Data Interoperability Maturity Model DIMM
Data Interoperability Maturity Model

The Data Interoperability Maturity Model (DIMM) lets you assess your agency’s progress towards data interoperability.

It can be used to:

- self-evaluate your current level of data interoperability maturity
- identify gaps in your data interoperability maturity
- plan improvements to reach the level of maturity your agency needs.

DIMM themes and steps

The DIMM helps you measure progression across the five interoperability key themes as well as their overall governance.

Each area is split into several categories. Each category has 5 steps that describe the common data interoperability behaviours, events and processes for the corresponding level of maturity.

How to use the DIMM assessment

- Define your key participants and assessment parameters.
- Who are the key stakeholders that need to be involved in the assessment?
- Are you assessing interoperability maturity for the whole agency, a division, a branch, a program or a single project?

- Using the DIMM assessment tool, talk to subject matter experts and stakeholders to identify and document your current level of maturity (step) for each category. This is your baseline maturity.
- To choose a level of maturity, you must also meet the characteristics and behaviours of all lower levels. For example, you should only select the ‘optimising’ step if you already meet the behaviours in the ‘managing’ step.
- Your level of maturity can vary between categories.

- Talk to key stakeholders about what level of maturity you need to meet your short- and long-term business needs.
- Document your desired future state for each category, noting that it can vary between categories and be different to other agencies.
- For each category, compare your baseline maturity to your desired future state and document any gaps in data interoperability maturity.

- Analyse your results to confirm your agency’s current strengths and document areas for improvement.
- You can use the results to inform strategic planning and investment activities or to create a roadmap for improvement. We recommend plotting a path that leads from your baseline to your target maturity for each category.
- Repeat the assessment regularly to track data interoperability improvements and trends over time.
### INFORMATION AND DATA GOVERNANCE: An agency's information and data governance maturity – used to coordinate and drive data interoperability across the five themes

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<td><strong>Frameworks, strategies, policies, standards, and roles.</strong></td>
<td>a. Agency understands regulatory, legal, risk and operational requirements and uses governance mechanisms to drive data interoperability.</td>
<td>• Data is not governed in a consistent way across the agency.</td>
<td>• Individual groups within an agency have established data governance structures and processes to improve interoperability, but these are not documented or adopted across the agency.</td>
<td>• Data governance is defined. It explicitly considers interoperability and is consistently applied to high-value data.</td>
<td>• Data governance processes and standards for interoperability are applied to all data.</td>
<td>• Agency-wide data governance framework is subject to continual review, monitoring and refinement.</td>
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<td>b. Agency-wide agreed standards are in place and understood by business.</td>
<td>• Data governance framework and practices do not consider supporting data interoperability.</td>
<td>• Agency has no definitive view of data quality, standards, metadata and file formats for the data it holds and manages.</td>
<td>• High-value datasets have assigned custodians and conform to agreed data standards.</td>
<td>• Responsibilities and roles for data governance processes and data ownership are clearly defined across the agency.</td>
<td>• Delivery of the objectives in the data interoperability strategy is reviewed and reported on, and goals are adjusted over time to continually drive improvement.</td>
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<td>c. Roles and responsibilities for interoperability are identified in the organisation structure. Changes are made where required.</td>
<td>• There is limited understanding about data interoperability and how it could be used across the agency. A wider data strategy may exist but does not explicitly address interoperability.</td>
<td>• A high-level data strategy and policies that support data interoperability are emerging.</td>
<td>• There is a definitive view of data quality, standards, metadata and file formats for data held and managed by the agency.</td>
<td>• Agency has set clear targets for the implementation of their data interoperability strategy, including KPIs.</td>
<td>• Policies that promote data interoperability are subject to continual improvement.</td>
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<td>• Data owners manage and maintain information and data holdings ad hoc. There are no roles or clear responsibilities within or across teams.</td>
<td>• Data owners understand the importance of managing and maintaining data holdings for interoperability. Some tasks and responsibilities have been allocated within teams.</td>
<td>• Agency has a clear, documented strategy for data interoperability that aligns with wider business objectives and plans.</td>
<td>• Agency’s data inventory or catalogue is used as a key tool for informing data interoperability policy and strategy.</td>
<td>• Metrics on data holdings are available and used to target improvement efforts, including feedback from external parties such as data consumers.</td>
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| **Leadership** | a. There is corporate support for data interoperability. | • The senior leadership team has some awareness of what is needed to build and manage data interoperability and of the management structures to support compliance to related standards. | • The senior leadership team is supporting data interoperability initiatives in some areas of the business. | • Ownership and responsibility for delivering the interoperability strategy is defined by a nominated champion for data interoperability. | • Senior leaders meet to discuss data interoperability as shared initiatives across their areas. | • Performance of the senior leadership team includes consideration of progress towards data interoperability objectives. |
|          | b. Knowledge and understanding of data interoperability exists at senior levels and in relevant committees such as the information governance committee. | • Senior leadership support of interoperability is not strategic and is inconsistent. | • Senior leadership support of interoperability initiatives is more clearly defined. | • The senior leadership team is visibly setting targets for data interoperability in line with agency priorities. | • Senior leaders continuously look to develop and innovate data interoperability that supports their agency or targeted work areas. | • The senior leadership team continuously reviews and adjusts targets specified in the data strategy, taking on board ongoing developments in best practice for data interoperability from the wider community and standards. |
|          | c. Senior levels proactively support interoperability initiatives. | | | | | |
## BUSINESS: An agency's operational maturity in producing, consuming and sharing data on a tactical level

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<td>Business planning</td>
<td>a. Business understands its operational requirements and expectations for producing, sharing and consuming data.</td>
<td>• Agency does not understand the business need for data interoperability.</td>
<td>• Agency understands the business need for interoperability.</td>
<td>• Agency business planning identifies strategies and programs that support interoperability.</td>
<td>• Business planning addresses the identified high-level data issues and projects that action these plans are in place.</td>
<td>• Plans are regularly reviewed and updated to reflect industry expectations and developments in interoperability.</td>
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<td>b. Business strategies and plans consider and set out an agency’s commitment to data interoperability.</td>
<td>• Agency does not understand cost and risk to business of not implementing interoperability initiatives. There is no communication of these risks as part of a broader governance approach.</td>
<td>• Agency understands the business cost and risk created by not planning and implementing interoperability initiatives and communicates these agency-wide.</td>
<td>• Agency business planning supports interoperability as part of a broader governance approach.</td>
<td>• Agency business planning identifies strategies and programs that support interoperability such as the metadata strategy, the data quality program and, more broadly, the information and data governance framework.</td>
<td>• Performance monitoring is shaped to support interoperability core targets and milestones in business plans.</td>
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<td>• Plans are regularly reviewed and updated so as to provide holistic governance of the strategies and programs that support data interoperability.</td>
<td>• High-level data issues that impede interoperability causing cost to business and increased risk have been identified. Plans to address these issues are emerging.</td>
<td>• Plans to address these issues are emerging.</td>
<td>• Industry and sector developments in data interoperability help inform the core targets and future visions of business plans.</td>
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<td>Digital skills</td>
<td>a. Staff have the required training, skills and support to deliver on data interoperability needs.</td>
<td>• Agency is unclear on the skills required to meet their data interoperability needs.</td>
<td>• Agency recognises the value and potential uses of data and there is some awareness of the skills required to support managing and implementing data interoperability.</td>
<td>• Agency has identified the key digital skills it requires to meet its data interoperability commitments and a suitable plan that implements them has been agreed to.</td>
<td>• Agency is building an internal community of practice around data interoperability, as well as participation in wider data interoperability forums within government and industry.</td>
<td>• Agency has the digital skills required to execute on data interoperability needs.</td>
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<td>b. Data interoperability skills are maintained and kept up to date.</td>
<td>• Plans to put the required skills in place are emerging.</td>
<td>• Training and support for data interoperability are planned and provided on an ad hoc basis for individual teams.</td>
<td>• Agency has identified and trained internal specialists who can mentor others and execute on data interoperability commitments.</td>
<td>• Awareness and training of data interoperability, data governance and data management are part of the induction and development program for relevant staff.</td>
<td>• A plan is in place to continually develop and improve data interoperability skills in line with industry developments, emerging best-practice and agency needs.</td>
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<td>• Data literacy is low across the workforce.</td>
<td>• Immediate skills shortages are being met through use of third-party specialists.</td>
<td>• Internal teams support, mentor and provide formalised knowledge transfer to other staff creating a more flexible workforce.</td>
<td>• Staff have access to training materials and guidance to assist in executing best practice data governance for interoperability.</td>
<td>• Agency is making an active contribution to interoperability forums within government and industry.</td>
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<td>• Pockets of strong data literacy are starting to appear.</td>
<td>• General data literacy is strong.</td>
<td>• General data literacy is emerging across the general workforce.</td>
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<td>• Staff across all parts of the agency have an awareness and understanding of the importance of data interoperability.</td>
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<td>• General data literacy is of a high standard and self-driven across the general workforce, supported by an agency-wide program of development. Interoperability specialists lead by example.</td>
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## BUSINESS: An agency's operational maturity in producing, consuming and sharing data on a tactical level

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<td>Performance monitoring</td>
<td>a. The effectiveness and efficiency of data interoperability related processes are tracked through defined KPIs.</td>
<td>• The value of data (especially datasets) and the performance of data interoperability capabilities are based on perception and not measured using formalised standards.</td>
<td>• Agency performs ad hoc evaluations of data value frequently and retrospectively to justify investment.</td>
<td>• Agency has defined a consistent approach for evaluating the value of its data holdings.</td>
<td>• Agency actively tracks the value of its data assets, and uses this to inform investment decisions.</td>
<td>• Agency regularly assesses the set of metrics used to evaluate the value of data.</td>
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<td>b. Quality of data assets are monitored and results drive ongoing improvements.</td>
<td>• Individual projects have funding allocated for data interoperability enhancements that are not tied into formal KPIs.</td>
<td>• Investments in data interoperability tend to be reactive rather than strategic (for example, responding to an immediate business or user need rather than planned in line with agency needs).</td>
<td>• Agency actively monitors the KPIs used to track the effectiveness and efficiency of data interoperability related processes.</td>
<td>• Agency is transparent on the mechanisms used to value data wherever applicable.</td>
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<td>c. Agency has defined methodology for evaluating the value and potential change in significance of data.</td>
<td>• Results and methods for data evaluation are inconsistent across the agency.</td>
<td>• Pockets of performance monitoring exist and include quality assessments within different areas of business such as the data inventory/catalogue, privacy and protection, and data entry standards.</td>
<td>• Agency investments in data interoperability initiatives are guided by KPIs.</td>
<td>• Agency investment focuses on more strategic areas such as improving data governance, enterprise data management tools and internal and external data interchange.</td>
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| Community and cross-Government engagement | a. Agency engages with the broader data community including other government agencies to share learning and experience, promote data interoperability activities, understand the needs of consumers and drive ongoing improvement. | • Agency is unaware of the wider data interoperability community (for example, industry and government conferences, forums, standards boards) or is not actively engaged. | • Individuals within the agency undertake ad hoc engagements with the wider community. | • There is a coordinated, agency-wide commitment to engagement with the wider community. | • Agency actively shares its findings, insights, successes and challenges with other agencies and the wider interoperability community. | • Agency engages with the wider community to support the creation of new data standards and models for its sector, supporting thought leadership within the community. |
| | | • Agency has a defined mechanism for engaging with its data consumers, and interactions are tracked to inform an understanding of consumer’s needs. | • Agency proactively obtains feedback from its data consumers (for example, through the use of forums and feedback channels), using metrics to inform and prioritise data interoperability initiatives including publishing publicly accessible datasets. | • Agency engages with data suppliers and consumers in data sharing experiences and providing or receiving feedback. | • Agency engages with data suppliers and consumers in data sharing experiences and providing or receiving feedback. | • Agency becomes a regarded authority in terms of data interoperability for the sectors and industries in which it is involved. |
| | | • Teams within the agency collaborate with other agencies on a demand-driven basis. They respond to requests for information and share some data via access to datasets. | • Formal data sharing arrangements and practices are established between agencies that regularly work together. | • Agency has data sharing arrangements across government, implements data exchange frameworks with other agencies, and works with agencies from different sectors to aggregate data for shared outcomes. | • Agency has data sharing arrangements with other agencies internationally where applicable, and works to help develop global standards in their domains. | • Agency has data sharing agreements are made publically applicable where applicable. |
### Security: An agency’s awareness and response to security risks and issues with respect to data interoperability, including alignment with legislation and industry standards, understanding and mitigating potential risks and considering data-specific issues such as disclosure and re-identification

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<td>Understanding and mitigating risk</td>
<td>a. The potential security risks of data interoperability are understood, with risk assessments undertaken and information security policies in place to mitigate risks.</td>
<td>• Agency has a risk assessment methodology, but this does not explicitly consider risks associated with data interoperability.</td>
<td>• Risk assessments relating to data interoperability are ad hoc and not based on an agreed documented process (for example, driven by external requests to share or access data).</td>
<td>• There is an agreed and documented risk assessment process which is applied consistently and regularly and considers specific data interoperability issues such as disclosure, tamperproofing, and re-identification.</td>
<td>• Regular risk management forms part of overarching data governance.</td>
<td>• Agency routinely assesses new and existing data for any risks associated with interoperability during their ongoing lifecycle.</td>
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<tr>
<td>Data protection and privacy</td>
<td>a. Standard processes consistently support the application of safeguards to de-identify data and prevent disclosure of sensitive data including personal information. b. Agency applies APS principles for data protection such as the Australian Privacy Principles and the Australian Government Agencies Privacy Code. c. Data sharing aligns with the Best Practice Guide to Applying Data Sharing Principles.</td>
<td>• There is limited awareness and capability in data protection and privacy including legal and legislative requirements.</td>
<td>• Data protection and privacy for interoperability initiatives for data sharing are considered on an ad hoc basis and implemented reactively.</td>
<td>• Agency has a policy and plan in place for information privacy, protection and security but these do not address data interoperability requirements.</td>
<td>• Agency has identified, documented and applied a standardised approach and policy for data protection and privacy in interoperability.</td>
<td>• All data is routinely assessed to ensure no sensitive information is inadvertently released.</td>
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<tr>
<td>Information security management</td>
<td>a. Agency maintains the confidentiality, integrity and availability of all official information. b. Best practice information security controls are applied in conjunction with an agency’s governance activities, strategies and business plans.</td>
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Agencies should refer to the Protective Security Policy Framework (PSPF) and related PSPF Maturity Self-Assessment Model.

### OBJECTIVES

**a.** All high-value datasets released are compliant with government legislation, legal requirements and government policy relevant to data interoperability. New legislation and legal requirements are being monitored and enforced.

**b.** An open data assessment of existing and future datasets is being established and implemented across relevant sections. There is clear understanding of licensing and terms of use for data re-use. Data interoperability initiatives are established to promote compliance in data sharing.

**c.** The government’s open data principles are recognised and managed as part of general licensing and terms of use. Licenses and terms of use for contracts on data are being reviewed for machine execution using agreed data models. Agency proactively encourages data interoperability by actions such as sharing data and publicising legislative barriers and other risks in sharing data (for example, consults with the Office of the National Data Commissioner of Prime Minister and Cabinet).

### CATEGORY

**Compliance**

- **a.** Agency complies with relevant government legislation, regulations and ethical requirements on providing services to consumers.
- **b.** Agency complies with internal and external policy relevant to data interoperability.

**Licensing and terms of use**

- **a.** Agency has appropriate mechanisms in place to licence the data for use by others including data custody arrangements, ownership, intellectual property considerations and appropriate terms of use.
- **b.** Licensing and terms of use are managed to capitalise on the potential value of publishing, linking and sharing data.
- **c.** The government’s open data principles are recognised and managed as part of general licensing and terms of use.

### STEP: Initial

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<tr>
<td>Compliance</td>
<td>a. Agency is not aware of all government legislation and legal requirements relevant to data interoperability.</td>
<td>• Agency is not aware of all government legislation and legal requirements relevant to data interoperability.</td>
<td>• Agency is aware of relevant legal requirements and government legislation.</td>
<td>• Agency is implementing their plan in order to meet government legislation, legal requirements and external policies relevant to data interoperability.</td>
<td>• Agency is able to demonstrate compliance with all relevant government legislation, legal requirements and external policies in regards to data interoperability.</td>
<td>• Agency continually reviews, analyses and improves existing services to meet or exceed policy requirements.</td>
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<td>Licensing and terms of use</td>
<td>b. Agencies with third parties that define licensing or terms of use do not exist or do not identify necessary data interoperability considerations.</td>
<td>• Agreements with third parties that define licensing or terms of use for the data they are responsible for as part of a data interoperability initiative.</td>
<td>• Individual teams establish sharing arrangements with other agencies or third parties.</td>
<td>• Agency is defining how open data may work for their business for access and interoperability.</td>
<td>• Plan for meeting relevant legal and legislative requirements is established and implemented across relevant sections.</td>
<td>• Data interoperability initiatives are routinely checked to ensure compliance is sustained.</td>
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<td>Licensing and terms of use</td>
<td>c. Data produced and published by the agency is not supported by relevant licensing arrangements and terms of conditions, or they are unclear.</td>
<td>• There is an awareness of open data principles and related resources (such as data.gov.au).</td>
<td>• There is clear understanding of the government’s open data principles and informed decisions are made about if and where the principles apply to the business area.</td>
<td>• Agency uses sharing arrangements such as a letter of exchange.</td>
<td>• An open data assessment of produced and owned datasets is undertaken and results clearly documented.</td>
<td>• New legislation, legal and external policy relevant to data interoperability are tabled for internal discussion with relevant sections.</td>
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### NATIONAL ARCHIVES OF AUSTRALIA

**Data Interoperability Maturity Model**
## Metadata

**a.** Agency creates and maintains standards-based structured information about its data and systems to ensure assets are discoverable and documented.

**b.** Agency ensures appropriate information about data assets is captured throughout the data lifecycle.

**c.** Agency is an active contributor to the national and international communities on metadata standards.

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| Metadata | • Agency does not have agreed metadata standards in place. 
  • Data quality statements are not created as standard practice. 
  • Published and unpublished datasets do not include structural metadata or data quality statements. 
  • Agency has no plan for a metadata strategy. 
  • Metadata is inconsistently created using personal judgement across the workforce. 
  • Metadata that is available does not adhere to recognised industry standards or standards as part of a data interoperability initiative. | • Agency has defined metadata standards and policies that align with industry standards or standards developed for interoperability initiatives. 
  • Metadata standards for interoperability initiatives adopt and adapt from industry standards. 
  • Metadata standards are consistently applied to the correct data across the agency. 
  • Responsibilities for the quality of metadata are clear, and processes for creation and maintenance of metadata are embedded. 
  • Elements of metadata strategy are identified and defined within strategic information and data management documentation. | • All data has metadata that complies with relevant standards and is maintained in an open format. 
  • All datasets have associated data quality statements that are linked to the data. 
  • Cross-walks between metadata standards are created when agency standards are updated, altered or referenced to other standards. 
  • Information such as data lineage is captured in metadata with processes throughout the data's lifecycle. 
  • Agency has mechanisms to enable search, query and reporting on metadata across agency. 
  • Automated tooling is used to reduce the manual effort involved in metadata maintenance. 
  • Metadata statements are created as part of standard practice. | • Agency proactively monitors the effectiveness and completeness of metadata for all its data and undertakes continual improvement. 
  • A single access point for metadata exists across the agency and this is made available in a suitably secure and controlled manner for external parties to query (for example, through a data catalogue or a metadata repository). 
  • Metadata creation and maintenance is automated. 
  • Metadata is harvested from other repositories and successfully mapped to the schema of your data catalogue, repository etc. 
  • Agency proactively shares and promotes its metadata standards with relevant communities. 
  • Metadata standards include core models (common subsets) that facilitate linked data. 
  • A metadata strategy exists with a clear review schedule. |

## Taxonomy

**a.** Agency aligns its thematic lists, schemas, standards and conventions to those relevant in their industry or sector, enabling their data to be more easily interchanged with other organisations.

**b.** Agency is an active contributor to the national and international communities’ controlled vocabularies.

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| Taxonomy | • Agency has limited or no controlled vocabularies in any form for its data (for example, taxonomies, data dictionaries, glossaries, thesauri or thematic lists). 
  • Agency’s information and data management systems use controlled vocabularies but the meaning of terms are not understood and are inconsistently applied using personal judgement. 
  • There is no consideration of monitoring or implementing consistent and accurate use of any of the available forms of controlled vocabularies. | • Ad hoc controlled vocabularies in different forms are created and managed by individual teams. 
  • Agency engages with communities who consume their data to determine appropriate taxonomies to be used. 
  • Controlled vocabularies of information and data management systems are understood but poorly documented. 
  • Agency is informed of existing industry vocabularies that align with their business but does not use them. | • Agency has defined and delegated the responsibilities for taxonomy creation, governance and maintenance. 
  • Agency-wide taxonomies and controlled vocabularies have been defined and documented. 
  • Industry vocabularies that align with business have been adopted and adapted where relevant. 
  • There are plans for schemas, thematic lists and code lists to be stored in open formats and be adherent to open standards. 
  • Monitoring of consistent and accurate use of controlled vocabularies has been implemented into procedures such as metadata quality checks. | • All agency’s high value data uses community and industry driven, standards based controlled vocabularies. 
  • Agency’s controlled vocabularies such as taxonomies, data dictionaries, glossaries, thesauri and thematic lists are routinely reviewed and updated to reflect current business. 
  • Agency’s controlled vocabularies are made available for sharing in a form adherent to open standards. 
  • Agency uses technologies such as automatic taxonomy construction (ATC) to create ontologies. | • All information and data that is generated, published or exchanged from the agency adopts or adapts an industry-recognised controlled vocabulary. 
  • Agency proactively engages with the wider community to ensure that the right controlled vocabulary terms are collected and documented. 
  • Agency adopts or develops automated tools to reduce the manual effort involved in publishing structured data. 
  • Agency proactively shares and promotes its vocabularies with relevant communities. |
### OBJECTIVES

- **Awareness**: An awareness of inefficiencies caused by data duplication across the agency's data holdings.
- **Central, consistent and reliable**: A central, consistent and reliable way to find, query and resolve duplicate entries.
- **Routine quality checking**: Routine quality checking for data holdings and data services.
- **Agency uses automated tools**: Agency uses automated tools to identify and capture the most valuable data.
- **Data entry standards**: Data entry standards for data catalogues are defined and documented.
- **Data dictionary**: A data dictionary exists but is incomplete and general staff are not aware of its benefits.
- **Catalogues or registers**: Catalogues or registers of data holdings exist across the agency, but are siloed within business areas and not always up to date.
- **Data dictionaries**: Data dictionaries for catalogues do not exist or are not consistent and relate only to individual catalogues.
- **Datasets**: Datasets are managed ad hoc and not clearly described so as to be easily findable.
- **An awareness of inefficiencies**: An awareness of inefficiencies caused by data duplication is understood across the agency.
- **There are no clear standards**: There are no clear standards for data entry into data catalogues.
- **A central, consistent and reliable**: A central, consistent and reliable agency-wide data catalogue is established and maintained with defined owners.
- **High-value data**: High-value data and data services have been captured.
- **Datasets are clearly described**: Datasets are clearly described.
- **Performance monitoring**: Performance monitoring of inventory/catalogues is implemented to ensure they identify and capture the most valuable data.
- **Data entry standards for data catalogues**: Data entry standards for data catalogues are defined and documented.
- **A data dictionary exists**: A data dictionary exists but is incomplete and general staff are not aware of its benefits.
- **A full and up-to-date data catalogue exists**: A full and up-to-date data catalogue exists and is available in a secure and controlled manner both internally and externally.
- **Routine quality checking for duplicate data**: Routine quality checking for duplicate data within and across holdings is scheduled.
- **Routine quality assessments**: Routine quality assessments of the data held by the data catalogue are scheduled and identified problems are documented.
- **A full and complete data dictionary**: A full and complete data dictionary for the data catalogue exists and general staff understand its value and how to use it.
- **Tools such as APIs are implemented**: Tools such as APIs are implemented to aid data discoverability internally or for the public.
- **A full and up-to-date data catalogue exists**: A full and up-to-date data catalogue exists that supports machine-based open-standards querying.
- **Agency uses automated tools**: Agency uses automated tools to find and resolve duplicate entries across catalogues and registers.
- **The data inventory or catalogue**: The data inventory or catalogue is aided by user-centred workflows and tools.
- **The data inventory or catalogue**: The data inventory or catalogue is interoperable with other data inventories or catalogues across the APS.

### SEMANTIC: The maturity of structures for enabling the meaning of exchanged information to be understood by people and systems, promoting more effective and efficient interoperability

#### CATEGORY: Data discovery

**Data discovery**

- **Objective a.** Data is managed as an asset and holdings published or used by the agency are discoverable through catalogues or registers.
- **Objective b.** Cost savings are realised through reduction of the management of duplicate data and applications.

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<td><strong>Objective b.</strong> Cost savings are realised through reduction of the management of duplicate data and applications.</td>
<td><strong>Objective a.</strong> Agency does not have an up-to-date, centralised view of data holdings and data services.</td>
<td><strong>Objective b.</strong> There is no consideration of inefficiencies caused by data duplication across the agency's data holdings.</td>
<td><strong>Objective a.</strong> A central, consistent and reliable agency-wide data catalogue is established and maintained with defined owners.</td>
<td><strong>Objective b.</strong> A full and up-to-date data catalogue exists that supports machine-based open-standards querying.</td>
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<td><strong>Objective a.</strong> Agency does not publish its controlled vocabularies online.</td>
<td><strong>Objective b.</strong> Agency shares its vocabularies online but as unstructured data such as images or scanned documents.</td>
<td><strong>Objective a.</strong> Agency publishes ontologies as machine-readable structured data.</td>
<td><strong>Objective b.</strong> Agency publishes ontologies as machine-readable structured data and in open formats such as CSV and ODS.</td>
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#### CATEGORY: Linked data

- **Objective a.** Linked data is part of a strategic plan for developing data interoperability through controlled vocabularies.
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**Data Interoperability Maturity Model**

- **Step 1: Initial**: Agency does not have an up-to-date, centralised view of data holdings and data services.
- **Step 2: Developing**: Agency does not publish its controlled vocabularies online.
- **Step 3: Defined**: Agency publishes ontologies as machine-readable structured data and in open formats such as CSV and ODS.
- **Step 4: Managing**: Agency publishes ontologies as machine-readable structured data and in open formats such as CSV and ODS, using open standards from W3C such as RDF.
- **Step 5: Optimising**: Agency publishes ontologies as machine-readable structured data and in open formats such as CSV and ODS, using open standards from W3C such as RDF, and has implemented their vocabulary mapping. Vocabulary terms are linked to those from other agencies using Persistent URIs.

---

**Footnotes**

- **Table Note**: These provide clearer guidance on the steps of the Data Interoperability Maturity Model.

---

**References**

- **W3C**: World Wide Web Consortium.
- **RDF**: Resource Description Framework.
- **CSV**: Comma Separated Values.
- **ODS**: OpenDocument Spreadsheet.
## TECHNICAL: The maturity of the technology that supports data interoperability, including computer systems and services

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<td>Enabling technologies</td>
<td>a. Tools and automation systems that are used within an agency consistently and reliably create, transform, maintain and publish data.</td>
<td>• Agency does not have a defined data architecture and does not consider data interoperability.</td>
<td>• Agency has created a data architecture roadmap which has been validated but not widely applied through the agency.</td>
<td>• Agency is implementing an architectural roadmap which is appropriate to their needs and supports the creation of flexible and scalable data services and interfaces.</td>
<td>• Agency has established an architecture which enables the flexible and responsive creation of new data services and the automated creation of new data holdings.</td>
<td>• Agency is continuously reviewing architecture models and emerging and disruptive technology to ensure their enabling technologies are optimised, efficient and cost effective.</td>
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<td>b. Data interoperability is built into technologies and systems by design.</td>
<td>• Data collection from customers and third parties is largely through manual means.</td>
<td>• The roadmap has elements that support data interoperability but there is no holistic plan of how they can be most effective.</td>
<td>• When evaluating technologies, the agency explicitly considers support for data interoperability (for example, support for open and industry standard file formats, APIs).</td>
<td>• Building and supporting data interoperability is a key principle of the roadmap and included by design.</td>
<td>• Where appropriate, the agency uses natural language processing, data mining and machine learning tools to process data into meaningful, structured, high-quality datasets.</td>
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<td></td>
<td>c. Redundant and obsolete technologies are managed and do not compromise data access and procedures essential to meeting business requirements.</td>
<td>• Critical data processes depend on manual or paper-based workflows.</td>
<td>• Where data collection is taking place, there are pockets of emerging best practice which use digital rather than paper-based collection and validation.</td>
<td>• Data handling and management workflows are largely digital from end to end.</td>
<td>• The processing, transformation, update and publishing of data to consumers is automated wherever possible.</td>
<td>• Forward planning successfully mitigates the risks of data inaccessibility caused by legacy systems and ensures technologies and procedures remain current to best address these issues.</td>
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<td>• Agency has limited tools and solutions for data management.</td>
<td>• Agency has started to digitise and automate high-value data handling and management processes (for example, scanning with OCR technology and ETL).</td>
<td>• Data, including high value data held in legacy systems, is identified. There are plans for how to access legacy data including migration to current systems.</td>
<td>• Published data is made available through standards-based APIs.</td>
<td>• Subject matter experts monitor emerging technologies as business as usual and update systems as appropriate.</td>
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<td>• Digital systems currently used are outdated and sliced where interoperability would be most effective.</td>
<td>• Legacy systems are known and documented. Discussions around how to manage and access their data are in progress.</td>
<td>• There are clear procedures for decommissioning legacy systems including data migration and disposal of temporary value data.</td>
<td>• Legacy systems are decommissioned and required data migrated. Temporary value data no longer needed for business purposes is accountably destroyed.</td>
<td></td>
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### TECHNICAL: The maturity of the technology that supports data interoperability, including computer systems and services

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| Architecture | a. Business architecture facilitates data interoperability by design.  
b. Strategic planning prioritises business agility and meeting the demands of rapid shifts in technologies.  
c. Agency has embraced DevOps processes for data exchange are in place for agile decision-making in data use, reuse and sharing.  
  - Decision-making regarding data use, reuse and sharing is difficult and tied to a centralised business owner.  
  - Lack of boundaries between business concepts or domains results in linked, interdependent systems (tightly coupled) that cannot be individually updated or developed.  
  - Assigning business owners to specific data sets or attributes is made difficult by data being tightly coupled within legacy systems. Business agility in decision-making is affected.  
  - The value of systems that can be easily and individually unlinked, updated and developed (loosely coupled) is understood and supported at senior level.  
  - The need to decentralise business owners to support agile decision-making for data use, reuse and sharing is agreed.  
  - A general understanding of monolithic systems and how they inhibit interoperability exists at senior level.  
  - Scoping has begun to break down monolithic systems into smaller services so that data is easier to expose to internal and external consumers.  
  - The scope of smaller services is defined through technologies such as domain-driven design (DDD) to create a bounded context for the data relating to that service. In this way, a service does not contain more data than it requires to fulfil its core function. Reference data is obtained through API calls.  
  - Clear boundaries between data domains and business concepts enable business owners of data to be decentralised, facilitating agile decision-making in data use, reuse and sharing.  
| Data publication and exchange | a. Agency uses standardised publication and exchange methods to ensure data is interoperable.  
b. Bespoke software is not required to interpret the data.  
c. The government’s open data principles are recognised and implemented into the business area as appropriate.  
  - High-value datasets that have appropriate licensing or terms of use are not published online or are published non-machine readable formats such as scanned images of documents.  
  - Exchange of data frequently involves a significant level of ad hoc manual intervention.  
  - Agency has no data standards for data exchange including in agreements with other agencies.  
  - Data being published is machine-readable and structured and can be processed using proprietary software (for example, Word documents).  
  - Standardised, repeatable processes support data exchange but involve manual work.  
  - Agency is working to develop standards-based processes for data publishing and exchange that define elements such as file format, data structure and approved data-sharing channels.  
  - There is an awareness of open data and supporting resources (for example, data.gov.au) but there is no consideration of how this applies to published and exchanged data.  
  - There is clear understanding of the technical and licensing or terms-of-use requirements for open data, how this can aid interoperability, and where or if it is relevant to business.  
  - Datasets with appropriate licensing are available online in open formats such as XML and CSV.  
  - Automated tools are being introduced to reduce the level of manual effort in data exchange.  
  - Standards for data exchange have been agreed upon and are being used between the agency and other organisations supplying and consuming data.  
  - Data with licensing and terms of use that facilitate sharing and reuse, such as open data, is flagged for priority publishing.  
  - There are trusted users for data exchange that have been accredited through external or internal procedures (for example, ‘TDFD accreditation or ‘whitelisting’).  
  - Data with appropriate licensing is published in open standards that enable it to be efficiently linked and integrated with other datasets (for example, RDF, OWL and SPARQL).  
  - Processes for data exchange are automated and their standards specify open or industry-standard formats.  
  - Agencies reuse or integrate with existing government platforms and data hubs for data exchange where appropriate.  
  - There are clear procedures and a strong culture of data exchange with accredited trusted users.  
  - A system is in place for publishing data identified as eligible to be open data. The data is published on the appropriate public channels.  
|             |                                          |                                          |                                          |              |              |
|-------------|------------------------------------------|------------------------------------------|------------------------------------------|--------------|--------------|--------------|
|             | • Agency has embraced DevOps practices. These increase their ability to build data sharing technologies such as API-enabled systems and the speed and amount of data that can be shared increases.  
  - DevOps practices bridge the gap between development project changes and release. Keeping data access points (such as APIs and other backend services) evergreen by swapping out for new functionality is fast and efficient.  
  - Strong business agility enables breaking down and development of features quickly as part of business as usual instead of large projects.  
  - Legacy systems are decommissioned and data is made accessible by being migrated to target modern systems or data stores.  
|             | • Agency publishes open-standards based web services to allow machine-based access to data.  
  - Agency collects and monitors metrics on the automated exchange of data.  
  - Compliance with standards for data exchange is continuously reviewed and updated to reflect best practice.  
  - Mutually beneficial data exchange agreements with other agencies and organisations are proactively sought.
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