NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI)

NSDI METADATA STANDARD

VERSION 2.0

NATIONAL SPATIAL DATA INFRASTRUCTURE (NSDI)

Ministry of Science & Technology
Government of India, New Delhi
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NSDI Metadata Standard Version 2.0

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PREFACE

NSDI is the national body to facilitate development of standards for metadata as well as
Spatial Data Infrastructure. broad public participation, will help to ease these problems and to develop the National user's system. The NSDI Metadata Standard, developed with the aim of encouraging applications, and the conditions for accessing existing data, and to transfer data to a prospective users to determine what data exist, the fitness of existing data for planned spatial data and a major difficulty in the spatial data is the lack of information that helps

Committee which is found to be acceptable as NSDI Metadata Standard Version 2.0. suggestions and comments received, final draft has been presented to the Executive version 2.0 which was also placed on web for comments. After incorporating all the Dr S K Pathan, met a number of times and prepared the draft metadata standard participating agencies in the country. The Working Group under the Chairmanship of standards for various elements of spatial data has been entrusted to different (Services) as part of the OGC Abstract Specification. The work of preparing national ISO/TC 211 and the same was adopted by ISO as 19115 (Metadata) and ISO 19119 NSDI Metadata version 1.0 was released in the year 2003. Subsequently OGC ratified

Standard Version 2.0 to document their spatial data. persons from government, private and academic agencies to use the NSDI Metadata the data generating organisation. The NSDI invites and encourages organizations and elements, 9 metadata elements are made mandatory and the rest are optional i.e. left to the metadata standards consist of 28 elements and corresponding schema. Out of 28 International Standards for adoption by all spatial data generators in the country. In all Finally, the metadata standards are drafted in accordance with reference to

NSDI Metadata Standard Version 2.0 shall be the National Document.

(Maj Gen (Dr) R Siva Kumar)
CEO, NSDI.

FOREWORD

Spatial information generated either through conventional or latest geoinformatics techniques has played a pivotal role in the sustainable development of natural resources of the country, in recent times. Considering the importance of providing information transparency and sharing the data among government and non-government organisations, academia, industry and citizens at large, it is felt to have common data standards and metadata definitions. NSDI has taken initiative and defined metadata standards and released the document in October, 2003. However, considering the technological developments at the international level and growing need of adopting international standards, NSDI has conducted a review meeting in July, 2008 with all participating agencies. After discussing various operational issues, eight working groups were formed to look into various aspects of spatial data infrastructure. ISRO has taken the lead to be as chair for working group on 'Metadata Standards'. Various issues related to metadata standards were discussed and a decision has been arrived to upgrade/modify the existing NNRMS-NSDI metadata standards with respect to international standards recommended by Open Geospatial Consortium.

As per the recommendations of working group on metadata standards, the existing NNRMS / NSDI metadata standards were reviewed against OGC metadata standards. The necessity of all 343 elements of OGC metadata and their schema are checked and finalized the metadata standards with 28 elements (with 9 mandatory elements and 19 optional elements). A copy the draft document on metadata standards were circulated to all NSDI agencies and the suggestions were incorporated in the document. The document finalized by this working group is adopted by one and all to document their data assets and this will enable the quick orperationalization of the NSDI metadata server and the start of NSDI Geo Portal services to the user community. Hence, it is an important document that defines the schema and design for the NSDI Metadata equating with international standards.

I take this opportunity to the members of working group and the team at SAC/ISRO that has defined the metadata standards and hope that the team will continue to address the maintainability of the standard as it evolves

Date: April 23, 2009

(S.K. Pathan)
Chairman, Working Group on "Metadata Standards", NSDI.

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THE NSDI VISION

NATIONAL INFRASTRUCTURE FOR THE AVAILIBILITY OF AND ACCESS TO ORGANISED SPATIAL DATA

USE OF THE INFRASTRUCTURE AT COMMUNITY, LOCAL, STATE, REGIONAL AND NATIONAL LEVELS FOR SUSTAINED ECONOMIC GROWTH

Background

Government of India has notified the establishment of NSDI through a Cabinet resolution in 2006. One of the objectives of NSDI is to provide metadata access to stake holders. NSDI also to work on Standards development for Geospatial data covering its entirety. It includes metadata, web services, content, proposals, exchange formats etc.

As a first step towards Standards development, NSDI formulated Eight Working Groups for the following.

NSDI WORKING GROUPS

S.No	Name Of The Working Group	Chairman
1.	Node Architecture & Guidelines	Shri S K Sinha, CGWB, Faridabad
2.	Interoperability and Data Exchange	Shri Subash Ashutosh, FSI, Dehradun
3.	Metadata Standards	Dr S K Pathan, SAC, Ahmedabad
4.	Data Content	Dr A K Maji, NBSS&LUP, Nagpur
5.	Network and Access Control	Dr Vandana Sharma, NIC, New Delhi
6.	Cost Recovery/Payment Gateways	Dr YVS Murthy, NRSC, Hyderabad
7.	Outreach Communication & Capacity Building	Dr Yogesh Paithankar, CWC, New Delhi
8.	Policy, Legal, Security and Projections/ Transformations	Brig Girish Kumar, SOI, New Delhi

The Working Groups on metadata Standards was Chaired by Dr. S.K. Pathan who consulted all Nodal Agencies,taken account of Internal/Global Standards, OGC before arriving at NSDI metadata Standard Version 2.0. All Working Group's are having nodal officers as members.

Indian Case Study

Metadata information provides a basis for the users to search spatial data holdings and enable users in discovery/access and processing of geo-spatial information for various data generating agencies. Applications of GIS often requires many sets of data. Few Organizations can afford to create all data they need. However, creation of metadata on a standard framework is long felt and keeping in view of the requirements, a SubCommittee on NSDI metadata submitted its report

in 2003 and was published as NSDI Metadata Version 1.0. It is the first of its kind in the country and contemplates a unification standard for all the geo-spatial data generators. As there was no global standards available at that time, the version it addressed was mainly to the requirements of the Indian Space Research Organisation programmes (ISRO), NRDMS programmes and other agencies like Survey of India, NATMO etc. However, the OGC has formulated various Working Groups and issued RFCs for the development of metadata standards and accordingly they came out with global standards TC211 which was ratified by the ISO also. So considering the international developments and the national requirements, NSDI worked on metadata standards and came out with the enhanced metadata standard Version 2.0. The OGC developments and standards were studied and the mandatory and optional fields of metadata standards was customized to the Indian conditions and arrived at present version 2.0.

Global review:

Metadata and the characteristics that should be chosen to best describe the spatial data set have been debated across the world. There are discussion groups, seminars and conferences and quantities of paper generated in the debate about the subject. Metadata Standards have been generated by a number of organisations to ensure that a degree of consistency exists within a given application community. A bird's eye-view of the Metadata development in different countries is presented in Annexure-A.

Metadata also forms an important part of the OpenGIS Abstract Specification. The Open Geospatial Consortium (OGC) http://www.opengis.org is an international membership organisation engaged in a co-operative effort to create open computing specifications in the area of geo-processing. As part of its draft 'OpenGIS Abstract Specification' OGC has a topic on recording metadata for spatial information. OGC has worked closely with Federal Geographic Data Centre (FGDC) and ISO/TC 211 to develop formal, global spatial metadata standards. At their plenary meeting in Vienna, Austria in March 1999, ISO/TC 211 welcomed the satisfactory completion of the co-operative agreement between the OpenGIS Consortium and ISO/TC 211 and endorsed the terms of reference for an ISO/TC 211 / OGC co-ordination group.

The Metadata Working Group addresses issues related to how metadata must be specified in OpenGIS specifications to fully enable certain services in the OpenGIS Service Architecture. It maintains lose correspondence between ISO TC/211 metadata standard and OpenGIS Specification's handling of metadata. The OGC is a voluntary consensus standards organization with a strong working relationship with ISO. The membership works primarily on collaboratively defining interfaces and encodings that enable interoperability for geospatial content, services, and applications. The working group does not define database content, metadata content, or database models. Further, it does not proscribe how the standards are to be implemented. Implementation is the responsibility of the community and not the OGC.

The OGC membership has approved using ISO 19115 (Metadata) and ISO 19119 (Services) as part of the OGC Abstract Specification. The purpose of the Abstract Specification is to create and document a conceptual model sufficient enough to allow for the creation of OGC Implementation Specifications (standards). From this perspective, the work of the OGC and ISO has been harmonized.

With this in view the metadata standards for NSDI have been revisited. According to international standards, the details of the proposed changes in the NNRMS-NSDI metadata are discussed in this report.

Various standards available at international level have been studied while preparing this document and the same are given in Annexure-A. Keeping in view the existing standards proposed by NNRMS, the many elements which are needed to be added for future usage are suggested in this proposed metadata elements and also it has been compared with international standards to meet the user needs for interoperability as mentioned in the NNRMS-NSDI 2003 document. The global perspective already mentioned with a list of international organizations like ***International Standards Organization (ISO), European Committee for Standardization (CEN), Canadian Geospatial Data Infrastructure (CGDI), Open GIS Consortium (OGC),*** with their standards are very important while adopting the new standard proposed here for providing the best solution to the nation.

Introduction:

India has a vast amount of map information generated through systematic topographic, geological, soil, cadastral surveys and various natural resources information generated with the use of the remote sensing data. Encapsulating these maps and images into a National Spatial Data Infrastructure (NSDI) provide information transparency and sharing, with the recognition that spatial information is a national resource and citizens, society, private enterprise and government have a right to access it, appropriately. One of the major elements of the NSDI is defining common conventions and technical agreements, standards, metadata definitions, network and access protocols – all of which will make it easily possible for the NSDI to come into existence.

Metadata is first element of the NSDI – which enables a user to find spatial data that is available in different NSDI Agency servers. Metadata serves two major purposes – both for the spatial data generator and for the spatial data user. For the generator, the Metadata provides a framework to document the spatial data and declare its content for users. For the user, Metadata serves many important purposes, including finding the spatial data as per need; browsing spatial data; deciding on whether the spatial data will meet the application need and finding how the spatial data can be accessed. This Metadata Standard is an important document that defines the schema and design for the NSDI Metadata.

The working group on Metadata Standard development along with the involvement of Survey of India (SOI), Natrional Informatics Centre (NIC), Geological Survey of India (GSI), Forest Survey of India (FSI), National Buaero of Soil Survey and Land Use Planning (NBSSLUP), Natioanl Atlas and Thematic Mapping Organisation (NATMO), Central Ground Water Board (CGWB), Central Water Commission (CWC) and the private sector, has led the effort of defining a ‘National Metadata Standards’.

This document gives a comparative study of the metadata required for a National Spatial Data Infrastructure to be adopted at National level taking into consideration the current existing standards.

Traditional techniques always remain with the organization but while working hand-to-hand among organization may result in solutions to handle data & information complexity, and diversity of dataset. Though, the data may be correct but how to ensure the security is a concern. So, the metadata standards allow describing the dataset to understand the uses and limitations of the data while distributing among the organizations.

Scope

This NSDI metadata Standard provides a key to the information on the schema which describes the information about the data and what services need to be given.

This gives the detailed information for distribution of dataset; where the fields are clearly mentioned as mandatory or optional. It helps organization to secure their data with a tool to share what level of information is required. Mandatory fields are defined as a language where the two organizations can have one-to-one communication using data.

In addition to the standards that are given, the information exchange can be extended using many parameters like hardcopy of map, can be translation, chart production etc. are not required to be mentioned in the metadata elements.

Conformance requirements

Metadata shall be provided as specified in proposed table. Any metadata claiming conformance with this national Standard shall pass the requirements described.

OTHER INTERNATIONAL STANDARDS

Other International Standards

1. Content Standard for Digital Geospatial Metadata (CSDGM)

The CSDGM postulates a set of metadata elements that can be used to as a basis for the development of organizational metadata and templates. Users are strongly encouraged to consider the elements & schema given in Table-1 as a starting place for template development and not a solution to minimizing the standard. The set represents an expansion to the purely mandatory elements specified by the CSDGM. The set is best applied to GIS data and imagery maintained in standard horizontal coordinate systems. For more specialized data and data maintained in vertical and horizontal coordinate systems, additional metadata elements become essential.

Elements are recommended in seven sections as *Identification Information, Spatial Reference Information, Entity and Attribute Information, Distribution Information, Data Quality, Spatial Data Organization Information, Metadata Reference.*

Table-1: Content Standards

Sr. No.	**Elements**	**scheme**
1	Identification Information	Originator Publication_Date Title Abstract Purpose Time_Period_of_Content Currentness_Reference Progress Maintenance_and_Update_Frequency West_Bounding_Coordinates East_Bounding_Coordinates North_Bounding_Coordinates South_Bounding_Coordinates Theme_Thesaurus

		Theme_Keywords Access_Constraints Use_Constraints Point_of_Contact Contact_Organization (preferred) or Contact_Person Contact_Position Address_Type Address City State_or_Province Postal_Code Contact_Voice_Telephone • If data are available online: Online_Linkage
		-
2	Spatial Reference Information	Horizontal_Datum Ellipsoid_Name Semi-Major_Axis Denominator_of_Flattening_Ratio Horizontal Coordinate System (compound element) If Geographic (Lat/Lon): Latitude_Resolution Longitude_Resolution Geographic_Coordinate_Units or If Planar (projected) data: Planar_Coordinate_Encoding_Method Abscissa_Resolution Ordinate_Resolution Planar_Distance_Units May 2008 3 If Map Projection: Map_Projection_Name < projection parameters – vary with Projection > or If Grid Coordinate System:

		Grid_Coordinate_System_Name < coordinate system parameters - vary with Coordinate System> □ □ Additional elements are required for data maintained using: Distance_and_Bearing_Representation Local_Planar_Horizontal_Coordinate_System Local_Horizontal_Coordinate_System Vertical_Coordinate_System
3	Entity and Attribute Information	Entity_and_Attribute_Overview and/or Entity_and_Attribute_Detailed_Description if the data includes a database that is not documented, you are strongly encouraged to develop the detailed description
4	Distribution Information	Distributor_Contact Contact_Organization (preferred) or Contact_Person Contact_Position Address_Type Address City State_or_Province Postal_Code Contact_Voice_Telephone Distribution_Liability
5	Data Quality	Logical_Consistency_Report Completeness_Report Process_ Description Process_Date • If source data were used: Source_Originator Source_Publication_Date Source_Title Source_Online_Linkage Source_Scale_Denominator Type_of_Source_Media Source_Time_Period_of_Content

		Source_Currentness_Reference Source_Citation_Abbreviation Source_Contribution • If data assessments performed: Attribute_Accuracy_Report (if applicable) Horizontal_Positional_Accuracy_Report (if applicable) Vertical_Positional_Accuracy_Report (if applicable) • If aerial photography or imagery: Cloud_Cover
6	Spatial Data Organization Information	Direct_Spatial_Reference_Method
7	Metadata Reference	Distributor_Contact Contact_Organization (preferred) or Contact_Person Contact_Position Address_Type Address City State_or_Province Postal_Code Contact_Voice_Telephone Distribution_Liability Section Seven: Metadata Reference Metadata_Date Metadata_Contact Contact_Organization or Contact_Person Contact_Position Address_Type Address City State_or_Province Postal_Code Contact_Voice_Telephone Metadata_Standard_Name Metadata_Standard_Version

2. **FGDC standard**

The Federal Geographic Data Committee (FGDC) is an inter agency committee that promotes the coordinated development, use, sharing and dissemination of geo spatial data on a National basis. The FGDC has developed procedures to assist in the implementation of a distributed discovery mechanism for national digital geospatial data. This nationwide data publishing effort is known as NSDI. The FGDC has developed geo spatial data standards for implementing the NSDI, in consultation and cooperation with state, local and tribal governments, private sector and academic community and to the extent feasible, the International community.

The FGDC coordinates the sharing of geographic data, maps, and online services through an online portal, 'geodata.gov', that searches metadata held within the NSDI Clearinghouse Network. The Clearinghouse Network publishes collections of metadata that describe their map and data resources within their areas of responsibility, documenting data quality, characteristics, and accessibility.

The details of FGDC standard elements & schema are presented- Table-2.

Table-2

Sr. No.	**Elements**	**scheme**
1	Identification Information	Name of the Dataset Name of the Data Theme Keywords Access Constraints Use Constraints Purpose of Creating Data Data Type
2	Contact Information	Contact Person Organization Mailing Address City/Locality Country Contact Telephone Contact Fax Contact Email
3	Spatial Domain	West Coordinate East Coordinate North Coordinate South Coordinate Administrative Location Coverage

4	Citation	Data Prepared by Original Source Source Scale and Date Lineage Associated Project preparing the data Associated Publications
5	Storage	Data Format Data File Size Data Physical Location (Computer + path)
6	Attributes	Name of Attributes Description of Attributes Properties of Attributes
7	Projection Information	Name of Projection Unit Projection Parameters
8	Quicklook	Grpahic file in jpg format
9	For Image Data	Name of the Satellite Sensor Path Row Image Acquired From Date and Time of Image File Format Bits per Pixel Spatial Resolution Spatial Resolution Unit Number of Bands Number of Rows Number of Cols Purchased or Obtained on Exchange Basic

3. Australia – New Zealand ANZLIC

ANZLIC, the Spatial Information Council is the peak intergovernmental organisation providing leadership in the collection, management and use of spatial information in Australia and New Zealand. ANZLIC's role is to facilitate easy and cost-effective access to the wealth of spatial data and services provided by a wide range of organisations in the public and private sectors. ANZLIC's policies and guidelines adopt international best practice in spatial data and metadata

management and are relevant to conditions found by practitioners and users of spatial information in both countries.

The international standard has now been reviewed by Standards Australia and Standards New Zealand and adopted as AS/NZS ISO 19115:2005 Geographic information—Metadata.

In order to use the metadata standard, a profile of that standard must be made that defines what will be included, excluded or added for use by a particular community. The ANZLIC Metadata Profile allows all elements of the published geographic metadata standard AS/NZS ISO 19115 with two minor changes. The Profile defines the appropriate content of metadata for geographic (or spatial) information Version 1.03 resources and how this metadata will be implemented throughout Australia and New Zealand. The Profile is intended to facilitate efficient access to descriptions of information resources, and in particular geographic (or spatial) data. Widespread use of the Profile will facilitate interoperability within and between agencies and jurisdictions, both within the region and internationally, by providing a consistent basis for communicating information about resources.

It is important to note that, while primarily used to describe digital geographic data, the Profile is not restricted to only describing such resources. Other resources that can be described include maps, charts, textual documents and non-geographic resources.

The Profile defines:

- Mandatory and conditional metadata sections, metadata entities, and metadata elements
- Minimum set of metadata elements for any resource in order to conform to the Profile
- Core metadata for geographic datasets
- Optional metadata elements that allow for a more extensive standard description of resources
- Option to extend the Profile to cater for specialized needs.

Table-3

Sr. No.	**Name**	**Path**	**Obligation**
1	Metadata file identifier	MD_Metadata.fileIdentifier	M a
2	Metadata language	MD_Metadata.language	C b
3	Metadata character set	MD_Metadata.characterSet	C c
4	Metadata file parent identifier	MD_Metadata.parentIdentifier	C d

5	Metadata point of contact	MD_Metadata.contact > CI_ResponsibleParty	M
6	Metadata date stamp	MD_Metadata.dateStamp	M
7	Metadata standard name	MD_Metadata.metadataStandardName	O
8	Metadata standard version	MD_Metadata.metadataStandardVersion	O
9	Dataset title	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.title	M
10	Dataset reference date	MD_Metadata.identificationInfo > MD_DataIdentification.citation > CI_Citation.date	M
11	Abstract describing the data	MD_Metadata.identificationInfo > MD_DataIdentification.abstract	M
12	Dataset responsible party	MD_Metadata.identificationInfo > MD_DataIdentification.pointOfContact > CI_ResponsibleParty	O
13	Spatial representation type	MD_Metadata.identificationInfo > MD_DataIdentification.spatialRepresentationType	O
14	Spatial resolution of the dataset	MD_Metadata.identificationInfo > MD_DataIdentification.spatialResolution > MD_Resolution.distance or MD_Resolution.equivalentScale	O e
15	Dataset language	MD_Metadata.identificationInfo > MD_DataIdentification.language	M
16	Dataset character set	MD_Metadata.identificationInfo > MD_DataIdentification.characterSet	C f

17	Dataset topic category	MD_Metadata.identificationInfo > MD_DataIdentification.topicCategory	M
18	Geographic location of the dataset (by four coordinates or by description)	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent > EX_GeographicBoundingBox or EX_GeographicDescription	C g, h
19	Temporal extent information for the dataset	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.temporalElement	O
20	Vertical extent information for the dataset	MD_Metadata.identificationInfo > MD_DataIdentification.extent > EX_Extent.verticalElement > EX_VerticalExtent	O
21	Lineage	MD_Metadata.dataQualityInfo > DQ_DataQuality.lineage > LI_Lineage	O
22	Reference system	MD_Metadata.referenceSystemInfo > MD_ReferenceSystem.referenceSystemIdentifier > RS_Identifier	O
23	Distribution Format	MD_Metadata.distributionInfo > MD_Distribution > MD_Format	O
24	On-line resource	MD_Metadata.distributionInfo > MD_Distribution > MD_DigitalTransferOption.onLine > CI_OnlineResource	O

a. the Profile imposes a mandatory obligation on the metadata element fileIdentifier

b. language: documented if not defined by the encoding process

c. characterSet: documented if ISO 10646-1, *Information technology — Universal Multiple-Octet Coded Character Set (UCS)* is not used and not defined by the encoding process

d. documented if a higher level of hierarchy level exists (e.g. if the geographic 'dataset' is part of a 'series')

e. distance is preferred over equivalentScale because the scale will change when presented at different sizes on a screen

f. characterSet: documented if ISO 10646-1 is not used

g. include either the geographic bounding box (extents) or the geographic description

h. if any one of west longitude, east longitude, south latitude or north latitude exists, then the remaining three must also be completed

4. Dublin Core

The Dublin Core metadata element set is a standard for cross-domain information resource description. It provides a simple and standardized set of conventions for describing things online in ways that make them easier to find. Dublin Core is widely used to describe digital materials such as video, sound, image, text, and composite media like web pages. Implementations of Dublin Core typically make use of XML and are Resource Description Framework based. Dublin Core is defined by ISO in 2003 ISO Standard 15836, and NISO Standard Z39.85-2007.

The Dublin Core Metadata Initiative (DCMI) is an organization providing an open forum for the development of interoperable online metadata standards that support a broad range of purposes and business models. DCMI's activities include consensus-driven working groups, global conferences and workshops, standards liaison, and educational efforts to promote widespread acceptance of metadata standards and practices (Table-4).

Table-4

Sr. No.	**Elements**		**scheme**	**value**
1	Title	title	Free text	
		title.alternate	Free text	
2	Subject	subject.specific	Free text	
		subject.domain	Theme(own)	
3	Description	description	Free Text	
		description.history	Free Text	
4	Publisher	publisher	Free text	
		publisher.address	Free text	
5	Creator	creator.person.Name	Free text	
		creator.person.Address	Free text	

		creator.person.Email	Email	
		creator.person.Affiliation	Free text	
		creator.CorporateName	Free text	
		creator.CorporateName.Address	Free text	
6	Date	date	ISO08601	2002
7	Type	type	Res.Type	Dataset
8	Format	format	Res.FMT	OWN DATASET
9	Language	language	ISO0639-2Bsh	eng
10	Coverage	coverage.x.min	WGS84LL	-180
		coverage.x.ma	WGS84LL	180
		coverage.y.min	WGS84LL	-90
		coverage.t.late	CE date	0
		coverage.t.early	CE date	0
		coverage.PlaceName	TGN	world
		coverage.PeriodName	Free Text	Modern
		coverage.spatial.resolution	Integer	
		coverage.spatial.georeference	spatial unit	
		coverage.spatial.aggregation	spatial unit	
		coverage.temporal.precision	Temporal unit	
		coverage.temporal.interval	Temporal unit	
		coverage.temporal.aggregation	Temporal unit	
		coverage.note		
		coverage.AlternativeMetadata	URL	

11	Rights	rights	Free Text	This data may used by non.profit personal and scholarly use
12	Company/ organisation	Company.team Company.expert.commentary Company.expert.internal_notes	Team Free Text Free Text	worldwide

COMPARISON TABLE

ANNEXURE - A

COMPARISON TABLE Table - 5

Sr. No.	Elements	Scheme	NNRMS	FGDC	ANZLIC	DUBLIN	CSDGM
1	Data Identification Information	Name of the Dataset	✔	✔	✔	✔	✔
		Name of the Data	✔	✔	✖	✖	✖
		Theme	✔	✔	✖	✖	✔
		Keywords		✔	✖	✖	✔
		Access Constraints	✔	✔	✖	✖	✔
		Use Constraints	✔	✔	✖	✖	✔
		Purpose of Creating Data	✖	✔	✖	✖	✔
		Data Type	✔	✔	✖	✔	✖
		Time Period of Content	✖	✖	✖	✖	✔
		Currentness of Reference	✖	✖	✖	✖	✔
		Progress	✖	✖	✖	✖	✔
		Maintenance & Update Frequency	✖	✖	✖	✖	✔
		Contact Position	✖	✖	✖	✖	✔
2	Contact Information	Contact Person		✔	✖	✖	✔ (CSDGM-1)
		Organization		✔	✖	✖	**✔ (CSDGM-1)**
		Mailing Address		✔	✖	✖	**✔ (CSDGM-1)**
		City/Locality		✔	✖	✖	**✔ (CSDGM-1)**
		Country		✔	✖	✖	

		Contact Telephone		✔	✖	✖	✔ **(CSDGM-1)**
		Contact Fax		✔	✖	✖	✖
		Contact Email		✔	✖	✖	✖
3	Coverage				✖	✖	✖
		coverage.x.min		✖	✖	✔	✔
		coverage.x.ma		✖	✖	✔	✔
		coverage.y.min WGS84LL		✖	✖	✔	✔
		coverage.y.max		✖	✖	✔	✔
		coverage.t.late CE date		✖	✖	✔	✖
		coverage.t.early		✖	✖	✔	✖
		coverage.PlaceName		✖	✖	✔	✖
		coverage.PeriodName		✖	✖	✔	✖
		coverage.spatial.resolution		✖	✖	✔	✖
		coverage.spatial.georeference		✖	✖	✔	✖
		coverage.spatial.aggregation		✖	✖	✔	✖
		coverage.temporal.precision		✖	✖	✔	✖
		coverage.temporal.interval		✖	✖	✔	✖
		coverage.temporal.aggregation		✖	✖	✔	✖
		coverage.note		✖	✖	✔	✖
		coverage.AlternativeMetadata		✖	✖	✔	✖
4	Geographic location of the dataset (by four coordinates or by description)	MD_Metadata.identificationInfo >	✖		✔	✖	✖
		MD_DataIdentification.extent >	✖	✔	✔	✖	✖
		EX_Extent > EX_GeographicBoundingBox or EX_GeographicDescription	✖	✔	✔	✖	✖
5	Citation	Data Prepared by	✔	✔	✖	✔	✖

		Original Source	✔	✔	✕	✕	✔ **(CSDGM-1)**
		Source Scale and Date	✔	✔	✔ **(ANZLIC-10)**	✕	✕
		Mapping year	✔		✕	✕	✕
		digitizing year	✔		✕	✕	✕
		survey year	✔		✕	✕	✕
		Lineage	✕	✔	✔	✕	✕
		Associated Project preparing the data	✔	✔	✕	✕	✕
		Associated Publications		✔	✕		✕
		person.Email	✔	✕	✕	✔	✕
		person.Affiliation	✔	✕	✕	✔	✕
		CorporateName	✔	✕	✕	✔	✕
		CorporateName.Address *		✕	✕	✔	✕
6	Metadata stamp	Metadata File identifier	✕	✕	✔	✕	✕
		Metadata File Parent identifier	✕	✕	✔	✕	✕
		Metadata Character Set	✕	✕	✔	✕	✕
		Metadata standard name	✕	✕	✔	✕	✕
		Metadata standard version	✕	✕	✔	✕	✕
		MD_Metadata.dateStamp M ISO08601 i.e Date of publishing data	✕	✕	✔	✕	✔ **(CSDGM-1)**
7	Type	Data Format *	✔	✔	✕	✔	✕
		Data File Size	✕	✔	✕	✔	✕
		Data Physical Location (Computer + path)	✕	✔	✕	✕	✕
8	Subject	subject.specific		✕	✕	✔	✕
		subject.domain		✕	✕	✔	✕
9	Description	description *		✕	✕	✔	✕
		description.history		✕	✕	✔	✕

10	Publisher	Publisher		✗	✗	✔	✗
		publisher.address		✗	✗	✔	✗
11	Meta Data responsible party	MD_Metadata.identificationInfo >	✗	✗	✔	✗	✗
		MD_DataIdentification.pointOfContact >	✗	✗	✔	✗	✗
		CI_ResponsibleParty	✗	✗	✔	✗	✗
				✗		✗	✗
12	Distribution Format	MD_Metadata.distributionInfo > MD_Distribution > MD_Format		✗	✔	✗	✗
				✗	✔	✗	✗
				✗	✔	✗	✗
13	On-line resource	MD_Metadata.distributionInfo >		✗	✔	✗	✗
		MD_Distribution >		✗	✔	✗	✗
		MD_DigitalTransferOption.onLine >		✗	✔	✗	✗
		CI_OnlineResource		✗	✔	✗	✗
14	Dataset topic category	MD_Metadata.identificationInfo > MD_DataIdentification.topicCategory	✔	✗	✔	✗	✗
15	Language	language ISO0639-2Bsh	✗	✗	✔	✗	✗
16	Abstract describing the data	MD_Metadata.identificationInfo >	✗	✗	✔	✗	✔
		MD_DataIdentification.abstract	✗	✗		✗	✗
17	Spatial representation type	MD_Metadata.identificationInfo >	✔	✗	✔	✗	✗
		MD_DataIdentification.spatialRepresentationType		✗	✔	✗	✗
18	Spatial resolution of the dataset	MD_Metadata.identificationInfo >		✗	✔	✗	✗
		MD_DataIdentification.spatialResolution >	✗	✗	✔	✗	✗

		MD_Resolution.distance or MD_Resolution.equivalentScale	✔	✘	✔	✘	✘
19	Reference system	MD_Metadata.referenceSystemInfo >		✘	✔	✘	✔
		MD_ReferenceSystem.referenceSystemIdentifier >		✘	✔	✘	✔
		RS_Identifier		✘	✘	✘	✔
20	Temporal extent information for the dataset	MD_Metadata.identificationInfo >	✘	✘	✔	✘	✘
		MD_DataIdentification.extent >	✘	✘	✔	✘	✘
		EX_Extent.temporalElement	✘	✘	✔	✘	✘
21	Vertical extent information for the dataset	MD_Metadata.identificationInfo >	✘	✘	✔	✘	✘
		MD_DataIdentification.extent >	✘	✘	✔	✘	✘
		EX_Extent.verticalElement >	✘	✘	✔	✘	✘
		EX_VerticalExtent	✘	✘	✔	✘	✘
22	Quicklook	Graphic file format / Map in encrypted mode	✔	✔	✘	✘	✘
23	For Image Data	Name of the Satellite	✘	✔	✘	✘	✘
		Sensor	✘	✔	✘	✘	✘
		Path	✘	✔	✘	✘	✘
		Row	✘	✔	✘	✘	✘
		Image Acquired From	✘	✔	✘	✘	✘
		Date and Time of Image	✘	✔	✘	✘	✘
		File Format	✘	✔	✘	✘	✘
		Bits per Pixel	✘	✔	✘	✘	✘
		Spatial Resolution	✘	✔	✘	✘	✘

		Spatial Resolution Unit	✗	✔	✗	✗	✗
		Number of Bands	✗	✔	✗	✗	✗
		Number of Rows	✗	✔	✗	✗	✗
		Number of Cols	✗	✔	✗	✗	✗
		Purchased or Obtained on Exchange Basis	✗	✔	✗	✗	✗
			✗	✗	✗	✗	✗
24	Rights	Rights	✗	✗	✗	✔	✗
25	Team(organization name) xxxxx	xxxxx.team	✗	✗	✗	✔	✗
		xxxxx.expert.commentary	✗	✗	✗	✗	✗
		xxxxx.expert.internal_notes	✗	✗	✗	✗	✗
26	Attributes/Entity and Attribute Information	Name of Attributes	✗	✔	✗	✗	✗
		Description of Attributes	✗	✔	✗	✗	✔
		Properties of Attributes	✗	✔	✗	✗	✔
27	Projection Information	Name of Projection	✔	✔	✗	✗	✗
		Unit	✔	✔	✗	✗	✗
		Projection Parameters	✔	✔	✗	✗	✗
28	Data Quality	Logical_Consistency_Report		✗	✗	✗	✔
		Completeness_Report		✗	✗	✗	✔
		Process_ Description		✗	✗	✗	✔
		Process_Date		✗	✗	✗	✔
		Source_Originator		✗	✗	✗	✔
		Source_Publication_Date		✗	✗	✗	✔

		Source_Title		✗	✗	✗	✔
		Source_Online_Linkage		✗	✗	✗	✔
		Source_Scale_Denominator		✗	✗	✗	✔
		Type_of_Source_Media	✔	✗	✗	✗	✔
		Source_Time_Period_of_Content		✗	✗	✗	✔
		Source_Currentness_Reference		✗	✗	✗	✔
		Source_Citation_Abbreviation		✗	✗	✗	✔
		Source_Contribution • If data assessments performed: Attribute_Accuracy_Report (if applicable)	✔	✗	✗	✗	✔
		Horizontal_Positional_Accuracy_Report (if applicable)	✔	✗	✗	✗	✔
		Vertical_Positional_Accuracy_Report (if applicable)	✔	✗	✗	✗	✔

Proposed Metadata Standards for NSDI

Proposed Metadata Standards for NSDI

As per the metadata described above the necessary standards for implementation at National level by all NSDI agencies have been worked out using existing NNRMS and NRDB metadata standards. Looking towards the data type available within various organizations under NSDI the following 'Metadata Standards (Table)' is proposed which need to be implemented for future uses.

Table : Proposed Metadata Standards for all NSDI Agencies

Sr. No.	Elements	Scheme
1	Data Identification Information	Name of the Dataset Name of the Data Theme Keywords Access Constraints Use Constraints Purpose of Creating Data Data Type
2	Contact Information	Contact Person Organization Mailing Address City/Locality Country Contact Telephone Contact Fax Contact Email
3	Coverage	
		coverage.x.min
		coverage.x.ma
		coverage.y.min WGS84LL
		coverage.t.late CE date
		coverage.t.early
		coverage.PlaceName
		coverage.PeriodName
		coverage.spatial.resolution
		coverage.spatial.georeference
		coverage.spatial.aggregation
		coverage.temporal.precision
		coverage.temporal.interval
		coverage.temporal.aggregation

		coverage.note
		coverage.AlternativeMetadata
4	Geographic location of the dataset (by four coordinates or by description)	Metadata.identificationInfo > DataIdentification.extent > Extent > GeographicBoundingBox or GeographicDescription
5	Citation	Data Prepared by Original Source Source Scale and Date Mapping year digitizing year survey year Lineage Associated Project preparing the data Associated Publications person.Email person.Affiliation CorporateName CorporateName.Address
6	Metadata date stamp	Metadata.dateStamp M ISO08601
7	Type	Data Format Data File Size Data Physical Location (Computer + path)
8	Subject	subject.specific
		subject.domain
9	Description	description
		description.history
10	Publisher	Publisher
		publisher.address
11	Dataset responsible party	Metadata.identificationInfo > DataIdentification.pointOfContact > ResponsibleParty
12	Distribution Format	Metadata.distributionInfo > Distribution > Format
13	On-line resource	Metadata.distributionInfo > Distribution > DigitalTransferOption.onLine > OnlineResource
14	Dataset topic	Metadata.identificationInfo >

	category	DataIdentification.topicCategory
15	Language	language ISO0639-2Bsh
16	Abstract describing the data	Metadata.identificationInfo > DataIdentification.abstract
17	Spatial representation type	Metadata.identificationInfo > DataIdentification.spatialRepresentationType
18	Spatial resolution of the dataset	Metadata.identificationInfo > DataIdentification.spatialResolution > Resolution.distance or Resolution.equivalentScale
19	Reference system	Metadata.referenceSystemInfo > ReferenceSystem.referenceSystemIdentifier >RS_Identifier
20	Temporal extent information for the dataset	Metadata.identificationInfo > DataIdentification.extent > Extent.temporalElement
21	Vertical extent information for the dataset	Metadata.identificationInfo > DataIdentification.extent > Extent.verticalElement > VerticalExtent
22	Quicklook	Graphic file format / Map in encrypted mode
23	For Image Data	Name of the Satellite Sensor Path Row Image Acquired From Date and Time of Image File Format Bits per Pixel Spatial Resolution Spatial Resolution Unit Number of Bands Number of Rows Number of Cols Purchased or Obtained on Exchange Basic

24	Rights	Rights
25	Team (organization name'xxxxx')	xxxxx.team
		xxxxx.expert.commentary
		xxxxx.expert.internal_notes
26	Attributes/Entity and Attribute Information	Entity_and_Attribute_Overview and/or Entity_and_Attribute_Detailed_Description if the data includes a database that is not documented, you are strongly encouraged to develop the detailed description
27	Projection Information	Name of Projection
		Unit
		Projection Parameters
28	Data Quality	Logical_Consistency_Report
		Completeness_Report
		Process_ Description
		Process_Date
		Source_Originator
		Source_Publication_Date
		Source_Title
		Source_Online_Linkage
		Source_Scale_Denominator
		Type_of_Source_Media
		Source_Time_Period_of_Content
		Source_Currentness_Reference
		Source_Citation_Abbreviation
		Source_Contribution • If data assessments performed: Attribute_Accuracy_Report (if applicable)
		Horizontal_Positional_Accuracy_Report (if applicable)
		Vertical_Positional_Accuracy_Report (if applicable)

NSDI NODAL AGENCIES

Sr. No.	Elements	Scheme
1	**Agency**	AgencyCode AgencyName AgencyAcronym AgencyNSDIMgr AgencyAddress1 AgencyAddress2 AgencyAddress3 AgencyNSDIMgrPhone AgencyNSDIMgrFax AgencyNSDIMgrEmail AgencyWebsite

From the above mentioned table, 9 elements are made "Mandatory" and the rest of the elements are made optional in a meeting held on 19th February, 2009 at NSDI, New Delhi. The details of mandatory elements are as follows along with their schema.

Proposed Metadata Standards for NSDI with Nine essential elements and their schema (Mandatory)

Sr. No.	Elements	Scheme
1	Data Identification Information	Name of the Dataset Name of the Data Theme Keywords Access Constraints Use Constraints Purpose of Creating Data Data Type
2	Contact Information	Contact Person Organization Mailing Address City/Locality Country Contact Telephone Contact Fax Contact Email
3	Coverage	
		coverage.x.min

		coverage.x.ma
		coverage.y.min WGS84LL
		coverage.t.late CE date
		coverage.t.early
		coverage.PlaceName
		coverage.PeriodName
		coverage.spatial.resolution
		coverage.spatial.georeference
		coverage.spatial.aggregation
		coverage.temporal.precision
		coverage.temporal.interval
		coverage.temporal.aggregation
		coverage.note
		coverage.AlternativeMetadata
4	Citation	Data Prepared by Original Source Source Scale and Date Mapping year digitizing year survey year Lineage Associated Project preparing the data Associated Publications person.Email person.Affiliation CorporateName CorporateName.Address
5	Metadata date stamp	MD_Metadata.dateStamp ISO08601
6	Dataset topic category	MD_Metadata.identificationInfo MD_DataIdentification.topicCategory
7	Language	language ISO0639-2Bsh
8	Abstract describing the data	MD_Metadata.identificationInfo MD_DataIdentification.abstract
9	For Image Data	Name of the Satellite Sensor

		Path Row Image Acquired From Date and Time of Image File Format Bits per Pixel Spatial Resolution Spatial Resolution Unit Number of Bands Number of Rows Number of Cols Purchased or Obtained on Exchange Basic

SUMMARY

A comparison study has been carried out for the requirement of standard to be proposed for the NSDI (Annexure-A). The existing standards of various countries has been followed and studied. The required standards have been set for the proposal of NSDI as given in Table above.

The proposed standard contains 28 elements and 102+ Schema, which may be sufficient for the data generating agencies and can be added further more if required. The effort has been taken to find out the necessary elements for the Indian scenario/ organizations. In addition to the above comparison study the ISO/TC 911 standard have been studied and verified with the existing standards. The last column is intentionally left blank and needs to be filled by the respective data generating organization with their centre name (Annexure-B).

ACKNOWLEDGEMENTS

The Working Group (WG) is grateful to the sub-committee for the excellent ground work done in preparing and developing the proto-type NSDI Metadata Server and the end-to-end proto-type NSDI.

The WG would like to gratefully acknowledge ISRO, NRSC and CWC for providing necessary inputs, guidance, encouragement and in finalizing the NSDI Metadata Standard Document.

The WG would like to place on record its deep sense of appreciation and gratitude to ISRO, DST and all NSDI Nodal Officers for participating in the discussions held at NSDI, New Delhi and shaping the NSDI Metadata Elements

in order to maintain international standards set up by Open Geospatial Consortium.

The WG has referred to a wide variety of Spatial Data Infrastructures especially with respect to metadata standards and strategies adopted by USA, Australia, Europe, the ISO documents, the Global Spatial Data Infrastructure Cookbook. The group has also referred articles by renowned National and International experts in finalizing NSDI Metadata Standards Version 2.0 at National Level.

Annexure - B

Metadata entity set information (Table –6)

	Name / Role name	Short Name	Obligation / Condition	NNRMS	NSDI Agency Name
1	MD_Metadata	Metadata	M		
2	fileIdentifier	mdFileID	O		
3	language	mdLang	C / not defined by encoding?		
4	characterSet	mdChar	C / ISO/IEC 10646-1 not used and not defined by encoding?		
5	parentIdentifier	mdParentID	C / hierarchy Level is not equal to "dataset"?		
6	hierarchyLevel	mdHrLv	C / hierarchyLevel is not equal to "dataset"?		
7	hierarchyLevelName	mdHrLvName	C / hierarchyLevel is not equal to "dataset"?		
8	contact	mdContact	M		
9	dateStamp	mdDateSt	M		
10	metadataStandardName	mdStanName	O		
11	metadataStandardVersion	mdStanVer	O		

(I) Identification information (includes data and service identification) (39 schemas)

Table - 7

	Name / Role name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
23.	*MD_Identification*	Ident	Use obligation from referencing object	✔	
24.	citation	idCitation	M	✔	
25.	abstract	idAbs	M	-	
26.	purpose	idPurp	O	-	
27.	credit	idCredit	O	✔	
28.	status	idStatus	O	-	
29.	pointOfContact	idPoC	O	✔	
30.	*Role name:* resourceMaintenance	resMaint	O	-	
31.	*Role name:* graphicOverview	graphOver	O	✔	
32.	*Role name:* resourceFormat	dsFormat	O	-	
33.	*Role name:* descriptiveKeywords	descKeys	O	-	
34.	*Role name:* resourceSpecificUsage	idSpecUse	O	-	
35.	*Role name:*	resConst	O	-	
	resourceConstraints				
35.1	*Role name:* aggregationInfo	aggrInfo	O	-	
36.	MD_DataIdentification	DataIdent	Use obligation from referencing object	-	
37.	spatialRepresentationType	spatRpType	O	✔	

38.	spatialResolution	dataScale	O	✔	
39.	language	dataLang	M	-	
40.	characterSet	dataChar	C/ISO/IEC 10646-1 not used?	-	
41.	topicCategory	tpCat	C / if hierarchyLevel equals "dataset"?	✔	
42.	intentionally left blank			-	
43.	intentionally left blank			-	
44.	environmentDescription	envirDesc	O	-	
45.	extent	dataExt	C / if hierarchyLevel equals "dataset"? either extent.geographic Element.EX_ GeographicBounding Box or extent.geographic Element.EX_ Geographic Description is required	-	
46.	supplementalInformation	suppInfo	O	-	
47.	MD_ServiceIdentification	SerIdent	Use obligation from referencing object	-	
48.	MD_BrowseGraphic	BrowGraph	Use obligation from referencing object	✔	
49.	fileName	bgFileName	M	-	
50.	fileDescription	bgFileDesc	O	-	
51.	fileType	bgFileType	O	-	
52.	MD_Keywords	Keywords	Use obligation from referencing object	-	
53.	keyword	keyword	M	-	
54.	Type	keyTyp	O	-	

55.	ThesaurusName	thesaName	O	-	
56.	MD_RepresentativeFraction	RepFract	Use obligation from referencing object	-	
57.	denominator	rfDenom	M	-	
58.	intentionally left blank			-	
59.	MD_Resolution	Resol	Use obligation from referencing object	-	
60.	equivalentScale	equScale	C / distance not documented?	-	
61.	distance	scaleDist	C / equivalentScale not documented?	-	

(II) Constraint information (includes legal and security)

Table - 8

	Name / Role name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
62.	MD_Usage	Usage	Use obligation from referencing object	-	
63.	specificUsage	specUsage	M	-	
64.	usageDateTime	usageDate	O	-	
65.	userDeterminedLimitations	usrDetLim	O	-	
66.	userContactInfo	usrCntInfo	M	✔ **(implemented but, not defined in standards)**	

66.1	MD_AggregateInformation	AggregateInfo	Use obligation from referencing object	-	
66.2	aggregateDataSetName	aggrDSName	C / if aggregateDataSet Identifier not documented ?	-	
66.3	aggregateDataSetIdentifier	aggrDSIdent	C / if aggregateDataSet Name not documented ?	-	
66.4	associationType	assocType	M		
66.5	initiativeType	initType	O		
67.	MD_Constraints	Consts	Use obligation from referencing object		
68.	useLimitation	useLimit	O	✔	
69.	MD_LegalConstraints	LegConsts	Use obligation from referencing object	-	
70.	accessConstraints	accessConsts	O	✔	
71.	useConstraints	useConsts	O	✔	
72.	otherConstraints	othConsts	C/accessCo	✔	

			nstraints or useConstraints equal "otherRestrictions"?		
73.	MD_SecurityConstraints	SecConsts	Use obligation from referencing object	✔	
74.	classification	class	M	✔	
75.	userNote	userNote	O	✔	
76.	classificationSystem	classSys	O	✔	
77.	handlingDescription	handDesc	O	✔	

(III) Data quality information

Table-9

	Name / Role Name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
78.	DQ_DataQuality	DataQual	Use obligation from referencing object	✔	
79.	scope	dqScope	M	-	
80.	*Role name:* report	dqReport	C / lineage not provided?	-	
81.	*Role name:* lineage	dataLineage	C / report not provided?	✔	
82.	LI_Lineage	Lineage	Use obligation from referencing object	✔	
83.	statement	statement	C /	-	

			(DQ_DataQuality.scope.DQ_Scope.level = "dataset" or "series")?		
84.	*Role name:* processStep	prcStep	C / mandatory if statement and source	-	
			not provided?		
85.	*Role name:* source	dataSource	C / mandatory if statement and processStep not provided?	✔	
86.	LI_ProcessStep	PrcessStep	Use obligation from referencing object	-	
87.	description	stepDesc	M	✔	
88.	rationale	stepRat	O	-	
89.	dateTime	stepDateTm	O	-	
90.	processor	stepProc	O	-	
92.	LI_Source	Source	Use obligation from referencing object	✔	
93.	description	srcDesc	C/ sourceExtent not provided?	✔	
94.	scaleDenominator	srcScale	O	-	
95.	sourceReferenceSystem	srcRefSys	O	✔	

96.	sourceCitation	srcCitatn	O	-	
97.	sourceExtent	srcExt	C/ description not provided?	✔	
98.	*Role name:*	srcStep	O	-	
	sourceStep			-	
99.	*DQ_Element*	DQElement	Use obligation from referencing object	-	
100.	nameOfMeasure	measName	O	-	
101.	measureIdentification	measId	O	-	
102.	measureDescription	measDesc	O	-	
103.	evaluationMethodType	evalMethType	O	-	
104.	evaluationMethodDescription	evalMethDesc	O	-	
105.	evaluationProcedure	evalProc	O	-	
106.	dateTime	measDateTm	O	-	
107.	result	measResult	M	-	
				-	
108.	DQ_Completeness	DQComplete	Use obligation from referencing object	-	
109.	DQ_Completeness Commission	DQCompComm	Use obligation from referencing object	-	
110.	DQ_CompletenessOmission	DQCompOm	Use obligation from referencing object	-	
111.	DQ_LogicalConsistency	DQLogConsis	Use obligation from referencing	-	

			object		
112.	DQ_ConceptualConsistency	DQConcConsis	Use obligation from referencing object	-	
				-	
113.	DQ_DomainConsistency	DQDomConsis	Use obligation from referencing object	-	
114.	DQ_FormatConsistency	DQFormConsis	Use obligation from referencing object	-	
115.	DQ_TopologicalConsistency	DQTopConsis	Use obligation from referencing object	-	
116.	DQ_PositionalAccuracy	DQPosAcc	Use obligation from referenc-ing object	-	
117.	DQ_AbsoluteExternal PositionalAccuracy	DQAbsExtPosAc c	Use obligation from referencing object	-	
118.	DQ_GriddedDataPositional Accuracy	DQGridData Pos Acc	Use obligation from referenc-ing object	-	
119.	DQ_RelativeInternalPositional Accuracy	DQRelIntPos Acc	Use obligation from referencing object	-	

120.	DQ_TemporalAccuracy	DQTempAcc	Use obligation from referencing object	-	
121.	DQ_AccuracyOfATime Measurement	DQAccTime Meas	Use obligation from referencing object	-	
122.	DQ_TemporalConsistency	DQTempCon sis	Use obligation from referencing object	-	
123.	DQ_TemporalValidity	DQTempVali d	Use obligation from referencing object	-	
124.	DQ_ThematicAccuracy	DQThemAcc	Use obligation from referencing object	-	
125.	DQ_ThematicClassificatio n Correctness	DQThemClas s Cor	Use obligation from referencing object	-	
126.	DQ_NonQuantitativeAttri bute Accuracy	DQNonQuan Att Acc	Use obligation from referencing object	-	
127.	DQ_QuantitativeAttribute Accuracy	DQQuanAtt Acc	Use obligation	-	

			from referencing object		
128.	*DQ_Result*	Result	Use obligation from referencing object	-	
129.	DQ_ConformanceResult	ConResult	Use obligation from referencing object	-	
130.	specification	conSpec	M	-	
131.	explanation	conExpl	M	-	
132.	pass	conPass	M	-	
133.	DQ_QuantitativeResult	QuanResult	Use obligation from referencing object	-	
134.	valueType	quanValType	O	-	
135.	valueUnit	quanValUnit	M	-	
136.	errorStatistic	errStat	O	-	
137.	value	quanVal	M	-	
138.	DQ_Scope	DQScope	Use obligation from referencing object	-	
139.	level	scpLvl	M	-	
140.	extent	scpExt	O	-	
141.	levelDescription	scpLvlDesc	C / level not equal “dataset” or “series”?	-	

(IV) Maintenance Information

Table – 10

	Name / Role Name	Short Name	Obligation / Condition	NNRMS	NSDI Agency Name
142.	MD_MaintenanceInformation	MaintInfo	Use obligation from referencing object	- -	
143.	maintenanceAndUpdate Frequency	maintFreq	M	- -	
144.	dateOfNextUpdate	dateNext	O	-	
145.	userDefinedMaintenance Frequency	usrDefFreq	O	-	
146.	updateScope	maintScp	O	-	
147.	updateScopeDescription	upScpDesc	O	-	
148.	maintenanceNote	maintNote	O	- - -	
148.1 149.	contact MD_ScopeDescription	maintCont ScpDesc	O Use obligation from referencing object	- - - -	
150.	attributes	attribSet	C / features, featureInstances, attributeInstances, dataset and other not documented?	- - -	

151.	features	featSet	C / attributes, featureInstances, attributeInstances, dataset and other not documented?	- - -		
152.	featureInstances	featIntSet	C / attributes, features, attributeInstances, dataset and other not documented?	- - -		
153.	attributeInstances	attribIntSet	C / attributes, features, featureInstances, dataset and other not documented?	- - -		
154.	dataset	datasetSet	C / attributes, features, featureInstances, attributeInstances, and other not documented?	-		

(V) Spatial Representation information (includes grid and vector representation)

Table – 11

	Name / Role Name	Short Name	Obligation / Condition	NNRMS	NSDI Agency Name
156.	*MD_SpatialRepresentation*	SpatRep	Use obligation/condition from referencing object		
157.	MD_GridSpatial Representation	GridSpatRep	Use obligation/condition from referencing object		
158.	numberOfDimensions	numDims	M		
159.	axisDimensionsProperties	axDimProps	M		
160.	cellGeometry	cellGeo	M		
161.	transformationParameter Availability	tranParaAv	M		
162.	MD_Georectified	Georect	Use obligation/condition from referencing object		
163.	checkPointAvailability	chkPtAv	M		
164.	checkPointDescription	chkPtDesc	C /		
			checkPointAvailability		
			equals “yes”?		
165.	cornerPoints	cornerPts	M		

166.	centerPoint	centerPt	O		
167.	pointInPixel	ptInPixel	M		
168.	transformationDimension Description	transDimDesc	O		
169.	transformationDimension Mapping	transDimMap	O		
170.	MD_Georeferenceable	Georef	Use obligation/condition from referencing object		
171.	controlPointAvailability	ctrlPtAv	M		
172.	orientationParameter	orieParaAv	M		
	Availability				
173.	orientationParameter Description	orieParaDs	O		
174.	georeferencedParameters	georefPars	M		
175.	parameterCitation	paraCit	O		
176.	MD_VectorSpatial Representation	VectSpatRep	Use obligation/condition from referencing		
			object		
177.	topologyLevel	topLvl	O		

178.	geometricObjects	geometObjs	O		
179.	MD_Dimension	Dimen	Use obligation/condition from referencing object		
180.	dimensionName	dimName	M		
181.	dimensionSize	dimSize	M		
182.	resolution	dimResol	O		
183.	MD_GeometricObjects	GeometObjs	Use		
			obligation/condition from referencing object		
184.	geometricObjectType	geoObjTyp	M		
185.	geometricObjectCount	geoObjCnt	O		

(VI) **Reference system information (includes temporal, coordinate and geographic identifiers)**

Table – 12

	Name / Role Name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
186.	MD_ReferenceSystem	RefSystem	Use obligation/condition from referencing object		
187.	referenceSystemIdentifier	refSysId	C / MD_CRS.projection, MD_CRS.ellipsoid, and		

			MD_CRS.datum not documented?		
188.	intentionally left blank				
189.	MD_CRS	MdCoRefSys	Use obligation/condition from referencing object		
190.	projection	projection	O	✔	
191.	ellipsoid	ellipsoid	O	✔	
192.	datum	datum	O	✔	
193.	*role name:* ellipsoidParameters	ellParas	O		
194.	*role name:* projectionParameters	projParas	O		
195.	*RS_ReferenceSystem*	RefSys	Use obligation/condition from referencing object		
196.	name	refSysName	M		
197.	domainOfValidity	domOValid	O		
198.	intentionally left blank				
199.	intentionally left blank				
200.	intentionally left blank				
201.	MD_EllipsoidParameters	EllParas	Use obligation/condition from referencing		
			object		
202.	semiMajorAxis	semiMajAx	M		
203.	axisUnits	axisUnits	M		
204.	denominatorOfFlatteningRatio	denFlatRat	C / not a spheroid?		
205.	MD_Identifier	MdIdent	Use obligation/condition from		

			referencing object		
206.	authority	identAuth	O		
207.	code	identCode	M		
208.	RS_Identifier	RsIdent	Use obligation/condition from referencing object		
208.1	codeSpace	identCodeSpace	O		
208.2	version	identVrsn	O		
209.	MD_ObliqueLineAzimuth	ObLineAzi	Use		
			obligation/condition from referencing object		
210.	azimuthAngle	aziAngle	M		
211.	azimuthMeasurePointLongitude	aziPtLong	M		
212.	MD_ObliqueLinePoint	ObLinePt	Use obligation/condition from referencing		Lines 213-214
			object		
213.	obliqueLineLatitude	obLineLat	M		Real
214.	obliqueLineLongitude	obLineLong	M		
215.	MD_ProjectionParameters	ProjParas	Use obligation/condition		
			from referencing object		
216.	zone	zone	O		
217.	standardParallel	stanParal	O		

218.	longitudeOfCentralMeridian	longCntMer	O		
219.	latitudeOfProjectionOrigin	latProjOri	O		
220.	falseEasting	falEastng	O		
221.	falseNorthing	falNorthng	O		
222.	falseEastingNorthingUnits	falENUnits	O		
223.	scaleFactorAtEquator	sclFacEqu	O		
224.	heightOfProspectivePoint AboveSurface	hgtProsPt	O		
225.	longitudeOfProjection Center	longProjCnt	O		
226.	latitudeOfProjectionCenter	latProjCnt	O		
227.	scaleFactorAtCenterLine	sclFacCnt	O		
228.	straightVerticalLongitudeFrom Pole	stVrLongPl	O		
229.	scaleFactorAtProjection Origin	sclFacPrOr	O		
230.	*role name:* obliqueLineAzimuthParameter	obLnAziPars	O		
231.	*role name:* obliqueLinePointParameter	obLnPtPars	O		

(VII) Content Information

Table - 13

	Name / Role Name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
232.	*MD_ContentInformation*	ContInfo	Use obligation/ condition from referencing		

			object		
	Name / Role Name	**Short Name**	**Obligation / Condition**		
233.	MD_FeatureCatalogue Description	FetCatDesc	Use obligation/ condition from referencing		
			object		
234.	complianceCode	compCode	O		
235.	language	catLang	O		
236.	includedWithDataset	incWithDS	M		
237.	featureTypes	catFetTyps	O		
238.	featureCatalogueCitation	catCitation	M		
239.	MD_CoverageDescription	CovDesc	Use obligation/ condition		
			from referencing object		
240.	attributeDescription	attDesc	M		
241.	contentType	contentTyp	M		
242.	*Role name:* dimension	covDim	O		
243.	MD_ImageDescription	ImgDesc	O		
244.	illuminationElevationAngle	illElevAng	O		
245.	illuminationAzimuthAngle	illAziAng	O		

246.	imagingCondition	imagCond	O		
247.	imageQualityCode	imagQuCode	O		
248.	cloudCoverPercentage	cloudCovPer	O		
249.	processingLevelCode	prcTypCde	O		
250.	compressionGeneration	cmpGenQuan	O		
	Quantity				
251.	triangulationIndicator	trianInd	O		
252.	radiometricCalibrationData	radCalDatAv	O		
	Availability				
253.	cameraCalibrationInformation	camCalInAv	O		
	Availability				
254.	filmDistortionInformation	filmDistInAv	O		
	Availability				
255.	lensDistortionInformation	lensDistInAv	O		
	Availability				
256.	MD_RangeDimension	RangeDim	Use obligation/ condition		
			from referencing object		
257.	sequenceIdentifier	seqID	O		
258.	descriptor	dimDescrp	O		
259.	MD_Band	Band	Use obligation/ condition from referencing		
			object		

260.	maxValue	maxVal	O		
261.	minValue	minVal	O		
262.	units	valUnit	C / minValue or maxValue provided?		
263.	peakResponse	pkResp	O		
264.	bitsPerValue	bitsPerVal	O		
265.	toneGradation	toneGrad	O		
266.	scaleFactor	sclFac	O		
267.	offset	offset	O		

(VIII) Portrayal catalogue information

TABLE - 14

	Name / Role Name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
268.	MD_PortrayalCatalogue Reference	PortCatRef	Use obligation/condition from referencing object		
269.	portrayalCatalogueCitation	portCatCit	M		

(IX) Distribution information

Table-15

	Name / Role Name	**Short Name**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**
270.	MD_Distribution	Distrib	Use obligation/condition from referencing object		
271.	*Role name:*	distFormat	C /		

	distributionFormat		MD_Distributor. distibutorFormat not documented?		
272.	*Role name:* distributor	distributor	O		
273.	*Role name:* transferOptions	distTranOps	O		
274.	MD_DigitalTransferOptions	DigTranOps	Use obligation/condition from referencing object		
275.	unitsOfDistribution	unitsODist	O		
276.	transferSize	transSize	O		
277.	onLine	onLineSrc	O		
278. 279.	offLine MD_Distributor	offLineMed Distributor	O Use obligation/condition from referencing object		
280.	distributorContact	distorCont	M		
281.	*Role name:* distributionOrderProces	distorOrdPrc	O		

	s				
282.	*Role name:*	distorFormat	C / MD_Distribution.		
	distributorFormat		distributionFormat not		
			documented?		
283.	*Role name:*	distorTran	O		
	distributorTransferOptions				
284.	MD_Format	Format	Use obligation/condition from referencing object		
285.	name	formatName	M		
286.	version	formatVer	M		
287.	amendmentNumber	formatAmdNum	O		
288.	specification	formatSpec	O		
289.	fileDecompressionTechnique	fileDecmTech	O		
290.	*Role name:* formatDistributor	formatDist	O		
291.	MD_Medium	Medium	Use		
			obligation/condition from referencing object		
292.	name	medName	O		
293.	density	medDensity	O		
294.	densityUnits	medDenUnits	C / density documented?		
295.	volumes	medVol	O		
296.	mediumFormat	medFormat	O		
297.	mediumNote	medNote	O		

(x) Metadata extension information

Table - 16

	Name / Role Name	Short Name	Obligation / Condition	NNRMS	NSDI Agency Name
298.	MD_StandardOrderProcess	StanOrdProc	Use obligation/condition from referencing object		
299.	fees	resFees	O		
300.	plannedAvailableDateTime	planAvDtTm	O		
301.	orderingInstructions	ordInstr	O		
302.	turnaround	ordTurn	O		
303.	MD_MetadataExtension Information	MdExtInfo	Use obligation/condition from referencing object		
304.	extensionOnLineResource	extOnRes	O		

305.	*Role name:* extendedElementInformation	extEleInfo	O		
306.	MD_ExtendedElemen tInformation	ExtEleInfo	Use obligation/con dition from referencing object		
307.	name	extEleName	M		
308.	shortName	extShortName	C / dataType notEqual "codelistEleme nt"?		
309.	domainCode	extDomCode	C / is dataType "codelistEleme nt"?		
310.	definition	extEleDef	M		
311.	obligation	extEleOb	C / dataType not "codelist", "enumeration" or		
			"codelistEleme nt"?		

312.	condition	extEleCond	C / obligation = "Conditional"?		
313.	dataType	eleDataType	M		
314.	maximumOccurrence	extEleMxOc	C / dataType not "codelist",		
			"enumeration" or		
			"codelistElement"?		
315.	domainValue	extEleDomVal	C / dataType not "codelist ",		
			"enumeration" or		
			"codelistElement"?		
316.	parentEntity	extEleParEnt	M		
317.	rule	extEleRule	M		
318.	rationale	extEleRat	O		
319.	source	extEleSrc	M		

(XI) Application schema information

Table - 17

	Name / Role Name	Short Name	Obligation / Condition	NNRMS	NSDI Agency Name
320.	MD_ApplicationSchema Information	AppSchInfo	Use obligation/condition from referencing object		
321.	name	asName	M		
322.	schemaLanguage	asSchLang	M		
323.	constraintLanguage	asCstLang	M		
324.	schemaAscii	asAscii	O		
325.	graphicsFile	asGraFile	O		
326.	softwareDevelopmentFile	asSwDevFile	O		
327.	softwareDevelopmentFile Format	asSwDevFiFt	O		
328.	intentionally left blank				
329.	intentionally left blank				
330.	intentionally left blank				
331.	intentionally left blank				
332.	intentionally left blank				
333.	intentionally left blank				

Data Type information

B.3.1 Extent information

Table - 18

	Name / Role Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	NNRMS	NSDI Agency Name
334.	EX_Extent	Extent	information about horizontal, vertical, and temporal extent	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
335.	description	exDesc	spatial and temporal extent for the referring object	C / geographicElement and temporalElement and verticalElement not documented?	1		
336.	*Role name:* geographicElement	geoEle	provides geographic component of the extent of the referring object	C / description and temporalElement and verticalElement not documented?	N	Association	
337.	*Role name:* temporalElement	tempEle	provides temporal component of the	C / description and geographicElement and verticalElement	N		

			extent of the referring object	not documented?			
338.	*Role name:* verticalElement	vertEle	provides vertical component of the extent of the referring object	C / description and geographicElement and temporalElement not documented?	N		

B.3.1.2 Geographic extent information

Table - 19

	Name / Role Name	**Short Name**	**Definition**	**Obligation / Condition**	**Maximum occurrence**	**NNRMS**	**NSDI Agency Name**
339.	*EX_GeographicExtent*	GeoExtent	geographic area of the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
340.	extentTypeCode	exTypeCode	indication of whether the bounding polygon encompasses an area covered by	O	1		

			the data or an area where data is not present				
341.	EX_BoundingPolygon	BoundPoly	boundary enclosing the dataset, expressed as the closed set of (x,y) coordinates of the polygon (last point replicates first point)	Use obligation/condition from referencing object	Use maximum occurrence from referencing object	Specified Class (EX_GeographicExtent)	
342.	polygon	polygon	sets of points defining the bounding polygon	M	N	Class	
343.	EX_GeographicBoundingBox	GeoBndBox	geographic position of the dataset NOTE This is only an	Use obligation/condition from referencing object	Use maximum occurrence from referencing		

			approximate reference so specifying the coordinate reference system is unnecessary		object		

344.	westBoundLongitude	westBL	western-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1		
345.	eastBoundLongitude	eastBL	eastern-most coordinate of the limit of the dataset extent, expressed in longitude in decimal degrees (positive east)	M	1		
346.	southBoundLatitude	southBL	southern-most coordinate of	M	1		

			the limit of the dataset extent, expressed in latitude in decimal degrees (positive north)				
347.	northBoundLatitude	northBL	northern-most, coordinate of the limit of the dataset extent expressed in latitude in decimal degrees (positive north)	M	1		
348.	EX_GeographicDescription	GeoDesc	description of the geographic area using identifiers	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
349.	geographicIdentifier	geoId	identifier used to represent a geographicarea	M	1		

B.3.1.3 Temporal extent information

Table - 20

	Name / Role Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	NNRMS	NSDI Agency Name
350.	EX_TemporalExtent	TempExtent	time period covered by the content of the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
351.	extent	exTemp	date and time for the content of the dataset	M	1		
352.	EX_SpatialTemporalExtent	SpatTempEx	extent with respect to date/time and spatial boundaries	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
353.	*role name:* spatialExtent	exSpat	spatial extent component of composite spatial and temporal extent	M	N		

B.3.1.4 Vertical extent information

Table - 21

	Name / Role Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	NNRMS	NSDI Agency Name
354.	EX_VerticalExtent	VertExtent	vertical domain of dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
355.	minimumValue	vertMinVal	lowest vertical extent contained in the dataset	M	1		
356.	maximumValue	vertMaxVal	highest vertical extent contained in the dataset	M	1		
357.	unitOfMeasure	vertUoM	vertical units used for vertical extent information Examples: metres, feet, millimetres, hectopascals	M	1		
358.	*role name:* verticalDatum	vertDatum	provides information about the origin from which the	M	1		

			maximum and minimum elevation values are measured				

B.3.2 Citation and responsible party information
B.3.2.1 General

Table - 22

	Name / Role Name	Short Name	Definition	Obligation / Condition	Maximum occurrence	NNRMS	NSDI Agency Name
359.	CI_Citation	Citation	standardized resource reference	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
360.	title	resTitle	name by which the cited resource is known	M	1		
361.	alternateTitle	resAltTitle	short name or other language name by which the cited information is known.	O	N		

			Example: "DCW" as an alternative title for "Digital Chart of the World"				
362.	date	resRefDate	reference date for the cited resource	M	N		
363.	edition	resEd	version of the cited resource	O	1		
364.	editionDate	resEdDate	date of the edition	O	1		
365.	identifier	citId	value uniquely identifying an object within a namespace	O	N		
366.	intentionally left blank						
367.	citedResponsibleParty	citRespParty	name and position information for an individual or organization that is responsible for the resource	O	N		
368.	presentationForm	presForm	mode in which the resource is represented	O	N		

369.	series	datasetSeries	information about the series, or aggregate dataset, of which the dataset is a part	O	1		
370.	otherCitationDetails	otherCitDet	other information required to complete the citation that is not recorded elsewhere	O	1		
371.	collectiveTitle	collTitle	common title with holdings note NOTE title identifies elements of a series collectively, combined with information about what volumes are available at the source cited	O	1		
372.	ISBN	isbn	international	O	1		

			Standard Book Number				
373.	ISSN	issn	international Standard Serial Number	O	1		
374.	CI_ResponsibleParty	RespParty	identification of, and means of communication with, person(s) and organizations associated with the dataset	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
375.	individualName	rpIndName	name of the responsible person- surname, given name, title separated by a delimiter	C / organisationName and positionName not documented?	1		
376.	organisationName	rpOrgName	name of the responsible organization	C / individualName and positionName not documented?	1		
377.	positionName	rpPosName	role or position of the responsible	C / individualName and organisationName	1		

			person	not documented?			
378.	contactInfo	rpCntInfo	address of the responsible party	O	1		
379.	role	role	function performed by the responsible party	M	1		

B.3.2.2 Address information
B.3.2.3 Contact information
B.3.2.4 Date information

Table - 23

	Name / Role Name	**Short Name**	**Definition**	**Obligation / Condition**	**Maximum occurrence**	**NNRMS**	**NSDI Agency Name**
380.	CI_Address	Address	location of the responsible individual or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
381.	deliveryPoint	delPoint	address line for the location (as described in ISO 11180, Annex A)	O	N		
382.	city	city	city of the	O	1		

			location				
383.	administrativeArea	adminArea	state, province of the location	O	1		
384.	postalCode	postCode	ZIP or other postal code	O	1		
385.	country	country	country of the physical address	O	1		
386.	electronicMailAddress	eMailAdd	address of the electronic mailbox of the responsible organization or individual	O	N		
387.	CI_Contact	Contact	information required to enable contact with the responsible person and/or organization	Use obligation/condition from referencing object	Use maximum occurrence from referencing object		
388.	phone	cntPhone	telephone numbers at which the organization or individual may	O	1		

			be contacted				
389.	address	cntAddress	physical and email address at which the organization or individual may be contacted	O	1		
390.	onlineResource	cntOnlineRes	on-line information that can be used to contact the individual or organization	O	1		
391.	hoursOfService	cntHours	time period (including time zone) when individuals can contact the organization or individual	O	1		
392.	contactInstructions	cntInstr	supplemental instructions on how or when to contact the	O	1		

393.	CI_Date	DateRef	individual or organization reference date and event used to	Use	Use		
			describe it	obligation/condition from referencing object	maximum occurrence from referencing object		
394.	date	refDate	reference date for the cited resource	M	1		
395.	dateType	refDateType	event used for reference date	M	1		

B.3.2.5 OnLine resource information
B.3.2.6 Series information
B.3.2.7 Telephone information

Table - 24

	Name / Role Name	**Short Name**	**Definition**	**Obligation / Condition**	**NNRMS**	**NSDI Agency Name**

396.	CI_OnlineResource	OnlineRes	information about on-line sources from which the dataset, specification, or community profile name and extended metadata elements can be obtained	Use obligation/condition from referencing object		
397.	linkage	linkage	location (address) for on-line access using a Uniform Resource Locator address or similar addressing scheme such as http://www.statkart.no/isotc211	M		
398.	protocol	protocol	connection protocol to be used	O		
399.	applicationProfile	appProfile	name of an application profile that can be used with the online resource	O		
400.	name	orName	name of the online resource	O		
401.	description	orDesc	detailed text description of what	O		

			the online resource is/does			
402.	function	orFunct	code for function performed by the online resource	O		
403.	CI_Series	DatasetSeries	information about the series, or aggregate dataset, to which a dataset belongs	Use obligation/condition from referencing object		
404.	name	seriesName	name of the series, or aggregate dataset, of which the dataset is a part	O		
405.	issueIdentification	issId	information identifying the issue of the series	O		
406.	page	artPage	details on which pages of the publication the article was published	O		
407.	CI_Telephone	Telephone	telephone numbers for contacting the responsible individual or organization	Use obligation/condition from referencing object		

408.	voice	voiceNum	telephone number by which individuals can speak to the responsible organization or individual	O		
409.	facsimile	faxNum	telephone number of a facsimile machine for the responsible organization or individual	O		

Glossary

Abstraction -- A way of viewing a real world object, usually a simplification. For example, a road may be represented as a centerline in one application and an area bounded by kerblines in another

Accuracy -- The closeness of results of observations, computations or estimates to the true values or the values accepted as being true.

Altitude -- Elevation above or below a reference datum, as defined in Federal Information Processing Standard 70-1. See also elevation.

Area -- Generic term for a bounded, continuous, two-dimensional object that may or may not include its boundary.

Attribute -- Defined characteristic of an entity type (e.g. composition).

Attribute value -- Specific quality or quantity assigned to an attribute (e.g., steel), for a specific entity instance.

Content -- In ArcWeb Services, data that may include data files, layers, or services.

Coordinates -- Pairs of numbers expressing horizontal distances along orthogonal axes; alternatively, triplets of numbers measuring horizontal and vertical distances.

Coverage -- A digital version of a map forming the basic unit of vector data storage in ARC/INFO. A coverage stores geographic features as primary features (such as arcs, nodes, polygons, and label points) and secondary features (such as ties, mapextent, links, and annotation) Associated feature attrubute tables describe abnd store attributes of the geographic features.

Data -- Any collection of related facts arranged in a particular format; often, the basic elements of information that are

produced, stored, or processed by a computer.

Database -- Logical collection of inter related information, managed and stored as a unit, usually on some form of mass storage system such as magnetic tape or disk. A GIS database includes data about the Spatial locations and shape of geographic features recorded as points, lines, pixels, grid cells or tins as well as their attributes.

Data element -- a logically primitive item of data.

Data format -- The structure used to store a computer file or record

Data set -- a collection of related data.

Data type -- The characteristics of columns and variables that defined what types of data values they can store. Examples include character, floating point and integer.

Digital image -- Two-dimensional array of regularly spaced picture elements (pixels) constituting a picture.

Domain -- In the definition of the elements in the metadata standard, the domain identifies valid values for a data element.

Elevation -- Conforming to Federal Information Processing Standard 70-1, the term "altitude" is used in this standard, rather than the common term elevation.

Entity instance -- A spatial phenomenon of a defined type that is embedded in one or more phenomena of different type, or that has at least one key attribute value different from the corresponding attribute values of surrounding phenomena (e.g., the 10 Street Bridge).

Entity point -- A point used for identifying the location of point features (or areal features collapsed to a point), such as

towers, buoys, buildings, places, etc.

Entity type -- Definition and description of a set into which similar entity instances are classified (e.g., bridge).

Geospatial data -- Information that identifies the geographic location and characteristics of natural or constructed features and boundaries on the earth. This information may be derived from, among other things, remote sensing, mapping, and surveying technologies.

GIS -- Geographic Information System. "A Geographic Information System is a computer system designed to allow users to collect, manage, and analyze large volumes of spatially referenced and associated attribute data. The major components of a GIS are: a user interface; system/database management capabilities; database creation/data entry capacity; spatial data manipulation and analysis packages; and display/product generation functions." - from USGS Open File Report 88-105 [A process for evaluating Geographic Information Systems]. In the broadest sense, a GIS is any integrated system of information that includes a geographic component.

Horizontal -- Tangent to the geoid or parallel to a plane that is tangent to the geoid.

Interface -- The type of signal protocol for connecting computer devices. You can only connect a peripheral device to a microcomputer through a matching interface. Common interface types include serial, parallel, SCSI and GPIB.

Interoperability -- The capability of components or systems to exchange data with other components or systems, or to perform in multiple environments. In GIS, interoperability is required for a GIS user using software from one vendor to study data compiled with GIS software from a different provider

Label point -- A reference point used for displaying map and chart text (e.g., feature names) to assist in feature identification.

Latitude -- Angular distance measured on a meridian north or south from the equator.

Layer -- An integrated, areally distributed, set of spatial data usually representing entity instances within one theme, or having one common attribute or attribute value in an association of spatial objects. In the context of raster data, a layer is specifically a two-dimensional array of scalar values associated with all of part of a grid or image.

Longitude -- Angular distance between the plane of a meridian east or west from the plane of the meridian of Greenwich.

Map -- Spatial representation, usually graphic on a flat surface, of spatial phenomena.

Media -- The physical devices used to record, store, and (or) transmit data.

Meridian -- A great circle on the Earth that passes through the geographic poles.

Metadata -- Data about the content, quality, condition, and other characteristics of data.

National Geospatial Data Clearinghouse -- Distributed network of geospatial data producers, managers, and users linked electronically. Building on initiatives such as the national information infrastructure, the clearinghouse uses a distributed, electronically connected network, such as the Internet. Each data provider will describe available data in an electronic form, and provide these descriptions (or "metadata") using means that can be accessed over a communications network. Thus, the data for the clearinghouse are located at the sites of data producers (or, where more efficient, at the sites of intermediaries) throughout the country. Using the network, users will search these descriptions to locate data that are suitable for their applications.

Node -- Zero-dimensional object that is a topological junction of two or more links or chains, or an end point of a link or chain.

Coordinate -- The coordinate of a point in a plane cartesian coordinate system obtained by measuring parallel to the y-

axis ("the 'y' value").

Pixel -- Two-dimensional picture element that is the smallest non divisible element of a digital image.

Raster -- One or more overlapping layers for the same grid or digital image.

Resolution-- The minimum difference between two independently measured or computed values which can be distinguished by the measurement or analytical method being considered or used.

Scale -- The ratio or relationship between a distance or area on a map and the corresponding distance or area on the ground, commonly expressed as a fraction or ratio. A map scale of 1/100,000 or 1:100,000 means that one unit of measure on the map equals 100,000 of the same unit on the earth.

Schema -- The structure or design of a database or database object, such as a table, view, index, stored procedure, or trigger. In a relational database, the schema defines the tables, the fields in each table, the relationships between fields and tables, and the grouping of objects within the database. Schemas are generally documented in a data dictionary. A database schema provides a logical classification of database objects.

Source -- Component of an extended element. the name of the individual or organization creating an extended element

Spatial -- An adjective applied to objects that vary in space in two or three dimensions.

Table -- A database is organized into tables that contain records. Tables cover different topics related to the same common theme. The theme and its extent of development determine the number of tables that comprise the database. For example, the Crow Butte soil polygon database contains twelve tables, in such areas as yield, crop potential, and statistical information. (See also: database object, field, record.)

Temporal extent -- All the temporal information, including the earliest and last observations, of a data layer in ArcGIS Tracking Analyst.

Vertical -- At right angles to the horizontal; includes altitude and depth.

ACRONYMS

NSDI	National Spatial Data Infrastructure
ISRO	Indian Space Research Organization
DOS	Department of Space
OGC	Open Geo-spation Consortium
ISO	International Standards Organization
SAC	Space Application Centre
NNRMS	National Natural Resources Management System
CSDGM	Content Standard for Digital Geospatial Metadata
FGDC	Federal Geographic Data Centre
ANZLIC	Australia New Zealand Spatial Information Council
NBSSLUP	National Buaero of Soil Survey and Land Use Planning
NIC	National Informatics Centre
CGWB	Central Ground Water Board
DST	Department of Science & Technology
FSI	Forest Survey of India
NRSA	National Remote Sensing Agency

CWC	Central Water Commission
SOI	Survey of India
CEN	European Committee for Standardization
CGDI	Canadian Geospatial Data Infrastructure
GSI	Geological Survey of India
NATMO	National Atlas and Thematic Mapping Organization
NRDMS	Natural Resources Data management System
WG	Working Group
WCS	Web Coverage Service
WMS	Web Map Service.
WFS	Web Feature Service
DCMI	Dublin Core Metadata Initiative
WGS84	World Geodetic System 1984
URL	Uniform Resource Locator
NRSC	National Remote Sensing Centre

Working Group on NSDI Metadata Standard

S.No	Name of the Official	Designation	Organisation
1.	Dr S K Pathan	Nodal Officer (Chairman)	Space Application Centre (ISRO), Ahmedabad
2.	Shri S K Sinha	Member	Central Ground Water Board (CGWB), Faridabad
3.	Shri Subash Ashutosh	Member	Forest Survey of India (FSI), Dehradun
4.	Dr A K Maji	Member	National Buaero of Soil Survey and Land Use Planning (NBSS&LUP), Nagpur
5.	Dr Vandana Sharma	Member	National Informatics Centre (NIC), New Delhi
6.	Dr YVS Murthy	Member	National Remote Sensing Centre (NRSC), Hyderabad
7.	Dr Yogesh Paithankar	Member	Central Water Commission (CWC), New Delhi
8.	Brig Girish Kumar	Member	Survey of India (SOI), New Delhi
9.	Dr Murli Mohan	Member	National Spatial Data Infrastructure (NSDI), New Delhi
10.	Mrs Pushpalata Shah	Member (Co-opted)	Space Application Centre (ISRO) Ahmedabad
11.	Shri Rajendra N Gaikwad	Member (Co-opted)	Space Application Centre (ISRO) Ahmedabad