



# **The Spatial Data Standards for Facilities, Infrastructure and Environment (SDSFIE) Quality and Raster Standards**

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# Agenda

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- What is the SDSFIE Quality Standard?
- ISO 19157 Data Quality Concepts
  - Data Quality Units
  - Measures or Metrics?
  - Data Quality Evaluation Process
- IGI&S Data Quality Management Framework
- Data Content Specifications (DCS)
  - DCS Metric Example
- What is the SDSFIE Raster Standard?



# What is SDSFIE?

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The Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE) are now a family of IT standards for IGI&S.

Vector



Metadata

Raster



Quality

Services



Endorsed

Portrayal



# What is SDSFIE-Q?

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***SDSFIE-Q specifies over-arching guidance for how DoD will implement a tiered approach to IGI&S data quality, based on ISO 19157***

Defines:

- Data quality processes, measures, and metrics for vector, raster and geospatial services
- IGI&S data quality framework

Consists of:

- Quality guidance for IGI&S data and services: SDSFIE-Q (Parts 1-4)
  - Appendix A: ISO 19157 Data Quality Standard Measures
  - Appendix B: IGG Data Quality Metrics
  - Appendix C: Metadata Examples
- Data Content Specifications (DCS) General Guidance: SDSFIE-Q (Annex A)
- DCS for each SDSFIE-V Gold feature type *TBD*
  - DCS Example (Military Range): SDSFIE-Q (Annex B)



# Foundational Concepts

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- ISO 19157 Components of a Quality Framework
  - Summary of 19157 concepts, terminology and processes that provide background for SDSFIE-Q concepts
  - Figure 1 (from ISO 19157) describes the components of data quality that are defined and discussed in Section 2

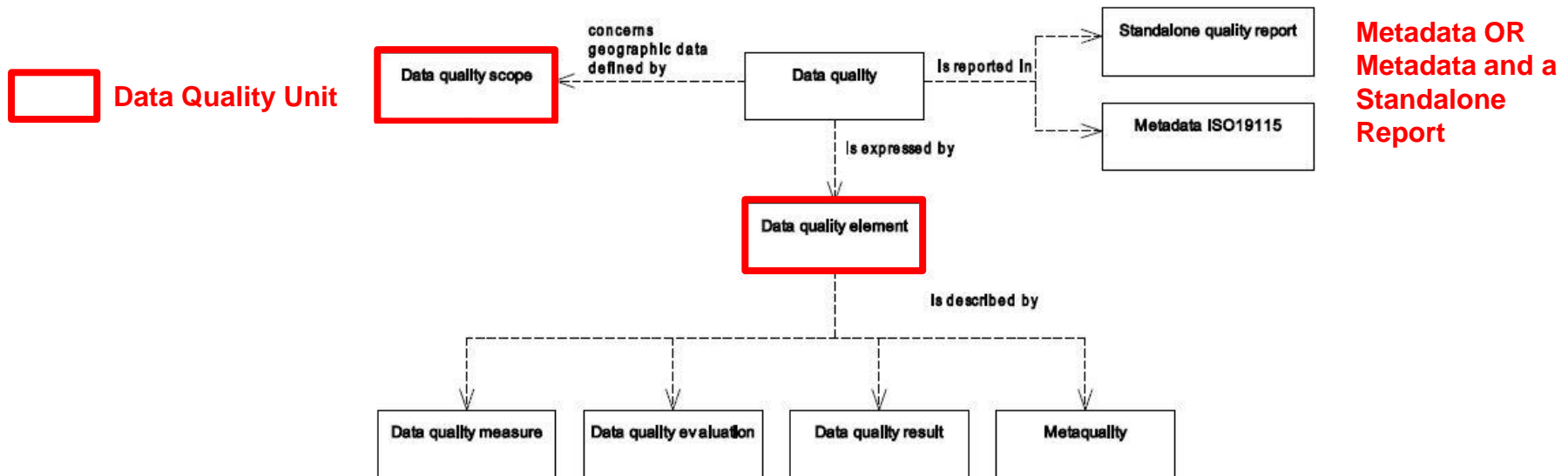


Figure 1 — Conceptual model of quality for geographic data



# Data Quality Unit

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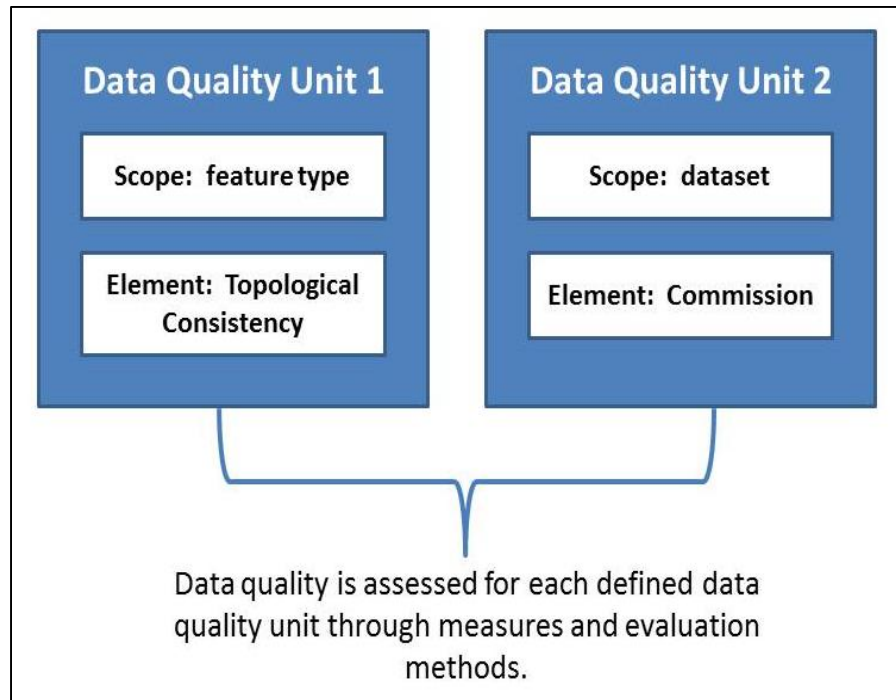
- **Data Quality Unit** - A data quality unit consists of a **data quality element** for a particular **scope** (dataset series, dataset, subset of data with defined characteristics). Data quality measures shall be evaluated for each data quality unit.

## Scope Types

- Attribute
- Attribute type
- Collection hardware
- Collection session
- **Dataset**
- Series
- Non Geographic dataset
- Dimension group
- Feature
- **Feature type**
- Property type
- Field session
- Software
- **Service**
- Model
- Tile
- **Metadata**
- Initiative
- Sample
- **Document**
- **Repository**
- **Aggregate**
- Product
- Collection
- Coverage
- Application

## ISO Elements

- Commission
- Omission
- Conceptual Consistency
- Domain Consistency
- Format Consistency
- Topological Consistency
- Absolute or External Accuracy
- Relative or Internal Accuracy
- Accuracy of a time measurement
- Temporal Consistency
- Temporal Validity
- Classification Correctness
- Non-quantitative Attribute Correctness
- Quantitative Attribute Correctness
- Usability



**Scopes identified for SDSFIE-Q**



# Data Quality Evaluation Process

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For all datasets being evaluated, the Data Quality Working Group or Component need to establish data quality units and determine which measures will be evaluated for each unit.

- SDSFIE-Q establishes these at a high level
- Could vary from layer to layer
- Each measure requires a corresponding evaluation method

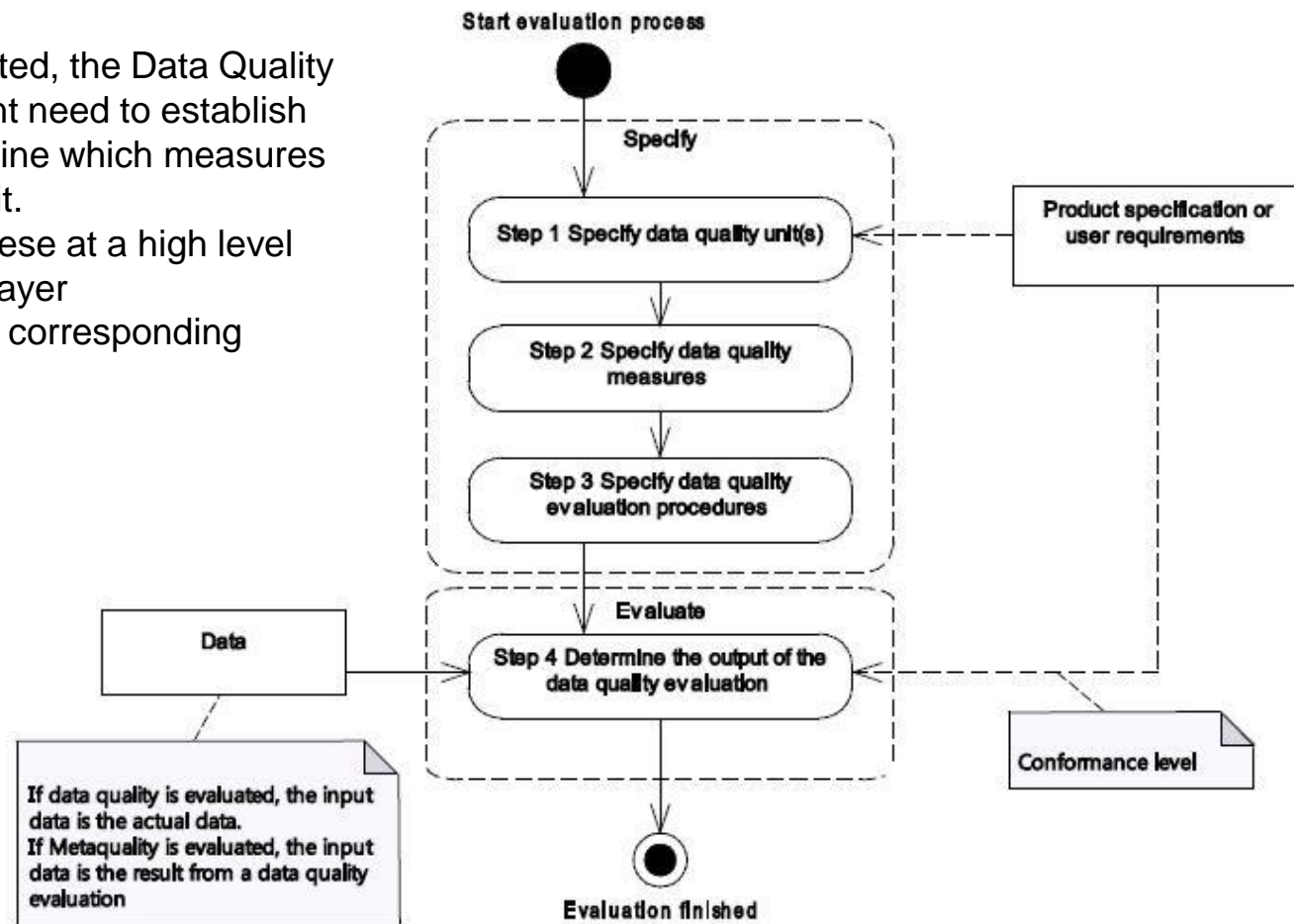


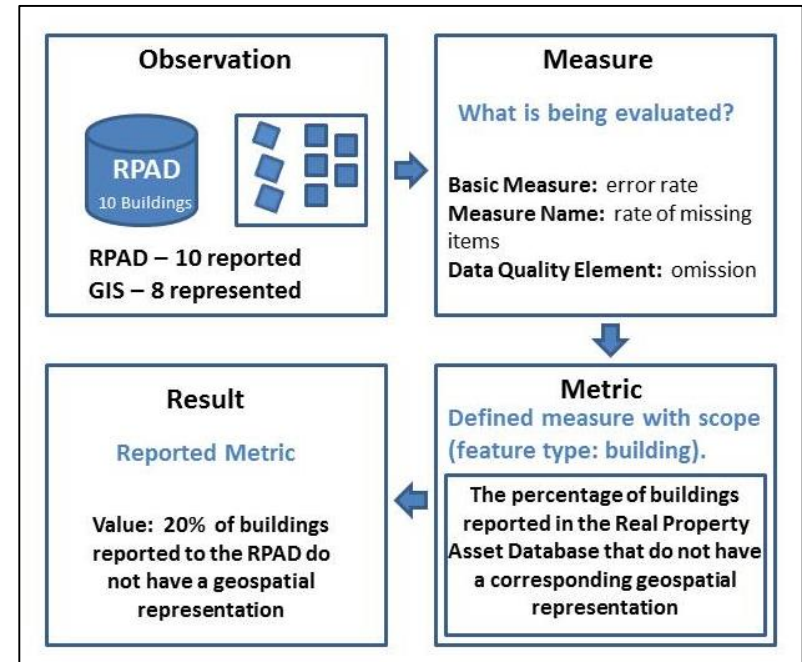
Figure 12 — Evaluating data quality



# Data Quality Evaluation – Measures vs. Metrics

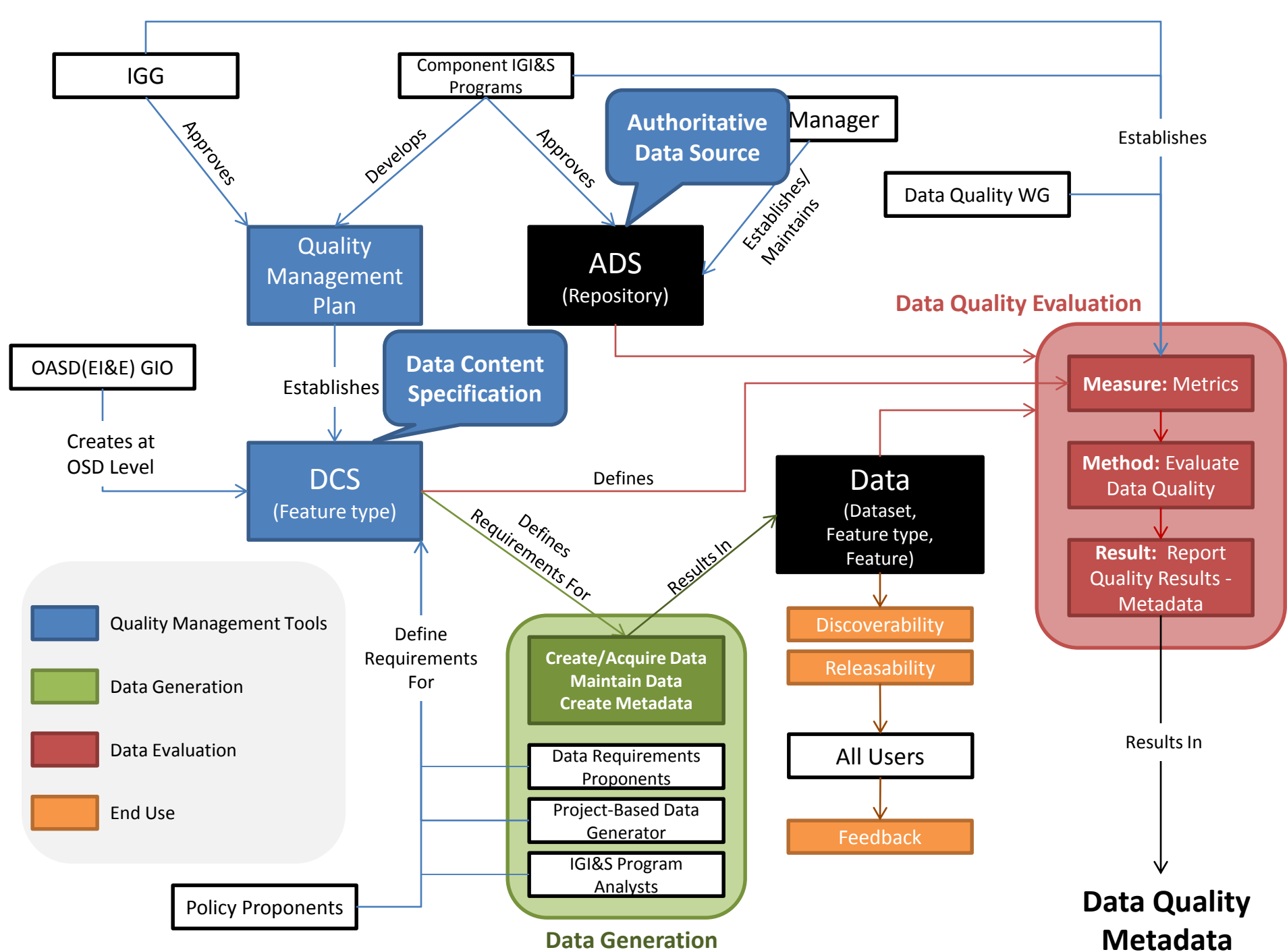
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- Measures are descriptions of the type of evaluation being assessed
  - Evaluated for a specific data quality unit
  - Examples include
    - o Rate of missing items
    - o Number of duplicate feature instances
    - o Conceptual schema compliance
    - o Number of invalid self-intersect errors
    - o Number of incorrectly classified features



- **Measures** become **metrics** when they are **associated with a scope**
- Metrics for IGI&S data are included in SDSFIE-Q along with descriptions of the associated data quality unit and measures







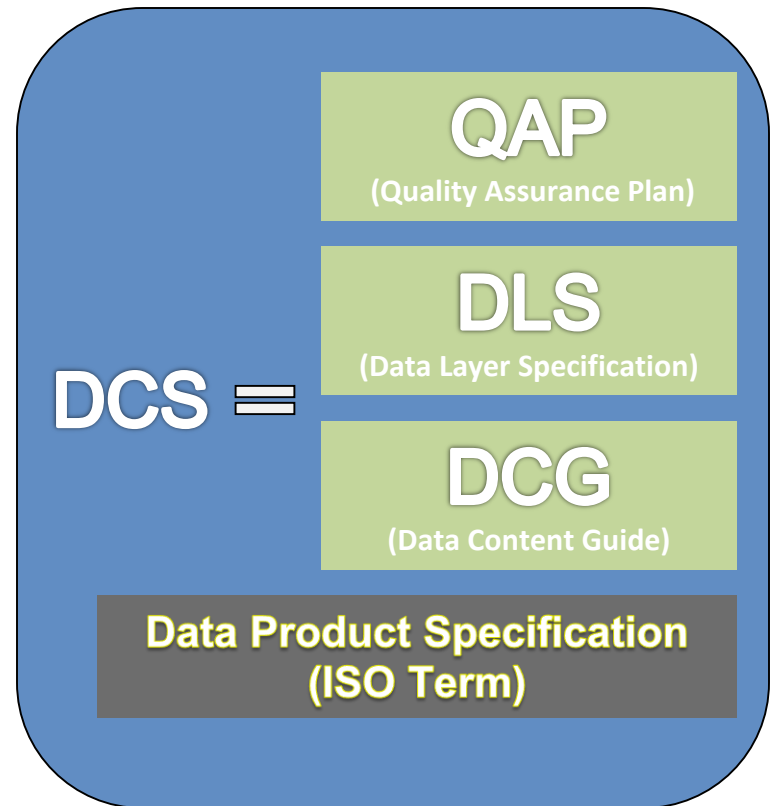
# Data Content Specifications (DCS)

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*A detailed description of a dataset or data layer, together with additional information that will enable it to be created, supplied to and used by other organizations (ISO 19131)*

DCSs will provide guidance for:

- Standardizing the collection and maintenance of data
  - Data collection requirements
  - Attribute guidance
  - Source selection
- Documenting metrics and data quality evaluation results in metadata
  - Mandatory and recommended metrics
  - Suggested evaluation methods
  - Minimum acceptable results for each metric
  - Overall DCS conformance requirements



***DISDI will create a DCS for every CIP feature type (initially) and every SDSFIE-V Gold feature type (eventually)***



# Example Metric - *MilitaryRange*

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Data Quality Element	ISO Measure Identifier	SDSFIE-Q Metric Identifier	<i>MilitaryRange</i> Metric Description	Suggested Evaluation Method	Minimum Acceptable Result	Mandatory for Military Range
Completeness: Commission	3	DCS2	The percentage of features included in the Military Range layer that are excess. (Features that are either not reported to the RPI or are not real world features)	Direct External: Visual inspection against imagery Direct External: Comparison against database of known features (i.e. real property database)	5%	Yes

**ISO Measure ID:** Points to the ISO standard measure from which the metric is derived. (SDSFIE-Q Appendix A)

Element Name	ISO Measure Identifier	Measure Name	Basic Measure	Measure Definition	Value type
Commission	3	rate of excess items	error rate	Number of excess items in the dataset or sample in relation to the number of items that should have been present	Real

**SDSFIE-Q Metric ID:** Points to the SDSFIE-Q metrics registry (will be managed on SDSFIE Online)

SDSFIE-Q Metric Identifier	DCS General Guidance Metric Description	Suggested Evaluation Method	Minimum Acceptable Result	Mandatory for CIP
DCS2	The percentage of features included in the layer that are excess. (e.g. features that are either not reported to the RPI or are not real world features)	Direct External: Visual inspection against imagery Direct External: Comparison against database of known features (i.e. real property database)	5%	Yes, Real Property feature types only

**Metric Description:** Description of the metric tailored to the DCS feature type

**Suggested Evaluation Method:** Recommended evaluation methods to determine the data quality result

**Minimum Acceptable Result:** The minimum acceptable result required for each metric



# What is SDSFIE – R?

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Provides guidance to the IGI&S Community for:

- Application of raster standards
- ***Minimum*** and ***preferred*** data resolutions to be used
- Preferred data collection, processing and interchange formats
- Best practices for all forms of raster data (raster maps, raster imagery, elevation, etc.)



# Using the Standard (SDSFIE-R)

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Two use case categories:

(a) Someone needing the preferred/recommended standards or specifications for one or more typical IGI&S uses of imagery/raster data

– **SDSFIE-R Sect. 2.0: Imagery and Raster Use Cases**

Imagery Use Cases

- ❖ Site Planning
- ❖ Environmental Assessment
- ❖ Feature Extraction
- ❖ Feature Classification

Raster Use Cases

- ❖ Obstruction Studies
- ❖ Contouring/Elevation Mapping
- ❖ Hydrographic Mapping/Modeling
- ❖ Line of Sight Studies
- ❖ Surface (3D) Modeling

(b) Someone needing all mandated or available imagery / raster standards

– **SDSFIE-R Annex: SDSFIE Raster Standards Compendium**



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**Questions?**