WHAT NEXT AFTER YOU HAVE BUILT YOUR CATALOG?

Mandy Chessell CBE FREng
Egeria Open Source Project Lead
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What is Egeria?

- A set of open type definitions providing a common language for metadata
  - Guiding organizations in its use
  - Providing a basis for metadata exchange

- Basic metadata management (metadata repositories, metadata onboarding and management, user interface for search and display, automated metadata discovery and stewardship, …)

- Metadata integration with heterogeneous tools
  - Event-based, batch or scheduled
  - Developer toolkit and connector catalog

- Open metadata archives and content packs

- Metadata governance (metadata deduplication, validation, enrichment, …)
Different types of metadata

- Sensitive
- Work Location
- Compensation Plan
- Hourly Pay Rate
- Annual Salary

Structural metadata for a data store

Data

https://egeria-project.org
Coco Pharmaceuticals persona

Jules Keeper, CDO
Tessa Tube, Chief Researcher
Faith Broker, Chief Privacy Officer
Nancy Noah, Cloud Specialist
Erin Overview, Information Architect
Bob Nitter, Integration Developer
Callie Quartile, Data Scientist
Gary Geeke, IT Infrastructure

https://odpi.github.io/data-governance/coco-pharmaceuticals/personas/
Data Transfer between Organizations

- Highly regulated process
- Trust is built from demonstrated governance on both sides.
Types of Asset

- The open metadata asset type hierarchy enables metadata from multiple governance domains to be linked together in a single model.
  - IT Infrastructure
  - Data
  - Applications and Events
  - Software development and DevOps
  - Security
Types of Asset

- **Infrastructure** – hardware and software generic “platforms”.
- **Process** – well defined sequence of actions.
- **DataStore** – data at rest
- **DataFeed** - data in motion
- **DataSet** – collection of data
- **DeployedAPI** – interface
- **Software** – parts for IT system
Asset Properties

Properties:
- **Open Metadata Unique identifier (GUID)** - this a globally unique id across all metadata instances. It is a string of letters and numbers and typically looks something like this 40d9520b-dbc0-4cc4-9bad-03ab72d027f3 and is assigned by Egeria.
- **Qualified Name** - this is a globally unique name of the asset - it is unique across all assets. It is assigned by the creator of the asset.
- **Display Name** - typically qualified names are long in order to make them unique. The display name is a short name used in reports and other displays of asset information.
- **Description** - description of the asset.
- **Additional Properties** - names and values of additional properties that the organization wants to record about the asset.

Usage
- With the basic asset properties defined, the asset catalog provides a searchable list of the assets of the organization. The content provides in the names, descriptions and additional properties will determine how easy it is to retrieve specific assets.
Connections

- A connection the information necessary to create a connector to the asset.
- The connector is a client to both the data and the information about the asset stored in open metadata. Some connectors use the metadata about the asset to control what data can be retrieved from the asset depending on the caller.

Usage

- The connector that is generated from the connection object enables both tools and applications to use the asset through a governed interface that provides metadata, data and, in some cases, metadata-driven access control.
Not all assets need a connection

- A connection is only needed if applications/tools needs to access its contents.
Schemas

- A schema describes the individual data fields and operations of the asset. It is organized to reflect the internal organization of the asset and so acts as a guide to the types of content in the asset and how to navigate around it.

Usage

- With the schema in place, it is possible to search for assets based on the type of data, or type of operations that the asset supports.
Asset Owners

- Asset ownership defines who is responsible for the asset. This covers ensuring the catalogue entry is correct, the contents of the asset are complete and correct and controlling access to the asset.

- The owner can be defined as a user identity, a personal profile or a team profile. These definitions are managed by the Community Profile OMAS.

Usage

- With an owner established, it records who is responsible for the protection and quality of the asset. It is possible to route requests from the consumers of the asset to the owner. An example of this is in managing queries about the content of the asset and requests for access to its contents.
Governance Zones

- Metadata can become more valuable than data when it pulls together a complete view of the organization’s assets and activities.
- A governance zone defines a set of assets that are related in some way.
Zone Membership

- The zones that an asset belongs to determines its visibility to specific governance processes and API entry points.
Access services’ zone settings

- **Default zones**
  - Zone membership for new assets (unless explicitly set)
  - Null means not a member of any zone

- **Supported zones**
  - Scope of assets that are visible through this OMAS
  - Null means all assets

- **Publish zones**
  - Zones to set in an asset when ready for broader consumption
Use of governance zones

- Data sovereignty
- Adjustments for legal jurisdiction
- Asset visibility and access control
- Data access control
- Maintenance and backup processing
- Metering and billing
- Understanding dependencies
Governance Zones

- Governance Zones allow assets to be grouped according to their usage. It is possible to assign supported zones to Egeria’s Open Metadata Access Services (OMASs) to limit the scope of assets that are returned from searches.

- **Usage**
  - Using governance zones allows the organization to scope the assets that are returned to a community of users who are using the asset catalogue.
  - The governance zones can also be used to define the group of assets that an automated process should process.
Asset Location

- Egeria supports the definition of a location model that divides both physical and digital space into hierarchies with cross links between the hierarchies. This means it is possible to link the assets to their location(s).

- **Usage**
  - Attaching assets to location definitions means it is possible to use details of the location as part of the search for assets.
  - Knowing the asset location, whether it is a physical or digital location can also help with demonstrating that data sovereignty is being respected and the level of risk that is allocated in a particular location.
License and Certifications

- An asset can have its license and/or certifications attached to it.
  - The license determines the terms and conditions of use for the asset. This becomes important particularly when assets come from an external organization.
  - Certifications typically relate to a regulation or standard or DevOps quality gate. When the certification is tied to the asset it means that the asset has passed the requirements.

- Usage
  - Attaching licences and certifications to assets raises awareness of the any restrictions on the use of the assets and to what standards they are managed to. If the licenses and certifications are machine readable, automated processes can used them to control the way that they manage the assets.
Classifiers

- Classifiers add labels and properties to the asset that identifies them as part of a specific group, or having particular characteristics.

- The types of classifiers are:
  - Glossary terms define the meaning of concepts and activities. When a glossary term is attached to a data field in the assets schema, it signifies that the data stored in that field has the meaning described in the glossary term.
  - Reference values identify sets of valid values of particular characteristics of the assets. For example, attaching a reference code for “personal data” to an asset indicates that it contains personal data.
  - Informal tags are labels that asset consumers create and attach to the asset and its data fields/operations. This is effectively a way of crowd sourcing knowledge about the asset.
  - Governance classifications provide formal classifiers for confidentiality, retention, confidence and criticality for the asset.

- Usage
  - Classifiers help to make assets more findable. They also identify which assets should be treated to certain types of processing. For example, data fields marked as sensitive could be masked when added to a sandbox.
Using classifiers

- The classifiers can be added to any **Referenceable**.
  - A referenceable is a metadata element with a unique qualified name.
  - Assets are referenceables, so are elements of a schema, connections and many of the types of elements that can be attached to an asset.

- This means, for example, classifiers the whole asset or a specific field or operation in the schema.
Metadata Security

- Metadata ranges from public information to highly sensitive information.
- The consequence of integrating metadata is that metadata security needs to be more granular – instance based.
- Picture is an example of the different levels of security challenge in an Egeria server.
- Security is controlled through a connector.
- Asset security can change asset settings (e.g., zone membership) based on calling user.
Types of information passed to the security connector

- Asset Properties
  - Identifiers
  - Type
  - Origin
  - License
  - Owner
  - Zone Membership
  - Classifications
  - Other Properties

- Asset Audit Header
  - Created By and Creation Time
  - Updated By and Update Time
  - Maintained By
  - Version number

*Values available through the Asset entity*  *Values maintained by the repository*
Lineage

- Lineage shows how data flows from its origins to its various destinations. This includes details of the processing along the way. It is used both to understand:
  - whether the data used in reports and analytics models has come from the correct sources and has passed through the correct processing (traceability of data).
  - what would be the impact on downstream processing and consumers if something was changed (impact analysis).
Basic lineage structure
Manual cataloging weekly patient readings

- Peter Profile is issuing calls to add the week 1 patient readings.
- Week 2 he gets to do it all over again
- And in week 3 …
Templated Cataloguing

- For assets that are similar, it is possible to use a template that allows new assets to be cataloged with a single call.

- The template is set up in Egeria.
Understanding Object Boundaries

- Visibility
- Cascaded deletes
- Monitoring
Integrated cataloguing

- Callie has a database server that she uses to analyze relational data.
- She creates a new sandbox for each type of analysis.
- The data platform proxy automatically catalogs the sandbox.
The Integration Daemon

- Metadata extraction, capture and delivery
Example integrations for data managers (databases, file systems etc.)


https://egeria-project.org
Lineage capture example with files

1. Move files to data lake
2. Weeklies Measurements
3. DataFolder Monitor Integration Connector
4. DataFile Monitor Integration Connector
5. Integration Daemon
6. Update DataFolder asset
7. Lineage capture
8. Spark Lineage Capture Integration Connector
9. Monitor
10. Archive DataFile asset

Metadata Server

Data Manager OMAS

Asset Manager OMAS

Repository Services
Asset Analysis and Governance Action

- Accessing resource to create new insights about an asset and storing them as annotations linked to the asset.
- Manages the transition of annotations to standard metadata elements.
  - With steward interaction
  - Completely automatically

https://egeria-project.org
Governance Action Processes

- Pre-defined process templates used to choreograph governance actions
Maintaining coherence

- Metadata from heterogeneous sources is:
  - Inconsistent
  - Incomplete
  - Duplicated

- Governance services (running in governance engines) attempt to:
  - Discover new metadata by analyzing resources
  - Improve the quality of metadata across the ecosystem
  - Coordinate governance across multiple governance tools
  - Provide an audit trail of all action taken
Inside the engine host

- Asset Analysis OMES
- Governance Action OMES
Example deployment
Challenges with Duplicates
Types of Duplicates

Elements with the same qualifiedName and different GUIDs

- **GlossaryTerm**
  - qualifiedName: customer

More subtle matching metadata properties

- **Asset**
  - qualifiedName: myDB

- **Asset**
  - qualifiedName: host1-db1

- **Connection**

- **Endpoint**
  - networkAddress: host1:db

Avoided in OMASs by checking for previously defined elements before create/update/restore.

Detected through monitoring and scanning metadata from the connected repositories.
Types of Duplicates

No correspondence in metadata but the contents of the real-world counterpart are the same.

Asset
qualifiedName: "data/images/IMG5837.jpg"

Asset
qualifiedName: "data/images/IMG058.jpg"

Avoided through sound data management practices
Metadata created by Automated Metadata Discovery; recorded in open metadata types as a FingerprintAnnotation
Annotations monitored using the metadata monitoring and scanning processes described above.
Examples of asset attachments that are combined

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Example 3 step process

a) Identify duplicates

Asset: ABC guid: xxx

Asset: ABC guid: zzz

b) Create a consolidated view

Asset: ABC guid: ccc

Asset: ABC guid: xxx

Asset: ABC guid: zzz

c) Control visibility of original duplicates

Asset: ABC guid: ccc

Asset: ABC guid: xxx

Asset: ABC guid: zzz

Zone boundary
Using Egeria …

• Eases the cost of metadata integration through
  • Comprehensive standards and libraries.
  • Active vendor recruitment program.

• Provides direct support to many governance roles, filling the gaps between function offered through commercial tools.

• Provides best practices and content packs to accelerate an organization’s journey to becoming data driven.

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Open forum

Questions?
THANK YOU!
Achievements

- 700 linked open metadata types demonstrating how the knowledge from many tools can be linked together.
- Open metadata repository interface proven for table, graph and hierarchical DB stores.
- Enterprise queries and replication across heterogeneous technologies
- Conformance test suite and mark
- Automated configuration of data virtualization technology and security as new data sets are added to a data lake
- Suite of persona-based labs and tutorial using Jupyter Notebooks.
- Virtual graph of metadata maintained across distributed heterogeneous metadata repositories.
- Frameworks, APIs and connectors for minimizing integration cost for different types of technologies
- Virtual repository explorer UI
- Instance based security
- Controlling visibility of assets through zones
- Scalable, secure platform configurable and customizable through connectors
- Purpose-based data access
- Metadata versioning and provenance
- Multi-tenant UI based on carbon
- W3C semantic standards pattern for data model exchange
- Automation of metadata acquisition through templates, daemons, discovery services and stewardship.
- Classification of assets
- Reference data management
- Multi-technology collaboration and feedback
- Multi-domain governance model
- Digital service lifecycle, from business design, development, devOps and use.
- Comprehensive open lineage services.
- Metadata deduplication
Scope of metadata covered

- Governance
- Lineage
- Base Types, Systems and Infrastructure
- Glossary
- Data Assets
- Collaboration
- Models and Reference Data
- Metadata Discovery

https://egeria.odpi.org/open-metadata-publication/website/open-metadata-types/
Scope of metadata covered

- Policy Metadata (Principles, Regulations, Standards, Approaches, Rule Specifications, Roles and Metrics)
- Governance Actions and Processes
- Campaigns and Projects
- Implementation
- Governance Actions and Processes
- Rights Management
- Information Process Instrumentation (design lineage)
- Basic Types, Infrastructure and Systems
- Strategy
- Rollout
- Classification Schemes
- Subject Area Definition
- Business Objects and Relationships, Taxonomies and Ontologies
- Business Attributes
- Asset Collections (Sets, Typed Sets, Type Organized Sets)
- Information Views
- Physical Asset Descriptions (Data stores, APIs, models and components)
- Connectors
- Access
- Instrument
- Association
- Discovery Metadata (profile data, technical classification, data classification, data quality assessment, ...)
- Teaming Metadata (people profiles, communities, projects, notebooks, ...)
- Feedback Metadata (tags, comments, ratings, ...)
- Models and Schemas
- Reference Data
- Classification Schemes
- Augmentation
- Augmentation

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