defines the requirements setting-up a WMS Service.

  https://portal.dgiwg.org/files/?artifact_id=68226&format=pdf

- **DGIWG-124** - Defence Profile of OGC's Web Map Tile Service 1.0, version 1.0.0, dated 2017-10-17 → defines the requirements setting-up a WMTS Service.

  https://portal.dgiwg.org/files/?artifact_id=68271&format=pdf

- **[1] NCIA** SIP for Map Rendering Services 1.0 → defines the requirements for setting-up a WMS and WMTS Service.

https://reccen.nr.ncia/_layouts/15/DocIdRedir.aspx?ID=NCIARECCEN-4-128933 (link is limited to the NR network)

Requirement 2: Unless a specialization of the View Service is required[1], a View Service shall implement the DGIWG Basic WMS (conformance class http://www.dgiwg.org/std/wms/3.0/conf/basic from DGIWG-112) or/and the DGIWG Basic WMTS (conformance class http://www.dgiwg.org/std/wmts/1.0/conf/basic from DGIWG-124).

WMS and WMTS are two geospatial services providing maps to the end users. A WMS provides maps produced on demand according to each request (requests may be complex to fit specific user needs) whereas a WMTS provides only tiles according a limited set of predefined parameters (CRS, zoom levels …). As tiles may be pre-calculated, it may be an efficient option when disseminating the same map to many users.

Some environments require implementing both interfaces, WMS and WMTS, in parallel as for example the Map Rendering Service specified by the NCIA SIP for Map Rendering Services**.**

Requirement 3: If a Map Rendering Service is required[2], a View Service shall implement the *Service Interface Profile (SIP) for Map Rendering Services* in reference [1].

The following Table 3 explicitly addresses the additional requirements which shall be met by a Map Rendering Service in contrast to a standard View Service. The *Page#Line* references the place of the original requirement in the Service Interface Profile for Map Rendering Services:

Page#Line	Requirement
10#13	In particular, any Map Rendering Service - MUST support a Web Map Service (WMS) interface, following the profile of the WMS Standard Version 1.3.0 [OGC WMS 1.3, 2006] as specified in Section 3. Here, "to support" means the ability to provide and exchange geospatial data via a WMS interface as specified in Section 3.

[1] For the use within NATO a specialization of the View Service is required. This specialized service is called Map Rendering Service. This case corresponds to requirement 3.
[2] A Map Rendering Service is required when operating within a NATO Network Enabled Capabilities (NNEC) environment in order to provide both OGC service interfaces (WMS and WMTS) in parallel in order to ensure interoperability with NATO Functional Area Systems (FAS) or NATO Functional Services (FS).

	- MUST support a Web Map Tile Service (WMTS) interface, following the profile of WMTS Standard Version 1.0.0 [OGC WMTS 1.0.0, 2010] as specified in Section 4. Here, "to support" means the ability to provide and exchange geospatial data via a WMTS interface as specified in Section 4. […] Note that this means that a system which hosts Map Rendering Services MUST support both interfaces, WMS and WMTS, in parallel, and MUST be able to offer the same geospatial data via both interfaces in parallel. However, this does not mean that necessarily all geospatial data will always be offered via both interfaces, as not every geospatial data is suitable to be cached and offered in a cached form.
15#1	*Rewording* In order to extend WMS 1.3 in line with OGC Web Services Common Standard the parameters introduced for a generic OWS as defined in Section 7.2 [OGC WSCommon 2.0, 2010] MAY be supported. If these parameters are used (AcceptVersions, Sections, AcceptFormats, and AcceptLanguages), they SHALL be used as specified in Section 7.3 of [OGC WSCommon 2.0, 2010]. If parameters that serve the same purpose (Version (from WMS 1.3) / AcceptVersions (from OGC WSCommon 2.0), Format (from WMS 1.3) / AcceptFormats (from OGC WSCommon 2.0)) appear together in the same service request, the WMS parameter SHALL take precedence.
15#7	*GetCapabilities* If an XML encoding is used for the request message it SHOULD comply with the XML schema specified in Appendix A.1. The values of the schemaLocation attributes of the import element MAY be changed accordingly to a local reference or a URL reference to the file. Note that the parameters defined by the WMS Standard are represented as XML attributes of the GetCapabilities element, while the parameters defined in WS Commons Standard are represented as sibling elements under the GetCapabilities element.
15#25	*GetMap* If an XML encoding is used for the request message it SHOULD comply with the XML schema specified in Appendix A.3. The XML schema follows the guidance for OWS services and uses syntactical constructs from the WS Commons Standards schemas, however, the meaning of the parameters SHALL be as defined in Section 7.3 of the WMS Standard [OGC WMS 1.3, 2006].
15#37	*GetFeatureInfo* If an XML encoding is used for the request message it SHOULD comply with the XML schema specified in Appendix A.4. The XML schema follows the guidance for OWS services and uses syntactical constructs from the WS Commons Standards schemas, however, the meaning of the parameters SHALL be as defined in Section 7.4 of the WMS Standard [OGC WMS 1.3, 2006].
16#35	In contrast to the WMS Standard, when parameters of a WMS request are duplicated with conflicting values, a Map Rendering Service MAY respond with an exception. If the exception is encoded as XML, it - SHALL be valid according to the schema provided in Appendix E.2 of the WMS Standard [OGC WMS 1.3, 2006], and SHALL use the exception code "DuplicatedParameterInRequest" as value of the attribute /ogc:ServiceExceptionReport/ogc:ServiceException/@code

	- SHALL contain the information that the cause for raising this exception is the existence of duplicated parameters in the operation request. The content of the element /ogc:ServiceExceptionReport/ogc:ServiceException SHALL be used for this purpose. - SHALL contain the name and the conflicting values of the duplicated parameters in the value of the attribute /ogc:ServiceExceptionReport/ogc:ServiceException/@locator
22#6	Regarding operation invocation a Map Rendering Service extends and profiles the WMTS Standard in the following way. A Map Rendering Service - SHOULD support service requests over the HTTP GET and POST methods using KVP parameter encoding. If supported, the HTTP KVP bindings for HTTP GET and POST requests MUST comply with the specification given in Section 8 of the WMTS Standard. … - MAY support SOAP bindings and offer its functionality via SOAP interfaces. If a Map Rendering Service offers its functionality via the SOAP protocol, it * MUST do so in compliance with the Messaging Service SIP [NCIA TR/2012/SPW008000/30, 2012] which defines general requirements that apply to all services in the NNEC environment that make use of SOAP. * MUST do so in compliance with Section 9 of the WMTS Standard.
24#15	Map Rendering Service MAY offer the GetResourceByID operation. If it offers such an GetResourceByID operation, it MUST comply with Section 9.3 the Web Services Common Standard [OGC WSCommon 2.0, 2010].

Table 3: Additional requirements of the SIP compared to the DGIWG WMS and WMTS profiles

Table 4 below lists additional requirements which are in the DGIWG profiles, but not in the SIP.

Profile# Req	**Requirement**
	WMS profile
WMS#3	A DGIWG Basic WMS server shall provide metadata content in a response to a "GetCapabilities" or “GetFeatureInfo” (if supported) request in English language. English is required to support interoperability in a coalition environment. *NOTE: Services can also be provided using alternative languages to English: This profile does not specify the details for implementation of multilingual services*.
WMS#4	A DGIWG Basic WMS server shall support the following raster formats for the GetMap operation:

<table>
<tr><td></td><td>• image/png (Portable Network Graphics)
• image/gif (Graphics Interchange Format)
• image/jpeg (Joint Photographics Expert Group)</td></tr>
<tr><td>WMS#5</td><td>A DGIWG Basic WMS server shall support the following coordinate reference systems:
• CRS:84 WGS84 geographic longitude, then latitude, expressed in decimal degrees
• EPSG:4326 WGS84 geographic latitude, then longitude, expressed in decimal degrees
• EPSG:3395 World Mercator projection
Among the following Coordinate Reference Systems, the service shall support all those which validity zone overlaps data published by the service:
• UTM projections over WGS84 (north zones)… EPSG:32601 to EPSG:32660
• UTM projections over WGS84 (south zones)… EPSG:32701 to EPSG:32760
• UPS projection over WGS84 (north zone)… EPSG:5041
• UPS projection over WGS84 (south zone)… EPSG:5042</td></tr>
<tr><td>WMS#6</td><td>A DGIWG Basic WMS server shall provide service exceptions in English language.</td></tr>
<tr><td>WMS#7</td><td>A DGIWG Basic WMS server shall provide all mandatory service metadata elements according to Table 4.
<table>
<tr><th>Element name</th><th>O/M[1]
OGC 06-042</th><th>O/R/M[1]
DGIWG Basic WMS</th><th>Description</th></tr>
<tr><td>Name</td><td>M</td><td>M</td><td>The Name is typically for machine-to-machine communication</td></tr>
<tr><td>Title</td><td>M</td><td>M</td><td>The Title is for informative display to a human.
For coalition interoperability an English title is mandatory.
NOTE: For national use the title can be provided in the national language.</td></tr>
<tr><td>Abstract</td><td>O</td><td>M</td><td>See Requirement 9
If the abstract element is provided in a coalition environment an English abstract is mandatory.
NOTE: For national use the abstract can be provided in the national language.</td></tr>
<tr><td>KeywordList</td><td>O</td><td>M</td><td>List of keywords or keyword phrases to help catalog searching.</td></tr>
<tr><td>Onlineresource</td><td>M</td><td>M</td><td>An OnlineResource is typically an HTTP URL. The URL is placed in the xlink:href attribute, and the value "simple" is placed in the xlink:type attribute.</td></tr>
<tr><td>ContactInformation</td><td>O</td><td>M</td><td></td></tr>
<tr><td>Fees</td><td>O</td><td>O</td><td></td></tr>
</table></td></tr>
</table>

	<table><tr><td>AccessConstraints</td><td>O</td><td>M</td><td>See Requirement 8</td></tr><tr><td>LayerLimit</td><td>Ot"</td><td>O</td><td>The optional <LayerLimit> element in the service metadata is a positive integer indicating the maximum number of layers a client is permitted to include in a single GetMap request. If this element is absent, the server imposes no limit.</td></tr><tr><td>MaxWidth</td><td>O</td><td>O</td><td></td></tr><tr><td>MaxHeight</td><td>O</td><td>O</td><td></td></tr><tr><td colspan="4">[1] O = Optional, R = Recommended, M = Mandatory, C = Conditional</td></tr></table>
WMS#8	If content provided by a WMS server is classified, a DGIWG Basic WMS server shall identify the highest classification level of the content accessible through the WMS service by populating the wms:AccessConstraints element.
WMS#9	A DGIWG basic WMS server shall include the following information in the abstract element of the service metadata: "This service implements the DGIWG WMS 1.3 profile version 3.0, DGIWG Basic WMS conformance class (http://www.dgiwg.org/std/wms/3.0/conf/basic)."
WMS#10	A DGIWG Basic WMS server shall provide a minimum keyword list based on the DGIM (DGIWG Geospatial Information Model) groups.
WMS#11	A DGIWG Basic WMS server shall provide information (Name and Title) on the supported styles.
WMS#12	A DGIWG Basic WMS server shall always provide at least one style element and that style shall be advertised even if it's only the default style.
WMS#13	The MaxWidth and MaxHeight shall be greater or equal to 800 pixels or omitted (meaning no constraint).
WMS#14	Each layer's style shall have an associated legend if warranted, available as an image in one of the following formats: PNG, GIF or JPEG.
WMS#15	This legend shall be accessible at the URL specified by LegendURL.
WMS#16	When scale denominators are both specified, the <MinScaleDenominator> value shall always be less than or equal to the <MaxScaleDenominator> value.
WMS#17	In the GetCapabilities, if any FeatureListURL element appears in a particular layer, then the list of features that are in the particular layer shall be resolvable.
WMS#18	In the GetCapabilities, if any DataURL element appears in a particular layer, then the underlying data of the particular layer shall be resolvable.
WMS#19	A DGIWG Basic WMS server shall provide the Layer Attributes according to Table 5.
WMS#20	A DGIWG Basic WMS server shall support transparency.

WMS#21	A DGIWG Basic WMS server shall support the INIMAGE EXCEPTIONS.
WMS#22	A DGIWG Basic WMS server shall support the BLANK EXCEPTIONS.
WMS#23	A DGIWG Basic WMS server that announces available sample dimensions in its service metadata shall resolve the corresponding parameters provided in the GetMap operation for requesting these dimensional values.
	WMTS profile
WMTS#2	A DGIWG Basic WMTS server SHALL support REST architectural patterns/encoding techniques
WMTS#3	A DGIWG Basic WMTS server shall declare its support for GetCapabilities operations using KVP with HTTP GET by providing an OperationsMetadata section in the ServiceMetadata document with an Operation section for each supported HTTP request type.
WMTS#4	A DGIWG Basic WMTS server shall generate a ServiceMetadata document in response to a GetResourceRepresentation request in REST architecture that looks like the one described in section 7.1.1.3 of Normative Reference 1.
WMTS#5	A DGIWG Basic WMTS server SHALL support KVP encoding of the GetTile operation request using parameters specified in [Normative Reference 1, Table 29 (GetTile operation request URL parameters)].
WMTS#6	A DGIWG Basic WMTS server SHALL provide standard endpoints from which a representation of each tile resource can be obtained.
WMTS#7	A DGIWG Basic WMTS server SHALL be capable of providing tiles in the following coordinate reference systems: • CRS:84 WGS84 geographic longitude, then latitude, expressed in decimal degrees • EPSG:4326 WGS84 geographic latitude, then longitude, expressed in decimal degrees
WMTS#8	A DGIWG Basic WMTS server SHALL comply with one or more of the following projections: • World Mercator EPSG:3395 • Universal Polar Stereographic North EPSG:5041 • Universal Polar Stereographic South EPSG:5042
WMTS#9	DGIWG Basic WMTS server shall employ the Well-Known Scale Sets as appropriate for the CRS/Projection chosen (see Annex B)
WMTS#10	A DGIWG Basic WMTS server SHALL be capable of offering tiles in the following formats: image/png, image/jpeg, and image/gif file formats.

WMTS#11	A DGIWG Basic WMTS server SHALL support negotiation of the standard version used for client-server interactions (procedure oriented architectural style).
WMTS#12	A DGIWG Basic WMTS server SHALL have a minimum keyword list based on the Defence Geospatial Information Framework -2 (DGIF-2) Groupings
WMTS#13	A DGIWG Basic WMTS server SHALL provide all service metadata elements based upon the DGIWG Metadata Foundation (DMF) v2.0.
WMTS#14	A DGIWG Basic WMTS server SHALL provide the “tile expiration date” as part of the data caching information.

Table 4: Additional requirements of the DGIWG WMS and WMTS profiles compared to the SIP

4.4 FEATURE DOWNLOAD SERVICE PROFILE

The Feature Download Service Profile defines the requirements for setting-up a WFS Service. It consists of one normative document:

- DGIWG 122, Defence Profile of OGC Web Feature Service 2.0, version 2.0.1, dated 2017-11-28).

  https://portal.dgiwg.org/files/?artifact_id=68228&format=pdf

Requirement 4: A Feature Download Service shall implement the DGIWG Basic WFS (conformance class http://www.dgiwg.org/std/wfs/3.0/conf/basic from DGIWG 122).

4.5 COVERAGE DOWNLOAD SERVICE PROFILE

The Coverage Download Service Profile defines the requirements for setting-up a WCS Service. It consists of one normative document:

- DGIWG 119, Defence Profile of OGC Web Coverage Service 2.0, version 1.0.0, dated 2017-11-28).

  https://portal.dgiwg.org/files/?artifact_id=68227&format=pdf

Requirement 5: A Coverage Download Service shall implement the DGIWG WCS Geo (conformance class http://www.dgiwg.org/std/wcs/1.0/conf/geo from DGIWG 119).

CHAPTER 5 GEOSPATIAL PRODUCT SPECIFICATION (NORMATIVE)

5.1 SCOPE

This chapter is normative. It defines requirements for the "Geospatial Product Specification" target, with only one single conformance class "**Geospatial Product Specification**".

5.2 Geospatial Product Specification profile

The Geospatial Product Specification profile defines the requirements for developing data product specifications. It consists of one normative document:

- DGIWG 101, Profile of ISO 19131 - Geographic Information - Data product specification, version 1.0.0, 2018-04-05).

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

Requirement 6: A Geospatial Product Specification, which compliant products are intended to be disseminated through geospatial web services, shall conform to DGIWG 101.

Requirement 7: A Geospatial Product Specification, which compliant products are intended to be disseminated through geospatial web services, shall contain one additional section dealing with web services delivery.

Aim of this additional section is to provide guidance/requirements for publishing data through web services. Following chapters provide more guidance on how to fill in this section about Web Services delivery.

5.3 Requirement to support cataloguing

To be able to catalog GI dataset/maps, geospatial products specifications have to define which metadata elements are suitable for the discovery of these available GI datasets/maps.

Requirement 8: A geospatial product specification, which compliant products are intended to be catalogued through geospatial web services, shall define metadata elements according to STANAG 2586 (NATO Geospatial Metadata Profile).

5.4 Requirement to support visualization

GI datasets/maps may be available/accessible through a geospatial visualization web service. Data is exposed to the client by a defined list of layers. To enhance interoperability and understanding of the content of these layers, the following requirements and recommendations are defined.

Requirement 9: A geospatial product specification, which compliant products are intended to be disseminated through geospatial web services, shall pre-define at least one layer, corresponding to the full content of the product specification

Recommendation 1: A geospatial product specification, which compliant products are intended to be disseminated through geospatial web services, may define sub-layers (or thematic layers) in case of a vector based product.

Note: goal of above requirement and recommendation is that same layers (for the same geospatial product specification) are available through all visualization services.

Requirement 10: For each layer, its content (i.e. list of features, …) shall be described by a name, a title, an abstract and a list of keywords.

Note: *additional information/constraints are provided below (from OGC base standards)*

*- A layer **name** has no space and is intended to be used as an identifier of the layer.*

*- A layer **title** is a human readable text and may have spaces; it is most of the time displayed in GIS systems.*

*- A description/**abstract** of the layer is a human readable text*

*- **Keywords** for a layer may be GI themes (road network, hydrography …); it may contain the list of features a specific layer contains*.

Recommendation 2: Layer names should be structured like "{productAcronym}_{type}_{content}_{optional}" with following guidance:

- *{productAcronym}* is a short name for the product (i.e. TM50, JOGA …). This information also provides information about the scale of the product.

- *{type}* is either raster or vector

- *{content}* is a keyword deriving the content of the layer according to the product specification: e.g. full content of the specification, only transportation information, only hydro network, …

- *{optional}* information may be added for specific cases (like date for imagery data …)

Examples: "JOGA_Raster_Full", "TM50_Vector_Transportation"

Recommendation 3: For vector based products, content of a layer should be described by a list of features.

5.5 Recommendation to support downloading

Recommendation 4: For feature based products, some thematic queries should be predefined in a geospatial product specification.

Thematic queries define groups of features that can be helpful for responding to specific uses cases/requirements. The product specification may guide selection of features that are of interest, as for example:

- Querying all the road network features for routing use cases,
- Querying all buildings, walls… and elevation data for intervisibility purposes,
- …

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Annex A ABSTRACT TEST SUITE

A.1 DISCOVERY SERVICE

a) Test Purpose: Verify that a web service satisfies all requirements of the Discovery Service conformance class.

b) Test Method: Pass all tests of the Discovery Service Profile

c) References: Clauses 4.2

d) Test Type: Capability

A.2 VIEW SERVICE

a) Test Purpose: Verify that a web service satisfies all requirements of the View Service conformance class.

b) Test Method: Pass all the tests of the View Service Profile (either from DGIWG-112 or DGIWG-124 according Requirement 2 or from NCIA [1] according Requirement 3)

c) References: Clauses 4.3

d) Test Type: Capability

A.3 FEATURE DOWNLOAD SERVICE

a) Test Purpose: Verify that a web service satisfies all requirements of the Feature Download Service conformance class.

b) Test Method: Pass all the tests of the Feature Download Service Profile

c) References: Clauses 4.4

d) Test Type: Capability

A.4 COVERAGE DOWNLOAD SERVICE

a) Test Purpose: Verify that a web service satisfies all requirements for the Coverage Download Service conformance class.

b) Test Method: Pass all the tests of the Coverage Download Service Profile

c) References: Clauses 4.5

d) Test Type: Capability

A.5 GEOSPATIAL PRODUCT SPECIFICATION

a) Test Purpose: Verify that a product specification satisfies all requirements for the Geospatial Product Specification conformance class.

b) Test Method: Pass all the tests of the Geospatial Product Specification

c) References: Clauses 5.2

d) Test Type: Capability

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