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|  | Reference Architecture for FAIR Data Infrastructures |  |
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|  |  |  |  |  |
|  | Purpose | | |  |
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|  | Reference Architecture for FAIR Data Infrastructures | | |  |
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|  | Reference Architecture for FAIR Data Infrastructures | 2 | / 97 |  |

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|  |  |  |  |  |
|  | Views | | |  |
|  |  |  |  |  |
|  | Default View | | |  |
|  | No viewpoint | | |  |
|  |  |  |  |  |
|  |  | | |  |
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|  | Reference Architecture for FAIR Data Infrastructures | 3 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Documentation | | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | | |  |
|  | Elements | | | |  |  |
|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Access control | Application Process | | |  |  |
|  | Access Management | Technology Service | | |  |  |
|  | Analytics | Technology Service | | |  |  |
|  | APIs | Technology Service | | |  |  |
|  | Application Interface | Technology Service | | |  |  |
|  | Clean Data Source | Application Service | | |  |  |
|  | Cleaned Data | Data Object | | |  |  |
|  | Cleaning | Application Process | | |  |  |
|  | Code Repository | Technology Service | | |  |  |
|  | Collaborative Wiki | Technology Service | | |  |  |
|  | Collection | Application Process | | |  |  |
|  | Columnar | Technology Service | | |  |  |
|  | Consultation and Training | Business Process | | |  |  |
|  | Data Governance Systems | Technology Service | | |  |  |
|  | Data Graph | Data Object | | |  |  |
|  | Data Harmonization Pipeline | Application Process | | |  |  |
|  | Data ingestion | Technology Service | | |  |  |
|  | Data Integration & Interoperability | Business Process | | |  |  |
|  | Data Lineage Systems | Technology Service | | |  |  |
|  | Data Management Plan | Business Process | | |  |  |
|  | Data mining | Technology Service | | |  |  |
|  | Data preservation | Application Process | | |  |  |
|  | Data Processing | Business Process | | |  |  |
|  | Data Processing Pipeline | Application Process | | |  |  |
|  | Data Processing Platform | Technology Service | | |  |  |
|  | Data Product | Data Object | | |  |  |
|  | Data Production | Business Process | | |  |  |
|  | Data Publication | Business Process | | |  |  |
|  | Data Quality Monitoring | Business Process | | |  |  |
|  | Data Standardization | Business Collaboration | | |  |  |
|  | Data Storage | Technology Service | | |  |  |
|  | Data Streams | Data Object | | |  |  |
|  | Data Workflow Repository | Technology Service | | |  |  |
|  | Database | Technology Service | | |  |  |
|  | Deduplication | Application Process | | |  |  |
|  | Devices | Technology Service | | |  |  |
|  | Digital Twin | Data Object | | |  |  |
|  | Dimensional | Technology Service | | |  |  |
|  | Document | Technology Service | | |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 4 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Documentation & Support Systems | Technology Service | | |  |  |
|  | Domain solutions | Technology Service | | |  |  |
|  | Dumb Data | Data Object | | |  |  |
|  | Dumb Data Lake | Data Object | | |  |  |
|  | Event streaming | Technology Service | | |  |  |
|  | FAIR Data Lifecycle | Business Process | | |  |  |
|  | Fair Data Source | Application Service | | |  |  |
|  | Fair Data Workflow | Data Object | | |  |  |
|  | Fair Digital Object | Data Object | | |  |  |
|  | FAIR Infrastructure Governance | Business Process | | |  |  |
|  | Fair Publication Pipeline | Application Process | | |  |  |
|  | FAIR publication system | Technology Service | | |  |  |
|  | Fair Research Dataset | Data Object | | |  |  |
|  | FAIR validation | Application Process | | |  |  |
|  | Fairdata platform | Technology Service | | |  |  |
|  | Filesystem | Technology Service | | |  |  |
|  | Graph | Technology Service | | |  |  |
|  | Hardware | Equipment | | |  |  |
|  | Harmonized Data | Data Object | | |  |  |
|  | Identity Management | Technology Service | | |  |  |
|  | Ingested Data Source | Application Service | | |  |  |
|  | Ingestion frequency | Application Process | | |  |  |
|  | Ingestion Pipeline | Application Process | | |  |  |
|  | Interoperable metadata | Application Process | | |  |  |
|  | Issues & Feedback | Technology Service | | |  |  |
|  | Key value | Technology Service | | |  |  |
|  | Learning Portal | Technology Service | | |  |  |
|  | Ledger | Technology Service | | |  |  |
|  | Machine Actionable Interface | Technology Service | | |  |  |
|  | Machine learning | Technology Service | | |  |  |
|  | Master Data | Data Object | | |  |  |
|  | Metadata Crosswalks | Technology Service | | |  |  |
|  | Metadata Management Systems | Technology Service | | |  |  |
|  | Model & Schema Repositories | Technology Service | | |  |  |
|  | Object | Technology Service | | |  |  |
|  | Ontology & Linked Data Platforms | Technology Service | | |  |  |
|  | Operational | Technology Service | | |  |  |
|  | Persistent identifiers | Application Process | | |  |  |
|  | PID Management | Technology Service | | |  |  |
|  | PID Resolver | Technology Service | | |  |  |
|  | Preservation system | Technology Service | | |  |  |
|  | Process engine | Technology Service | | |  |  |
|  | Processing | Application Process | | |  |  |
|  | Provenance Systems | Technology Service | | |  |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 5 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Publication system | Technology Service | | |  |  |
|  | Publishing platform | Technology Service | | |  |  |
|  | Quality assurance | Technology Service | | |  |  |
|  | Querable Data Stream | Data Object | | |  |  |
|  | Querable Structured Data | Data Object | | |  |  |
|  | Raw Data Source | Application Service | | |  |  |
|  | Reference & Master Data Management | Business Process | | |  |  |
|  | Reference Data & Taxonomies | Technology Service | | |  |  |
|  | Relational | Technology Service | | |  |  |
|  | Research notebooks | Technology Service | | |  |  |
|  | Scientific computing | Technology Service | | |  |  |
|  | Semantic Artefact Repositories | Technology Service | | |  |  |
|  | Sensors | Technology Service | | |  |  |
|  | Smart Data Source | Application Service | | |  |  |
|  | Source systems | Technology Service | | |  |  |
|  | Spatiotemporal | Technology Service | | |  |  |
|  | Specialized | Technology Service | | |  |  |
|  | Staging System | Technology Service | | |  |  |
|  | Structured Data Dump | Data Object | | |  |  |
|  | Synthesizing | Application Process | | |  |  |
|  | Transformation | Application Process | | |  |  |
|  | Validation | Application Process | | |  |  |
|  | Validation Tools | Technology Service | | |  |  |
|  | Vector | Technology Service | | |  |  |
|  | Verification | Application Process | | |  |  |
|  | Virtual Research Environment | Technology Service | | |  |  |
|  | Visualisation platforms | Technology Service | | |  |  |
|  | Workflow Management | Application Process | | |  |  |
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|  | Reference Architecture for FAIR Data Infrastructures | | 6 | / 97 | |  |

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|  | FAIR Data Capabilities | | | | |  |
|  | No viewpoint | | | | |  |
|  |  |  |  |  |  |  |
|  |  | | | | |  |
|  | Elements | | | |  |  |
|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Access Management | Capability | | |  |  |
|  | Actionable Data Management Plan | Capability | | |  |  |
|  | Anonymization and Pseudonymization | Capability | | |  |  |
|  | API Management | Capability | | |  |  |
|  | Artificial Intelligence | Capability | | |  |  |
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|  | Reference Architecture for FAIR Data Infrastructures | | 7 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Change Management | Capability | | |  |  |
|  | Cloud Architectures | Capability | | |  |  |
|  | Cumulative and Big Data | Capability | | |  |  |
|  | Data Analytics And Reporting | Capability | | |  |  |
|  | Data Citation and Attribution | Capability | | |  |  |
|  | Data Curation | Capability | | |  |  |
|  | Data Discovery Architecture | Capability | | |  |  |
|  | Data Encryption | Capability | | |  |  |
|  | Data Engineering | Capability | | |  |  |
|  | Data Ethics | Capability | | |  |  |
|  | Data Licensing | Capability | | |  |  |
|  | Data Lineage | Capability | | |  |  |
|  | Data Policies | Capability | | |  |  |
|  | Data Preservation | Capability | | |  |  |
|  | Data Processing | Capability | | |  |  |
|  | Data Publication | Capability | | |  |  |
|  | Data Quality | Capability | | |  |  |
|  | Data Rights and Legal Compliance | Capability | | |  |  |
|  | Data Security | Capability | | |  |  |
|  | Data Stewardship | Capability | | |  |  |
|  | Data Valuation and Meritation | Capability | | |  |  |
|  | Data Versioning and Provenance | Capability | | |  |  |
|  | Data Visualization | Capability | | |  |  |
|  | Database Management | Capability | | |  |  |
|  | Domain Architectures | Capability | | |  |  |
|  | Edge Computing | Capability | | |  |  |
|  | FAIR Principles | Capability | | |  |  |
|  | Green Data Architecture | Capability | | |  |  |
|  | Information Architecture | Capability | | |  |  |
|  | Infrastructure scalability | Capability | | |  |  |
|  | Integration Development | Capability | | |  |  |
|  | Intellectual Property Rights | Capability | | |  |  |
|  | Interoperability and Standards | Capability | | |  |  |
|  | Interoperability Frameworks | Capability | | |  |  |
|  | Legal Framework | Capability | | |  |  |
|  | Master and Reference Data Architecture | Capability | | |  |  |
|  | Metadata Architecture | Capability | | |  |  |
|  | Metadata Harmonization and Crosswalks | Capability | | |  |  |
|  | MyData Principles | Capability | | |  |  |
|  | Ontology Development | Capability | | |  |  |
|  | Persistent Identifiers | Capability | | |  |  |
|  | Preservation Architecture | Capability | | |  |  |
|  | Project Funding | Capability | | |  |  |
|  | Project planning | Capability | | |  |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 8 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Real-Time Data Processing | Capability | | |  |  |
|  | Reproducible Research | Capability | | |  |  |
|  | Research Data Governance | Capability | | |  |  |
|  | Research Data Management | Capability | | |  |  |
|  | Research Data Process Development | Capability | | |  |  |
|  | Research Dataset Metadata | Capability | | |  |  |
|  | Research Infrastructure Architecture | Capability | | |  |  |
|  | Research Methods | Capability | | |  |  |
|  | Research Networking and Collaboration | Capability | | |  |  |
|  | Research, Development and Innovation | Capability | | |  |  |
|  | Risk Management | Capability | | |  |  |
|  | Scientific computing | Capability | | |  |  |
|  | Search Engine Optimization | Capability | | |  |  |
|  | Sensitive Data Architecture | Capability | | |  |  |
|  | Service Development | Capability | | |  |  |
|  | Software Development | Capability | | |  |  |
|  | Workflows, Pipelines and Deployment | Capability | | |  |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 9 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | FAIR Data Lifecycle | | | | |  |
|  | No viewpoint | | | | |  |
|  |  |  |  |  |  |  |
|  |  | | | | |  |
|  | Elements | | | |  |  |
|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Curator | Business Actor | | |  |  |
|  | Data Management Plan | Business Process | | |  |  |
|  | Data Processing | Business Process | | |  |  |
|  | Data Production | Business Process | | |  |  |
|  | Data Publication | Business Process | | |  |  |
|  | FAIR Data Lifecycle | Business Collaboration | | |  |  |
|  | FAIR Publication Support | Business Function | | |  |  |
|  | FAIR Research Support | Business Function | | |  |  |
|  | FAIR Workflow Support | Business Function | | |  |  |
|  | Funder | Business Actor | | |  |  |
|  | Infrastructure Governance | Business Function | | |  |  |
|  | Preservation Support | Business Function | | |  |  |
|  | Preserve, Discard, Reuse | Business Process | | |  |  |
|  | Project consulting | Business Function | | |  |  |
|  | Project Proposal | Business Process | | |  |  |
|  | Project support | Business Actor | | |  |  |
|  | Publication Support | Business Actor | | |  |  |
|  | Research Support | Business Actor | | |  |  |
|  | Researcher | Business Actor | | |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 10 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Service Owner | Business Actor | | |  |  |
|  | Technology support | Business Actor | | |  |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 11 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Functions and Capabilities | | | | |  |
|  | No viewpoint | | | | |  |
|  |  |  |  |  |  |  |
|  |  | | | | |  |
|  | Elements | | | |  |  |
|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Data Curation | Capability | | |  |  |
|  | Data Engineering | Capability | | |  |  |
|  | Data Preservation | Capability | | |  |  |
|  | Data Stewardship | Capability | | |  |  |
|  | Data Stewardship | Capability | | |  |  |
|  | FAIR Data Support | Business Function | | |  |  |
|  | FAIR Principles | Capability | | |  |  |
|  | FAIR Publication Support | Business Function | | |  |  |
|  | FAIR Workflow Support | Business Function | | |  |  |
|  | Information Architecture | Capability | | |  |  |
|  | Infrastructure Governance | Business Function | | |  |  |
|  | Legal Framework | Capability | | |  |  |
|  | Preservation Support | Business Function | | |  |  |
|  | Project consulting | Business Function | | |  |  |
|  | Project Funding | Capability | | |  |  |
|  | Project planning | Capability | | |  |  |
|  | Research Methods | Capability | | |  |  |
|  | Risk Management | Capability | | |  |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 12 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Research Data Lifecycle | | | | |  |
|  | No viewpoint | | | | |  |
|  |  |  |  |  |  |  |
|  |  | | | | |  |
|  | Elements | | | |  |  |
|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Curator | Business Actor | | |  |  |
|  | Data Management Plan | Business Process | | |  |  |
|  | Data Processing | Business Process | | |  |  |
|  | Data Production | Business Process | | |  |  |
|  | Data Publication | Business Process | | |  |  |
|  | Funder | Business Actor | | |  |  |
|  | Preserve, Discard, Reuse | Business Process | | |  |  |
|  | Project Proposal | Business Process | | |  |  |
|  | Research Support | Business Actor | | |  |  |
|  | Researcher | Business Actor | | |  |  |
|  | Technology support | Business Actor | | |  |  |
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|  | Reference Architecture for FAIR Data Infrastructures | | 13 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Roles | | | | |  |
|  | No viewpoint | | | | |  |
|  |  |  |  |  |  |  |
|  |  | | | | |  |
|  | Elements | | | |  |  |
|  |  |  |  |  |  |  |
|  | Element | Type | | |  |  |
|  | Curator | Business Actor | | |  |  |
|  | Funder | Business Actor | | |  |  |
|  | Research Support | Business Actor | | |  |  |
|  | Researcher | Business Actor | | |  |  |
|  | Technology support | Business Actor | | |  |  |
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|  | Reference Architecture for FAIR Data Infrastructures | | 14 | / 97 | |  |

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|  |  |  |  |  |  |  |  |
|  | Value streams | | | | | |  |
|  | No viewpoint | | | | | |  |
|  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |
|  | Elements | | | | |  |  |
|  |  |  |  |  |  |  |  |
|  | Element | | Type | | |  |  |
|  | Value Stream | | Value Stream | | |  |  |
|  |  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 15 | / 97 | |  |

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|  |  |  |  |  |  |  |
|  | Strategy Layer | | | | |  |
|  |  |  |  |  |  |  |
|  | Access Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to manage user access and permissions across datasets and systems, ensuring that only authorized users can interact with sensitive data. | | | |  |
|  |  |  |  |  |  |  |
|  | Access Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to manage user access and permissions across datasets and systems, ensuring that only authorized users can interact with sensitive data. | | | |  |
|  |  |  |  |  |  |  |
|  | Actionable Data Management Plan | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to create machine-readable data management plans, share and update them through interfaces. Ability to actively utilize the machine-readable features of the data management plan to facilitate the researcher's work throughout the research process. | | | |  |
|  |  |  |  |  |  |  |
|  | Actionable Data Management Plan (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to create machine-readable data management plans, share and update them through interfaces. Ability to actively utilize the machine-readable features of the data management plan to facilitate the researcher's work throughout the research process. | | | |  |
|  |  |  |  |  |  |  |
|  | Anonymization and Pseudonymization | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Anonymization and Pseudonymization (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | API Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in developing and managing APIs (Application Programming Interfaces) that enable efficient and secure access to datasets and research tools. | | | |  |
|  |  |  |  |  |  |  |
|  | API Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in developing and managing APIs (Application Programming Interfaces) that enable efficient and secure access to datasets and research tools. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 16 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Artificial Intelligence | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in leveraging machine learning and artificial intelligence to gain insights from large datasets, including the ability to apply advanced analytics techniques for pattern recognition, prediction, and data mining. | | | |  |
|  |  |  |  |  |  |  |
|  | Artificial Intelligence (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in leveraging machine learning and artificial intelligence to gain insights from large datasets, including the ability to apply advanced analytics techniques for pattern recognition, prediction, and data mining. | | | |  |
|  |  |  |  |  |  |  |
|  | Change Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The knowledge to plan and manage changes in data infrastructure, governance policies, or technology systems to adapt to evolving research needs. | | | |  |
|  |  |  |  |  |  |  |
|  | Change Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The knowledge to plan and manage changes in data infrastructure, governance policies, or technology systems to adapt to evolving research needs. | | | |  |
|  |  |  |  |  |  |  |
|  | Cloud Architectures | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to leverage cloud computing resources to build scalable, flexible, and cost-effective data infrastructures for research. | | | |  |
|  |  |  |  |  |  |  |
|  | Cloud Architectures (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to leverage cloud computing resources to build scalable, flexible, and cost-effective data infrastructures for research. | | | |  |
|  |  |  |  |  |  |  |
|  | Cumulative and Big Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Experise in transfer, storage, and processing of large data volumes. Knowledge in applying data compression techniques to manage large volumes of data without sacrificing data quality or performance. Skills in managing and processing datasets that grow incrementally over time. Expertise in handling and processing large datasets, including the infrastructure and computational techniques required to manage them effectively. | | | |  |
|  |  |  |  |  |  |  |
|  | Cumulative and Big Data (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 17 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Experise in transfer, storage, and processing of large data volumes. Knowledge in applying data compression techniques to manage large volumes of data without sacrificing data quality or performance. Skills in managing and processing datasets that grow incrementally over time. Expertise in handling and processing large datasets, including the infrastructure and computational techniques required to manage them effectively. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Analytics And Reporting | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in applying analytical techniques to interpret large datasets and generate insights that inform research findings and reporting. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Analytics And Reporting (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in applying analytical techniques to interpret large datasets and generate insights that inform research findings and reporting. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Citation and Attribution | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge in assigning proper citations and credit for datasets, ensuring that data creators are appropriately acknowledged in research outputs. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Citation and Attribution (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge in assigning proper citations and credit for datasets, ensuring that data creators are appropriately acknowledged in research outputs. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Curation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in managing and preserving datasets over time, including the selection, organization, and validation of research data for long-term use. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Curation (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in managing and preserving datasets over time, including the selection, organization, and validation of research data for long-term use. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Discovery Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in designing infrastructures that allow researchers and other stakeholders to find and access relevant datasets | | | |  |
|  |  |  |  |  |  |  |
|  | Data Discovery Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 18 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Skills in designing infrastructures that allow researchers and other stakeholders to find and access relevant datasets | | | |  |
|  |  |  |  |  |  |  |
|  | Data Encryption | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in applying encryption techniques to protect data at rest and in transit, ensuring its confidentiality and integrity. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Encryption (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in applying encryption techniques to protect data at rest and in transit, ensuring its confidentiality and integrity. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Engineering | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Data Engineering | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills needed to build, optimize, and manage the systems and pipelines that store, process, and analyze research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Engineering (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills needed to build, optimize, and manage the systems and pipelines that store, process, and analyze research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Ethics | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in ensuring that data collection, use, and dissemination uphold ethical standards, particularly when handling sensitive or personal data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Ethics (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in ensuring that data collection, use, and dissemination uphold ethical standards, particularly when handling sensitive or personal data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Licensing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Understanding various types of data licenses (e.g., open, restricted) and applying them to protect intellectual property while enabling appropriate data sharing. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Licensing (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 19 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Understanding various types of data licenses (e.g., open, restricted) and applying them to protect intellectual property while enabling appropriate data sharing. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Lineage | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Experise in defining data workflows that preserves the history and lineage of the data to maintain accountability and transparency in data use. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Lineage (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Experise in defining data workflows that preserves the history and lineage of the data to maintain accountability and transparency in data use. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Policies | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of creating and enforcing institutional data policies that govern the collection, storage, sharing, and use of data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Policies (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of creating and enforcing institutional data policies that govern the collection, storage, sharing, and use of data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Preservation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise to protect data from being lost or destroyed using national guidelines and research domain spesific best practices | | | |  |
|  |  |  |  |  |  |  |
|  | Data Processing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to design, optimize, and run data processing workflows that clean, transform, and analyze raw data for domain-spesific research purposes. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Processing (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to design, optimize, and run data processing workflows that clean, transform, and analyze raw data for domain-spesific research purposes. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Publication | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Data Quality | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 20 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Expertise in ensuring the accuracy, completeness, and consistency of data throughout its lifecycle, including the identification and resolution of data quality issues. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Quality (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in ensuring the accuracy, completeness, and consistency of data throughout its lifecycle, including the identification and resolution of data quality issues. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Rights and Legal Compliance | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The knowledge and practices required to ensure that research data is managed and shared according to applicable laws, licenses, regulations and ethical guidelines. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Rights and Legal Compliance (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The knowledge and practices required to ensure that research data is managed and shared according to applicable laws, licenses, regulations and ethical guidelines. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Security | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in implementing security measures, including encryption, access controls, and monitoring, to protect research data from unauthorized access or breaches. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Security (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in implementing security measures, including encryption, access controls, and monitoring, to protect research data from unauthorized access or breaches. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Stewardship | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Data Stewardship | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to oversee data throughout its lifecycle, ensuring it remains accurate, accessible, and aligned with institutional policies. Skills in managing the various stages of the data lifecycle (collection, generation, gathering, processing, analysis, publication, sharing, preservation, archiving, disposal, reuse). | | | |  |
|  |  |  |  |  |  |  |
|  | Data Stewardship (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to oversee data throughout its lifecycle, ensuring it remains | | | |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 21 | / 97 |  |

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| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | accurate, accessible, and aligned with institutional policies. Skills in managing the various stages of the data lifecycle (collection, generation, gathering, processing, analysis, publication, sharing, preservation, archiving, disposal, reuse). | | | |  |
|  |  |  |  |  |  |  |
|  | Data Valuation and Meritation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in creating policies and evaluating the value of data based on its quality, relevance, and potential for reuse within research contexts and across domains. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Valuation and Meritation (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in creating policies and evaluating the value of data based on its quality, relevance, and potential for reuse within research contexts and across domains. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Versioning and Provenance | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in creating metadata for tracking changes to datasets over time and ensuring a record of their origin, modifications, and history. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Versioning and Provenance (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in creating metadata for tracking changes to datasets over time and ensuring a record of their origin, modifications, and history. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Visualization | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in visualizing large datasets and generating insightful reports, allowing researchers to easily interpret and communicate their findings. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Visualization (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in visualizing large datasets and generating insightful reports, allowing researchers to easily interpret and communicate their findings. | | | |  |
|  |  |  |  |  |  |  |
|  | Database Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to design, implement, and maintain efficient and secure databases that store and organize research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Database Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to design, implement, and maintain efficient and secure databases that store and organize research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 22 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Domain Architectures | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of designing domain specific data architectures tailored to particular research area, ensuring that reasearch area specific needs are met. | | | |  |
|  |  |  |  |  |  |  |
|  | Domain Architectures (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of designing domain specific data architectures tailored to particular research area, ensuring that reasearch area specific needs are met. | | | |  |
|  |  |  |  |  |  |  |
|  | Edge Computing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in processing data at the edge of the network, close to the data source, reducing latency and enhancing the efficiency of real-time data analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | Edge Computing (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in processing data at the edge of the network, close to the data source, reducing latency and enhancing the efficiency of real-time data analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Principles | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in applying the principles of Findability, Accessibility, Interoperability, and Reusability to research data management practices. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Principles (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in applying the principles of Findability, Accessibility, Interoperability, and Reusability to research data management practices. | | | |  |
|  |  |  |  |  |  |  |
|  | Green Data Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of designing energy-efficient data systems that minimize environmental impact, promoting sustainability in research infrastructures. | | | |  |
|  |  |  |  |  |  |  |
|  | Green Data Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of designing energy-efficient data systems that minimize environmental impact, promoting sustainability in research infrastructures. | | | |  |
|  |  |  |  |  |  |  |
|  | Information Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 23 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Expertise needed to design FAIR information architectures that enhances data usability, findability, accessibility and interoperability. | | | |  |
|  |  |  |  |  |  |  |
|  | Information Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise needed to design FAIR information architectures that enhances data usability, findability, accessibility and interoperability. | | | |  |
|  |  |  |  |  |  |  |
|  | Infrastructure scalability | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Competencies in designing and maintaining infrastructures that can scale up to accommodate growing data volumes and increased complexity. | | | |  |
|  |  |  |  |  |  |  |
|  | Infrastructure scalability (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Competencies in designing and maintaining infrastructures that can scale up to accommodate growing data volumes and increased complexity. | | | |  |
|  |  |  |  |  |  |  |
|  | Integration Development | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to integrate disparate data systems and tools, ensuring seamless interaction and data exchange across platforms and applications. | | | |  |
|  |  |  |  |  |  |  |
|  | Integration Development (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to integrate disparate data systems and tools, ensuring seamless interaction and data exchange across platforms and applications. | | | |  |
|  |  |  |  |  |  |  |
|  | Intellectual Property Rights | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in understanding, protecting and managing intellectual property rights related to data ownership and usage within the framework of research. | | | |  |
|  |  |  |  |  |  |  |
|  | Intellectual Property Rights (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in understanding, protecting and managing intellectual property rights related to data ownership and usage within the framework of research. | | | |  |
|  |  |  |  |  |  |  |
|  | Interoperability | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Interoperability and Standards | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 24 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Knowledge of relevant data standards within specific fields and understanding and applying of generic data standards (such as W3C standards, ISO, etc.) to ensure that datasets can be exchanged and understood across different systems and disciplines. | | | |  |
|  |  |  |  |  |  |  |
|  | Interoperability and Standards (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of relevant data standards within specific fields and understanding and applying of generic data standards (such as W3C standards, ISO, etc.) to ensure that datasets can be exchanged and understood across different systems and disciplines. | | | |  |
|  |  |  |  |  |  |  |
|  | Interoperability Frameworks | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in designing and implementing architectures that ensure seamless data exchange and compatibility between different systems, platforms, and formats. Ensuring that data management systems can interact with other systems, allowing secure data exchange and cross-collaboration. Capability to co-develop data specifications supporting interoperability within and across research domains. Readiness to apply recommendations and standards, and participate in national and international standardization organizations. | | | |  |
|  |  |  |  |  |  |  |
|  | Interoperability Frameworks (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in designing and implementing architectures that ensure seamless data exchange and compatibility between different systems, platforms, and formats. Ensuring that data management systems can interact with other systems, allowing secure data exchange and cross-collaboration. Capability to co-develop data specifications supporting interoperability within and across research domains. Readiness to apply recommendations and standards, and participate in national and international standardization organizations. | | | |  |
|  |  |  |  |  |  |  |
|  | Legal Framework | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of relevant laws and regulations governing data use, such as GDPR, copyright law, and privacy policies, ensuring compliance in the research domain. | | | |  |
|  |  |  |  |  |  |  |
|  | Legal Framework (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of relevant laws and regulations governing data use, such as GDPR, copyright law, and privacy policies, ensuring compliance in the research domain. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 25 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Master and Reference Data Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to ensure the consistency, accuracy, and integrity of master data across multiple systems, datasets and research projects. Expertise in organizing and managing reference datasets, which provide consistent data for use across research projects and domains. | | | |  |
|  |  |  |  |  |  |  |
|  | Master and Reference Data Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to ensure the consistency, accuracy, and integrity of master data across multiple systems, datasets and research projects. Expertise in organizing and managing reference datasets, which provide consistent data for use across research projects and domains. | | | |  |
|  |  |  |  |  |  |  |
|  | Master Data Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to ensure the consistency, accuracy, and integrity of master data across multiple datasets and research projects. | | | |  |
|  |  |  |  |  |  |  |
|  | Metadata Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise needed to develop and manage metadata that support the effective discovery, interpretation, use and reuse of research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Metadata Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise needed to develop and manage metadata that support the effective discovery, interpretation, use and reuse of research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Metadata Harmonization and Crosswalks | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in building harmonizing architectures and reconciling and mapping different metadata schemas across disciplines, promoting interoperability and cross-disciplinary research. | | | |  |
|  |  |  |  |  |  |  |
|  | Metadata Harmonization and Crosswalks (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in building harmonizing architectures and reconciling and mapping different metadata schemas across disciplines, promoting interoperability and cross-disciplinary research. | | | |  |
|  |  |  |  |  |  |  |
|  | MyData | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 26 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | MyData Principles | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in managing personal data with a user-centric approach, allowing individuals to control the usage, sharing, and storage of their data. | | | |  |
|  |  |  |  |  |  |  |
|  | MyData Principles (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in managing personal data with a user-centric approach, allowing individuals to control the usage, sharing, and storage of their data. | | | |  |
|  |  |  |  |  |  |  |
|  | Ontology Development | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of creating and managing ontologies and linked data to facilitate understanding, data categorization and interoperability. | | | |  |
|  |  |  |  |  |  |  |
|  | Ontology Development (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Knowledge of creating and managing ontologies and linked data to facilitate understanding, data categorization and interoperability. | | | |  |
|  |  |  |  |  |  |  |
|  | Persistent Identifiers | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to assign and manage unique, permanent identifiers (e.g., DOI, ORCID) to datasets, ensuring long-term findability and reference. The use of persistent identifiers enhances data management and enables, for example, the formation of knowledge graphs and supports the repeatability and automation of research. | | | |  |
|  |  |  |  |  |  |  |
|  | Persistent Identifiers (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to assign and manage unique, permanent identifiers (e.g., DOI, ORCID) to datasets, ensuring long-term findability and reference. The use of persistent identifiers enhances data management and enables, for example, the formation of knowledge graphs and supports the repeatability and automation of research. | | | |  |
|  |  |  |  |  |  |  |
|  | Preservation Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in designing infrastructure for the long-term storage and preservation of datasets, ensuring their availability for future use. | | | |  |
|  |  |  |  |  |  |  |
|  | Preservation Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in designing infrastructure for the long-term storage and preservation of datasets, ensuring their availability for future use. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 27 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Project Funding | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in identifying funding opportunities, writing grant applications, and securing financial support for research projects and data infrastructure. | | | |  |
|  |  |  |  |  |  |  |
|  | Project Funding (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in identifying funding opportunities, writing grant applications, and securing financial support for research projects and data infrastructure. | | | |  |
|  |  |  |  |  |  |  |
|  | Project planning | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to define research objectives, timelines, resources and requirements, ensuring efficient execution and alignment with institutional goals and funding agencies requirements. | | | |  |
|  |  |  |  |  |  |  |
|  | Project planning (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The capability to define research objectives, timelines, resources and requirements, ensuring efficient execution and alignment with institutional goals and funding agencies requirements. | | | |  |
|  |  |  |  |  |  |  |
|  | Real-Time Data Processing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in processing streaming data in real-time, useful in fields like sensor data analysis or financial research. | | | |  |
|  |  |  |  |  |  |  |
|  | Real-Time Data Processing (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in processing streaming data in real-time, useful in fields like sensor data analysis or financial research. | | | |  |
|  |  |  |  |  |  |  |
|  | Reproducible Research | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to design research workflows and processes that allow for data and research findings to be consistently reproduced by others, promoting transparency. | | | |  |
|  |  |  |  |  |  |  |
|  | Reproducible Research (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to design research workflows and processes that allow for data and research findings to be consistently reproduced by others, promoting transparency. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 28 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Research Data Governance | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Planning data management to support the research process. Capability to comprehensively develop support processes and services toward interoperable data management planning and guidance. Requires collaboration between organizations providing support services at both local and national levels.  Research Data Governance encompasses the skills and knowledge required to establish and enforce policies, procedures, and frameworks that govern the management of research data. It ensures that data is handled responsibly, ethically, and in compliance with legal and institutional standards. Key areas include risk management, policy development, data valuation, and fostering collaborations within and outside institutions. Governance ensures that data is used effectively, securely, and sustainably, supporting long-term research goals and data stewardship. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Governance (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Planning data management to support the research process. Capability to comprehensively develop support processes and services toward interoperable data management planning and guidance. Requires collaboration between organizations providing support services at both local and national levels.  Research Data Governance encompasses the skills and knowledge required to establish and enforce policies, procedures, and frameworks that govern the management of research data. It ensures that data is handled responsibly, ethically, and in compliance with legal and institutional standards. Key areas include risk management, policy development, data valuation, and fostering collaborations within and outside institutions. Governance ensures that data is used effectively, securely, and sustainably, supporting long-term research goals and data stewardship. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to produce and manage data throughout the research process, ensuring sufficient information on the origin and lifecycle of the data. Research data is managed throughout its lifecycle, ensuring its controlled collection, creation, sharing, storage, archiving, destruction, and publication. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to produce and manage data throughout the research process, ensuring sufficient information on the origin and lifecycle of the data. Research data is managed throughout its lifecycle, ensuring its controlled collection, creation, | | | |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 29 | / 97 |  |

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| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | sharing, storage, archiving, destruction, and publication. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Process Development | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expetise to design, optimize, and implement processes that support the full lifecycle of research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Process Development (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expetise to design, optimize, and implement processes that support the full lifecycle of research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Dataset Metadata | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in creating and managing metadata (DCAT, DataCite, etc.) that accurately describes research datasets, improving their accessibility and reusability. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Dataset Metadata (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in creating and managing metadata (DCAT, DataCite, etc.) that accurately describes research datasets, improving their accessibility and reusability. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Infrastructure Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise needed to design, build, and maintain the physical and digital architectures that support research data management in different research domains | | | |  |
|  |  |  |  |  |  |  |
|  | Research Infrastructure Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise needed to design, build, and maintain the physical and digital architectures that support research data management in different research domains | | | |  |
|  |  |  |  |  |  |  |
|  | Research Methods | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Understanding a variety of quantitative and qualitative research methodologies and how data management is embedded within these methods. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Methods (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 30 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Understanding a variety of quantitative and qualitative research methodologies and how data management is embedded within these methods. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Networking and Collaboration | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to leverage national and international collaboration to advance data management. Skills to foster partnerships between researchers, institutions, and other stakeholders to facilitate the exchange of knowledge and data. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Networking and Collaboration (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to leverage national and international collaboration to advance data management. Skills to foster partnerships between researchers, institutions, and other stakeholders to facilitate the exchange of knowledge and data. | | | |  |
|  |  |  |  |  |  |  |
|  | Research, Development and Innovation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to commercialize research results, especially research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Research, Development and Innovation (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Capability to commercialize research results, especially research data. | | | |  |
|  |  |  |  |  |  |  |
|  | Risk Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Ability to identify, assess, and mitigate risks related to research data handling, storage, sharing, and legal compliance. | | | |  |
|  |  |  |  |  |  |  |
|  | Risk Management (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Ability to identify, assess, and mitigate risks related to research data handling, storage, sharing, and legal compliance. | | | |  |
|  |  |  |  |  |  |  |
|  | Scientific computing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in leveraging high-performance computing (HPC) and other advanced computing systems to process and analyze large, complex datasets. | | | |  |
|  |  |  |  |  |  |  |
|  | Scientific computing (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in leveraging high-performance computing (HPC) and other advanced computing systems to process and analyze large, complex datasets. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 31 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Search Engine Optimization | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to optimize metadata and dataset descriptions to ensure that research data is easily discoverable through search engines. | | | |  |
|  |  |  |  |  |  |  |
|  | Search Engine Optimization (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | The ability to optimize metadata and dataset descriptions to ensure that research data is easily discoverable through search engines. | | | |  |
|  |  |  |  |  |  |  |
|  | Sensitive Data Architecture | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in building data infrastructures that securely store and manage sensitive or confidential information, adhering to privacy regulations. | | | |  |
|  |  |  |  |  |  |  |
|  | Sensitive Data Architecture (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Skills in building data infrastructures that securely store and manage sensitive or confidential information, adhering to privacy regulations. | | | |  |
|  |  |  |  |  |  |  |
|  | Service Development | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in developing and enhancing research data services, ensuring they are accessible, user-friendly, and aligned with the needs of researchers and institutions. | | | |  |
|  |  |  |  |  |  |  |
|  | Service Development (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in developing and enhancing research data services, ensuring they are accessible, user-friendly, and aligned with the needs of researchers and institutions. | | | |  |
|  |  |  |  |  |  |  |
|  | Software Development | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Generic expertise in software development and programming languages | | | |  |
|  |  |  |  |  |  |  |
|  | Software Development (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Generic expertise in software development and programming languages | | | |  |
|  |  |  |  |  |  |  |
|  | User Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 32 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Value Stream | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Value Stream | | |  |
|  |  |  |  |  |  |  |
|  | Workflows, Pipelines and Deployment | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in designing and automating data workflows and pipelines to efficiently process and move data from source to storage and analysis. Skills in using container technologies (e.g., Docker, Kubernetes) to deploy scalable, portable data processing environments. | | | |  |
|  |  |  |  |  |  |  |
|  | Workflows, Pipelines and Deployment (copy) | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Capability | | |  |
|  |  |  |  |  |  |  |
|  |  | Expertise in designing and automating data workflows and pipelines to efficiently process and move data from source to storage and analysis. Skills in using container technologies (e.g., Docker, Kubernetes) to deploy scalable, portable data processing environments. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 33 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Business Layer | | | | |  |
|  |  |  |  |  |  |  |
|  | Business Actor | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Business Collaboration | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Collaboration | | |  |
|  |  |  |  |  |  |  |
|  | Business Event | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Event | | |  |
|  |  |  |  |  |  |  |
|  | Business Interaction | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Interaction | | |  |
|  |  |  |  |  |  |  |
|  | Business Process | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  | Business Process | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  | Consultation and Training | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  | Curator | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Data Integration & Interoperability | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of combining data from different sources and ensuring it works together in a seamless, interoperable manner, allowing systems to share and interpret data effectively. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Management Plan | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Encompasses the creation and maintenance of the research plan and data management plan, including preparing for data acquisition, selecting formats and storage solutions, and anticipating sharing and dissemination strategies to guide data management throughout the research lifecycle. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Preservation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Collaboration | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 34 | / 97 |  |

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| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Data Processing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Encompasses actions taken to refine and analyze raw or acquired data by researchers, using tools and programs, to yield processed data ready for observations and conclusions. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Production | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Focuses on the creation, collection, or acquisition of raw research data, either generated internally or sourced externally, through experimental or computational methods. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Publication | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Covers the external dissemination of both raw and processed research data, ensuring access for the wider community while adhering to policies on public sharing, use, and reuse. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Quality Monitoring | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of ensuring that data meets defined standards of accuracy, consistency, and reliability, critical for effective decision-making and analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Standardization | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Collaboration | | |  |
|  |  |  |  |  |  |  |
|  |  | Collaborative process for developing common standards for data and ensuring that data across different systems or organizations conforms to agreed format and structure. | | | |  |
|  |  |  |  |  |  |  |
|  | Director | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Data Lifecycle | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Collaboration | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Data Lifecycle | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process that encompasses all phases of research data management, from planning, collection, processing, preservation, to sharing and reuse adhering to FAIR and CARE principles. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Data Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 35 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | FAIR Infrastructure Governance | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The structured process of managing and regulating the infrastructure required for ensuring that data adheres to FAIR principles. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Publication Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Research Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Workflow Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Workflow Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | Funder | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Infrastructure Governance | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | Preservation Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | Preserve, Discard, Reuse | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Defines the processes for long-term data management, including archival or disposal of research data, ensuring compliance with records management practices and safe data handling at the end of its lifecycle. | | | |  |
|  |  |  |  |  |  |  |
|  | Project consulting | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Function | | |  |
|  |  |  |  |  |  |  |
|  | Project Proposal | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Establishes the strategic direction and decisions for an organization’s research data program, integrating it with broader data governance strategies to align with organizational goals. | | | |  |
|  |  |  |  |  |  |  |
|  | Project support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 36 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Publication Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Reference & Master Data Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of managing key data entities (reference and master data) that are critical for the operation of the research infrastructure. This process includes definition of common terminologies, taxonomies and codelists using standards and best practices from the research domain. | | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Infrastructure | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Process | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Infrastructure | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Service | | |  |
|  |  |  |  |  |  |  |
|  | Research Data Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Collaboration | | |  |
|  |  |  |  |  |  |  |
|  | Research Support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Researcher | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Service Owner | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Technology support | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Business Actor | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 37 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Application Layer | | | | |  |
|  |  |  |  |  |  |  |
|  | Access control | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of managing how the raw data sources are accessed | | | |  |
|  |  |  |  |  |  |  |
|  | Clean Data Source | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A source of data that has been cleaned to remove errors, inconsistencies, and redundancies, ensuring higher quality. | | | |  |
|  |  |  |  |  |  |  |
|  | Cleaned Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Data that has undergone a cleaning process to remove errors, inconsistencies, and duplicate entries, ensuring higher quality and usability. | | | |  |
|  |  |  |  |  |  |  |
|  | Cleaning | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of detecting and correcting (or removing) corrupt or inaccurate records from a dataset, improving data quality. | | | |  |
|  |  |  |  |  |  |  |
|  | Collection | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of gathering and storing data from different sources for further analysis or processing. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Cleaning Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A system or software component responsible for the cleaning and preprocessing of raw data before it is used for analysis or further processing. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Graph | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A structured representation of data in a graph format, showing relationships between entities, typically used in graph databases or semantic web applications. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Harmonization Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A software system or module designed to ensure that data from different sources conforms to a common format or structure, enabling interoperability and consistency. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 38 | / 97 |  |

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| --- | --- | --- | --- | --- | --- | --- |
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|  |  |  |  |  |  |  |
|  | Data Harmonization Pipeline | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | A structured process that ensures data is cleaned, harmonized and transformed into more usable format for ease of use across different systems or databases. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Ingestion Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A system or tool responsible for collecting and integrating data from various sources into a central repository for analysis or further processing. | | | |  |
|  |  |  |  |  |  |  |
|  | Data preservation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of maintaining and safeguarding data to ensure its long-term accessibility and usability. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Processing Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A system or tool that applies transformations, aggregations, and calculations to raw data, preparing it for analysis or reporting. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Processing Pipeline | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | A sequence of operations to collect, process and transform data into a well-defined format ensuring fit-for-purpose quality, often through a combination of software applications and processes. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Product | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A product or output that is generated from processing or analyzing raw data, designed to provide insights, services, or solutions. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Streams | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Continuous flows of data generated by various sources, often in real-time, used for monitoring, analysis, and decision-making. | | | |  |
|  |  |  |  |  |  |  |
|  | Deduplication | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of identifying and removing duplicate records from a dataset to ensure uniqueness and data quality. | | | |  |
|  |  |  |  |  |  |  |
|  | Digital Twin | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 39 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | A digital replica of a physical entity, process, or system used for simulation, analysis, and monitoring. | | | |  |
|  |  |  |  |  |  |  |
|  | Dumb Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Data that lacks context, structure, or meaningful metadata, making it difficult to use or interpret effectively. | | | |  |
|  |  |  |  |  |  |  |
|  | Dumb Data Lake | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A storage repository that holds a vast amount of raw data in its native format, typically without any preprocessing or structuring. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Data that is Findable, Accessible, Interoperable, and Reusable, adhering to the FAIR principles. | | | |  |
|  |  |  |  |  |  |  |
|  | Fair Data Source | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A data source that adheres to the FAIR principles (Findable, Accessible, Interoperable, and Reusable), ensuring data quality and compliance with FAIR standards. | | | |  |
|  |  |  |  |  |  |  |
|  | Fair Data Workflow | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A set of processes and procedures designed to handle data in a manner that adheres to FAIR principles. | | | |  |
|  |  |  |  |  |  |  |
|  | Fair Digital Object | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A FAIR digital object is a unit composed of data that is a sequence of bits, or a set of sequences of bits, each of the sequences being structured (typed) in a way that is interpretable by one or more computer systems, and having as essential elements an assigned globally uniqueandpersistent identifier (PID), a type definition for the object as a whole and a metadata description (which itself can be another FAIR digital object) of the properties of the object, making the whole findable, accessible, interoperable and reusable both by humans and computers for the reliable interpretation and processing of the data represented by the object (TSIG FDO WG). | | | |  |
|  |  |  |  |  |  |  |
|  | Fair Publication Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A system or tool that manages the process of publishing data in a manner that conforms to FAIR principles, ensuring that data is Findable, Accessible, | | | |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 40 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Interoperable, and Reusable. | | | |  |
|  |  |  |  |  |  |  |
|  | Fair Publication Pipeline | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The structured workflow for publishing data in a manner that adheres to FAIR principles (Findable, Accessible, Interoperable, and Reusable). | | | |  |
|  |  |  |  |  |  |  |
|  | Fair Research Dataset | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A research dataset that complies with FAIR principles, making it easily discoverable and usable by others. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR validation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of verifying whether data adheres to FAIR principles, ensuring it is findable, accessible, interoperable, and reusable. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR Validation Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A tool or system that checks whether data adheres to FAIR principles, ensuring compliance and quality of data publication. | | | |  |
|  |  |  |  |  |  |  |
|  | Harmonized Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Data that has been standardized and integrated from multiple sources to ensure consistency and compatibility across datasets. | | | |  |
|  |  |  |  |  |  |  |
|  | Ingested Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Data that has been collected and integrated into a system for further processing or analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | Ingested Data Source | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A data source that has been collected and integrated into a system for analysis or further processing. | | | |  |
|  |  |  |  |  |  |  |
|  | Ingestion frequency | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The rate at which new data is collected and integrated into a system or database for further processing. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 41 | / 97 |  |

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| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Ingestion Pipeline | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | A sequence of steps that facilitate the input and integration of data into a system for cleaning, processing and further analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | Ingestion Pipeline Component | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Component | | |  |
|  |  |  |  |  |  |  |
|  |  | A module or system responsible for managing the sequence of steps involved in the collection and integration of data from various sources into a central system. | | | |  |
|  |  |  |  |  |  |  |
|  | Interoperable metadata | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Metadata that is structured in a way that allows it to be used and understood across different systems, promoting data sharing and reuse. | | | |  |
|  |  |  |  |  |  |  |
|  | Master Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Critical business data that is essential for operations, often shared across multiple systems and processes within an organization. | | | |  |
|  |  |  |  |  |  |  |
|  | Persistent identifiers | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | Unique and persistent identifiers assigned to data or digital objects to ensure their long-term accessibility and referenceability, such as URN, DOI and ORCID | | | |  |
|  |  |  |  |  |  |  |
|  | Processing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The sequence of actions applied to data to analyze, enrich and convert the data to support the intended use case | | | |  |
|  |  |  |  |  |  |  |
|  | Querable Data Stream | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A data stream that can be queried or accessed in real-time for analysis or monitoring purposes. | | | |  |
|  |  |  |  |  |  |  |
|  | Querable Structured Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Structured data that can be easily queried, analyzed, and used in various applications and systems. | | | |  |
|  |  |  |  |  |  |  |
|  | Raw Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 42 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | Unprocessed data that has been collected directly from the source without any transformation, cleaning, or aggregation. | | | |  |
|  |  |  |  |  |  |  |
|  | Raw Data Source | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A source of unprocessed or untransformed data, typically collected directly from the origin systems or devices. | | | |  |
|  |  |  |  |  |  |  |
|  | Smart Data | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | Data that has been enriched with additional context or metadata to enhance its value and facilitate advanced analysis or decision-making. | | | |  |
|  |  |  |  |  |  |  |
|  | Smart Data Source | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A data source that has been enriched with additional context, metadata and documentation to enable efficient data reuse and more advanced analysis or decision-making. This is typically domain spesific or fit-for-purpose enterpise level data that is well documented and ready to be used within a bounded context using the documentation and tools provided with the data. | | | |  |
|  |  |  |  |  |  |  |
|  | Structured Data Dump | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Data Object | | |  |
|  |  |  |  |  |  |  |
|  |  | A collection of structured data exported from a system or database, typically used for backup, analysis, or migration purposes. | | | |  |
|  |  |  |  |  |  |  |
|  | Synthesizing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of combining different data sources to generate new insights or data products. | | | |  |
|  |  |  |  |  |  |  |
|  | Transformation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of converting data from one format, structure, or model to another for compatibility or analysis purposes. | | | |  |
|  |  |  |  |  |  |  |
|  | Validation | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of checking the accuracy and integrity of data to ensure it meets the required standards and specifications. | | | |  |
|  |  |  |  |  |  |  |
|  | Verification | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 43 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | The process of confirming that data or processes meet defined requirements and specifications, typically in quality assurance. | | | |  |
|  |  |  |  |  |  |  |
|  | Workflow Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Application Process | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of organizing and optimizing the flow of tasks and information in a data processing pipeline or system. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 44 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Technology & Physical Layer | | | | |  |
|  |  |  |  |  |  |  |
|  | Technology Service | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  | Access Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Services and tools that manage user access to systems and data, ensuring proper authentication and authorization. Access can be managed on service, API or dataset level using Resource Entitlement Management Systems. | | | |  |
|  |  |  |  |  |  |  |
|  | Analytics | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Data storage that integrates data from multiple sources, optimized for reporting and analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | APIs | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Application Programming Interfaces that allow different software applications to communicate and interact with each other, enabling integration and functionality sharing. | | | |  |
|  |  |  |  |  |  |  |
|  | Application Interface | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | The point of interaction between different software applications, enabling them to communicate and exchange data. | | | |  |
|  |  |  |  |  |  |  |
|  | Code Repository | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A storage location for software code, enabling version control, collaboration, and management of codebases. | | | |  |
|  |  |  |  |  |  |  |
|  | Collaborative Wiki | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A web-based platform that allows multiple users to create, edit, and share content collaboratively in real-time. | | | |  |
|  |  |  |  |  |  |  |
|  | Columnar | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Database where data is stored in columns instead of rows to optimize certain types of queries, analytic workflows and data manipulation operations. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 45 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Data Governance Systems | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Software systems designed to manage, monitor, and enforce data governance policies and practices within an organization. | | | |  |
|  |  |  |  |  |  |  |
|  | Data ingestion | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | The process of importing, transferring, loading, and processing data for later use or storage in a database or data warehouse. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Lineage Systems | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | The documentation of the origin, lineage, and history of data, ensuring its authenticity and traceability throughout its lifecycle. | | | |  |
|  |  |  |  |  |  |  |
|  | Data mining | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | The practice of examining large datasets to discover patterns, trends, and insights that can inform decision-making. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Processing Platform | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A software platform that provides tools and infrastructure for processing, analyzing, and managing large volumes of data. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Storage | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Systems and formats used to store data, including different types of databases, data warehouses, data lakes, cloud storage solutions and transaction formats. The list is endless and the high level categorization is mainly used to exemplify that there are different types of data storage and transaction formats to suit different needs. | | | |  |
|  |  |  |  |  |  |  |
|  | Data Workflow Repository | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A system that stores and manages workflows related to data processing, ensuring efficient and repeatable data operations. | | | |  |
|  |  |  |  |  |  |  |
|  | Database | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | An organized collection of structured information or data, typically stored electronically in a computer system. | | | |  |
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|  | Reference Architecture for FAIR Data Infrastructures | | | 46 | / 97 |  |

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|  |  |  |  |  |  |  |
|  | Devices | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Hardware tools and equipment used for data collection, processing, and storage, such as sensors, computers, and mobile devices. | | | |  |
|  |  |  |  |  |  |  |
|  | Dimensional | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Relational database that uses a dimensional data model to organize data. This model uses fact tables and dimension tables using different schema models such as star model, snowflake, galaxy or data cube schema. A dimensional database is the optimal type of database for data warehousing. | | | |  |
|  |  |  |  |  |  |  |
|  | Document | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A type of database designed to store, retrieve, and manage document-oriented information, typically in formats like JSON or XML. | | | |  |
|  |  |  |  |  |  |  |
|  | Documentation & Support Systems | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Software tools and systems that provide documentation, help resources, and support for users managing data systems and infrastructure. | | | |  |
|  |  |  |  |  |  |  |
|  | Domain solutions | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Specialized software or systems designed to address specific needs or challenges within a particular domain or industry. | | | |  |
|  |  |  |  |  |  |  |
|  | Event streaming | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | The continuous flow of data generated by events, typically processed in real-time for immediate analysis and response. | | | |  |
|  |  |  |  |  |  |  |
|  | FAIR publication system | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A system designed to publish data in accordance with FAIR principles, ensuring data is findable, accessible, interoperable, and reusable. | | | |  |
|  |  |  |  |  |  |  |
|  | Fairdata platform | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | FAIR data infrastucture designed to manage, store, and provide access to FAIR data, ensuring compliance with FAIR principles. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 47 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Filesystem | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A method and data structure that an operating system uses to control how data is stored and retrieved on storage devices. | | | |  |
|  |  |  |  |  |  |  |
|  | Graph | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A type of database that uses graph structures with nodes, edges, and properties to store and represent data, enabling data integration and efficient querying of relationships. Different types of graph databases like RDF, propery graph and in-memory graph databases offer diverse functionalities suitable for specialized applications to support different use cases that use high variety, interconnected and dynamic data from multiple sources. | | | |  |
|  |  |  |  |  |  |  |
|  | Identity Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Services and systems that manage user identities and control access to resources based on authenticated identities. | | | |  |
|  |  |  |  |  |  |  |
|  | Issues & Feedback | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Systems and processes that collect, manage, and respond to user-reported issues and feedback regarding data systems and services. | | | |  |
|  |  |  |  |  |  |  |
|  | Key value | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A type of NoSQL database that stores data as a collection of key-value pairs, allowing for simple and fast data retrieval based on unique keys. | | | |  |
|  |  |  |  |  |  |  |
|  | Learning Portal | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | An online platform that provides educational resources, training materials, and learning modules for users and stakeholders. | | | |  |
|  |  |  |  |  |  |  |
|  | Ledger | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Immutable record-keeping system that is permanent and immune to data corruption and provides strong gaurantees about the lineage of data. Ledgers can be both centralized or decentralized. | | | |  |
|  |  |  |  |  |  |  |
|  | Machine Actionable Interface | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Interfaces that allow machines to interpret and act upon data or commands without | | | |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 48 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  |  | human intervention, facilitating automation and integration. | | | |  |
|  |  |  |  |  |  |  |
|  | Machine learning | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A subset of artificial intelligence that involves the development of algorithms that can learn from and make predictions or decisions based on data. | | | |  |
|  |  |  |  |  |  |  |
|  | Metadata Crosswalks | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Tools or processes that map metadata elements from one schema or standard to another, enabling interoperability and data integration across different systems. | | | |  |
|  |  |  |  |  |  |  |
|  | Metadata Management Systems | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Systems that manage metadata, ensuring it is properly collected, stored, and accessible for data governance and usage. | | | |  |
|  |  |  |  |  |  |  |
|  | Model & Schema Repositories | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Structured representations of data that define the organization, relationships, and constraints of data elements within a system or application. | | | |  |
|  |  |  |  |  |  |  |
|  | Notebooks | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  | Object | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A storage architecture that manages data as objects, each containing the data itself, metadata, and a unique identifier, suitable for large-scale unstructured data. | | | |  |
|  |  |  |  |  |  |  |
|  | Ontology & Linked Data Platforms | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Formal representations of knowledge (Classes, properties and instances) as a set of concepts and the relationships between them, used to model domain knowledge and integrating data from multiple sources to semantically interoperable data model. | | | |  |
|  |  |  |  |  |  |  |
|  | Operational | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Data storage systems designed to update data in real-time | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 49 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | PID Management | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Process and systems for managing Persistent Identifiers (PIDs) to ensure unique, long-lasting references to digital objects or data. | | | |  |
|  |  |  |  |  |  |  |
|  | PID Resolver | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A system or service that resolves Persistent Identifiers (PIDs) to their corresponding digital objects or data locations. | | | |  |
|  |  |  |  |  |  |  |
|  | Preservation system | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Systems and processes designed to maintain and protect digital data over time, ensuring its accessibility and integrity for future use. | | | |  |
|  |  |  |  |  |  |  |
|  | Process engine | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Software that manages and executes business processes, often using defined workflows to coordinate tasks and data flows. | | | |  |
|  |  |  |  |  |  |  |
|  | Property graph | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  | Provenance Systems | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Systems that track the origins, movement, and transformations of data. These include data lineage systems as well as the provenance of code and the deployment and usage of the systems used to manage the data. | | | |  |
|  |  |  |  |  |  |  |
|  | Publication system | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Systems that manage the dissemination and distribution of data, content, or research outputs to end-users or the public. | | | |  |
|  |  |  |  |  |  |  |
|  | Publishing platform | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Software systems that facilitate the publishing and distribution of data, content, or services to end-users. | | | |  |
|  |  |  |  |  |  |  |
|  | Quality assurance | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Processes and systems designed to ensure that data and data-related processes meet defined quality standards and requirements. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 50 | / 97 |  |

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|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Reference Data & Taxonomies | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Standardized sets of data and classification systems that provide a consistent framework for data categorization and analysis across different systems. | | | |  |
|  |  |  |  |  |  |  |
|  | Relational | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  | Research notebooks | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Interactive notebooks, digital tools or platforms designed to support and enhance scientific research, experimentation, and analysis. They function as a dynamic environment where researchers can record, execute, and visualize code, document processes, and share results in an integrated and collaborative manner. | | | |  |
|  |  |  |  |  |  |  |
|  | Scientific computing | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | The use of advanced computing capabilities such as parallel processing or quantum computing to understand and solve complex scientific problems through simulations, modeling, and data analysis. | | | |  |
|  |  |  |  |  |  |  |
|  | Semantic Artefact Repositories | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Semantic artifact repositories enable both humans and machines to access, understand, and use this structured knowledge. Semantic artifacts are formal, machine readable and actionable representations of knowledge, used to capture and structure information in a domain. Examples include ontologies, terminologies, taxonomies, thesauri, vocabularies, metadata schemas, data models and data mappings. | | | |  |
|  |  |  |  |  |  |  |
|  | Sensors | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Devices that detect and measure physical properties, converting them into data that can be analyzed and used for monitoring and decision-making. | | | |  |
|  |  |  |  |  |  |  |
|  | Source systems | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Original systems where data is created or initially stored, serving as the primary data sources for data integration and processing. | | | |  |
|  |  |  |  |  |  |  |
|  | Spatiotemporal | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Designed to efficiently store, query, and process spatial and temporal data, such as observations, time series, geoinformation, historical locations and events etc. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 51 | / 97 |  |

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| --- | --- | --- | --- | --- | --- | --- |
|  | | | | | | |
|  |  |  |  |  |  |  |
|  | Specialized | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Data storage system designed and optimized for different use cases. This type of data storages can also be hybrid, multimodal and used both in operational or analytic use cases. | | | |  |
|  |  |  |  |  |  |  |
|  | Staging System | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A system used to temporarily store data before it is processed and moved to a final destination, often used as a first step in data cleaning, data warehousing and integration platforms. | | | |  |
|  |  |  |  |  |  |  |
|  | Technology Service | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  | Technology Service | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  | Validation Tools | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Data quality management tools that monitor and validate metadata to identify discrepancies, missing fields, or inconsistencies. | | | |  |
|  |  |  |  |  |  |  |
|  | Vector | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Data structures used to store and manipulate mathematical vectors, often used in machine learning and data analysis applications. | | | |  |
|  |  |  |  |  |  |  |
|  | Virtual Research Environment | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | A specialized data processing platform that provides researchers with tools, resources, and collaborative spaces to conduct and manage research activities. | | | |  |
|  |  |  |  |  |  |  |
|  | Visualisation platforms | | | | |  |
|  |  |  |  |  |  |  |
|  | Type | | Technology Service | | |  |
|  |  |  |  |  |  |  |
|  |  | Tools or systems designed to create, manage, and interact with visual representations of data. These platforms facilitate the transformation of complex datasets into graphical or visual forms such as charts, graphs, maps, dashboards, and interactive visuals. The goal of these platforms is to make data more understandable, accessible, and actionable, allowing users to explore, analyze, and communicate insights effectively. | | | |  |
|  |  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | | 52 | / 97 |  |

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|  |  |  |  |  |  |
|  | Relations | | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | FAIR Research Support | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Raw Data Source | | |  |
|  | Target | Data Streams | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Documentation & Support Systems | | |  |
|  | Target | Learning Portal | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Semantic Artefact Repositories | | |  |
|  | Target | Reference Data & Taxonomies | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Analytics | | |  |
|  | Target | Relational | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | MyData | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Data Production | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Data Engineering | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 53 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | Intellectual Property Rights | | |  |
|  |  |  |  |  |  |
|  | Specialization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Specialization relation | | |  |
|  | Source | Fair Data Workflow | | |  |
|  | Target | Fair Digital Object | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Risk Management (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Fair Publication Pipeline | | |  |
|  | Target | Interoperable metadata | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Research Support | | |  |
|  | Target | Project consulting | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Infrastructure scalability (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Change Management | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Data Support | | |  |
|  | Target | Research Data Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Operational | | |  |
|  | Target | Object | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 54 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture (copy) | | |  |
|  | Target | Data Versioning and Provenance (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Anonymization and Pseudonymization | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Project consulting | | |  |
|  | Target | Information Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | Data Citation and Attribution (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  | Target | Notebooks | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Processing Pipeline | | |  |
|  | Target | Collection | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | FAIR Publication Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture (copy) | | |  |
|  | Target | Search Engine Optimization (copy) | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Management Plan | | |  |
|  | Target | Project Proposal | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 55 | / 97 |  |

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|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Clean Data Source | | |  |
|  | Target | Cleaned Data | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | API Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Data Processing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Semantic Artefact Repositories | | |  |
|  | Target | Metadata Crosswalks | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Service Development (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture (copy) | | |  |
|  | Target | Research Dataset Metadata (copy) | | |  |
|  |  |  |  |  |  |
|  | Specialization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Specialization relation | | |  |
|  | Source | Validation | | |  |
|  | Target | Data Harmonization Pipeline | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Analytics | | |  |
|  | Target | Dimensional | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Data Processing Platform | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 56 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Data Storage | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Research Support | | |  |
|  | Target | FAIR Research Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Information Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Processing Pipeline | | |  |
|  | Target | Processing | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Publishing platform | | |  |
|  | Target | Publication system | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Workflow Management | | |  |
|  | Target | Data Processing Pipeline | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Project consulting | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Ingested Data Source | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Processing | | |  |
|  | Target | Data Publication | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 57 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Source | Research Data Management | | |  |
|  | Target | Research Data Process Development | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Columnar | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Ingested Data Source | | |  |
|  | Target | Querable Data Stream | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Master Data Management (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Quality | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Project consulting | | |  |
|  | Target | Project planning | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Information Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Data Rights and Legal Compliance | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Operational | | |  |
|  | Target | Graph | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 58 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Access Management (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance (copy) | | |  |
|  | Target | Data Ethics (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Publishing platform | | |  |
|  | Target | Identity Management | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Semantic Artefact Repositories | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management (copy) | | |  |
|  | Target | Data Engineering (copy) | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Workflow Support | | |  |
|  | Target | Scientific computing | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Publication | | |  |
|  | Target | Preserve, Discard, Reuse | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Data Processing Platform | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Change Management (copy) | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 59 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Cloud Architectures | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Data Valuation and Meritation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Processing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Real-Time Data Processing | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Workflow Support | | |  |
|  | Target | Data Lineage | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Specialized | | |  |
|  | Target | Ledger | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | Sensitive Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Technology support | | |  |
|  | Target | FAIR Workflow Support | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 60 | / 97 |  |

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|  |  |  |  |  |  |
|  | Target | Research Support | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Provenance Systems | | |  |
|  | Target | Data Workflow Repository | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Source systems | | |  |
|  | Target | Staging System | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Service Development | | |  |
|  |  |  |  |  |  |
|  | Specialization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Specialization relation | | |  |
|  | Source | Fairdata platform | | |  |
|  | Target | Publishing platform | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Workflow Support | | |  |
|  | Target | Data Engineering | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Governance Systems | | |  |
|  | Target | Documentation & Support Systems | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Research Support | | |  |
|  | Target | FAIR Workflow Support | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 61 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Source | Fairdata platform | | |  |
|  | Target | Fair Data Source | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Data Support | | |  |
|  | Target | Data Stewardship | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management (copy) | | |  |
|  | Target | Data Rights and Legal Compliance (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Interoperability Frameworks | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Data Governance Systems | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Software Development | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Publication Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Actionable Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Business Event | | |  |
|  | Target | Business Process | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 62 | / 97 |  |

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|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Fairdata platform | | |  |
|  | Target | FAIR publication system | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Persistent Identifiers (copy) | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Preservation Support | | |  |
|  | Target | Data Preservation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Data Valuation and Meritation (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Staging System | | |  |
|  | Target | Data ingestion | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Fair Data Source | | |  |
|  | Target | Fair Digital Object | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Project planning | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture | | |  |
|  | Target | Metadata Harmonization and Crosswalks | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Ingested Data Source | | |  |
|  | Target | Dumb Data Lake | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 63 | / 97 |  |

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|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Project support | | |  |
|  | Target | Project consulting | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | User Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Lineage (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Anonymization and Pseudonymization (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance (copy) | | |  |
|  | Target | Data Licensing (copy) | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Project consulting | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Technology Service | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Data Support | | |  |
|  | Target | Information Architecture | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Storage | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 64 | / 97 |  |

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|  |  |  |  |  |  |
|  | Target | Key value | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Preservation Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Raw Data Source | | |  |
|  | Target | Dumb Data | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Software Development (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | PID Management | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  | Target | Domain solutions | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Domain Architectures (copy) | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Clean Data Source | | |  |
|  | Target | Smart Data Source | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Interoperability Frameworks (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 65 | / 97 |  |

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|  |  |  |  |  |  |
|  | Source | Data Engineering | | |  |
|  | Target | API Management | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Technology support | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Research Support | | |  |
|  | Target | Data Production | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Cumulative and Big Data | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Publication Support | | |  |
|  | Target | FAIR Publication Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Analytics And Reporting (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Infrastructure Governance | | |  |
|  | Target | Consultation and Training | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Research Networking and Collaboration (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture (copy) | | |  |
|  | Target | Metadata Harmonization and Crosswalks (copy) | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 66 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Data Discovery Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Interoperability and Standards | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Fair Publication Pipeline | | |  |
|  | Target | FAIR validation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Research Infrastructure Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Sensitive Data Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Publication Support | | |  |
|  | Target | Data Publication | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Workflow Management | | |  |
|  | Target | Data Harmonization Pipeline | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Scientific computing | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Publication | | |  |
|  | Target | Data Processing | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 67 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Operational | | |  |
|  | Target | Document | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Publishing platform | | |  |
|  | Target | Access Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Green Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | Data Policies | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Clean Data Source | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Documentation & Support Systems | | |  |
|  | Target | Collaborative Wiki | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Project Proposal | | |  |
|  | Target | Preserve, Discard, Reuse | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Visualization | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Fair Research Dataset | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 68 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Fair Digital Object | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | Data Ethics | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Project consulting | | |  |
|  | Target | Interoperability | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Persistent Identifiers | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Data Production | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Master and Reference Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Harmonization Pipeline | | |  |
|  | Target | Transformation | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Clean Data Source | | |  |
|  | Target | Data Processing Pipeline | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Raw Data Source | | |  |
|  | Target | Ingestion Pipeline | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 69 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Source | Semantic Artefact Repositories | | |  |
|  | Target | Ontology & Linked Data Platforms | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Stewardship | | |  |
|  | Target | Data Citation and Attribution | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Research Support | | |  |
|  | Target | Project consulting | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Specialized | | |  |
|  | Target | Columnar | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Metadata Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Sensitive Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Stewardship | | |  |
|  | Target | Data Publication | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Data Discovery Architecture | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 70 | / 97 |  |

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|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Fairdata platform | | |  |
|  | Target | Machine Actionable Interface | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Publication Support | | |  |
|  | Target | Preservation Support | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Staging System | | |  |
|  | Target | Ingested Data Source | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | FAIR Publication Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | Research Methods | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Lineage | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | Reproducible Research | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Project Proposal | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Staging System | | |  |
|  | Target | Quality assurance | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 71 | / 97 |  |

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|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Hardware | | |  |
|  | Target | Sensors | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Staging System | | |  |
|  | Target | Data Storage | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | Data Curation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Cumulative and Big Data | | |  |
|  | Target | Real-Time Data Processing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Artificial Intelligence | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | Data Standardization | | |  |
|  | Target | Reference & Master Data Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture | | |  |
|  | Target | Search Engine Optimization | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Processing | | |  |
|  | Target | Data Production | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Graph | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 72 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Property graph | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Vector | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Source systems | | |  |
|  | Target | APIs | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Quality (copy) | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Smart Data Source | | |  |
|  | Target | Fair Data Source | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Ledger | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Preserve, Discard, Reuse | | |  |
|  | Target | Data Publication | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Curator | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Integration Development (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 73 | / 97 |  |

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|  |  |  |  |  |  |
|  | Source | Fairdata platform | | |  |
|  | Target | Preservation system | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Provenance Systems | | |  |
|  | Target | Code Repository | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Project planning (copy) | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Workflow Management | | |  |
|  | Target | FAIR Infrastructure Governance | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Database Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Preservation Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Processing (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Analytics | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Database Management (copy) | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 74 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Stewardship | | |  |
|  | Target | Data Curation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Harmonization Pipeline | | |  |
|  | Target | Cleaning | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Scientific computing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Ingestion Pipeline | | |  |
|  | Target | Ingestion frequency | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Curator | | |  |
|  | Target | Preservation Support | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Governance Systems | | |  |
|  | Target | Data Storage | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | Legal Framework | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Infrastructure Governance | | |  |
|  | Target | Data Quality Monitoring | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Green Data Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 75 | / 97 |  |

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|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Project consulting | | |  |
|  | Target | Research Methods | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Artificial Intelligence (copy) | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Governance Systems | | |  |
|  | Target | Fairdata platform | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | API Management (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | Data Stewardship | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Access Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Stewardship | | |  |
|  | Target | Data Preservation | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Funder | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Source systems | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 76 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Filesystem | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Security (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Operational | | |  |
|  | Target | Key value | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Edge Computing (copy) | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Smart Data Source | | |  |
|  | Target | Digital Twin | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | Interoperability Frameworks | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Data Support | | |  |
|  | Target | Interoperability | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  | Target | Research notebooks | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Metadata Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 77 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Source | Metadata Architecture | | |  |
|  | Target | Research Dataset Metadata | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Fair Data Workflow | | |  |
|  | Target | Fair Research Dataset | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture | | |  |
|  | Target | Master and Reference Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Raw Data Source | | |  |
|  | Target | Ingested Data Source | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Management Plan | | |  |
|  | Target | Project Proposal | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture | | |  |
|  | Target | Ontology Development | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance (copy) | | |  |
|  | Target | Legal Framework (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | Data Curation (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Domain Architectures | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 78 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Reproducible Research | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Workflow Management | | |  |
|  | Target | FAIR Data Lifecycle | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Publishing platform | | |  |
|  | Target | Application Interface | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Publishing platform | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Processing | | |  |
|  | Target | Data Publication | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Smart Data Source | | |  |
|  | Target | Data Processing Pipeline | | |  |
|  |  |  |  |  |  |
|  | Specialization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Specialization relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  | Target | Data Processing Platform | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management (copy) | | |  |
|  | Target | Research Infrastructure Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Data Policies | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 79 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | MyData | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Researcher | | |  |
|  | Target | FAIR Data Lifecycle | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Smart Data Source | | |  |
|  | Target | Data Product | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  | Target | Visualisation platforms | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Research Data Infrastructure | | |  |
|  |  |  |  |  |  |
|  | Specialization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Specialization relation | | |  |
|  | Source | Fair Research Dataset | | |  |
|  | Target | Fair Digital Object | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Preservation Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | Data Citation and Attribution | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Provenance Systems | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 80 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Issues & Feedback | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Source systems | | |  |
|  | Target | Database | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Researcher | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management (copy) | | |  |
|  | Target | Research Data Governance (copy) | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Production | | |  |
|  | Target | Data Processing | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Processing Platform | | |  |
|  | Target | Machine learning | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture | | |  |
|  | Target | Data Versioning and Provenance | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Fair Publication Pipeline | | |  |
|  | Target | Data preservation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance (copy) | | |  |
|  | Target | Intellectual Property Rights (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 81 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Source | Analytics | | |  |
|  | Target | Vector | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Data Curation | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Raw Data Source | | |  |
|  | Target | Structured Data Dump | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Specialized | | |  |
|  | Target | Vector | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Workflows, Pipelines and Deployment | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Research Networking and Collaboration | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Master and Reference Data Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Hardware | | |  |
|  | Target | Source systems | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Document | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 82 | / 97 |  |

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|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Reference Data & Taxonomies | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Metadata Architecture (copy) | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Researcher | | |  |
|  | Target | Project Proposal | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Staging System | | |  |
|  | Target | Event streaming | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | FAIR Research Support | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Ingested Data Source | | |  |
|  | Target | Data Harmonization Pipeline | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Analytics And Reporting | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Clean Data Source | | |  |
|  | Target | Harmonized Data | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Project support | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 83 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | Reproducible Research (copy) | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Management Plan | | |  |
|  | Target | Data Production | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Workflow Support | | |  |
|  | Target | Workflows, Pipelines and Deployment | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Research, Development and Innovation | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Data Valuation and Meritation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Data Publication | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Analytics | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Fairdata platform | | |  |
|  | Target | PID Resolver | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Publishing platform | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 84 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Smart Data Source | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Workflow Support | | |  |
|  | Target | FAIR Publication Support | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Data Policies (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Reproducible Research | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Metadata Crosswalks | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Preservation Support | | |  |
|  | Target | Data Curation | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Risk Management | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Publication Support | | |  |
|  | Target | Data Stewardship | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Interoperability Frameworks | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 85 | / 97 |  |

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|  |  |  |  |  |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Risk Management | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | Sensitive Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Workflow Management | | |  |
|  | Target | Ingestion Pipeline | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Object | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | MyData Principles (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | MyData | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | Data Stewardship (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Architecture (copy) | | |  |
|  | Target | Ontology Development (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Data Rights and Legal Compliance | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 86 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Encryption (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | Research Methods (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Sensitive Data Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management (copy) | | |  |
|  | Target | Research Data Process Development (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Information Architecture | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture (copy) | | |  |
|  | Target | Cloud Architectures (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Provenance Systems | | |  |
|  | Target | Data Lineage Systems | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Operational | | |  |
|  | Target | Relational | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Governance Systems | | |  |
|  | Target | Publishing platform | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 87 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Infrastructure Governance | | |  |
|  | Target | Data Integration & Interoperability | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Processing Platform | | |  |
|  | Target | Scientific computing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | Data Policies | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Processing Pipeline | | |  |
|  | Target | Synthesizing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Management | | |  |
|  | Target | Research Data Governance | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Hardware | | |  |
|  | Target | Devices | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development (copy) | | |  |
|  | Target | FAIR Principles (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Project Funding | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 88 | / 97 |  |

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| --- | --- | --- | --- | --- | --- |
|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Data Processing Platform | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Virtual Research Environment | | |  |
|  | Target | null | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Fair Data Source | | |  |
|  | Target | Fair Data Workflow | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Infrastructure scalability | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Source systems | | |  |
|  | Target | Raw Data Source | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Semantic Artefact Repositories | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Ingestion Pipeline | | |  |
|  | Target | Access control | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | MyData Principles | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | MyData Principles | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 89 | / 97 |  |

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|  |  |  |  |  |  |
|  | Source | Research Data Management | | |  |
|  | Target | Research Methods | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Fair Data Source | | |  |
|  | Target | Fair Research Dataset | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Standardization | | |  |
|  | Target | FAIR Infrastructure Governance | | |  |
|  |  |  |  |  |  |
|  | Assignment relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Assignment relation | | |  |
|  | Source | Data Standardization | | |  |
|  | Target | Data Integration & Interoperability | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Research, Development and Innovation (copy) | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Project planning | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Specialized | | |  |
|  | Target | Spatiotemporal | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | FAIR Data Support | | |  |
|  | Target | FAIR Principles | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Workflow Support | | |  |
|  | Target | Data Processing | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 90 | / 97 |  |

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|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Project Funding | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Fair Data Workflow | | |  |
|  | Target | Fair Digital Object | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Preserve, Discard, Reuse | | |  |
|  | Target | Project Proposal | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Rights and Legal Compliance | | |  |
|  | Target | Data Licensing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | FAIR Infrastructure Governance | | |  |
|  | Target | Reference & Master Data Management | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Ingested Data Source | | |  |
|  | Target | Querable Structured Data | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Integration Development | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Data Production | | |  |
|  | Target | Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Fair Data Source | | |  |
|  | Target | Fair Publication Pipeline | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 91 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Harmonization Pipeline | | |  |
|  | Target | Deduplication | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Interoperability and Standards (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance | | |  |
|  | Target | Data Policies | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Issues & Feedback | | |  |
|  | Target | Source systems | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Edge Computing | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Governance (copy) | | |  |
|  | Target | Project Funding (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Provenance Systems | | |  |
|  | Target | Data Governance Systems | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Project consulting | | |  |
|  | Target | Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Semantic Artefact Repositories | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 92 | / 97 |  |

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|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Model & Schema Repositories | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Processing Platform | | |  |
|  | Target | Data mining | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Smart Data Source | | |  |
|  | Target | Data Graph | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Infrastructure Architecture | | |  |
|  | Target | API Management | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Document | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Real-Time Data Processing (copy) | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Fairdata platform | | |  |
|  | Target | Publishing platform | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Cumulative and Big Data (copy) | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Project consulting | | |  |
|  | Target | FAIR Research Support | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 93 | / 97 |  |

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|  |  |  |  |  |  |
|  | Source | Data Governance Systems | | |  |
|  | Target | Staging System | | |  |
|  |  |  |  |  |  |
|  | Aggregation relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Aggregation relation | | |  |
|  | Source | FAIR Data Lifecycle | | |  |
|  | Target | Service Owner | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Interoperability Frameworks | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Validation Tools | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | FAIR Research Support | | |  |
|  | Target | Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Workflow Management | | |  |
|  | Target | Fair Publication Pipeline | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Staging System | | |  |
|  | Target | Process engine | | |  |
|  |  |  |  |  |  |
|  | Access relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Access relation | | |  |
|  | Source | Clean Data Source | | |  |
|  | Target | Master Data | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Scientific computing (copy) | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 94 | / 97 |  |

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|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Preservation Support | | |  |
|  | Target | Preserve, Discard, Reuse | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Graph | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Fair Publication Pipeline | | |  |
|  | Target | Persistent identifiers | | |  |
|  |  |  |  |  |  |
|  | Flow relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Flow relation | | |  |
|  | Source | Ingested Data Source | | |  |
|  | Target | Clean Data Source | | |  |
|  |  |  |  |  |  |
|  | Association relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Association relation | | |  |
|  | Source | Metadata Management Systems | | |  |
|  | Target | Ontology & Linked Data Platforms | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture | | |  |
|  | Target | MyData Principles | | |  |
|  |  |  |  |  |  |
|  | Realization relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Realization relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Legal Framework | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Information Architecture (copy) | | |  |
|  | Target | Actionable Data Management Plan (copy) | | |  |
|  |  |  |  |  |  |
|  | Triggering relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Triggering relation | | |  |
|  | Source | Project Proposal | | |  |
|  | Target | Data Management Plan | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 95 | / 97 |  |

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|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Security | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Analytics | | |  |
|  | Target | Columnar | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering | | |  |
|  | Target | Data Encryption | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  | Target | Data Visualization (copy) | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Data Governance Systems | | |  |
|  | Target | Data Processing Platform | | |  |
|  |  |  |  |  |  |
|  | Serving relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Serving relation | | |  |
|  | Source | Infrastructure Governance | | |  |
|  | Target | Project Proposal | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Specialized | | |  |
|  | Target | Graph | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Storage | | |  |
|  | Target | Specialized | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Data Engineering (copy) | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 96 | / 97 |  |

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| --- | --- | --- | --- | --- | --- |
|  | | | | | |
|  |  |  |  |  |  |
|  | Target | Workflows, Pipelines and Deployment (copy) | | |  |
|  |  |  |  |  |  |
|  | Composition relation | | | |  |
|  |  |  |  |  |  |
|  | Type | Composition relation | | |  |
|  | Source | Research Data Process Development | | |  |
|  | Target | FAIR Principles | | |  |
|  |  |  |  |  |  |
|  | Reference Architecture for FAIR Data Infrastructures | | 97 | / 97 |  |