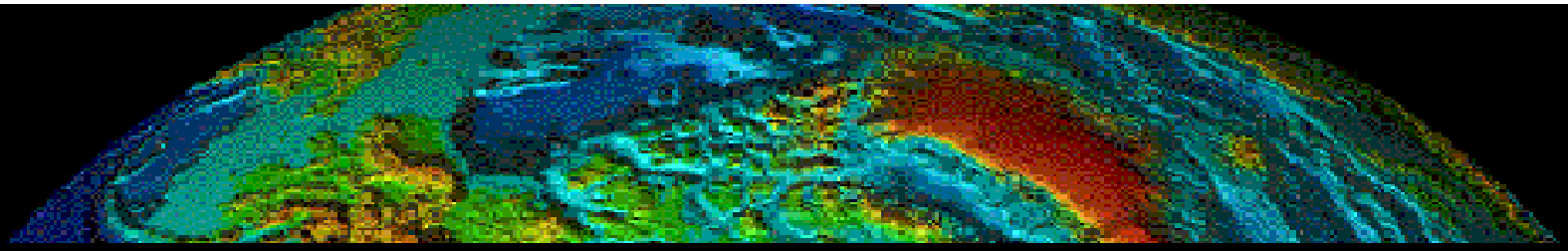
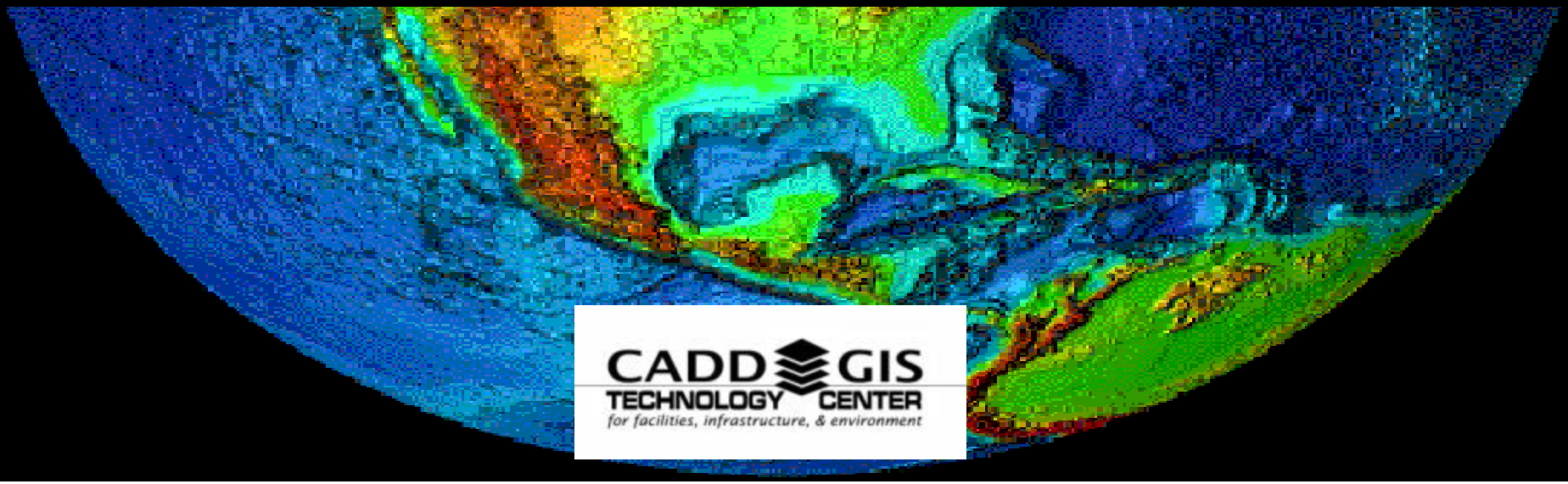
Center's Internet Web Page URL Address: http://tsc.wes.army.mil



Spatial Data Standards for facilities, infrastructure, and environment (SDSFIE)
and
Facility Management Standards for facilities, infrastructure, and environment (FMSFIE)

METADATA



CADD/GIS Technology Center

for facilities, infrastructure, and environment

- Originally established as the “Tri-Service CADD/GIS Technology Center” in 1992 at the Army Waterways Experiment Station, Information Technology Laboratory, Vicksburg, Mississippi .

- Established by the Army (including Army Corps of Engineers), Navy, and Air Force (i.e, Tri-Services).

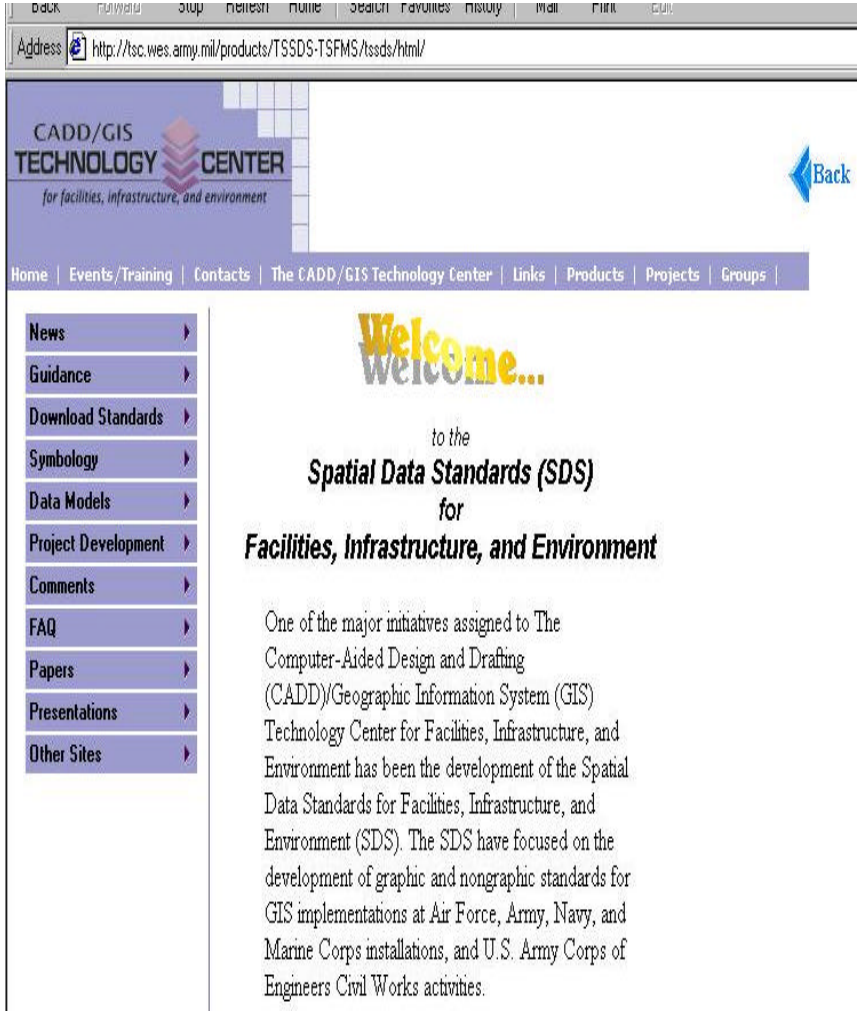
- Center’s name changed to “CADD/GIS Technology Center for facilities, infrastructure, and environment” in July, 1999 to reflect a broader mission.

- CADD – Computer Aided Design & Drafting
- GIS – Geographic Information System

Participating DoD and Governmental Agencies

- **Participating Department of Defense (DoD) and Federal Government Agencies (as of January 2001):**
- **U.S. Army Corps of Engineers**
- **U.S. Army**
- **U.S. Navy**
- **U.S. Air Force**
- **U.S. Marines**
- National Aeronautics and Space Administration (NASA)
- Defense Logistics Agency (DLA)
- U.S. Coast Guard
- General Services Administration (GSA)
- National Institute of Building Sciences (NIBS)
- U.S. Environmental Protection Agency

Center Project No. 96.013 - Spatial Data Standards



- **The Spatial Data Standards for facilities, infrastructure, & environment (SDSFIE) are CADD/GIS Technology Center Project No. 96.013.**
- **Monthly Status Reports are provided on CADD/GIS Technology Center web site (http://tsc.wes.army.mil) under "Projects".**
- **Typically, 2 "SDS Implementation Workshops" are provided each year at Vicksburg, Mississippi. See "Classes" area of CADD/GIS Technology Center web site.**
- **Download latest release and additional SDSFIE information from the "Products", "Standards" area of the CADD/GIS Technology Center's web site.**

Part 3: Spatial Data Standards for facilities, infrastructure, & environment (SDSFIE)

- Provides a standard graphic and nongraphic (database) format and structure for GIS implementations at Air Force, Army, Navy, and Marine Corps installations and Army Corps of Engineers Civil Works activities. Also provides a GIS standard for use by other Federal, State, and Local Government organizations, public utilities; and private industry.
- Provides a "nonproprietary" standard designed for use with commercially available "off-the-shelf" GIS and relational database software.
- Provides a GIS implementation schema for approved FGDC and DISA geospatial related data standards.
- Provides a grouping of geographically referenced (geospatial) features (i.e., features which can be depicted graphically on a map at their geographic location (coordinate). Each geospatial feature has an "attached" Attribute Table containing pertinent data about the geospatial feature.
- Called Tri-Service Spatial Data Standards (TSSDS) prior to July 1999. The acronym SDS was used from July 1999 until January 2001.

What is Geospatial Data?

Definition from Executive Order 12906:

- " 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. Statistical data may be included in this definition at the discretion of the collecting agency."

Geospatial Data Systems (GDS)

- Any automated system that employs data referenced to a location on the earth.

- Includes Geographic Information Systems (GIS's), Land Information Systems (LIS's), Remote Sensing (RS) Systems, Image Processing (IP) Systems, Computer-Aided Design and Drafting (CADD) Systems, Automated Mapping/Facilities Management (AM/FM) Systems, and Automated Mapping (AM) Systems.

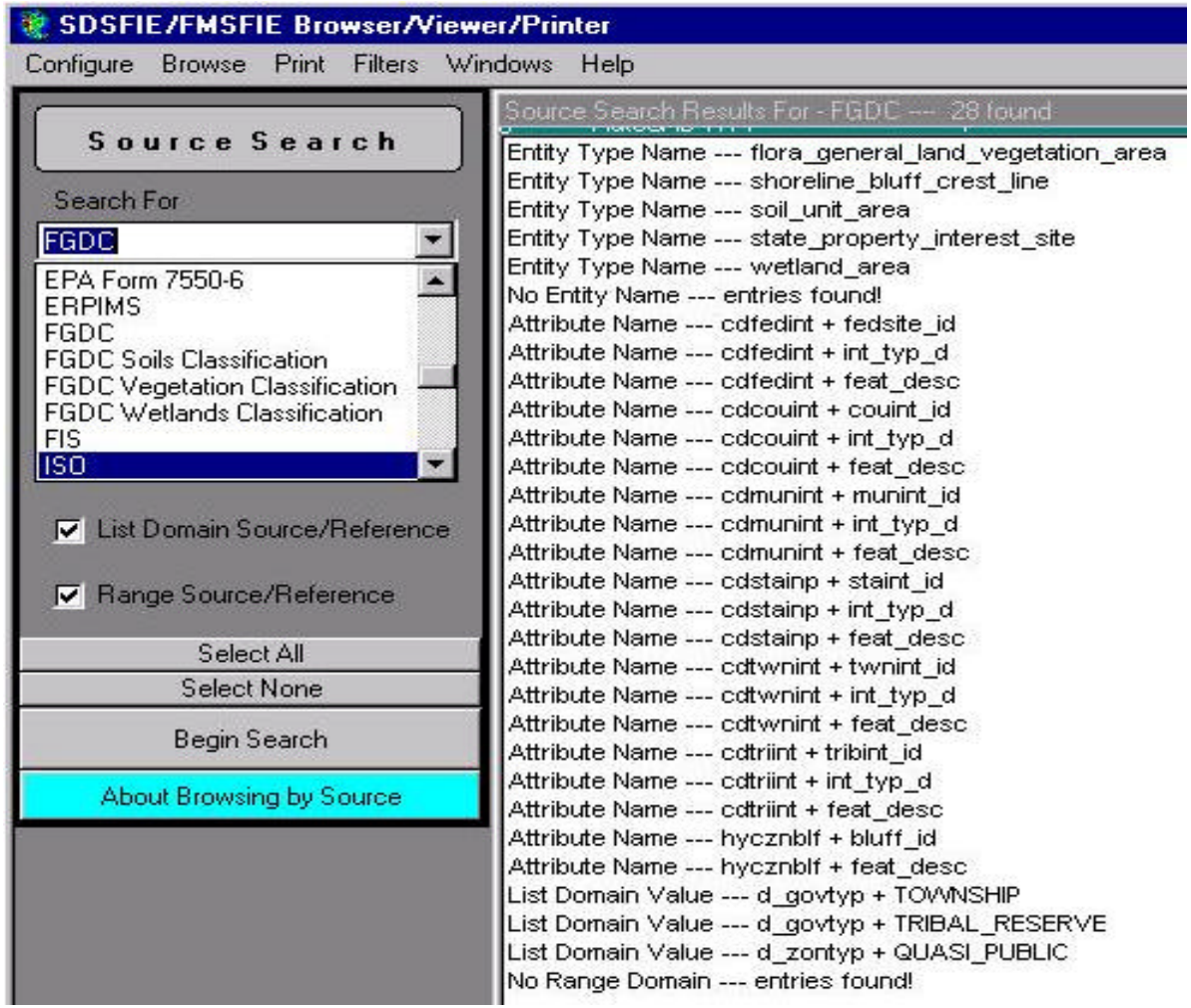
Spatial Data and Facility Management Standards - Coordination

Coordination Efforts With DoD & Federal Standards Development Initiatives Include:

- Federal Geographic Data Committee (FGDC)
  - *Center* Participation
  - Adoption of Subcommittee Products
  - Adoption of Metadata Standards
- Defense Information Systems Agency (DISA)
- Corporate Information Management (CIM) Initiatives
- Defense Environmental Security Corporate Information Management (DESCIM) Initiatives
- National Imagery and Mapping Agency (NIMA) (formerly Defense Mapping Agency (DMA)) Initiatives

Incorporation of Approved FGDC Data Standards

- The SDSFIE/FMSFIE provides a GIS Implementation Schema for Approved Federal Geographic Data Committee (FGDC) Data Standards.
- Approved FGDC Soils, Vegetation, and Wetlands Classification Standards were incorporated in the TSSDS/TSFMS Release 1.80.



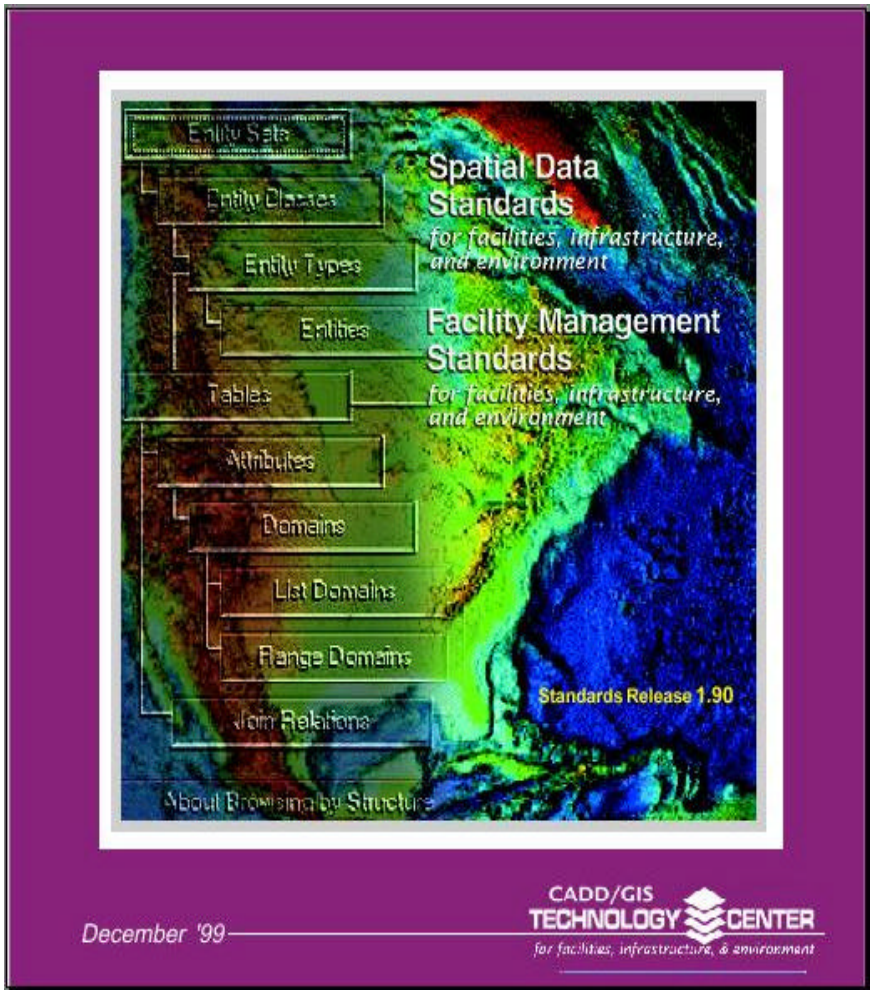
Spatial Data and Facility Management Standards - Design Considerations

- **Must be compatible with the predominant Commercially Available CADD, GIS, & Relational Database Software.**
- GIS and CADD Software include:
  - ESRI Arc/Info - Bentley MicroStation - ESRI ArcView
  - Autodesk Map - Intergraph MGE - Autodesk AutoCAD
  - Intergraph GeoMedia - Bentley GeoGraphics
- Relational Database Management System (RDBMS) Software includes:
  - ANSI Standard Structured Query Language (SQL)
  - Informix SQL - Microsoft Access - ESRI SDE
  - Oracle SQL - Microsoft SQL Server
- Operating Systems include:
  - UNIX
  - Windows 95, 98, 2000, and NT

Spatial Data and Facility Management Standards – Software Tools

- **Interactive Windows Application**
  - Self-contained Microsoft Visual Basic (32 bit) based Software Applications for Windows 95, 98, 2000, and NT.
  - Runs on Windows 95, 98, 2000, and/or NT Personal Computer
  - No Additional Software Required
  - Distributed on CD-ROM and via Internet
  - A "Living Application"; Versioning
  - The current version (Release 2.00) was completed in January 2001.
  - The current version is also available for download from The CADD/GIS Technology Center Internet Web Site http://tsc.wes.army.mil. Go to "Products", then select either "Spatial Data Standards" or "Facility Management Standards."

Spatial Data Standards (SDSFIE) & Facility Management Standards (FMSFIE) - Development History



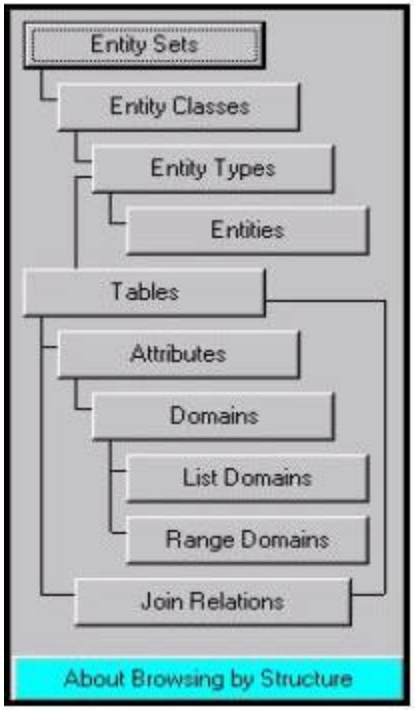
- TSSDS Release 1.20 - November 1993.
- TSSDS Release 1.40 - August 1995.
- TSSDS Release 1.60 - November 1996.
- TSSDS Release 1.70 - August 1997.
- TSSDS Release 1.75 - January 1998.
- TSSDS/TSFMS Release 1.80 - February 1999.
- SDS/FMS Release 1.90 - December 1999
- SDS/FMS Release 1.95 - April 2000
- SDSFIE/FMSFIE Release 2.00 – January 2001

SDSFIE/FMSFIE Data Model Organization

- **Entity Sets -**
  - Broad grouping for data management purposes.
- **Entity Classes -**
  - Grouping of data within each Entity Set for Data Management Purposes.
- **Entity Types -**
  - Grouping of SDS Geospatial Features (i.e., items that appear graphically on a map or drawing). Grouped within each Entity Class.
  - **Entities -**
    - Items that appear graphically on a map or drawing. Grouped within each Entity Type. Each Entity Type may have one or more Entities.
- **Attribute Tables -**
  - Relational database tables containing attribute data. Grouped within each Entity Class.
- **Domain Tables -**
  - Contains lists of “valid” or “permissible” values for specific attributes in an Attribute Table.

Size and Complexity - SDS/FMS Release 2.000

Size and Complexity - SDSFIE/SDSFIE Release 2.000



26	Entity Sets
181	Entity Classes
1,006	Entity Types
5,453	Entities (CADD & CADD Based GIS)
1,014	Attribute Tables (Database Tables)
25,844	Attributes (Fields in Tables)
959	Domain Tables (List & Range)
21,542	List Domain Values
18	Range Domains
8,149	Relational Database Join Relationships

FGDC Metadata

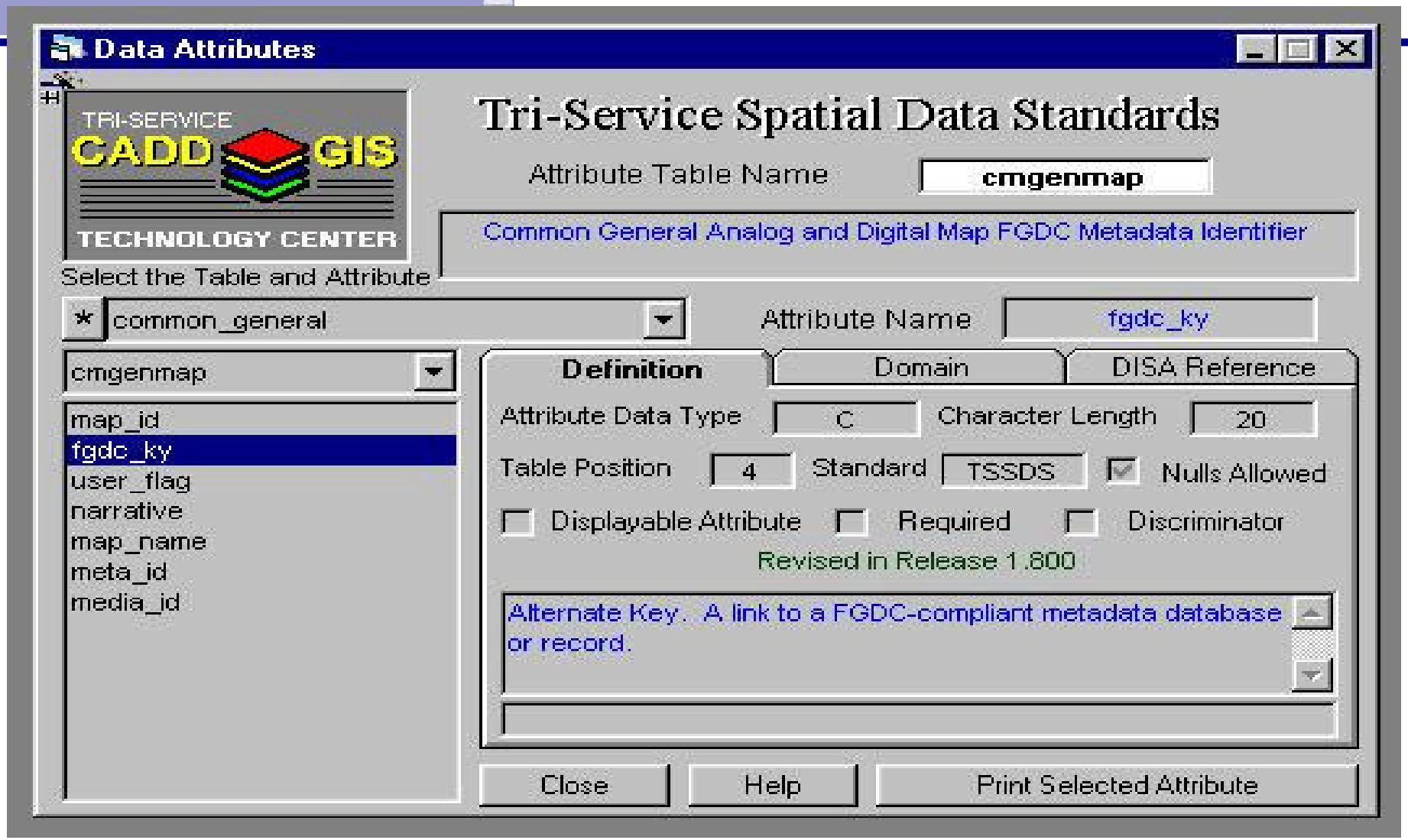
- FGDC “Content Standard for Digital Geospatial Metadata” provides a standard for documenting content and information about a geospatial data set (i.e., a map file).
- FGDC Metadata Standard “does not specify the means by which this information is organized in a computer system or in a data transfer, nor the means by which this information is transmitted, communicated, or presented to the user.”
- See http://www.fgdc.gov/metadata/contstan.html for additional information.

SDSFIE Link to FGDC Metadata Record

- FGDC metadata file is compiled through the use of metadata generator software.

- SDSFIE provides capability to link GIS database records related to map files to the appropriate FGDC metadata file (record). The attribute field “fgdc_ky” in the SDSFIE “Map File” table (cmgenmap) provides this capability.

SDSFIE Link to FGDC Metadata Record



Incorporating FGDC Metadata in SDSFIE GIS Database

- SDSFIE also provides capability to record metadata for individual features in a map file.

- SDSFIE provides capability to link GIS database records related to map files to the appropriate FGDC metadata file (record). The attribute field “metamap_id” in the SDSFIE “Metadata” table (cmgenmet) provides this capability.

- The incorporation of FGDC Metadata records within a SDSFIE compliant GIS database is optional.

Incorporating FGDC Metadata in SDSFIE GIS Database

Tri-Service Spatial Data Standards
June 29,1999

Table/Attribute Summary

TSSDS Release - 1.800

ENTITY SET NAME
common

ENTITY CLASS NAME
common_general

TABLE NAME	TABLE LONG NAME	TABLE TYPE	KEY COLUMN	VER	STD
cmgenmet	Common General Metadata	Non-Graphic	1028	1.800	TSSDS

TABLE DEFINITION This table contains attribute table level metadata, data about the attribute data which identifies items like who collected the data, when it was collected, and the accuracy of the data.

ATTRIBUTE NAME	DATA TYPE	CHAR LENGTH	DOMAIN TABLE	VER	STD	DEFINITION
meta_id	C	20		1.800	TSSDS	Primary Key. A unique, user defined record or instance of attribute table metadata.
metamap_id	C	20		1.800	TSSDS	Foreign Key. A user defined identifier that references metadata that describes individual or groups of geospatial records and entities.
datecreate	I			1.400	TSSDS	The date on which this metadata record was first created. Format for date is YYYYMMDD (i.e., September 15, 1994 = 19940915).
datemodify	I			1.800	TSSDS	The date on which the metadata record or attribute table data was last modified or changed. Format for date is YYYYMMDD (i.e., September 15, 1994 = 19940915).
data_ty_d	C	16	d_tydata	1.400	TSSDS	The type of data.
ent_mth_d	C	16	d_datent	1.800	TSSDS	The method or process used to enter the attribute table data for which this metadata is collected into the system.
source_d	C	16	d_datsrc	1.800	TSSDS	The source of the attribute table data.
reliable_d	C	16	d_datrel	1.800	TSSDS	An indication of the reliability of the attribute table data.
maintainer	C	12		1.800	TSSDS	The name of the individual or office responsible for maintaining the attribute table data.
creator	C	12		1.800	TSSDS	The name of the individual or office that first created the attribute table data. (Last name, First Initial).
history	C	12		1.400	TSSDS	The history of the metadata.
narrative	C	240		1.400	TSSDS	A description or other unique information concerning the subject item, limited to 240 characters.
user_flag	C	20		1.400	TSSDS	An operator defined work area. This attribute can be used by the operator for user defined system processes. It does not effect the subject item's data integrity and should not be used to store the subject item's data.
contr_ok_d	C	16	d_boolen	1.800	TSSDS	A boolean value that indicates whether or not it is OK for granting contractor access to the data
sec_clas_d	C	16	d_metsec	1.800	TSSDS	Security classification of the data contained in the table.

Incorporating FGDC Metadata in SDSFIE GIS Database

Surface Water Course CL

Table Name - hysurcrs

PK - sur_crs_id

FK - meta_id

Metadata

Table Name - cmgenmet

PK - meta_id

FK - metamap_id

Identification Information

Table Name - cmmetidt

PK - metamap_id

FK - citatn_id

FK - timepdc_id

FK - metpoc_id

Citation Information

Table Name - cmmetcit

PK - citatn_id

Time Period Information

Table Name - cmmettim

PK - timepdc_id

Contact Information

Table Name - cmmetcnt

PK - metpoc_id

Incorporating FGDC Metadata in SDSFIE GIS Database

Spatial Data Organization Information

Table Name - cmmetsdo

PK - spatdo_id

FK - metamap_id

Identification Information

Table Name - cmmetidt

PK - metamap_id

Reference Information

Table Name - cmmetref

PK - metaref_id

FK - metamap_id

Attribute

Table Name - cmmetent

PK - entity_id

FK - metamap_id

Spatial Reference Information

Table Name - cmmetspa

PK - coordpj_id

FK - metamap _id

Incorporating FGDC Metadata in SDSFIE GIS Database

Distribution Information

Table Name - cmmetdst

PK - distrib_id

FK - metamap_id

FK - metpoc_id

FK - timepdc_id

Identification Information

Table Name - cmmetidt

PK - metamap_id

Time Period Information

Table Name - cmmettim

PK - timepdc_id

Data Quality Information

Table Name - cmmetdqa

PK - dataqual_id

FK - metamap _id

FK - timepdc_id

FK - metpoc_id

Contact Information

Table Name - cmmetcnt

PK - metpoc_id

SDSFIE Feature/Attribute Metadata

- SDSFIE provides capability to record metadata for individual features (i.e., Entity Types) and Attribute Table records.
- The attribute field “meta_id” in the SDSFIE “Metadata” table (cmgenmet) provides this capability.
- For example:
  - Assume a GIS contains data records for 100 power poles. The SDSFIE cmgenmet table provides the capability to record detailed metadata (e.g., accuracy of data source (scanned drawings, field survey, gps, etc.), date data obtained & recorded, point-of-contact for record, etc.) for each individual power pole.

SDSFIE Feature/Attribute Metadata

Tri-Service Spatial Data Standards
June 29,1999

Table/Attribute Summary

TSSDS Release - 1.800

ENTITY SET NAME
common

ENTITY CLASS NAME
common_general

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datecreate	I			1.400	TSSDS	The date on which this metadata record was first created. Format for date is YYYYMMDD (i.e., September 15, 1994 = 19940915).
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data_ty_d	C	16	d_tydata	1.400	TSSDS	The type of data.
ent_mth_d	C	16	d_datent	1.800	TSSDS	The method or process used to enter the attribute table data for which this metadata is collected into the system.
source_d	C	16	d_datsrc	1.800	TSSDS	The source of the attribute table data.
reliable_d	C	16	d_datrel	1.800	TSSDS	An indication of the reliability of the attribute table data.
maintainer	C	12		1.800	TSSDS	The name of the individual or office responsible for maintaining the attribute table data.
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