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Dataset Name

Maturity Level as of mm/dd/yyyy

Stewardship Maturity Matrix for Digital Environmental Data Products

Maturity Scale	Preservability	Accessibility	Usability	Production Sustainability	Data Quality Assurance	Data Quality Control/Monitoring	Data Quality Assessment	Transparency /Traceability	Data Integrity
Level 1 – Ad Hoc **Not Managed**	Any storage location Data only	Not publicly available Person-to-person	Extensive product-specific knowledge required No documentation online	Ad Hoc or Not applicable No obligation or deliverable requirement	Data quality assurance (DQA) procedure unknown or none	None or Sampling unknown or spotty Analysis unknown or random in time	Algorithm/method/model theoretical basis assessed (method and results online)	Limited product information available Person-to-person	Unknown or no data ingest integrity check
Level 2 - Minimal **Managed Limited**	Non-designated repository Redundancy Limited archiving metadata	Publicly available Direct file download (e.g., via anonymous FTP server) Collection/dataset level searchable	Non-standard data format Limited documentation (e.g., user's guide) online	Short-term Individual PI's commitment (grant obligations)	Ad Hoc and random DQA procedure not defined and documented	Sampling and analysis are regular in time and space Limited product-specific metrics defined & implemented	Level 1 + Research product assessed (method and results online)	Product information available in literature	Data ingest integrity verifiable (e.g., checksum technology)
Level 3 - Intermediate **Managed Defined, Partially Implemented**	Designated archive Redundancy Community-standard archiving metadata Conforming to limited archiving process standards	Level 2 + Non-standard data service Limited data server performance Granule/file level searchable Limited search metrics	Community Standard-based interoperable format & metadata Documentation (e.g., source code, product algorithm document, processing or/and data flow diagram) online	Medium-term Institutional commitment (contractual deliverables with specs and schedule defined)	DQA procedure defined and documented and partially implemented	Level 2 + Sampling and analysis are frequent and systematic but not automatic Community metrics defined and partially implemented Procedure documented and available online	Level 2 + Operational product assessed (method and results online)	Algorithm/method/model Theoretical Basis Document (ATBD) & source code online Dataset configuration managed (CM) Unique Object Identifier (OID) assigned (dataset, documentation, source code) Data citation tracked (e.g., utilizing Digital Object Identifier (DOI) system)	Level 2 + Data archive integrity verifiable
Level 4 - Advanced **Managed Well-Defined, Fully Implemented**	Level 3 + Conforming to community archiving standards	Level 3 + Community-standard data services Enhanced data server performance Conforming to community search metrics Dissemination report metrics defined and implemented internally	Level 3 + Basic capability (e.g., subsetting, aggregating) & data characterization (overall/global, e.g., climatology, error estimates) available online	Long-term Institutional commitment Product improvement process in place	DQA procedure well documented, fully implemented and available online with master reference data Limited data quality assurance metadata	Level 3 + Anomaly detection procedure well-documented and fully implemented using community metrics, automatic, tracked and reported Limited quality monitoring metadata	Level 3 + Quality metadata assessed (method and results online) Limited quality assessment metadata	Level 3 + Operational Algorithm Description (OAD) online, OID assigned, and under CM	Level 3 + Data access integrity verifiable Conforming to community data integrity technology standard
Level 5 - Optimal **Level 4 + Measured , Controlled , Audit**	Level 4 + Archiving process performance controlled, measured, and audited Future archiving standard changes planned	Level 4 + Dissemination reports available online Future technology and standard changes planned	Level 4 + Enhanced online capability (e.g., visualization, multiple data formats) Community metrics of data characterization (regional/cell) online External ranking	Level 4 + National or international commitment Changes for technology planned	Level 4 + DQA procedure monitored and reported Conforming to community quality metadata & standards External review	Level 4 + Cross-validation of temporal & spatial characteristics Physical consistency check Conforming to community quality metadata & standards Dynamic providers/users feedback in place	Level 4 + Assessment performed on a recurring basis Conforming to community quality metadata & standards External ranking	Level 4 + System information online Complete data provenance available online	Level 4 + Data authenticity verifiable (e.g., data signature technology) Performance of data integrity check monitored and reported

Dataset Information: URL Goes Here
Dataset POC: Name & E-mail Here

SMM POC: Ge.Peng@noaa.gov
SMM Assessment POC: Name & E-mail Here

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Peng, G., J.L. Privette, E.J. Kearns, N.A. Ritchey, and S. Ansari, 2015: A unified framework for measuring stewardship practices applied to digital environmental datasets. *Data Science Journal, 13.* http://dx.doi.org/10.2481/dsj.14-049.

High-level background on the scientific data stewardship maturity matrix can be found at:

https://doi.org/10.6084/m9.figshare.1150243

(short link: bit.ly/DSMMintro)

The scope and rationale of the stewardship maturity assessment model and its nine key components are described in Peng et al. (2015), which can be accessed at :

https://dx.doi.org/10.2481/dsj.14-049

(short link: bit.ly/DSMMpaper)

A self-assessment template using the latest NCEI/CICS-NC Scientific Data Stewardship Maturity Matrix (DSMM) is available at:

https://dx.doi.org/10.6084/m9.figshare.1211954

(short link: bit.ly/DSMMtemplate)

Additional Resources

- ncics.org/dsmm

Getting to know and to use DSMM:

https://doi.org/10.6084/m9.figshare.5346343

(short link: bit.ly/DSMM-FlowChart)

NOAA *OneStop* Application of DSMM:

- Poster: Providing Rich and Structured Dataset Quality Information https://doi.org/10.6084/m9.figshare.7945796 (short link: bit.ly/DSMM-RDA13P)
- Preprint: Practical Application of a Data Stewardship Maturity Matrix for the NOAA OneStop Project https://osf.io/preprints/fp3js (submitted to *Data Science Journal*)

WMO Commission for Climate Adaption of DSMM:

- Poster: WMO STEWARDSHIP MATURITY MATRIX FOR CLIMATE DATA (SMM-CD) https://doi.org/10.6084/m9.figshare.8038730 (short link: bit.ly/SMM-CD-EGU19)
- Guidance Booklet – WMO Stewardship Maturity Matrix for Climate Data (SMM-CD) https://doi.org/10.6084/m9.figshare.7002482 (short link: bit.ly/SMM-CD-Manual)