MD iMAP

DATA MANAGEMENT

PLAN

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Version 1.0

My signature indicates approval of this Data Management Plan.

Approved by:

Barry Kreas

Geographic Information Officer

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Revision History

Date	Version	Description	Author
12/03/2012	1.00	Initial document creation	L. Lowe
9/17/2013	1.00	Updated security section to include four levels of iMap security	L. Lowe
1/29/2015	1.00	Revised to reflect changes in MD iMap 2.0	L. Lowe

EXECUTIVE SUMMARY

Spatial data has become a vital component for many organizations. It is also a critical piece of the decision making process. The State of Maryland publishes almost 200 web map services sourced from multiple agencies through a common information technology platform. In March 2012, the Governor signed an Executive Order that states that MD iMap is Maryland's statewide enterprise GIS system. MD iMap is a central store of data and services, giving the public and staff from all industries access to the most recent spatial data that is so critical to their work.

In the past, the MD iMap system has had no formal plan for managing the large of amount of data in its system. This has resulted in redundant and inconsistent data. The specifications and guidelines in this Data Management Plan will improve data consistency and availability of information. It will ensure that all levels of government and the public have access to the most up-to-date GIS information; reduce or eliminate overlapping data requests and redundant data maintenance; ensure metadata is consistently created; and ensure that data services can be displayed by the consumer with the cartography of its choice.

This Data Management Plan contains the following sections:

- *Roles and Responsibilities* - Entities involved in MD iMap and their responsibilities
- *General Data Specifications* - Data specifications that pertain to all spatial data. The goal is to adhere to the recognized national and international geospatial standards.
- *Metadata* - Datasets included on MD iMap are the basis for many applications and services. This section contains instructions for MD iMap metadata requirements.
- *Data Maintenance* - The data owner/custodian will be responsible for ensuring the data on MD iMap is kept up-to-date. Where applicable, the data shall be updated at least two (2) times a year.
- *Quality Assurance/Quality Control* - Data owners/custodians will be responsible for QA/QC of these data. Recommended minimum steps are provided. In addition, the DoIT GIO staff will perform some basic quality inspection such as ensuring data is displayed correctly.
- *Data Security* - Security will conform to MD Department of Information Technology's Information Security Policy.
- *Organization* - MD iMap services and data will be grouped in categories.
- *Procedures for Publication of Data onto MD iMap* - Instructions on preparing and submitting data for inclusion on MD iMap.

1 PURPOSE

MD iMap is Maryland's statewide enterprise GIS system. The standards and specifications within this Data Management Plan will improve data consistency and availability of information.

MD iMap contains a central store of data and services, giving the public and staff from all industries access to the most recent spatial data that is critical to many organizations. The MD iMap central data store will reduce costs and improve the effectiveness of agency GIS efforts by:

- Ensuring that all levels of government and the public have access to the up-to-date GIS information from other agencies;
- Reducing or eliminating:
    - Overlapping data requests; for example, multiple agencies contacting SHA for the latest road centerlines;
    - Redundant data maintenance; for example, MDP sends data updates to multiple agencies each of whom upload the data on their own system and update their geocoding services.
- Ensuring metadata is consistently created, maintained, understood and used
- Data services (unlike most services currently published on iMap) can be displayed by the consumer agency with the cartography or related tables of its choice.
- Data that is restricted for use within the government can be securely handled and shared.

This central store and catalog of data and services is a complex system that requires planning if it is to be successful.

2 EXCEPTIONS

Exceptions to the standards in this document can be made by requesting an exemption from the State Geographic Information Officer. Requests for exemption from these standards must include justification.

3 ROLES AND RESPONSIBILITIES

This section contains a list of entities involved in MD iMap and their responsibilities.

3.1 Department of Information Technology

- DoIT is responsible for overall management of the MD iMap system.
- DoIT will be the default custodian on any data layers that are ambiguous, data layers that do not have a clear custodian.

3.2 Data Custodians

- The data custodian is not necessarily the data owner. For example, MDA may repackage USDA data but they are not considered the data owner. USDA would be the data owner and MDA would be the data custodian.
- The data custodians are responsible for quality assurance and quality control and maintenance of their datasets.

3.3 Data Owners

- The authoritative data source ;
- Can authorize or deny access to the data and is responsible for its accuracy, integrity, and timeliness

3.4 MD iMap Technical Committee

- The Technical Committee is responsible for the development of the MD iMap content, policies, and procedures;
- Provides status reports to the Open Data Council;
- Resolves issues identified or brings them to the Open Data Council for resolution;

3.5 Open Data Council

- Approves the policies and procedures developed by the Technical Committee;
- Resolves issues identified by the Technical Committee;
- Provides recommendations and technical support to the budget approving authority;
- Provide guidance to the Technical Committee;
- Advises the Governor on issues related to MD iMap.

4 GENERAL DATA SPECIFICATIONS

This section contains the data specifications that apply to all spatial data. Various national and international bodies establish and maintain geospatial standards. The goal is to adhere to these recognized geospatial standards.

4.1 Data and Services Format

All spatial data shall meet the format requirements defined in Table 4-1.

Table 4-1 Data Formats

Information Type	Preferred Format	Comments
GIS Data	ESRI Shapefile	
	Geodatabase	ESRI file geodatabase Enterprise geodatabase
Digital Elevation Models (DEM, point cloud, mass points)	TIFF and GeoTIFF ArcGIS GRID	JPG and TIF images shall be supplied with an associated 'world file' containing image

	ERDAS IMAGINE .LAS file format	header information (.JFW or .TFW file)
Satellite Imagery Aerial Photography Georeferenced Images	TIFF and GeoTIFF JPEG ERDAS IMAGINE Lossless compression as the raster images may be used for analysis or deriving other data products	JPG and TIF images shall be supplied with an associated 'world file' containing image header information (.JFW or .TFW file)
Data Attribute Tables	Dbase IV Comma separated value Spreadsheets (i.e, Microsoft Excel or similar)	

4.2 File Naming Convention

4.2.1 File names shall succinctly summarize the data to allow users to understand the content of the data quickly. The following naming convention should be followed: CategoryAbbreviation_DataLayerName_DataLayerOwnerAgencyAbbreviation. For example, BSEC_EnterpriseZones_DBED

4.3 Service Naming Convention

The service name will be in the form of <State>_<Dataset Name>
Example: MD_TargetedEcologicalAreas

4.4 Coordinate System

Web Mercator coordinate system will be used for all data. ArcGIS users would choose, Projected Coordinate System → World → WGS 1984 Web Mercator (auxiliary sphere)

5 METADATA

Datasets included on MD iMap are the basis for many applications and services. It is essential that the datasets be thoroughly documented to ensure the integrity of the information being presented via MD iMap. Metadata allows data users to make informed decisions on the suitability of data for a given purpose and to understand the method used to capture the data and its currency.

5.1 Metadata Requirements

5.1.1 FGDC compliant metadata must be included with all data submissions.

5.1.2 Metadata may be submitted in xml or txt format.

5.1.3 The data owner may use any tool at their disposal that will output FGDC compliant metadata.

5.1.4 The metadata should be validated for FGDC compliance prior to submitting.

5.1.5 ISO Standard metadata is acceptable.

Table 5-1 shows the required metadata fields that must be submitted with all data and Table 5-2 shows additional optional fields that may also be submitted with the data, as defined by FGDC[i].

Table 5-1 Required Metadata Fields *

Field	Description
Identification	
Originator	Party responsible for the data set
Publication Date	The date the data was published or otherwise made available
Title	Dataset title
Online Linkage	URL to data download, data clearinghouse, or web-mapping services
Abstract	Brief description of the dataset that should include general content and features, data set form (GIS, CAD, image, database) and geographic coverage (county/city name)
Purpose	
Time Period of Content	The relevant date of the data content. This can be a single date, multiple dates, or a range of dates.
Currentness Reference	The basis on which the time period of content information is determined. For example, an orthophotograph may have been compiled and delivered in June (publication date) but flown in February (ground condition).
Update Frequency	Frequency with which changes are made to the data set after the initial data set is completed. Domain: continually, daily, weekly, monthly, annually, unknown, as needed, irregular, none planned
Progress	This field has a fixed domain of: Complete, In Work, and Planned.
Theme Keyword	Include ISO Topic Category and any additional descriptive terms
Place Keyword	specific regional reference such as city or county name
Access Constraints	Any restrictions or legal prerequisites to accessing the actual data set
Use Constraints	Any restrictions or legal prerequisites to using the data set.

Point of Contact	The individual or organization that is knowledgeable about the data set and should be contacted with questions.
Metadata Date	The date the metadata is written or completed
Bounding Coordinates	
Metadata Contact	The individual or organization that is responsible for the metadata for the dataset
Spatial Reference	
Horizontal Coordinate System	Description of the reference frame for horizontal position such as geographic, latitude/longitude, etc.
Abscissa resolution/ordinate resolution	The smallest distance that can exist between two points.
Planar Distance Units	The units of measure
Metadata Reference	
Metadata Date	The date that the metadata is written or completed
Metadata Contact	The individual or organization that is responsible for the metadata for the data set.
Metadata Name	Content Standard for Digital Geospatial Metadata
Metadata Version	As of Oct 2002: FGDC-STD-001-1998

Table 5-2 Optional Metadata Fields*

Field	Description
Identification	
Supplemental Information	An comment field that can include information that will not fit anywhere else in the metadata
Dataset credit	Identify others that should be recognized for their contributions to the data set
Native Dataset Environment	Software and version and operating system and version used to create the data.
Data Quality	
Attribute Accuracy Report	Assessments as to how “true” the attribute values may be. It may refer to field checks, crosschecks with other documents, statistical analysis of values, and parallel independent measures. It does NOT refer to the positional accuracy of the feature.
Logical Consistency Report	Tests used to check for data inconsistencies including topological checks (clean and build), and database QA/QC routines such as: Are the X values always between 0 and 100? Are all Y values text format? Does value Z always equal the sum of values R and S?
Completeness Report	Is there anything I might expect to be in the data set that isn’t? Identification of data omitted from the data set that might normally expected, as well as the reason for the exclusion. This may include geographic exclusions, ‘data was not available for the South Shores neighborhood’; categorical exclusions ‘municipalities with population

	under 1,000 were not included'; and definitions used 'floating marsh was mapped as land'.
Positional Accuracy Report	How sure are you that the tree is where you say it is? This is a description of the assessments as to the horizontal and/or vertical location of the feature. It may refer to field checks, survey quality, cross-checks with other locational references, etc.
Process Step	This can be a single collective description or individual process steps based upon: staging of processing, incorporation of sources, project milestones
Process Contact	The individual responsible for the data processing and putting the data together
Cloud Cover	This would be left blank for GIS and digital map files but should be included for imagery and photography. This is an integer field indicating the percent of the image obscured by cloud cover
Entity and Attributes	
Detailed Description	Detailed description if the database is not documented in another form such as a data dictionary or data specification manual, including attribute labels and definitions.
Domain Types	*Enumerated Domain:* a defined set of possible values, a picklist *Range Doman*: a sequence, series, or scale that has defined maximum and minimum values *Codeset Domain*: any published codeset, example: FIPS codes *Unrepresented Domain*: any value that is not prescribed
Overview Description	Provide overview description if: • your database is well-documented as a data dictionary, data specification manual , or some other format, AND you can provide data consumers a citation for the document and , if applicable, a website link to the document • your database is minimal and you can adequately describe in a short descriptive paragraph.
Distribution Information	
Distributor Contact Information	Name, Organization, and address of the individual and organization responsible for distribution of the data
Distribution Liability	A statement of the liability assumed by the Distributor

6 DATA MAINTENANCE

It is recommended that each state agency have in place an overall data maintenance plan. The plan should detail how the agency will handle its maintenance responsibilities including agency-specific QA/QC methodology and data standards.

The data owner/custodian will be responsible for ensuring the data on MD iMap is kept up-to-date. Where applicable, the data shall be updated at least two (2) times a year.

7 QUALITY ASSURANCE / QUALITY CONTROL (QA/QC)

7.1 Data Owners/Custodians

Data owners/custodians will be responsible for QA/QC of these data.

To the extent possible, it is recommended that automated analytical techniques be used for vector datasets. At a minimum, the following steps are recommended:

- Vectors – Are the vectors in the correct position when compared against a suitable raster or vector?
- Are there attributes and are they what was expected?
    - Do they provide aliases for the field names?
    - Are the addresses in a standard format? For example, using St or Street but not mixed); street address, city, state, zip in separate fields.
- Rasters – Are the rasters in the correct location when compared against a suitable raster or vector?

7.2 DoIT GIO Staff

When the data is submitted for inclusion in MD iMap, GIO staff will perform some basic quality inspection such as ensuring the data displays as expected. These steps will include:

- Did we receive everything that was expected?
- Is the projection in WGS1984 Web Mercator?
- Does it contain metadata?

Any discrepancies in the data will be reported to the party submitting the data. In the case where more than one agency is submitting similar datasets, discrepancies will be reported to each party and DoIT GIO staff will coordinate resolution.

8 DATA SECURITY

The MD iMap system will contain four levels of security:

- Public
- Any level of government
- Only Maryland State agencies

- Special interest groups (this would include all sectors)

9 ORGANIZATION

9.1 Organization of Data

MD iMap services and data will be grouped in the following categories.

Prefix	Category Name	Description	Examples of data Included in Category
AGRL	Agriculture	Rearing of Animals; Cultivation of Plants	Agriculture, Aquaculture, Herding, Irrigation, Livestock
BIOT	Biota	Flora and/or Fauna in the Natural Environment	Biological Resources, Ecology, Habitat, Sea Life, Vegetation, Wildlife, Wilderness
BNDY	Boundaries	Governmental Jurisdictions; Physical Delineation	County, Legislative Districts, Municipalities, School Districts, Shorelines, Voting Districts
BSEC	Business Economy (BusinessEconomy)	Business Activities; Economic Activities	Business, Commerce, Incentives Programs
DEMO	Demographic	Census Boundaries; Characteristics of Population	Age, Blocks, Block Groups, Census Tracts, Housing, Income, Population, Urban Areas
EDUC	Education	Education facilities; educational resources	K-12 schools, universities, colleges, libraries
ELEV	Elevation	Height Above or Below Sea Level	Bathymetry, Digital Elevation Models (DEMs), LiDAR, Slope, TINs
ENVL	Environment	Environmental Resources; Environmental Protection; Conservation Programs	Environmental Impact, Environmental Pollution, Nature Reserves, Protected Lands, Water & Air Quality, Waste Storage and Treatment

	Geocode Services	Automated Process to Match an Attribute Location to a Geospatial Location	Address Points, Centerlines, Highway Exits, Intersections, Parcel Points, ZIP Codes
	Geoprocessing Services	Access Capabilities of Geospatial Analysis	Clip and Ship, Print, Query, Search, Select
GSCI	Geoscientific	Information Pertaining to Earth Sciences	Earthquakes, Erosion, Geology, Geophysical Features, Hydrogeology, Minerals, Soils
HLTH	Health	Health Facilities; Health Services; Health Trends; Human Ecology	Diseases, Health Care Facilities, Mental and Physical Health, Public Health, Substance Abuse
HIST	Historic	Archeological Data; Historic Locations	Archeological Sites; Historic Properties; Preservation Sites; Sites of Historic Events
HYDR	Hydrology	Movement of Water On and Below Earth's Surface and In the Atmosphere	Continental Shelf, Currents, Dams, Hydrography, Outer Continental Shelf, Rivers, Streams, Tides, Shoreline, Watersheds, Wetlands
IMAG	Imagery	Imagery	Color Infrared Imagery; Composite Imagery; Grids; High Resolution Imagery; Incident-Specific Imagery
LOCA	Location	Positional Information and Services	Addresses, Centroids, Geodetic Control Points
MLTY	Military	Military Activities, Bases and Structures	Barracks, Events, Facilities, Military Transportation, Training Grounds
PLAN	Planning Cadastre (PlanningCadastre)	Land Designations; Property Boundary Delineation; Tax Appropriations	Cadastral Surveys, Easements, Land Cover, Land Use, Parcel Boundaries, Tax Maps, Zoning

SAFE	Public Safety (PublicSafety)	Prevention of and Protection From Crime, Damage, Danger, Harm or Injury	Correctional Facilities, Crime Statistics, Emergency Response, Fire and Police Stations
SOCI	Society	Community and Cultural Facilities; Non-Demographic Characteristics	Community Centers, Cultural Resources, Libraries, Monument, Schools, Sporting Venues
STRU	Structure	Man-Made Construction With No Cultural Value	Architectural and Structural Plans, Building Footprints, Dams, Towers
TRAN	Transportation	Conveyance of Persons and/or Goods; Mobility Resources; Modal Infrastructure	Airports, Bridges, Nautical Charts, Roads, Railways, Shipping Lanes, Tunnels
UTIL	Utility Telecommunications (UtilityTelcom)	Communication Systems; Energy Systems; Waste Systems; Water Systems	Broadband, Cellular, Electric, Fiber, Gas, Geothermal, Hydroelectric, Radio, Sewage, Solar, Water
WEAT	Weather	Atmospheric Conditions; Atmospheric Phenomena	Atmospheric Conditions; Atmospheric Phenomena

10 PROCEDURES FOR PUBLICATION OF DATA ONTO MD IMAP

It is important that the datasets on MD iMap be thoroughly documented to ensure the integrity of the information being presented via MD iMap. Datasets can be provided from all levels of government. Datasets can be provided as shapefiles, file geodatabases or data feeds. Organizations can submit dataset for inclusion into MD iMap using the guidelines provided below. The datasets will be evaluated according to the policy set forth below. Datasets that do not meet the standards or conform to the requirements below will not be available through MD iMap.

10.1 Submission Guidelines

The following steps are required when standing up a service on the MD iMap infrastructure.

Step 1: Prepare Data for Submission

Data should be prepared for submission according to the following “best practices” for creating map services. When preparing data for inclusion on MD iMap, it is important to treat the data as an

informational product that will be meaningful to others outside your agency. DoIT GIO office recommends following these steps to produce an intelligent map service:

- Project data to WGS 1984 Web Mercator (auxiliary sphere)
    - ArcGIS users would choose, Projected Coordinate System → World → WGS 1984 Web Mercator (auxiliary sphere)
- Use simple symbology
- Set the appropriate scale dependencies for labels and geometry. Check to determine if the right amount of information is displayed at various scales.
- Use simple labeling techniques. Consider using an annotation layer versus dynamic labeling.
- Use clear descriptions when naming layers and groups. Jargon should not be used.
- Provide appropriate map/layer documentation including title, summary (typically 1 sentence), description (1-4 sentences), tags, author, and credits. This information should be entered into the Map Document Properties so the information will be published with the service.
- Provide aliases to all named attributes.
- Any fields that you do not wish to display should be removed from the attribute table prior to submission.

Step 2: Notify the DoIT GIO Office

Data should be submitted to the DoIT GIO Office for inclusion on MD iMap. Send an initial email request to your DoIT GIO staff person liaison (see MD iMap Portal GIO Office tab for list of GIO staff http://imap.maryland.gov/Pages/gio-organizational-chart.aspx). The following information should be included in the email:

- Data Layer(s) Name
- Desired Map Service Name
- Request the Map Service to be Cached? Yes or No
- Frequency of Data Update
- Last Updated
- Map Service Description (225 characters max)
- WFS enable? Yes or No, if No please provide an explanation (Ex – Secure Data, Licensed Data)
- Do you want the data available for download? (This pertains to vector datasets only, no raster datasets can be downloaded).
- Would you like the data moved to Socrata? Yes or No

Step 3: Receive Approval to proceed via email from DoIT GIO

Upon approval notification email, submit the GIS Dataset(s), MXD(s), and all supporting documentation to DoIT GIO via FTP (to be supplied with the approval notification).

Step 4: Deliver Data

When initiating the publishing of a map service on the MD iMap infrastructure, the party requesting the map service must provide the following data to DoIT GIO:

- All vector and/or raster datasets that the map service will use. Vector data can be delivered as a shapefile or in a file geodatabase.
- An MXD that has all scale dependencies, symbolization, and field visibility defined for all data layers.
- FGDC-Compliant metadata for each dataset must be provided, as defined in Section 5 of this document. ISO standard metadata is acceptable but FGDC-compliant is preferred.

Step 5: Map Service Deployment and Verification

Once the data, MXD, and metadata have been received and verified by the DoIT GIO staff, the data will be loaded into the geodatabase and map service(s) created staging and production servers. The following verification steps will occur:

- Requesting party will verify the map service on the staging server upon receiving an email from DoIT GIO. Staging allows Internet viewing, specifically by the requesting party to provide confirmation for deployment into production. Should any changes/updates be necessary prior to production deployment, staging allows those changes/updates to be viewed via the Internet.
- When confirmation is received to deploy to production, it will be the responsibility of the requesting party to verify production and provide confirmation.

10.2 Metadata

It is essential that the datasets be documented thoroughly and accurately to ensure the integrity of the information being presented via MD iMap. All datasets submitted for inclusion into MD iMap should include FGDC complaint metadata. See metadata section above for list of required fields. We will also accept ISO Standard metadata.

10.3 Symbology

A dataset must be accompanied by information on how the organization prefers the data to be symbolized. The specification for symbology can be in the form of a written specification or an ESRI ArcGIS map document file (mxd). The hosting organization will render the data according to the information provided on the development environment for certification prior to moving the dataset to the production site.

Tips for Optimizing Map Service Performance

- Complex symbols can take longer to draw than simple symbols and ArcGIS Server cannot handle some custom symbology. Use simple line and fill symbols where possible, avoid symbology that contains multiple layers, complicated dash patterns, hash lines, or outlines.
- If applicable, set scale dependency so that symbols are not drawn until zoomed in to a certain scale.

10.4 Data Caching

MD iMap would like to make datasets available as dynamic services as much as possible. This will allow end users to resymbolize the service and help reduce redundant and application specific services.

However, MD iMap may cache datasets to optimize performance. An organization can request that the submitted data be included in an existing data cache or that a new cache be established. The DoIT GIO will make the final decision whether or not to cache the data.

REFERENCES

[i] Federal Geographic Data committee (FGDC). (2005). Geospatial Metadata Quick Guide. Retrieved from http://www.fgdc.gov/metadata/metadata-publications-list.