OREGON DATA LITERACY FRAMEWORK REPORT

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I. Introduction

Why Focus on Data Literacy?

Thoughtful use of data is critical for effective, equitable, and efficient government programs and services. Use of data as a strategic asset is also integral to the development and delivery of new policies and services.

When representative and equitable data directly supports decision making, expected outcomes are better defined, assessments made more accurate, service improvements more effective, programs are managed and maintained more efficiently, and communities of many backgrounds benefit. All areas of work are directly impacted by the quality, availability, management, and use of data, making each employee within the state a data citizen, with direct responsibility for upholding good data practices within state government.

Ensuring state employees have access to the knowledge, foundational data governance, and sound data management structure they need to accomplish quality work on behalf of citizens are goals embodied in the Oregon Data Strategy. The Oregon Data Strategy 2021-2023 Biennial Action Plan identified development of a Data Literacy Framework as critical to advance Oregon's use of data as a strategic asset.

This framework is intended to act as a flexible high-level tool for identifying core competencies and skillsets, and to assist in building educational and professional development opportunities for data literacy throughout the state.

What Do We Mean by Data Literacy?

When asked how one defines data literacy, the answer generally varies in relationship to the experience respondent(s) bring to the question. Most often when you ask data professionals, you will hear some version of the following:

"Data literacy is the ability to read, write and communicate data in context…" [1]

However, this seemingly simple statement leaves many details undefined and has some important gaps. Let's begin with the details. For the Oregon Data Literacy Framework, a broad universe of data-related abilities is included in what is considered "data literacy".

Numeracy – the ability to understand and work with numbers.

Visualization Literacy – the ability to create data visualizations that communicate effectively.
Visual Literacy – the ability to interpret data visualizations correctly.

[1] *Gartner Hype Cycle for Midsize Enterprises*, July 17, 2023

Statistical Literacy – the ability to generate and interpret statistics.

Computer Literacy – having data-related application (low and no-code) and/or programming (coding) skills.
Computational Literacy – the ability to understand, reason, and interact with complex and abstract systems, including those driven by computers and algorithms.

Data Management Skills – the ability to collect and store quality data securely, and make it readily available for use.

Data Architecture and/or Engineering Skills – the ability to conceptualize, visualize, and design data pathways to optimize the flow of data throughout the organization; and/or to build, manage and maintain them.

Artificial Intelligence & Machine Learning Skills – the ability to understand the workflows, modeling techniques, and strategies behind artificial intelligence and machine learning solutions.

Information Literacy – the ability to recognize when information is needed, and locate, evaluate, and use the needed information effectively.

Data Ethics – the ability to fully grasp the significance of decision making related to data collection, analytics, and use, by critically thinking about context, working to avoid biases, and ensuring that data practices consider equity and inclusion.

This broad definition informed the development of the data literacy framework capabilities (specific skill/ability groupings) and proficiencies (levels of attainment within those groupings).

Now the gaps. First, data literacy is not a "one size fits all" proposition. The range of capabilities and level of skill (proficiency) required for individuals to be successful varies depending on their role(s), their profession or industry, the size of their organization, and even the stage of their career. For this reason, the framework includes a base set of personas or roles and describes a set of capabilities and proficiencies for each one. Organizations can use this base set as provided, adjust them, use them as examples to create their own, or some combination of those approaches to meet their needs.

In addition, achieving data literacy isn't simply about what you understand and are capable of, there must be a willingness to act on that knowledge, and to integrate the change in understanding into work practices. Some of that willingness occurs at the individual level, but there are also cultural and environmental factors that influence the degree to which action is taken.

This means becoming a data literate and data-informed organization or state will likely also require some adjustments to general mindset or culture, and potentially changes in the foundational data management and delivery approaches supporting employees' ability to act.

II. How to use the Framework

The next section provides an overview of the framework components and some limited guidance on framework use. Development of more complete guidance on how to use the framework is recommended as part of framework implementation.

Basic Components

The Oregon Data Literacy Framework is composed of three primary components:

- Capabilities – specific skill/ability groupings
- Proficiencies – levels of attainment for each capability
- Personas/Roles – a recognizable role or role grouping that requires similar data-related skillsets

Capabilities

There are seventeen capabilities comprising a broad range of skill/ability groups. These are intended to represent the most common skill areas, though the list is by no means comprehensive. Appendix A gives more detail about what each capability entails and what different levels of proficiency mean.

Capability	Description
Value Data Assets	Understanding the value and use of data and treating organizational data accordingly. This includes drawing insights from data for evidence-based decisions and recommendations.
Collection	Gathering and combining primary or secondary data for a specific purpose
Documentation	Developing and/or augmenting metadata to improve findability and accessibility, business rules, collection, tagging (for both primary and secondary/derived data)
Organization/ Management	Gathering data and then analyzing, categorizing, contextualizing, and maintaining it (and in some cases, destroying) as an organizational resource. The process of acquiring, organizing, storing, and maintaining data throughout its lifecycle to ensure its availability, reliability, integrity, and security. It involves the implementation of strategies, policies, and procedures to effectively manage data assets within an organization
Privacy & Security	*Privacy:* Ensuring the proper use and processing of personal data, potentially including enabling individuals to decide and limit access to the use and sharing of their personal data. *Security:* Protecting digital data from theft, corruption, or unauthorized access throughout its entire lifecycle: creation, storage, use, sharing, archiving, destruction. Labeling data (classification) to indicate the appropriate level of access.

Governance	Developing and/or implementing a collection of practices and processes, which help ensure the intentional management of data assets within an organization.
Modeling	Creating a conceptual representation of data objects and their relationships to one another by applying formal techniques (through text and symbols) for the purpose of database, systems, and architectural design. Data modelers work with stakeholders to understand the data requirements, define the entities and attributes, establish the relationships between the data objects, and create a model that accurately represents the data in a way that can be used by data engineers and architects, application developers, database administrators, and others.
Integration	Combining multiple datasets together to form a larger dataset, aiming to maximize the value of the data.
Cleaning	Using the appropriate method and tools to fix or remove corrupted, incorrectly formatted, duplicate, or incomplete data within a dataset
Quality Evaluation	Assessing data and analyses critically to determine whether they meet the quality required for a given purpose and are of the right type and quantity to support their intended use
Discovery	Searching, identifying, locating, and accessing data from a range of sources
Analysis	Using analytical or statistical techniques and tools to provide summaries/patterns and extract actionable/relevant information from the given dataset. Applying advanced analytical or statistical techniques and tools (e.g., machine learning, data mining) to build accurate and valid mathematical or qualitative modeling solutions
Visualization	Creating meaningful tables, charts, and graphics to visually present data for end users or consumers
Interpretation	Reading and understanding data in context and identifying points of interest (inferring understanding of mathematical concepts, visualizations, patterns, and trends)
Storytelling	Communicating data insights tailored to a specific audience with a compelling narrative
Evidence-Based Decision-Making	Making a judgment on the interpretation of processed/analyzed data and using data to inform reasonable decisions

Ethics	Acquiring, using, and sharing data in an ethical manner, including recognizing legal, ethical, and equity issues (e.g., bias, credibility, copyright, disproportionate impact)

Notes: Adapted from both *A Comparative Analysis of Data Literacy Competency Frameworks,* by Jeonghyun (Annie) Kim and Catrina Berka, at the University of North Texas and the *Australian Public Sector Data Capability Framework,* by the Australian Bureau of Statistics, Commonwealth of Australia 2021.

Proficiencies

The proficiencies describe levels of attainment for each capability. The framework includes three levels of proficiency: foundational, intermediate, and advanced. Each proficiency level is described in terms of level of understanding, level of ability, and the way the person at this level interacts with others when either they or another seek to actualize the specific capability. Appendix A offers specifics about what each proficiency level means for each capability.

Elements	Foundational	Intermediate	Advanced
Understanding	• Basic awareness of concepts and techniques • Can identify subpar work in the basic application of this skill/knowledge area	Demonstrates a broad understanding of concepts and techniques	Demonstrates an extensive understanding of concepts and techniques
Ability	• Follows guidance • Complies with established procedures	• Demonstrates application of concepts and techniques with minimal guidance in normal situations • Uses precedents and/ or industry standards	• Demonstrates extensive application of concepts and techniques • Uses industry standards and sometimes modifies uses of precedents • Shapes the organization's approach in the application of this skill/knowledge area
Interaction with Others	Seeks advice	Influences, upholds, modifies, consults others with more experience, shares advice	Leads, implements, monitors, regulates, advises, explains

Note: Adapted from *Australian Public Sector Data Capability Framework*.

Many frameworks describe people at the highest level of proficiency as coaching or teaching others. This was purposefully excluded in the Oregon Data Literacy Framework, as the ability to coach or teach is separate from having attained high levels of proficiency.

However, some cultural and technological foundations were assumed, and that is reflected in the proficiency descriptions.

Personas/Roles

As mentioned in the introduction, data literacy is not a "one size fits all" proposition. The range of capabilities and level of skill (proficiency) required for individuals to be successful varies. It depends on their role(s), their profession or industry, the size of their organization, and even the stage of their career.

For this reason, the Oregon Data Literacy Framework includes a base set of profiles for nine personas/roles that require similar data-related skillsets. These are:

Persona/Role	Description
Decision Makers	Executive leaders, managers, and board members who are thought leaders primarily responsible for driving the strategic agenda of an organization.
Organizational Data Leads	People in the organization with broad based accountability and responsibility for strategic planning for data, data governance, and data management for the organization as a whole or a major division/department.
Data Managers	Supervisory managers responsible and accountable for managing organizational data assets (though they may not be doing any of the hands-on work themselves). Typically, these are tactical or operational roles. If they have strategic responsibilities, they tend to be at the unit level only.
Subject Matter Experts	Business area subject matter experts and people responsible for the day-to-day management of business data (data stewards).
Data Architects/Engineers /Administrators	People responsible for database design, development, and/or maintenance. Staff that design or implement data architecture; and/or lead or support creating, managing, and/or updating data management pipelines. Staff that provides data engineering, data transformation, or data integration services.
Data Analysts	People whose primary responsibilities include retrieving and/or analyzing data, using statistical modeling and/or other data science methodologies. People in this role have a strong production orientation, and serve as experts in advanced analytics, business intelligence, data management, etc.
General Data Users	People whose job sometimes involves using or analyzing data to guide activities or decisions in support of core agency functions and activities.
Data Collectors/Data Entry Staff	People whose job includes collecting, creating, or entering data as part of day-to-day work in support of core agency functions and activities.
Data Communicators	People in the organization who are responsible for communicating data to others, such as the general public, media, and/or legislators.

The profiles for each persona/role include the persona/role title, description, capabilities list (including expected level of proficiency for each capability), and a narrative summarizing some of the key elements of the capabilities/proficiencies. Appendix A includes all of the base set of nine persona/role profiles.

Using Personas/Roles

Organizations can use the base set of persona or role profiles as provided, adjust them, use them as examples to create their own, or some combination of those approaches to meet their needs.

Modifying

Modifications to the personas/roles may include:

- Adjusting the level of proficiency for an included capability.
- Adding or removing a capability.
- Adjusting the name and description to better align with how they are described within your organization.

Adding

This framework gives you the building blocks necessary develop your own personas/roles. Note however that roles are layered to represent jobs (next section). The approach for developing a new persona/role should include:

- Identify a role or role grouping that requires the same or similar data-related capabilities (at a minimum), and preferably similar levels of proficiency.
- Identify the capabilities and the level of proficiency you wish to recommend for each capability.
- Title and describe the role.
- Identify some of the key elements of the cabilities/proficiencies you are recommending.
- Use the provided template to communicate this information.
- Get feedback and adjust as necessary.

Relationship to Jobs

Our professional lives, like our personal lives, often require us to play more than one role. The following narratives are provided to illustrate possible relationships between the data-related roles in the framework and jobs:

Anna is responsible for overseeing the process for handling complaints from the public through an online database. She serves as a complaints duty officer entering complaints that come in over the phone (*Data Collectors/Data Entry Staff*), as the person responsible for ensuring quality and consistency of data in the complaints system, and she serves as a data steward (*Subject Matter Expert*). She also uses the database to run quarterly reports about complaints for agency leadership (*General Data Users*).

Jerome manages the community outreach department for his city. The department uses and collects a wide variety of quantitative and qualitative data about the city's organizations, neighborhoods, and underserved groups (*General Data User*). The data is used routinely both internally and by the public, so Jerome discusses the department's work with community groups and policy makers (*Data*

Communicator). As department manager, Jerome oversees the staff who collect, use, and preserve community data, and works with IT, other departments, and external vendors to assist with certain data functions *(Data Manager*). In partnership with his staff and policymakers, Jerome exercises relatively wide authority over how his department conducts outreach, its strategic direction, and the data they collect (*Decision Maker*).

Tammy is an operations and policy analyst for a state regulatory agency. She is a data steward who oversees a significant part of her agency data. She is considered the *Subject Matter Expert* in her area for her agency, providing guidance and training to her team and external partners. She is often called upon for guidance in any project that uses data from or affects her area. She also serves as a representative of the agency on national organizations, helping to set the standards and rules that relate to her data. She does not create reports herself, but she reviews existing reports and uses them to review and clean-up data as necessary.

When layering personas/roles to describe a job and using them to assess or describe data-related capabilities and proficiencies, the following is recommended:

- Aggregate capabilities so that they are cumulatively represented.
- Only represent each capability once, even if it occurs across several of the roles that comprise a job.
- Identify the highest proficiency for the capabilities for the range of roles included. If you decide going with the highest proficiency for all the roles with a given capability is not warranted, document and share explanation.

Using Capabilities and Proficiencies

Similar to the personas/roles, organizations can use the capabilities and proficiencies as provided, adjust them, use them as examples to create their own, or some combination of those approaches to meet their needs.

Modifying

Modification can occur a number of ways. Here are a few examples:

- Modify just the proficiencies of a capability by providing more details or editing the descriptions. Make sure that these additions or edits still fit with the umbrella of the capability.
- Modify the capability and then adjust the proficiency levels to reflect your change to the capability.
- Reduce or eliminate the cultural elements embedded in the capability and its proficiency levels.
- Add identification of relevant dependencies (see below).
- Modify the proficiency approach and document both changes and reasoning.

Adding

The approach for developing a capability and associated proficiencies should include:

- Identify a specific skill/ability grouping (capability) not represented or split-off a segment of an existing framework capability (for instance split-off machine learning and artificial intelligence from analysis). Try not to create overlap or redundancy with other capabilities you are using.
- Develop three levels of proficiency for your new capability: foundational, intermediate, and advanced. Each proficiency level is described in terms of level of understanding, level of ability, and the way the person at this level interacts with others when either they or another are seeking actualize the specific capability. Use the same proficiency approach across all capabilities.
- Title and describe the capability.
- Get feedback and adjust as necessary.

Dependencies

There are some dependencies across the capabilities list. However, given the variability of approaches to using this framework and the variability of skills needs depending on role(s), profession, industry, size of organization, and stage of career, no attempt has been made to definitively map them.

However, we do recommend providing some guidance on dependencies, either through course hierarchies or as a part of your organizational framework adoption. Here are some examples:

- Foundational "Analysis" proficiency is required to reach a foundational proficiency in "Visualization", "Interpretation", "Storytelling", or "Evidence-Based Decision-Making".
- Understanding data "Documentation" is an important precursor to intermediate levels of proficiency in data "Governance", "Quality Evaluation", and "Discovery".

Assessing Data Literacy Courses/Training

When assessing whether identified data literacy courses/training (existing or under development) would allow attendees to meet specific levels of proficiency for selected capabilities, the following approaches are recommended:

- Determine and map alignment of courses with capabilities you have adopted, then assess what level of proficiency the course would meet within the capability.
- Assume all elements within a proficiency need to be met to reach that proficiency. More than one course may be required to reach any given proficiency level.
- Assess the target audience of the course. If the material and structure are not intended for the type of people in the roles you are targeting, it may not be a good fit, even if the course material is in alignment with the capabilities and proficiencies you have identified.

These recommendations are just a start. Development of more complete guidance on how to assess data literacy courses is recommended as part of the framework implementation efforts.

Appendix C includes recommendations for the state and other organizations implementing this framework.

Appendix A: Oregon Data Literacy Framework

Capabilities & Proficiencies

The framework consists of seventeen capability groupings, each with three described levels of proficiency: foundational, intermediate, and advanced. The proficiency levels describe expectations in terms of level of understanding, level of ability, and the way the person at this level interacts with others when either they or another seek to actualize the specific capability.

Capability	Description	Proficiency Levels		
		Foundational	**Intermediate**	**Advanced**
Value Data Assets	Understanding the value, use, and limitations of data and treating organizational data accordingly. This includes drawing insights from data for evidence-based decisions and recommendations.	Is familiar with organizational data assets relevant to their work. Understands how those assets contribute value to the organization and that there may be limitations to existing data. Actively looks for opportunities to use data to support equitable decision making, advice, and research. Uses insights from data to make informed, evidence-based decisions and recommendations, and act accordingly.	Has extensive knowledge of the organization's data assets, including a comprehensive understanding of how their fitness for purpose translates to value for the organization. Promotes opportunities for using data to support equitable decision making, advice, and research. Considers the broader environment and context, including equity considerations, when drawing or interpreting insights from data. Uses these insights to make informed, evidence-based decisions and recommendations, and act accordingly.	Has a comprehensive understanding of the data assets available to the organization and understands how these assets contribute strategic value, and more equitable outcomes. Understands the limitations of existing data, including the underlying assumptions embedded, and how this may hinder equitable processes and decisions. Looks for new ways to obtain value from organizational data assets. Can advise how organizational data assets contribute value in broader data contexts. Is an expert resource on the broader and strategic environment when drawing insights from data. Uses this expertise to make informed, equitable, evidence-based decisions and recommendations, and act accordingly.
Collection	Gathering and combining primary or secondary data for a specific purpose	Understands the role of data collection and the value propositions and equity impacts of different collection approaches. Can collect data by following established processes, using the systems and tools provided. Is aware of relevant data collection methodologies. Knows where to obtain advice on data collection methodologies as required.	Has a comprehensive knowledge of the full range of data collection options, including costs, benefits, and equity considerations. Is able to develop no or low code methods and/or amend existing code (programming language) to collect data. Knows how to mitigate issues arising from different collection modes. Can make and justify recommendations of various modes of collection. Consults with those they are collecting data about to ensure fair and equitable representation.	Is an expert resource in all aspects of data collection, including why data is collected, the roles associated with collection, and the equity implications of different collection methods. Can write custom scripts and code (programming language) to collect data. Can make justifiable decisions about how data is collected. Maintains understanding of new trends and innovations relating to data collection methodology (including Artificial Intelligence-based technologies) and develops own capabilities in these where relevant. Works with communities that are underserved and under-resourced to address systemic inequities and biases in data collection.
Documentation	Developing and/or augmenting metadata to improve findability and accessibility, business rules, collection, and tagging (for both primary and secondary/derived data)	Understands there are different ways to summarize data and has a basic understanding of commonly used metadata options. Understands the concept of metadata, including its purpose and benefits.	Can use various summary options to effectively describe data and explain and justify those choices. Understands there are equity implications for how data is described. Uses metadata with current terminology and concepts that is sensitive to the nature of the data being described. Follows organizational standards and procedures relating to metadata creation, storage, and use. Can access metadata and use the descriptors to better understand existing data and effectively use it. Can use a range of tools for storing and working with metadata. Keeps metadata refreshed and updated, and can repair items that are incorrect or out of date.	Is an expert resource on metadata. Can establish standards for metadata and provide oversight and advice to others. Maintains knowledge of metadata best practices, including standards and applications. Proactively identifies equity considerations in developing metadata standards and schema.

Capability	Description	Proficiency Levels		
		Foundational	**Intermediate**	**Advanced**
Organization/ Management	Gathering data and then analyzing, categorizing, contextualizing, and maintaining it (and in some cases, destroying) as an organizational resource. The process of acquiring, organizing, storing, and maintaining data throughout its lifecycle to ensure its availability, reliability, integrity, and security. Implementing strategies, policies, and procedures to effectively manage data assets within an organization.	Can access and comply with data and information management principles and associated guidelines. This includes requirements relating to data access, data security, privacy, and ethics. Knows where to obtain advice on the application of good data and information management practice. Is aware of basic data categories, classifications, and database development protocols, and their proper application to data in general. Understands the basics of data, its characteristics, and its significance. Knows how to collect relevant and reliable data from various sources and how to critically evaluate those sources. Understands different storage options and the basics of database management systems. Is aware of data security principles, data privacy regulations, and best practices for securing data.	Has a comprehensive knowledge of the organization's data and information management principles and guidelines and can apply them to support good data practice. This includes requirements relating to data access, data security, privacy, ethics, and equity. Can advise others on the proper application of data and information management concepts. Has a comprehensive knowledge of data categories, classifications, and database development protocols. Knows where to obtain related expert advice when needed. Familiar with establishing policies, processes, and controls to ensure data integrity, compliance, and accountability.	Is an expert resource for implementing and shaping the organization's data and information management practices and can advise others. This includes requirements relating to data access, data security, privacy, ethics, and equity. Skilled in developing data strategies, aligning data management with organizational goals, and creating roadmaps for data initiatives. Represents a point of contact for data and information management leads in other organizations. Is an expert resource on and can employ conceptual frameworks in support of data categories, classifications, and database development protocols.
Privacy & Security	*Privacy:* Focuses on why personal information is collected, processed, maintained, and shared and the individual's rights related to the use of their information. *Security:* Protecting digital data from theft, corruption, or unauthorized access throughout its entire lifecycle: creation, storage, use, sharing, archiving, destruction. Labeling data (classification) to indicate the appropriate level of access.	Is aware there are legal and regulatory conditions, and best practices for data privacy and security and understands the importance of protecting personal and sensitive data. Can label and secure data following established processes, using the systems and tools provided. Knows where to obtain advice on data security and privacy as required.	Understands and can describe the importance of data privacy and security and their application to organizational data. Is familiar with laws, regulations, policies, and guidance governing data privacy, and methods and systems which are used to appropriately secure data. Is aware of and applies an equity lens to evaluating who may be more vulnerable and in need of privacy protections. Can communicate the importance of good data privacy and security practices to others.	Is an expert resource in data privacy and security and can formulate and advise on policies and procedures. Follows new legislative requirements and ensures organizational compliance with these. Maintains awareness of trends related to data security and privacy. Evaluates and provides guidance on applying these processes to ensure equitable protection. Can advise others on the interpretation and implementation of data privacy and security laws, regulations, policies, and best practices.
Governance	Developing and/or implementing a collection of practices and processes, which help ensure the formal management of data assets within an organization.	Is aware of and understands implications of data governance frameworks and policies and the relevant legislative requirements that underpins them (includes data access, data security, privacy, equity, and ethics). Knows where to obtain advice on governance as required.	Can contribute to the creation of internal policies in support of data governance in alignment with current legislative and organizational requirements (includes data access, security, privacy, equity, and ethics). Can explain to others the importance of good governance practices.	Is an expert resource in data governance and can formulate and advise on data governance policies and contribute to the structure of organizational data governance frameworks (includes data access, security, privacy, equity, and ethics). Represents a point of contact for data governance leads in other organizations. Follows new legislative requirements and trends that impact good data governance and ensures organizational compliance with these (includes data access, security, privacy, equity, and ethics). Understands and can advise on managing data assets to promote equitable outcomes. Can provide data governance thought leadership across broader data use contexts.

Capability	Description	Proficiency Levels		
		Foundational	**Intermediate**	**Advanced**
Modeling	Creating conceptual representations of data objects and their relationships to one another by applying formal techniques (through text and symbols) for the purpose of database, systems, and architectural design. Includes several steps such as requirements gathering, conceptual design, logical design, physical design, and implementation. Involves working with stakeholders to understand data requirements, define entities and attributes, establish relationships between the data objects, and create models that accurately represents the data in a way that can be used by data engineers and architects, application developers, database administrators, and others.	Understands the different types of data models (conceptual, logical, physical) and their use. Understands data modeling techniques or approaches and when to employ them. Can create basic data models and/or revise or update existing models.	Can work with business lines to identify requirements, capture the business context of data, and meet an organization's information needs. Understands there may be equity implications to different modeling techniques or approaches. Can develop conceptual, logical, and physical data models using a variety of techniques/approaches and validate their accuracy.	Can create complex data models. Can clearly explain to others the types of data models, modeling techniques or approaches, and when to employ them. Stays aware of advancements in data modeling and architecture and is an expert resource. Understands and can advise on equity considerations for selecting appropriate techniques or approaches.
Integration	Combining multiple datasets together to form a larger dataset, aiming to maximize the value of the data. Includes incorporating quantitative and qualitative data as appropriate.	Has a basic understanding of how data can be linked with other data. Understands what data integration is, including its benefits and limitations. Understands what types of data can be combined for analysis. Can follow guidelines and procedures to maintain the integrity of the data they are combining.	Can perform data integration using standard tools and can implement quality controls. Can assess datasets' suitability for linkage and extract appropriately prepared datasets. Can identify if integration of qualitative and quantitative datasets is possible and desirable. Has a comprehensive understanding of relevant data integrity principles and practices and uses them to maintain integrity of organizational data. Understands equity implications of integrating data. Knows where to obtain expert advice on data integration as needed.	Can perform and provide expert advice on data integration, including combining qualitative and quantitative datasets. Is an expert resource on ensuring data integrity across its lifecycle, and advises others. Can explain good data integration practices and principles. Maintains understanding of new trends and innovations relating to integrating data and develops skills in these where relevant. Understands and provides guidance on equity implications of integrating data.
Cleaning	Using the appropriate method and tools to fix or remove corrupted, incorrectly formatted, duplicate, or incomplete data within a dataset	Knows where to access relevant methods for checking data for consistency, errors and outliers, and correcting errors, and understands the basics of those methods. Knows who to consult for expert data cleaning knowledge. Can edit data following established guidelines and procedures.	Has a comprehensive knowledge of the different cleaning and editing methods at their disposal. Understands why different methods are used and can describe the limitations of each method, including equity considerations. Knows where to find expert advice about data cleaning and editing as required.	Is an expert resource on different methods of data cleaning and editing and can advise others. Can assess current and evolving data cleaning and editing methods critically, including the equity implications of different methods. Can clearly explain data cleaning and editing concepts and methods to others.

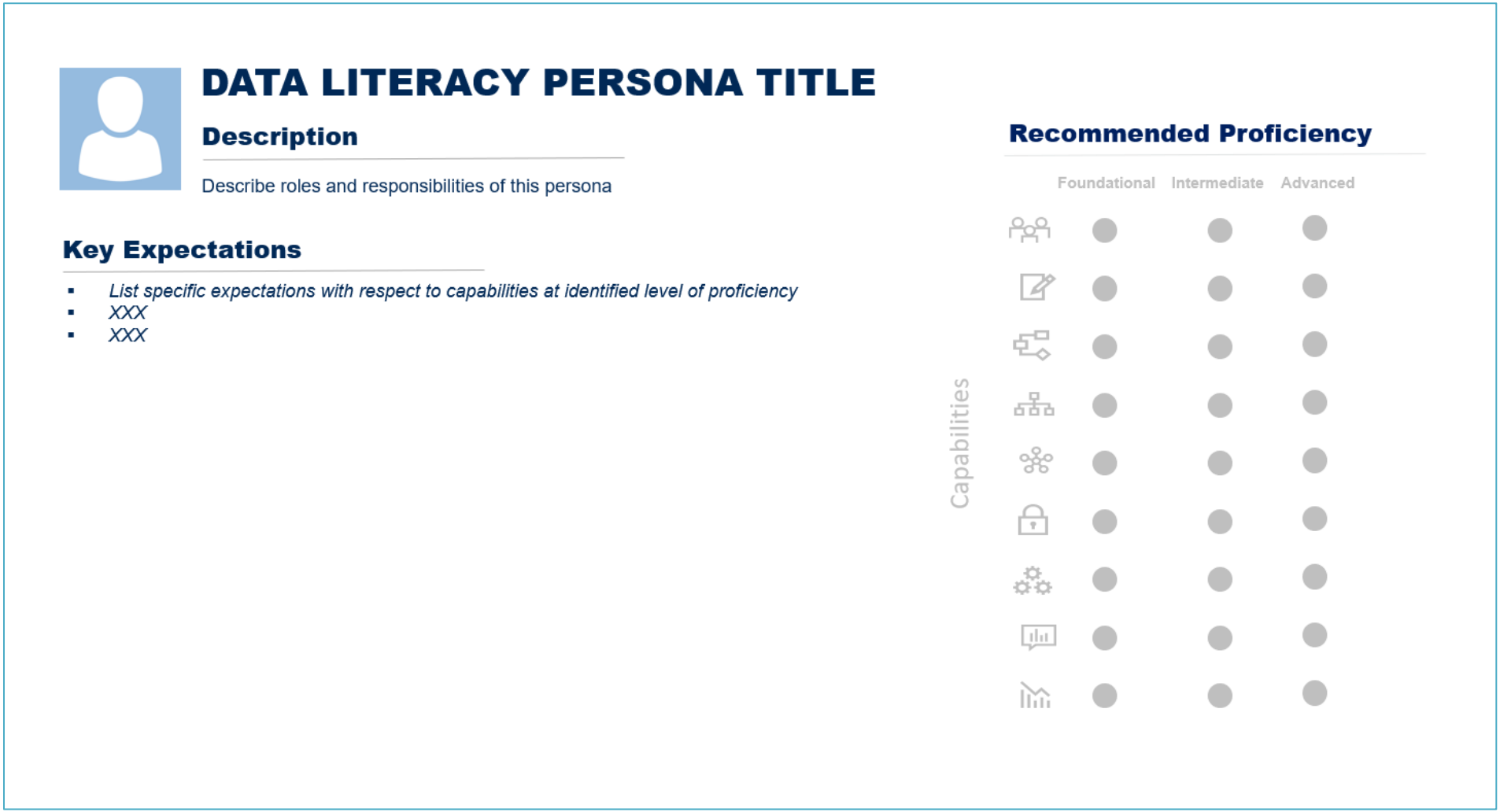
Capability	Description	Proficiency Levels		
		Foundational	**Intermediate**	**Advanced**
Quality Evaluation	Assessing data and analyses critically to determine whether they meet the quality required for a given purpose and are of the right type and quantity to support their intended use	Understands the concept of data quality and its importance. Knows where to access data quality measures for the data they use. Can follow guidelines and procedures to determine the trustworthiness and accuracy of the data they are using and considers whether there is equitable representation of different groups.	Can describe and produce data quality measures for the outputs they produce. Has a comprehensive knowledge of relevant data quality measures and can use them to make accurate assessments of data fitness for purpose (including trustworthiness, accuracy, and equity).	Is an expert resource in the use of measures for data quality assurance, the interaction of those measures, and their application in conjunction with one another. Can advise others on the use of data quality measures to make accurate assessments of data fitness for purpose (including trustworthiness, accuracy, and equity). Understands and advises on the equity implications of assessing data quality and whether it is accurately reflective of diverse communities and interests.
Discovery	Searching, identifying, locating, and accessing data (both qualitative and quantitative) from a range of sources	Is aware of or can find available data (both internal and external). Is aware that data has limitations and gaps and seeks support in evaluating this if needed. Can use the range of available options to access common data sources.	Can identify and evaluate internal and external sources of data, including understanding any limitations and gaps and their equity implications. Can use suitable techniques to evaluate new sources of data. Has a comprehensive knowledge of protocols associated with data access.	Is an expert resource for seeking out new sources of data, including those more inclusive of underserved or underrepresented populations, or identifying new ways of using existing sources of data. Researches new techniques to assess data availability. Provides expertise in techniques to evaluate possible new sources of data. Can mitigate issues arising from different access approaches, including equity considerations. Can provide actionable strategic advice on data access. Can make and justify recommendations for data access.
Analysis	Using analytical or statistical techniques and tools to provide summaries/ patterns and extract actionable/relevant information from the given dataset. Applying advanced analytical or statistical techniques and tools (e.g., machine learning, data mining) to build accurate and valid mathematical and qualitative modeling solutions.	Is familiar with and maintains a basic understanding of analytical and statistical methodologies and concepts relevant for their work. Understands that data can be combined for analysis and the risks of combining data inappropriately. Understands how conscious and unconscious bias may impact how data is collected, documented, analyzed, and interpreted. Can choose from data analysis techniques. Can use (or learn how to use) appropriate analytical tools to investigate data.	Has a comprehensive understanding of a wide range of analytical and statistical concepts, methodologies, and their appropriate application. Can explain the proper use of a range of analytical and statistical concepts, methodologies to others. Understands what types of data can be combined for analysis and/or how to determine if they should be. Understands how conscious and unconscious bias may impact how data is collected, documented, analyzed, and interpreted, and can explain the ethical and equity implications. Can identify and implement suitable techniques and tools and assemble data visualizations for analysis on large/complex datasets. Can validate unexpected results. Can use business intelligence applications to create complex reports and dashboards. May use low and no code methods to understand, amend, and conduct data analysis. May use specialist statistical applications for statistical models.	Is an expert resource on statistical concepts and can provide advice on the proper use of statistical methods. Leads efforts to apply good statistical practice. Can clearly explain to others how to understand and apply statistical concepts and methods. Understands how bias may impact how data is collected, documented, analyzed, and interpreted, and can provide guidance on implementing more equitable processes. Is highly competent at performing analysis on large/complex datasets. Can clearly explain exploratory data analysis techniques to others. Maintains understanding of new trends and innovations relating to data and statistical analysis (including Artificial Intelligence-based technologies) and develops skills in these where relevant. Contributes to the development of new functionality for analytical and statistical applications, which enables new ways of doing things. May write custom scripts and code in a programming language to conduct complex analytical and statistical tasks.

Capability	Description	Proficiency Levels		
		Foundational	**Intermediate**	**Advanced**
Visualization	Creating meaningful tables, charts, and graphics to visually present data for end users or consumers	Can create basic visualizations such as tables, charts, diagrams, maps and graphics. Understands and can use the basics of visual design (color, emphasis, etc..) Can use business intelligence applications to create dashboards.	Can readily produce a range of data visualization outputs (including complex visualizations). Can critically assess and enhance visualizations produced by others. Can select the most appropriate medium to visualize data. Understands that how data is visualized can have equity implications by misrepresenting or erasing the experiences of diverse groups.	Innovates the development of new approaches to, and options for, data visualization, and can incorporate a range of techniques, including automation, interactivity, and animations. Can advise others on data visualizations options and the best options to present data results. Can clearly explain to others how to create and interpret data visualizations. Understands and can advise on how to avoid misrepresenting or erasing the experiences of diverse communities in data visualizations.
Interpretation	Reading and understanding data in context and identifying points of interest (inferring basic understanding of mathematical concepts, visualizations, patterns, and trends)	Can interpret basic quantitative data metrics and simple visualizations like standard charts, especially those within their content area. Understands recurring metrics, such as scorecards and dashboards created with business intelligence tools. Can interpret basic insights from qualitative data, such as thematic trends and common patterns, within their content area. Can question data and results they are presented, for their content area.	Can interpret novel reports and representations of data. Can explain basic reports and graphics to others. Can recognize appropriate (or inappropriate) representation of data in graphic or summarized form. Can question presented results of both quantitative and qualitative data to ensure they are not misleading, misused. Understands how bias can impact how data is interpreted.	Can contextualize summarized data using subject matter expertise, including knowledge of business rules, policies, and other factors that affect the interpretation of both quantitative and qualitative data. Can make informed interpretations about extent and limitations of available information. Can confidently call out issues with graphics and summarized reports. Can posit what additional questions may be of interest and what additional information would be needed for further analysis. Understands how bias can impact how data is interpreted and can advise on methods to reduce the impacts of bias on underserved and underrepresented communities.
Storytelling	Communicating data insights tailored to a specific audience with a compelling narrative	Can develop and deliver simple narratives to communicate insights related to their data. Can ask and answer a range of questions relating to their data, relevant to the audience. Can effectively communicate the relationship between the data and the context in which it is used. Can communicate effectively with a range of diverse individuals and communities. Understands when to delegate to specialists.	Can develop and deliver effective narratives to communicate insights drawn from a range of data sources and outputs. Can tailor approach to communicating insights through dialog with a diverse range of individuals and groups. Can comfortably question data and results they are presented, and answer technical questions relating to their data, relevant to the audience. Can communicate effectively between technical and non-technical experts across data production, management, or use, including customers, managers, and data professionals.	Can develop and deliver advanced narratives to communicate insights drawn from complex data sources and outputs. Maintains understanding of new trends and innovations relating to data communication (including Artificial Intelligence-based technologies) and develops skills in these where relevant. Understands the importance of translating technical concepts into non-technical language and can adapt communication effectively for a range of audiences. Can use innovative approaches to improve the process of summarizing data into meaningful narratives. Can advise on approaches to communicating insights in dialog with a diverse range of individuals and groups, with an emphasis on equitable sharing of data insights with those most impacted. Uses high quality analytics and visualization to communicate insights from data. Can effectively listen to technical and business stakeholders and understand and interpret their data needs.

Capability	Description	Proficiency Levels		
		Foundational	**Intermediate**	**Advanced**
Evidence-Based Decision-Making	Making judgments on the interpretation of processed/analyzed data and using data to inform reasonable and equitable decisions	Demonstrates a basic understanding of evidence-based decision making and how it differs from relying on gut or instinct. Understands the value of using data to inform decision-making processes, as well as the potential limitations and equity impacts of not critically evaluating the data sources. Understand the basic steps involved in evidence-based decision making, such as formulating a question, gathering data, analyzing the data, assessing equity implications, and drawing conclusions.	Able to critically evaluate data sources for reliability, validity, equity, and relevance to decisions being considered. Can use data and analysis to answer specific questions and effectively communicate findings and recommendations based on the data analysis. Has at least a foundational understanding of how intuition can play a limited part in decision making when combined with evidence.	Can apply sophisticated decision-making approaches to complex problems and decisions. Has a strong ability to synthesize and integrate data from multiple sources to generate actionable insights. Can communicate complex findings in a clear and compelling manner to diverse audiences. Is adept at critically evaluating if conclusions and decisions made by others can be supported by presented analysis and what may be missing. Understands that how data used in decision making has the potential to exacerbate or reduce equitable outcomes and can advise on steps to reduce bias. Able to reintegrate intuition along with evidence-based methods to apply their knowledge to real-world scenarios.
Ethics	Acquiring, using, and sharing data in an ethical manner, including recognizing legal, ethical, and equity issues (e.g., bias, credibility, copyright, disproportionate impact)	Understands that data practices have ethical implications. Knows that data practices disproportionately affect communities that are underserved and under-resourced. Recognizes that data practices are affected by personal and systemic biases. Is aware that there are legal implications and restrictions of data, such as copyright and privacy, and understands when subject matter expertise and/or professional legal support is needed. Understands that communities and cultures differ on appropriate data practices, such as what data is appropriate to collect or share. Is aware that data can be misinterpreted or misused for unintended purposes.	Can identify ethical implications of specific data practices. Can analyze data practices to identify disproportionate impact and how data practices are affected by bias. Has knowledge of how legal frameworks impact their own data practices and consults with legal professionals when appropriate. Understands varying perspectives about the ethical issues arising from the data with which they work. Can implement measures to mitigate ethical concerns and the potential for misinterpretation or misuse.	Can create methods to address specific ethical implications of data practices. Works with communities that are underserved and under-resourced to address systemic inequities and biases. Is an expert on the legal issues impacting their organization's data practices, working in concert with legal professionals. Creates standards and practices to ensure ethical data practices and limit potential misinterpretation or misuse. Works with groups to synthesize varying perspectives to create mutually agreeable ethical data practices.

Persona/Role Profiles

Data literacy is not a "one size fits all" proposition. The range of capabilities and level of skill (proficiencies) required for individuals to be successful varies. It depends on their role(s), their profession or industry, the size of their organization, and even the stage of their career. For this reason, the Oregon Data Literacy Framework includes a base set of profiles for nine personas/roles that require similar data related skillsets. The profiles are provided in a consistent template that includes the persona/role title, description, capabilities list (including expected level of proficiency for each capability), and a narrative summarizing some of the key expectations taken from the capabilities and proficiencies table for the appropriate proficiency level.



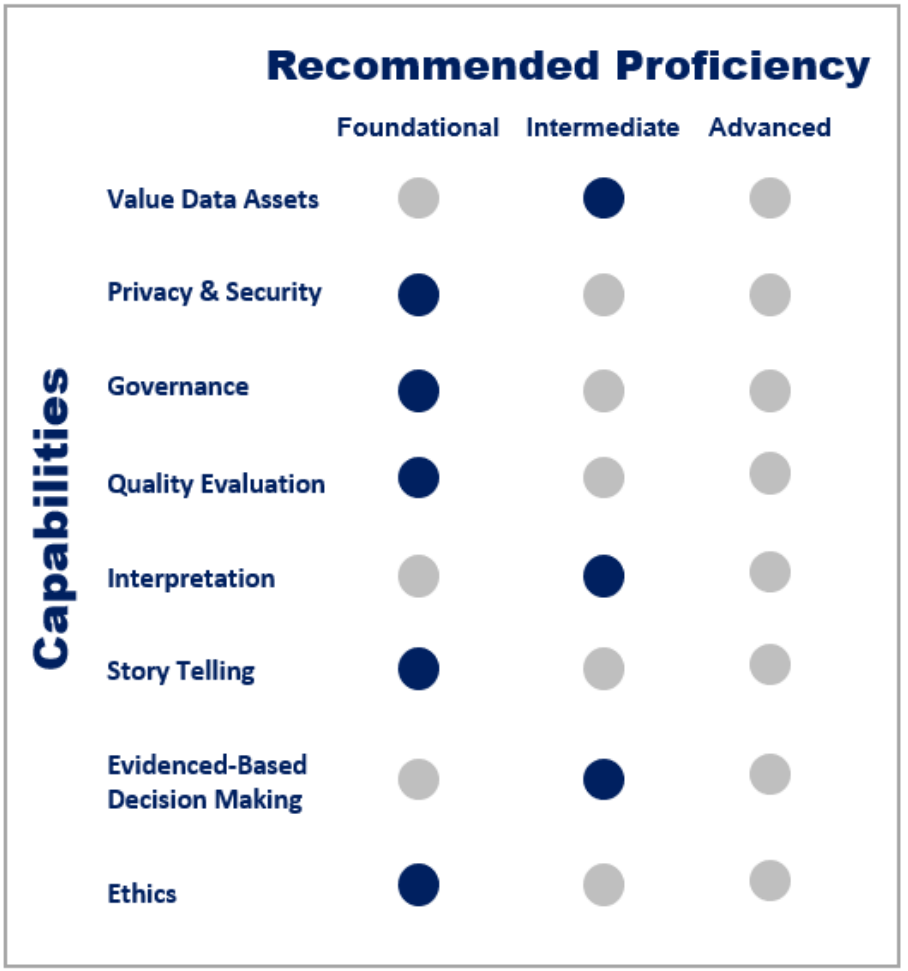
DECISION MAKER

Description

Executive leaders and managers who are primarily responsible for driving the strategic agenda of an organization.

Key Expectations

- Has extensive knowledge of the organization's data assets, including a comprehensive understanding of how their fitness for purpose translates to value for the organization.
- Promotes opportunities for using data to support decision making, advice, and research.
- Is aware there are legal and regulatory conditions for data privacy and security and understands the importance of protecting sensitive data. Knows where to obtain advice on data security and privacy as required.
- Is aware of and understands implications of data governance frameworks and policies and the relevant legislative requirements that underpins them (includes data access, data security, privacy, and ethics). Knows where to obtain advice on governance as required.
- Has a basic understanding of how data can be linked with other data. Understands what data integration is, including its benefits and limitations.
- Understands the concept of data quality and its importance. Knows where to access data quality measures for the data they use.
- Can explain basic reports and graphics to others. Can recognize appropriate (or inappropriate) representation of data in graphic or summarized form. Can question presented results to ensure they are not misleading or misused.
- Can develop and deliver a simple narrative to communicate insights related to their data. Can effectively communicate the relationship between the data and the context in which it is used.
- Able to critically evaluate data sources for reliability, validity, and relevance to decision being considered.
- Recognizes that data practices are affected by personal and systemic biases. Is aware that there are legal implications and restrictions of data, such as copyright and privacy, and understands when subject matter expertise and/or professional legal support is needed.



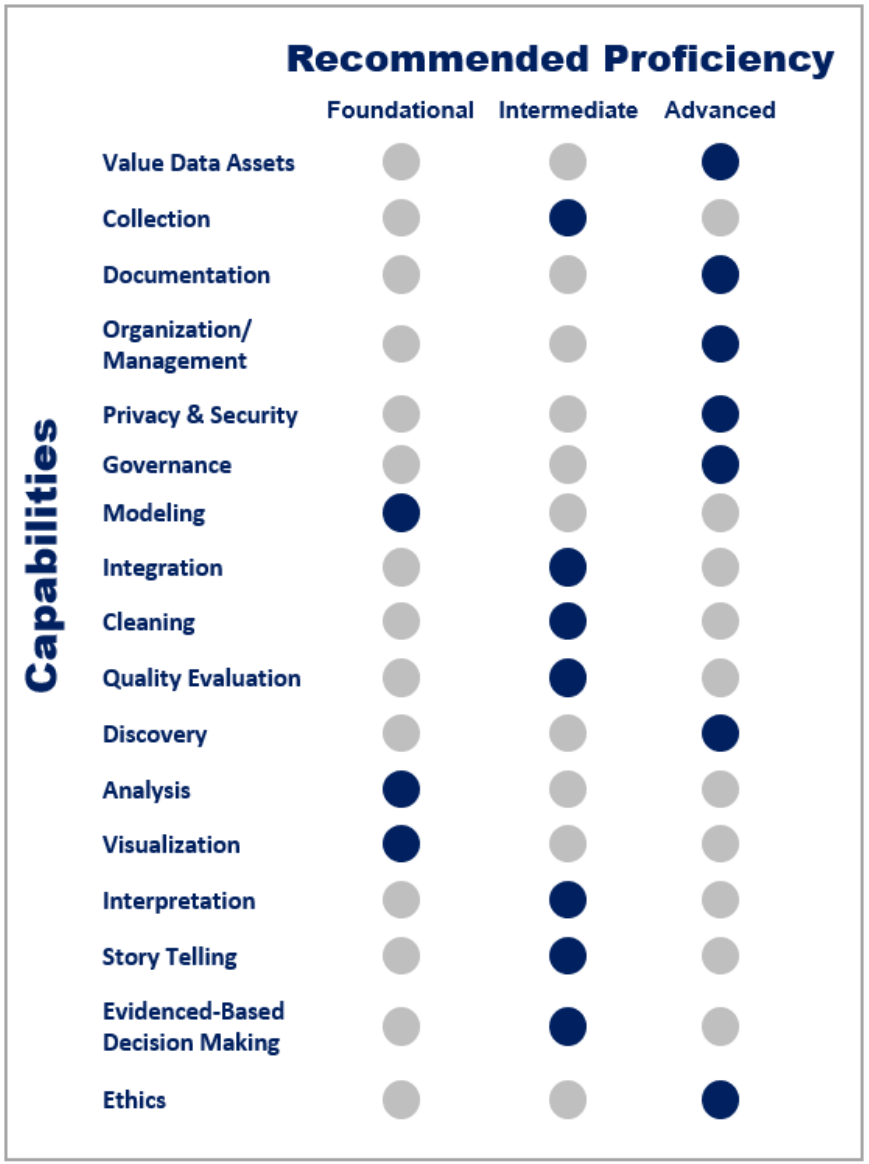
ORGANIZATIONAL DATA LEAD

Description

People in the organization with broad based accountability and responsibility for strategic planning for data, data governance, and data management for the organization as a whole or a major division/department.

Key Expectations

- Has a comprehensive understanding of the data assets available to the organization and how these assets contribute strategic value, and more equitable outcomes.
- Has a comprehensive knowledge of data collection options, including costs and benefits and equity considerations.
- Is an expert resource on metadata. Can establish standards for metadata and provide oversight and advice to others.
- Is an expert resource for implementing and shaping the organization's data and information management practices and can advise others.
- Is an expert resource in data privacy and security.
- Is an expert resource on data governance and contributes to the structure of organizational data governance frameworks.
- Understands data modeling techniques and when to employ them.
- Can perform data integration using standard tools and can implement quality controls.
- Has a comprehensive knowledge of different data cleaning methods.
- Can advise others on the use of data quality measures to make accurate assessments of data fitness-for purpose.
- Is an expert resource for seeking out new sources of data or identifying new ways of using existing sources of data.
- Is familiar with and maintains a basic understanding of statistical methodologies and concepts relevant for their work.
- Can create basic visualizations such as tables and graphs.
- Can interpret novel reports and graphical representations of data.
- Can develop and deliver effective narrative to communicate insights drawn from a range of data sources and outputs.
- Able to critically evaluate data sources for reliability, validity, equity, and relevance to decision being considered.
- Creates standards and practices to ensure ethical data practices and limit potential bias, misinterpretation, or misuse.



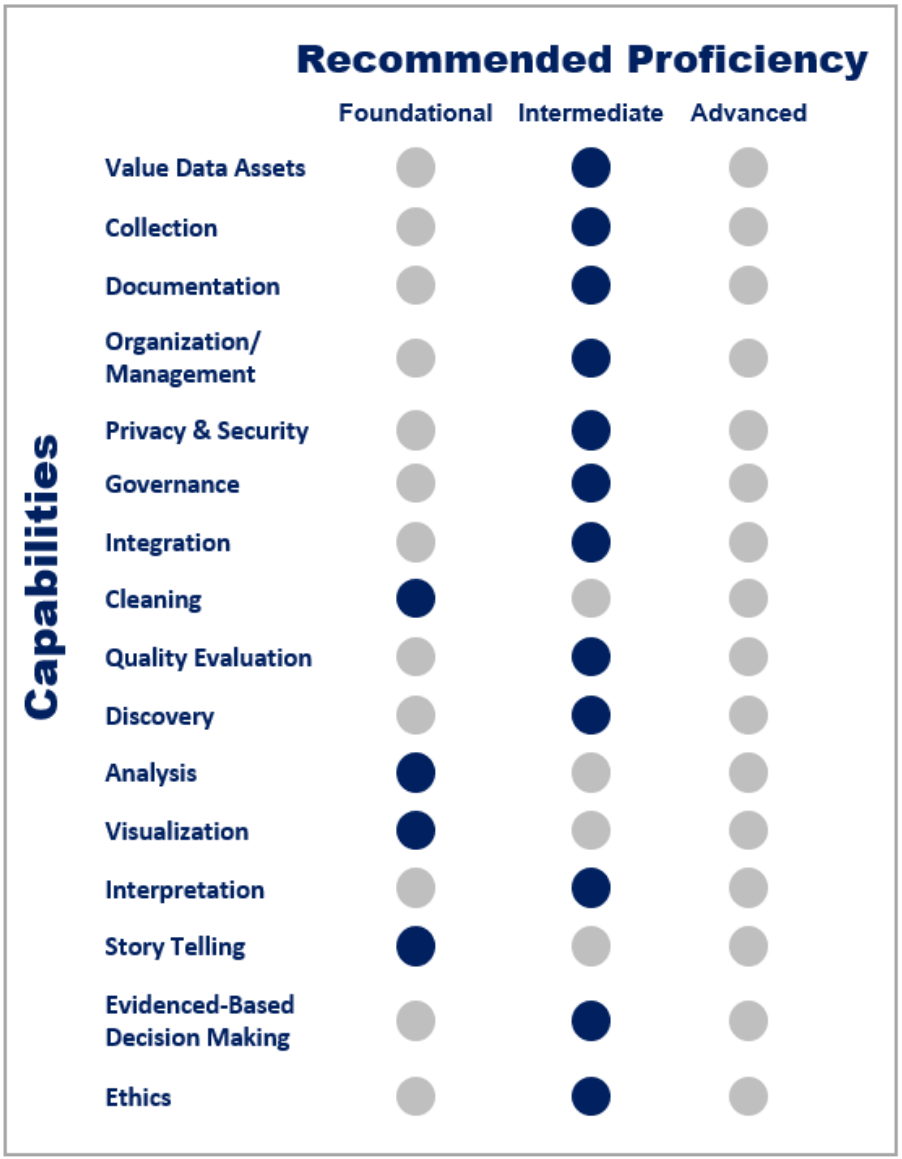
DATA MANAGER

Description

People responsible and accountable for managing organizational data assets.

Key Expectations

- Promotes opportunities for using data to support equitable decision making, advice, and research.
- Has a comprehensive knowledge of the full range of data collection options, including costs, benefits, and equity considerations.
- Follows organizational standards and procedures relating to metadata creation, storage, and use.
- Has a comprehensive knowledge of the organization's data and information management principles and guidelines and can apply them to support good data practice.
- Is familiar with laws, regulations, policies, and guidance governing data privacy, and methods and systems which are used to appropriately secure data.
- Can explain to others the importance of good governance practices.
- Has a comprehensive understanding of relevant data integrity principles and practices and uses them to maintain integrity of organizational data.
- Knows where to access relevant methods for checking data for consistency, errors and outliers, and correcting errors, and understands the basics of those methods.
- Can describe and produce data quality measures for the outputs they produce.
- Has a comprehensive knowledge of protocols associated with data access.
- Is familiar with and maintains a basic understanding of analytical and statistical methodologies and concepts relevant for their work.
- Can create basic visualizations such as tables, charts, diagrams, maps and graphics.
- Can question presented results of both quantitative and qualitative data to ensure they are not misleading, misused.
- Can use data and analysis to answer specific questions and effectively communicate findings and recommendations.
- Can identify ethical implications of specific data practices and implement mitigation measures.



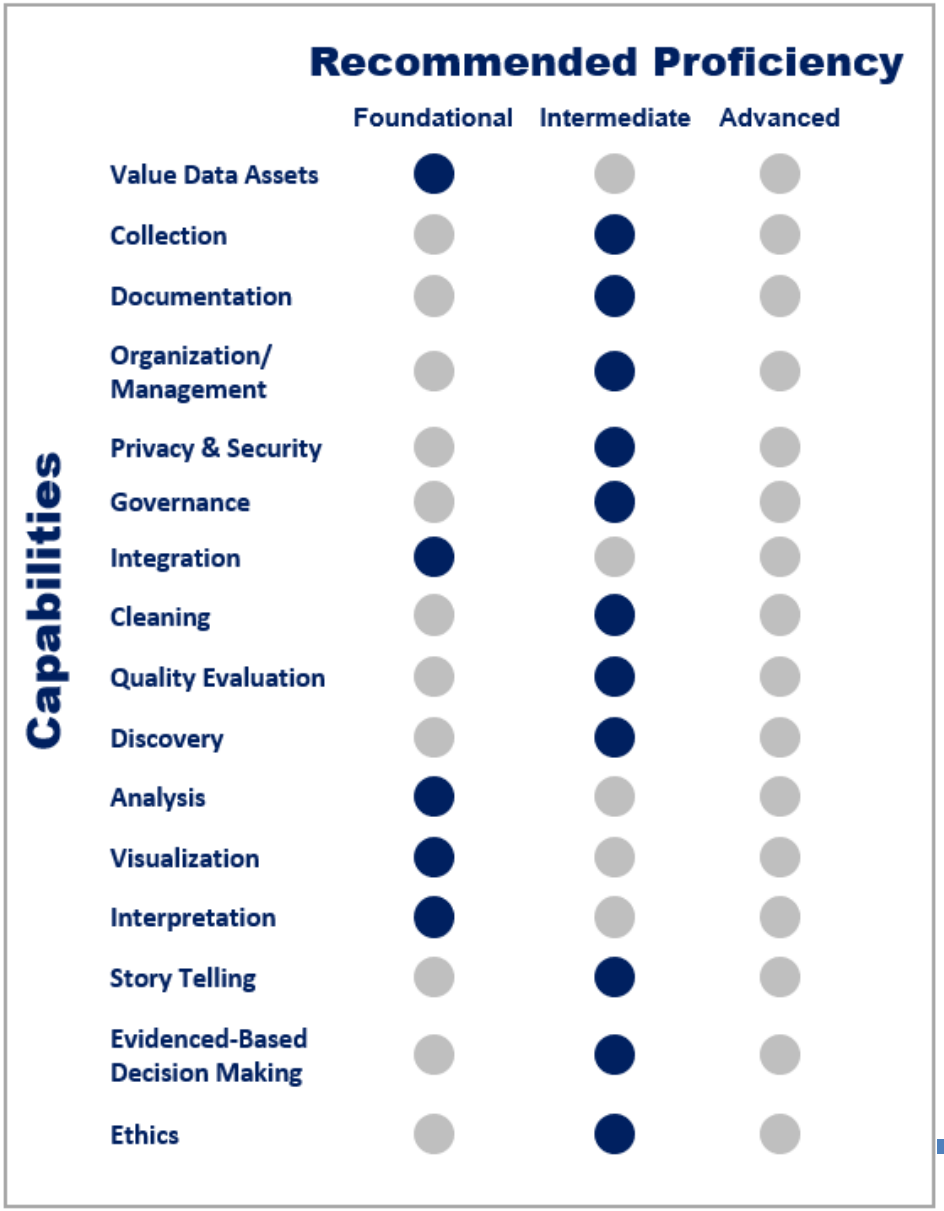
SUBJECT MATTER EXPERT

Description

Business area subject matter experts and people responsible for the day-to-day management of business data (data stewards).

Key Expectations

- Is familiar with organizational data assets relevant to their work.
- Can use a range of tools for storing and working with metadata. Keeps metadata refreshed and updated and can repair items that are incorrect or out of date.
- Has a comprehensive knowledge of the organization's data and information management principles and guidelines and can apply them to support good data practice. This includes requirements relating to data access, data security, privacy and ethics, and equity.
- Can advise others on the proper application of data and information management concepts.
- Familiar with establishing policies, processes, and controls to ensure data integrity, compliance, and accountability.
- Can contribute to the creation of internal policies in support of data governance in alignment with current legislative and organizational requirements (includes data access, data security, privacy, equity, and ethics).
- Has a comprehensive knowledge of relevant data quality measures and can use them to make accurate assessments of data fitness-for purpose (including trustworthiness and accuracy, and equity).
- Can comfortably question data and results they are presented, and answer technical questions relating to their data, relevant to the audience.
- Can communicate effectively between technical and non-technical experts across data production, management, or use, including customers, managers, and data professionals.
- Able to critically evaluate data sources for reliability, validity, equity, and relevance to decision being considered.
- Can implement measures to mitigate ethical concerns and the potential for misinterpretation or misuse.



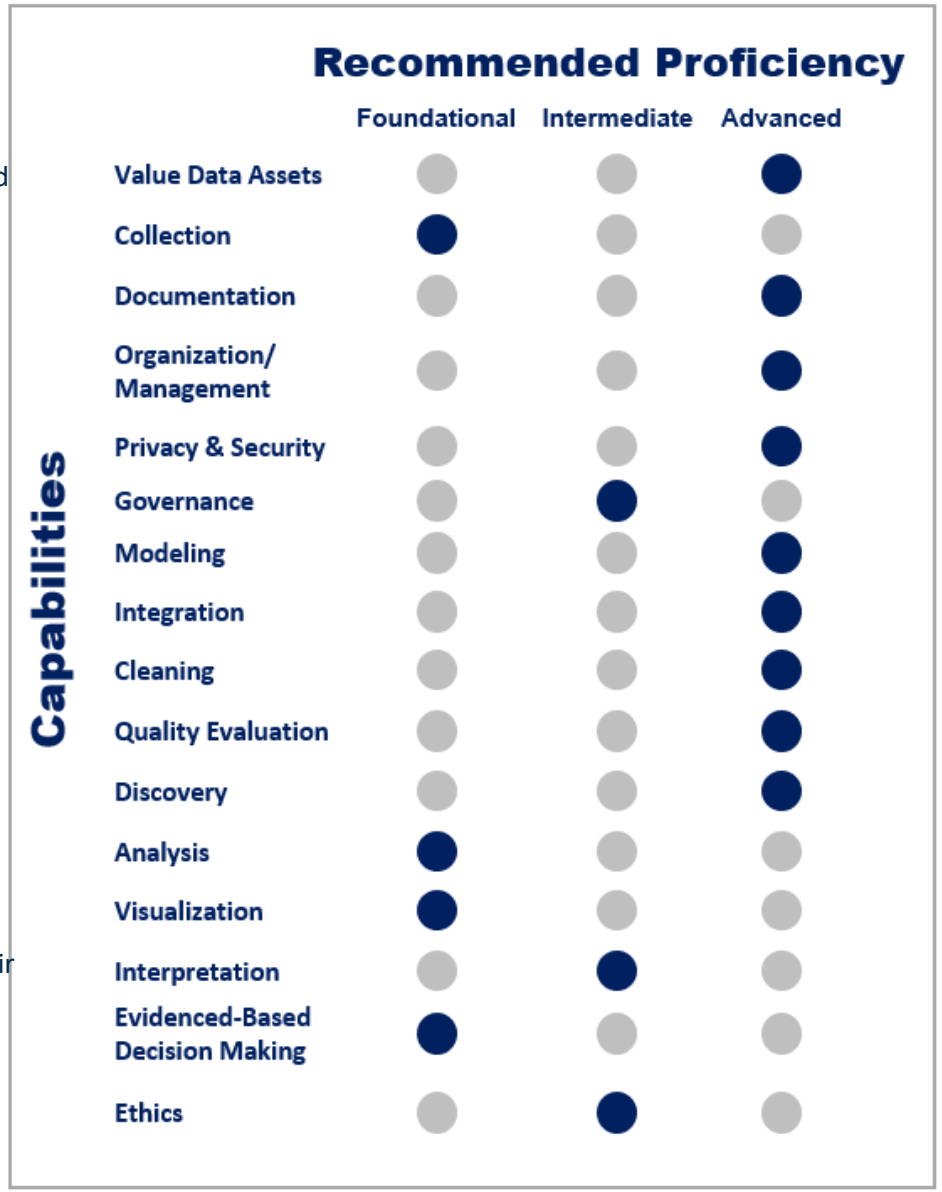
DATA ARCHITECT/ENGINEER/ADMINISTRATOR

Description

People responsible for database design, development, and/or maintenance. Staff who design or implement data architecture, lead or support creating, managing, and/or updating data management pipelines. Staff who provide data engineering, transformation, or integration services.

Key Expectations

- Looks for new ways to obtain value from organizational data assets.
- Is aware of relevant data collection methodologies.
- Maintains knowledge of metadata best practices, including standards and applications.
- Is an expert resource on and can employ conceptual frameworks in support of data categories, classifications, and database development protocols.
- Can advise others on the interpretation and implementation of data privacy and security laws, regulations, policies, and best practices.
- Can contribute to the creation of internal policies in support of data governance in alignment with current legislative and organizational requirements.
- Can clearly explain to others the types of data models, modeling techniques or approaches, and when to employ them, including relationship to equity considerations.
- Can explain good data integration practices and principles.
- Is an expert resource on different methods of data cleaning and editing and can advise others.
- Is an expert resource in the use of measures for data quality assurance, the interaction of those measures, and their application in conjunction with one another.
- Can provide actionable strategic advice on data access and justify recommendations.
- Is familiar with and maintains a basic understanding of analytical, statistical, and visualization methodologies and concepts relevant for their work.
- Understand the basic steps involved in evidence-based decision making.
- Can identify ethical implications of specific data practices.



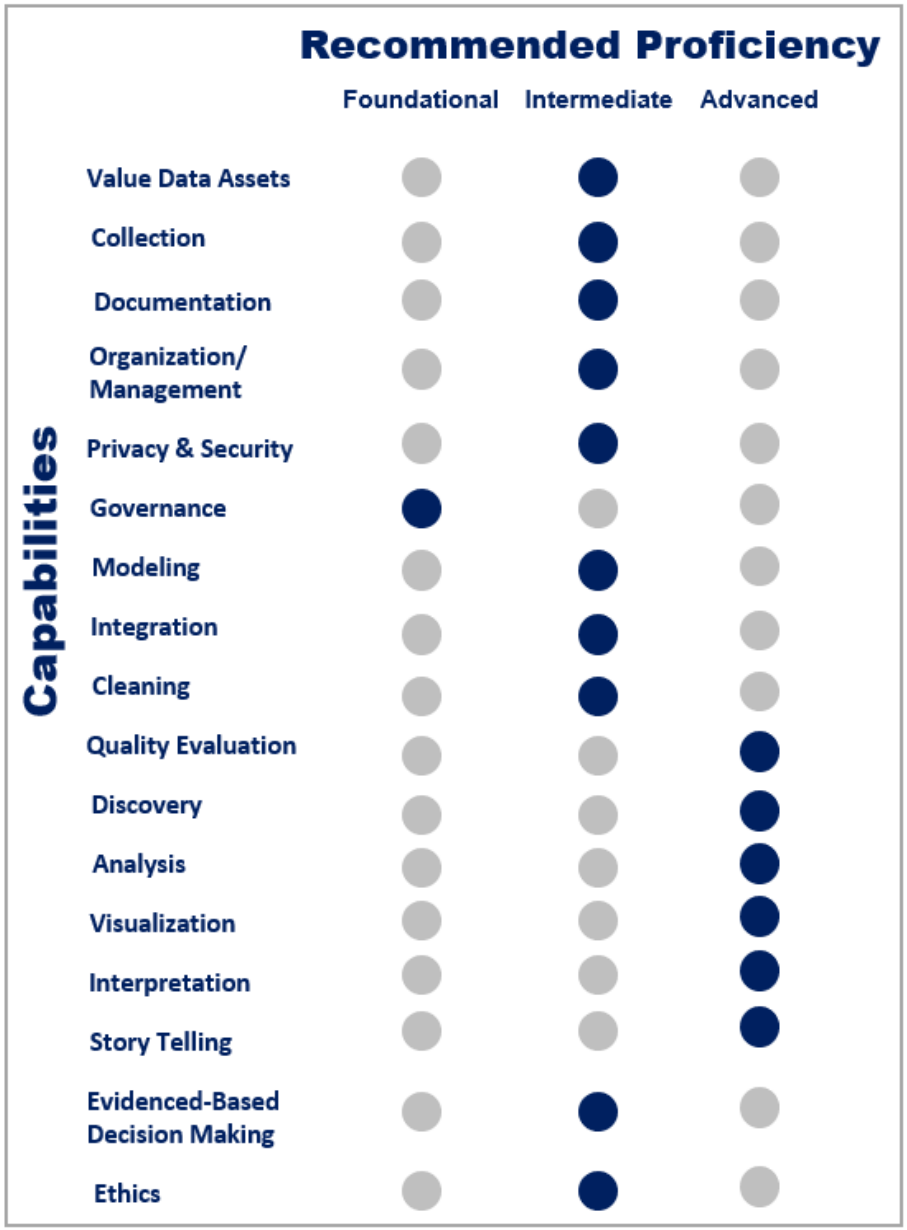
DATA ANALYST

Description

People whose primary responsibilities include managing, retrieving, and/or analyzing data using statistical modeling and/or other data science methodologies. Serve as experts in data management, business intelligence, advanced analytics, etc.

Key Expectations

- Has extensive knowledge of the organization's data assets, including a comprehensive understanding of how their fitness for purpose translates to value for the organization.
- Has a comprehensive knowledge of the full range of data collection options, including costs and benefits.
- Can use various summary options to effectively describe quantitative and qualitative data and explain and justify those choices.
- Has a comprehensive knowledge of the organization's data and information management principles and guidelines and can apply them.
- Is familiar with laws and regulations governing data privacy and methods and systems which are used to appropriately secure data.
- Is aware of and understands implications of data governance frameworks and policies and the relevant legislative requirements that underpins them (includes data access, data security, privacy, equity, and ethics). Knows where to obtain advice on governance as required.
- Can work with business lines to identify requirements, capture the business context of data, and meet an organization's information needs.
- Is an expert resource in the use of measures for data quality assurance.
- Is an expert resource on analytical and statistical concepts and can provide advice on the proper use of methods. Is highly competent at performing analysis on large/complex datasets.
- Can develop and deliver advanced level narratives to communicate insights drawn from complex data sources and outputs.
- Can analyze data practices to identify disproportionate impact and how data practices are affected by bias.



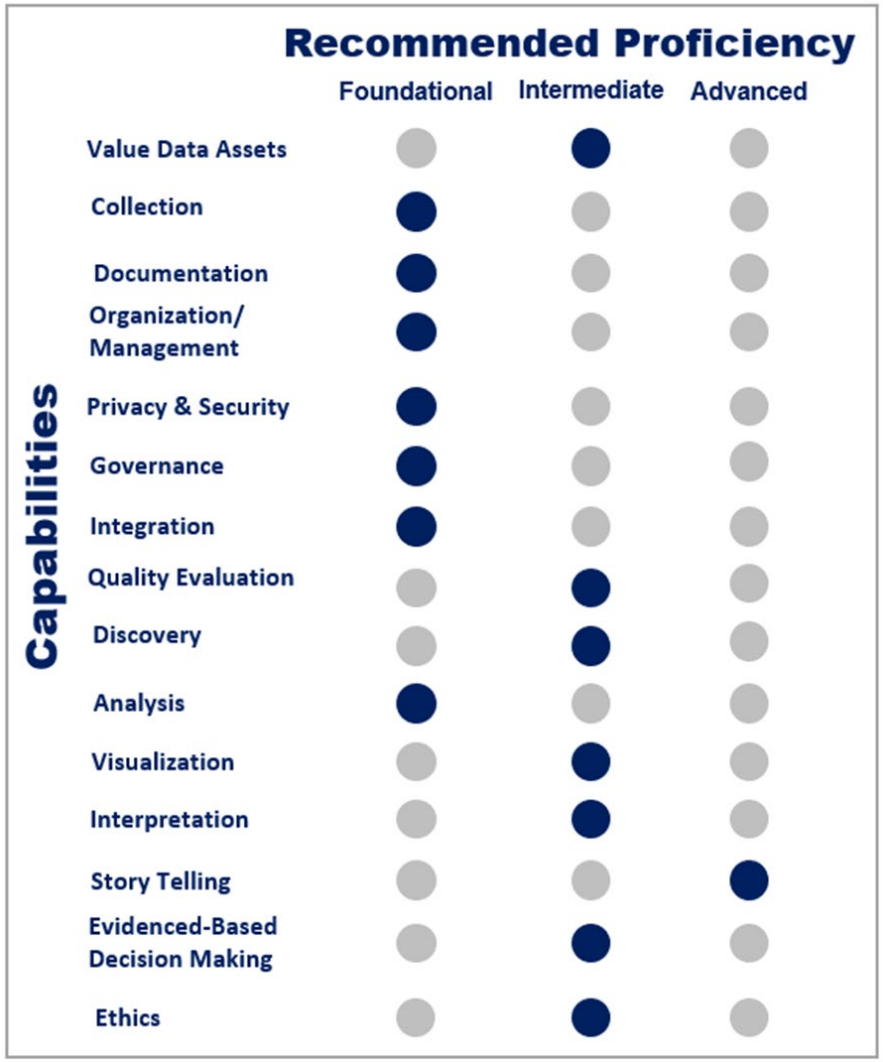
DATA COMMUNICATOR

Description

People in the organization who are responsible for communicating data to others, such as the public, media, and/or legislators.

Key Expectations

- Has extensive knowledge of the organization's data assets.
- Is aware of relevant data collection methodologies.
- Has a basic understanding of commonly used metadata.
- Knows how to collect relevant and reliable data from various sources and how to critically evaluate those sources.
- Is aware there are legal and regulatory conditions for data privacy and security and understands the importance of protecting data.
- Is aware of and understands implications of data governance frameworks, policies, and laws.
- Understands how data can be linked with other data.
- Has comprehensive knowledge of relevant data quality measures and can use them to accurately assess data fitness for purpose.
- Can identify and evaluate sources of data, including understanding any limitations and gaps and their equity implications.
- Is familiar with and maintains a basic understanding of analytical and statistical methodologies and concepts relevant for their work.
- Can readily produce a range of complex data visualization outputs.
- Can explain basic reports and graphics to others.
- Can develop and deliver advanced level narratives to communicate insights drawn from complex data sources and outputs.
- Can use data and analysis to answer specific questions. Individuals at this level can and effectively communicate findings and recommendations based on the data analysis.
- Can implement measures to mitigate ethical concerns and the potential for misinterpretation or misuse.



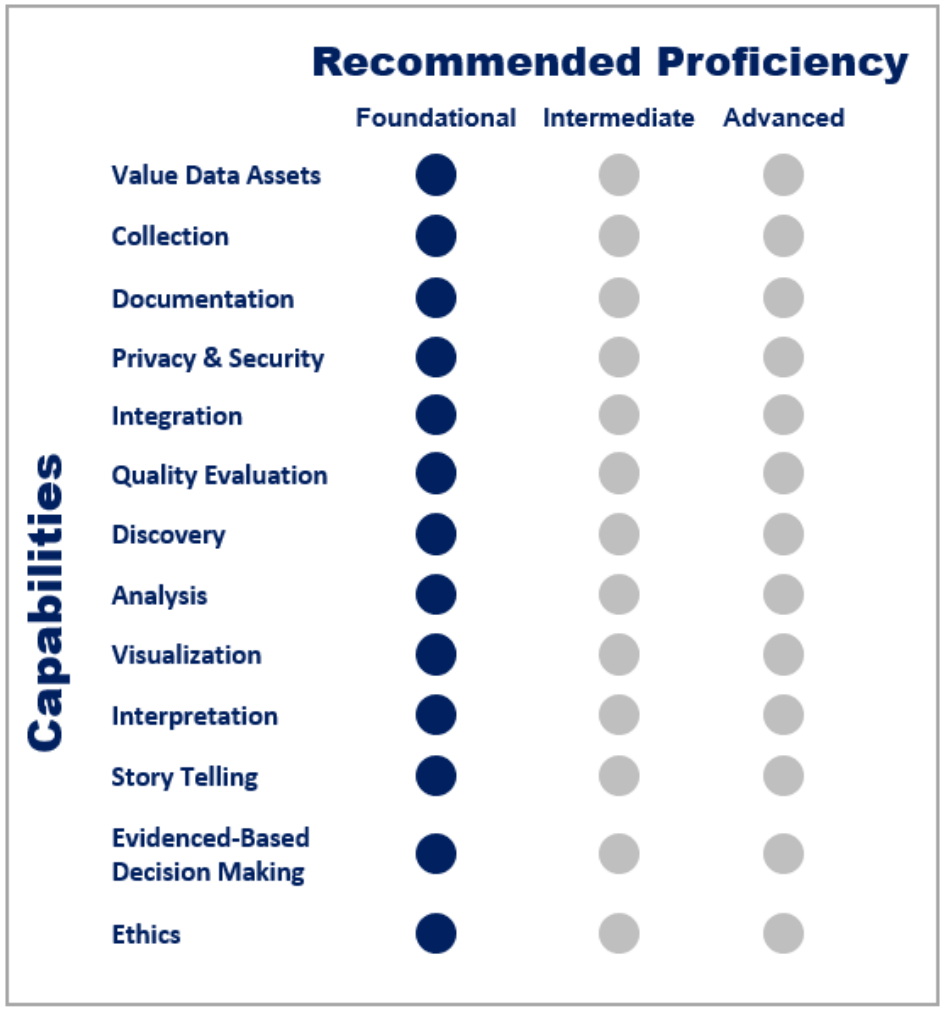
GENERAL DATA USER

Description

People whose job sometimes involves using or analyzing data to guide activities or decisions in support of core agency functions and activities.

Key Expectations

- Is familiar with organizational data assets relevant to their work.
- Is aware of relevant data collection methodologies.
- Has a basic understanding of commonly used metadata.
- Is aware there are legal and regulatory conditions for data privacy and security and understands the importance of protecting data.
- Can follow guidelines and procedures to maintain the integrity of the data they are combining.
- Can follow guidelines and procedures to determine the trustworthiness and accuracy of the data they are using.
- Can use available options to access common data sources.
- Can use (or learn how to use) appropriate analytical tools to investigate data.
- Can create basic visualizations such as tables, charts, diagrams, maps, and graphics.
- Can interpret basic quantitative and qualitative data metrics and simple visualizations like standard charts, especially those within their content area.
- Can develop and deliver simple narratives to communicate insights related to their data.
- Understands the value of using data to inform decision-making processes, as well as the potential limitations and equity impacts of not critically evaluating the data sources.
- Understands that data practices have ethical implications. Knows that data practices disproportionately affect communities that are underserved and under-resourced.



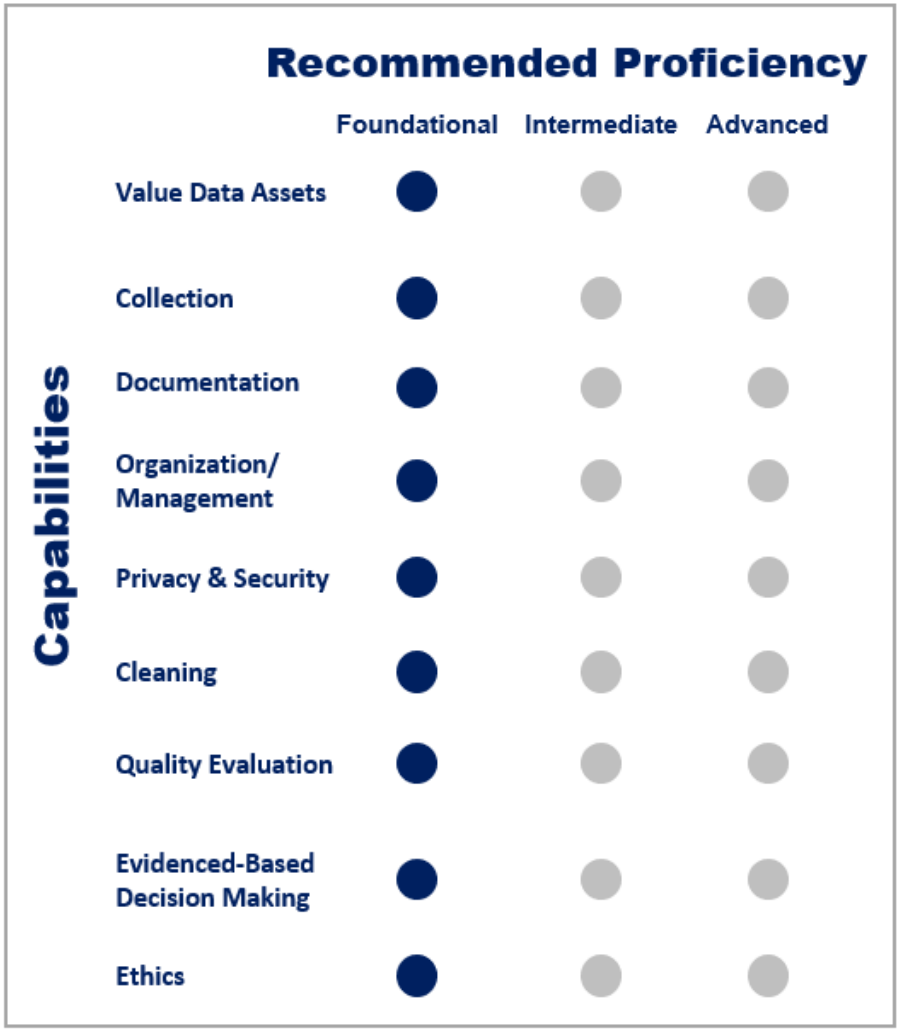
DATA COLLECTOR/DATA ENTRY STAFF

Description

People whose job includes collecting, creating, or entering data as part of day-to-day work in support of core agency functions and activities.

Key Expectations

- Is familiar with organizational data assets relevant to their work. Understands how those assets contribute value to the organization.
- Can collect data by following established processes, using the systems and tools provided. Knows where to obtain advice on data collection methodologies as required.
- Understands the concept of metadata, including its purpose and benefits.
- Can access and comply with data and information management principles and associated guidelines. Knows where to obtain advice on governance as required.
- Is aware there are legal and regulatory conditions for data privacy and security and understands the importance of protecting sensitive data. Knows where to obtain advice on data security and privacy as required.
- Can edit data following established guidelines and procedures. Knows where to access relevant methods for checking data for consistency, errors and outliers, and correcting errors, and understands the basics of those methods.
- Understands the concept of data quality and its importance. Knows where to access data quality measures for the data they collect.
- Understand the value of using data to inform decision making processes.
- Recognizes that data practices are affected by personal and systemic biases. Understands that different communities and cultures have differing views on appropriate data practices, such as what data is appropriate to collect or share.



Appendix B: Framework Development Approach

To develop the framework, the Oregon Chief Data Officer (CDO), Kathryn Helms, and the CDO Advisory Council created a work group composed of state agency representatives and jurisdictional partners. The work group was also supported by temporary members and other contributors. The work group was tasked with both developing the framework and providing implementation recommendations, with oversight from the CDO Advisory Council.

Table 1. Oregon Data Literacy Work Group

Name	Position	Organization	Representing
Tasha Chapman	Research Analyst in the Central Services Division	Oregon Dept. of Consumer and Business Services	State Agencies
Hector Dominguez	Open Data Coordinator	City of Portland	Local Govt
Shawn Irvine	Economic Development Director	City of Independence	Local Govt
Buzzy Nielsen	Program Manager, Library Support & Development Services	State Library of Oregon	State Agencies
Taina Saltysiak	Office of Data & Analytics Manager	Lane County	Local Govt
Leela Yellesetty	Records Officer	Oregon Dept. of Environmental Quality	State Agencies
Denise Whitney Dahlke (Work Group Chair)	Chief Data Steward	Oregon Dept. of Transportation	State Agencies

Table 2. Temporary Work Group Members and Other Contributors

Name	Position	Organization	Representing
Micah Brown	Data and Analytics Supervisor for Lane County Health and Human Services	Lane County	Local Govt
Ashley Sears	Director, Institutional Research and Reporting	Clackamas Community College	Higher Ed/Academia
Rachel Wente-Chaney	Chief Information Officer	High Desert Education Service District	K-12 Education
Alicia Miao	Director of Data Strategy and Management	Oregon Dept. of Education, Early Learning Division	State Agencies
Alan Duncan	Distinguished Vice President for Data and Analytics Strategy and Chief Data & Analytics Officers (CDAO)	Gartner, Inc.	National Consultant

Work group tasks included:

- Developing a work group charter
- Developing an equity framework
- Reviewing a number of existing data literacy frameworks, data literacy assessments, and summaries of frameworks to determine best practices
- Developing design goals and preferred outcomes
- Defining the breadth of possible data literacy definitions to be included
- Drafting a flexible framework that includes data literacy competencies, different proficiency levels for each competency, and a base set of personas/roles that would need similar data literacy competencies and proficiencies
- Providing elements to assist users in understanding how to use the framework (such as narratives that help people see how to convert roles to jobs)
- Drafting implementation recommendations
- Drafting this final report

Once the work group completed an initial draft framework, they hosted four two-hour open house/listening sessions in June 2023, each focused on getting input from different audiences:

- State Agencies
- Education Community
- Other Potential Jurisdictional Adopters
- Community Based Organizations

There were 35 attendees total (excluding the work group members who attended, presenters, and note takers).

In general, the response to the draft framework was very positive. Participants felt creating a common language for data literacy and having a flexible framework would be helpful. The suggestions for the framework itself were limited, and the work group adjusted the framework to incorporate most of the recommendations.

Much of the input focused on participants need for support implementing the framework and specific suggestions for how to provide that support. The suggestions primarily fell into three categories:

- Setting clear expectations for state agency adoption
- Providing ongoing implementation support
- Assessments and training

These suggestions were provided to the State CDO in notes from the listening sessions, and some are included in the implementation recommendations in Appendix C.

Appendix C. Implementation Recommendations

The following implementation recommendations reflect input from work group members, the listening sessions, and other contributors that participated in the framework development process.

Setting Clear Expectations for Agency Adoption

At the listening session for state agencies, there were assistance requests related to setting clear expectations for agency adoption of the Oregon Data Literacy Framework. Addressing them is recommended as part of the framework roll-out. Specifically:

- Providing a call-to-action to encourage leadership to prioritize these efforts
- Defining who is responsible and/or accountable for agency adoption, especially for agencies with shared services
- Being very clear about what agency adoption entails. What is expected to be adopted? Do they have to adopt all the base personas? How much flexibility is there?

Providing Initial and Ongoing Implementation Support

There were recommendations from all contributors focused on providing either initial or ongoing state level implementation support. These included:

- Providing roadmap guidance for adoption. Where to start with implementation, typical steps, resources to tap along the way, etc. This could also include guidance on the relationship between data literacy and other related efforts such as standing up data governance or analytics programs.
- Creation of a community of practice for framework users so that implementors can learn from each other and not spend time recreating methods/approaches. It was also suggested that framework development work group members be a part of this community as their knowledge would be of benefit. Many of the work group members have said they are willing to participate.
- Provide professional assistance either through the Office of the Chief Data Officer or through consultants. Types of assistance could include:
    - Help creating new or modifying the base set of personas/roles
    - Creating or modifying capabilities and proficiencies
    - Scaling for organizational size
    - Evaluating and identify courses/training that are in alignment with the framework capabilities and proficiencies
    - Developing courses/training as needed to ensure opportunities to upskilling all the framework capabilities and proficiencies
    - Incorporating data capabilities into the state succession planning guidance

Assessments and Training

There are a range of considerations when thinking about assessing people for the framework data capabilities and proficiencies. Contributors from the education community listening session asked who would be considered qualified to make such assessments.

Data literacy self assessments have been developed for individuals and organizations – though not yet for this specific framework. The risk with self assessments is that people may not know or understand what they don't know.

Yet assessments can be an important path for communicating the need for data literacy training to organizational leaders and starting a targeted approach to meeting that need. So, the recommendation is that guidance and assessments specifically targeted to these capabilities and proficiencies be developed to help support implementation.

As mentioned in the previous sections, there is a strong desire for support in finding and/or creating related training. Developing curricula for the capabilities targeted to personas would be ideal. For instance, a Decision Maker and a Data Analyst may respond better to Analysis courses that target their needs. However, some training may be broadly applicable across personas/roles (such as those related to the Value Data Assets capability).

Research suggest that data literacy training is most effective when examples or exercises directly related to a person's job or role are included. This suggest that capstone projects or organization and job specific add-on exercises may also be helpful. Support in developing these add-on elements at the organizational level is also recommended. Data Governance is a good example of a capability where this would be helpful. While the broad concepts may be the same across organizations, specific elements, and resources available will differ.

Measuring Efficacy

It is recommended that the state and other implementors of the framework consider adopting and tracking metrics related to the efficacy of their respective data literacy efforts. Gartner identifies three different ways to measure efficacy of data literacy initiatives:

- Data Literacy Programs Success
- Employee Success with Data Literacy
- Related Business Outcome Success

The following table on the following page provides examples of possible metrics for each of these categories.

Data Literacy Programs	Employee Success with Data Literacy	Related Business Outcome Success
Participants as a percentage of potential attending population [e.g. course or certification participants as a percentage of agency or state employees]	**Personal development training record includes data-related capabilities and learning pathways for job/role**	**Workforce planning: number of job openings with explicit data-related hiring criteria; number of development plans identifying data-related learning**
Number of courses available and/or classes held	**Attainment of proficiency level(s) in specific data capability(ies) related to their job/roles**	**Staff productivity gains: increase in availability and accessibility of business-relevant data; time saved in performing analysis tasks**
Number of participants per course	**Improvement in individual data self-assessment results**	**Regulatory compliance: increased compliance with data-related expectations**
Participant satisfaction survey scores	**360-degree feedback shows improvement in data-related skills**	**Organizational performance monitoring: increased ability to report on incremental steps and/or outcomes to oversight groups or legislature**
Increase in demand for training/courses [e.g. number of Workday Learning searches for data-related courses]	**Receives new data-related certification**	**Efficiency gains: process improvements related to new or improved data and reporting**