Avancier Methods (AM)

Data architecture diagrams

DATA ARCHITECTURE

Avancier

Motivations and constraints

Aims
Goals
Objectives
Requirements

Directives
Principles
Policies
Rules

Compliance
Regulations
Standards (SIB)
Design Patterns (RM)

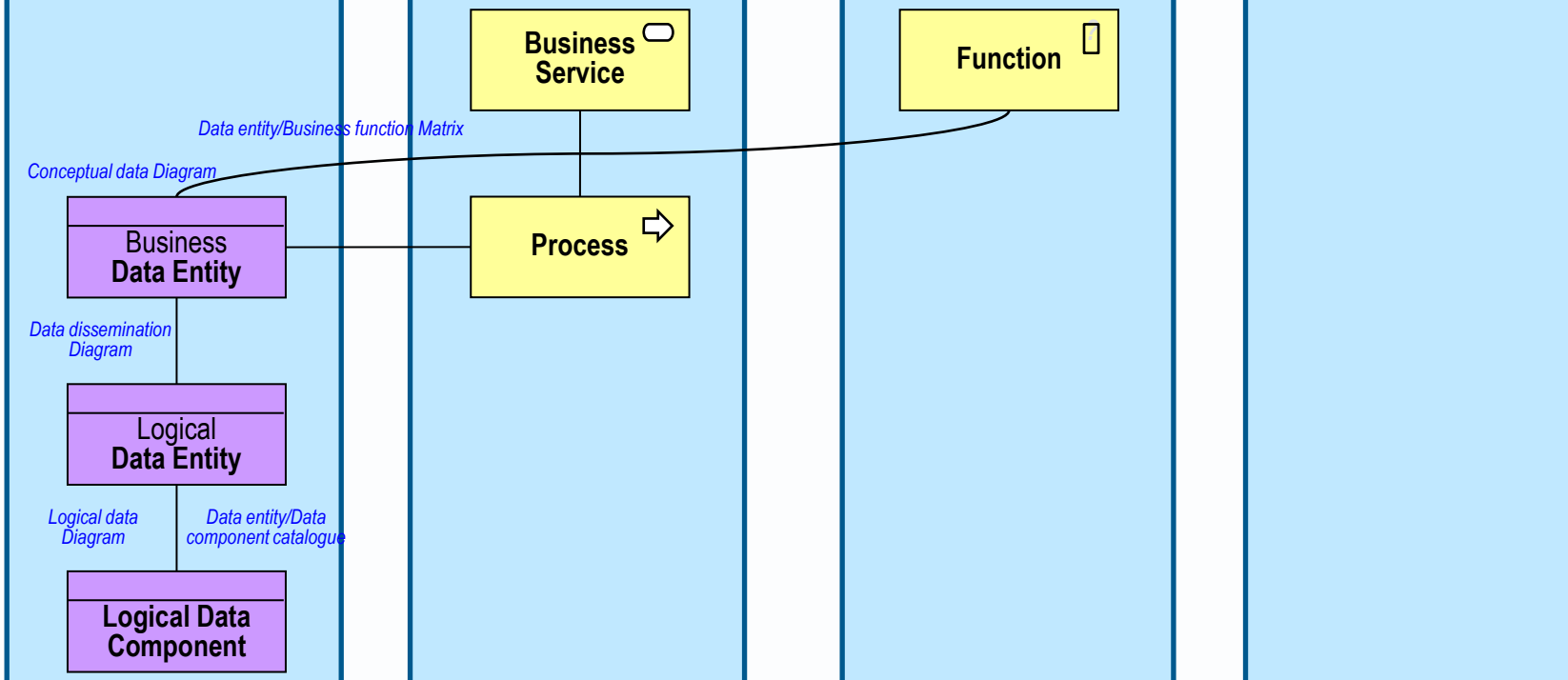
Management
Time
Budget
Resources

Passive structures
Things that are acted in or on

Behaviors
Things happening over time that access or change the state of business systems

Logical active structures
Specifications of things that act

Physical active structures
Things that act



TOGAF says: Data Entity/Business Function Matrix

Avancier

- ... to depict the relationship between data entities and business functions within the enterprise.
- Business functions are supported by business services with explicitly defined boundaries and will be supported and realized by business processes.
- The mapping enables the following to take place:
  - Assign ownership of data entities to organizations
  - Understand the data and information exchange requirements business services
  - Support the gap analysis and determine whether any data entities are missing and need to be created
  - Define application of origin, application of record, and application of reference for data entities
  - Enable development of data governance programs across the enterprise (establish data steward, develop data standards pertinent to the business function, etc.)

Function Data Entity	Cust. Relations	Claims	Product manage't
Customer	Owner		
Policy type			Owner
Policy			Owner?

Function Data Entity	Cust. Relations	Claims	Product manage't
Customer	Origin	Ref	
Policy type			Origin
Policy	Origin	Ref	

One of the most traditional EA artifacts

- Read Function for Process, and note clustering on “Create”

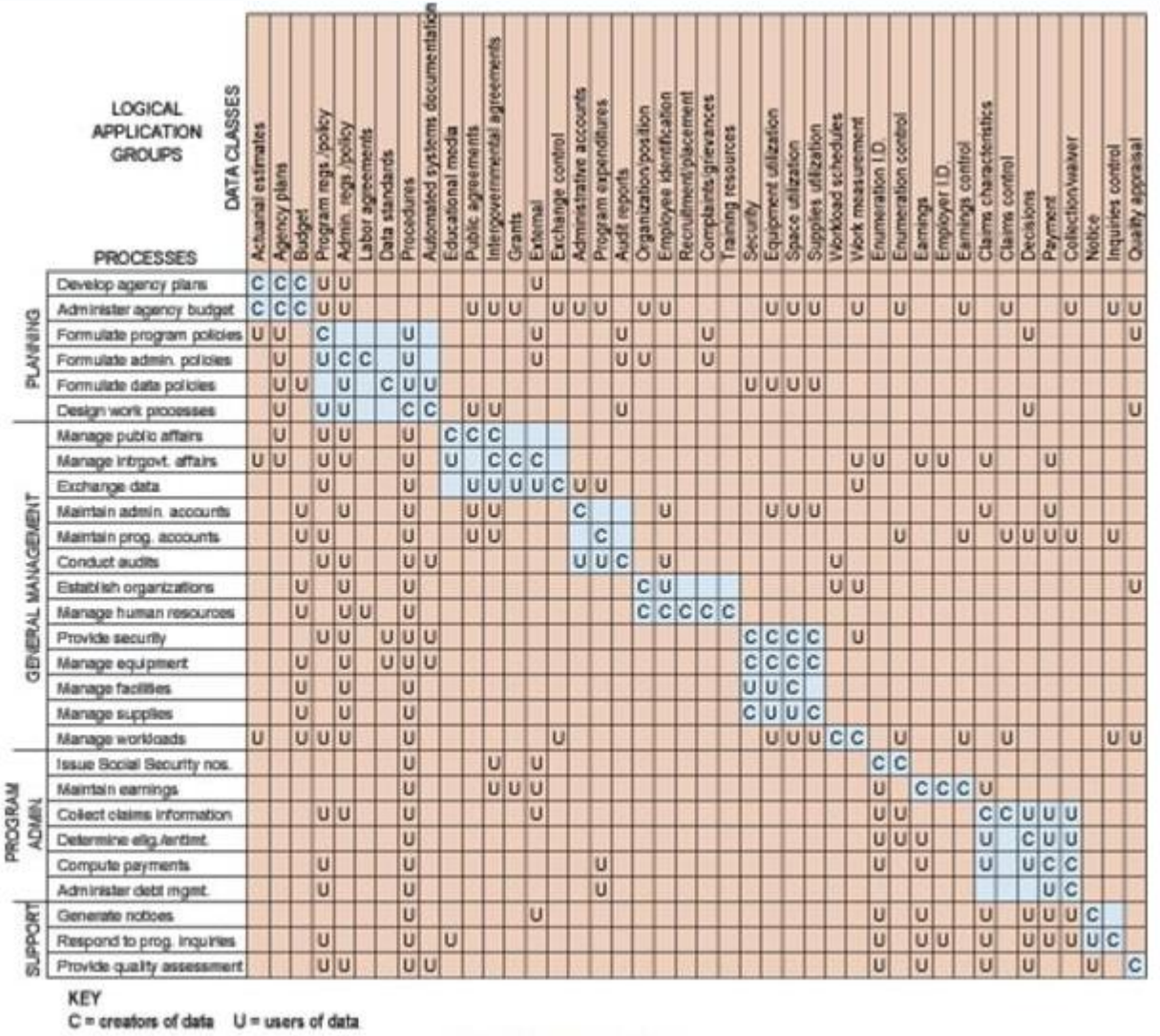


Figure 12-1

ArchiMate???

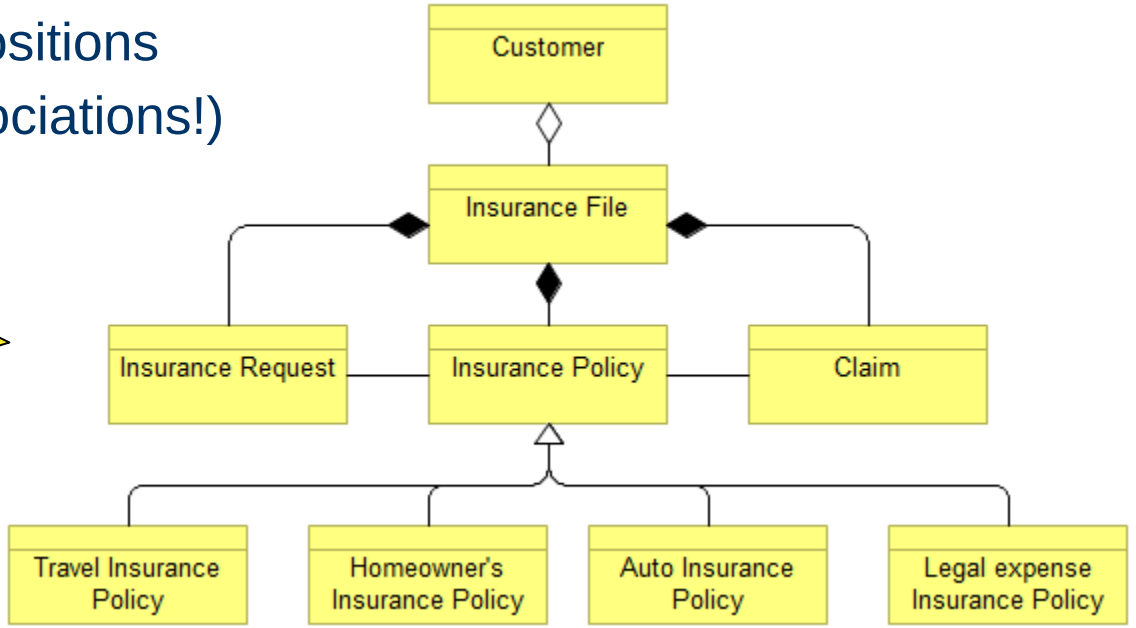
TOGAF says: Conceptual Data Diagram

- The key purpose is to depict the relationships between critical data entities within the enterprise - to address the concerns of business stakeholders. (TOGAF)

- Poor match in ArchiMate
- **An information structure view – business/conceptual level**
- (Aargh! Aggregates and compositions
- instead of properly named associations!)

Difficult to draw a data model for a whole enterprise

A catalogue of core business data entities is more practical



TOGAF says: Data Entity/Data Component Catalog

- ... to identify and maintain a list of all the data use across the enterprise, including data entities and also the data components where data entities are stored.
- supports the definition and application of information management and data governance policies and also encourages effective data sharing and re-use.

ArchiMate???

TOGAF says: Data Dissemination Diagram

Avancier

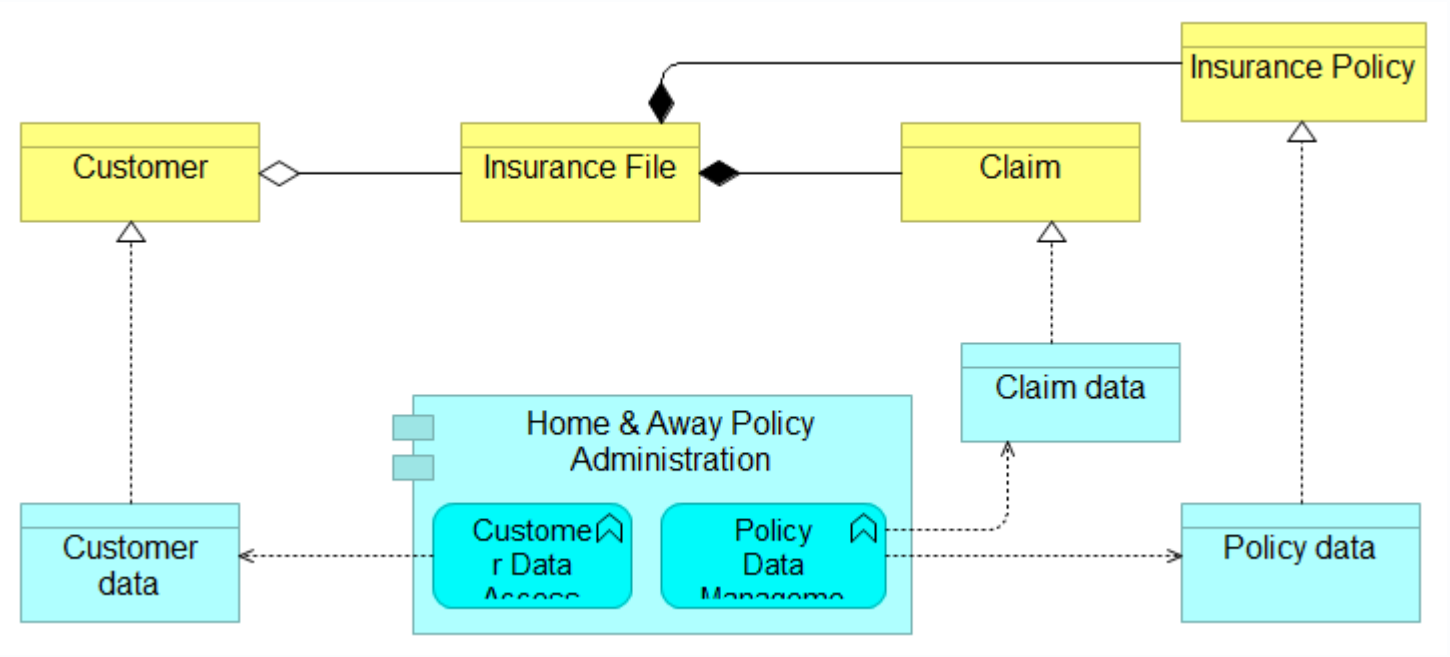
- ... to show the relationship between data entity, business service, and application components.
- It shows how the logical entities are to be physically realized by application components.
- It allows effective sizing to be carried out and the IT footprint to be refined.
- Moreover, by assigning business value to data, an indication of the business criticality of application components can be gained.
- It may show data replication and application ownership of the master reference for data…
- it can show two copies and the master-copy relationship between them.
- It can include services; that is, services encapsulate data and they reside in an application, or services that reside on an application and access data encapsulated within the application.

Application / Data entity	CRM	ERP	Billing	Data warehouse
Customer	Master	Copy	Copy	Copy
Order	Master (1)	Copy	Master (2)	Copy
Invoice			Master	Copy

(1) until Order Closed
(2) after Order Closed.

Partial match in ArchiMate

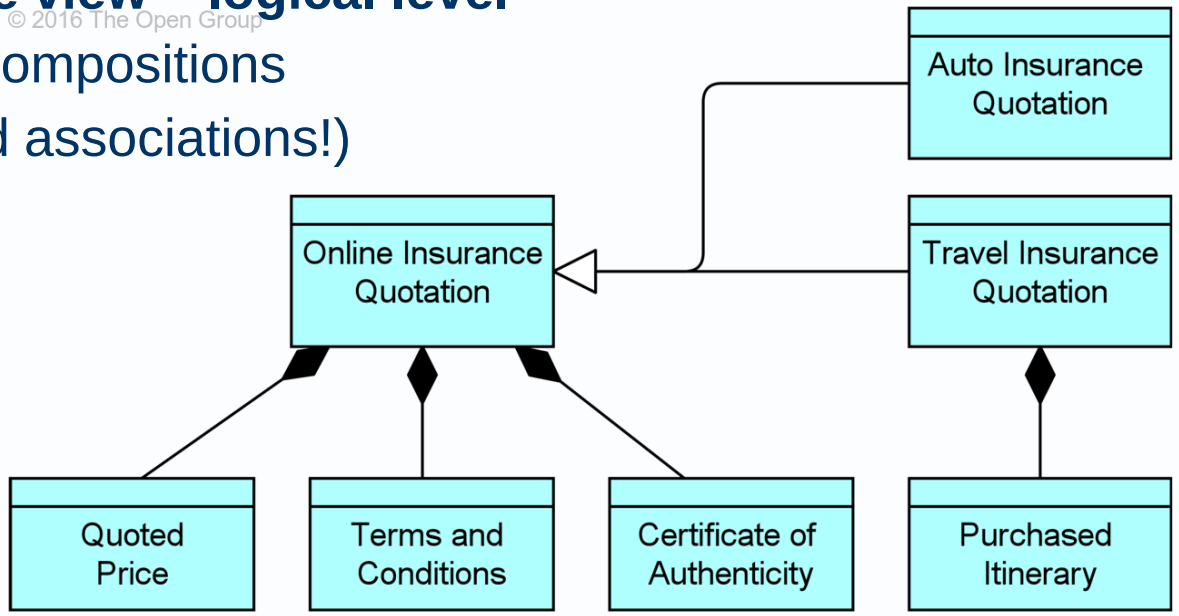
- Hand made



TOGAF says: Logical data diagram

- ... to show logical views of the relationships between critical data entities within the enterprise - to address the concerns of Application developers and Database designers. (TOGAF)

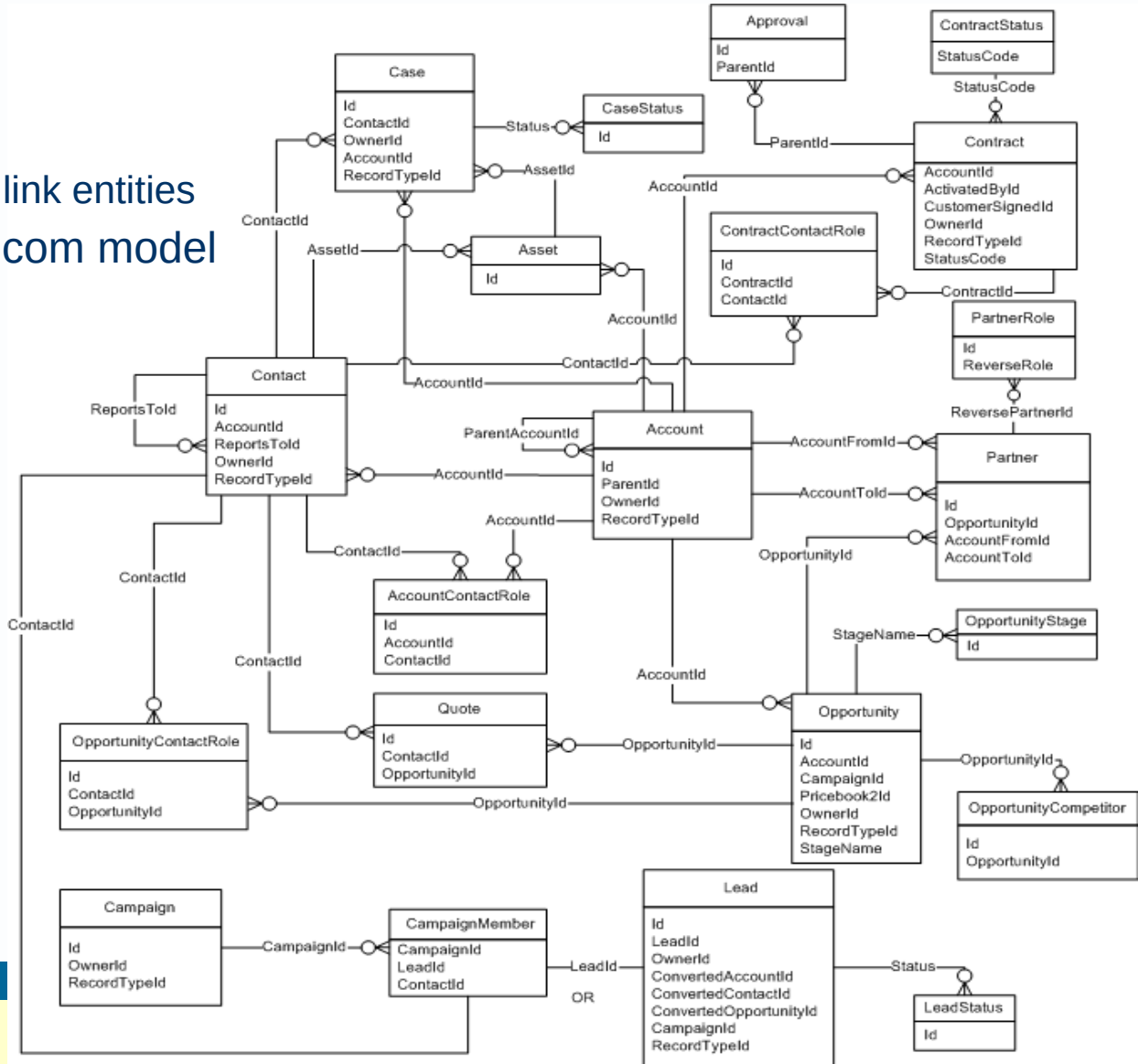
- Poor match in ArchiMate
- **An information structure view – logical level**
- (Aargh! Aggregates and compositions
- instead of properly named associations!)



Logical Data Diagram

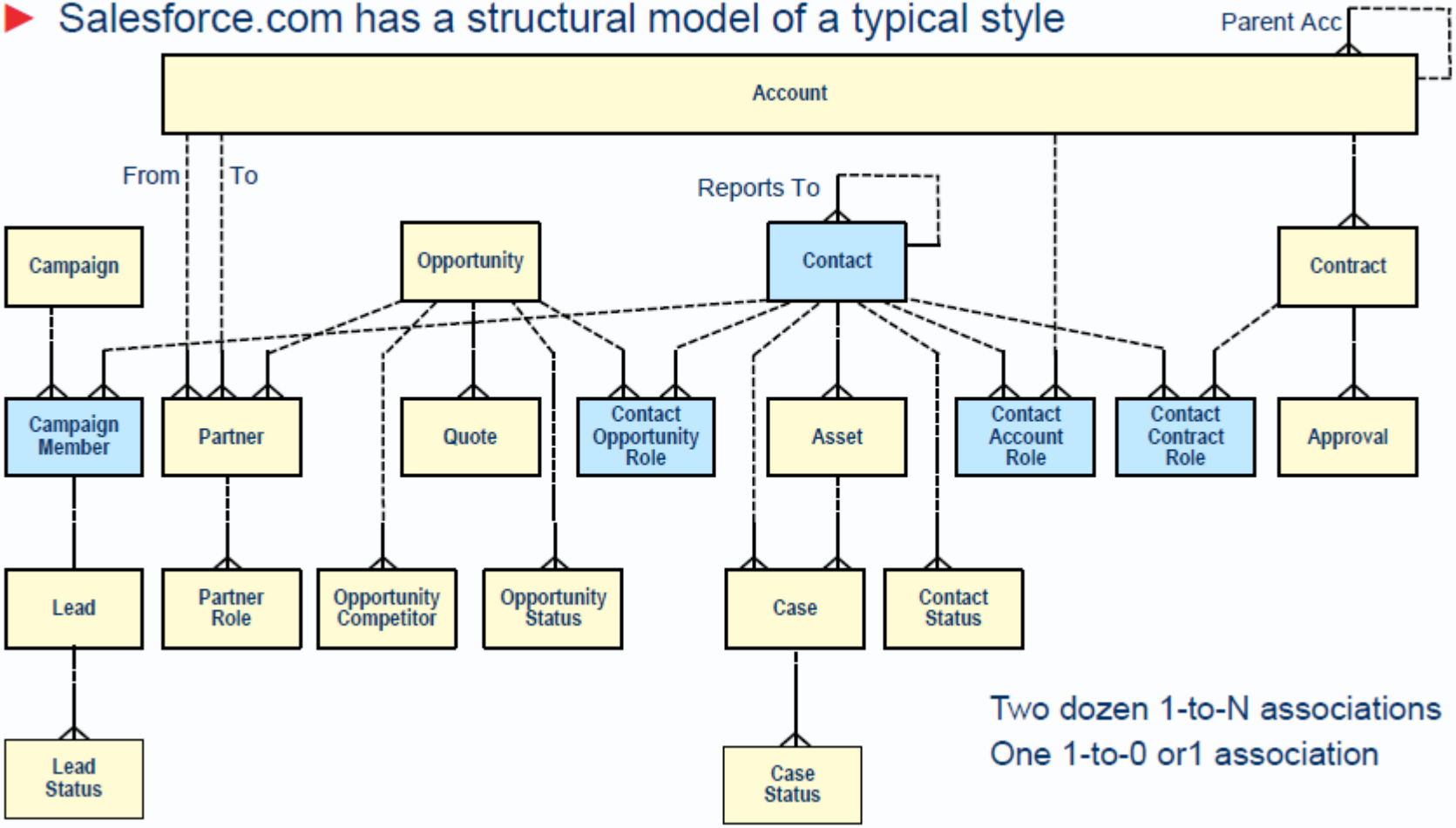
Avancier

- In models of persistent business entities, the passage of time tends to turn
  - Subtypes into roles
  - Aggregations into associations
  - 1-1 associations into 1-N
  - 1-N associations into N-to-N with link entities
- See for example this Salesforce.com model



Logical Data Diagram

- Salesforce.com has a structural model of a typical style



TOG says: Data security diagram

Avancier

- to depict which actor (person, organization, or system) can access which enterprise data.
- can be shown in a matrix between objects or as a mapping.

Data entity / Role/actor	Customer	Product	Invoice	Employee
HR manager				Can read
Product manager		Can read		
Salesman	Can read	Can read	Can read	
1st line support	Can read	Can read	Can read	
Fulfilment agent	Can read	Can read		

- can be used to demonstrate compliance with data privacy laws and other applicable regulations (HIPAA, SOX, etc).
- should also consider any trust implications where an enterprise's partners or other parties may have access to the company's systems

Data quality scoring scheme

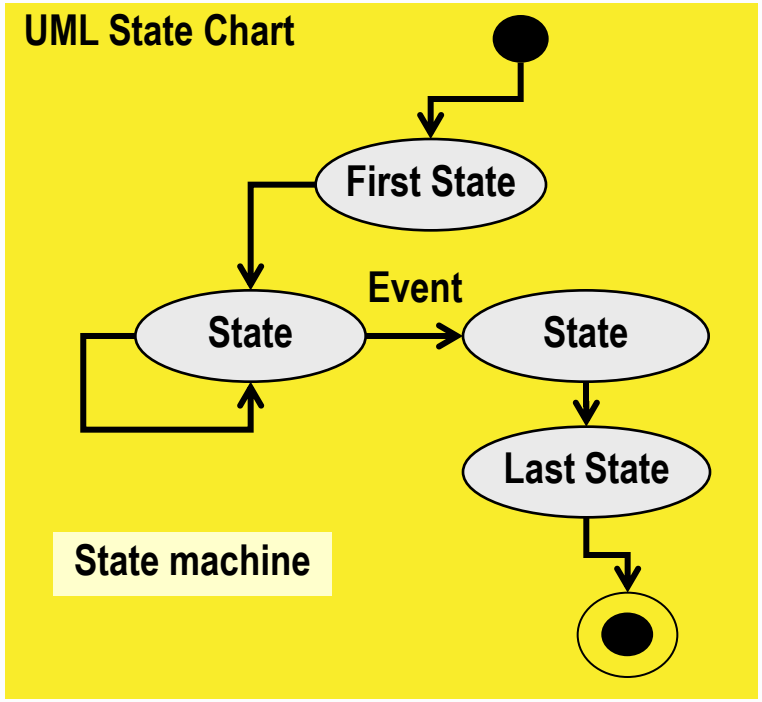
Avancier

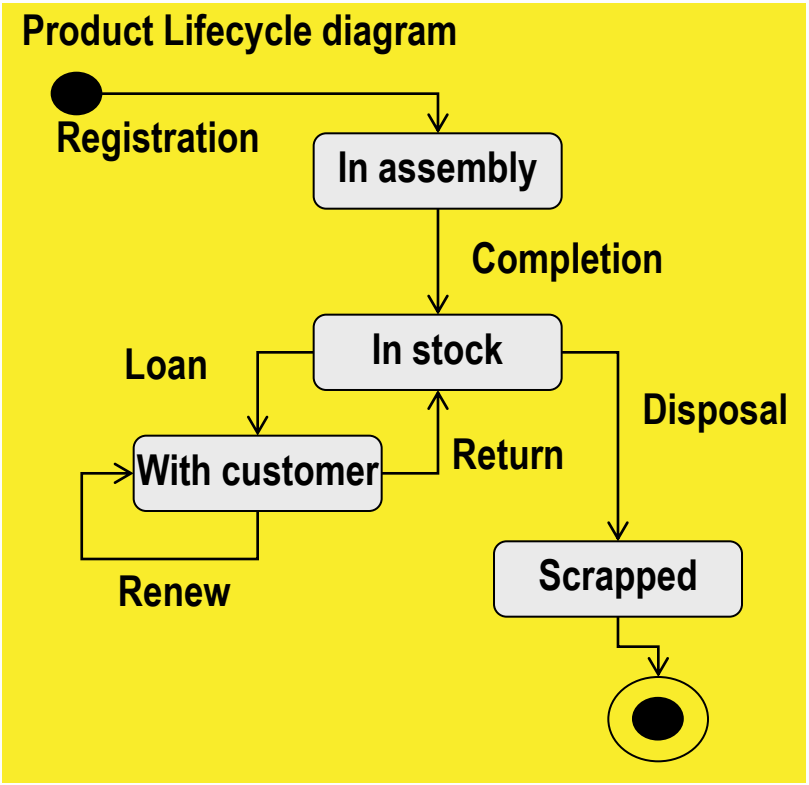
- Score each the data item/group/store thus

Confidentiality	Integrity	Availability	Level
Unauthorized use or disclosure	Data inaccuracy, incompleteness or unauthorized modification	Unavailable information	
Severely impairs business operations, make a segment of the company unable to function or cause high monetary loss.	Causes failures of operations, revenue loss, wrong decisions to be made, loss in productivity or loss of customer confidence or market share.	Impairs business operations, affects customer service or makes it impossible to process revenues.	High
Does not severely affect operations or does not result in high monetary loss.	Makes it impossible to make some decisions, but the problem is not difficult to detect and correct, and does not severely impact business operations.	Causes productivity loss, but does not interrupt customer service or revenue generation.	Moderate
Does not affect operations or result in significant monetary loss.	Does not disable business operations, since alternative validations of the information make it possible to continue	Does not severely impact business operations.	Low

TOG says: Data Lifecycle diagram

- an essential part of managing business data through its lifecycle from conception to disposal within the constraints of the business process.
- Each change in state is represented on the diagram which may include the event or rules that trigger that change in state.





Data Lifecycle diagram v Process Flow diagram

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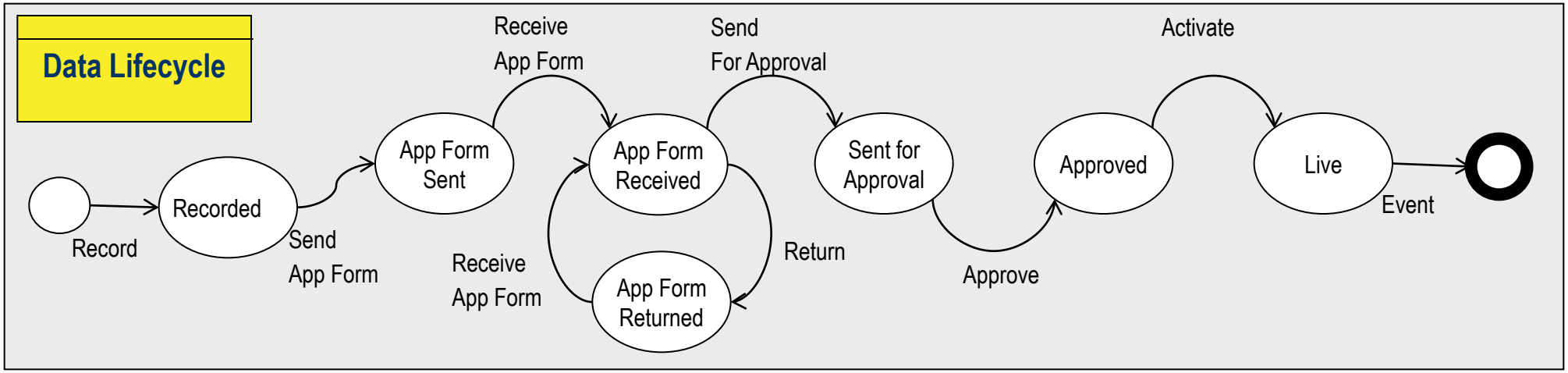
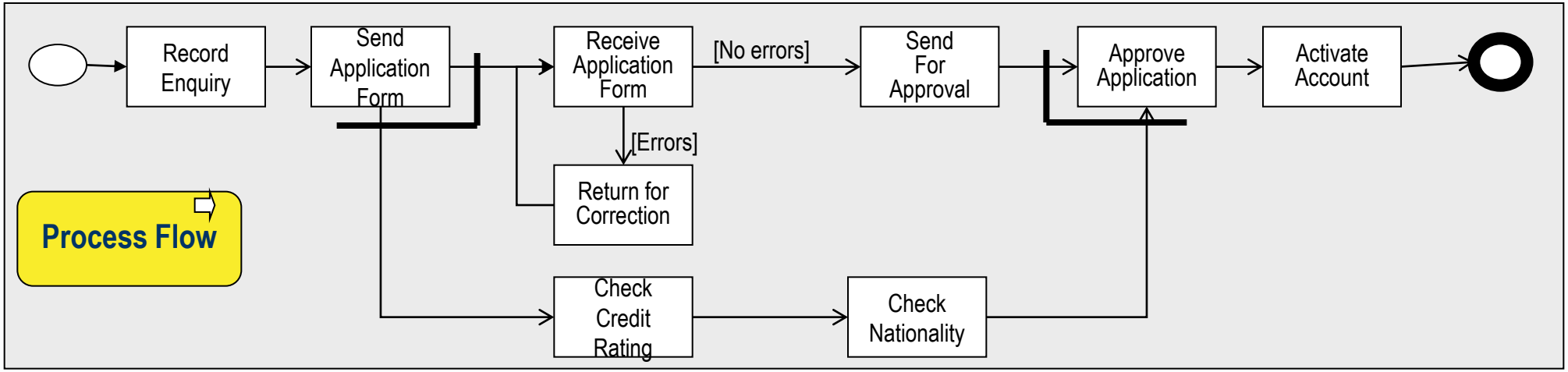
- Notice how one reflects each other





TOG says: Data Migration diagram (not a great example!)

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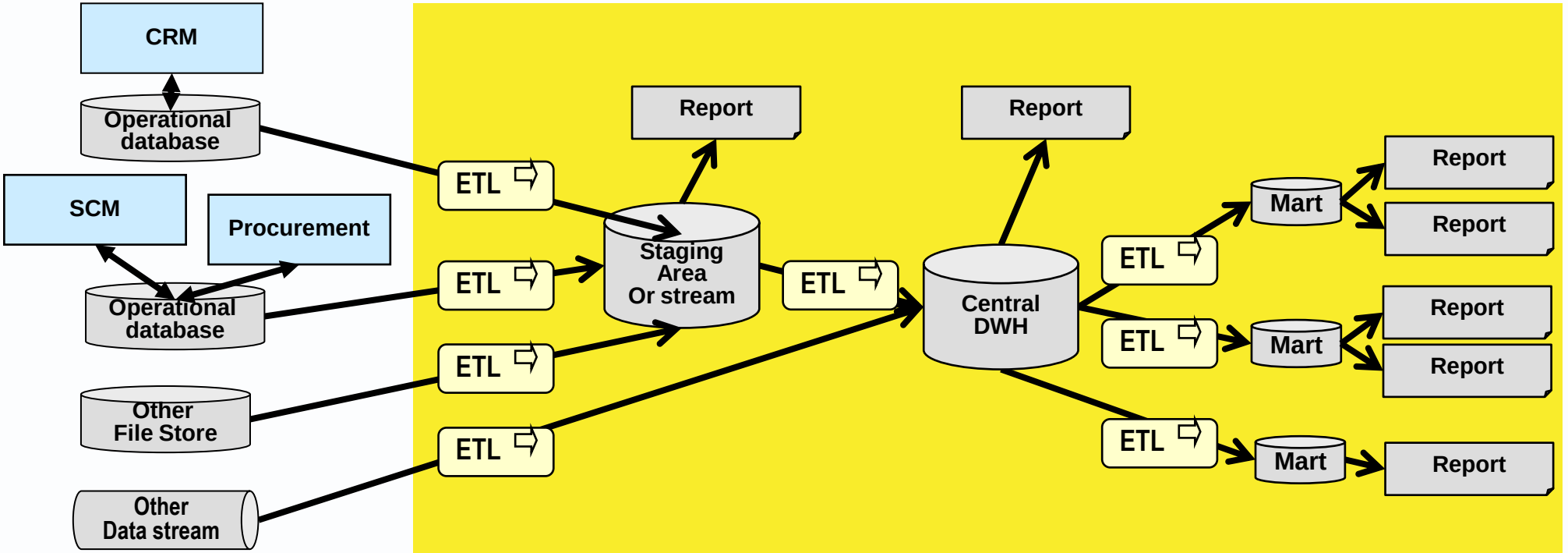
- to show the flow of data from the source to the target applications.
- provide a visual representation of the spread of sources/targets and serve as a tool for data auditing and establishing traceability.
- For example, just an overall layout of migration landscape or could go into individual application metadata element level of detail.



MORE…

Four notations

- Barker's is good

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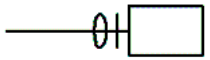
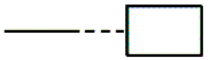
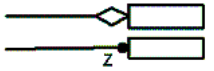
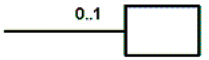
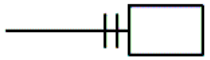
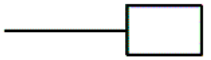
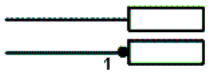
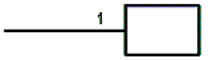
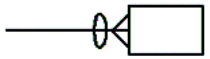
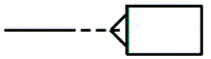
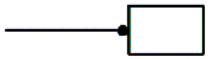
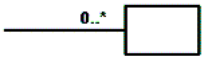
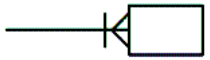
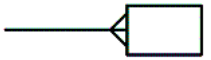
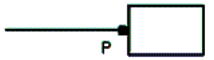
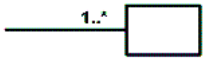
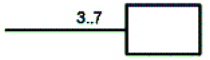
- Zero or one				
- One only				
- Zero or more				
- One or more				
- Specific range	N/A	N/A	N/A	
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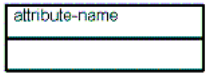
Primary key/unique identifier	N/A	**# Attribute Name**		**attributeName <<PK>> {order=#}**
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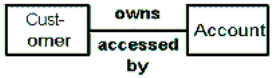
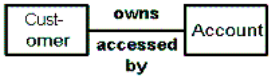
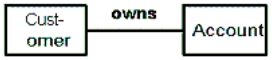
Labels				
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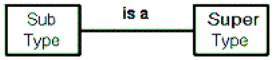
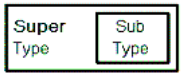
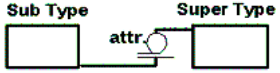
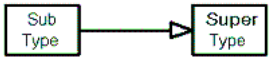
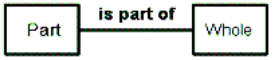
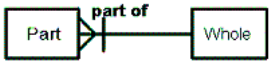
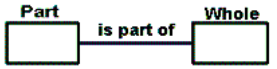
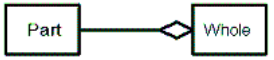
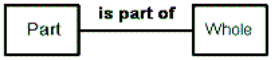
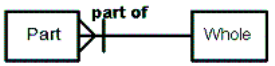
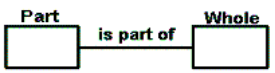
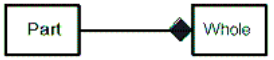
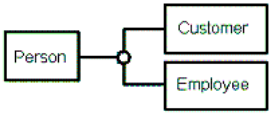
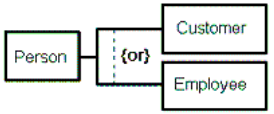
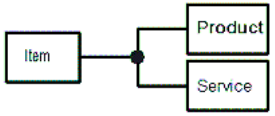
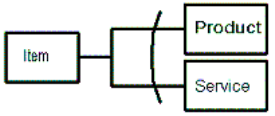
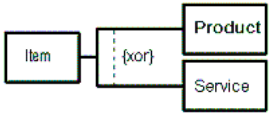
Subtyping				
Aggregation				
Composition				
Or Constraint		N/A	N/A	
Exclusive Or (XOR) Constraint			N/A	

Logical Data diagram notation: Barker and IDEF styles

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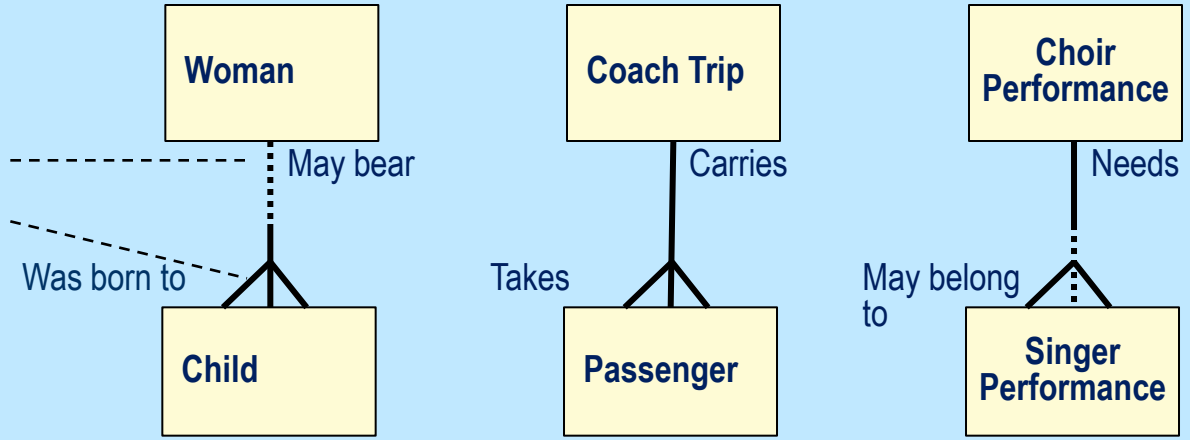
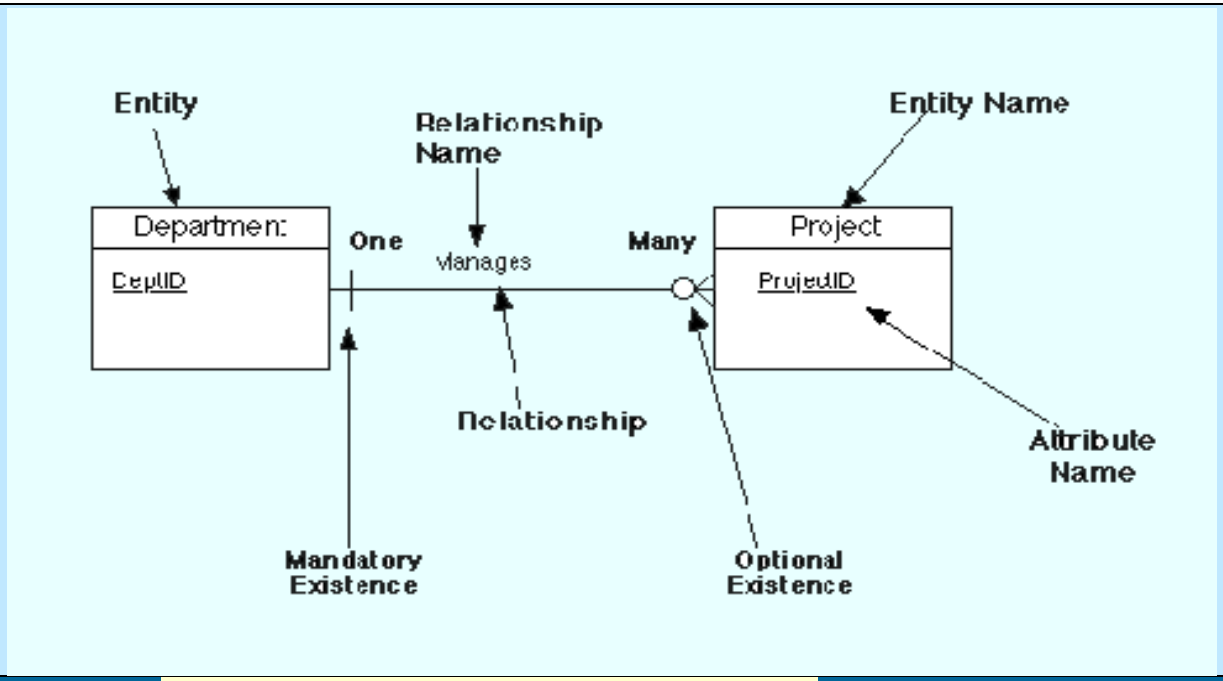
- Optional
- Multiple

Barker style



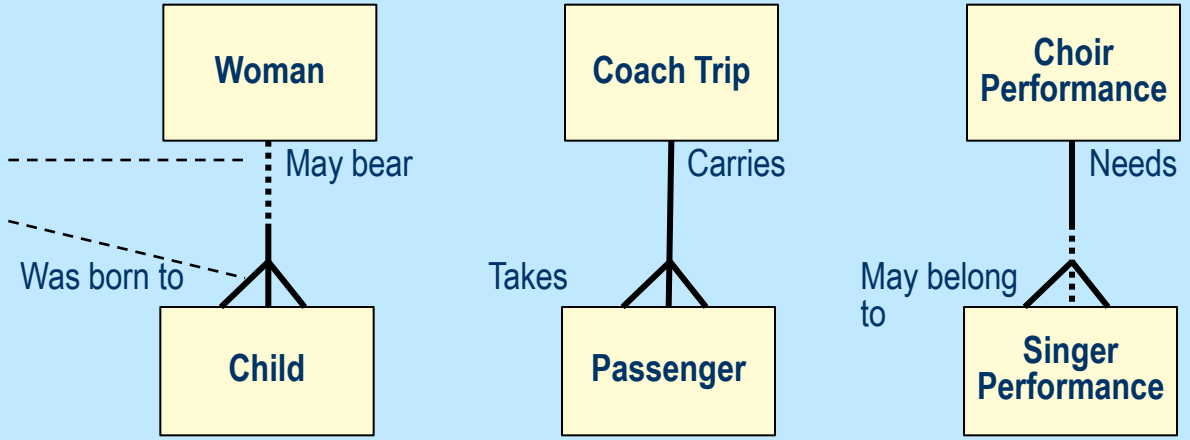
IDEF style



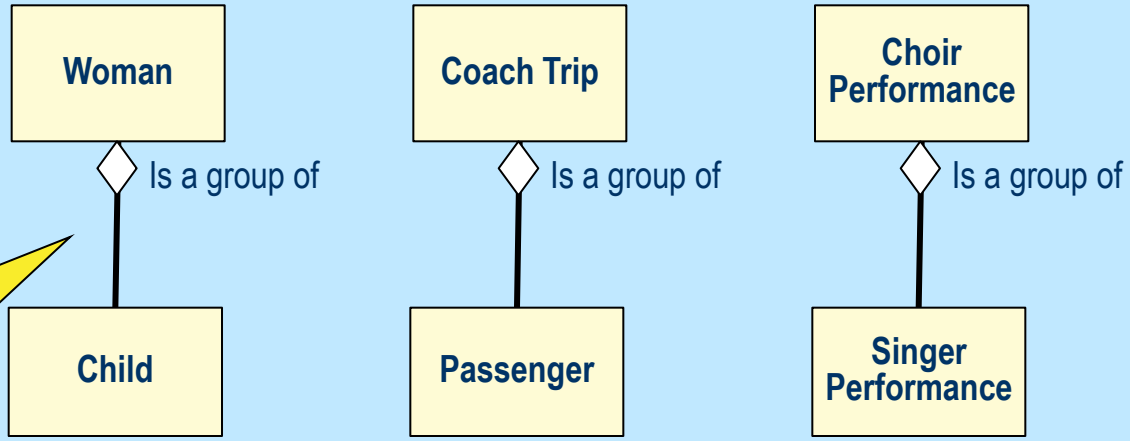
Footnote: naive uses of aggregation

- Optional
- Multiple

Barker Entity Relationship Diagram



ArchiMate Information Structure



Not all one-to-many associations are *aggregates*

Interface catalog

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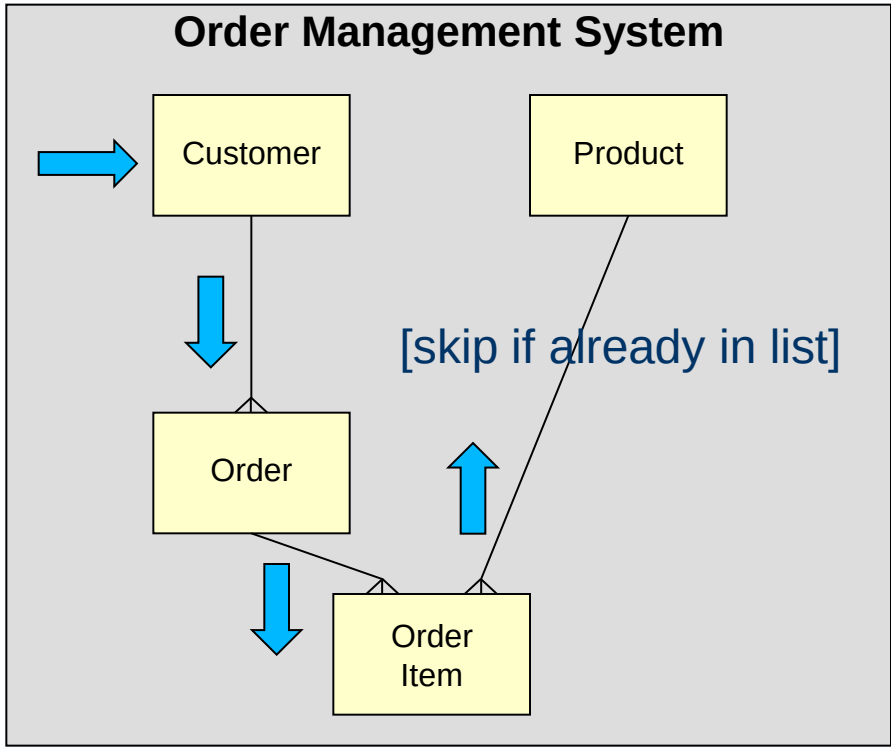
A Data Flow Catalogue (Interface Catalogue in TOGAF)				
Functional attributes	Flow name	**Enquiry**	**Response**	**Order**
	Trigger		Enquiry	
	Source	Customer	Sales	Customer
	Destination	Sales	Customer	Sales
	Information	Unstructured	Unstructured	Order details (tbd)
Non-functional attributes	Frequency	1,000/day	1,000/day	30/day
	Volume			500K
	Confidentiality	High	High	High
	Integrity	Medium	Medium	High
	Availability	24/7	09.00-18.00	24/7
Transport mechanisms	Technology	Web	Telephone	Web
	Protocol	HTTP		HTTPS

Data Access Path (short-term process) diagram

- Which data entities are accessed by a process?
- Useful in analysing the efficiency of a process.

- Where an automated service accesses data in a data store, then the logic of the process can be shown in an access path diagram.
- A node in the diagram is a persistent entity.
- Lines between nodes show the path a process takes through the structure of persistent entities.
- (You might manipulate a UML interaction diagram to define an access path.)



Data Flow Structure (regular expression) diagram

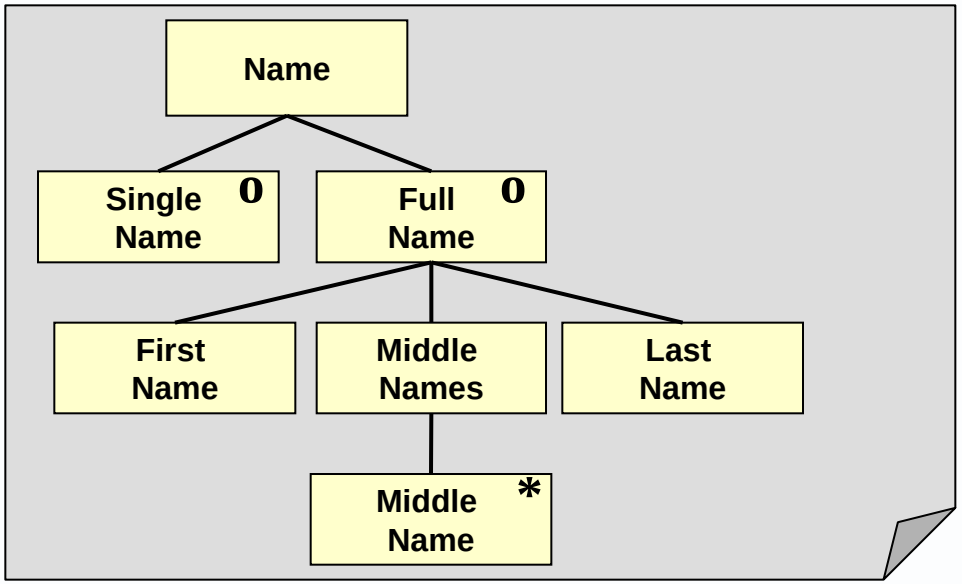
- What is the content and hierarchical structure of a data flow or message?
- What data structure must be implemented in an XML or other data definition schema?

Message with iterated element

Name SELECT
- **Single Name**

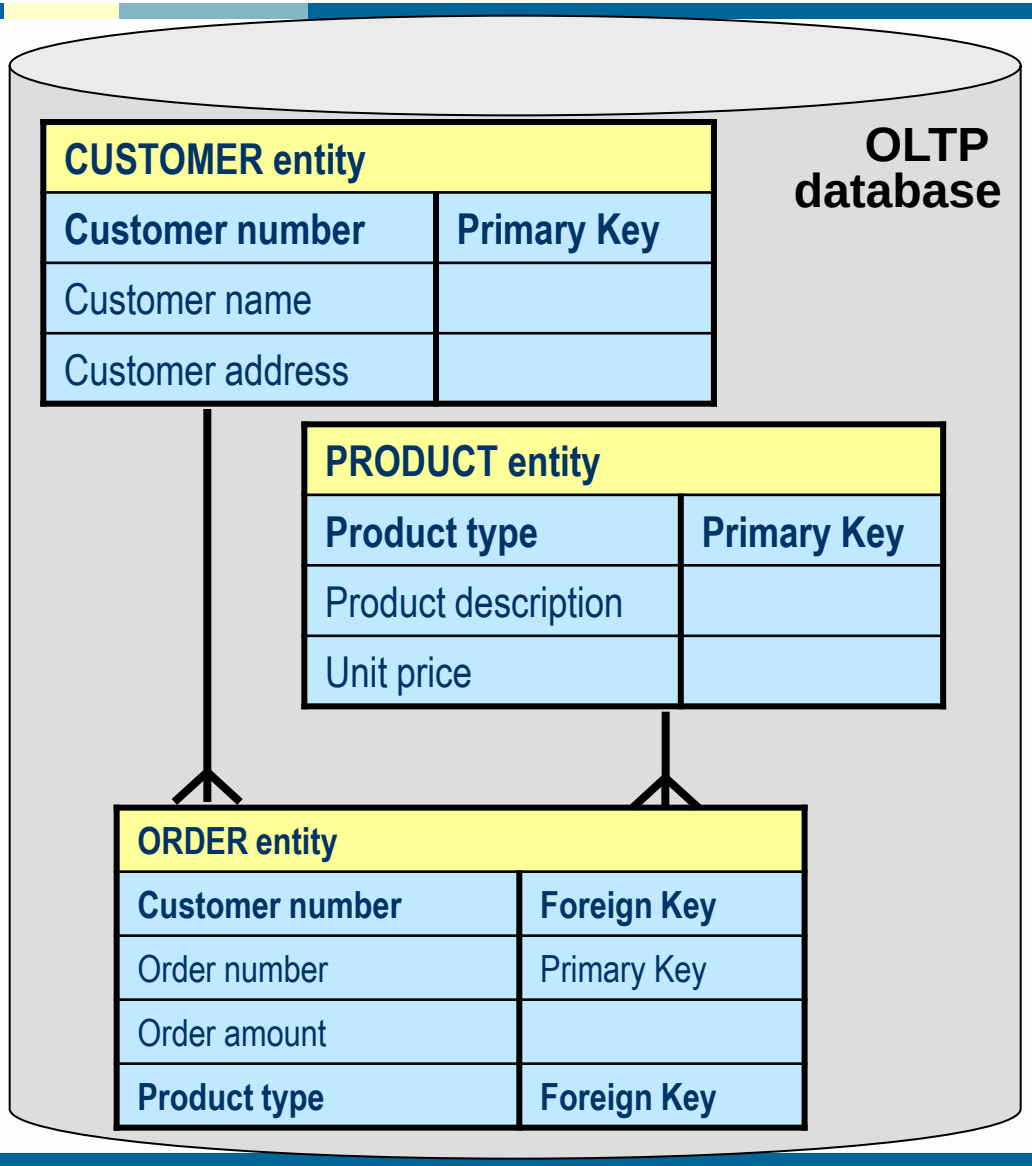
Name OR
- Full name SEQUENCE
  - **First Name**
  - Middle Names ITERATION
    - **Middle Name**
  - Middle Names END
  - **Last Name**
- Full name END

Name END




```
xsd:choice
    xsd:element name="SingleName" type="Text" minOccurs="1" maxOccurs="1" /
    xsd:sequence
      xsd:element name="FirstName" type="Text" minOccurs="1" maxOccurs="1" /
      xsd:element name="MiddleName" type="Text" minOccurs="0" maxOccurs="unbounded"/
      xsd:element name="LastName" type="Text" minOccurs="1" maxOccurs="1" /
    /xsd:sequence
/xsd:choice
```

Logical Data diagram – Relational style



- Entities
- Attributes &
- Relationships

- Usually defining the content of one persistent data store

- And designed to enable I/O data flows

Logical Data diagram: MODAF style

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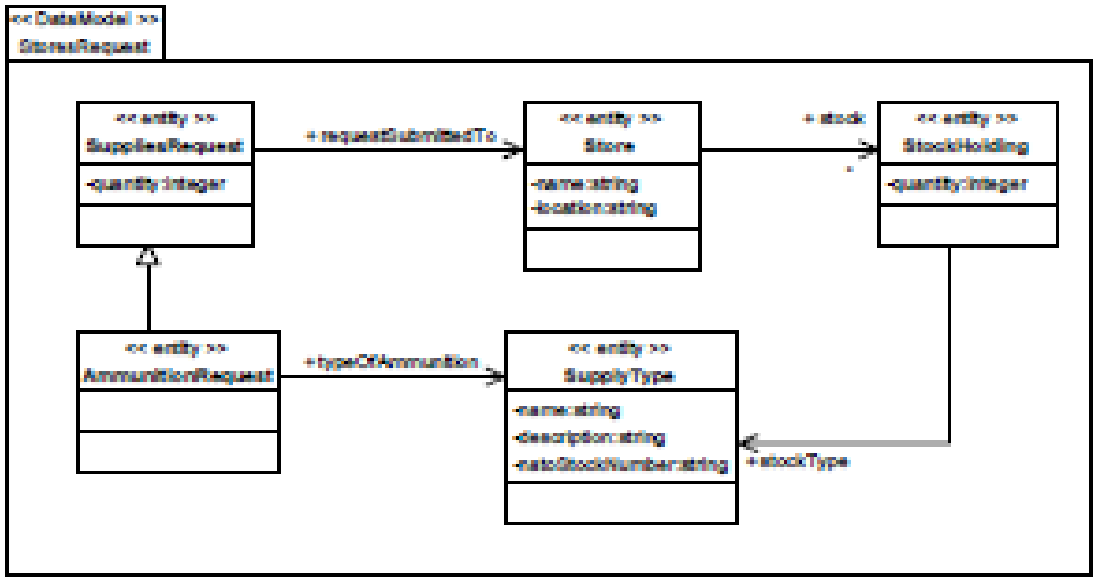
OV-7 Logical Data Model



Example – OV-7 Extract for Generic Stores System

Data objects:
Information entity
Information entity relationships
Information entity structure
Information entity attribute

Usage:
Operational analysis and information structure optimisation
Specification of user information requirements in the URD (aids interoperability)

Description:
Describes the structure and relationships between operational data elements

Alternative Views:
UML Class Diagram

Logical Data diagram: ORM style

- This specialist notation expresses detailed business rules that constrain the values of data items/ attributes.
- Example from Wikipedia