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NSDI METADATA STANDARD
(WITH DESIGN OF PROTO-TYPE NSDI METADATA)

PREPARED BY:
SUB-COMMITTEE ON NSDI METADATA

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
INDIAN SPACE RESEARCH ORGANISATION
NNRMS SECRETARIAT
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October 31, 2003

FOREWORD

India has a vast amount of map information generated through systematic topographic surveys, geological surveys, soil surveys, cadastral surveys, various natural resources information generated with the use of the remote sensing images. Encapsulating these maps and images into a National Spatial Data Infrastructure (NSDI) will 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 element 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 the 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 of his 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.

ISRO, with the involvement of SOI, NIC, GSI, FSI, NBSSLUP, NATMO and the private sector, has led the effort of defining a national Metadata Standard and I am happy to note that the NSDI Metadata Standard document has been finalised by this inter-agency committee. I am sure that the Metadata Standard will be adopted by one and all to document their data assets and this will enable the quick operationalisation of the NSDI Metadata Server and the start of the first of the NSDI services to the user community.

I take this opportunity to congratulate the team that has defined the standard and hope that the team will continue to address the maintainability of the standard as it evolves.

Date: October 31, 2003

(G Madhavan Nair)





सत्यमेव जयते

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MESSAGE

I am happy to note that the NSDI Metadata Standard document has been finalised and issued for agencies to populate their metadata – as per a common reference and standard. The metadata is a very important information and the need for standardizing this has been felt over the past one year or so. The sub-committee of the NSDI Task Force – which has representation for almost all NSDI agencies has done an extremely systematic job in defining this standard.

The metadata becomes important as it systemizes the process of documenting records of spatial data available with different agencies. At the same time, over a good search and access protocol users can access the metadata and locate the information of their interest. The metadata, to that end, is the front-end interface to the user.

Considerable amount of work has been done in the NSDI – especially in the metadata, exchange, network and applications standards. Demonstration of the metadata and the NSDI portal has resulted in the better understanding of the NSDI to a larger community. While we are far away from the full-fledged NSDI to become a reality we have made considerable progress from the strategy and action plan defined to years ago.

I am happy at the progress made and the good integration of government, private and NGOs happening as part of the NSDI. I take this opportunity to record appreciation to the NSDI Task Force and the sub-committee which has brought out the NSDI Metadata Standard.

The real success of the metadata will be when it is actually implemented by all agencies and we can have a common metadata server providing efficient search, access and locating tools – this would be the first step of the NSDI becoming a reality.

(VS Ramamurthy)

November 4, 2003



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

The NSDI Task Force Sub-Committee on NSDI Metadata and Content Standard invites and encourages organizations and persons from government, private and academic agencies to use the NSDI Metadata Standard to document their spatial data.

A software utility has also been developed by ISRO that allows agencies to populate their agency Metadata in the NSDI Metadata Standard format and then link it with the overall Metadata Server.

Mukund Rao (ISRO)
Chair, NSDI Task Force
Sub-Committee on NSDI Metadata
and Content Standard



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THE NSDI VISION

**NATIONAL INFRASTRUCTURE FOR THE
AVAILABILITY OF AND ACCESS TO
ORGANISED SPATIAL DATA**

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

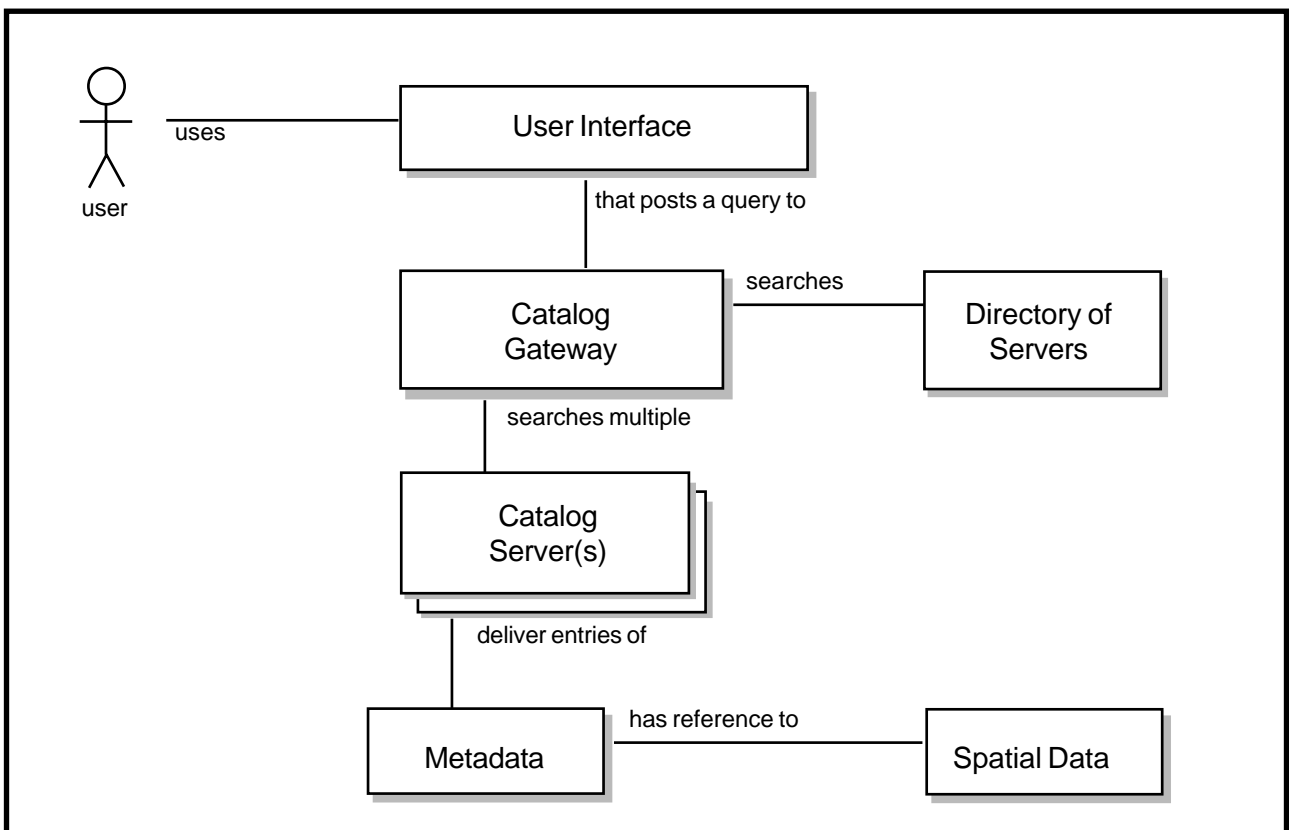
1.0 INTRODUCTION

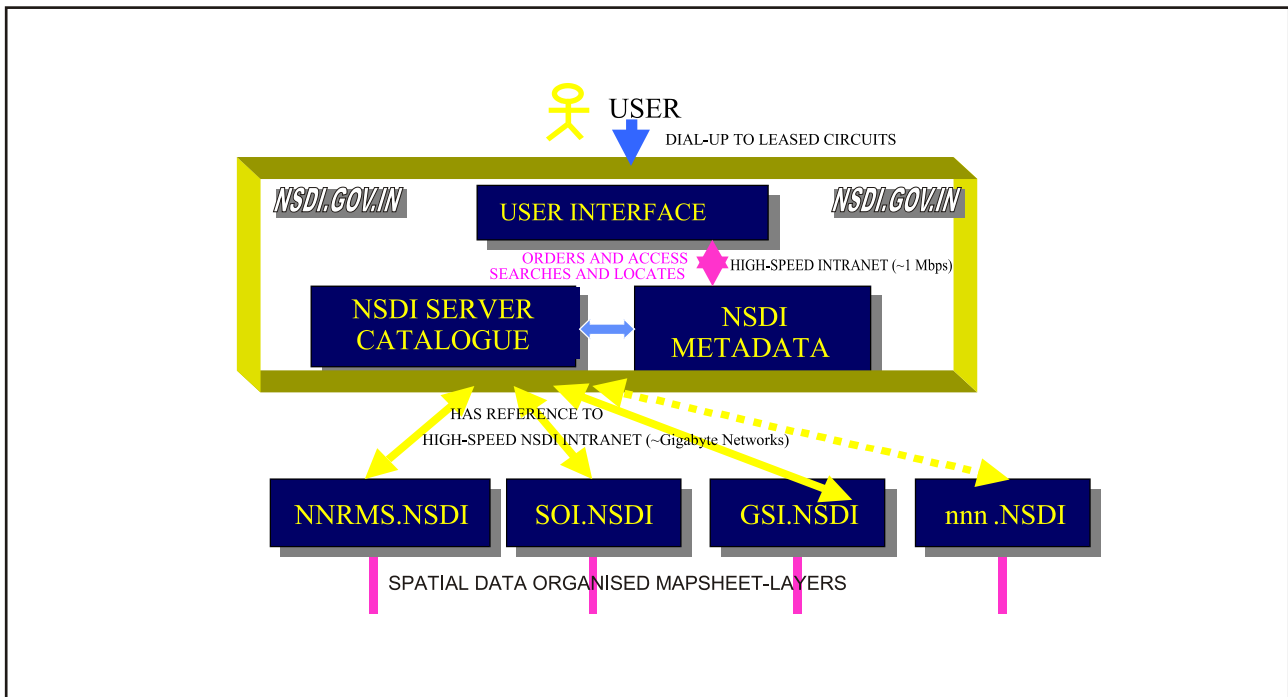
- 1.0 India is fast moving into being an information and knowledge society – especially with the emphasis on Information Technology and “transparent” e-governance. The next decade will see further large-scale investment in communications technology as India moves to exploit the full potential of the information age. Recent initiatives by the Government, including the IT Act, as well as announced plans for private and public investment, make it clear that within a few years an unprecedented capability will exist for sharing of data along “electronic superhighways.” Amongst the variety of datasets that would be involved, spatial (or map) information will be a major “content”. These Spatial information sets are vital to make sound decisions at the local, regional, state and central level planning, implementation of action plans, infrastructure development, disaster management support, and business development. Natural Resources management, flood mitigation, environmental restoration, land use assessments and disaster recovery are just a few examples of areas in which decision-makers are benefiting from spatial information.
- 2.0 Until recently, maps (usually in paper form) have been a mainstay for a wide variety of applications and decision-making. This is changing as more spatially referenced data and information on a wider variety of topics or themes (e.g., population, land use, economic transactions, hydrology, agriculture, climate, soils) are being produced, stored, transferred, manipulated, and analyzed in digital form.
- 3.0 A new wave of technological innovation is allowing us to capture, store, process and display an unprecedented amount of geographical and spatial information about Society and a wide variety of environmental and cultural phenomena. Much of this information is “spatial” - that is, it refers to a coordinate system and is representable in map form. Current and accurate spatial data must be readily available to contribute to local, state and national development and contribute to economic growth, environmental quality and stability, and social progress.
- 4.0 India has, over the past years, produced a rich “base” of map information through systematic topographic surveys, geological surveys, soil surveys, cadastral surveys, various natural resources inventory programmes and the use of the remote sensing images. Further, with the availability of precision, high-resolution satellite images, data enabling the organisation of Geographical Information System (GIS), combined with the Global Positioning System (GPS), the accuracy and information content of these spatial datasets or maps is extremely high.
- 5.0 Encapsulating these maps and images into a National Spatial Data Infrastructure (NSDI) has been recognised and the emphasis is on 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. Only through common conventions and technical agreements, standards, metadata definitions, network and access protocols will it be easily possible for the NSDI to come into existence.

- 6.0 India has now a NSDI strategy and the “NSDI Strategy and Action Plan” report has been prepared and is being taken up as a major national endeavor. The first steps have been taken but the end-goal is farther away but in sight now. While Government is providing the lead, private enterprise, NGOs and academia have a major role to play in making the NSDI a reality. NSDI will require the coming together of various “groups” and harmonizing their efforts in making this national endeavor a success.
- 7.0 As per the NSDI Strategy and Action Plan, one of the major elements of the NSDI elements is the NSDI Metadata Standard for cataloguing and organizing the NSDI Metadata – thus, allowing for information search and access. The NSDI Metadata would get be based on the NSDI content and as digital spatial information is populated in the NSDI, the Metadata would evolve. As a part of NSDI, one of the critical steps would be the development of a metadata standard and development metadata files.
- 8.0 This document details the framework of the NSDI Metadata Standard and the Search and Access protocols. The document is a baseline document and will evolve through a process of Development Cycle and Certification before being formally accepted for implementation for the NSDI.

2.0 NSDI SERVERS

- 9.0 The NSDI would be a network of Servers that, in unison, would enable the successful performance of NSDI goals and objectives. The following 3 NSDI elements are envisaged:
- 9.1 **NSDI Web-Server:** The NSDI Web-Server would be the front-end interface to NSDI. The Web-Server would provide the open access to NSDI information and “secure” entry to NSDI Metadata and NSDI Agency Servers. The DNS for the NSDI web-server would be www.nsd.gov.in
 - 9.2 **NSDI Metadata Server:** The NSDI Metadata Server would maintain the NSDI metadata content. At a higher level, it would be linked to NSDI Web-Server and lower-level it would be linked through NSDI Server Catalogue to NSDI Agency Servers.
 - 9.3 **NSDI Agency Server:** The NSDI Agency Server (or Servers) would hold the actual spatial data of the NSDI Agency.





2.1 LINKING NSDI METADATA AND NSDI AGENCY SERVERS

10.0 The powering of the 3 servers can be taken upon phases and as and when ready – while each of them could independently be established in phases. The NSDI Web-Server could be the first one to get powered and onto the internet. The NSDI Metadata Server can be on-line when the metadata is available and the Server could be populated as and when NSDI Agencies are ready. The last to get linked would be the NSDI Agency Server and for this to happen, the following would be required:

10.1 The national policy would clear the connectivity of NSDI Agency Server

11.0 The NSDI Metadata Server would maintain the NSDI Metadata and could be replicated in the NSDI Agency Servers. The NSDI Metadata Server would get linked to the NSDI Agency Servers when the Server Conformity clearance is obtained. A procedure of test and certification of Server compatibility is established.

12.0 The NSDI Gateway and its user interface allows a user to query distributed collections of spatial information through their metadata descriptions. This spatial information may take the form of “data” or of services available to interact with spatial data, described with complementary forms of metadata. A user interested in locating spatial information uses a search user interface, fills out a search form, specifying queries for data with certain properties. The search request is passed to the Catalog Gateway and poses the query of one or more registered catalog servers. Each catalog server manages a collection of metadata entries. Within the metadata entries there are instructions on how to access the spatial data being described. There are a variety of user interfaces available in this type of Catalog search in various national and regional SDIs around the world. Interoperable search across international Catalogs can be achieved through use of a common descriptive vocabulary (metadata), a common search and retrieval protocol, and a registration system for servers of metadata collections.

	Classic	Online	Fully Functional
Metadata	Adhoc (NRIS, DVD)	NSDI based	NSDI based
Catalog	Offline, Hardcopy-based, disk	Database enabled; Web Accessible	Semantic interoperability via Search and Access Protocols (Z. 39, GEO, OGC)
Visualisation	Paper/Report; Offline	Web-Access; Map Enabled	Semantic interoperability via WebMapping
Ordering	Phone, Fax, E-mail	E-mail, Web-forms	Web-forms, E-Commerce
Product Selection	Predefined products	Geographic Framework Search; Subsetting of defined products	Selection based on features from seamless data volumes
Delivery	Offline, hardcopy	Back-end Shop; softgoods	On-line file-based delivery
Packaging/Safe Delivery	Hardcopy packaging	User Specified Product in network off-line delivery	User Specified encrypted product
Payment	User Account/Deposits	User Account/Deposits	E-Commerce

2.2 NSDI SERVER SECURITY

- 13.0 Security of the NSDI Servers is of utmost importance and ensuring their protection will be a major endeavor of NSDI. Multi-layer protection and firewalls and secure ftp ports will have to be enabled for maximizing security.

3.0 NEED FOR METADATA

- 14.0 The word Metadata shares the same Greek root as the word metamorphosis. “Meta-” means change and metadata, or “data about data” describe the origins of and tracks the changes to data. Metadata is the term used to describe the summary information or characteristics of a set of data. This very general definition includes an almost limitless spectrum of possibilities ranging from human-generated textual description of a resource to machine-generated data that may be useful to software applications. The term metadata has become widely used over the past 15 years, and has become particularly common with the popularity of the World Wide Web. But the underlying concepts have been in use for as long as collections of information have been organised. Library catalogues represent an established variety of metadata that has served for decades as collection management and resource discovery tools.
- 15.0 The concept of Metadata is also familiar to most people who deal with spatial data. A map legend is one representation of metadata, containing information about the publisher of the map, the publication date, the type of map, a description of the map, spatial references, the map’s scale and its accuracy, among other things. In this form, Metadata is readily apparent and easily transferred between map producers and map users. When map data are in a digital form, metadata is equally as important, but its development and maintenance often require a more conscious effort on the part of data producers and the chain of subsequent users who may modify the data to suit their particular needs.
- 16.0 Metadata are also these types of descriptive information applied to a digital spatial file. They’re a common set of terms and definitions to use when documenting and using spatial data. Most digital spatial files now have some associated metadata. In the area of spatial information or information with a geographic component this normally means the What, Who, Where, Why, When and How of the data. The only major difference that therefore exists from the many other metadata sets being collected for libraries, academia, professions and elsewhere is the emphasis on the spatial component - or the where element.
- 17.0 Metadata helps people who use spatial data find the data they need and determine how best to use it. Metadata benefit the data-producing organization as well.
- 18.0 Metadata serves two major purposes 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:
- 18.1 Locating and Searching for spatial data
 - 18.2 Browsing spatial data
 - 18.3 Deciding on whether the spatial data will meet the application need
 - 18.4 Finding how the spatial data can be accessed
 - 18.5 Obtaining the spatial data
- 19.0 Metadata helps to :
- 19.1 Organize and maintain an organization’s holdings of spatial data. Metadata help insure an organization’s investment in data. As personnel change or time passes, information about an organization’s data will be lost and the data may lose their value.

Later workers may have little understanding of the content and uses for a digital data base and may find that they can't trust results generated from these data. Complete metadata descriptions of the content and accuracy of a geospatial data set will encourage appropriate use of the data. Such descriptions also may provide some protection for the data producing organization if conflicts arise over the misuse of data.

- 19.2 Provide information to users on spatial data holdings and enable clearinghouse operations for spatial data delivery. Applications of geographic information systems often require many themes of data. Few organizations can afford to create all data they need. Often data created by an organization also may be useful to others. By making metadata available through data catalogs and clearinghouses, organizations can find data to use, partners to share data collection and maintenance efforts, and customers for their data. The NSDI will be sponsoring the development of the on-line Clearinghouse through which data producers can provide metadata to others using the Internet.
 - 19.3 Provide information to aid data transfer. Metadata should accompany the transfer of a data set. The metadata will aid the organization receiving the data process and interpret data, incorporate data into its holdings, and update internal catalogs describing its data holdings.
- 20.0 Metadata can be organized in varying details ranging from a simple listing of basic information about available data to detailed documentation about an individual data set. At a fundamental level, metadata may support the creation of an inventory of the data holdings of a government agency. Metadata is also important in the creation of a spatial data clearinghouse, where potential users can search to find the data they need for their intended application. At a more detailed level, metadata may be considered as insurance. Metadata insures that potential data users can make an informed decision about whether data are appropriate for the intended use. Metadata also insures that the data holdings of an agency are well documented and that agencies are not vulnerable to losing all the knowledge about their data when key employees retire or accept other jobs.

3.1 STATUS OF METADATA SOLUTIONS

- 21.0 Considerable debate across the world on Metadata and the characteristics that should be chosen to best describe the spatial data set. 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 all designed to ensure that a degree of consistency exists within a given application community. ANNEXURE – I provides a bird's eye-view of the Metadata development in different agencies/countries.
- 22.0 Metadata also forms an important part of the OpenGIS Abstract Specification. The Open IS 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 data. OGC are working closely with 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.

4.0 METADATA FRAMEWORK

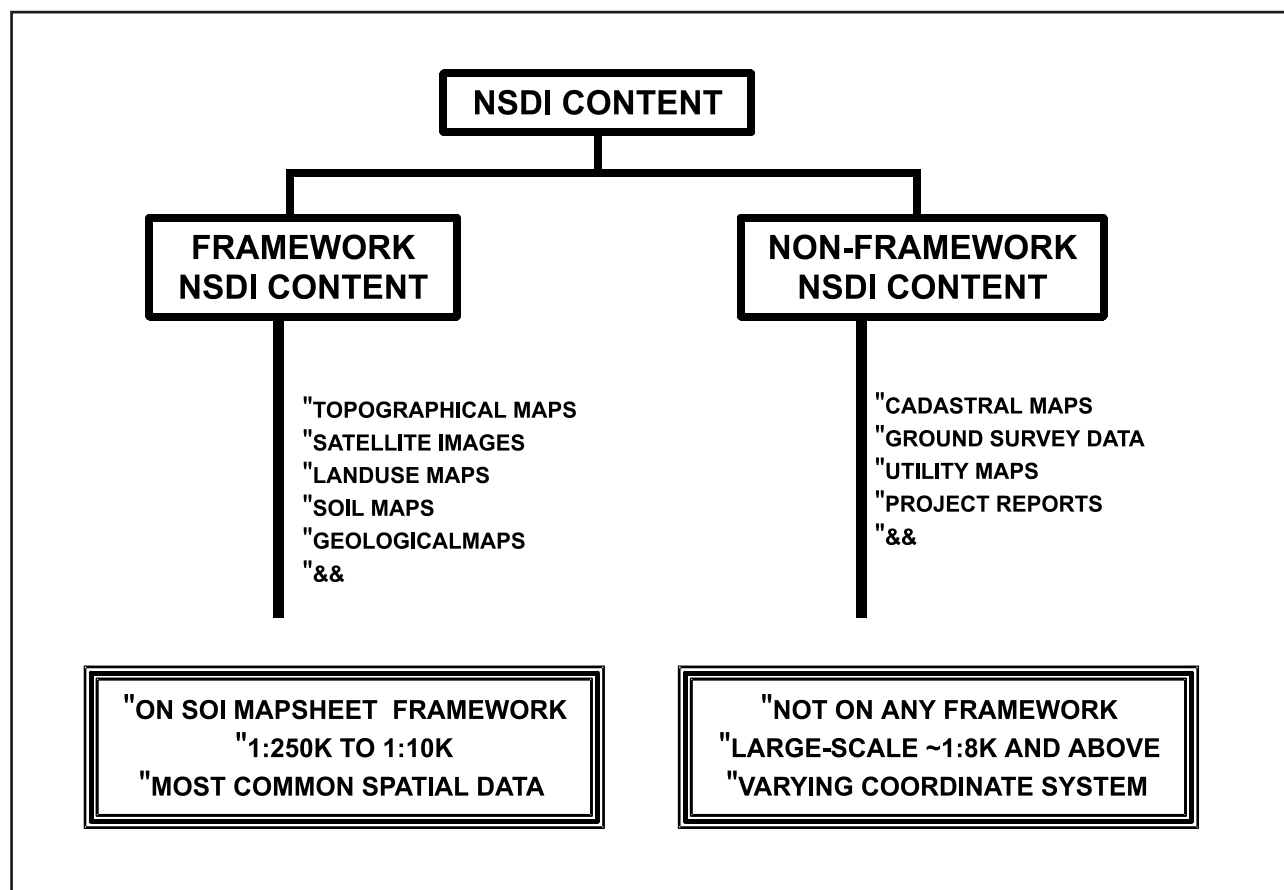
4.1 NSDI CONTENT

- 23.0 As envisaged in the NSDI Strategy and Action Plan, to start with the NSDI would include:
- 23.1 National coverage of topographical maps on scales of 1:250000, 1:50000 and 1:25000 and any other data of the Survey of India (SOI) toposheets
 - 23.2 National coverage of geological maps on 1:50000 scale and other maps/data of the Geological Survey of India (GSI)
 - 23.3 National coverage of soil maps on 1:250000 and 1:50000 scales and other maps/data of the National Bureau of Soil Survey and Landuse Planning (NBSSLUP)
 - 23.4 National coverage of forest maps on 1:50000 scale of the Forest Survey of India (FSI)
 - 23.5 National coverage of the hydrology maps on all scales of the Central Ground Water Board (CGWB)
 - 23.6 National coverage of landuse maps on 1:50000 scale; wasteland maps on 1:50000 scale; urban maps on 1:50000 scale; groundwater potential map on 1:50000 scale and other thematic maps of National Remote Sensing Agency (NRSA);
 - 23.7 Natural Resources Census, IRS Portal, NRIS of NNRMS Programme involving local, District, State and national natural resources databases on 1:50000 and larger scales;
 - 23.8 Command area maps of Central Water Commission (CWC);
 - 23.9 Central Pollution Control Board (CPCB) pollution data;
 - 23.10 Spatial and Non-spatial databases of National Informatics Centre (NIC);
 - 23.11 National coverage of coastal landuse maps on 1:50000 and 1:25000 scale of Ministry of Environment and Forests (MoEnF)
 - 23.12 Census maps and census data of the Census Department
 - 23.13 NATMOs national atlases on 1:1000000 and other scales
 - 23.14 National coverage of Satellite images of different resolutions
 - 23.15 Hydrographic data of the National Hydrographic Department
 - 23.16 To this set of basic data, addition of India Meteorological Department's weather information and Department of Ocean Development's Ocean information (at smaller scales) could also be added.
 - 23.17 Non-spatial data of the Bureau of Economics and Statistics, National Council for Applied Economic Research etc – which could be linked to the spatial features and become a part of the NSDI.
- 24.0 A basic assumption is made that the NSDI would have the participation of NNRMS, SOI, GSI, FSI, CGWB, NNRMS/NRIS, CWC, MoEnF, NATMO, NBSSLUP, CGWB, Census department, IMD, DOD, BES, NCR etc.

- 25.0 As brought out in the foregoing, there are now a large number of organizations committed to NSDI with their own datasets. There is, thus, a need for standardization of the NSDI. One of the considerations in this is the
- 26.0 First and foremost for the NSDI would be the development of a Metadata – a process by which the information of the available spatial data of the NSDI is organised into a systematic database so that users can locate and find the data that they require.

4.2 IMPACT OF NSDI CONTENT FOR DESIGN OF NSDI METADATA

- 27.0 NSDI is envisaged to be a network of Agency Servers that will archive spatial data. The following types of spatial data are envisaged to be part of NSDI:



- 27.1 **Framework Spatial Data:** Spatial data would in most probability be organised on a standardized spatial framework – which in most cases would be the SOI graticule of maps in the country. The graticule applies to a hierarchy of scales – 1:250K; 1:50K; 1:25K and can be logically extended to 1:10K also. Most NSDI Agency spatial data would be of this type – topographical maps, remote sensing data and maps, geological maps and so on.
- 27.2 **Spatial Framework’s standard reference** – In terms of Datum and Projection will be an important parameter of NSDI design. While Everest datum is mostly used by

SOI maps, WGS84 datum may get standardized as the civilian map datum. As far as projection is concerned, the prevalent projection is Polyconic and UTM or LCC may get standardized for the NSDI.

- 27.3 NSDI would also include **Non-Framework Spatial** data – especially the cadastral data, aerial photo maps, large-scale project databases and so on. While the spatial data would have location information, it may not conform to any standard framework – datum, projections and so on.
- 27.4 **Spatial data layers** would be committed by different NSDI Agency to the NSDI. Layers may get populated/committed to the NSDI in a phased manner for the spatial framework – that is, for a Landuse layer of NNRMS the commitment to NSDI may happen sheet-by-sheet and thus over time the whole country would be incorporated into the NSDI.

4.3 PROCEDURE OF COMMITTING DATA TO NSDI METADATA

- 28.0 With NSDI envisaged to be a systematic data infrastructure and not a databank, it is envisaged that there would be a procedure for committing spatial data to NSDI. The procedure would include:
 - 28.1 A process of simple “registration” of an agency as NSDI Agency which would enable the agency to be able provide its spatial data as part of the NSDI.
 - 28.2 With a view to ensure “quality” of NSDI content, a process of NSDI Standard conformal report by the registered NSDI Agency – which would be a process of self-certification of conforming to the NSDI Standard. An automated and self-generating “Conformity score” would get affixed to the NSDI Metadata for each layer committed to NSDI.
 - 28.3 Providing metadata and committing to the NSDI Metadata server – by which the NSDI Agency and the spatial data becomes apart of the Metadata.
 - 28.4 Actual spatial data commitment to NSDI – by the process of Server Conformity tests and certification.

4.4 THE NSDI METADATA CONTENT

- 29.0 There are different purposes for which the Metadata may be used for:
 - 29.1 Metadata for Search and Location of spatial data in NSDI - This enables organizations to know and publicize what data holdings they have. The Search and Location Metadata is the minimum amount of information that needs to be conveyed to the user. This falls into broad categories to answer the “what, why when who, where and how” questions about geospatial data. Online systems for handling metadata need to rely on their being predictable in both form and content. The level of metadata

detail that will be documented is dependent on the type of data held and the methods that it is being accessed and used. Different types of data (e.g. vector, raster, textual, imagery, thematic, boundary, polygon, attribute, point, etc.) will require different levels and forms of metadata to be collected. However there is still a high degree of compatibility between most of the metadata elements required. Some subsets of the Metadata would be:

- Identification Information – basic information about the spatial data layer.
- Spatial Data Organization Information – the mechanism used to represent spatial information in the data NSDI.
- Spatial Reference Information – description of the reference frame for, and means of encoding, coordinates in the data set.

29.2 Metadata for Investigation of spatial data of NSDI - Do the identified data sets contain sufficient information to enable a sensible analysis to be made for my purposes? This is documentation to be provided with the data to ensure that others use the data correctly and wisely. Investigation Metadata should provide sufficient information that will enable a NSDI-User to ascertain that the spatial data would meet his intended requirements by evaluating its properties and reference some point of contact for more information on the spatial data . Thus, after Search and Location, more detail is needed about individual spatial data sets and more comprehensive and more specific metadata is required. Some of the sub-elements of the Metadata would be:

- Accuracy of the spatial data – in terms of positional, thematic accuracies.
- Data Quality Information – an assessment of the quality of the spatial data set.
- Entity and Attribute Information – information about the content of the data set, including the entities types and their attributes and the domains from which attribute values may be assigned.

29.3 Metadata for Browsing intended data. Once the NSDI data has been investigated, the user would want to browse and see the data before taking a decision to order and access the spatial data. Metadata must take care of providing browsing facility of the spatial data.

29.4 Metadata for Access of Spatial data of NSDI – What is the process of obtaining and using the data that are required? This helps end users and provider organizations to effectively store, reuse, maintain and archive their data holdings. Access Metadata include those properties required to access, transfer, load, interpret, and apply the data in the end application where it is to be utilised. This class of metadata often includes the details of a data dictionary, the data organization or schema, projection and geometric characteristics, and other parameters that are useful to human and machine in the proper use of the spatial data of the NSDI. This would include:

- Access Information – information about accessing/ordering the spatial data set.
- Cost information for the spatial data

30.0 Each of these purposes, while complementary, requires different levels of information. As such NSDI Metadata should look at their overall needs and requirements before developing the metadata systems. The important aspect is for agencies to establish their business requirements first, the content specifications second and the technology and implementation methods third.

5.0 THE NSDI METADATA STANDARD

- 31.0 The Metadata standard specifies the elements needed to support establishment of a NSDI Metadata and also for major uses of metadata: (1) to maintain a catalogue of a NSDI Agency's spatial data holdings (2) to provide information to users of the holdings and catalog of information (3) to provide information needed to process and investigate spatial data holdings for access by users (4) to standardize the exchange format of the spatial data.
- 32.0 The standard defines the information required by a prospective user (1) to determine the availability of a set of spatial data, (2) to determine the compliance of a set of spatial data for an intended use, (3) to determine the means to access the set of spatial data, and (4) to access the set of spatial data successfully.
- 33.0 The fundamental aspects of the NSDI Metadata will be:
- 33.1 Consisting of Framework Spatial data – map and image data from different NSDI agencies. This could be at different scales – 1:250K to 1:10K thru 1:50K and 1:25K.
 - 33.2 Consisting of Non-Framework Spatial data
 - 33.3 The Metadata format will be GIS independent but will be compliant to most (if not all) GIS packages. Thus the NSDI database engine will have to be an independent one
 - 33.4 Web-enabled so that on-line access on nsdi.org is possible. This will at least open up information about spatial data availability.
- 34.0 The objectives of the NSDI Metadata Standard are to provide a common set of terminology and definitions for the documentation of digital spatial data. The standard establishes the names of data elements to be used for these purposes, the definitions of these and data elements, and information about the values that are to be provided for the data elements.

5.1 NSDI METADATA DEFINITIONS / TERMS

- 35.0 The standard specifies the information content for a set of digital geospatial data. The standard establishes a common set of terminology and definitions for concepts related to NSDI Metadata, as follows :

NSDI means the National Spatial Data Infrastructure

NSDI Agency means any agency or organisation which is part of the NSDI and has committed spatial data holdings to NSDI

NSDI Metadata means the information about spatial data in the NSDI

MetadataName means the Name of a NSDI Metadata Table that specifies the schema of the table

MetadataPurpose means the purpose for which the Metadata Table is organised

MetadataGenerator means the person who generates and populates the Metadata table – either through a standard NSDI process or through the NSDI Agency

Metadata Form which describes the form for entry of the Metadata

UpdateCondition which describes how any update would happen to the metadata.

ModifyCondition which covers the mechanism for modification that happens to this metadata table

MetadataLocale means the place where the Metadata would reside – either on the NSDI.Org server or at the NSDIAgency server

MetadataStructure means the listing of the schema of the Metadata Table – containing a set of Metadata elements

Element means the individual parameter-types of the Metadata Table – together forming a Table

ElementType means the type of the element – whether it is a Key, unique or individual. Key elements are used to link Metadata Tables to other tables in extracting information

DataType means the type of data defining the Element – whether it is “Integer”, “Real”, “Text”, “Date”, “Currency” or “Time”

DataSize means the definition of allotted size for the Element

SchemaDescription means the pre-defined set of valid values that can be assigned or allotted to the Element

Pointer means a pointer to a defined URL for further access.

URLs will be defined as service://hostname:port/path/filename

Coordinates will always be defined as decimal fraction of degrees

Dates will always be defined as Days -Months-Year in dd/mm/yyyy format

Time will always be 24-hours time of hh:mm:ss of Indian Standard Time

Network Locator values for file names, network addresses for computer systems, and related services should follow the Uniform Resource Locator convention of the Internet when possible.

5.2 NSDI METADATA CONTENT

5.2.1 NSDI AGENCIES

- MetadataName : NSDIAgency
- MetadataPurpose : A consolidated table of authenticated NSDI Agencies and the agency details
- MetadataGenerator : NSDI Manager – based on input from the NSDI-Agency
- MetadataForm : NSDIAgency
- UpdateCondition : As and when more agencies become part of NSDI.
- ModifyCondition : Only by NSDIManager
- MetadataLocale : NSDI.GOV.IN Server
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
AgencyCode	Key	Varchar	2	Sequential code automatically allocated by NSDI.Manager
AgencyName		Varchar	100	List of NSDI Committed Agencies
AgencyAcronym		Varchar	10	List of Acronym for NSDI Agency
AgencyNSDIMgr		Varchar	50	NSDIAgency Manager Contact Person's Name
AgencyAddress1		Varchar	200	First line field for Address of NSDIAgency
AgencyAddress2		Varchar	100	Second line field for Address of NSDIAgency
AgencyAddress3		Varchar	50	Third line field for Address of NSDIAgency
AgencyNSDIMgrPhone		Varchar	15	Phone Number of NSDIManager
AgencyNSDIMgrFax		Varchar	15	Fax Number of NSDIManager
AgencyNSDIMgrEmail		Varchar	25	Email address of NSDIManager
AgencyWebsite		Varchar	100	Website URL Address of the NSDI Agency (Hyperlink)

5.2.2 NSDI – ORGANISATION-WISE LAYERS

- MetadataName : NSDILayers
- MetadataPurpose : Registry of layers of NSDI – Agency-wise. Will be used for varied Search operations.
- MetadataGenerator : Respective NSDI Organisation
- MetadataForm : NSDILayerForm
- UpdateCondition : As and when more layers become part of NSDI.
- ModifyCondition : Only by NSDIAgencyManager
- MetadataLocale : NSDI.GOV.IN Server. Replicated and used in NSDIAgency Server also. Can be replicated on NSDIAgency Servers
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
LayerCode	Key	Varchar	6	Sequential code automatically allocated by NSDI.Manager
AgencyCode	Foreign Key	Varchar	2	From Metadata:NSDIAgency
LayerName		Varchar	30	Name of layer that is being committed to NSDI by NSDIAgency
LayerType		Varchar	50	One of the following selections defining the format in which the layer is available: <ul style="list-style-type: none"> · Print Map · Vector Digital Map · Scanned Digital Ma · Print and Vector Ma · Print and Scanned Map · Satellite Image (Raster) · Non Spatial Tables · Non-Spatial Digital tables · Printed Reports · Digital Reports
LayerGIS		Varchar	50	Indicating the GIS format in which the Layer is organised by NSDIAgency. This is to be entered only for vector data
LayerImageFormat		Varchar	25	The format of the image layer that is committed by NSDIAgency
LayerImagePixelSize		Numeric	6,2	Pixel size (in meters) of the Image Layer in meters.
LayerDesc		Varchar	200	Brief Technical Description of Layer

Element	ElementType	Data Type	DataSize	SchemaDescription
LayerCitation		Varchar	250	A Brief Description of the citation of the layer-details of project under which created and the group that created the layer.
OperatingSystem		Varchar	50	Name of the Operating System with version Number. Example: DOS 6.2, Windows 2000, Xenix 2, Solaris 2.4 etc.
LayerEntity		Varchar	50	TableName of the NSDI Layer Content – containing the detailed Content Standard description The table files must also be available as part of NSDI Metadata in NSDI.GOV.IN
LayerSpread		Varchar	100	Description of the spatial coverage of the Layer
LayerClassification		Varchar	25	Details of Security Classification associated with Layer. Values could be: « Top secret » « Secret » « Confidential » « Restricted » « UnRestricted »
LayerClassification Description		Varchar	100	Description of the Security Classification.
OrderLayer		Varchar	25	On-line form file name or Download form in pdf format. The file must also be available as part of NSDI Metadata in NSDI.GOV.IN
LayerSymbolSet		Varchar	50	Reference to a file-set that contains the symbolization for the layer

Element	ElementType	DataType	DataSize	SchemaDescription
LayerSymbolDescription		Varchar	100	Description on layer Symbology that is included in Metadata
MapBaseSystem		Varchar	20	Description whether Framework Spatial Data or Non-Framework Spatial Data Options for: <ul style="list-style-type: none"> • Framework • Non-Framework
MapCode		Int	4	Sequential Code allocated for Non-Framework by NSDI.Manager
MapProjection		Varchar	50	Selection of one of the following: <ul style="list-style-type: none"> • POLY – Polyconic • LCC – Lambert Conformal Conic • UTM – Universal Transverse Mercator • Planar • Others
MapDatum		Varchar	20	Selection of the following datum: <ul style="list-style-type: none"> • WGS84 • Everest • Modified Everest • Other (To be Specified)
MapDatum SemiMajorAxis		Float	12,4	Input of the Semi-major radius of Earth of Datum identified in MapDatum.
MapDatum SemiMinorAxis		Float	12,4	Input of the Semi-minor radius of Earth of Datum identified in MapDatum.
MapDatumEllipticity		Float	9,8	Input of the Ellipticity of Earth of Datum identified in MapDatum.
CategoryCode		Varchar	2	The codes for 5 possible grouping categories are concatenated and separated by commas to create the listing. The codes are as per NSDICategoryCode

5.2.3 GROUPINGS OF LAYERS INTO SPECIFIC CATEGORIES

- MetadataName : NSDILayerCategory
- MetadataPurpose : Listing of the user categories into which allayers are grouped for user search. At present, the constraint set is that a NSDILayer can be allocated to 5 possible NSDICategories
- MetadataGenerator : NSDI Manager
- UpdateCondition : As and when more categories get defined.
- ModifyCondition : Only by NSDIManager
- MetadataLocale : NSDI.GOV.IN Server
- MetadataLinkage : Linked to a NSDILayers for Search and Access on Categories.
- MetadataStructure :

Element	ElementType	Data Type	DataSize	SchemaDescription
CategoryCode	Key	Varchar	2	Sequential code allocated by NSDIManager for a specific grouping category and entered by NSDIManager
CategoryName		Varchar	50	Grouping Name that is decided by NSDI and entered by NSDIManager

5.2.4 SPATIAL FRAMEWORK – MAPSHEETS (FOR FRAMEWORK SPATIAL DATA)

- MetadataName : SpatFrameMap (If NSDILayer:MapSystem = Framework)
- MetadataPurpose : Listing of the spatial framework of NSDI and applicable for Framework NSDI data.
- MetadataGenerator : NSDI Manager
- UpdateCondition : Not to be updated.
- ModifyCondition : One time creation. Not to be Modified.
- MetadataLocale : NSDI.GOV.IN Server. Replicated and used in NSDIAGency Server also
- MetadataLinkage : Linked to a MapSheet layer of spatial information on MapCode
- MetadataStructure :

Element	ElementType	Data Type	DataSize	SchemaDescription
Map_Sheet_Code	Key	Varchar	12	<p>Unique Code allotted by NSDI. Manager for the Map Sheet.</p> <p>The code depicts the scale of the framework:</p> <ul style="list-style-type: none"> • 54 for 1:1M • 5401 – 5416 for 1:250K • 540101 – 540116 for 1:50k • 54010101 – 54010104 for 1:25k

Element	ElementType	DataType	DataSize	SchemaDescription
Corner1Lat		Float	8,6	Coordinates of Latitude for NW Corner of MapSheet
Corner1Long		Float	8,6	Coordinates of Longitude for NW Corner of MapSheet
Corner2Lat		Float	8,6	Coordinates of Latitude for NE Corner of MapSheet
Corner2Long		Float	8,6	Coordinates of Longitude for NE Corner of MapSheet
Corner3Lat		Float	8,6	Coordinates of Latitude for SW Corner of MapSheet
Corner3Long		Float	8,6	Coordinates of Longitude for SW Corner of MapSheet
Corner4Lat		Float	8,6	Coordinates of Latitude for SE Corner of MapSheet
Corner4Long		Float	8,6	Coordinates of Longitude for SE Corner of MapSheet

5.2.5 NON-FRAMEWORK – SPATIAL DATA (FOR NON-FRAMEWORK SPATIAL DATA)

- MetadataName : NonFrameMap (If NSDILayer:MapSystem = Non-Framework) for Every MapSystemCode
- MetadataPurpose : Listing of the framework of NSDI layer which is not Framework compliant and is applicable for Non-Framework NSDI data.
- MetadataGenerator : NSDI Manager
- UpdateCondition : As and when more Non-Framework data is added
- ModifyCondition : One time creation. Not to be Modified.
- MetadataLocale : NSDI.GOV.IN Server. Replicated and used in NSDIAGency Server also
- MetadataLinkage : Linked to a MapSheet layer of spatial information on NSDILayers: FrameworkCode
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
MapCode	Foreign Key	Int	4	Unique Code allotted by NSDI. Manager for every unique MapSystem.
Corner1Lat		Float	8,6	Coordinates of Latitude for NW Corner of MapSystem
Corner1Long		Float	8,6	Coordinates of Longitude for NW Corner of MapSystem
Corner2Lat		Float	8,6	Coordinates of Latitude for NE Corner of MapSystem
Corner2Long		Float	8,6	Coordinates of Longitude for NE Corner of MapSystem
Corner3Lat		Float	8,6	Coordinates of Latitude for SW Corner of MapSystem
Corner3Long		Float	8,6	Coordinates of Longitude for SW Corner of MapSystem
Corner4Lat		Float	8,6	Coordinates of Latitude for SE Corner of MapSystem
Corner4Long		Float	8,6	Coordinates of Longitude for SE Corner of MapSystem

5.2.6 SPATIAL FRAMEWORK – STATES

- MetadataName : SpatFrameState
- MetadataPurpose : Listing of all the States and their spatial reference as per the spatial framework. Used for Search and Access protocol
- MetadataGenerator : NSDI Manager
- UpdateCondition : As and when more states get established.
- ModifyCondition : Only by NSDIManager
- MetadataLocale : NSDI.GOV.IN Server
- MetadataLinkage : None
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
State_Code	Key	Numeric	9	Sequential code allocated for all State by NSDIManager
State_Name		Varchar	100	Name of State
Map_Sheet_Code	Foreign Key	Varchar	12	MapSheetCode as in Metadata:SDpatFrameMap

5.2.7 SPATIAL FRAMEWORK - DISTRICTS

- MetadataName : SpatFrameDist
- MetadataPurpose : Listing of all the Districts and their spatial reference as per the spatial framework. Used for Search and Access Protocol.
- MetadataGenerator : NSDI Manager
- UpdateCondition : As and when more districts get established.
- ModifyCondition : Only by NSDIManager
- MetadataLocale : NSDI.GOV.IN Server
- MetadataLinkage : None
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
District_Code	Key	Numeric	9	Sequential code allocated for all Districts by NSDIManager
District_Name		Varchar	25	Name of District
Map_Sheet_Code		Varchar	12	MapSheetCode as in Metadata:SDpatFrameMap

5.2.8 SPATIAL FRAMEWORK – TALUK

- MetadataName : SpatFrameTaluk
- MetadataPurpose : Listing of all the taluks and their spatial reference as per the spatial framework. Used for Search and Access Protocol
- MetadataGenerator : NSDI Manager
- UpdateCondition : As and when more taluks get established.
- ModifyCondition : Only by NSDIManager
- MetadataLocale : NSDI.GOV.IN Server
- MetadataLinkage : None
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
Taluk		Varchar	50	Name of taluk
Taluk_ID	Key	Varchar	40	Unique Code allocated for taluk by NSDIManager
Map_Sheet_Code	Foreign Key	Varchar	12	MapSheetCode as in Metadata:SpatFrameMap
District-Code	Foreign Key	Numeric	9	Code the district in the taluk falls

5.2.9 SPATIAL FRAMEWORK – UNIQUE POINTS

- MetadataName : SpatFramePts
- MetadataPurpose : Listing of all the unique reference locations and their spatial reference. Used for Search and Access protocol
- MetadataGenerator : NSDI Manager
- UpdateCondition : As and when more unique points get established.
- ModifyCondition : Only by NSDIManager
- MetadataLocale : NSDI.GOV.IN Server
- MetadataLinkage : None
- MetadataStructure :

Element	ElementType	DataType	DataSize	SchemaDescription
LocPtCode	Key	Numeric	5	Sequential code allocated for all unique location points by NSDIManager
State_Code	Foreign Key	Numeric	9	As in Metadata:SpatFrameState
LocPtName		Varchar	25	Name of Location Point that is included as reference
Map_Sheet_Code	Foreign Key	Varchar	12	MapSheetCode as in Metadata:SDpatFrameMap

5.2.10 SPATIAL FRAMEWORK – USER DEFINED BOX

This will have to be computed on-line for every user-defined box to find out his area of interest – and correlating it to the toposheet.

5.2.11 ATTRIBUTE LAYER CODES

- **MetadataName** : LayerName:LayerEntity (One table for each layer)
- **MetadataPurpose** : Contains Description of Layer Attributes/Entity and their Coding Schemes (To be adopted from NSDI Content Standard of each layer)
- **MetadataGenerator** : Respective NSDIAgencyManager for each Layer Content
- **MetadataForm** : NSDILayerEntity
- **UpdateCondition** : As and when NSDI Standard is modified.
- **ModifyCondition** : Only by NSDIAgencyManager
- **MetadataLocale** : NSDI.GOV.IN Server. Replicated and adopted by all NSDIAgency Servers.
- **MetadataStructure** :

Element	ElementType	DataType	DataSize	SchemaDescription
AttCode	Key	Varchar	20	Unique Code adapted from the Domain Server
Attribute		Varchar	100	Attributes of the Layer

Example : The following is an example of the LayerName:LayerEntity attribute Layer Codes for:

- * NSDILayer : Landuse/Cover
- * Spatial Framework : 1:50000 scale SOI graticule (560101 type)
- * Adapted from NRIS Standards
- * Attribute Code : Nested for 4 levels of Landuse/Cover information – each levels denoted by 2 characters- separated by a “-“.

AttributeCode	Attribute
01-01-01-00	Towns/cities (Urban) - Residential
01-01-02-00	Towns/cities (Urban) - Industrial
01-01-03-00	Towns/cities (Urban) - Commercial
01-01-04-00	Towns/cities (Urban) - Recreational
01-01-05-00	Towns/cities (Urban) - Public & Semi- Public
01-01-06-00	Towns/cities (Urban) - Mixed Built- up land
01-01-07-00	Towns/cities (Urban) - Open Spaces/ Vacant Land
01-01-08-00	Towns/cities (Urban) - Others
01-02-00-00	Villages (Rural)
02-01-00-00	Crop land
02-02-01-00	Current Fallow
02-02-02-00	Permanent Fallow
02-03-01-00	Plantations - Tea

AttributeCode	Attribute
02-03-02-00	Plantations - Coffee
02-03-03-00	Plantations - Rubber
02-03-04-00	Plantations - Coconut
02-03-05-00	Plantations - Arcanut
02-03-06-00	Plantations - Citrus wood land
02-04-00-00	Acquaculture
03-01-01-00	Forest - Evergreen/ Semi evergreen - Dense/ Closed
03-01-02-00	Forest - Evergreen/ Semi evergreen - Open
03-01-03-00	Forest - Evergreen/ Semi evergreen - Scrub Forest
03-01-04-00	Forest - Evergreen/ Semi evergreen - Forest Blanks
03-02-01-00	Deciduous (Moist/Dry) - Dense/ Closed
03-02-02-00	Deciduous (Moist/Dry) - Open
03-02-03-00	Deciduous (Moist/Dry) - Scrub Forest
03-02-04-00	Deciduous (Moist/Dry) - Forest Blanks
03-03-00-00	Forest Plantations
03-04-00-00	Mangroves (Littoral swamp forest) -
03-04-01-00	Mangroves (Littoral swamp forest) - Dense
03-04-02-00	Mangroves (Littoral swamp forest) - Sparse
03-05-01-00	Old Shifting Cultivation
03-05-02-00	Abandon Shifting Cultivation
03-05-03-00	Current Shifting Cultivation
03-06-00-00	Crop Land in Forest
04-01-00-00	Wastelands - Salt Affected Land
04-02-00-00	Wastelands - Gullied/ Ravenous Land
04-03-00-00	Wastelands - Land with scrub
04-04-00-00	Wastelands - Land without scrub
04-05-00-00	Wastelands - Sandy-desertic Land
04-06-00-00	Wastelands - Mining/ Industrial waste
04-07-00-00	Wastelands - Barren Rocky/ Stony waste/ Sheet Rock
05-01-00-00	Water bodies - River
05-01-01-00	Water bodies - Water channel area
05-01-02-00	Water bodies -Sandy area
05-01-03-00	Water bodies -Tidal
05-01-04-00	Water bodies -River Island

AttributeCode	Attribute
05-01-05-00	Water bodies - River bed Cultivation
05-02-00-00	Water bodies - Canal
05-03-00-00	Water bodies - Lakes/Ponds
05-04-00-00	Water bodies - Reservoirs
05-05-00-00	Water bodies - Tanks
05-06-00-00	Water bodies - Cooling pond/ Cooling Reservoir
05-07-00-00	Water bodies - Abandoned quarries with water
05-08-01-00	Bay - Back waters
05-08-02-00	Bay - Estuary/ Kayal
05-08-03-00	Bay – Creek
05-08-04-00	Bay – Lagoon
05-09-00-00	Cut-off Meander
06-01-01-00	Wetland - Inland Wetlands - Water logged
06-01-02-00	Wetland - Inland Wetlands - Marshy/ Swampy
06-01-03-00	Wetland - Inland Wetlands - Ox-bow lakes
06-02-01-00	Wetland - Coastal Wetlands - Marsh Vegetation
06-02-02-00	Wetland - Coastal Wetlands - Algae
06-02-03-00	Wetland - Coastal Wetlands - Mud flat
06-02-04-00	Sand
06-02-05-00	Coral Reef
06-02-06-00	Rocky coast
07-01-00-00	Grass land / Grazing land - Dense
07-02-00-00	Grass land / Grazing land - Degraded
08-01-00-00	Snow covered - Perennial
08-02-00-00	Snow covered - Glacial area

5.2.12 LAYER CATALOGUE

- MetadataName : LayerCat (For each and every MapSheet and all layers)
- MetadataPurpose : Details of layers on Mapsheet spatial framework indicating availability and information about spatial data
- MetadataGenerator : Respective NSDIAgencyManager
- UpdateCondition : As and when required by NSDIAgencyManager.
- ModifyCondition : Only by NSDIAgencyManager
- MetadataLocale : NSDI.GOV.IN Server AND NSDI.NODE-Server
- Matrix Structure : To be repeated for as many layers

Element	ElementType	DataType	DataSize	SchemaDescription
Map_Sheet_Code	Foreign Key	Varchar	12	MapSheetCode as from Metadata: SpatFrameMap
LayerCode	Foreign Key	Varchar	6	LayerCode as from NSDILayers
Status		Varchar	50	<p>Selection of the status of availability of that specific NSDILayer:</p> <ul style="list-style-type: none"> • Print Map • Vector Digital Map • Scanned Digital Map • Print and Vector Map • Print and Scanned Map • Satellite Image (Raster) • Non Spatial Tables • Non-Spatial Digital tables • Printed Reports • Digital Reports
PACCLayer_HOR		Float	6,2	RMS meters Positional Accuracy for Layer-MapSheet
Qua_Eva_M_HOR		Varchar	200	Procedure adopted in arriving at the Positional Accuracy. If possible document reference can be included and document must be a part of NSDI.GOV.IN
TaccLayer		Float	2	%ageAccuracy of Correctness of thematic Class of Layer-MapSheet
Qua_Eva_M_Tacc		Varchar	250	Procedure adopted in arriving at the Thematic Accuracy. If possible document reference can be included and document must be a part of NSDI.GOV.IN

Element	ElementType	DataType	DataSize	SchemaDescription
PACCLayer_Ver		Float	6,2	RMS Elevation Accuracy in meters for Layer-MapSheet (IF APPLICABLE)
Qua_Eva_M_Ver		Varchar	200	Procedure adopted in arriving at the Elevation Accuracy. If possible document reference can be included and document must be a part of NSDI.GOV.IN
CLong		Float	8, 5	Value of the Central Longitude used for projecting the NSDILayer for the MapSheet. This must confirm with the MapProjection oin Metadata: NSDILayers. This could be the CentralLongitude for the MapSheet itself or some other value that has been in a "project" and may not be in the MapSheet itself.
CLat		Float	8,5	Value of the Central Latitude used for projecting the NSDILayer for the MapSheet. This must confirm with the MapProjection oin Metadata: NSDILayers. This could be the CentralLatitude for the MapSheet itself or some other value that has been in a "project" and may not be in the MapSheet itself.
StdParallel1		Float	8, 5	Value of the First Standard Parallel used for projecting the NSDILayer for the MapSheet.

Element	ElementType	DataType	DataSize	SchemaDescription
				This must confirm with the MapProjection oin Metadata: NSDILayers.
StdParallel2		Float	8, 5	Value of the Second Standard Parallel used for projecting the NSDILayer for the MapSheet. This must confirm with the MapProjection oin Metadata: NSDILayers
FalseEasting		Float	8, 5	Value of the False Easting used for projecting the NSDILayer for the MapSheet. This must confirm with the MapProjection oin Metadata: NSDILayers
FalseNorthing		Float	8, 5	Value of the False Northing used for projecting the NSDILayer for the MapSheet. This must confirm with the MapProjection oin Metadata: NSDILayers
LayerPixels		Numeric	8	If NSDILayer is an Image then the number of pixels in the MapSheet NSDILayer. This must confirm with LayerPixelSize in Metadata: NSDILayers.
LayerLines		Numeric	8	If NSDILayer is an Image then the number of lines in the MapSheet NSDILayer. This must confirm with LayerPixelSize in Metadata: NSDILayers.

Element	ElementType	DataType	DataSize	SchemaDescription
LayerBands		Numeric	8	If NSDILayer is an Image then the number of bands image in the MapSheet NSDILayer.
BrowseLayer		Varchar	100	HTML Tag to a filename containing a browse of the layer. The file-types could be: <ul style="list-style-type: none"> • “CGM” Computer Graphics Metafile • “EPS” Encapsulated Postscript format • “EMF” Enhanced Metafile • “GIF” Graphic Inter change Format • “JPEG” Joint Photo graphic Experts Group format • “PBM” Portable Bit Map format • “PS” Postscript format • “TIFF” Tagged Image File Format • “WMF” Windows metafile • “XWD” X-Windows Dump
CostMapSheet		Float	8	Cost of the layer for a particular toposheet
AccessMapSheet		Varchar	100	Pointer to Access of Layer – on-line URL; off-shelf contact; datastore address and so on
SurveyYear		Varchar	4	Year of Completion of Survey of the mapsheet
MappingYear		Varchar	4	Year of Completion of Mapping for the mapsheet

Element	ElementType	DataType	DataSize	SchemaDescription
DigitizationYear		Varchar	4	Year of Completion for Digitization MapSheet
NSDIDateLayer*		Datetime		Date of committing of Layer-MapSheet to NSDI (dd/mm/yyyy) in case of single characters eg "7" the entry shall be "7"

* For one Layer and needs to be repeated for as many Layers in the NSDI.

- LayerCode is a schema element and the actual LayerCode value needs to be replaced for the schema

5.2.13 NSDI METADATA USER REGISTRATION

- MetadataName : User_signin
- MetadataPurpose : Details of Registered Users to NSDI Metadata. Mainly used for house-keeping activities of NSDI Metadata.
- MetadataGenerator : NSDI Manager from the User's information from the web-site
- UpdateCondition : As and when more users get registered.
- ModifyCondition : Modified
- MetadataForm : NSDI Metadata Registration
- MetadataLocale : NSDI.GOV.IN Server
- Metadata Structure :

Element	ElementType	DataType	DataSize	SchemaDescription
Userld	Key	Varchar	10	Unique Code allocated for specific registered users by NSDI.Manager
FName		Text	25	First Name of User that is registered.
LName		Text	25	Second Name of User that is registered.
Address		Text	50	First line of Address of registered user.
City		Text	25	City of Address of registered user.
PinCode		Number	6	Pin Code of Address of registered user.
State		Text	25	State of Address of registered user.

Element	ElementType	DataType	DataSize	SchemaDescription
Country		Text	25	Country of Address of registered user.
Phone		Text	15	Phone of Address of registered user.
Fax		Text	15	Fax of Address of registered user.
E-Mail		Text	15	E-Mail of Address of registered user.
Birthday		Date	DD/MM/YYYY	Birthdate of user for "isolating" a specific user form password recovery requests.
Organisation		Text	25	Name of Organisation of registered user.
Designation		Text	15	Designation in Organisation of registered user.
Password		Text	100	Password that the user has registered for his account.

5.2.14 NSDI METADATA ACCESS RECORD

- MetadataName : NSDIMetadataAccessRecord
- MetadataPurpose : Details of all registered user access to NSDI Metadata. Mainly for house-keeping activities of NSDI Metadata.
- MetadataGenerator : NSDIManager from the User's information from the web-site
- UpdateCondition : As and when more users get registered.
- ModifyCondition : Not to be Modified
- MetadataForm : None
- MetadataLocale : NSDI.GOV.IN Server
- Metadata Structure :

Element	ElementType	DataType	DataSize	SchemaDescription
UserId	Foreign Key	Varchar	10	Unique Code allocated for specific registered users by NSDI.Manager
IPAddress		Text	50	IP Address from where the user is making Access to NSDI Metadata.
Date		Date	DD/MM/YYYY	Date on which the specific access to NSDIMetadata was made from the specific IP Address.

5.3 NSDI METADATA PRESENTATION

36.0 We should not confuse the metadata presentation (view) with the metadata itself. There is a temptation to lump form and content into the same bin (e.g. "What I see in my database is what I print"). However, the ability to differentiate the contents of the meta-database (the columns or fields) from its presentation (writing formatted reports) is now commonplace in desktop database software packages. This allows users to consider more flexibly how to present what information. There are typically three forms of metadata that should be recognized and supported in systems: the implementation form (within a database or software system), the export or encoding format (a machine-readable form designed for transfer of metadata between computers), and the presentation form (a format suitable to viewing by humans). By recognizing the connections between these dispositions of metadata, one can build systems that support mission requirements, standard encoding for exchange, and permit many "report" views of the metadata to satisfy the needs and experience of different user constituencies. The Extensible Markup Language (XML) provides two solutions to this metadata problem. First, it includes a capable markup language with structural rules enforced through a control file to validate document structure. Second, through a companion standard (XML Style Language, or XSL), an XML document may be used along with a style sheet to produce standardised presentations of content, allowing the user to shuffle field order, change tag names, or show only certain fields of information. Used together XML and style sheets allow for a structured exchange format and for flexible presentation. Thus, a metadata entry can be rendered in many ways from the same, single structured encoding. XML is a widely accepted encoding methodology with international software support. It is supported by a lot of software, both free and commercial. However, the metadata-producing community doesn't have much experience using it to solve problems yet. Through reference implementations of software and experimentation, local Spatial Data Infrastructures can share their successes and failures in applying this new technology to fullest community benefit.

6.0 NSDI METADATA DEVELOPMENT TOOLS

- 37.0 The NSDI Metadata would be developed on the SQL engine and would be web-enabled.
- 38.0 No tool can check the accuracy of metadata. Moreover, no tool can determine whether the metadata properly include elements designated by the Standard to be conditional, or 'mandatory if applicable.' Consequently, some level of human review is required. But human review should be simpler in those cases where the metadata is known to have the correct syntactical structure. Software cannot be said to conform to the Standard. Only metadata records in a given encoding form can be said to conform or not. A program that claimed to conform to the Standard would have to be incapable of producing output that did not conform. Such a tool would have to anticipate all possible data sets. Instead, tools should assist you in entering your metadata, and the output records must be checked for both conformance and accuracy in separate steps. At best one can describe or anticipate compatibility testing among software components. **ANNEXURE – II** shows the tools that are available for NSDI Metadata.

7.0 IMPLEMENTING NSDI METADATA

7.1 PROTO-TYPE NSDI METADATA SERVER

- 39.0 ISRO has developed a proto -type NSDI Metadata Server. The main aim of the proto-type server is to catalogue all spatial data availability and make it available for access on-line on the nsdi.org domain. The proto-type Metadata will assume that the spatial framework is based on the 1:50k SOI graticule (1:250k and 1:25k could also be considered).
- 40.0 The proto-type server catalogues the following:
- 40.1 All agencies participating in NSDI
 - 40.2 Layers committed by all agencies
 - 40.3 Information on availability of Layers on the spatial framework
- 41.0 A Questionnaire survey has been made of all agencies for their NSDI participation; NSDI data commitment and the availability of spatial data. The NSDI Metadata Questionnaire is placed at **ANNEXURE – III**.
- 42.0 It is planned to involve all NSDI agencies and the private sector for the development of the proto-type NSDI Metadata.
- 43.0 ISRO has developed the NSDI Metadata Server and Search and Access protocols – which is taking care of the fundamental design and development. The proto-type NSDI metadata consists of the Metadata of NNRMS, FSI, SOI – while GSI, NBSS&LUP and NATMO are in the process of providing the Metadata. As and when other NSDI Agencies provide their Metadata , the NSDI Metadata will get enhanced. The development has been based on the NSDI Metadata Standard that has been developed by the sub-committee. The proto-type NSDI metadata Standard was demonstrated to the NSDI-TF in December, 2002 and all agencies were requested to provide NSDI Metadata. The same was evaluated by a Peer Committee of the NSDI Task force and has also been previewed by GSI, FSI etc.
- 44.0 The NSDI Metadata Server has been previewed at a Committee of Secretaries Meeting on July 11, 2003. The details of the proto-type NSDI Metadata Server is given in **ANNEXURE – IV**.

NSDI METADATA UTILITY

- 45.0 The success of the Metadata Server will be when it is well populated with all agency's Metadata (while as of now we have limited Metadata but this can expand as agencies populate their data). It is planned to populate the NSDI Metadata from individual agencies using a software tool for generating Agency Metadata. This is an important element as it allows for the agencies to populate their Metadata according to NSDI Metadata Standard formats. The software tool is an easy-to-use package that will enable your spatial Metadata to be encapsulated.
- 46.0 ISRO has developed this utility and the NSDI Metadata Utility CD (labeled NSDI Metadata Utility) is available for agencies to generate and populate the Metadata as per NSDI Metadata

Standard format. This program will run automatically by inserting CD in CD drive of your system. Alternately, one could also install it by double clicking the setup.exe from the CD. After the installation, you will find a program named "NSDI Application" in Start – Programs of your computer. There are three sub programs under NSDI Application: NSDI, NSDI Help and Uninstall.

- 46.1 NSDI utility allows you to generate the necessary tables of your metadata in the NSDI Metadata Standard format. The utility will generate Agency related metadata, layer related metadata, for each committed layer sheet-wise metadata and access related metadata.
- 46.2 The total metadata can be generated on your computer itself and will be residing as XML files (.xml file created in the installation directory c://Program Files NSDIApplication/Agency/(directory name of agency)/(file name of layer).xml).
- 46.3 If this XML file is made available (as of now off-line but later on-line), the same will get automatically incorporated into the NSDI Metadata Server.
- 46.4 A HELP utility will guide you to generate the metadata and will also provide additional information.

7.2 END-TO-END PROTOTYPE NSDI DEMO

- 47.0 ISRO had taken up the development of the proto-type NSDI by integrating the NSDI Metadata Server and also adding on the NSDI Data Server and the NSDI Applications Server. This integrated proto-type NSDI was the core of the demonstration that was done to the Committee of Secretaries (COS) in July, 2003. The demonstration was well received by COS.

ACKNOWLEDGEMENTS

The sub-committee, led by ISRO, is grateful to Mr G Madhavan Nair, Chairman, ISRO/Secretary, DOS and Prof VS Ramamurthy, Secretary, DST for their support and encouragement in developing this NSDI Metadata Standard. We are thankful to them for giving us this challenging task of designing the NSDI Metadata Standard and also for having given us the opportunity for developing the proto-type NSDI Metadata Server and the end-to-end proto-type NSDI. Earlier, Dr K Kasturirangan, Hon'ble Member of Parliament and previously Chairman, ISRO/Secretary, DOS has been the visionary and guiding force for undertaking the NSDI activities and we thank him for all his support.

The Sub-Committee would like to gratefully acknowledge the encouragement and support of the NSDI Task Force Members and a number of Government agencies, private sector agencies, NGOs and Academia experts – with whom the NSDI sub-committee had detailed consultations in finalizing the NSDI Metadata Standard.

The sub-committee would like to place on record its deep sense of appreciation and gratitude to ISRO for leading the effort of conceptualizing, shaping and authoring the NSDI Metadata Standard document and also for undertaking the development of the NSDI proto-type Metadata Server and proto-type NSDI.

The sub-committee is also grateful to ESRI for involvement in the development of the NSDI Metadata.

The sub-committee has referred to a wide variety of literature and materials on spatial data infrastructures – specially the strategy adopted by USA, Australia, Europe, the ISO documents and the Global Spatial Data Infrastructure Cookbook. Many other articles by renowned national and international experts have formed the reference materials for the NSDI Metadata Standard.

The sub-committee has also taken the liberty to refer to a large number of GIS project reports and documents produced by various agencies in India. These GIS reports have provided the visualization of the GIS activities that have been taken up in India.

SUB-COMMITTEE ON NSDI METADATA AND CONTENT STANDARD

CHAIRMAN

1. Mr Mukund Rao, ISRO Headquarters

MEMBERS

1. Dr S R Sengupta, GSI
2. Dr JK Rawat, FSI/Dr Alok Saxena, FSI
3. Brig Gopala Rao, Survey of India
4. Ms Vandana Sharma, NIC
5. Dr R Siva Kumar, NRDMS, DST
6. Mr RK Goel, SAC/ISRO
7. Dr V Raghavaswamy, NRSA
8. Mr Girish Kumar, SOI
9. Dr P Krishnan, NBSS&LUP
10. Director, NATMO
11. Mr Anirudha Roy, ESRI (Mr Krishanu Roy and Ms Shama Maan)
12. Dr Manosi Lahiri, MapInfo
13. Ms AS Padmavathy, ISRO Headquarters
14. Dr J Krishnamurthy, ISRO Headquarters

CONSULTATION GROUP:

1. Dr RR Navalgund, Director, NRSA
2. Dr AKS Gopalan, ex-Director, SAC
3. Dr AR Dasgupta, Deputy Director (SITA), SAC
4. Dr V. Jayaraman, Director, EOS, ISRO Headquarters
5. Mr MK Munshi, Rolta India Ltd
6. Mr Rajesh Mathur, ESRI India
7. Dr VS Hegde, ISRO Headquarters
8. Dr SK Bhan, ex-Associate Director, NRSA
9. Dr Asis Bhattacharya, NRSA
10. Dr Prithvish Nag, SG-SOI
11. Dr TP Singh, Director, RESECO, Gandhinagar
12. Dr PS Roy, Dean, IIRS (Mr Suddhasheel Ghosh)

NSDI TASK FORCE

Department of Science and Technology, Government of India constituted Task Force on NSDI with following terms of reference:

- To draw up a vision for creation of National Geo-Spatial Data Infrastructure.
- To suggest strategic plan at national level.
- To suggest R&D requirements.
- Any other item relevant to the subject.

COMPOSITION OF TASK FORCES ON NSDI

Chairman

Dr Prithvish Nag
Surveyor General of India, Survey of India, Dehradun

Member Secretary

Dr R Siva Kumar
Director of NSDI Secretariat and Head NRDMS, Dept. of Science and Technology

Members

- Mr Amitabha Pande, Joint Secretariat, Dept. of Science and Technology
- Dr EVR Parthasarathi, DDG, Geological Survey of India
- Rear Admiral K Srinivasan, Chief Hydrographer
- Mr Mukund Rao, Dy. Director (T&S), Indian Space Research Organisation
- Dr NS Viridi, Director, Wadla Institute of Himalayan Geology
- Dr KS Gajbhye, National Bureau of Soil Survey & Land Use Planning
- Dr PC Mandal, Geological Survey of India
- Dr JK Rawat, Director, Forestry Survey of India
- Dr GD Gupta, Head Seismology, Dept. of Science and Technology
- Dr Vandana Sharma, NIC
- Dr Manosi Lahiri, Representative of Confederation of Indian Industry.
- Mr Gautham Sanyal, Director (G), MOD
- Major General H K Sinha, Additional Director General, MO-GSGS, Army HQ
- Mr Vibhu Mushran, PSO, TIFAC
- Maj Gen KK Naithani, Addl SG, SOI
- Dr Smitha Sengupta, Tata Infotech Ltd.
- Mr Avinash Dikshit, Director, Dept. of Science and Technology
- Dr D Dutta, PSO, NRDMS, DST
- Dr MP Narayanan, President, Center for Spatial Database Management and Solutions (CSDMS)

ANNEXURE – I

OVERVIEW OF METADATA STANDARDS FOR SPATIAL DATA

Considerable debate across the world on Metadata and the characteristics that should be chosen to best describe the spatial data set. 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 all designed to ensure that a degree of consistency exists within a given application community.

Three main metadata standards exist or are in development that are of broad international scope and usage and provide detail for all levels of metadata mentioned earlier:

- The Content Standard for Digital Geospatial Metadata, U.S. 1994, revised 1998 <http://www.fgdc.gov/> In the USA the Federal Geographic Data Committee (FGDC) approved their Content Standard for Digital Geospatial Metadata in 1994. This is a national spatial metadata standard developed to support the development of the National Spatial Data Infrastructure. The standard has also been adopted and implemented in the United States, Canada, and the United Kingdom through the National Geographic Data Framework (NGDF). It is also in use by the South African Spatial Data Discovery Facility, the Inter- American Geospatial Data Network of twelve Latin American countries, and elsewhere in Asia.
- A CEN Pre-standard adopted in 1998 <http://forum.afnor.fr/afnor/WORK/AFNOR/GPN2/Z13C/indexen.htm> In 1992 the Comité Européen de Normalisation (CEN) created technical committee 287 with responsibility for geographic information standards. A family of European Pre -standards have now been adopted including 'ENV (Euro-Norme Voluntaire) 12657 Geographic information – Data description – Metadata'. A ISO TC 211 Standard (19115-Draft International Standard)
- An ISO standard is now at approval stage and expected to be ratified in late 2001 (<http://www.statkart.no/isotc211/welcome.html>). In 1994 the International Standards Organisation created technical committee 211 (ISO/TC 211) with responsibility for Geoinformation/Geomatics. They are preparing a family of standards; this process involves a working group, a committee draft, a draft international standard and finally the international standard. ISO have now released the committee draft of 'ISO 19115 - GI – Metadata. It is hoped that all the existing standards will converge through the ISO initiative. Indeed, most of the existing standards already have a great deal in common and a robust international discussion has ensured that the ISO standard has accommodated most of the various international requirements. The ISO standard has equally benefited from the experiences of the various national bodies and their implementations of the respective metadata standards assisted by metadata software.
- Metadata also forms an important part of the OpenGIS Abstract Specification. The OpenGIS 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 geoprocessing.

As part of its draft 'OpenGIS Abstract Specification' OGC has a topic on recording metadata for spatial data. OGC are working closely with 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.

A number of national and regional initiatives have also developed metadata standards. These include initiatives managed by The Australian and New Zealand Land Information Council (ANZLIC) and two European Commission financed projects (LaCLEF and ESMI). These initiatives have taken similar approaches in promoting a limited set of metadata (described as "Core Metadata" or "Discovery Metadata" that organisations should use, as a minimum, to improve the knowledge, awareness and accessibility of the available geospatial data resources. Each of the initiatives is promoting the standards and use of discovery metadata as a foundation of their respective metadata directory initiatives. This discovery metadata provides sufficient information to enable an inquirer to ascertain that existence of data fit for purpose exists and to reference some point of contact for more information. If, after discovery, more detail is needed about individual data sets then more comprehensive and more specific metadata is required. It is possible that organisations may wish to develop metadata at different but complementary levels - at one level discovery metadata for external use and for in-house / internal use more detailed metadata. And to avoid duplication of effort those elements common to both are flagged. These guidelines have been developed with recognition of the importance of more extensive metadata required for data management and each of the organisations is promoting the adoption of ISO Metadata Standard.

ANNEXURE – II CANDIDATE METADATA TOOLS

Tool Name	Win 95/98	Win NT/2000	UNIX	Web Host	Fee?	Requirements	Import	Export
ArcCatalog		X			Incl	ArcINFO 8.1	XML	XML
ArcView Metadata Collector	X	X	X		No	ArcView 3.X		mptext
BIC Metadata Tool	W	W	W	UNIX	No	cgi-script	text	mptext, SGML
CorpsMet95	X	X*			No	Standalone	mptext	mptext
DataLogr	X*				Yes	Standalone	text	text
Data Dictionary (DataDict)		X*	X		No	ARC/INFO AML		mptext
Dataset Catalog Database Sys	X				No	Standalone	dbase	other
Document AML		X	X		No	ARC/INFO AML		mptext
Fgdcmeta AML		X	X		No	ARC/INFO AML		mptext
Geodata MDB	X	X*			No	Access 2.0		other
Geospatial Metadata Mgt Sys	X				No	Access 2.0		mptext
M3Cat	W	W	W	Win 98, 2000 or NT	No	Access or Oracle	XML, text	XML, text
Metadata 2 (MD2)					No	Access 2.0		other
Metadata Entry System	W	W	W	UNIX	No	cgi-script	form entry	mptext, SGML mptext, XML,
MetaLife System for Windows	X	X			No	Standalone	data entry	SGML
Metadata Management System	X				Yes	Standalone DB	html	html
MetaMaker 2.10	X				No	Standalone	other	mptext, dif
Spatial Metada Management System (SMMS) 3.2	X	X			Yes	Standalone	mptext, SGML	mptext, SGML, html, XML

Tool Name	Win 95/98	Win NT/2000	UNIX	Web Host	Fee?	Requirements	Import	Export
MetaStar (MDC, MDM, MDS)	J	J	J	UNIX NT	Yes	Standalone	SGML, custom	html, SGML, text, XML, custom
Xt Metada Editor 1.9.1			X		No	Standalone	mptext, XML,SGML	mptext, XML, SGML

* denotes that it may possibly work in that environment but behavior is unknown or undocumented.

W denotes access through HTML Web browser.

J denotes access through Java-based Web browser

ANNEXURE – III

National Natural Resources Management System **ISRO HQ, Bangalore**

FORMAT OF QUESTIONNAIRE FOR CREATING AGENCY METADATA FOR NSDI METADATA SERVER

(Information to be provided by NSDI participating organisations)

1. NSDI AGENCIES

- 1.1. Name of agency
- 1.2. Acronym of agency
- 1.3. Contact Address of the agency
- 1.4. Contact Person for the NSDI

2. NSDI LAYERS

- 2.1. List the committed layers to NSDI from your agency:
 - a)
 - b)
 - c)
 - d)
 - .
 - .

(Kindly provide the following information for each of the thematic layer committed to NSDI)

- 2.2. Name of Layer
- 2.3. Broad description of Layer
- 2.4. Scale of spatial map layer
- 2.5. Brief description of suggested use and limitations of the layer if any
- 2.6. Format in which thematic map is presently available:
(Paper/Digital)
- 2.7. If digital in which GIS format Layer is organised/proposed to be organised
- 2.8. Give the spatial extent of the map coverage (like for entire country / state / district / toposheet/.....)
- 2.9. Date of Surveying/sensing – completed date can be used
- 2.10. Date of map publication
- 2.11. Any restriction rules associated with the map
- 2.12. Any other important information you wish to add

3.0 NSDI LAYERS AVAILABILITY

(AS PER THE SPATIAL FRAMEWORK – SOI 1:50,000 TOPOSHEET REFERENCING)

The intention of the proto-type NSDI Metadata is to organise an online server that provides availability of spatial data, a part of NSDI on the spatial reference of a SOI mapsheet. This, indicating for each Layer (mentioned in 2.1) the availability on a mapsheet basis (like availability for 56A/12, 56H/16 and so on).

The access database file has been generated for the mapsheet lists – 5656 records. (Attached access data file in a floppy) Kindly:

- Add columns for each layer committed
- Indicate through logical fields data availability for each sheet.

(In case of doubt/clarification, please contact Shri Mukund Rao, whose address is given below)

Completed questionnaire may kindly be mailed by April 15, 2002 to

**Mr Mukund Rao, Dy. Director, (T&S), EOS, ISRO Head Quarters
Antariksh Bhavan, New BEL Road, Bangalore – 560 094
Tel : 080-3417359; Fax:080-3417455**

ANNEXURE – IV

PROTO-TYPE NSDI METADATA SERVER

The proto-type NSDI Metadata server was designed and developed by ISRO (through a contract awarded to ESRI India). The Server is having a web-server and the Metadata Server. This site is primarily for querying and retrieving data for the various layers as provided by different NSDI agencies. This metadata is built on the windows environment and is GIS independent. However ArcIMS is drawn for the purpose of display. SQL server which serves as the database engine is for data storage and retrieval.

Following is the details for the various components of the site:

- Number of Pages used In the NSDI website: 10
- Number of Pages used in the Metadata Explorer: 27
- Number Of ASP : 25
- Number Of JSP: 2
- Number Of HTML : 10
- Number Of SQL tables:10
- Number Of JavaScript files: 4
- Number Of stylesheets : 1

1. Page Listing for the NSDI website :

No	Name	Purpose
1.	Index.htm	The home page of NSDI this shall be the first page that shall be displayed to the user.
2.	about_nsdi.htm	Contains information about NSDI.
3.	nsdi_taskforce.htm	Contains information about NSDI Task Force.
4.	StrategynActionplan.htm Action Plans of NSDI.	Contains information about Strategies and
5.	NSDI_Agencies.htm Agencies.	Contains information about different NSDI
6.	NSDI_Standards.htm of NSDI.	Information about the different Standards
7.	NSDI_Publications.htm	Information and links to different publica tions of NSDI.
8.	events.htm	Contains information regarding different events held by NSDI.
9.	relatedlinks.htm	Links to related site
10.	Contactus.asp	Contact Information for NSDI.

2. Page Listing for the Metadata Explorer of NSDI:

No	Name	Purpose
1.	CheckPass.asp	Checks the login information entered by the user.
2.	explorer.asp	Contains the different frames for display of the explorer.
3.	title.html	Contains the mast head/banner for the NSDI pages.
4.	tabs.asp	Contains different tabs for the Metadata Explorer.
5.	content_frames.asp	Contains frames for search and Map display.
6.	search_frames.asp	Contains the different frames for attribute search, is called from the content_frames.asp page and is displayed on the left side of the explorer.
7.	search_map.jsp	Contains the map based search page.
8.	search_form.asp	Contains different drop down list for display of criteria selection. Creates connections to the database to display the different agencies and datatypes. Contained in search_frames.asp.
9.	AREASELECTION.asp	Contains listing for different states/districts/ Toposheets for selection. This page is updated from eighter sheetselection.asp or beforeAreaselection.asp.
10.	District_validator.asp	Validates the criteria selected by the user in the search_form.asp page calls beforeareaselection.asp in case of districts, sheetselection.asp in case of toposheets, Areaselection.asp in case of state or define a box criteria selection.
10.	beforeAreaselection.asp	Shown in case of district selection, displays the states of India and connects to State_resolution tables to retrieve data.
11.	Sheetselection.asp	Contains information regarding the different sheets.
12.	Search.asp	Contains different frames for search results display.
13.	searchtab.asp	Contains the search details image displayed on top of the Search Results page. Called from within the search.asp page.

No	Name	Purpose
14.	search_results.asp	Contains ASP scriptlets to query the data base and to display results on the front end.
15.	coverage.asp	Displays the information for the layer selected by the user.Contains ASP scriptlets to query the database and to display results on the front end.
16.	agency.asp	Displays the information for the agency selected by the user.Contains ASP scriptlets to query the database and to display results on the front end.
17.	coveragedetailsframes.asp	Contains frames to display the different pages for coverage information of a Layer.
18.	display.asp	Displays the legend information for the cover age display.
19.	coveragedetails.asp	Contains the map image for querying and displaying the map image at the front end. All the toposheets covered by the layer are displayed in red and the selected region is rendered in yellow.
20.	Login.asp	Displayed in case of incorrect username or password entry by the user.
21.	signin.asp	Displayed to new user's of the site. Asks for different parameters to be entered by the user. Passes the parameters to the registerthanks.asp.
22.	Registerthanks.asp	Checks for validity of the data hence entered by the user. Checks for redundancy of the user. In terms of users all ready existing. In case of valid users control passes to changepass.asp
23.	changepass.asp	Displays to the user text boxes for entry of the username and password. Passes these parameters to Changed.asp.
24.	Changed.asp	Checks for the validity of the username and password in terms of redundancy in the database. In case there is none the data is entered into the database else an appropriate message is displayed to the user.
25.	JSPSearch.asp	Contains the different pages for map based searches.

No	Name	Purpose
26.	JSPsearch_results.asp	Displays the search results for Map based search. Contains ASP scriptlets to query and display data.
27.	topo_query.jsp	Contains JSP scriptlets to query the different toposheet as selected by the user and display the same to the user. Passes the selected toposheets as parameter to JSPsearch_results.asp.

3. Java Scripts files as Used as a Part of the Metadata Explorer:

No.	Name	Purpose
1.	common.js	For common functionalities like layer creation, trapping mouse moves, etc. Used for implementing common functionalities at the front end. Contains common java script parameters used through out the site.
2.	mm_rollover.js	Used for Image rollovers. Displays different images to give a visual differentiator of the selection of that image.
3.	search_general.js	Contains variables, parameters and functions to implement map base search from the front end.
4.	zoombox.js	Contain functions for the implementation of different mapping tools like zoom, pan etc.

4. Style Sheets as used as a part of the NSDI website:

- metadata.css

5. Structure and Placement of the Virtual directories as part of the Website.

Home Directory :

- NSDI, Is the parent directory for all the ASP and HTML as contained and displayed on the site.
- NSDIJSP, Is the parent for all the JSP pages as contained and displayed on the site.

Javascripts files:

Javascript directory containing all the javascript files as mentioned above. Falls under the respective home directories.

Image Files:

Image directory containing all the images related with the site.

StyleSheets:

External directory contains all the Stylesheets pertaining to the site.

6. Database Design:

No.	Metadata Name	Name	Purpose
1.	NSDIAgency	Agency_resolution	Contains information about different agencies of NSDI.
2.	NSDILayers	Layer_catalogue	Contains information regarding different layers as provided by the agencies.
3.	SpatFrameMap	Map_sheet_resolution	Contains lat/long values for each toposheet.
4.	LayerCat	Layer_MapSheet_resolution	Contains toposheet wise information for the different of layers.
5.	CatType	Layer_type	Contains the categories into which each layer as a part of NSDI would fall under.
6.	SpatFrameState	State_resolution	Contains sheetwise information for each state.
7.	SpatFrameDist	District_resolution	Contains sheetwise information for each district.
8.	UserSign	User_Signin	Contains signin information for each user.
9.	UserValidation	User_Validation	Contains the username, password for each user.
10.	UserAddress	User_Address	Contains the IP address for each user accessing the site.

GLOSSARY

(This is a limited Glossary that is identified. In phases, this can be further evolved to a final Glossary list for NSDI)

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

area — a generic term for a bounded, continuous, two-dimensional object that may or may not include its boundary.

attribute — a defined characteristic of an entity type (e.g. composition).

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

coordinates — pairs of numbers expressing horizontal distances along orthogonal axes; alternatively, triplets of numbers measuring horizontal and vertical distances.

data element — a logically primitive item of data.

data set — a collection of related data.

image — a two-dimensional array of regularly spaced picture elements (pixels) constituting a picture.

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 Bridge Street).

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 — the definition and description of a set into which similar entity instances are classified (e.g., bridge).

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 — a 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.

name — the name of an extended element. The extended element name must not be the name of any other element in the Standard.

National Spatial Data Clearinghouse — a distributed network of spatial data producers, managers, and users linked electronically. Building on a network backbone, 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.

spatial 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.

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