1a TOGAF artefacts with ArchiMate illustrations and the meta model derived from those artefacts
Last updated 02/01/2018 18:40

1. To support TOGAF's artefacts and principles (more comprehensive, coherent and consistent than some realise)
2. To simplify and clarify definitions of TOGAF's architecture artefacts
3. To distinguish EA artefacts from SA artefacts
4. To illustrate EA artefacts using ArchiMate where possible
5. To illustrate SA artefacts using ArchiMate where possible
6. To raise awareness of a few points
7. To generate a TOGAF meta model that is more demonstrably consistent with its artefacts

TOGAF Principles

service-oriented implementation-independent specification of business systems

Motivations and constraints	**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
Aims Goals Objectives Requirements		Business Service	Function	Organization Unit
Directives Principles Policies Rules	Business Data Entity	Process	Role	Actor
Compliance Regulations Standards (SIB) Design Patterns (RM)	Logical Data Entity	App/IS Service	Logical App Component	Physical App Component
Management Time Budget Resources	Logical Data Component	Technology Service	Logical Technology Component	Physical Technology Component

Separation of logical ABBs from physical SBBs

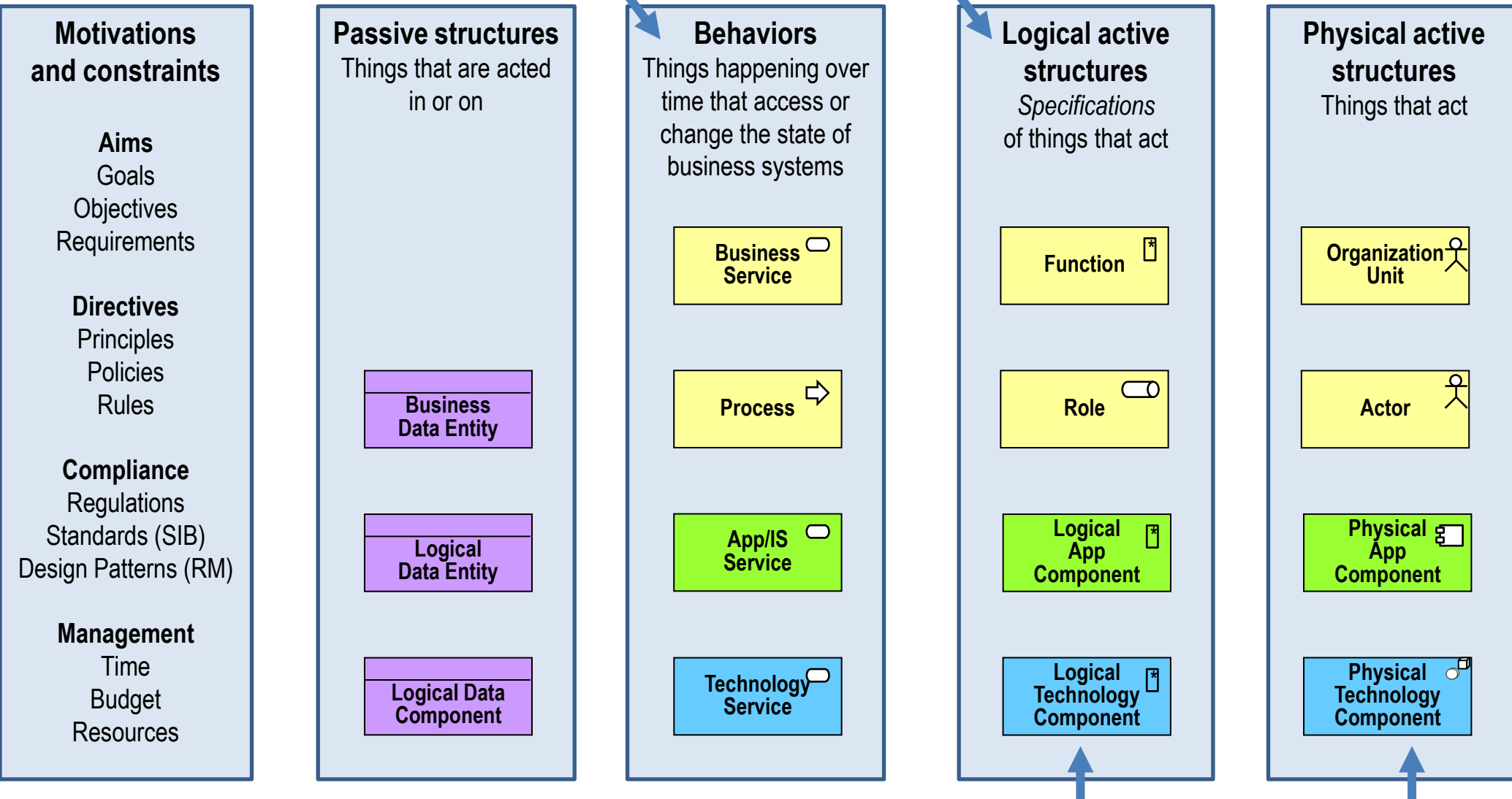Physical things in EA are still "considerably abstracted from implementation"

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For example

Turgid text

Role Catalog

Provides a listing of all authorization levels or zones within an enterprise. Frequently, application security or behavior is defined against locally understood concepts of authorization that create complex and unexpected consequences when combined on the user desktop. If roles are defined, understood, and aligned across organizations and applications, this allows for a more seamless user experience and generally more secure applications, as administrators do not need to resort to workarounds in order to enable users to carry out their jobs. In addition to supporting security definition for the enterprise, the Role Catalog also forms a key input to identifying organizational change management impacts, defining job functions, and executing end-user training. As each role implies access to a number of business functions, if any of these business functions are impacted, then change management will be required, organizational responsibilities may need to be redefined, and retraining may be needed.

What it says

Role Catalog

Lists roles by authorization level and/or zone.

Helps to prevent difficulties when different local security standards are combined, ensuring both a more seamless user experience and more secure applications.

A key input to change impact analysis for role definition and user training.

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The ADM (KLP 2.4-1)

- "Architecture Development Method
  - The core of TOGAF.
  - A step-by-step approach to
  - develop and use
  - an Enterprise Architecture."
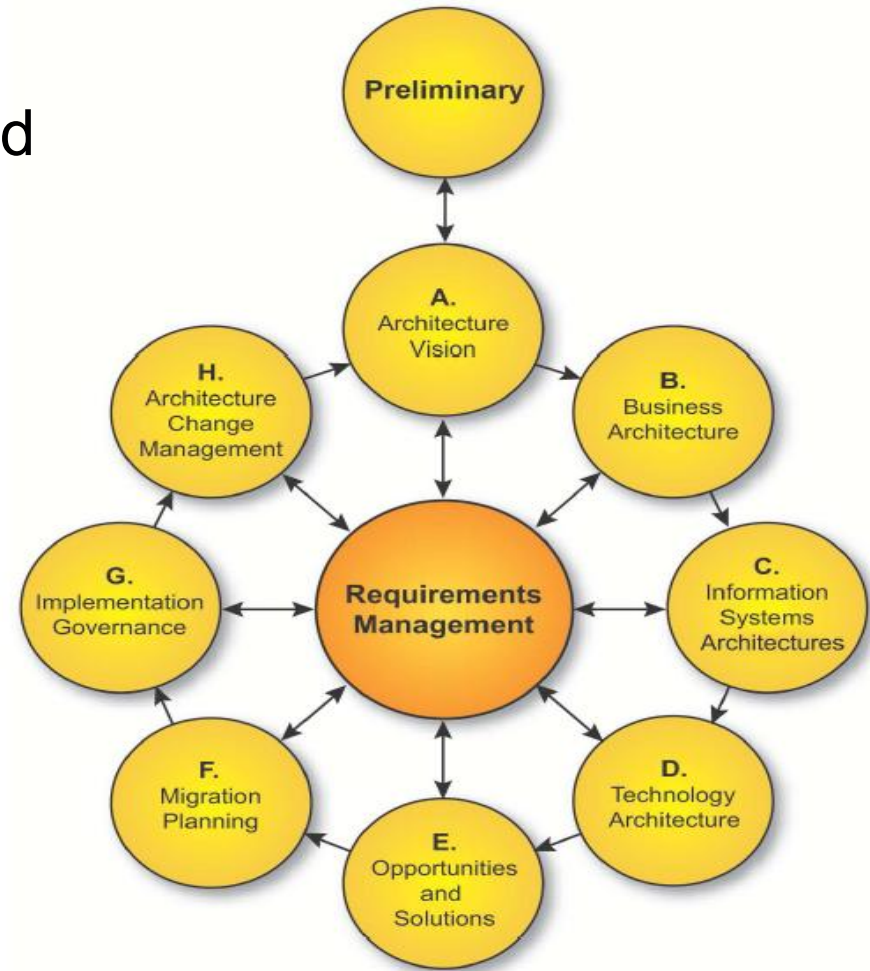
Figure 5-1 Architecture Development Cycle

The different levels of architecture that exist in an organization (KLP 20-1)

- "Strategic Architecture
  - an organizing framework for change and direction setting at an executive level.

- "Segment Architecture
  - an organizing framework for change and direction setting and the development of effective architecture roadmaps at a program or portfolio level.

- "Capability [increment?] Architecture
  - an organizing framework for change, and the development of effective architecture roadmaps realizing capability increments"
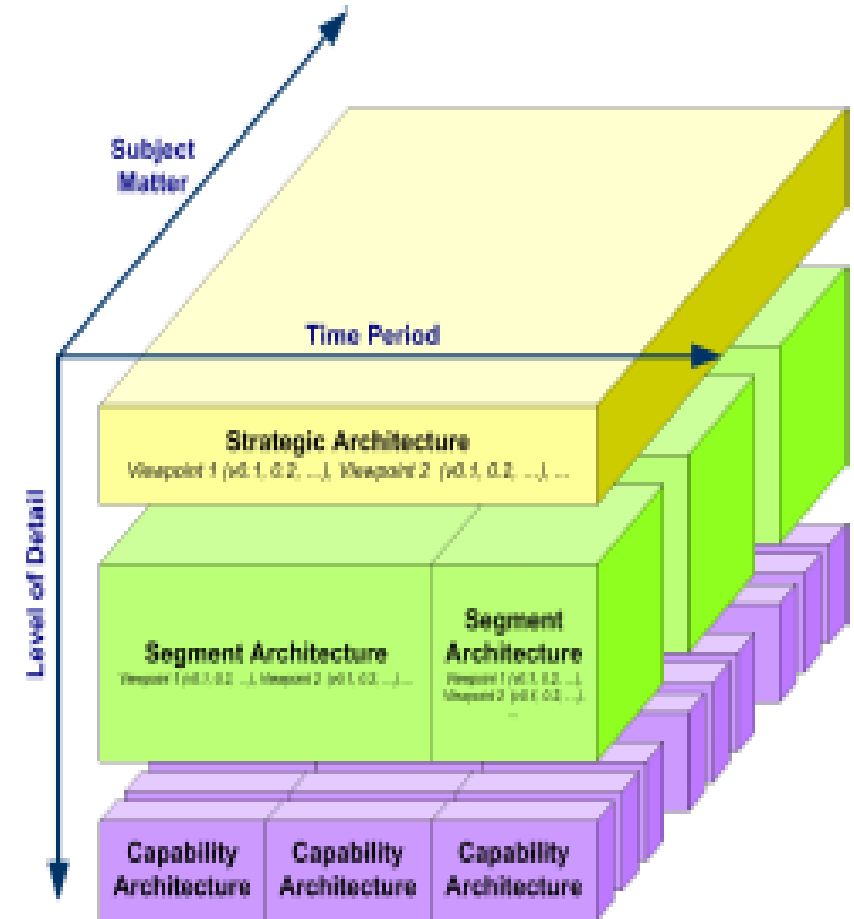

Figure 40-1 Summary Classification Model for Architecture Landscapes

A picture that can mislead

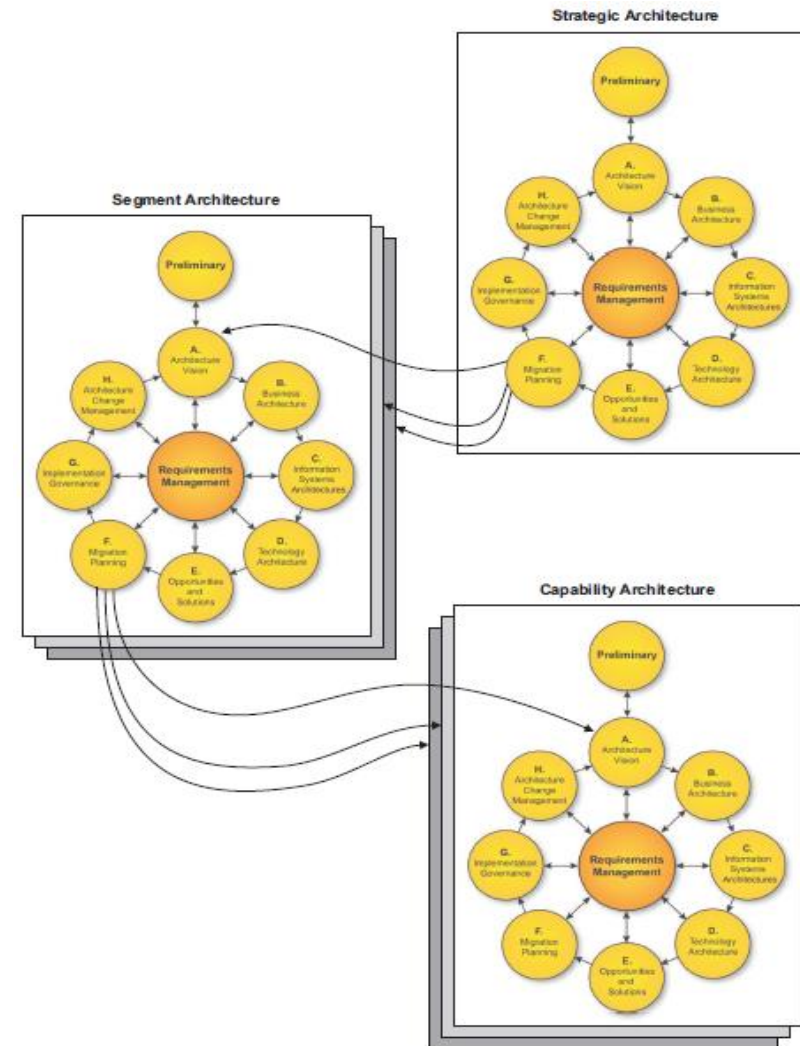- Because the artefacts and activities at top and bottom levels are so different
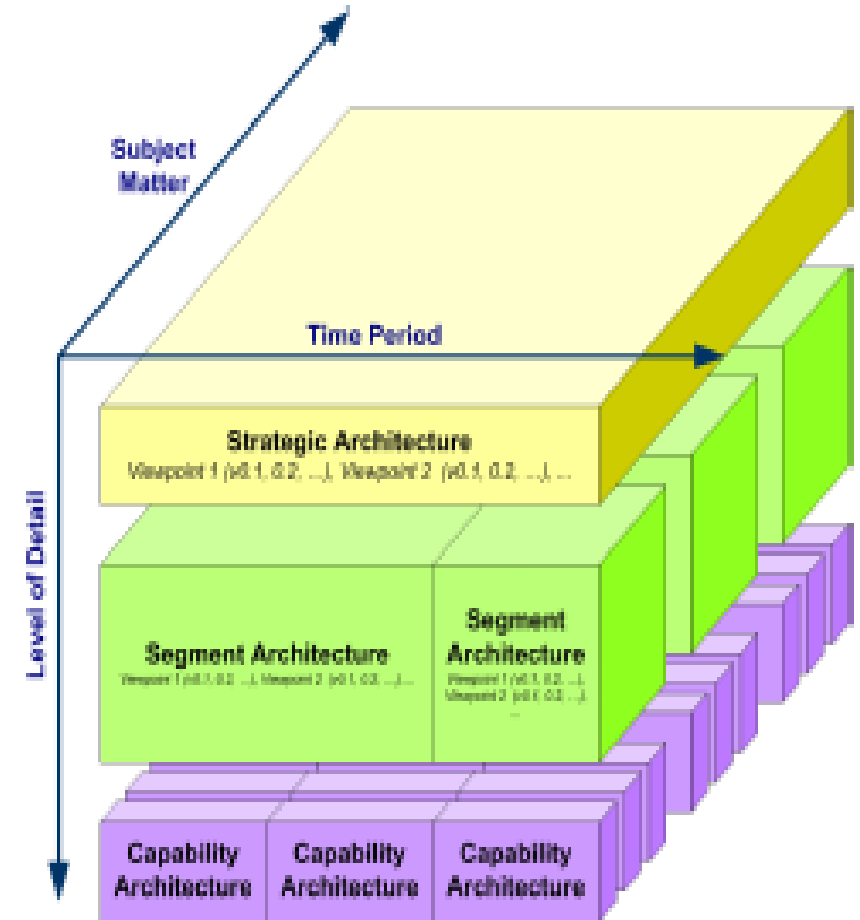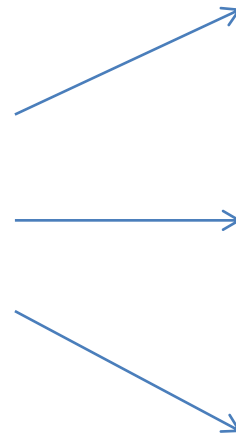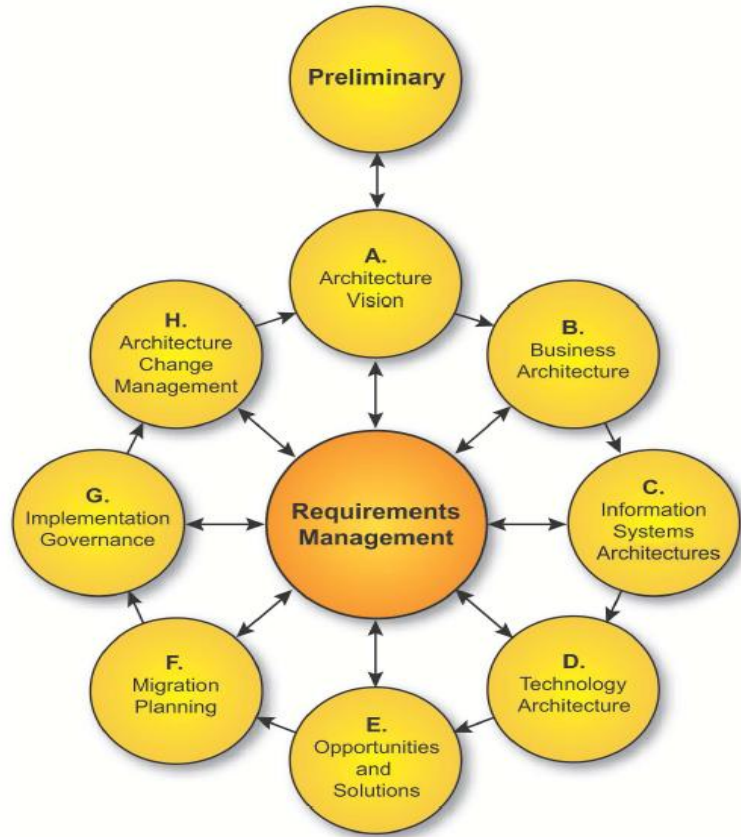

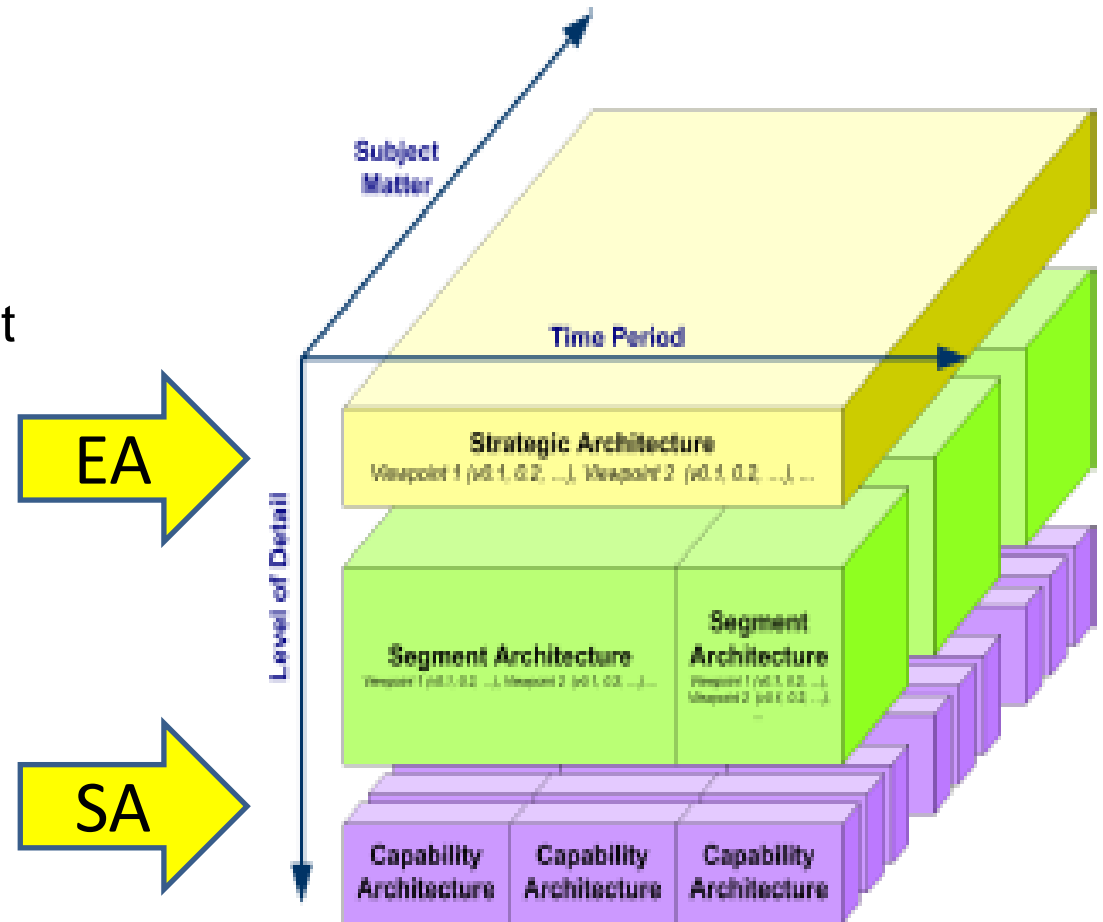Figure 19-3 A Hierarchy of ADM Processes Example

Problem: TOGAF 9 decoupled the ADM from the architecture level

Solution: distinguish Enterprise Architecture from Solution Architecture

- artefacts for
- Analysis and direction setting at an executive level and portfolio level

- Differ from artefacts for
- Architecture development during an ADM cycle at the capability or solution level

EA

SA

Subject Matter

Time Period

Level of Detail

Strategic Architecture
Viewpoint 1 (v0.1, 0.2, ...), Viewpoint 2 (v0.1, 0.2, ...), ...

Segment Architecture
Viewpoint 1 (v0.1, 0.2 ...), Viewpoint 2 (v0.1, 0.2, ...), ...

Segment Architecture
Viewpoint 1 (v0.1, 0.2, ...), Viewpoint 2 (v0.1, 0.2 ...) ...

Capability Architecture

Capability Architecture

Capability Architecture

c40 TOGAF artefacts (more comprehensive, coherent and consistent than some realise)

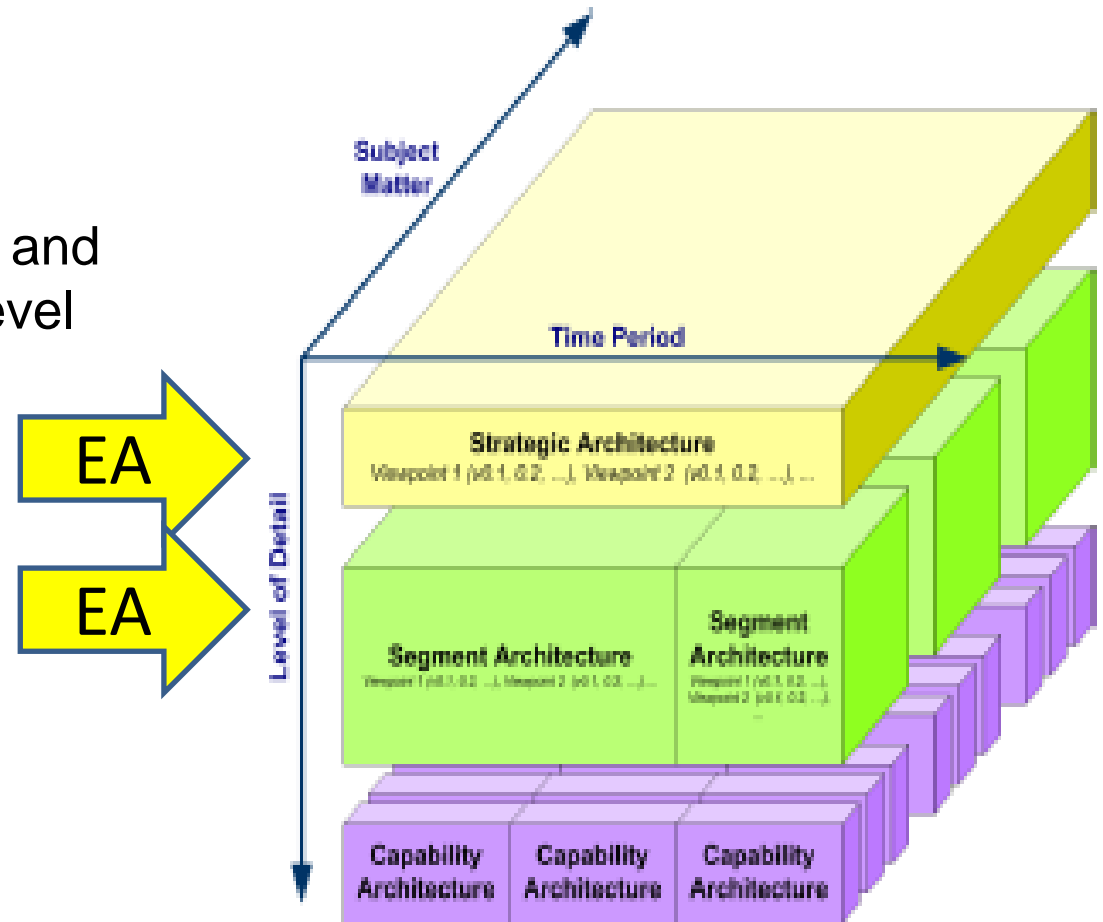|	Enterprise / Strategy / Portfolio level artefacts	Solution or Capability Increment level artefacts
Motivation	Driver Goal/Objective Catalog	Goal/Objective/Service Diagram
Business	Organization Decomposition Diagram Node Connectivity Diagram (physical or logical) Functional Decomposition Diagram Function/Org Matrix Role Catalog Business Function/Service Catalog Process/Event/Control/Product Catalog	Process Flow Diagram Business Scenario Actor/Role Matrix Organization/Actor Diagram
Applications	Application Portfolio Catalog Application/Function Matrix Role/Application Matrix Application Communications Diagram	Process Application Realization Diagram Application Use Case Diagram Application User Location Diagram Software Engineering Diagram Software Distribution Diagram
Data	Conceptual Data Diagram Data Entity/Function Matrix Application/Data Matrix Data Entity/Data Component Catalog Data Dissemination Diagram	Business Service/Info Diagram Logical Data Diagram Data Security Diagram Data Lifecycle Diagram Data Migration Diagram
Technology	Technology Standards Catalog Technology Portfolio Catalog Technology Services Catalog (TRM) Technology/Application Matrix	Environments and Locations Diagram Processing Diagram Networked Computing/Hardware Diagram Communications Engineering Diagram Platform Decomposition Diagram

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The ArchiSurance examples are the widely published ones created by Marc Lankhorst.

1st   the EA / Strategic / Portfolio level

- TOGAF features c20 Catalogs and Matrices that enable portfolio level
  - Gap analysis
  - Cluster analysis
  - Impact analysis
  - Traceability analysis

STRATEGIC BUSINESS ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation	Driver Goal/Objective Catalog	
Business	**PHYSICAL STRUCTURE** Organization Decomposition Diagram Node Connectivity Diagram (physical) **LOGICAL STRUCTURE** Functional Decomposition Diagram Node Connectivity Diagram (logical) Function/Org Matrix Role Catalog **BEHAVIOR** Business Function/Service Catalog Process/Event/Control/Product Catalog	
Applications		
Data		
Technology		

TOGAF artefact: Driver/Goal/Objective Catalog

| Goal/Objective | — | Driver | — | Organization Unit |

- Driver/Goal/Objective Catalog
  - provides a cross-organizational view of how an organization responds to drivers through the setting of goals, objectives, and any measure associated with them.
  - Helps to identify synergies (e.g. organizations with similar or related objectives) allowing stakeholders to be identified and change initiatives to be aligned or consolidated.
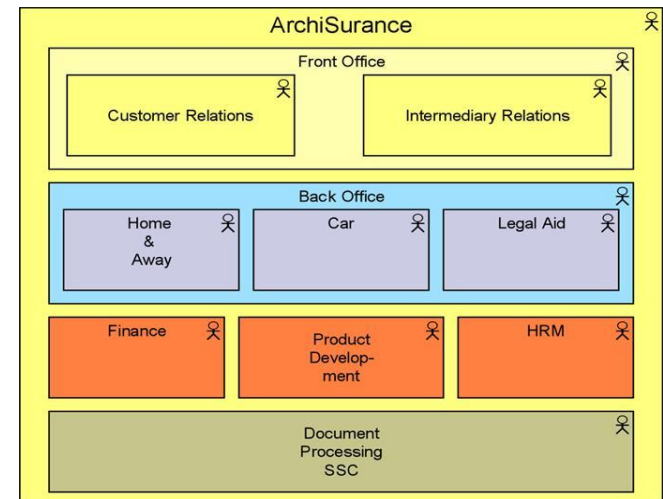
Organization Unit	Driver	Goal	Objective

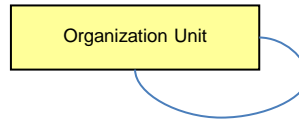# TOGAF artefact: Organization Decomposition Diagram
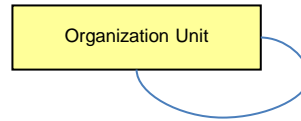
Organization Unit

- Organization Decomposition Diagram
  - The base artefact for physical / strategic-level business architecture
  - provides the foundation for other artefacts
  - relates actors and/or roles to organization units in an organization tree.
  - may indicate locations
  - indicates owners, decision-makers and a chain of command
  - helps to identify which stakeholders are concerned with which business drivers, goals and objectives.
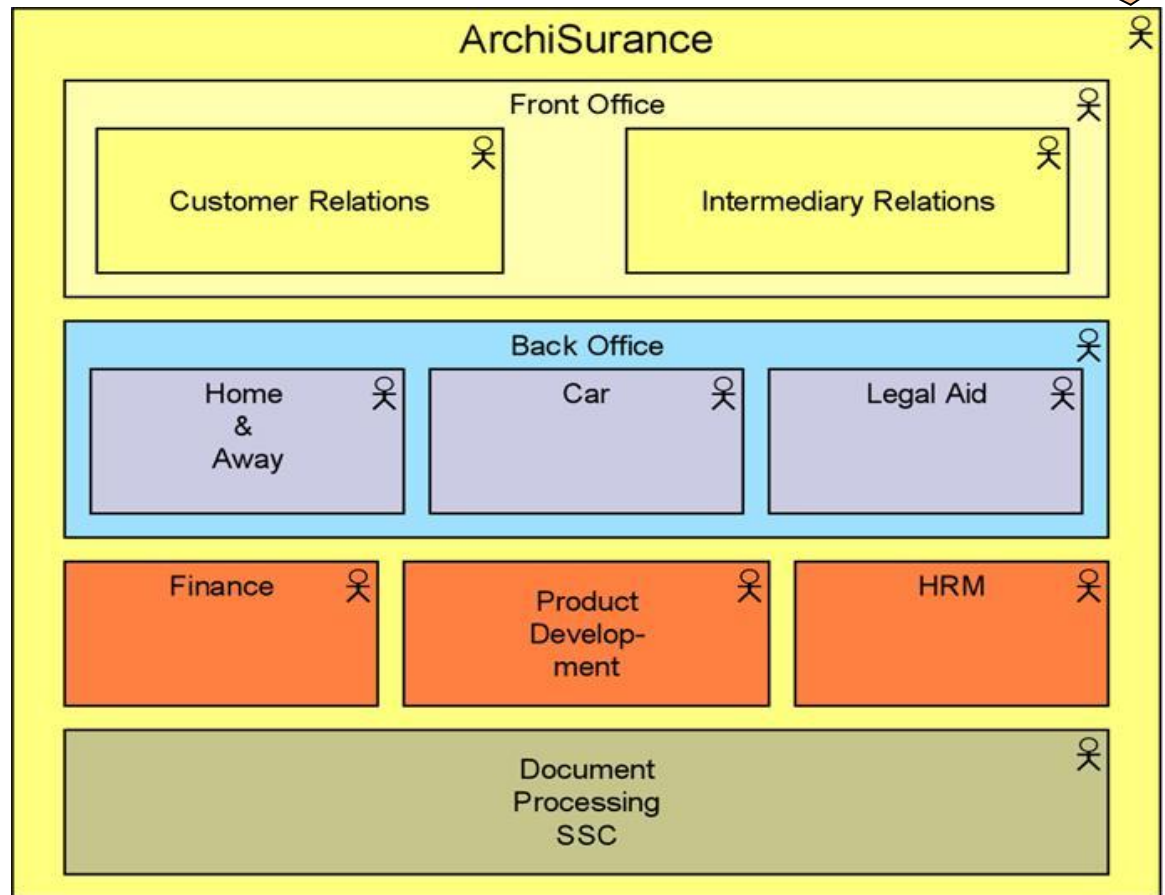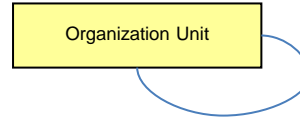
ArchiSurance

Front Office

Customer Relations

Intermediary Relations

Back Office

Home & Away

Car

Legal Aid

Finance

Product Develop-ment

HRM

Document Processing SSC

ArchiMate

- An organization view

TOGAF artefact: Node Connectivity Diagram

Organization Unit

- **The Node Connectivity Diagram (physical)**   (aka goods and services flow diagram)
  - A node: an organizational unit, actor, location or facility.
  - A needline: shows the need of one node for information from another.
  - An arrow: shows information flow direction
  - A flow can be named and annotated to describe the data carried
    - content
    - transport mechanism/media
    - security or other classification level,
    - timeliness
    - interoperability requirements.

Node connectivity Diagram: SCOR technique

Organization Unit
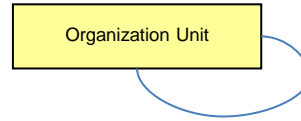
- Identify your customers
- Identify your suppliers

Suppliers		Customers
Flash, Inc.		
Battery Ltd.		Retail, Inc.
Components		
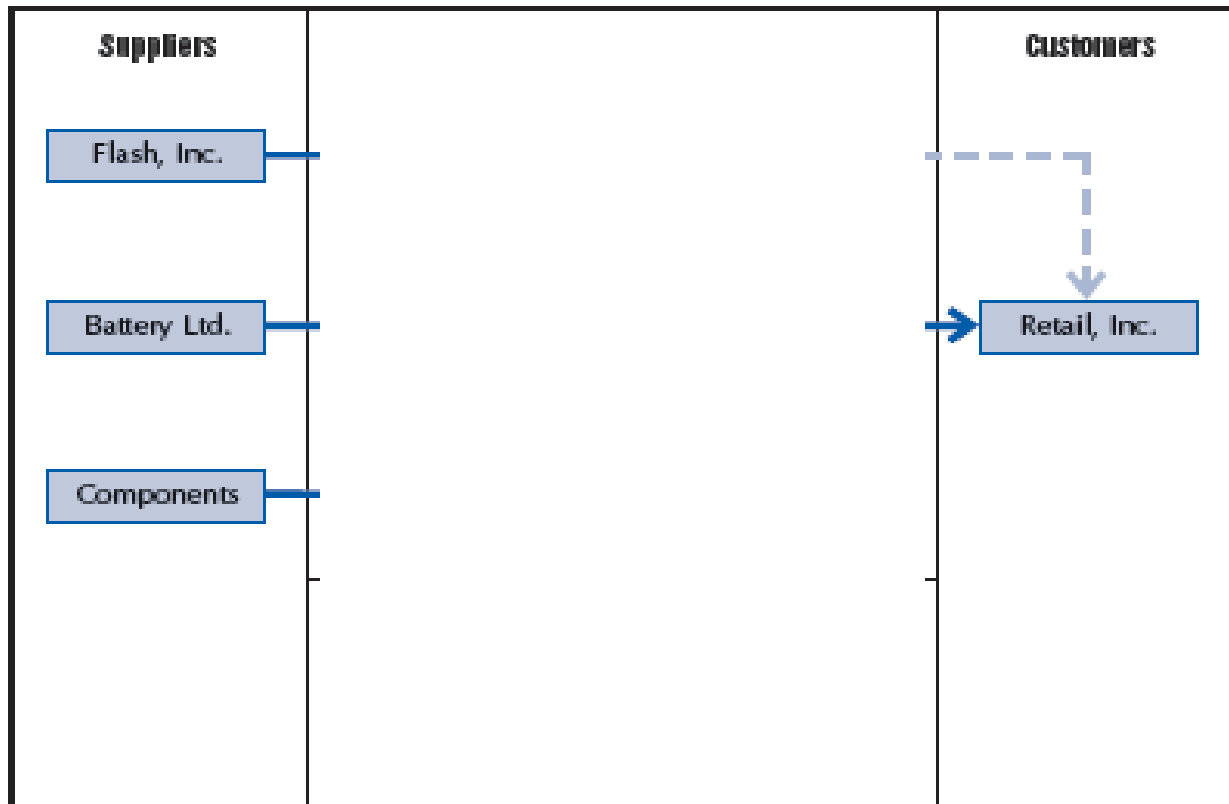
Node connectivity Diagram: SCOR technique
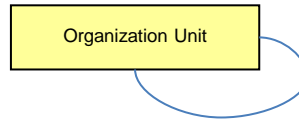
Organization Unit

1. Identify your customers
2. Identify your suppliers
3. Identify the key nodes (entities in the supply chain)
4. Link nodes by flows.

Suppliers

Flash, Inc.

Battery Ltd.

Components

mp3, Inc.

mp3 HQ

Factory

Warehouse

Customers

Retail, Inc.

Information flow

A subsystem or component

Material and Information flow

Service Providers

→ Material and information flow

⇢ Information flow

ArchiMate
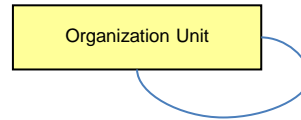
Organization Unit

- An Organization View - Nodes are physical Actors

Surely communication path rather than interface?
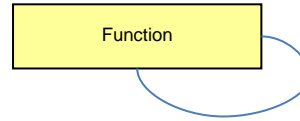
Reverse engineering principles (1)

- Reverse engineer from

    - physical structure to logical structure

| Organization Unit | → | Function |

TOGAF artefact: Functional Decomposition Diagram

Function

- Functional Decomposition Diagram
  - The base artefact for logical / strategic-level business architecture
  - provides the foundation for other artefacts
  - shows on a single page the organization capabilities relevant to the architecture to be defined and governed.
  - helps to quickly model the organization's capabilities without being dragged into debate on how the organization does it.
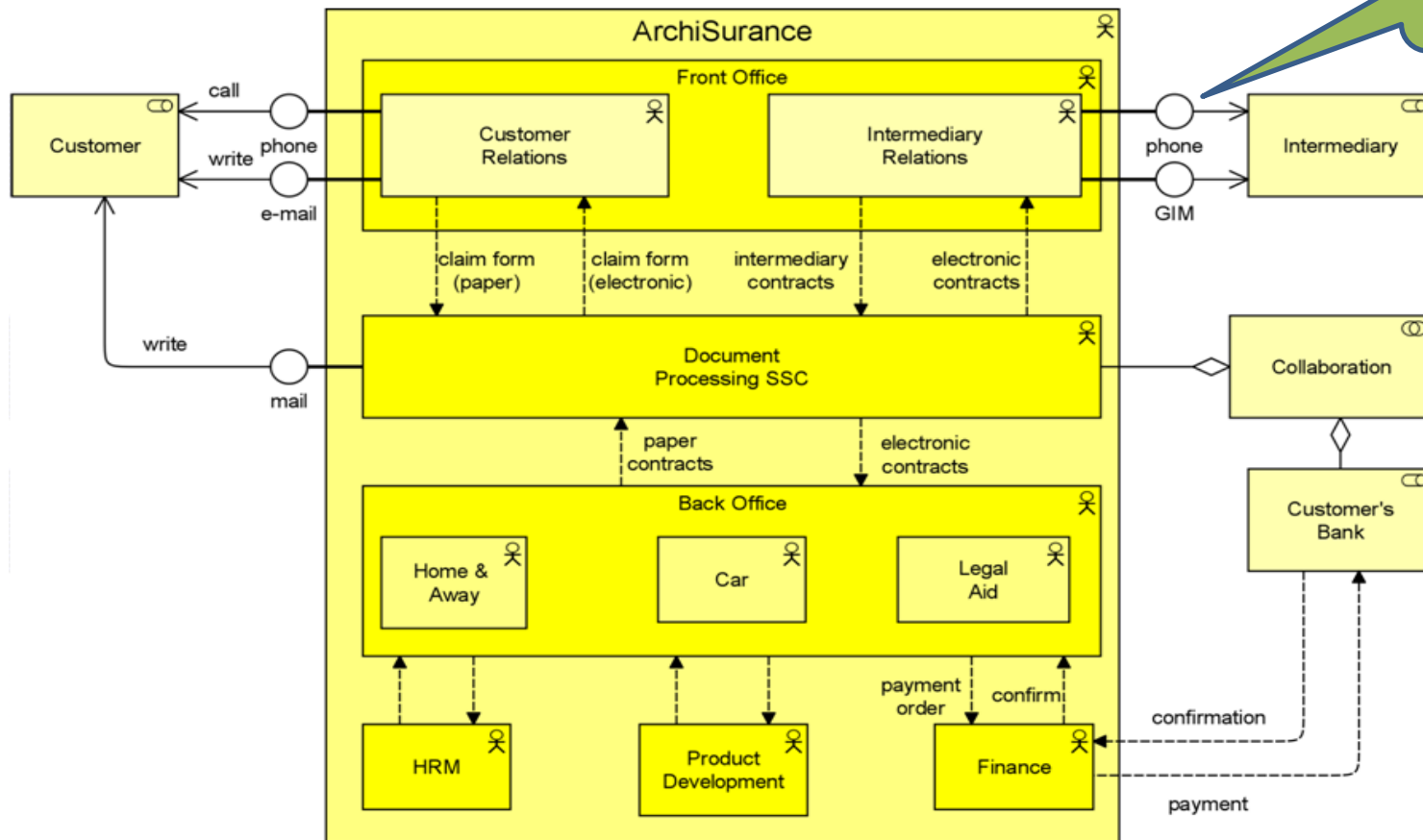 - given a basic diagram, it is possible to layer heat-maps on top of it to show scope and decisions. For example, the capabilities to be implemented in different phases of a change program.

can be composed or decomposed - from wide/top to narrow/bottom.
"the level and rigor of decomposition varies" (TOGAF)

ArchiMate

A strict (non-redundant) hierarchy.

Strategic management functions

- **Strategy**
- **Fiscal and accounting**
- **Risk and Compliance**
- **Performance**

Operational functions

Products
- **Product definition**
- **Product engineering**

Marketing
- **Market development**
- **Campaigning**

Sales
- **Distribution channels**
- **Sakes execution**

Customer care
- **Customer service**
- **Customer relations**
- **Service channel**
- **Customer data**

Assets
- **Investment**
- **Investment performance**
- **Investment portfolio**
- **Asset inventory**

Money
- **Banking**
- **Accounts**
- **Cash flow**
- **Money market**

Claims
- **Contracts life cycle**
- **Claim settlement**
- **Contract admin.**
- **Claim admin.**

Support functions

- **Organization**
- **HR**
- **Process**
- **Office**
- **Facility**
- **ITSM**

TOGAF artefact: Node Connectivity Diagram

- Node Connectivity Diagram (logical)   (aka goods and services flow diagram)
  - A node: a function or role
  - A needline: shows the need of one node for information from another.
  - An arrow: shows information flow direction
  - A flow can be named and annotated to describe the data carried
    - content
    - transport mechanism/medium
    - security or other classification level,
    - timeliness
    - interoperability requirements.

Node Connectivity Diagram in ArchiMate

Function

- Shows services offered by nodes to external entities and to each other

ABC Limited

Supplier

Supplier

Goods receipt

Reporting

Goods delivery

Money handling

Driver

Manager

A Role that provides or receives a flow

A flow of goods, services or data

A one Actor Role

BACS

Node Connectivity Diagram in ArchiMate

Function

Research Community — New Technologies → **Product Development**

Product Development — Product Proposals → **Governance Board**

Governance Board — Credit Requests → **Finance**

Capital Markets — Funds → **Finance**

Sales — Orders → **Finance**

Customer — Orders → **Sales**

Finance — Approved Orders → **Product Assembly**

Supplier — Parts → **Product Assembly**

Product Assembly — Products → **Product Delivery**

Product Delivery — Products → **Customer**

TOGAF mapping logical organization to physical organization

Function	Organization Unit
	Org/Function Matrix
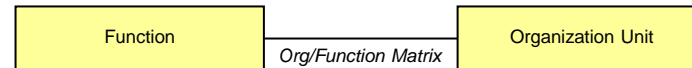
- "Structured Analysis: Identifies the key business functions within the scope of the architecture, and maps those functions onto the organizational units within the business."

- Might reveal a 1-1
- "Functional organization"

- Or else an N-N realization

Organization Function	Marketing	Sales	Delivery
Marketing	Activity		
Sales		Activity	
Delivery			Activity

Organization Function	Petrol	Paints	Plastics
Marketing	Activity	Activity	Activity
Sales	Activity	Activity	Activity
Delivery	Activity	Activity	Activity

TOGAF artefact: Role Catalog

Role

- Role Catalog
  - The base artefact for people-oriented views
  - Provides a foundation for mapping roles to processes, applications and data
  - Lists roles by authorization level and/or zone .
  - Helps to prevent difficulties when different local security standards are combined, ensuring both a more seamless user experience and more secure applications.
  - Supports change impact analysis for role definition and user training
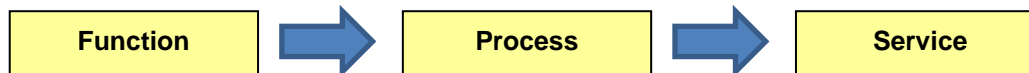
Reverse engineering principles (2)

- Reverse engineer from

  - physical structure to logical structure

    | Organization Unit | ➡ | Function |

  - structure to behavior

    | Function | ➡ | Process | ➡ | Service |

TOGAF artefact: Process/Event/Control/Product Catalog

Process

- Process/Event/Control/Product Catalog
  - a hierarchical process structure including
    - events that trigger processes, outputs from processes, and
    - controls/rules (pre and post conditions).
  - enables gap, cluster and analysis of a portfolio:
    - allows an architect to filter, report, and query across organization processes to identify scope, commonality
  - enables impact analysis on changing a process.

Process level 1	Process level 2	Process Level 3	Input / event	Output / product	Control / rules

TOGAF artefact: Business Function/Service Catalog

| Business Service | Function | Organization Unit |
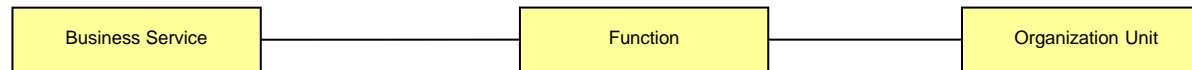
- Business Function/Service Catalog
  - provides a functional decomposition in a form that can be filtered, reported on, and queried. It can be used to
    - identify capabilities of an organization
    - understand the level that governance is applied to the functions of an organization.
    - identify new capabilities required to support business change
    - determine the scope of change initiatives, apps, or technology components.

Function level 1	Function level 2	Business Service	Organization Unit

ArchiMate

Business Service ——— Function

- Hand made

Insure

Claim on Insurance

Function assigned to Service

Insurance

Function uses Service

Insurance Application Service

Claim Registration Service

Claims Payment Service

Customer Information Service

Premium Payment Service

Close Contract

Handle Claim

Inform Customer

Collect Premium

© The Open Group
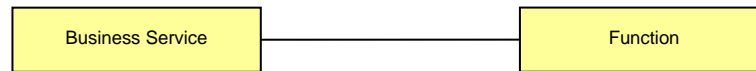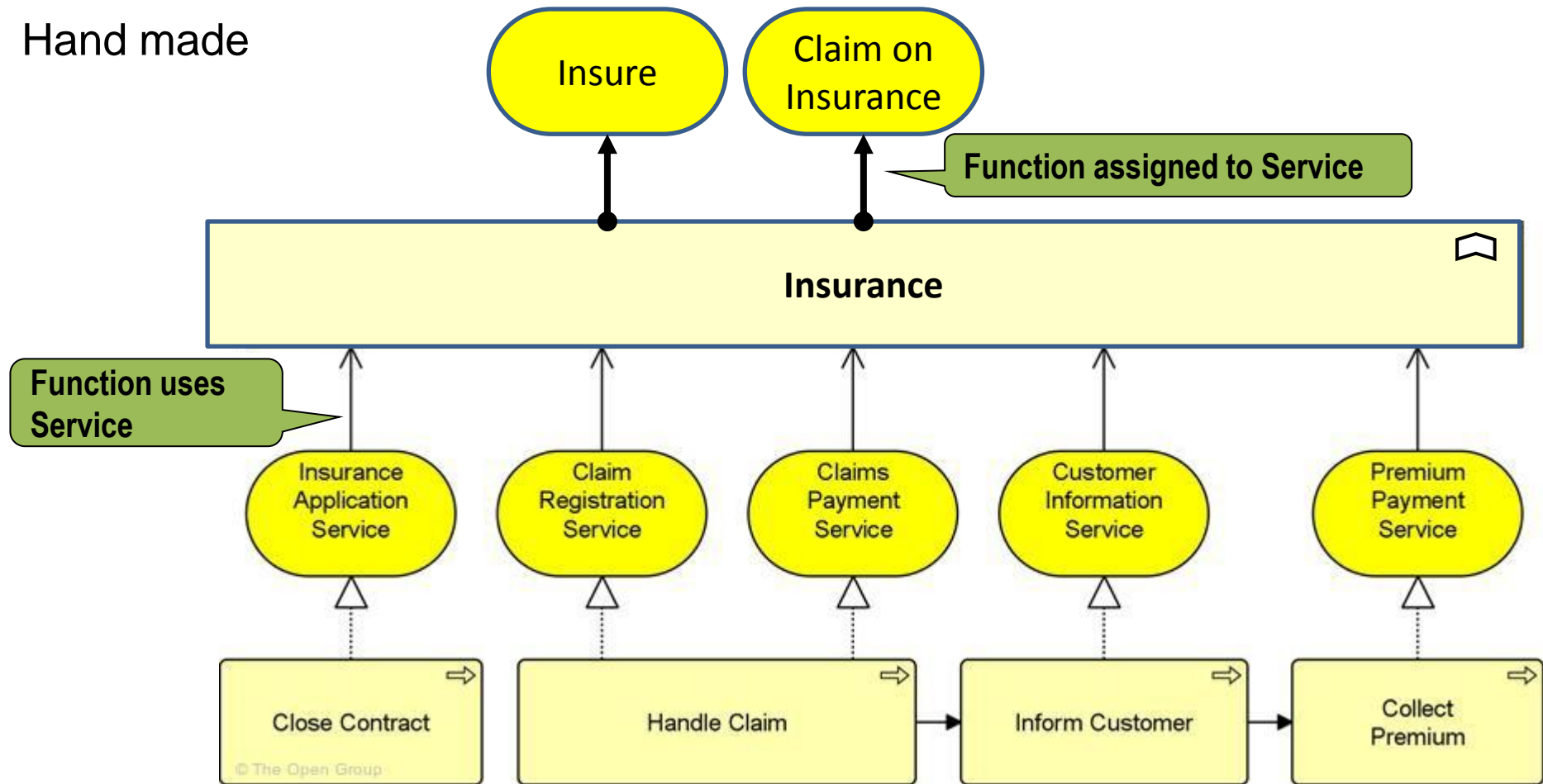
STRATEGIC APPS ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation		
Business		
Applications	App Portfolio Catalog App/Function Matrix Role/App Matrix App Communications Diagram	
Data		
Technology		

TOGAF artefact: App Portfolio Catalog

<div style="text-align:center">Application Component</div>

- App Portfolio Catalog
  - The base artefact in strategic applications architecture
  - provides the foundation for other artefacts.
  - lists all (logical and/or physical) applications in the enterprise that are to be defined and governed
  - helps to scope change initiatives that impact applications.
  - may be extended to name IS Services provided

- ArchiMate doesn't feature catalogs and matrices use for portfolio management

TOGAF artefact: App/Function Matrix

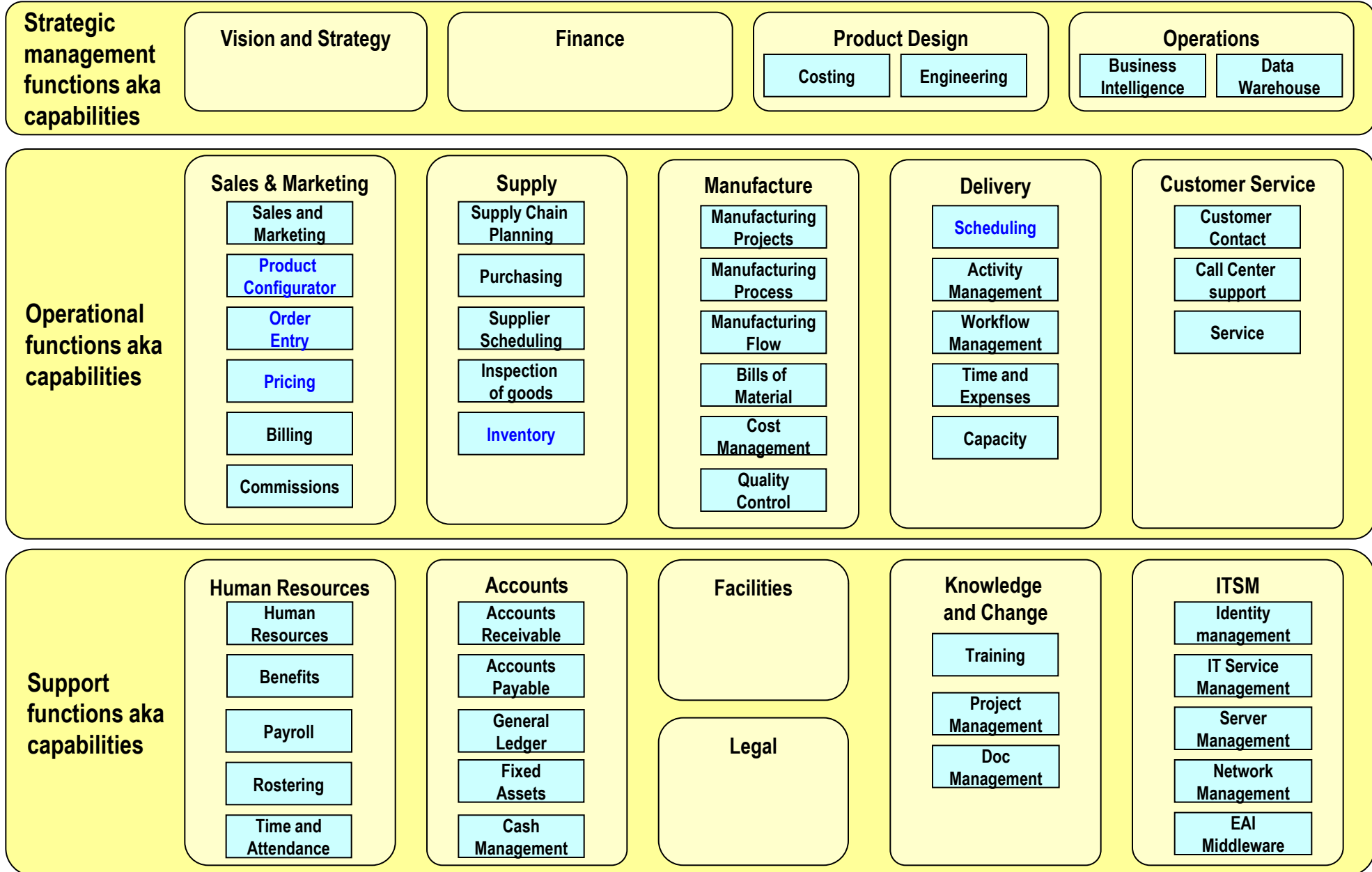| Function	App/IS Service	Application Component

- App/Function Matrix
  - Enables gap, cluster and impact analysis of a portfolio.
  - Asking which business functions use an app reveals where the same app supports different functions, which apps are essential and those little used.
  - Asking which apps are used by a business function may reveal requirements for interoperability and support.

App / Function	CRM	ERP	Billing	Data warehouse
Sales	Place order Register customer			
Invoicing			Post invoice	

- ArchiMate doesn't feature catalogs and matrices use for portfolio management

App/Function matrix as a diagram

Strategic management functions aka capabilities			
Vision and Strategy	**Finance**	**Product Design** Costing | Engineering	**Operations** Business Intelligence | Data Warehouse

Operational functions aka capabilities

Sales & Marketing	Supply	Manufacture	Delivery	Customer Service
Sales and Marketing	Supply Chain Planning	Manufacturing Projects	Scheduling	Customer Contact
Product Configurator	Purchasing	Manufacturing Process	Activity Management	Call Center support
Order Entry	Supplier Scheduling	Manufacturing Flow	Workflow Management	Service
Pricing	Inspection of goods	Bills of Material	Time and Expenses	
Billing	Inventory	Cost Management	Capacity	
Commissions		Quality Control		

Support functions aka capabilities

Human Resources	Accounts	Facilities	Knowledge and Change	ITSM
Human Resources	Accounts Receivable		Training	Identity management
Benefits	Accounts Payable	Legal	Project Management	IT Service Management
Payroll	General Ledger		Doc Management	Server Management
Rostering	Fixed Assets			Network Management
Time and Attendance	Cash Management			EAI Middleware

TOGAF artefact: Role/App Matrix

| Role	—	App/IS Service	—	Application Component

- Role/App Matrix
  - Shows which roles use which apps.
  - Enables gap, cluster and impact analysis of an app portfolio.
  - Asking which apps support a role reveals permissions needed by that role.
  - Asking which roles use an app may reveal requirements for availability, security and support.

App Role	CRM	ERP	Billing	Data warehouse
Sales	Place order Register customer			
Invoicing			Post invoice	

- ArchiMate doesn't feature catalogs and matrices use for portfolio management

TOGAF artefact: App Communication Diagram

Application Component

Interfaces renamed as data flows
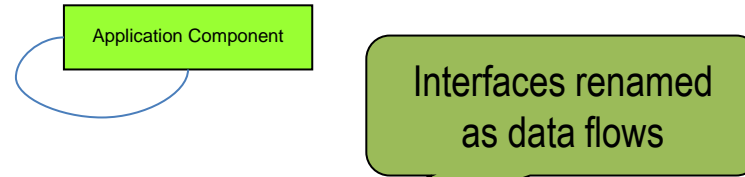
- App Communication Diagram
  - shows which apps communicate and what data passes between them
  - may associate data flows with data entities
  - may associate apps, via IS services, with business services
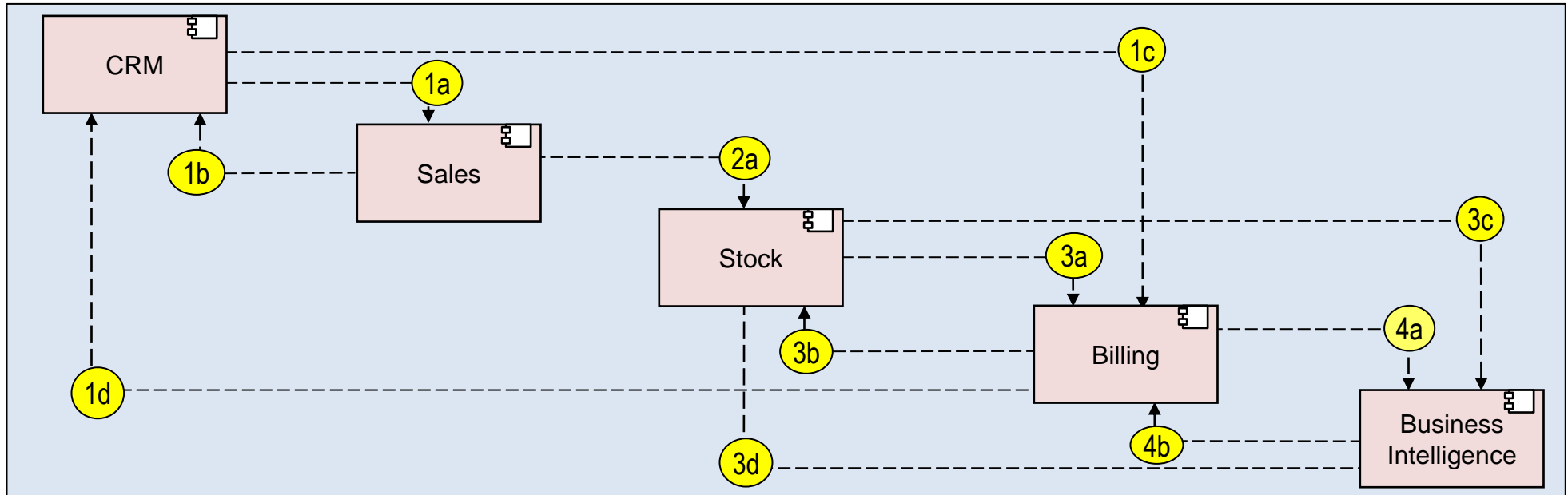 - logical, only shows data transport technologies where architecturally significant.

ABC Limited

Supplier

Customer

Business Apps Portfolio

ERP

DW-BI

CRM

Money handling

Salesman

Manager

BACS
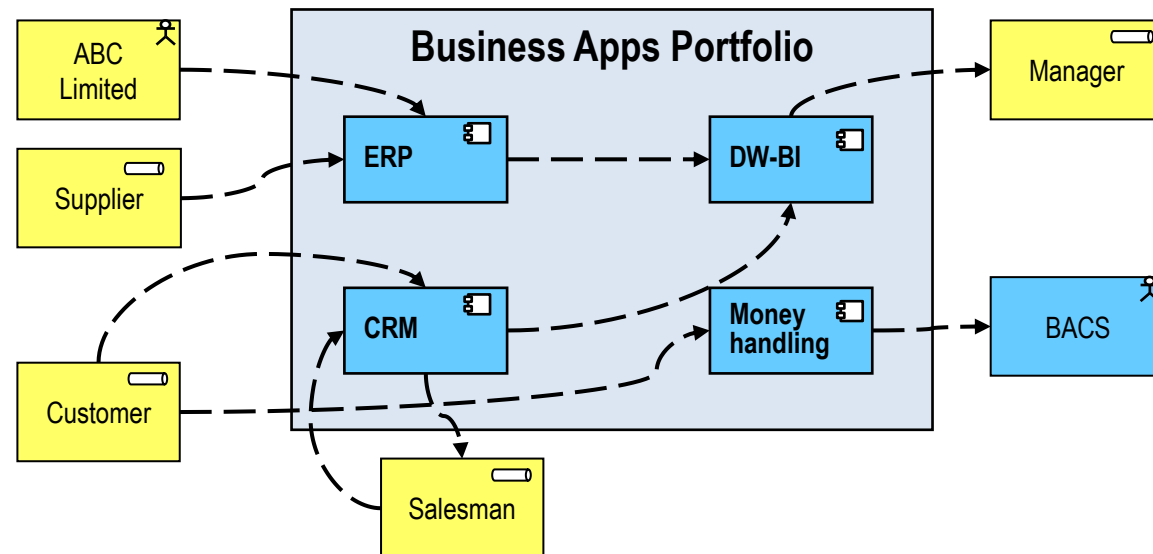
TOGAF supports the Diagram with an "interface" Catalog

Application Component

App Communication Diagram

N2 model, or Node Connectivity Diagram in FEAF

Interface (Aargh! Data Flow) Catalog

Data Flow id	Source App	Destination App	Data content	Trigger event
1a	CRM	Sales	Sales order request	New sales order
1b	Sales	CRM	Sales order confirmation	Order created in the Sales system
2a	Sales	Stock	Requisition	Subscribe/Publish timer

ArchiMate

Application Component

Front Office

Web Portal

CRM data

Legal Expense CRM System

customer data

call report

Call Center Application

General CRM System

call report

customer data

Back Office

Home & Away Financial Application

Home & Away Policy Administration

Auto Insurance Application

Legal Expense Back-Office System

Shared Service Center

document data

document data

document data

document data

document data

Document Management System

STRATEGIC DATA ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation		
Business		
Applications		
Data	Conceptual data Diagram Data Entity/Function Matrix App/Data Matrix Data Entity/Data Component Catalog Data dissemination Diagram	
Technology		

TOGAF artefact: Conceptual data Diagram

Business Data Entity

- Conceptual data Diagram (Better Catalog?)
  - The base artefact in strategic data architecture
  - provides the foundation for other artefacts
  - lists critical data entities within the enterprise
  - shows relationships between them. (TOGAF)

- ArchiMate information structure view
- – business/conceptual level
- (Aargh! Aggregates and compositions
- instead of properly named associations!)
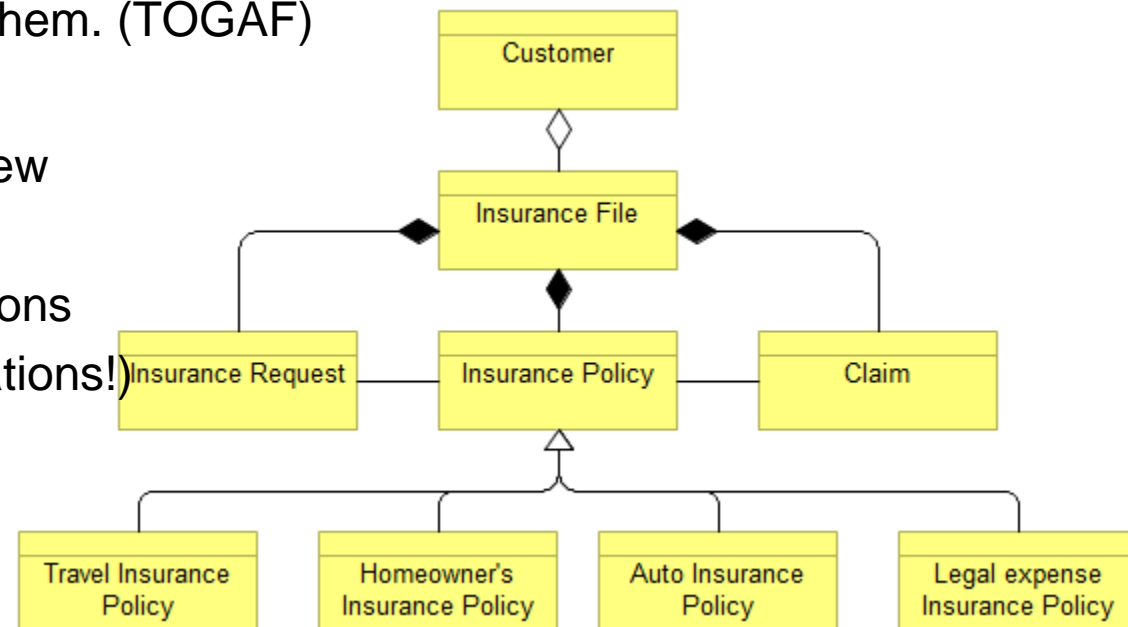
Customer

Insurance File

Insurance Request — Insurance Policy — Claim

Travel Insurance Policy | Homeowner's Insurance Policy | Auto Insurance Policy | Legal expense Insurance Policy

TOGAF artefact: Data Entity/Business Function Matrix

| Function |—| Business Data Entity |
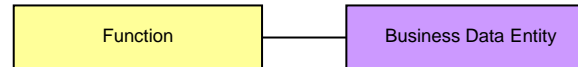
- Data Entity/Business Function Matrix
  - Shows which business functions create and use which data
  - Enables gap, cluster and impact analysis of a portfolio.
  - Asking which functions create and use an data entity reveals data entities that are essential or appear unused, and indicates where functions do or might exchange/share data.
  - Asking which entities each business function creates and uses reveals functions that use little data, and so might be better supported.
  - Supports data governance by data steward against data standards.

© Minder Chen, 1997-2008   **Figure 12-1**   **Enterprise Architecture**

One of the most traditional EA artefacts

- Read Function for Process, and note clustering on "Create"

KEY
C = creators of data   U = users of data

© Minder Chen, 1997-2008   **Figure 12-1**   Enterprise Architecture

TOGAF artefact: Data Entity/Data Component Catalog

Business Data Entity	—	Logical Data Entity	—	Logical Data Component

- Data Entity/Data Component Catalog
  - lists all data used across the enterprise, and the data components where data is stored.
  - encourages effective data sharing and re-use
  - enables the definition and app of information management and data governance policies

- ArchiMate doesn't feature catalogs and matrices use for portfolio management

TOGAF artefact: App/Data Matrix

Application Component	Logical Data Entity

- App/Data Matrix
  - shows which apps create, read, update and delete which data entities.
  - enables gap, cluster and impact analysis of a portfolio
  - asking which apps access a data entity reveals where the same data is use by different apps, and they do or might exchange/share data
  - asking which data entities are accessed by an app helps understanding of data entities and their lifecycles in the enterprise.
  - may classify data (master, reference, transactional, content, historic…)
  - may classify apps (transactional, batch, warehouse…)

Data Entity App	Customer	Order	Invoice	Payment
CRM	CRUD	CRUD	RUD	RD
CRM	RUD	RUD	CRUD	RD
Billing	RUD	CRUD	CRUD	RD
Data warehouse	RD	RD	RD	

Partial match in ArchiMate

Application Component	Logical Data Entity

- A hand made view: only a partial view of the App/data estate governed by EA (so not used for gap, cluster or impact analysis)
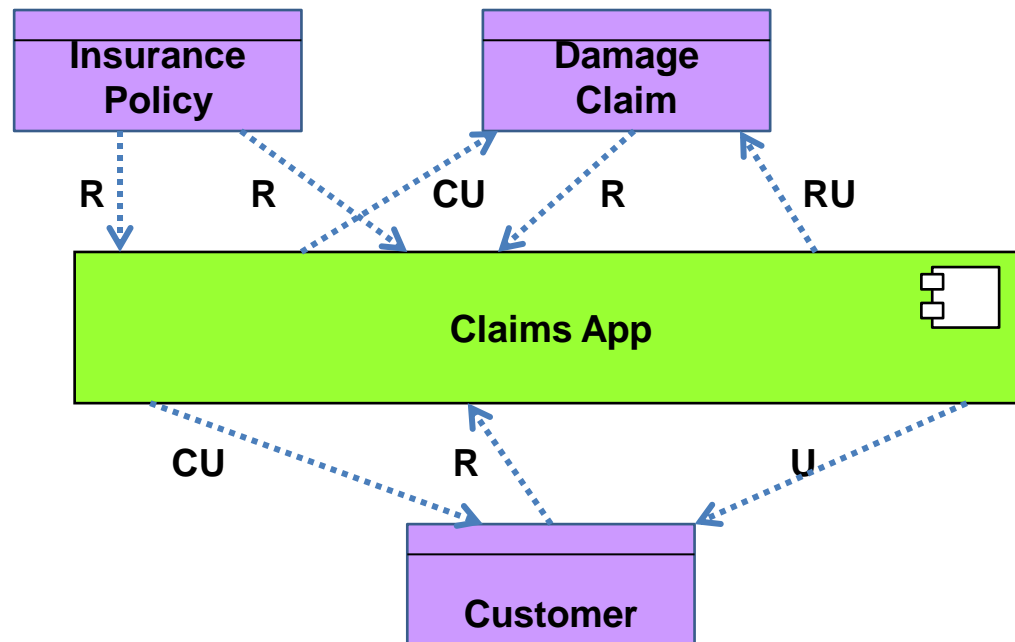
TOGAF artefact: Data Dissemination Diagram

Business Data Entity		Logical Data Entity		Application Component
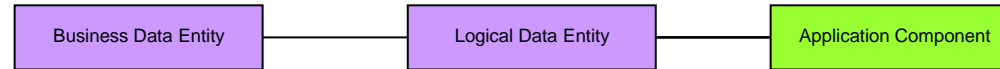
- Shows where business data entities are digitised in different applications
- Allows effective sizing to be carried out and the IT footprint to be refined.
- By attaching business value to data, an indication of the business criticality of apps can be gained.
- May show data replication and app ownership of the master reference for data…
- Can show several copies and the master-copy relationship between them.
- Can include services; that is, services encapsulate data and they reside in an app, or services that reside on an app and access data encapsulated within the app.

App 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.				

STRATEGIC TECHNOLOGY ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation		
Business		
Applications		
Data		
Technology	Technology Standards Catalog Technology Portfolio Catalog Technology Services Catalog (TRM) Technology/App Matrix	

TOGAF artefact: Technology Portfolio Catalog

- Technology Portfolio Catalog
  - the base artefact in strategic technology architecture
  - provides the foundation for other artefacts, and for management of technology lifecycles, versions and standards
  - lists all (logical and/or physical) technologies in the enterprise that are to be defined and governed
  - includes hardware and platform applications (aka system software)
  - should be classified using the headings in the TRM or similar
  - may be extended to name platform Technology Services provided

- ArchiMate doesn't feature catalogs and matrices use for portfolio management

Technology Service Catalog (aka TRM)

User Interface Services
- Graphical Client/Server services
- Display Objects services
- Window Management services
- Dialogue Support services
- Printing services
- Computer-Based Training and Online Help services
- Character-Based services

Transaction Processing Services
- Starting a transaction
- Co-ordination of recoverable resources in a transaction
- Committing or rolling back transactions
- Controlling timeouts on transactions
- Chaining transactions together
- Monitoring transaction status

Operating System Services
- Kernel Operations
- Command Interpreter and Utility services
- Batch Processing services
- File and Directory Synchronization

Software Engineering Services
- Programming Language services
- Object Code Linking services
- CASE Environment and Tools services
- Graphical User Interface (GUI) Building services
- Scripting Language services
- Language Binding services
- Run-Time Environment services
- App Binary Interface services

Graphics and Imaging Services
- Graphics services
- Graphical Object Management services
- Drawing services
- Imaging functions

Data Management Services
- Data Dictionary/Repository services
- Database Management System (DBMS) services
- OO Database Management System (OODBMS) services
- File Management services
- Query Processing functions
- Screen Generation functions
- Report Generation functions
- Networking/Concurrent Access functions
- Warehousing functions

Network Services
- Electronic Mail services
- Distributed Data services
- Distributed File services
- Distributed Name services
- Distributed Time services
- Remote Process (Access) services
- Remote Print Spooling and Output Distribution services
- Enhanced Telephony functions
- Shared Screen functions
- Video-Conferencing functions
- Broadcast functions
- Mailing List functions

OO Provision of Services
- Object Request Broker (ORB) services
- Implementation Repository services
- Installation and Activation services
- Interface Repository services
- Replication services
- Common Object services
- Change Management services
- Collections services
- Concurrency Control services
- Data Interchange services
- Event Management services
- Externalization services
- Licensing services
- Lifecycle services
- Naming services
- Persistent Object services
- Properties services
- Query services
- Relationship services
- Security services
- Start-Up services
- Time services
- Trading services

International Operation Services
- Character Sets and Data Representation services
- Cultural Convention services
- Local Language Support services

Data interchange services
- Document Generic Data Typing and Conversion services
- Graphics Data Interchange services
- Specialized Data Interchange services
- Electronic Data Interchange services
- Fax services
- Raw Graphics Interface functions
- Text Processing functions
- Document Processing functions
- Publishing functions
- Video Processing functions
- Audio Processing functions
- Media Synchronization functions
- Multimedia Processing functions
- Information Presentation and Distribution functions
- Hypertext functions

Location and Directory Services
- Directory services
- Special-Purpose Naming services
- Service Location services
- Registration services
- Filtering services
- Accounting services

Security Services
- System Entry Control services
- Security Management services
- Audit services
- Access Control services
- Non-Repudiation services
- Trusted Recovery services
- Encryption services
- Trusted Communication services

System and Network Management Services
- User Management services
- Configuration Management (CM) services
- Performance Management services
- Availability and Fault Management services
- Accounting Management services
- Security Management services
- Print Management services
- Network Management services
- Backup and Restore services
- Online Disk Management services
- License Management services
- Capacity Management services
- Software Installation services
- Trouble Ticketing services

TOGAF artefact: Technology/App Matrix

- Technology/App Matrix
  - Enables gap, cluster and impact analysis of a portfolio.
  - Asking which apps use a technology helps when a technology is going out of support or is to change.
  - Asking which technologies are used by an app may reveal interoperability and support implications.

- ArchiMate doesn't feature catalogs and matrices use for portfolio management

1. To support TOGAF's artefacts and principles (more comprehensive, coherent and consistent than some realise)
2. To simplify and clarify definitions of TOGAF's architecture artefacts
3. To distinguish EA artefacts from SA artefacts
4. To illustrate EA artefacts using ArchiMate where possible
5. To illustrate SA artefacts using ArchiMate where possible
6. To raise awareness of a few points
7. To generate a TOGAF meta model that is more demonstrably consistent with its artefacts

The ArchiSurance examples are the widely published ones created by Marc Lankhorst.

2nd the Solution Architecture / Capability change level

- TOGAF defines diagram artefacts, better suited to this level
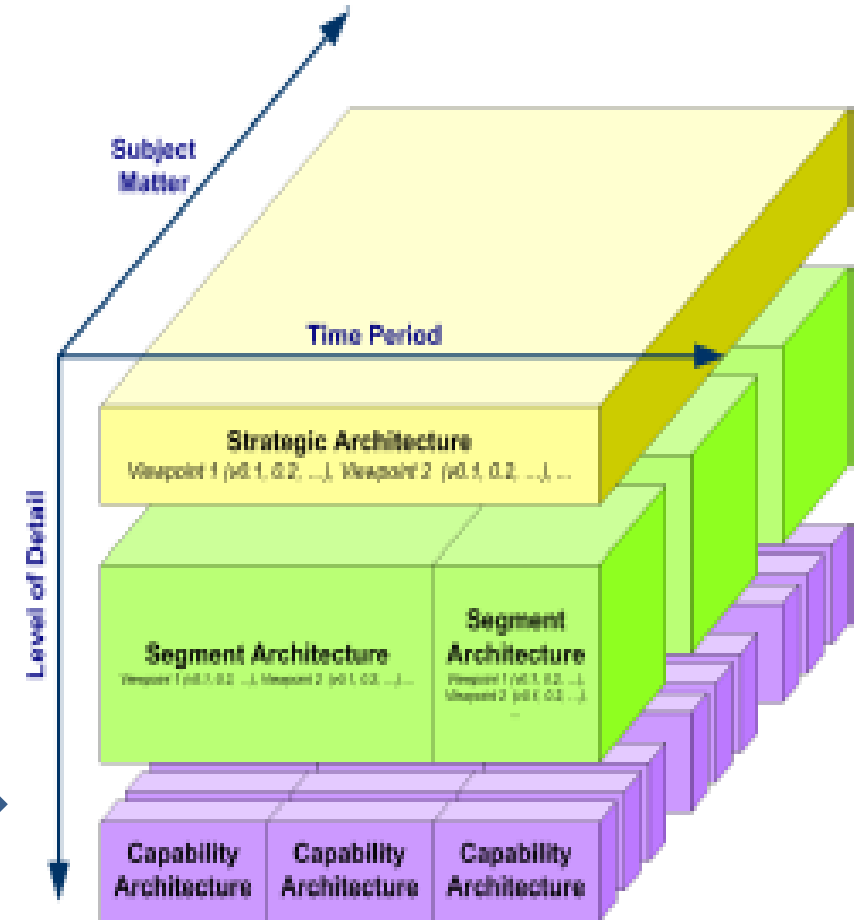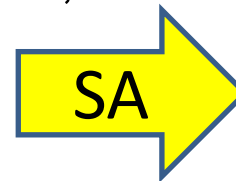
Solution level BUSINESS ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation	Referred to, refined and updated	Goal/Objective/Service Diagram
Business	Referred to, refined and updated	Process Flow Diagram Business Scenario Actor/Role Matrix Organization/Actor Diagram
Applications		
Data		
Technology		

Identify priorities for change

- Identify
  - Problems
  - Opportunities
- Envisage
  - New/changed business services
- Apply heat mapping techniques to the
  - Functional decomposition diagram
  - Node connectivity diagram
- Produce one or more "Requests for architecture Work"

Forward engineering principles

- Forward engineer from
  - aims to behaviors

  | Goal/Objective | ➡ | Service | ➡ | Process |

  - behaviors to structures

  | Process | ➡ | Roles | ➡ | Organization unit |

  - logical structures to physical structures

  | Roles | ➡ | Organization Unit |

TOGAF artefact: Goal/Objective/Service Diagram

Driver		Goal/Objective		Business Service

- Goal/Objective/Service Diagram
  - Given a vision of new/changed business services
  - this diagram shows which drivers, goals and objectives they support
  - It may group services supporting similar or related aims.
  - It indicates, at least qualitatively, what constitutes success for a service.

Driver	Goal	Objective	Service

ArchiMate

Driver	Goal/Objective	Business Service

- Hand made by
- Pieter Van Ostaeyen

Partial match in ArchiMate
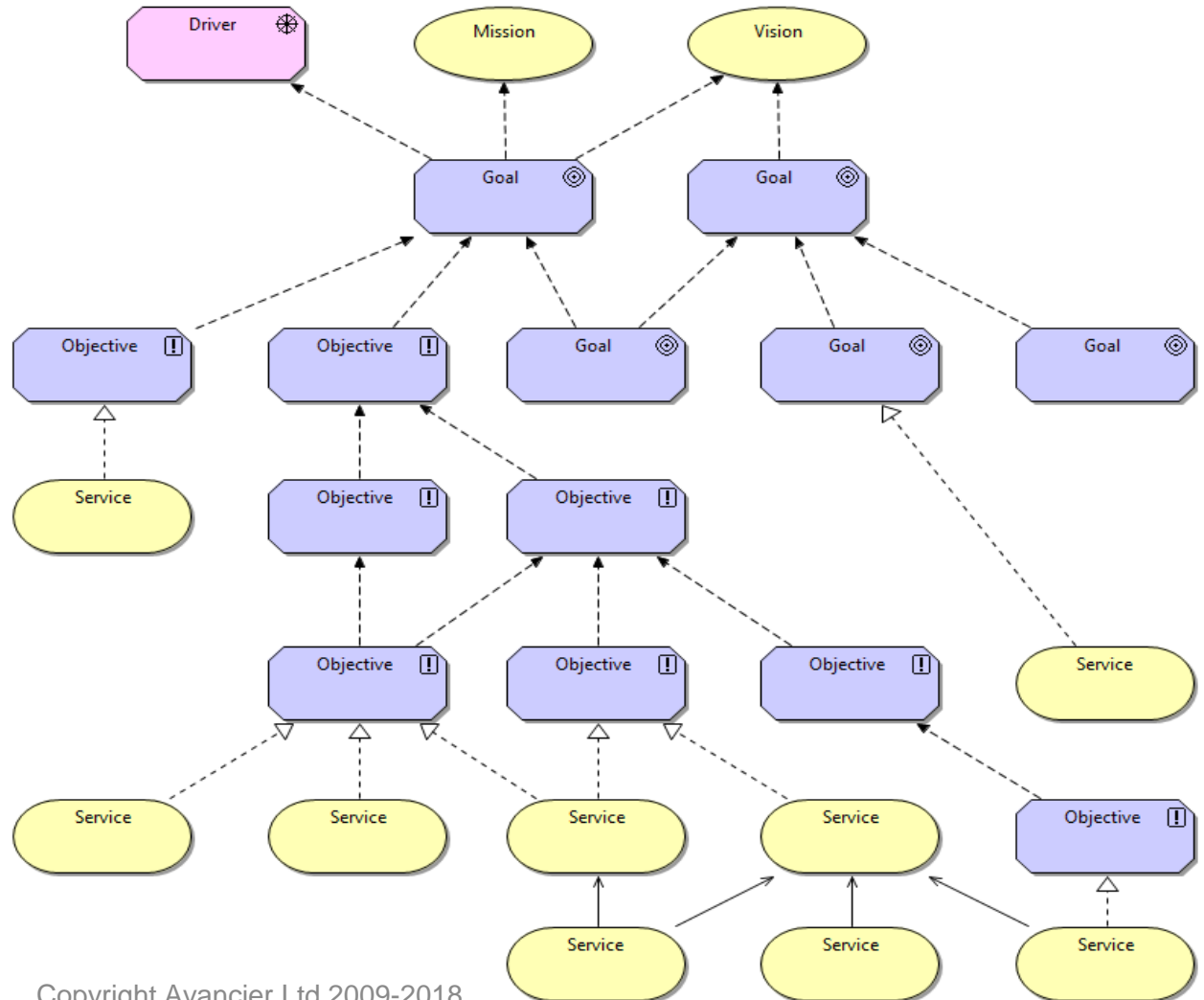
Driver	—	Goal/Objective	—	Business Service
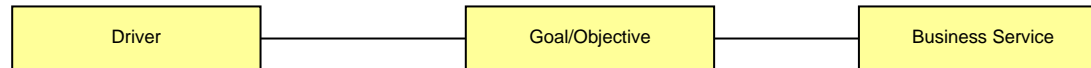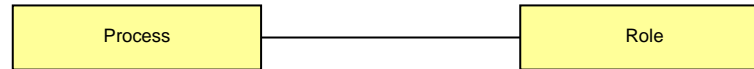
- A lower-level requirements realization view
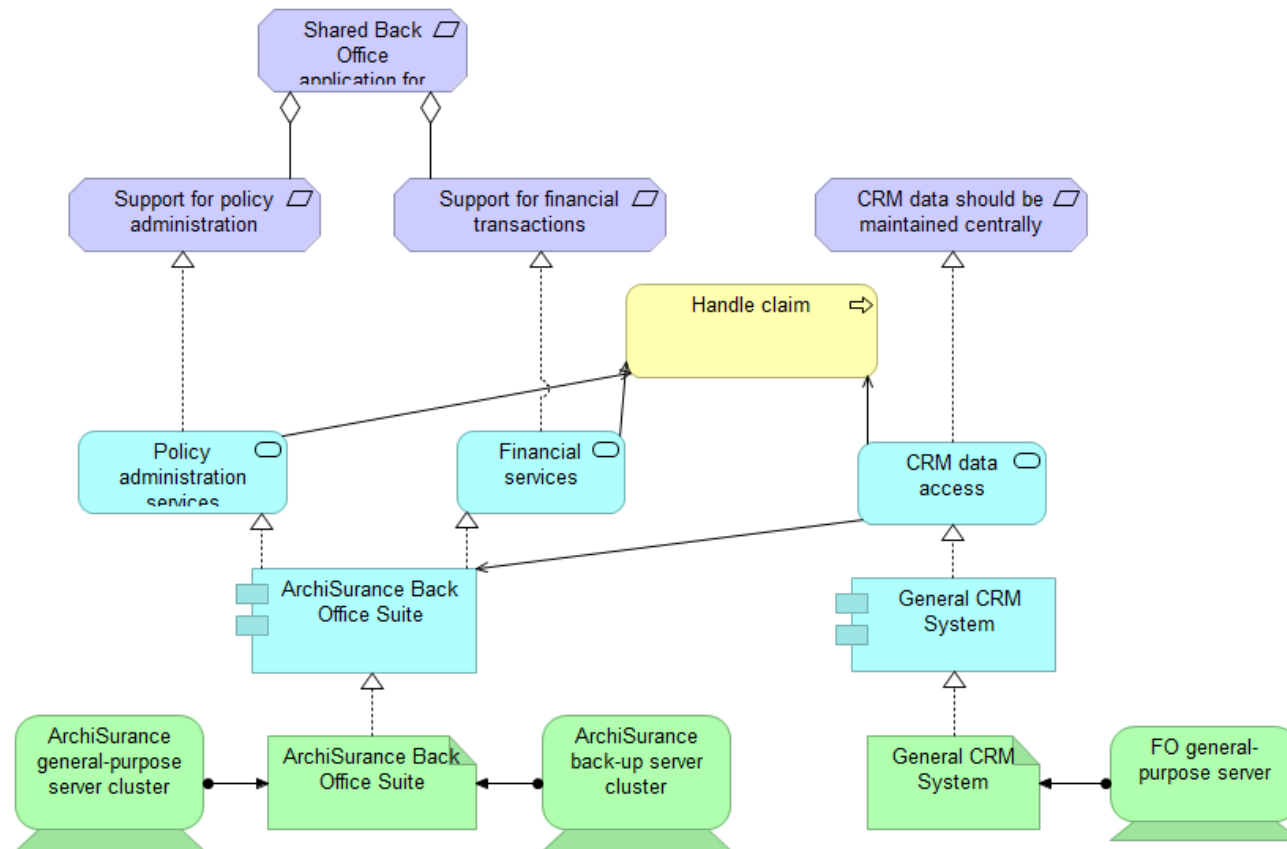
TOGAF artefact: Process flow Diagram

Process		Role

- Process flow Diagram (cf. value stream)
  - Given a product or service of value to be delivered
  - this presents the necessary activities/steps in sequence(s)
  - It may show
    - events that trigger processes,
    - outputs from processes, and
    - controls/rules (pre and post conditions).
  - may use swim lanes to represent owners, roles or resources associated with process steps
  - can help subject specialists to describe "how the job is done" for a particular function. .

can be composed or decomposed - from long/top to short/bottom
"the level and rigor of decomposition varies" (TOGAF)

Partial match in ArchiMate

- Two process flow views (not explicitly related the service)
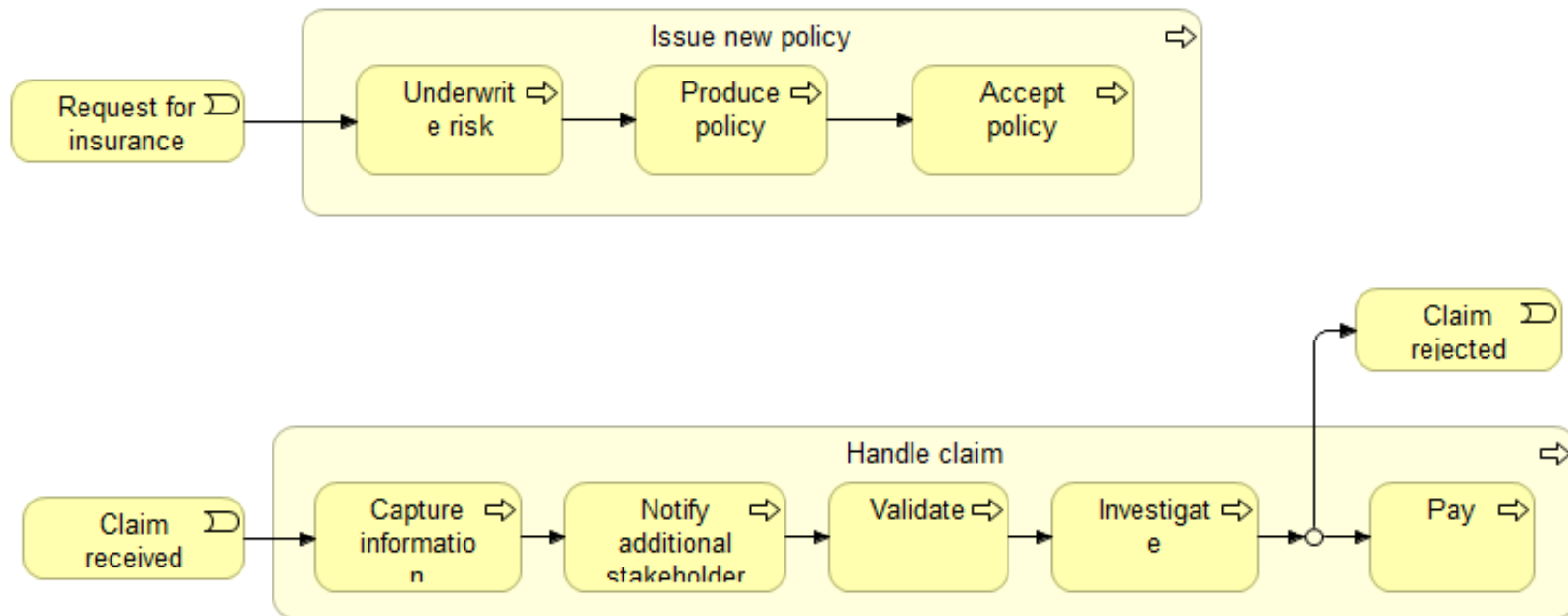
Processes can be composed or decomposed - from long/top to short/bottom
"the level and rigor of decomposition varies" (TOGAF)

Partial match in ArchiMate

- A process flow view
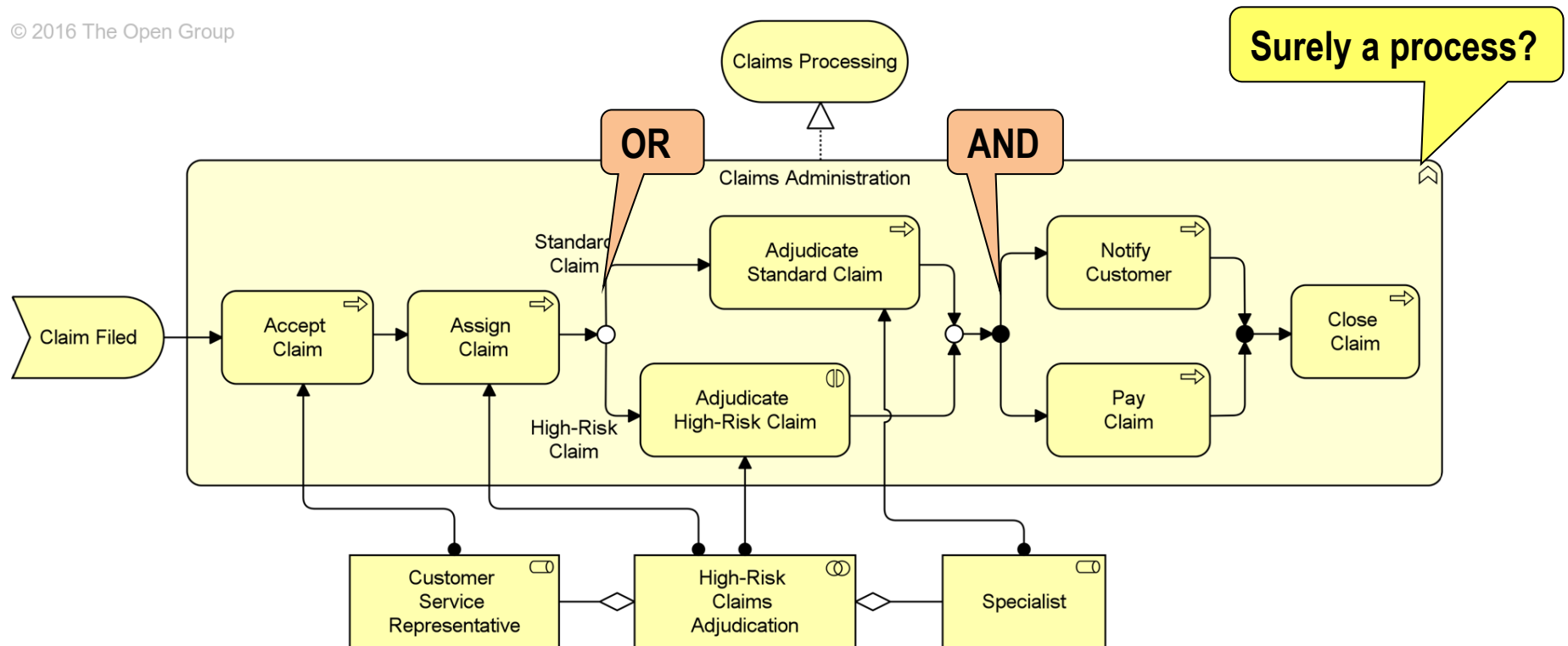
TOGAF promotes definition of Busines Scenarios

Process	Role	App/IS Service	Application Component

- Busines Scenario
  - documents the roles of
  - human and computer actors in a
  - process that leads to a measurable
  - business goal (via a product or service of value to be delivered)

Business scenario – example adapted from TOGAF 8

Process	Role	App/IS Service	Application Component
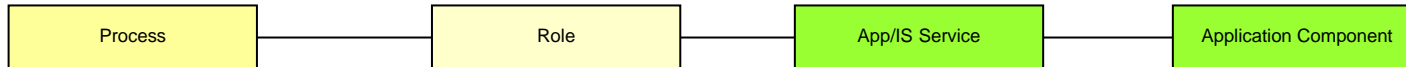
Precondition: Sales visit agreed and scheduled	Human roles		Computer roles	
Scenario process	**Customer**	**Sales**	**Lap top**	**Data centre Apps**
1 Initiate sales process with the customer	Open door	Greet customer		
2 Discuss customer requirements	Accept sales visit	Ask about requirements		
3 Work with customer to create a product configuration	Explain requirements and discuss options	Get product descriptions Assemble configurations	Use case Use case	Product Configurator
4 Verify desired configuration can be delivered	Select option based on capabilities	Check configuration availability	Use case	Inventory
	Confirm interest	Get delivery date and show	Use case	Scheduling
5 Determine price of requested configuration	Accept date	Price configuration and show	Use case	Pricing
6 Confirm customer desire to purchase	Accept price	Recap and ask for confirmation		
7 Place an order	Confirm purchase	Enter order details, get email reply Print out email, request signature	Use case	OMS
8 Capture customer signature	Sign	Confirm signature	Use case	OMS
Post condition: Order captured				

Partial match in ArchiMate

Process	—	Role	—	App/IS Service	—▷	Application Component

- Imagine combining this scenario drawn by Pieter Van Ostaeyen
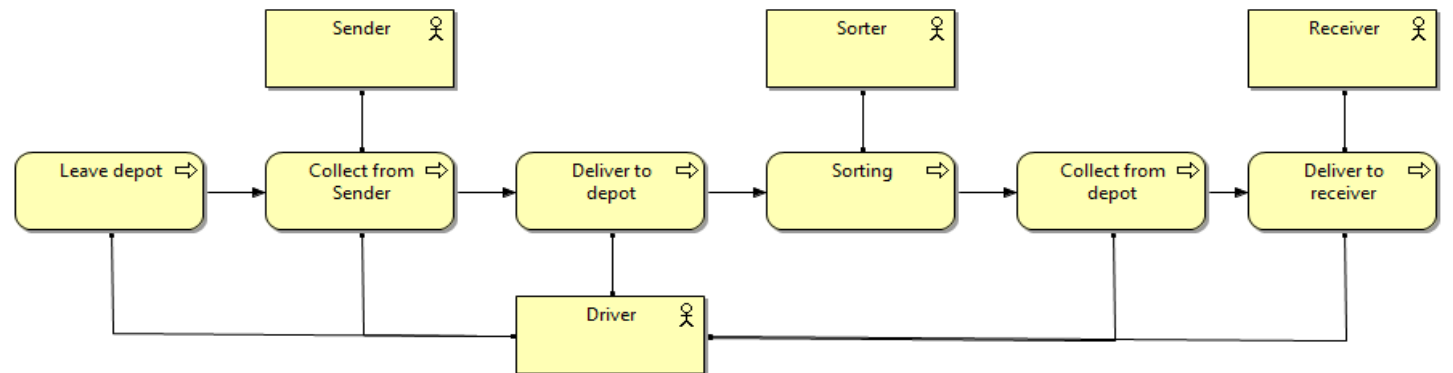
- With this process
- application realization
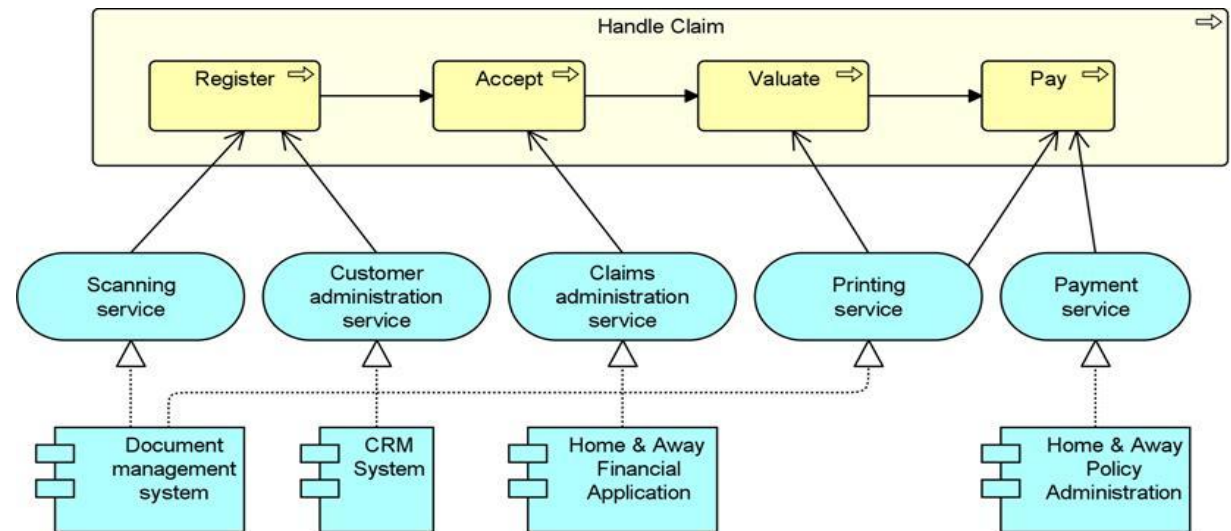
TOGAF artefact: Actor/Role Matrix
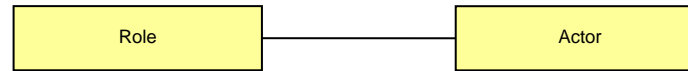
Role		Actor

- Actor/Role Matrix
  - shows which actors perform which roles
  - supports the definition of security and skills requirements.
  - supports the definition of user security settings and training needs,
  - helps in business change management.

Role Actor	A	B	C
P	Performs	Performs	
Q		Performs	Performs

TOGAF artefact: Organization/Actor Catalog
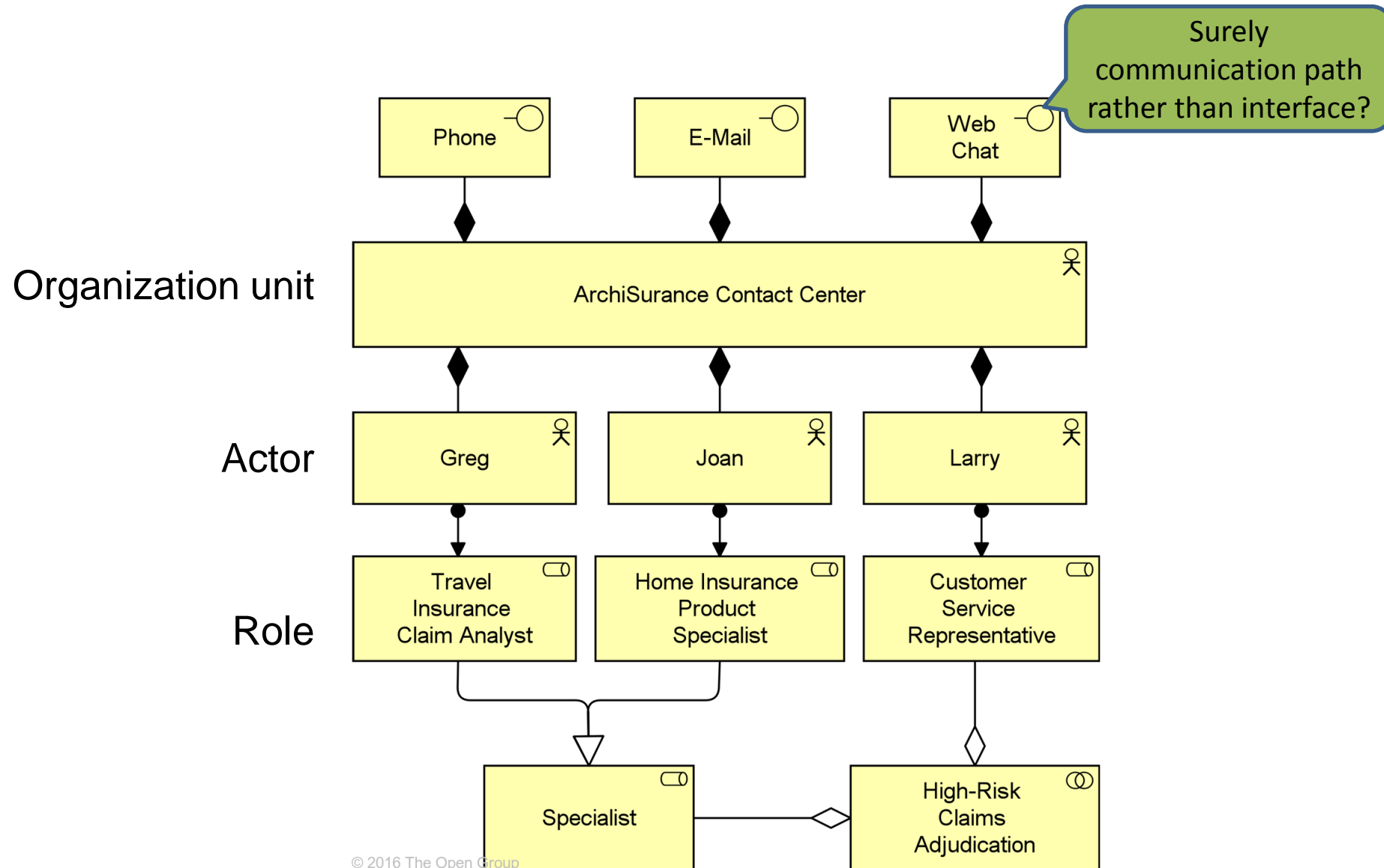
Actor	—	Organization Unit
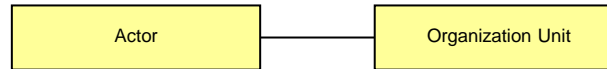
- Organization/Actor Catalog
  - Lists participants in business systems
  - Includes users and owners of IT systems.
  - Can be useful in testing requirements for completeness. For example, to identify which customer types need to be supported and any requirements for or restrictions on user types.

Org level 1	Org level 2	Org level 3	Location	Actor *

ArchiMate
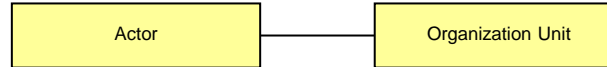
- Beware conflation of or confusion between organization unit and location

Solution level APPS ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation		
Business		
Applications	Referred to, refined and updated	Process App. Real. Diagram App Use Case Diagram App User Location Diagram Software Engineering D iagram Software Distribution Diagram
Data		
Technology		

TOGAF artefact: Process/App Realization Diagram

Process	App/IS Service	Application Component

- Process/App Realization Diagram
  - shows the sequence of events when multiple apps are involved in executing a business process.
  - augments the app communication diagram with sequencing constraints, and hand-off points between processes (perhaps transactional and batch)
  - may identify efficiency improvements to reduce traffic between apps
  - may identify complex sequences that can be simplified or rationalised – and so speed up the process.

ArchiMate

Process	App/IS Service	Application Component

- Simulation in ArchiMate of a UML Sequence Diagram

Process flow

Customer

Submit Claim

Receive Money

Customer Relations App

Process Claim

Claim Handling App

Assess Claim

Finance App

Pay Claim

Partial match in ArchiMate

Process	—	App/IS Service	—	Application Component

- An App usage view

A process step that may be assigned to a role and or a function

Handle Claim

Register → Accept → Valuate → Pay →

A use case

Scanning service

Customer administration service

Claims administration service

Printing service

Payment service

Document management system

CRM System

Home & Away Financial Application

Home & Away Policy Administration

An App providing two discrete services

TOGAF artefact: App Use-Case Diagram

App/IS Service	—	Application Component

- App Use-Case Diagram
  - Defines the scope of an application in terms of services provided to users – be they human actors or other apps
  - Like other diagrams, it can be annotated with more technical detail as architecture development proceeds
  - Each use case can be described separately – each being a behavior with entry and exit conditions, main path and extension paths, and non-functional qualities

Partial match in ArchiMate

App/IS Service —— Application Component

- An App usage view (again)

A process step at which two use cases are needed

A use case

Handle Claim

Register → Accept → Valuate → Pay

Scanning service

Customer administration service

Claims administration service

Printing service

Payment service

Document management system

CRM System

Home & Away Financial Application

Home & Away Policy Administration

An App providing two discrete services
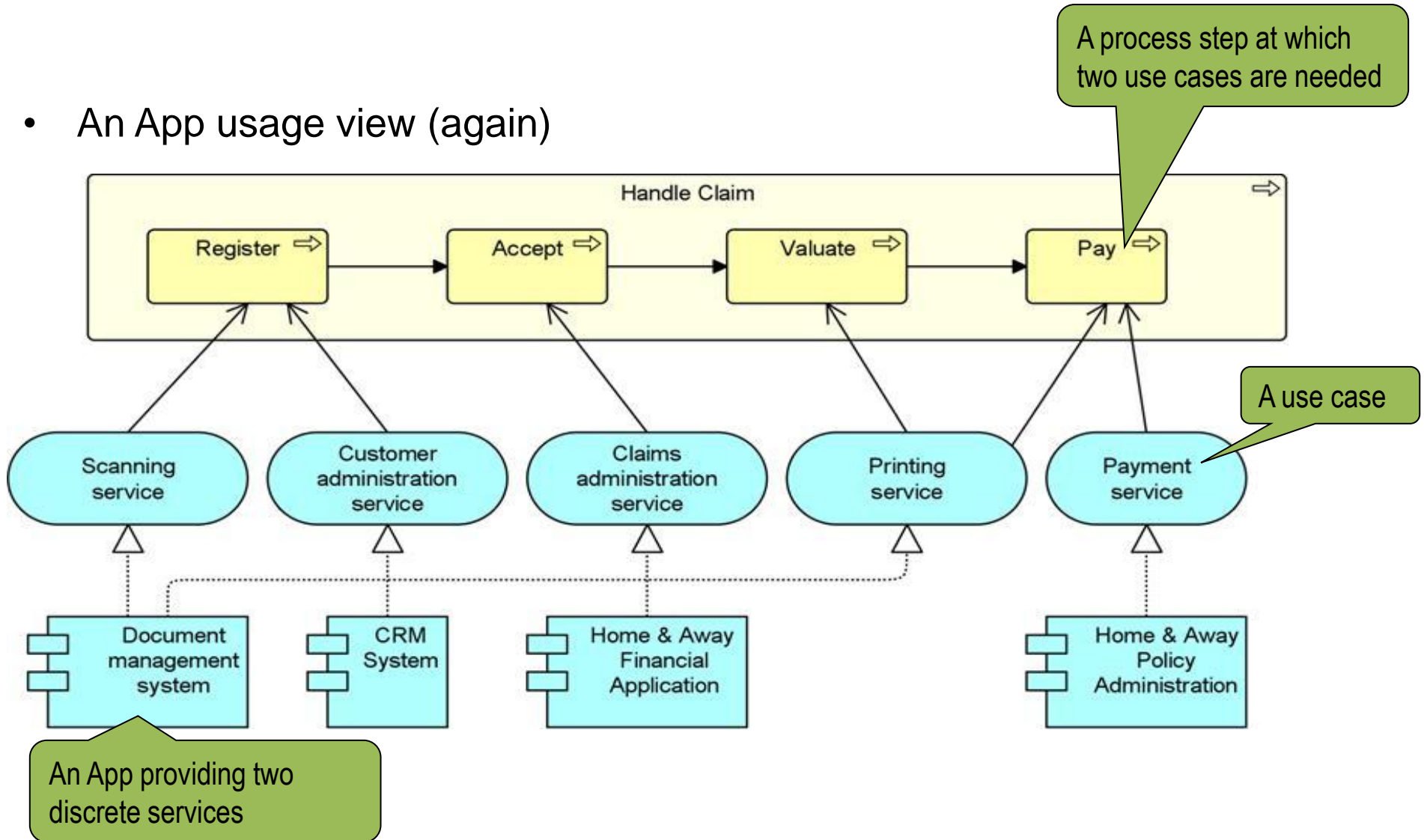
ArchiMate

App/IS Service —— Application Component

Hand made

One-Actor Role → ABC Limited

Use case: an app-enabled process that an external actor plays a role in

A role engaged in the use case process → Manager

Supplier

Record goods receipt

Report monthly

One-Actor Role → BACS

Supplier

Record goods delivery

Settle payment

Driver
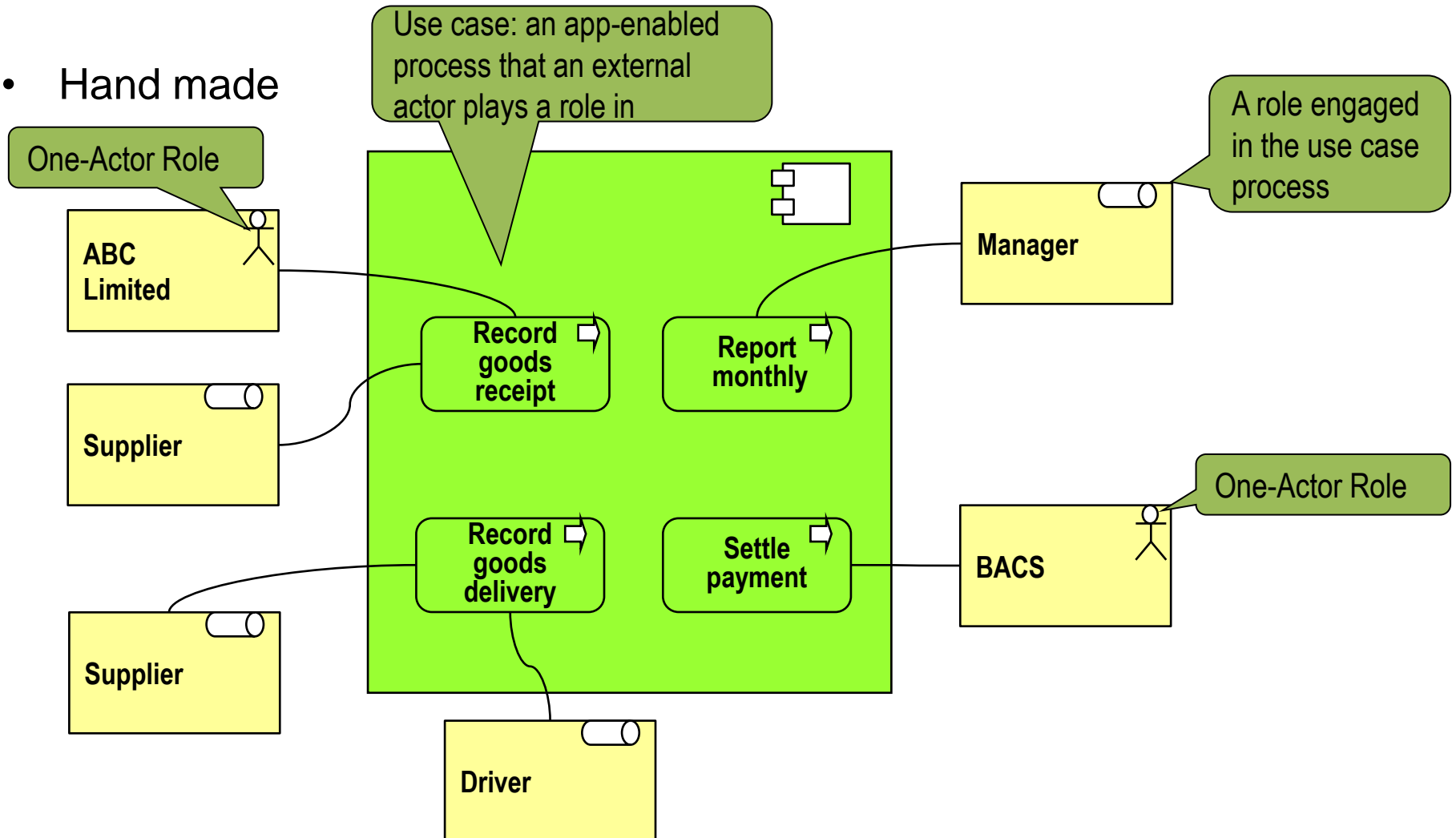
TOGAF artefact: App and User Location Diagram

Application Component	—	Location

- App and User Location Diagram
  - shows where apps are used by end users
  - may also show where apps are
    - hosted, executed and/or delivered to client devices
    - developed, tested, and released; etc.
  - may reveal duplications, gaps or opportunities for rationalization
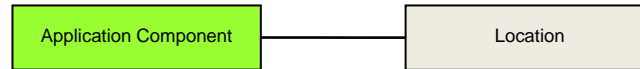
Weak match in ArchiMate

- This App Cooperation view?

ArchiMate

| Application Component | — | Location |

Customer location (where 1,000 salesman work)

Laptop

Salesman

Drawing App

Ordering App

Printer

PAN

WAN

LAN

Product Management

Order Management

HQ location
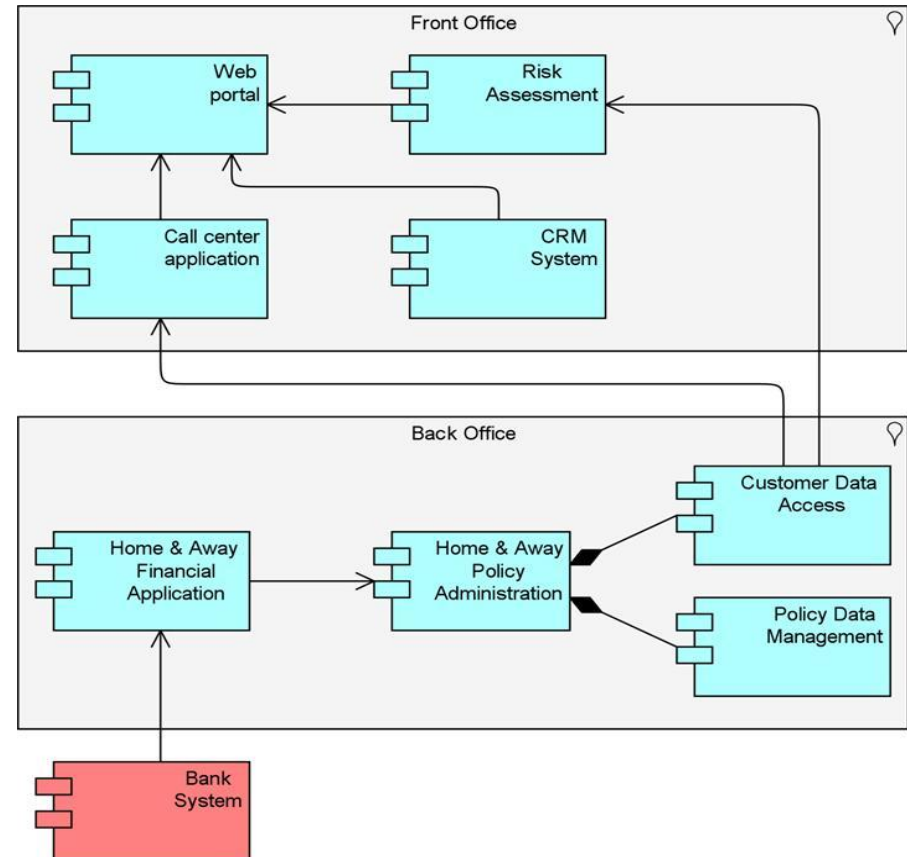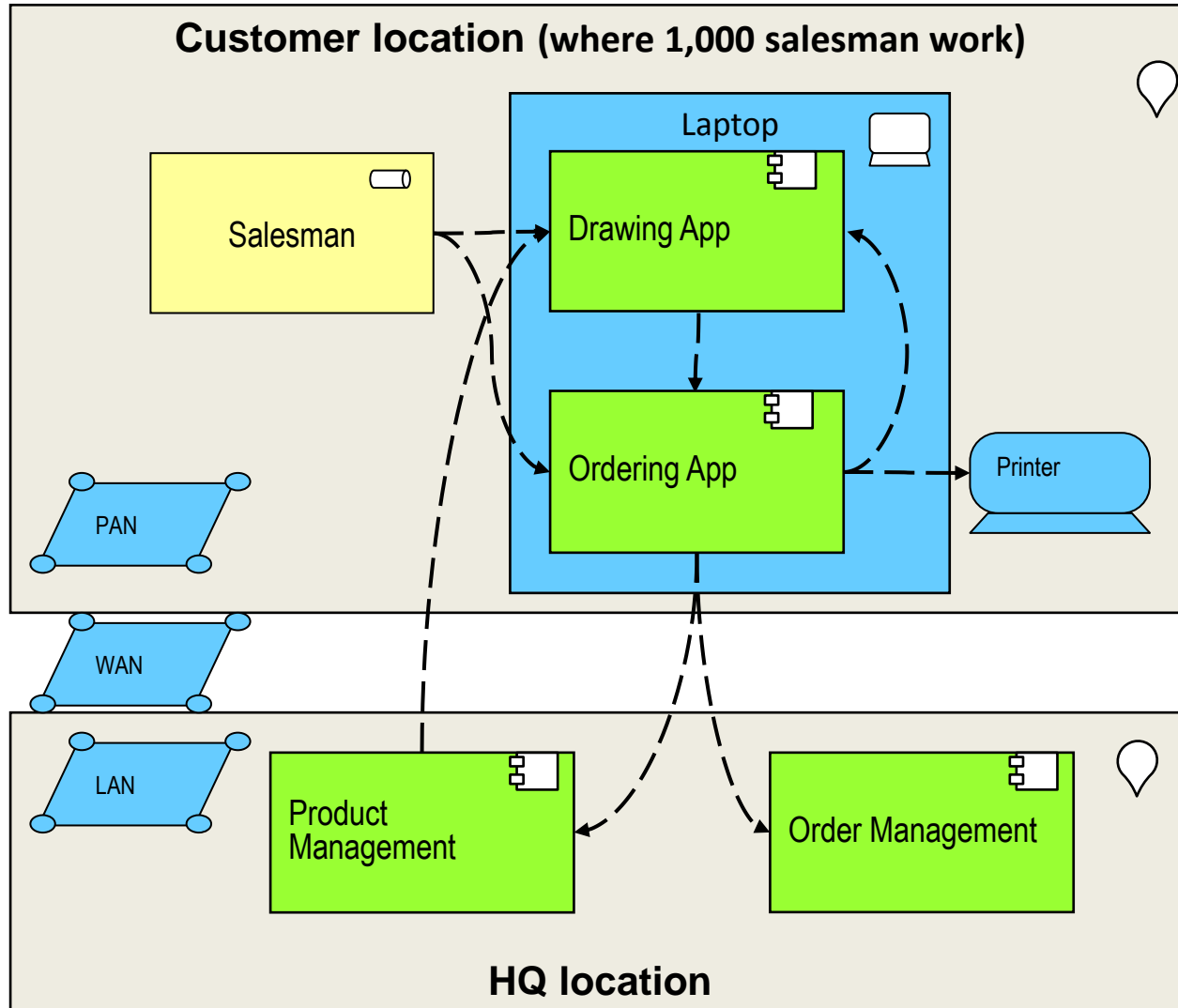
TOGAF artefact: Software Engineering Diagram

Application Component
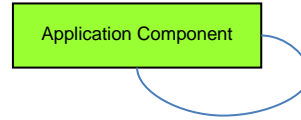
- Software Engineering Diagram
  - breaks apps into packages, modules, services, and operations from a development perspective.
  - enables more detailed impact analysis when planning migration stages, and analyzing opportunities and solutions.
  - helps app development and management teams when managing complex development environments.

Possible match in ArchiMate?

Application Component

- An App Behavior view?

A kin to a use case header

Aargh! Operation shown using function symbol!

Policy Creation Service

Service realised by Process

Home & Away Policy Administration

Policy Creation

| Calculate Risk | Calculate Premium | Create Policy | Store Policy |

Function accesses data

Transition arrow

Insurance Request Data

Insurance Policy Data

Customer File Data
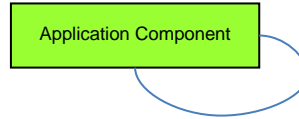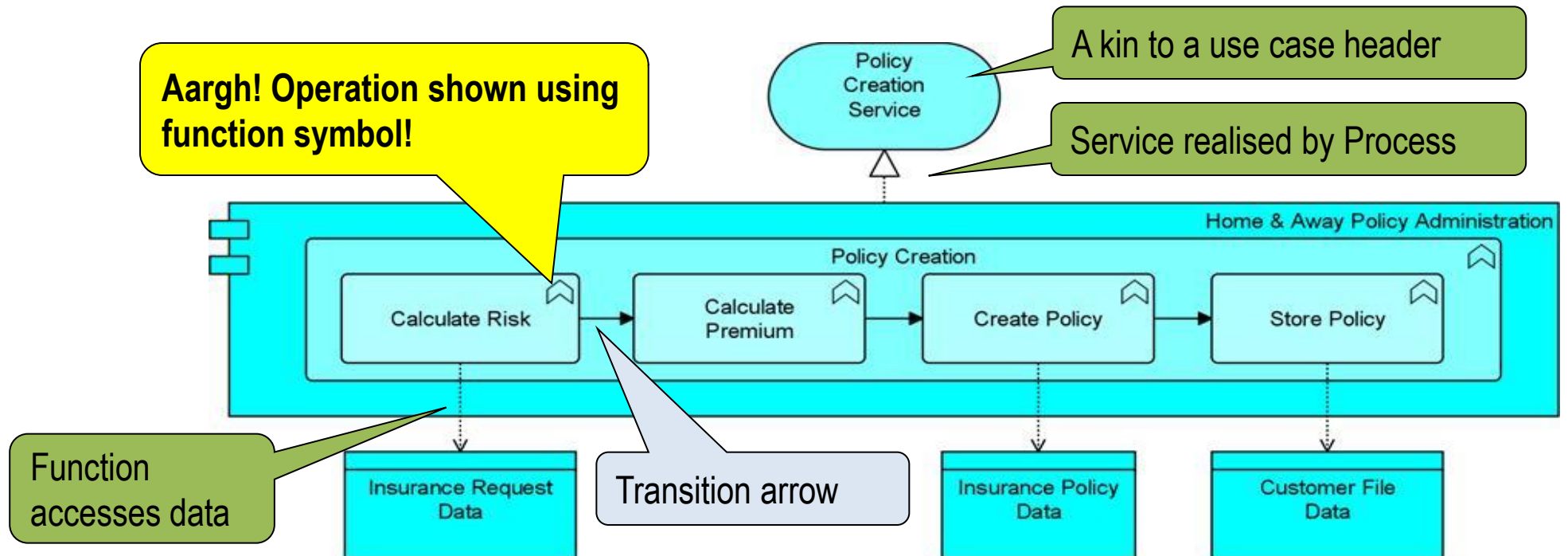
TOGAF artefact: Software Distribution Diagram

- Software Distribution Diagram
  - shows how app software is structured and distributed across the estate.
  - useful in systems upgrade or app consolidation projects.
  - shows how physical apps are distributed across physical technology and the location of that technology.
  - enables a clear view of how the software is hosted
  - enables managed operations staff to understand how that app software is maintained once installed.

- *Seems indistinguishable from several Technology artefacts to follow*
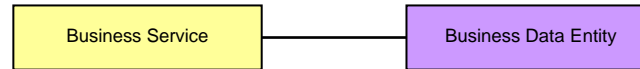
Solution level DATA ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation		
Business		
Applications		
Data	Referred to, refined and updated	Business Service/Info Diagram Logical Data Diagram Data Security Diagram Data Lifecycle Diagram Data Migration Diagram
Technology		

TOGAF artefact: Business Service/Information Diagram

| Business Service |—| Business Data Entity |

- Business Service/Information Diagram
  - shows the information needed by one or more business services.
  - shows what data is consumed or produced by a business service and may also show the source of information.
  - shows an initial representation of information created and used, which can be elaborated and refined in Phase C: Data Architecture

Information needed	Customer account	Sender address	Receiver address	Depot address	Package description	Package status	Journey route
Business services							
Order delivery	Use	Create	Create	Use	Create	Initialise	
Collect from sender		Use	Use	Use	Use	Update	Use
Deliver to depot					Use	Update	
Sort in depot			Use			Update	
Collect from depot						Update	Use
Deliver to receiver						Update	

Partial match in ArchiMate

Business Service	Business Data Entity

- A Business Process View
- Here, maps data to process, rather than the service

This access arrow shows direction of flow (not access)

Transition arrow

Insurance Policy

Damage Claim

Claim Form

read   read

create/ update

read   read/update

Handle Claim

Damage Occurred → Register → Accept → Valuate → Pay

create/ update

read

update

Customer File

Note: process rather than the function symbol often used in the App layer
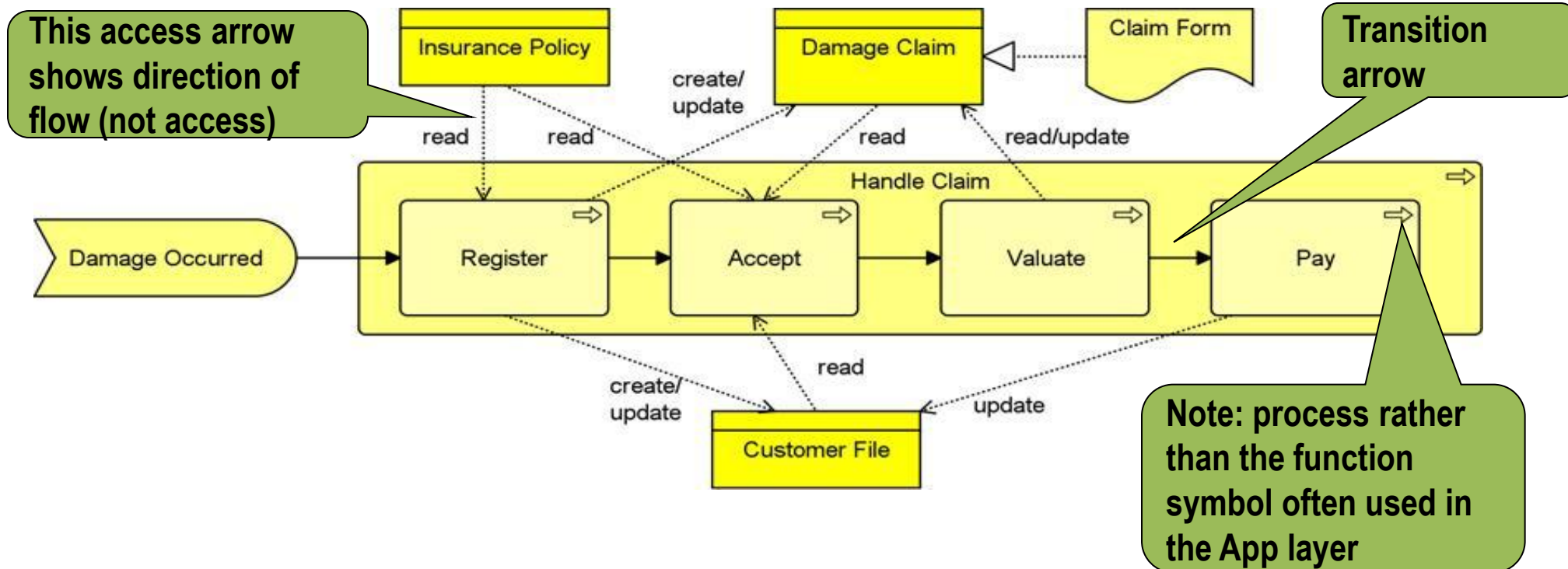
TOGAF artefact: Logical data Diagram

Logical Data Entity —— Logical Data Component
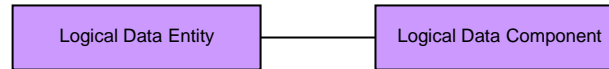
- Logical data Diagram
  - Shows a logical view of the relationships between data entities within a data store - to assist application developers and database designers.

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

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Auto Insurance Quotation

Online Insurance Quotation

Travel Insurance Quotation

Quoted Price

Terms and Conditions

Certificate of Authenticity

Purchased Itinerary
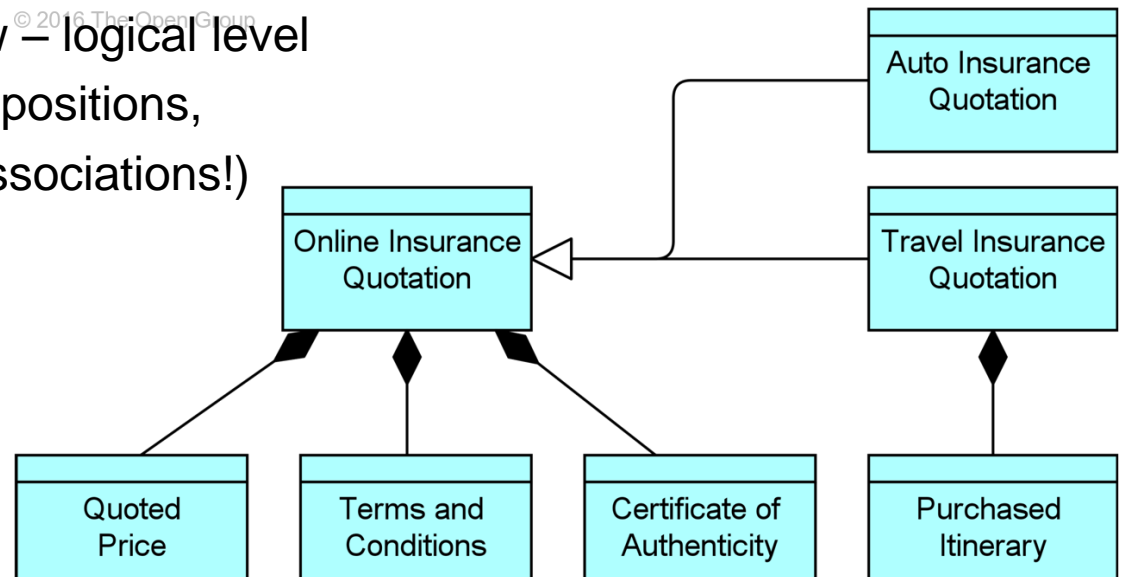
Logical Data Diagram

- 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

Part of the Salesforce.com model
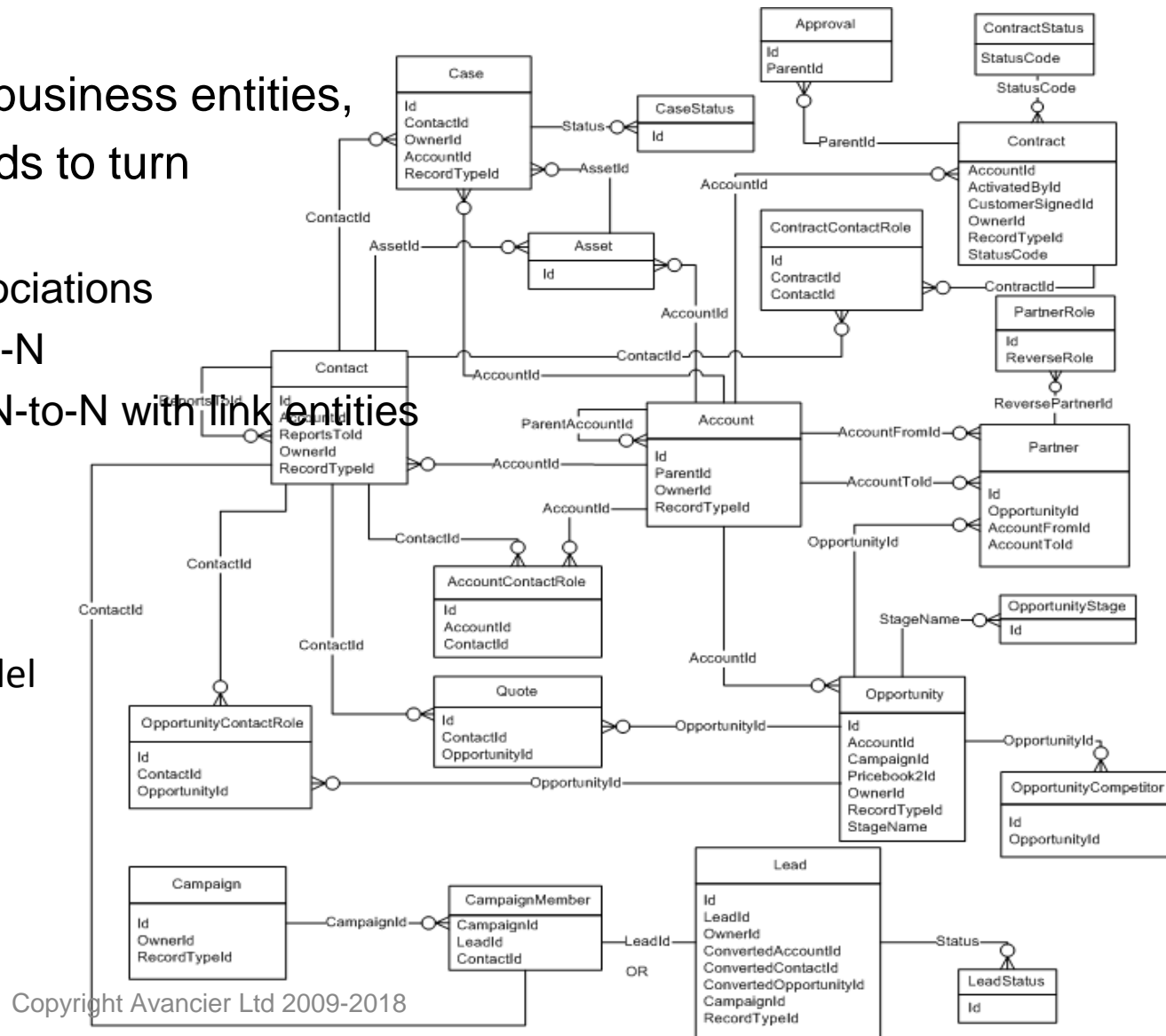
Logical Data Diagram

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

Parent Acc

Account

From | To — Reports To

Campaign — Opportunity — Contact — Contract

Campaign Member — Partner — Quote — Contact Opportunity Role — Asset — Contact Account Role — Contact Contract Role — Approval

Lead — Partner Role — Opportunity Competitor — Opportunity Status — Case — Contact Status

Lead Status — Case Status

Two dozen 1-to-N associations
One 1-to-0 or1 association
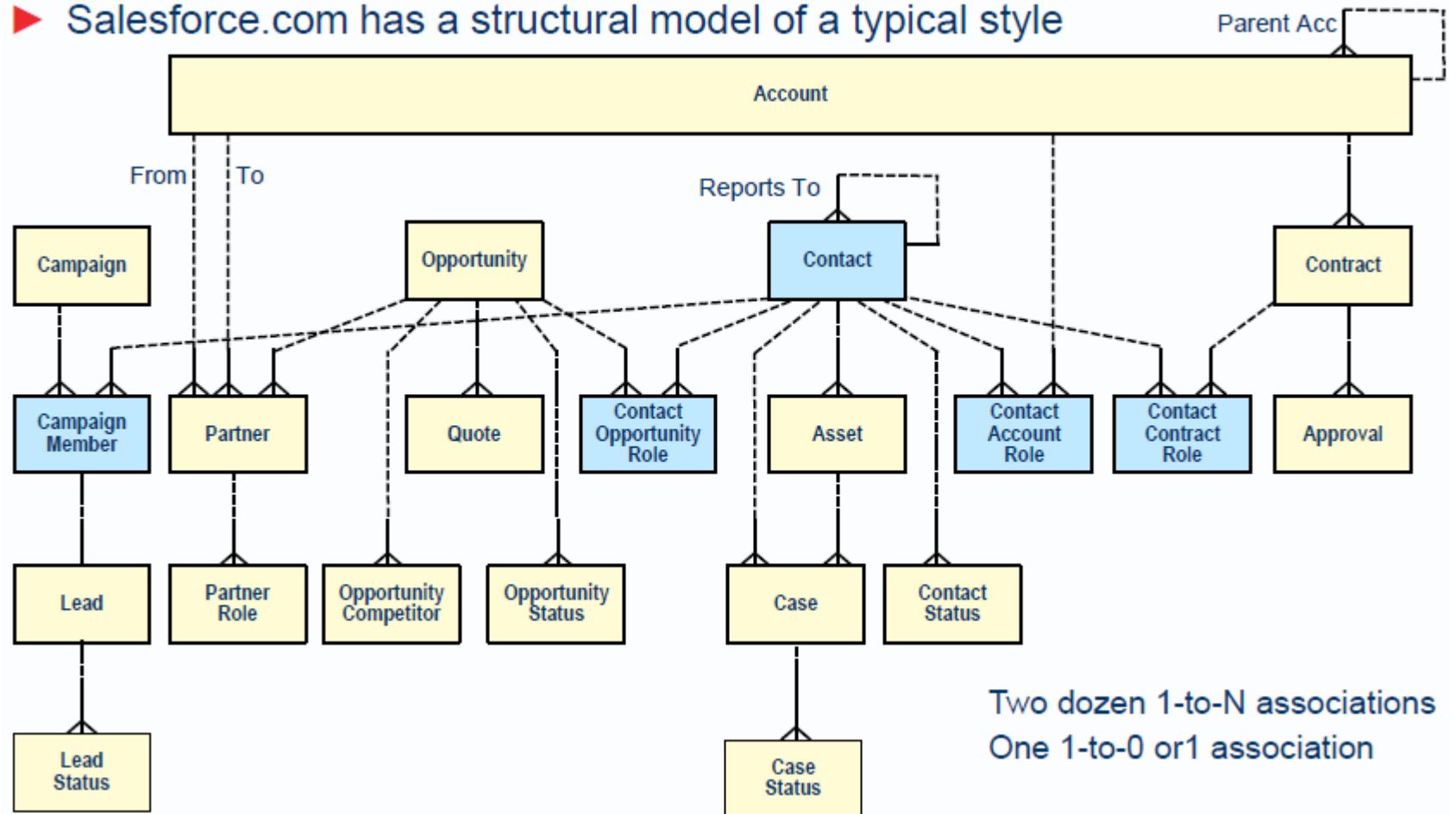
TOGAF artefact: Data security Diagram

| Logical Data Entity |———| Role |
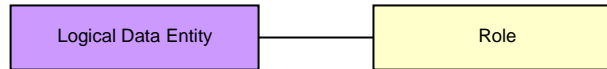
- Data Security Diagram
  - Shows which actors (people, organizations, or systems) can access which data entity – in a diagram or matrix
  - May be needed to demonstrate compliance with data privacy laws and regulations (HIPAA, SOX, etc).
  - May indicate trust implications where parties outside the enterprise have access to data

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		

Data quality scoring scheme

- 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

TOGAF artefact: Data Lifecycle Diagram

- Data Lifecycle Diagram
  - Shows the life cycle of a data entity from creation to disposal.
  - Shows the events and rules that trigger each state change.

UML State Chart

First State

State — Event → State

Last State

Product Lifecycle diagram

Registration

In assembly

Completion

In stock

Loan

With customer

Return

Renew

Disposal

Scrapped
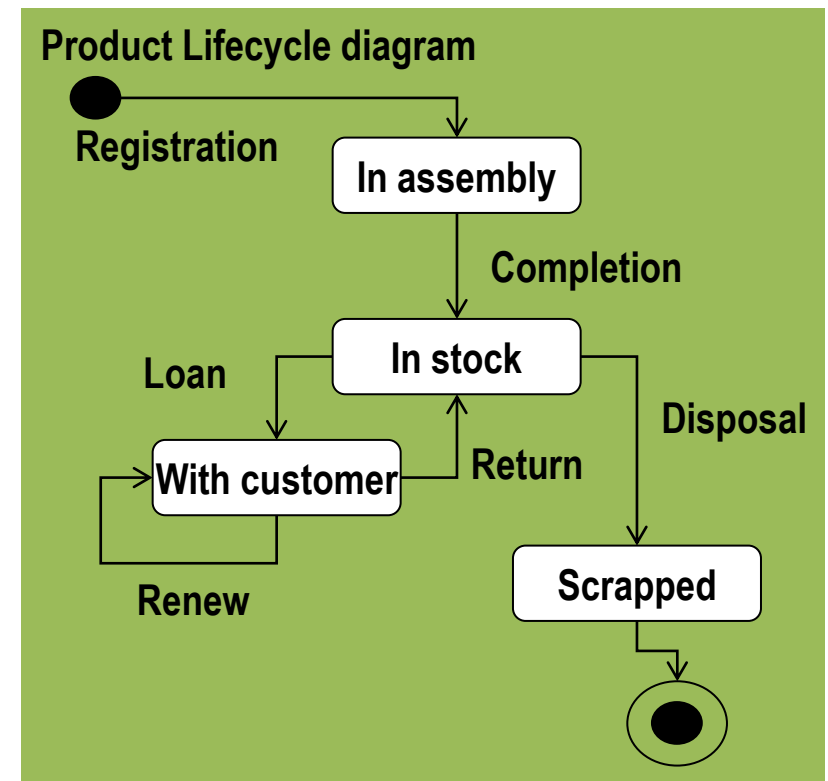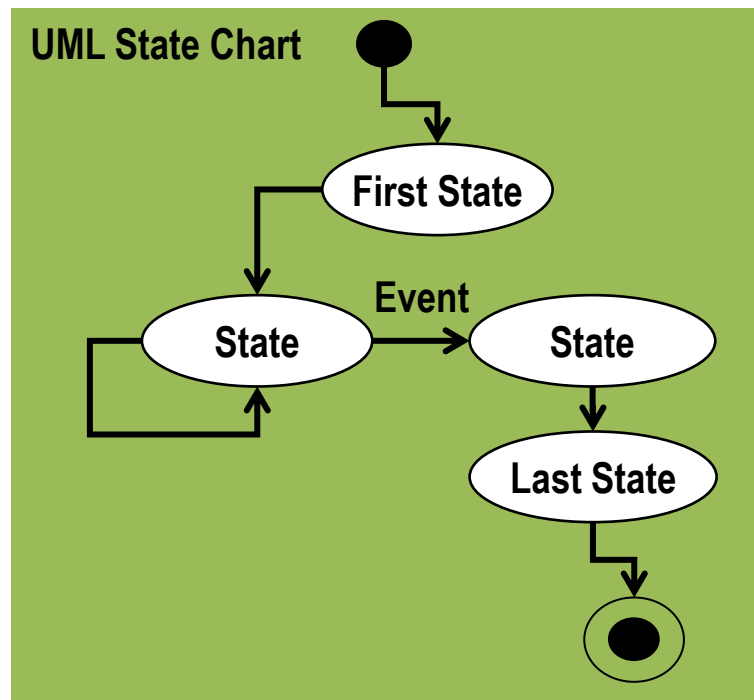
Data Lifecycle Diagram v Process Flow Diagram

Data Lifecycle

Record → Recorded → Send App Form → App Form Sent → Receive App Form → App Form Received → Send For Approval → Sent for Approval → Approve → Approved → Activate → Live → Event

Receive App Form → App Form Returned → Return → App Form Received

Process Flow

Record Enquiry → Send Application Form → Receive Application Form → [No errors] → Send For Approval → Approve Application → Activate Account

Receive Application Form → [Errors] → Return for Correction

Check Credit Rating → Check Nationality → Approve Application

TOGAF artefact: Data Migration Diagram

- Data Migration Diagram
    - Shows data flows from source(s) to the target(s)
    - Supports audit and traceability of data
    - Can range from a landscape overview or to data item level movements
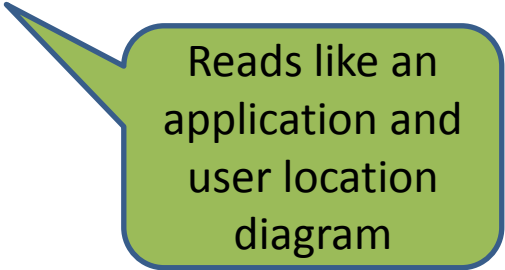
Solution level TECHNOLOGY ARCHITECTURE

	Enterprise Strategy and Portfolio level	Solution or Capability Increment level
Motivation		
Business		Location
		Application Catalog *Location Catalog*
		Physical App Component
Applications		*Software Distribution Diagram*
		App/Technology Matrix
		Environments & Locations Diagram
		Processing Diagram
		Networked Computing/Hardware Diagram
		Communications Engineering Diagram
Data		Physical Technology Component
Technology	Referred to, refined and updated	Environments and Locations Diagram
		Networked Computing/Hardware Diagram
		Communications Engineering Diagram
		Processing Diagram
		Platform Decomposition Diagram

TOGAF artefact: Environments and Locations Diagram

Reads like an application and user location diagram

- Environments and Locations Diagram
  - shows which locations host which apps
  - identifies what technologies and/or apps are used at which locations, and finally
  - identifies the locations from which business users typically interact with the apps.
  - should also show the existence and location of different deployment environments, including non-production environments, such as development and pre production.

ArchiMate

- A Technology view (note locations)

ArchiMate

Home & Away headquarters

Front Office

FO web hosting server
- Web Portal

FO general-purpose server
- Call Center Application
- General CRM System
- Legal Expense CRM System

Home & Away

Homeowner's & Travel Back Office

ArchiSurance general-purpose
- Home & Away Financial Application
- Home & Away Policy Administration

ArchiSurance WAN

LegallyYours headquarters

Legal Expense Back Office

Legal Expense general-purpose server
- Legal Expense Back Office System

PRO-FIT headquarters

Auto Back Office

Auto general-purpose server
- Auto Insurance Application

PRO-FIT LAN

Shared Service Center

Document management server
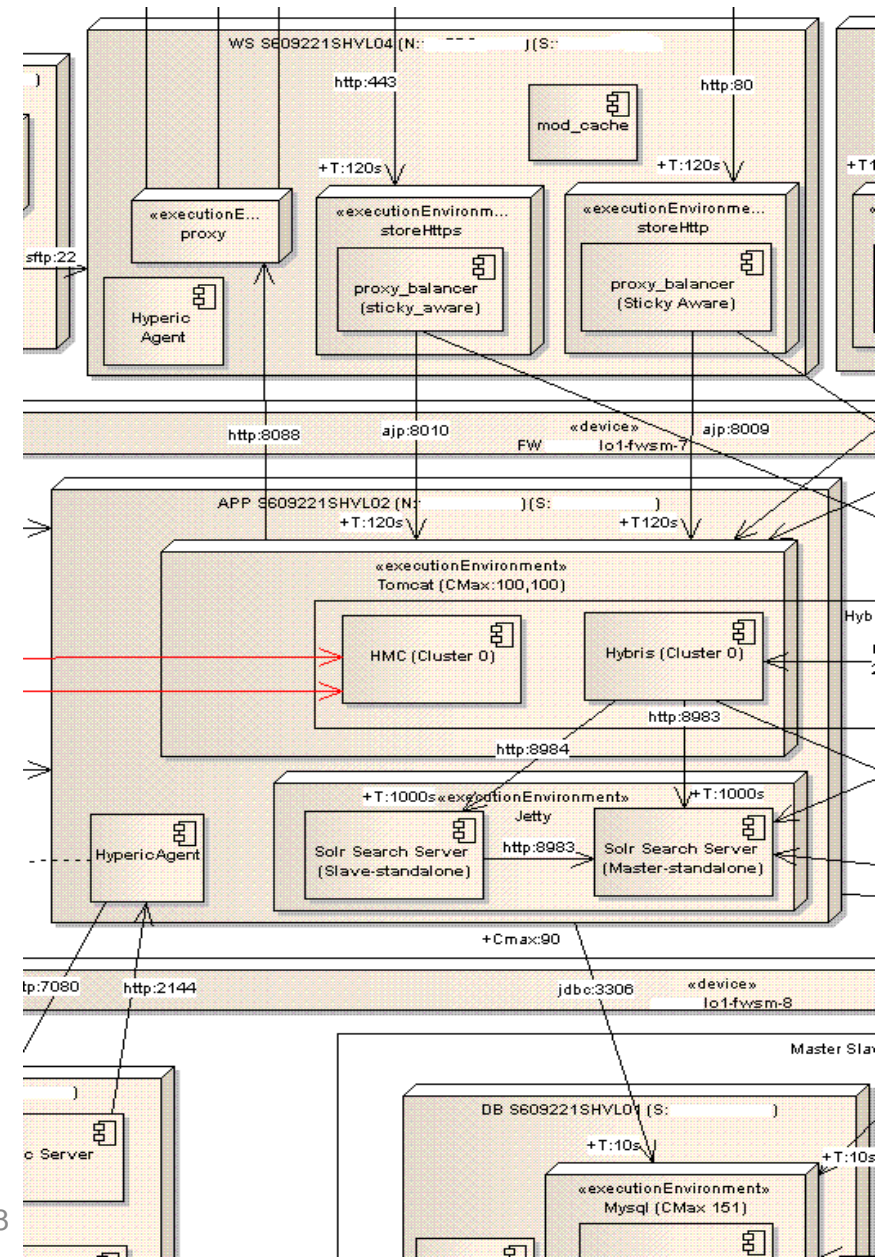- Document Management System

TOGAF artefact: Networked Computing/Hardware Diagram

- Networked Computing/Hardware Diagram
  - Commonly defines layers in a client-server stack, such as:
    - Client devices
    - Web server layer
    - App server layer
    - Data server layer.
  - May define infrastructure shared by several apps.

ArchiMate

- Implementation and Deployment
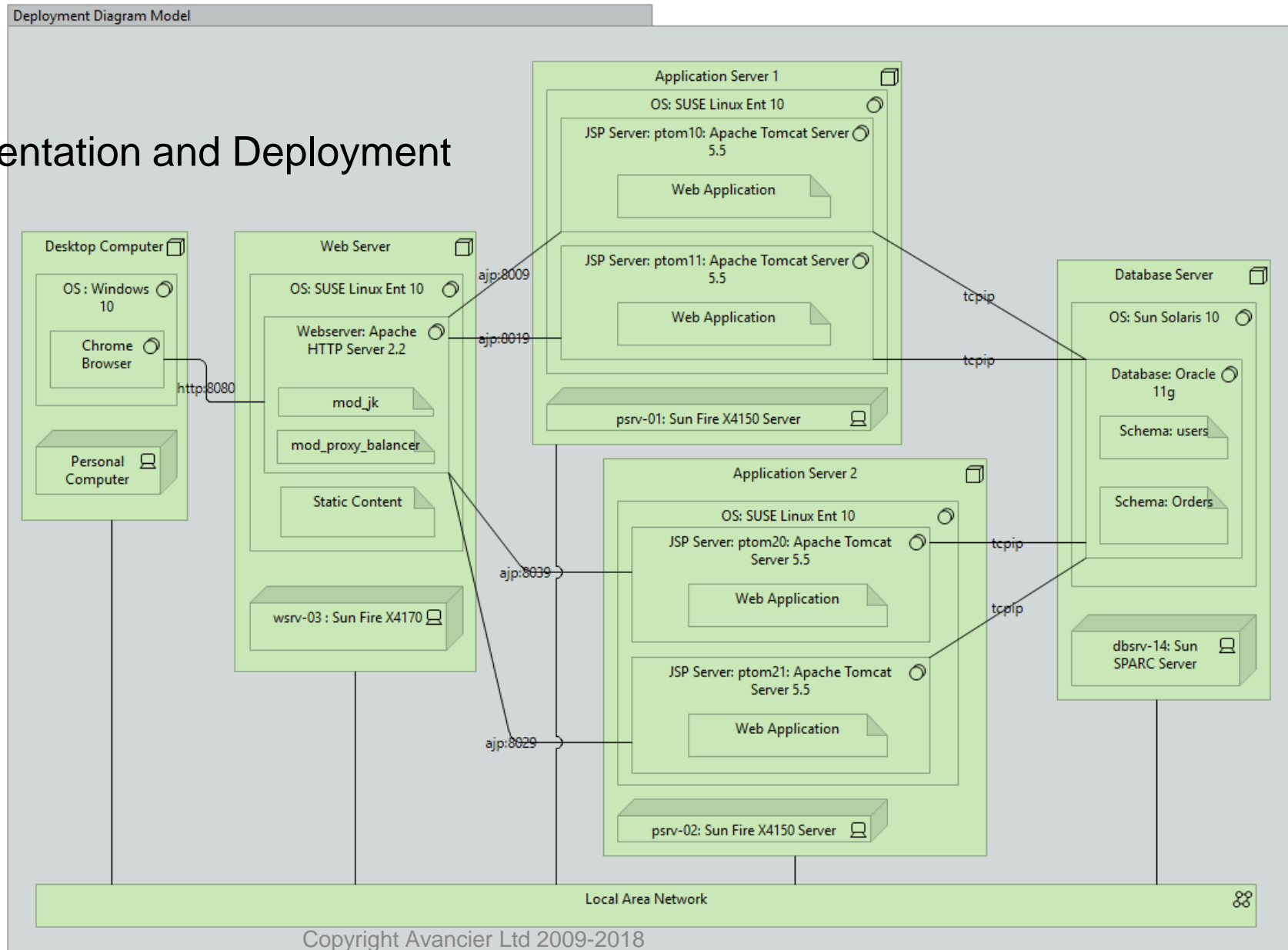
TOGAF artefact: Communications Engineering Diagram
(how is this different?)

- Communications Engineering Diagram
  - describes the method of sending and receiving information between technology components
  - connects components in a client and server stack
  - identifies network boundaries and infrastructure required to make connections
  - defines protocols and capacities
  - does not describe information format or content.
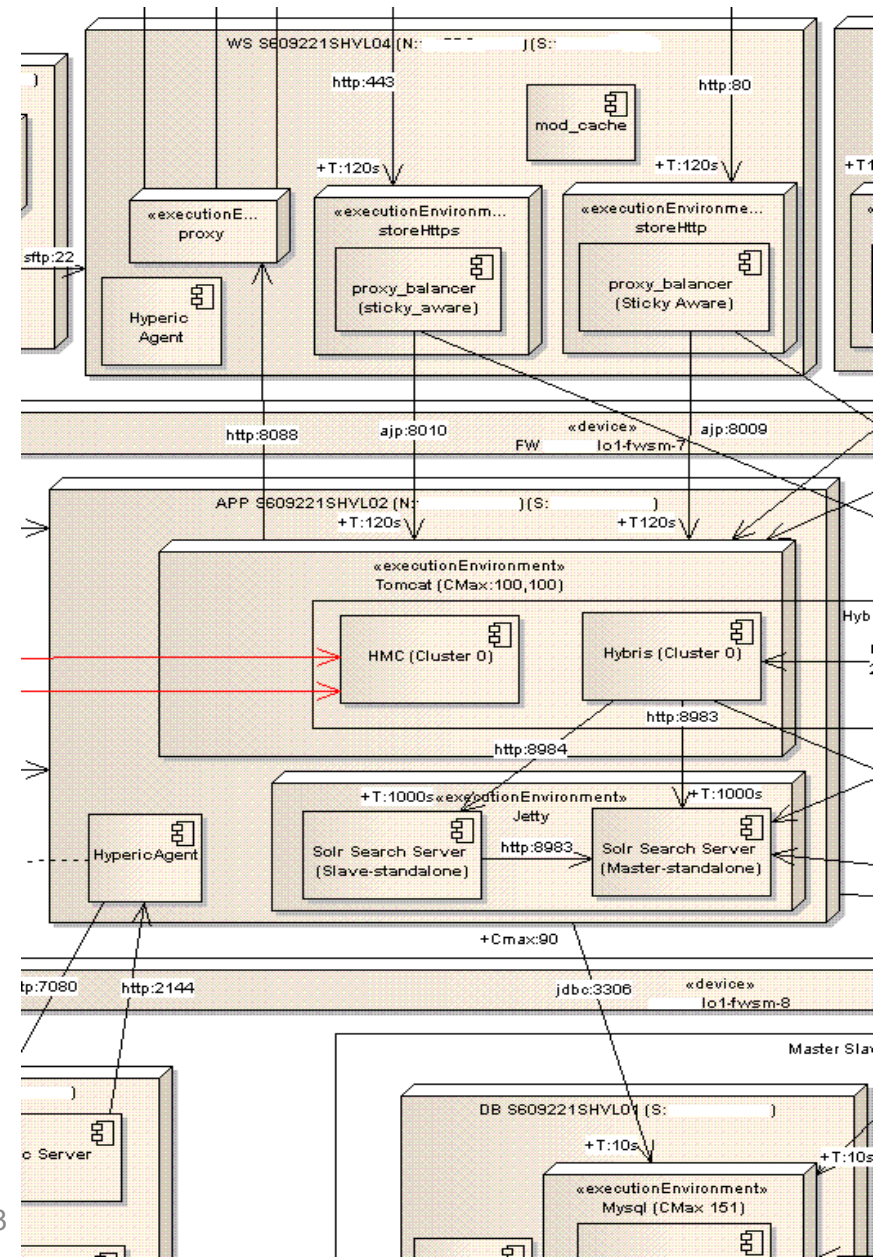
TOGAF artefact: Processing Diagram
(how is this different?)

- Processing Diagram
  - Groups app components into deployment units
  - Shows how deployable units are deployed onto the technology platform.
  - Shows how deployment units interact (network, connections and protocols)
  - Shows load or capacity measures for different technology components
  - Typically separates concerns of the
    - presentation layer
    - business logic layer
    - data store layer
    - service-level requirements

Note the duplication between TOGAF Technology Diagrams

Application and User Location Diagram
"shows the geographical distribution of applications, where applications are used by the end user; where the host application is executed and/or delivered in thin client scenarios; where applications are developed, tested, and released; etc."

Application/Technology Matrix
"documents the mapping of business systems [i.e applications] to technology platform."

Processing Diagram
"focuses on deployable units of code/configuration and how these are deployed onto the technology platform."

Software Distribution Diagram
"shows how application software is structured and distributed across the estate…
shows how physical applications are distributed across physical technology and the location of that technology…
enables a clear view of how the software is hosted"

Environments and Locations Diagram
"depicts which locations host which applications…
what technologies and/or applications are at which locations"

Networked Computing/Hardware Diagram
"to document the mapping between logical applications and the technology components (e.g., server) that supports the application both in the development and production environments…
"to show the "as deployed" logical view of logical application components in a distributed network computing environment…
"Enable understanding of which application is deployed where in the distributed network computing environment."

TOGAF artefact: Platform Decomposition Diagram

- shows the infrastructure technology platform that supports the applications and data architecture.

- EITHER an overview of the enterprise's technology platform - an informal "eye-chart" of the technical environment.

- OR expanded to map the technology platform (to application components) within a specific functional or process area, showing details such as product versions, number of CPUs, etc.
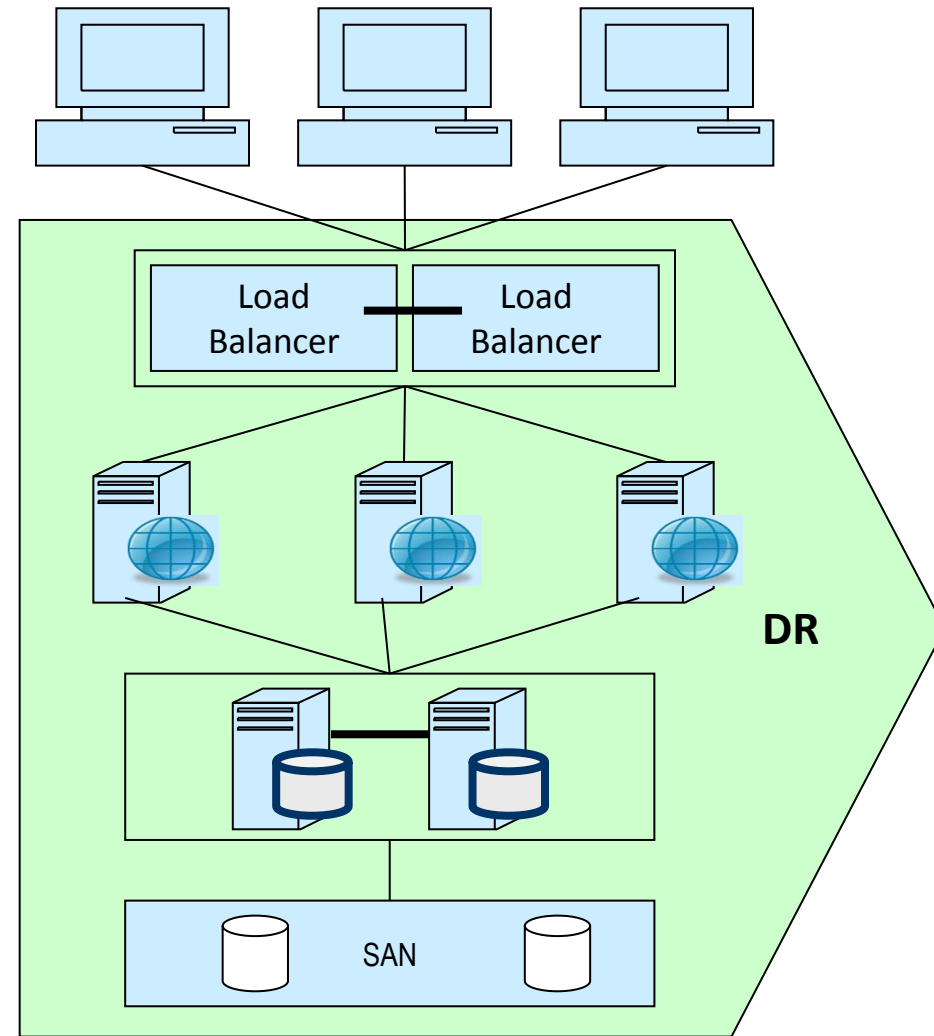
TOGAF artefact: Enterprise Manageability Diagram

- shows how one or more applications interact with components that support operational management of a solution.

- Analysis can reveal duplication and gaps, and opportunities in the IT service management operation of an organization.
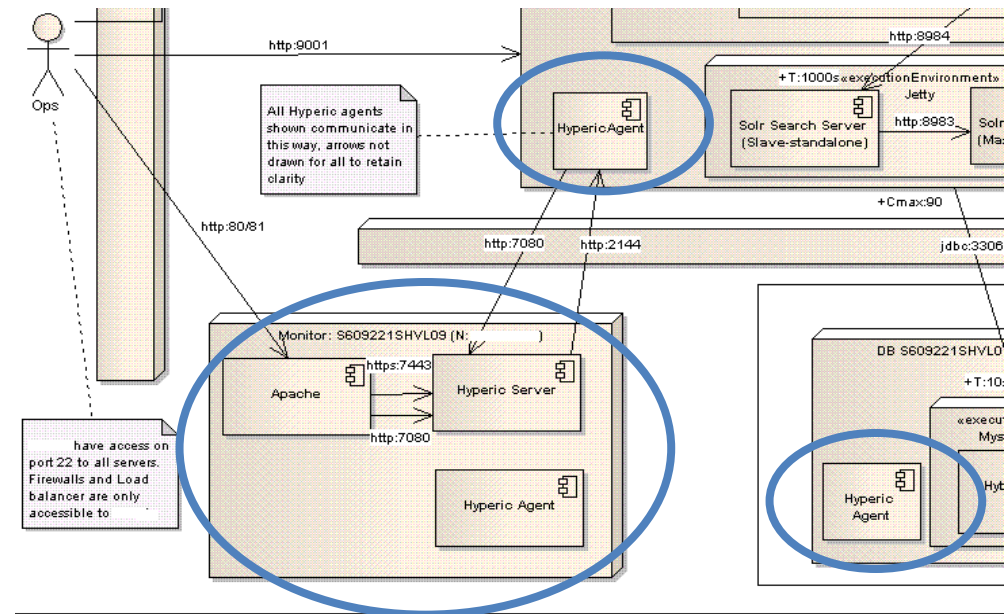
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2. To simplify and clarify definitions of TOGAF's architecture artefacts
3. To distinguish EA artefacts from SA artefacts
4. To illustrate EA artefacts using ArchiMate where possible
5. To illustrate SA artefacts using ArchiMate where possible
6. To raise awareness of a few points
7. To generate a TOGAF meta model that is more demonstrably consistent with its artefacts

Portfolio Management

- ArchiMate doesn't feature catalogs and matrices that enable portfolio level
  - Gap analysis
  - Cluster analysis
  - Impact analysis
  - Traceability analysis

- Though it does include symbols that can be used in drawing diagrams of subsets of and relationships between portfolios to show stakeholders
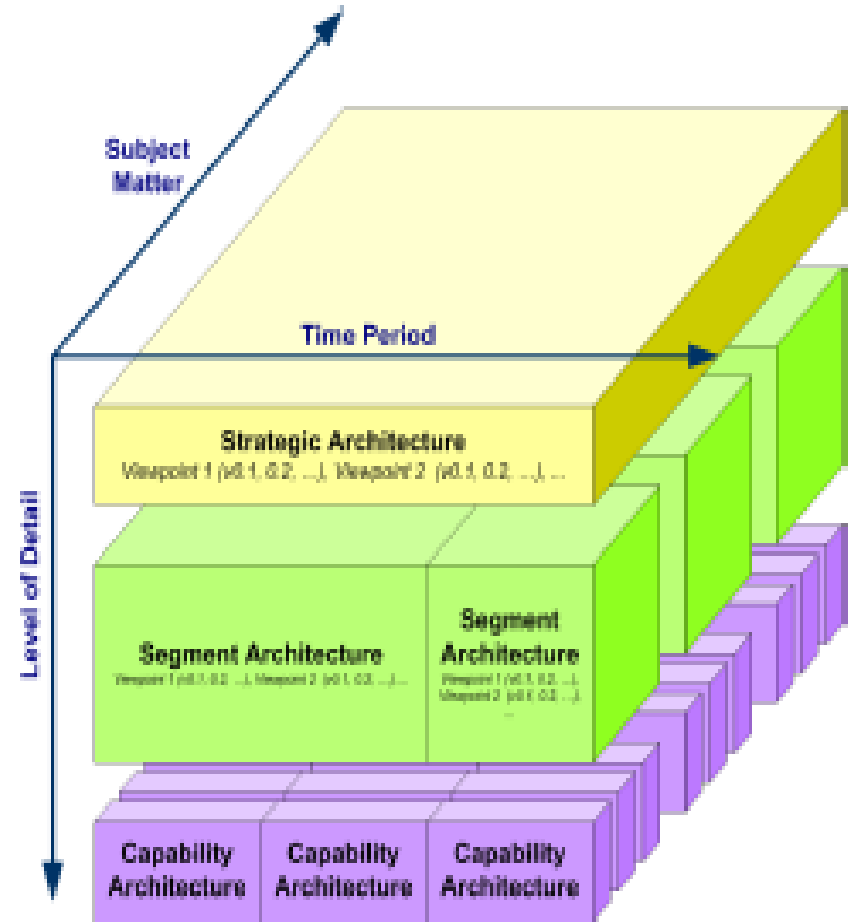
How do aims, structures and behaviors relate?

- In particular methods and cases, you might say (e.g.)
  - 1 Function meets 1 Goal/Objective
  - 1 Function provides 1 Service
  - 1 Process meets 1 Goal/Objective
  - 1 Process provides 1 Service

- In general, and so in TOGAF
  - All architectural entities may be recursively composed and decomposed,
  - All relationships are many to many. E.g
    - 1 Function may provide several Services, and be one of several Functions that cooperate to provide 1 coarse-grained Service
    - 1 Process may coordinate several fine-grained Functions, and be one of several Processes that enable 1 coarse-grained Function.

1 Process may coordinate several fine-grained Functions

Swim lanes show logical structures

⚐ Actor

⬯ Role or

⬠ Function

Arrows show behaviors

⬭ Event

→ Trigger

⇨ Activity

Structural view
Activities grouped by
logical cohesion

Behavioral view
Activities in sequence

Handle Claim Process

Customer ⬯

Submit Claim ⬭

Customer Relations Function ⬠

Record Claim ⇨

Claim Handling Function ⬠

Assess Claim ⇨

Email Approval ⇨

Finance Function ⬠

Pay Claim ⇨
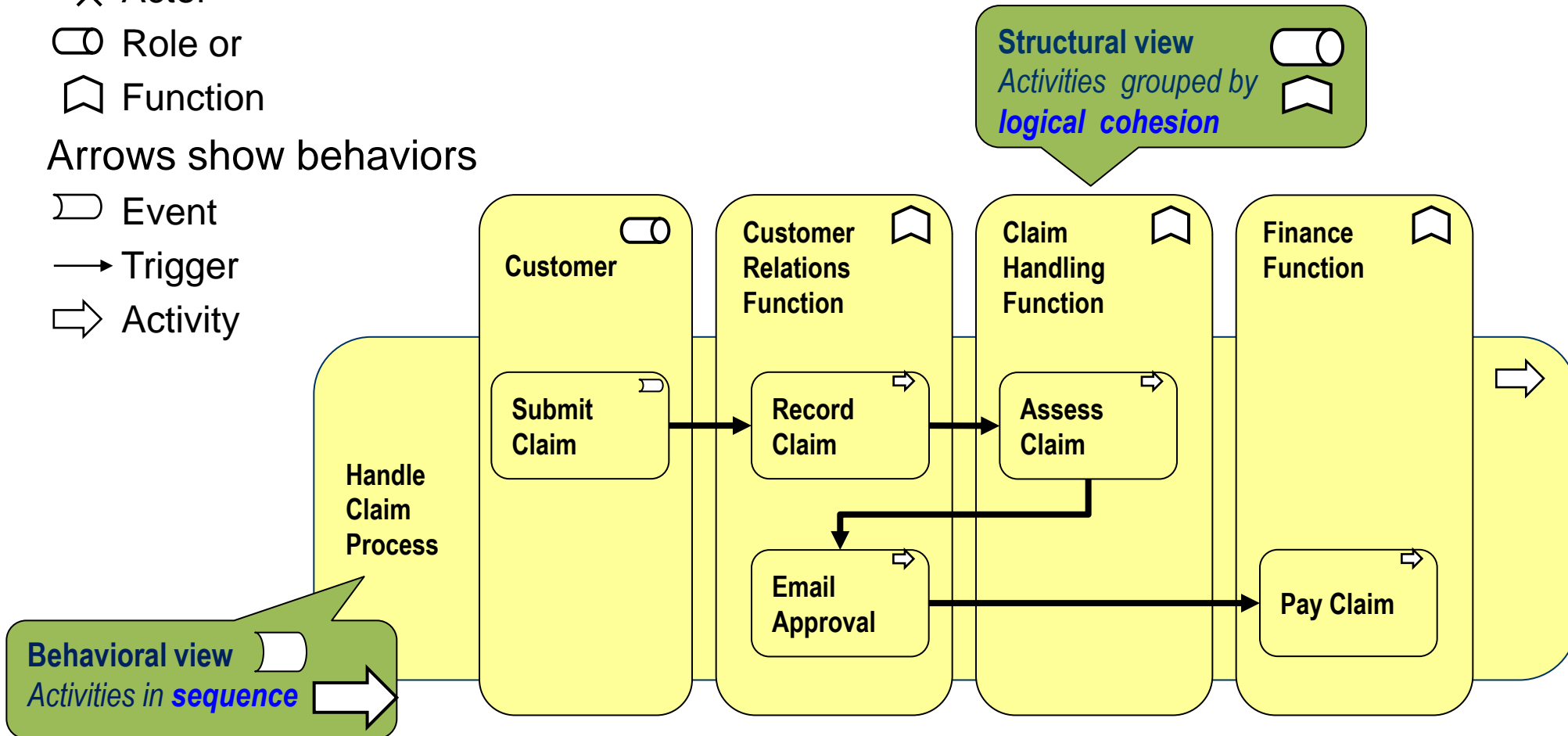
Node Connectivity Diagrams

- Business Architecture needs the "Node Connectivity Diagram"
  - It is mentioned in phase B but strangely omitted from the TOGAF 9.1 viewpoint/artefact type taxonomy.

- There is naturally some duplication between artefacts that document the physical and logical organization structures

The function / process confusion

- ArchiMate interprets "behavior" differently from UML
  - People misunderstand "business function" in TOGAF and
  - Confuse with function with process.
- Where some use process symbols in the business layer
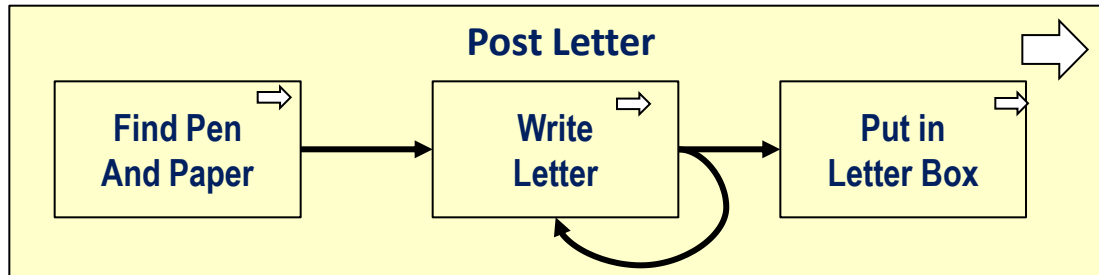
- Some use functions symbols application layer
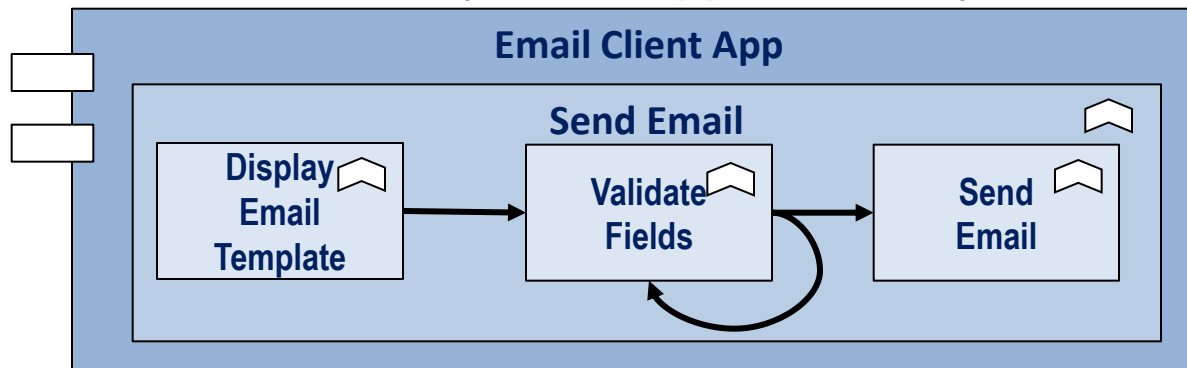
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Distinguishing EA artefacts from SA artefacts

	Enterprise / Strategy / Portfolio level artefacts	Solution or Capability Increment level artefacts
Motivation	**Driver Goal/Objective Catalog**	**Goal/Objective/Service Diagram**
Business	**Organization Decomposition Diagram** **Node Connectivity Diagram (physical or logical)** **Functional Decomposition Diagram** **Function/Org Matrix** **Role Catalog** **Business Function/Service Catalog** **Process/Event/Control/Product Catalog**	**Process Flow Diagram** **Business Scenario** **Actor/Role Matrix** **Organization/Actor Diagram**
Applications	**Application Portfolio Catalog** **Application/Function Matrix** **Role/Application Matrix** **Application Communications Diagram**	**Process Application Realization Diagram** **Application Use Case Diagram** **Application User Location Diagram** **Software Engineering Diagram** **Software Distribution Diagram**
Data	**Conceptual Data Diagram** **Data Entity/Function Matrix** **Application/Data Matrix** **Data Entity/Data Component Catalog** **Data Dissemination Diagram**	**Business Service/Info Diagram** **Logical Data Diagram** **Data Security Diagram** **Data Lifecycle Diagram** **Data Migration Diagram**
Technology	**Technology Standards Catalog** **Technology Portfolio Catalog** **Technology Services Catalog (TRM)** **Technology/Application Matrix**	**Environments and Locations Diagram** **Processing Diagram** **Networked Computing/Hardware Diagram** **Communications Engineering Diagram** **Platform Decomposition Diagram**

A TOGAF meta model based on c40 artefacts

All entities may be recursively composed and decomposed, and all relationships are many to many. So for example, a process may coordinate several low level functions, and be one of several processes that enable one higher function.

Motivation

Driver Goal/Objective Catalog

Goal/Objective — **Driver**

Business Architecture

Goal/Objective/Service Diagram

Node Connectivity Diagram
Functional Decomposition

Node Connectivity Diagram
Organization decomposition

Business service/Information Diagram

Business Service

Bus.Service Function Catalog

Function

Organization Unit

Org/Function Matrix

Data Architecture

Conceptual data Diagram

Data Entity/Function Matrix.

Role Catalog

Org/Actor Catalog

Business Data Entity

Process

Business Scenario
Process Flow

Role

Actor

Actor/Role Matrix

Process/Event/Control Catalog

Data dissemination Diagram

Process App. Real. Diagram

App/Function Matrix.

Role/App Matrix

Apps Architecture

Logical Data Entity

App/IS Service

App Use Case Diagram

App and User Location Diagram

Location

Logical data Diagram

Data entity/Data component Catalog

App Data Matrix

Application Catalog
App Comm's Diagram

Location Catalog

Logical Data Component

Logical App Component

Physical App Component

Technology Architecture

Technology Service

Technical Services Catalog (TRM)

Software Distribution Diagram
App/Technology Matrix
Environments & Locations Diagram
Processing Diagram
Networked Computing/Hardware Diagram
Communications Engineering Diagram

Logical Technology Component

Physical Technology Component

Recap

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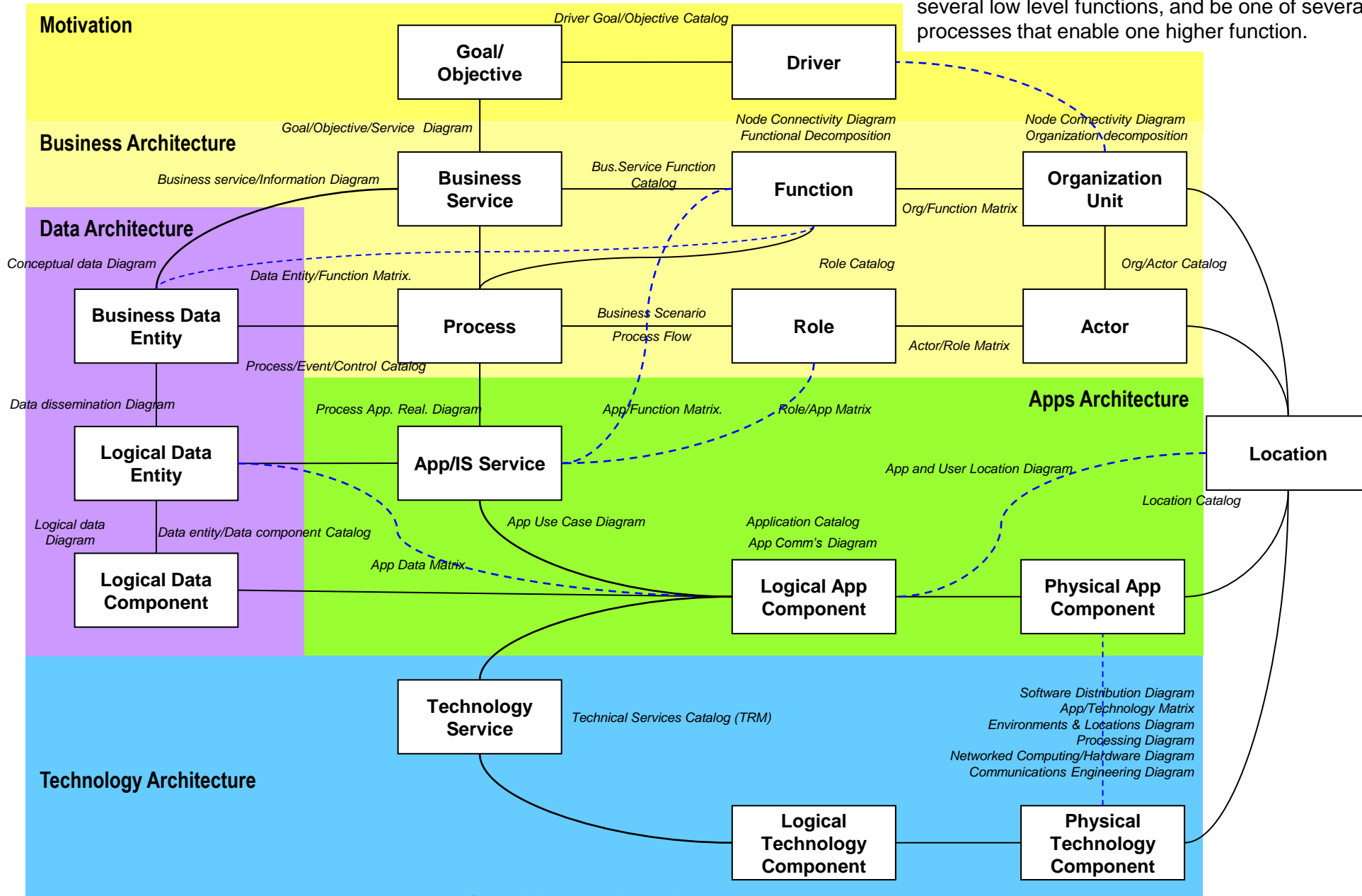7. To generate a TOGAF meta model that is more demonstrably consistent with its artefacts