EA Forum 18 May 2022

Why is Data Integration so Difficult?

Dr Chris Harding
Lacibus

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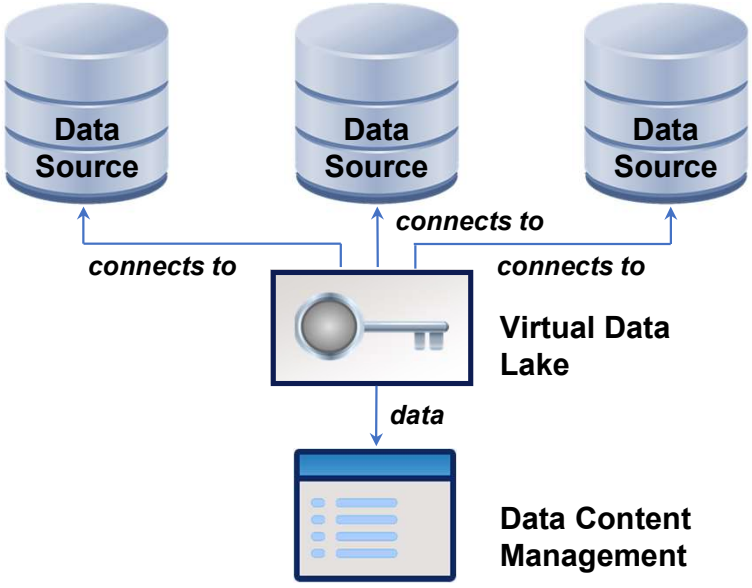
About Me

Chris Harding



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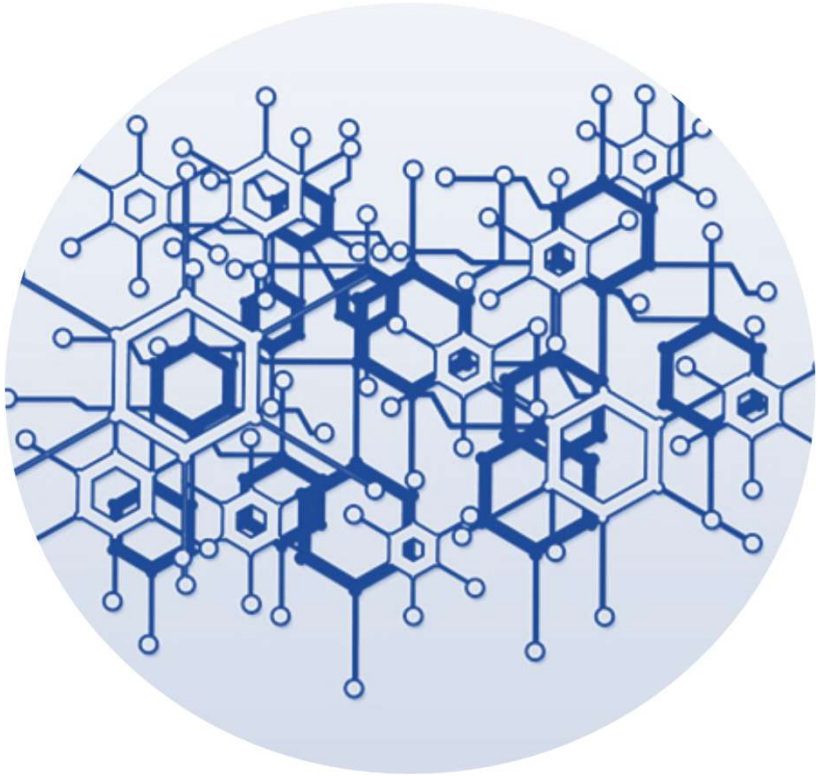
The EA Forum Webinar



- Data Integration
- Relevant Work from The Open Group
- Future Trends

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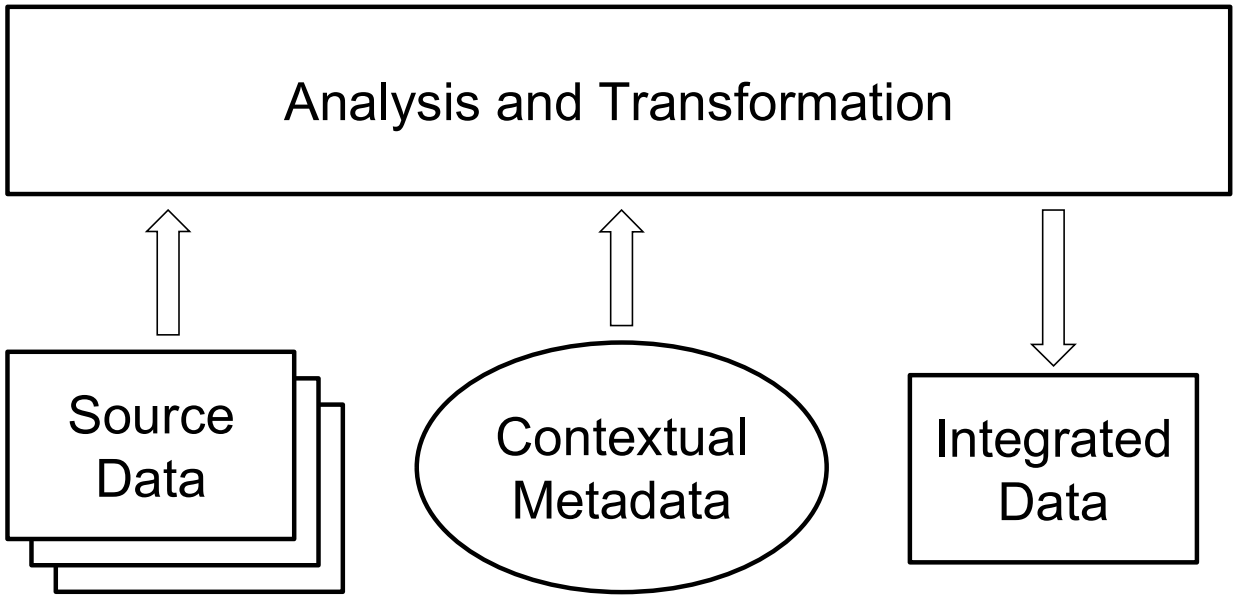
Data Integration

Data integration involves combining data from varying sources to provide users with a unified single view



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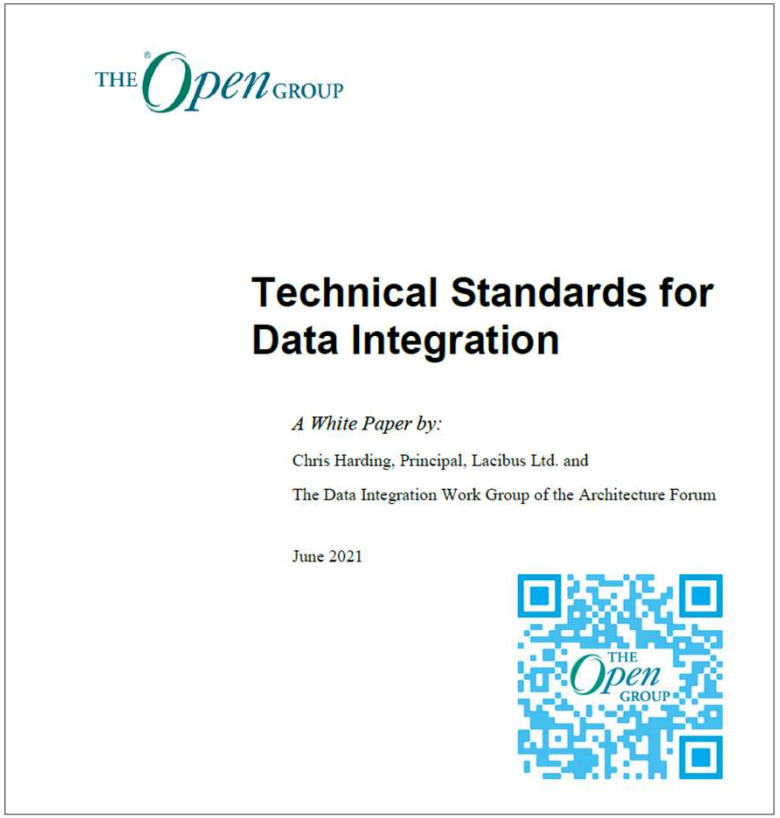
Technical Standards



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Technical Standards for Data Integration

A White Paper by:

Chris Harding, Principal, Lacibus Ltd. and

The Data Integration Work Group of the Architecture Forum

June 2021

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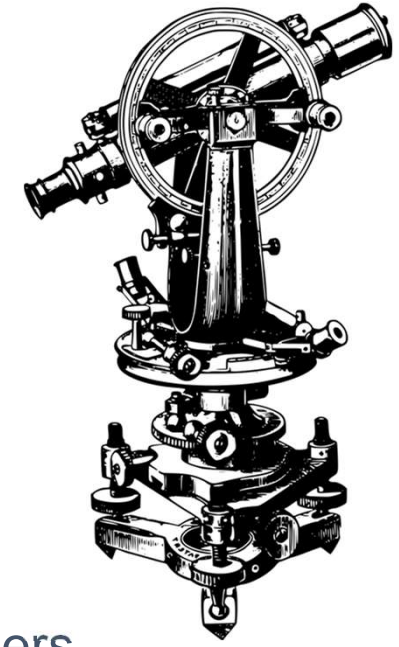
Data Integration Survey

23 responses from Architecture Forum members

- Mostly external consultant architects
- Accelerating speed of discovery and delivery of data (e.g. DataOps) biggest gap for improving data use

592 responses from AEA members

- Mostly internal architects
- Lack of governance and stewardship biggest gap for improving data use
- Other results quite similar to results from Forum members



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Data in the Enterprise

- Business leaders mostly view data as a strategic corporate asset
- Data use is often localized by business unit
- Some data is in the Cloud, some on-premise
- Overall data quality is mixed: some excellent, some terrible, most somewhere in between
- There are often islands of “quality” data with differing management regimes

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Data Integration

- Analytics and decision support are important reasons for integrating data, but operations (transactional) most important
- Data to be integrated most often from databases, but surprising amount from electronic documents, and some from IoT and social media
- Data to be integrated mostly from within the enterprise, but often with some external data

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Pain Points

Lack of commitment from business units

- Departments don't want to share their data
- No understanding of the business value
- Difficult to find the data
- SMEs don’t explain the data

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Pain Points

Lack of commitment at corporate level

- Enterprise data integration not seen as a business initiative that justifies investment

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Pain Points

Heterogeneous sources and tool-stacks

- Different formats with different processing needs
- Different data platforms
- Web services with different languages and operating systems
- SaaS providers with different interfaces

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Pain Points

Conflicting data models

- No enterprise data model
- The data is not standardized
- It includes data from legacy and open systems
- It incorporates external data that is ontologically and taxonomically un-normalized and/or at odds with internal data

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Pain Points

No culture of data management

- No data governance task force
- No policies that speak directly to data
- Data quality issues, including
  - Inconsistent data from different sources
  - Duplicate records

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Why is Data Integration so Difficult?

- Integrations involving multiple departments must have department and corporate backing
- Business case must be clearly explained to all stakeholders
- Difficulties of differing data formats and interfaces must be addressed
- Poor data quality must be addressed
- Access control must be addressed, especially for PII

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How Can We Make Data Integration Easier?

- By applying architecture methods and techniques

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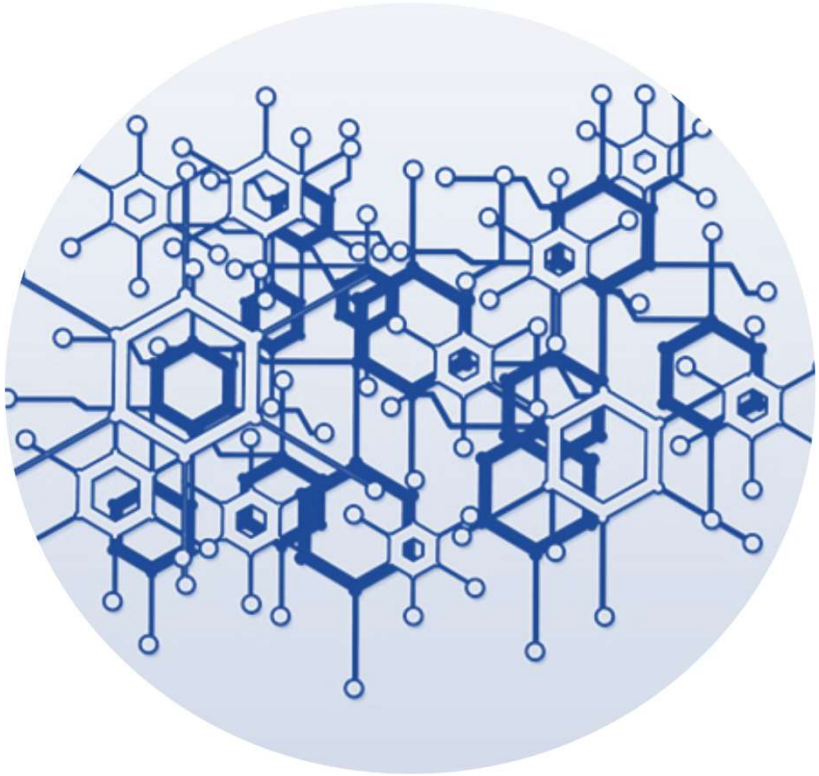
Relevant Work from The Open Group



- Method standards
- Business Domains
- Platforms
- Other Publications
- Data Integration Work Group

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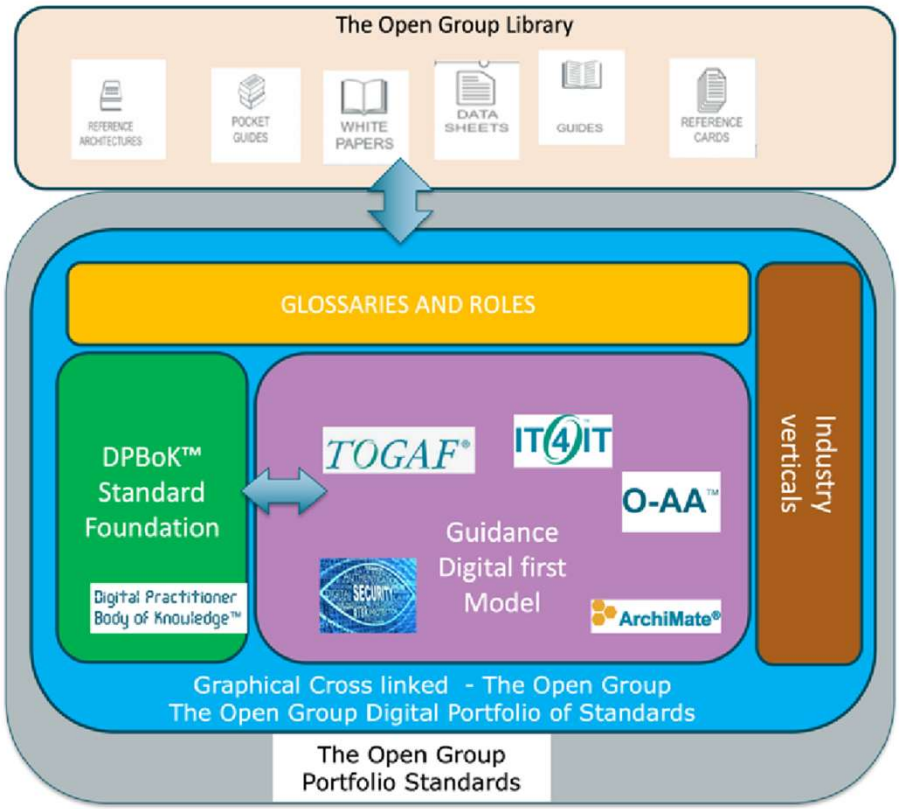
Method Standards

- The TOGAF® Standard
- The Open Agile Architecture™ standard (O-AA)
- The Digital Practitioner Body of Knowledge™ Standard (DPBoK)

Part of The Open Group ***Digital Portfolio***



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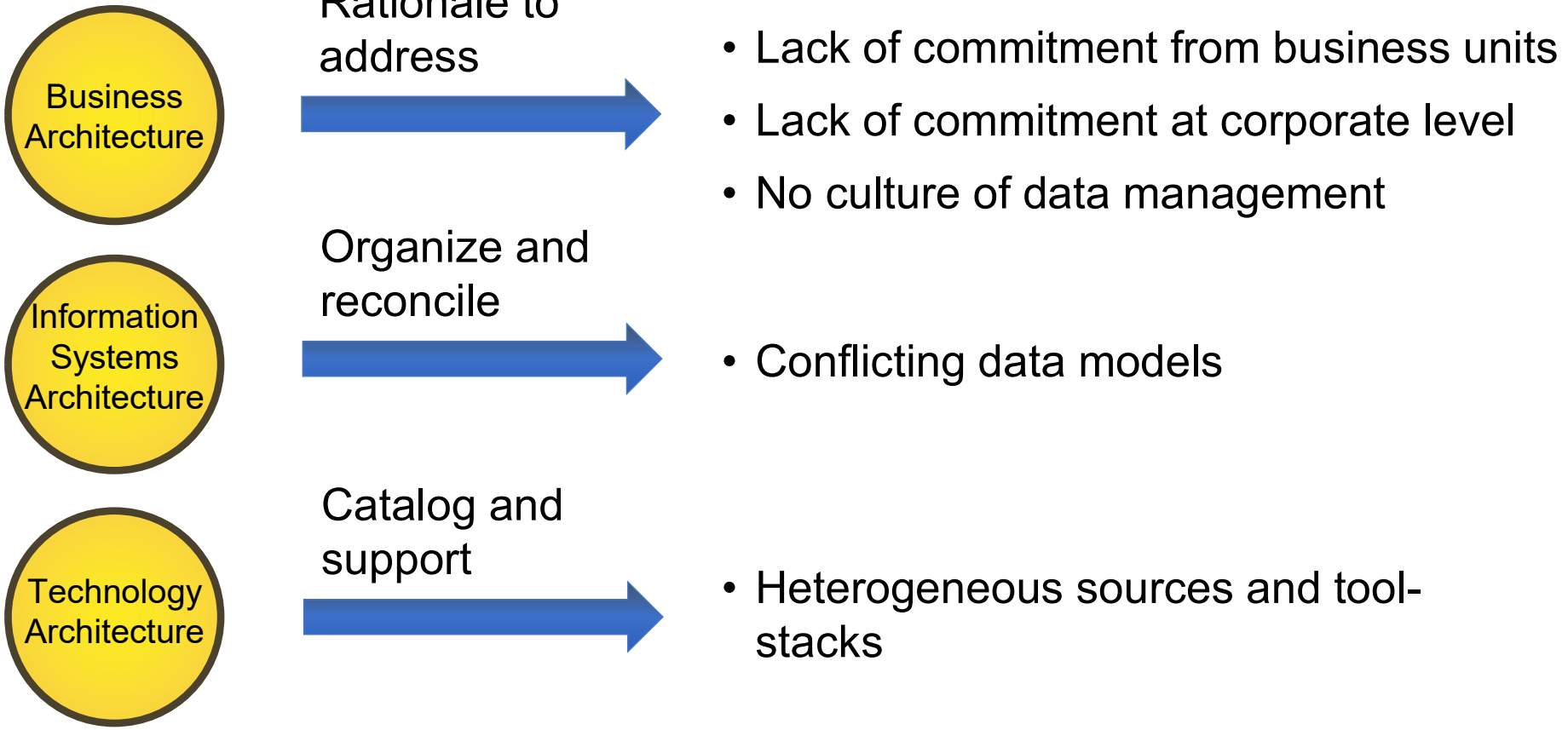
TOGAF®



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O-AA™

- Presentation of integrated data

- Definition of Data-Ops

- Specification of Data Platforms

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DPBoK™

- The Digital Practitioner Body of Knowledge™ Standard
- Information Management chapter contains section on *Data Integration and the System of Record*
- Use of master data to maintain integration between data in multiple – perhaps hundreds of - databases
- More detail on Customer Master Data Management in the C-MDM TOGAF® Guide

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Business Domain Standards

Business Definitions

- Exploration and Mining Business Reference Model and Capabilities Map
- Government Reference Model

Data Models

- The Federated Health Information Model (FHIM)
- Commercial Aviation Reference Model

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Data Platforms

Open Subsurface Data Universe™ (OSDU)

- Open source standards-based technology agnostic data platform
- For the energy industry (oil and gas exploration)

Open Footprint™ Forum

- Common model for footprint-related data covering all types of emissions
- Base calculations to normalize and aggregate data

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Other Publications

Search results for:
'data integration'

Items 1-10 of 338

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Related search terms

- Data Architecture
- Data standards
- Integration of SABSA Security Architecture Approaches with TOGAF ADM
- Data lake reference architecture
- Data center reference architecture

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Data Integration Work Group

- Part of The Open Group Architecture Forum
- Objectives
  - Create a body of architecture artefacts for data integration
  - And an overall framework to stitch them together
- Current State
  - First White Paper published
  - Survey of Enterprise Architects conducted
- Forward work program to be defined

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Guide to Data Integration Architecture

- Possible Work Group deliverable
- How to use The Open Group architecture standards for data integration
- Based on research on data integration use cases such as mergers, rationalisation, federated enterprise interworking, and analytics
- Using TOGAF®, O-AA™ and DPBoK™

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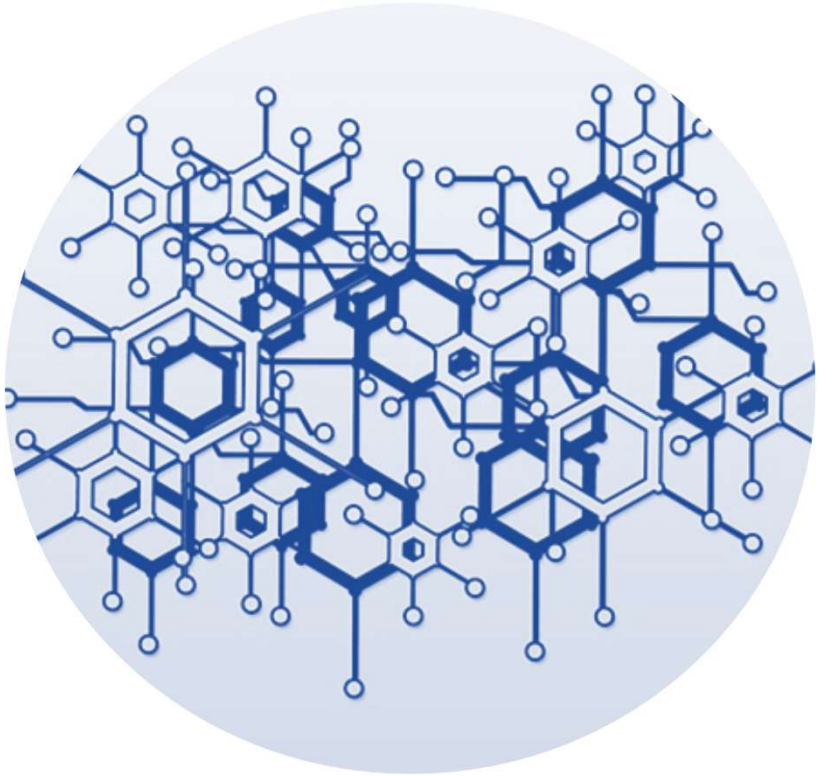
Future Trends



- Data Virtualization
- Data Fabric
- Data Mesh
- Data Platforms
- Natural Language Data
- Knowledge Graphs

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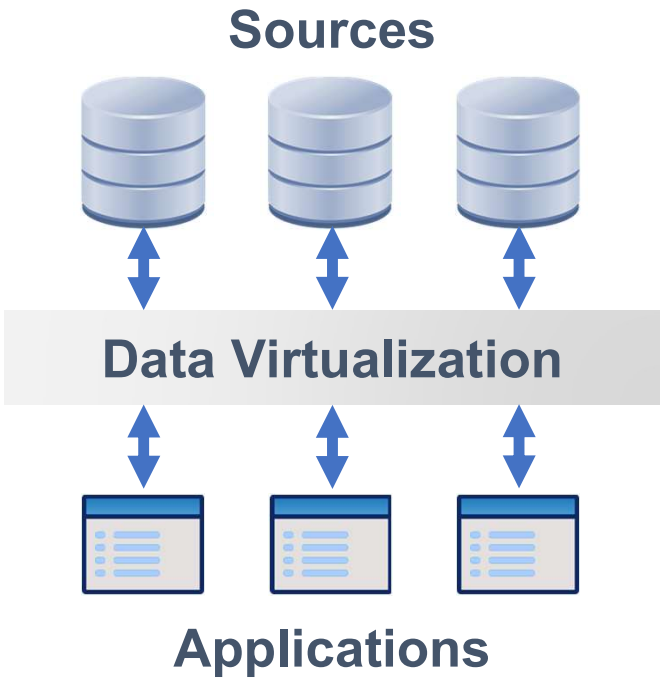
Data Virtualization

- Any approach to data management that allows an application to retrieve and manipulate data without requiring technical details
- Can provide a single customer view (or single view of any other entity) of the overall data
- Mostly for access rather than update
- Often used with relational data
- Often used by Data Fabric and Data Mesh platforms “under the hood”



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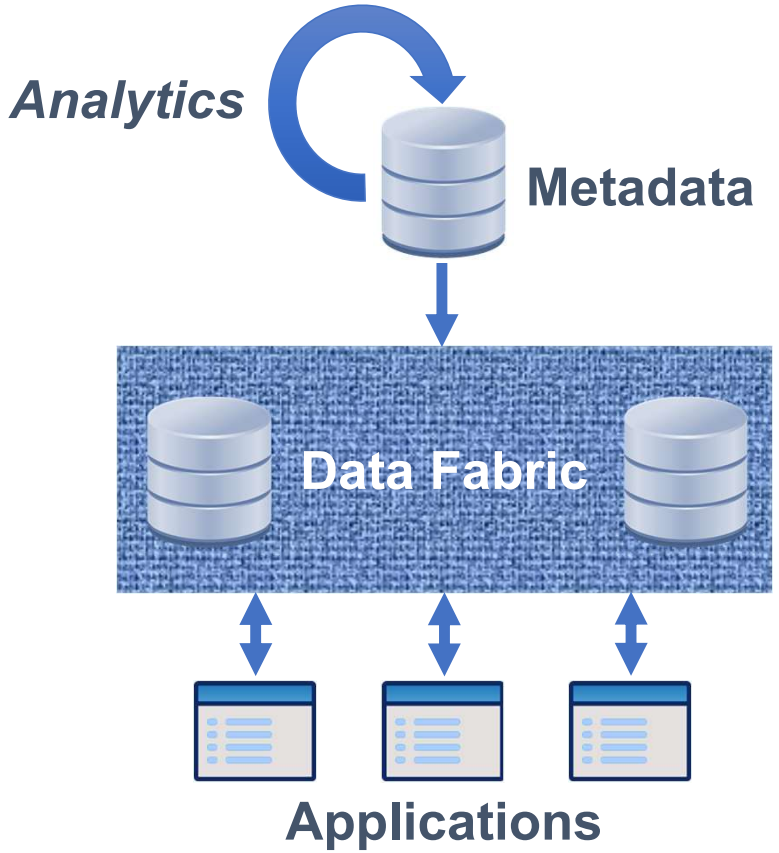
Data Fabric

- Unified access to data of different kinds
- SQL, NoSQL, IoT, cloud, on-premise, edge . . .
- Can use continuous automated analytics over metadata to organize the data



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Data Mesh

- Data is treated as a product
- Owned by teams that most intimately know and consume it
- Self-serve data platforms
- Federated Governance

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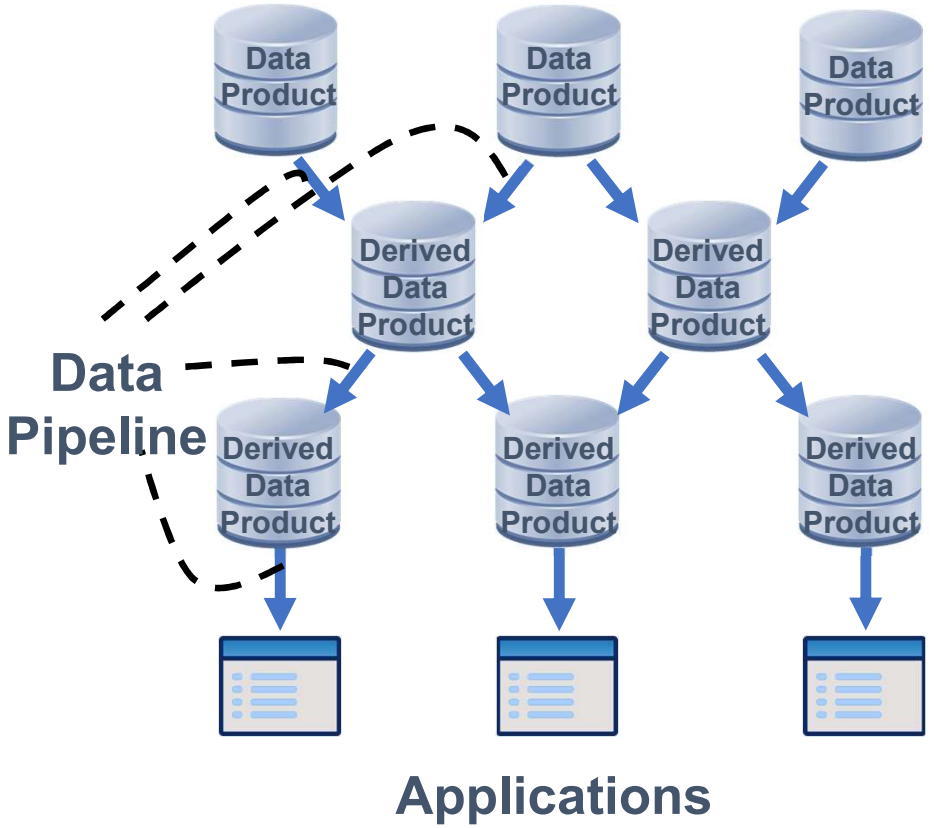

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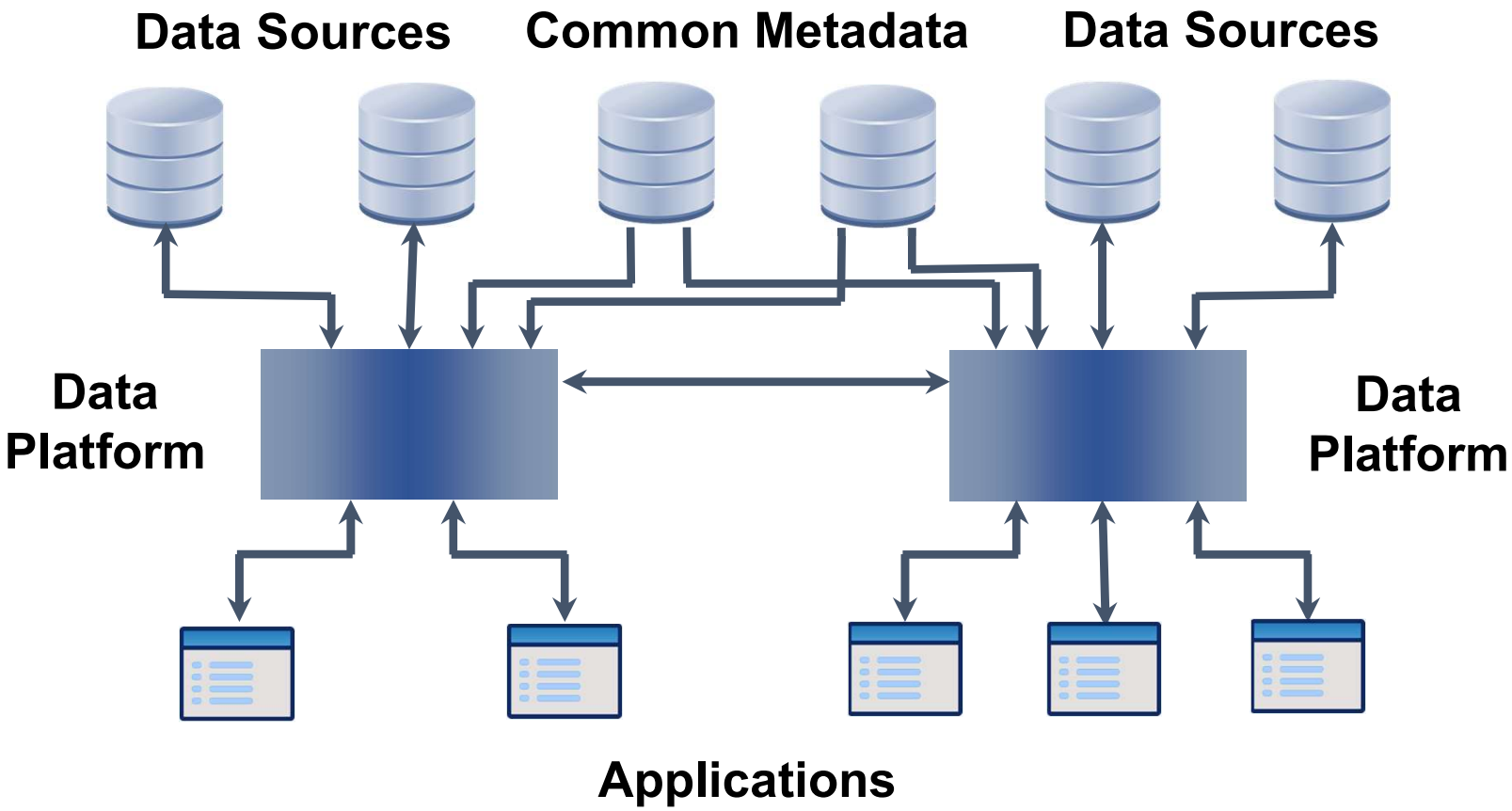
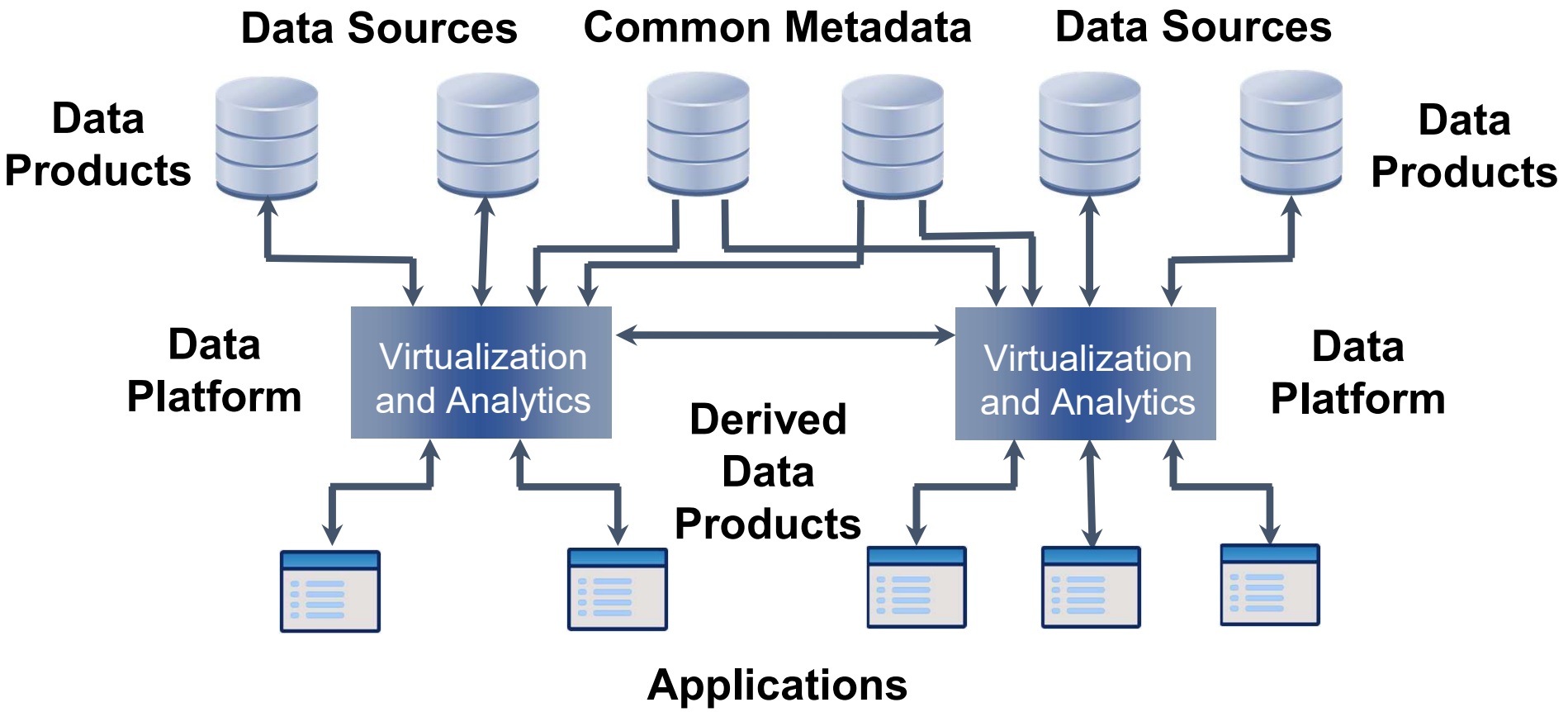
Data Platforms



Data Platforms



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Natural Language Data

- Natural Language Processing (NLP) has improved enormously in recent years
- Sentence analysis and named object recognition
- Word vectors and sentence embeddings
- Enables integration of text and voice recordings

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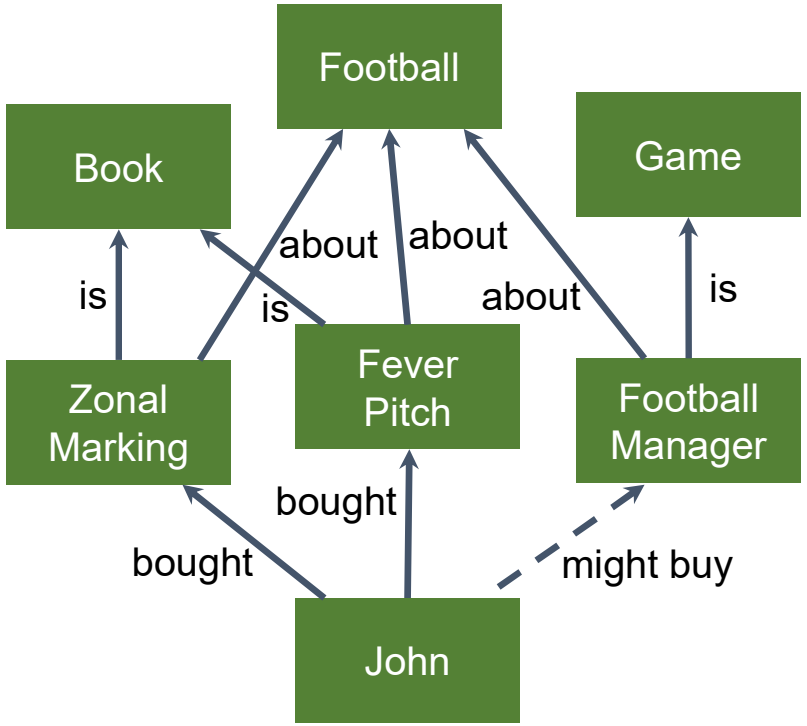
Knowledge Graphs

- A knowledge graph is a network of concepts and things, linked by the relations between them
- They are routinely used by marketing applications and search engines
- They can easily be merged and are a powerful tool in data integration



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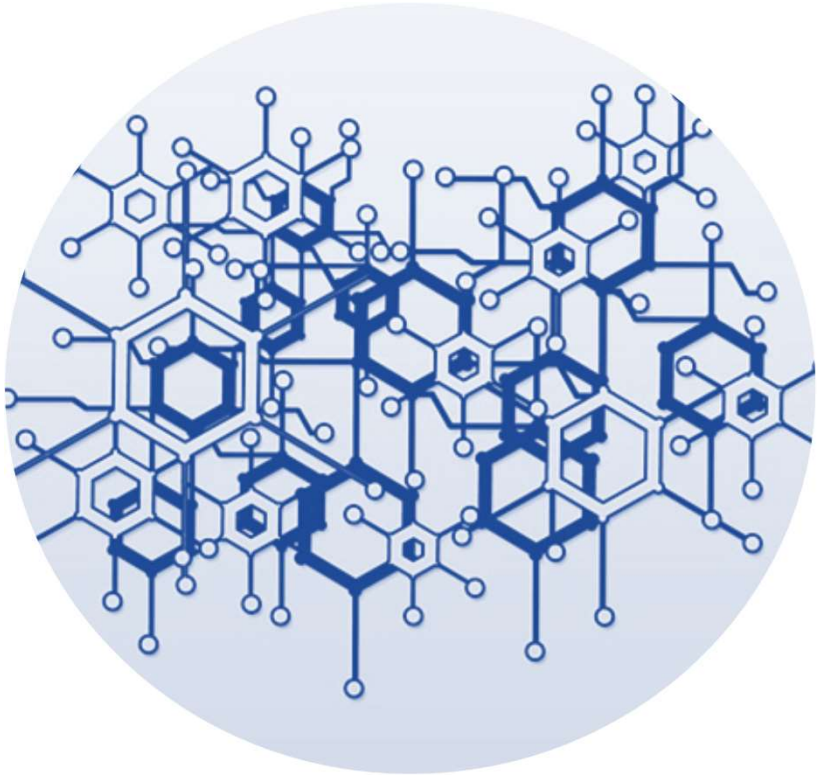
Conclusions



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Data Integration *is* Difficult

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The Open Group Work Can Help

Methods

- TOGAF, OAA, DPBoK, C-MDM

Business Domains

- Exploration and Mining, Government, Healthcare, Civil Aviation

Platforms

- OSDU, Open Footprint

Other Publications

. . . .

The Data Integration Work Group

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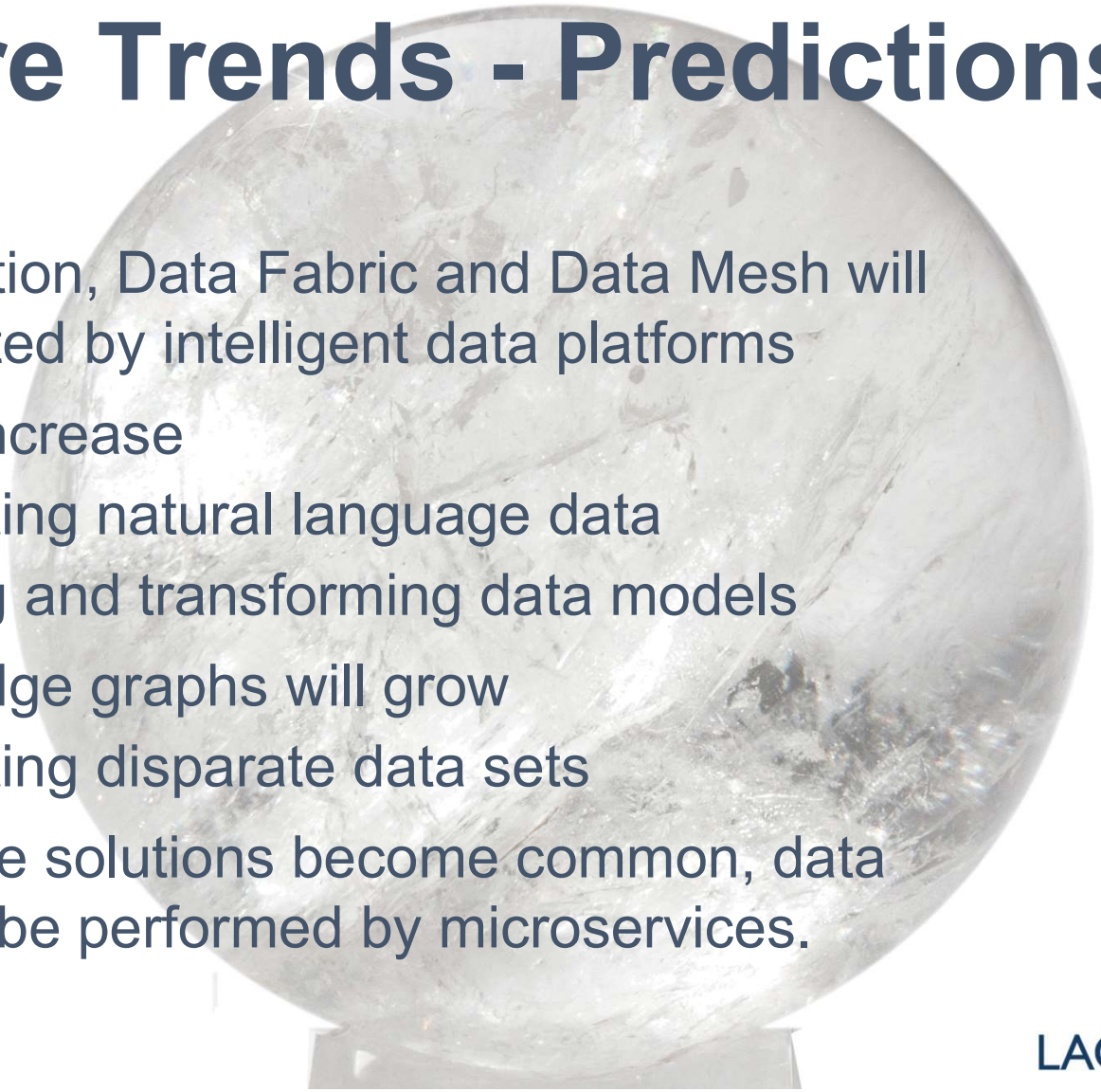
Future Trends - Predictions



- Data Virtualization, Data Fabric and Data Mesh will merge, supported by intelligent data platforms
- Use of AI will increase
  - for integrating natural language data
  - for building and transforming data models
- Use of knowledge graphs will grow
  - for integrating disparate data sets
- As Cloud Native solutions become common, data integration will be performed by microservices.

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Questions?

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Thank You!

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- @chrisjharding

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Website References

- Lacibus Virtual Data Lake and other open source material http://www.lacibus.net
- Lacibus Data Content Management System http://www.lacibus.com
- Data Integration Work Group https://collaboration.opengroup.org/projects/archmain/data_integration/
- The TOGAF Standard https://www.opengroup.org/togaf/
- The TOGAF Standard Digital Edition https://www.opengroup.org/togaf/10thedition
- The DPBoK Library https://publications.opengroup.org/dpbok-library
- The Open Agile Architecture™ website. https://www.opengroup.org/agilearchitecture
- The Federated Health Information Model (FHIM). https://www.fhim.org/
- The Open Group OSDU™ Forum. https://osduforum.org/
- The Open Group Open Footprint Forum. https://www.opengroup.org/openfootprint-forum
- The Open Group Architecture Forum. https://www.opengroup.org/architecture-forum

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Open Group Publications

Open Group Publications website https://publications.opengroup.org/

Search for content by keyword or document reference.

- Technical Standards for Data Integration. Open Group document reference w211
- Digital Practitioner Body of Knowledge™ Standard. Open Group document reference c196
- TOGAF® Series Guide: Information Architecture: Customer Master Data Management (C-MDM) Open Group document reference G218
- The Open Agile Architecture™ Standard. Open Group document reference c208
- The Exploration & Mining Business Reference Model. Open Group document reference c135
- The Exploration & Mining Business Capability Reference Map. Open Group document reference c143
- TOGAF® Series Guide: Government Reference Model (GRM). Open Group document reference G210
- The Open Group Commercial Aviation Reference Architecture. Open Group document reference P180

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