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

**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

**Motivations and constraints**

- **Aims**
  - Goals
  - Objectives
  - Requirements

- **Directives**
  - Principles
  - Policies
  - Rules

- **Compliance**
  - Regulations
  - Standards (SIB)
  - Design Patterns (RM)

- **Management**
  - Time
  - Budget
  - Resources

**Separation of logical ABBs from physical SBBs**
Physical things in EA are still "considerably abstracted from implementation"
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<table>
<thead>
<tr>
<th>Turgid text</th>
<th>What it says</th>
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</table>
| **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. | **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”
A picture that can mislead

- Because the artefacts and activities at top and bottom levels are so different
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
c40 TOGAF artefacts (more comprehensive, coherent and consistent than some realise)

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<thead>
<tr>
<th>Motivation</th>
<th>Enterprise / Strategy / Portfolio level artefacts</th>
<th>Solution or Capability Increment level artefacts</th>
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<tbody>
<tr>
<td>Business</td>
<td>Organization Decomposition Diagram</td>
<td>Process Flow Diagram</td>
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<td>Node Connectivity Diagram (physical or logical)</td>
<td>Business Scenario</td>
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<td>Functional Decomposition Diagram</td>
<td>Actor/Role Matrix</td>
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<td>Function/Org Matrix</td>
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<td>Driver Goal/Objective Catalog</td>
<td>Goal/Objective/Service Diagram</td>
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<td>Application Portfolio Catalog</td>
<td>Process Application Realization Diagram</td>
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<td>Application/Function Matrix</td>
<td>Application Use Case Diagram</td>
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<td>Software Engineering Diagram</td>
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<td>Conceptual Data Diagram</td>
<td>Business Service/Info Diagram</td>
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<td>Data Entity/Function Matrix</td>
<td>Logical Data Diagram</td>
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<td>Application/Data Matrix</td>
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<td>Data Entity/Data Component Catalog</td>
<td>Data Lifecycle Diagram</td>
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<td>Data Migration Diagram</td>
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<td>Technology Standards Catalog</td>
<td>Environments and Locations Diagram</td>
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<td>Processing Diagram</td>
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<td>Technology Services Catalog (TRM)</td>
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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
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<td>Organization Decomposition Diagram</td>
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<td>Node Connectivity Diagram (physical)</td>
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<td>Function/Org Matrix</td>
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<td>Role Catalog</td>
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</table>
• **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.

<table>
<thead>
<tr>
<th>Organization Unit</th>
<th>Driver</th>
<th>Goal</th>
<th>Objective</th>
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TOGAF artefact: Organization Decomposition Diagram

- **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.
• An organization view
TOGAF artefact: Node Connectivity Diagram

- 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

- Identify your customers
- Identify your suppliers
Node connectivity Diagram: SCOR technique

1. Identify your customers
2. Identify your suppliers
3. Identify the key nodes (entities in the supply chain)
4. Link nodes by flows.
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
TOGAF artefact: Functional Decomposition Diagram

- **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)
A strict (non-redundant) hierarchy.
• 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.
• Shows services offered by nodes to external entities and to each other.
TOGAF mapping logical organization to physical organization

• “Structured Analysis: Identifies the key business functions within the scope of the architecture, and maps those functions onto the organizational units within the business.”

<table>
<thead>
<tr>
<th>Organization Function</th>
<th>Marketing</th>
<th>Sales</th>
<th>Delivery</th>
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<tbody>
<tr>
<td>Marketing</td>
<td>Activity</td>
<td></td>
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<tr>
<td>Sales</td>
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<td>Activity</td>
<td>Activity</td>
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<tr>
<td>Delivery</td>
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<td>Activity</td>
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</tbody>
</table>

• Might reveal a 1-1
• “Functional organization”

<table>
<thead>
<tr>
<th>Organization Function</th>
<th>Petrol</th>
<th>Paints</th>
<th>Plastics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marketing</td>
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<td>Activity</td>
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TOGAF artefact: Role Catalog

• 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
  - structure to behavior
TOGAF artefact: Process/Event/Control/Product Catalog

- **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.
TOGAF artefact: Business Function/Service Catalog

- **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.
• Hand made
## STRATEGIC APPS ARCHITECTURE

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</tbody>
</table>
• **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

- **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.

<table>
<thead>
<tr>
<th>Function</th>
<th>App</th>
<th>CRM</th>
<th>ERP</th>
<th>Billing</th>
<th>Data warehouse</th>
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</thead>
<tbody>
<tr>
<td>Sales</td>
<td></td>
<td>Place order</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
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<td>Register customer</td>
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<tr>
<td>Invoicing</td>
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<td></td>
<td>Post invoice</td>
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</table>

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

### Support functions aka capabilities
- Human Resources
  - Human Resources
    - Human Resources
  - Benefits
    - Benefits
  - Payroll
    - Payroll
  - Rostering
    - Rostering
  - Time and Attendance
    - Time and Attendance
- Accounts
  - Accounts Receivable
    - Accounts Receivable
  - Accounts Payable
    - Accounts Payable
  - General Ledger
    - General Ledger
  - Fixed Assets
    - Fixed Assets
  - Cash Management
    - Cash Management
- Facilities
- Knowledge and Change
  - Training
    - Training
  - Project Management
    - Project Management
  - Doc Management
    - Doc Management
- Legal
- ITSM
  - Identity management
    - Identity management
  - IT Service Management
    - IT Service Management
  - Server Management
    - Server Management
  - Network Management
    - Network Management
  - EAI Middleware
    - EAI Middleware
• **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.

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TOGAF artefact: App Communication Diagram

- 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.
Interface (Aargh! Data Flow) Catalog

<table>
<thead>
<tr>
<th>Data Flow id</th>
<th>Source App</th>
<th>Destination App</th>
<th>Data content</th>
<th>Trigger event</th>
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<td>1a</td>
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<td>Sales order request</td>
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<td>1b</td>
<td>Sales</td>
<td>CRM</td>
<td>Sales order confirmation</td>
<td>Order created in the Sales system</td>
</tr>
<tr>
<td>2a</td>
<td>Sales</td>
<td>Stock</td>
<td>Requisition</td>
<td>Subscribe/Publish timer</td>
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## STRATEGIC DATA ARCHITECTURE

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TOGAF artefact: Conceptual data Diagram

- 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!)
TOGAF artefact: Data Entity/Business Function Matrix

- 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.
One of the most traditional EA artefacts

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

- 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…)

<table>
<thead>
<tr>
<th>App</th>
<th>Data Entity</th>
<th>Customer</th>
<th>Order</th>
<th>Invoice</th>
<th>Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRM</td>
<td>Customer</td>
<td>CRUD</td>
<td>CRUD</td>
<td>RUD</td>
<td>RD</td>
</tr>
<tr>
<td>CRM</td>
<td>Order</td>
<td>CRUD</td>
<td>RUD</td>
<td>CRUD</td>
<td>RD</td>
</tr>
<tr>
<td>Billing</td>
<td>Invoice</td>
<td>RUD</td>
<td>CRUD</td>
<td>CRUD</td>
<td>RD</td>
</tr>
<tr>
<td>Data warehouse</td>
<td>Payment</td>
<td>RD</td>
<td>RD</td>
<td>RD</td>
<td></td>
</tr>
</tbody>
</table>
Partial match in ArchiMate

- 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

- 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.

<table>
<thead>
<tr>
<th>Data entity</th>
<th>App</th>
<th>CRM</th>
<th>ERP</th>
<th>Billing</th>
<th>Data warehouse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td>Master</td>
<td>Copy</td>
<td>Copy</td>
<td>Master (1)</td>
<td>Copy</td>
</tr>
<tr>
<td>Order</td>
<td>Master (1)</td>
<td>Copy</td>
<td>Master (2)</td>
<td>Copy</td>
<td></td>
</tr>
<tr>
<td>Invoice</td>
<td>Master</td>
<td></td>
<td>Master</td>
<td>Copy</td>
<td></td>
</tr>
</tbody>
</table>

(1) until Order Closed
(2) after Order Closed.
<table>
<thead>
<tr>
<th>Motivation</th>
<th>Enterprise Strategy and Portfolio level</th>
<th>Solution or Capability Increment level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td>Technology Standards Catalog</td>
<td>Technology Portfolio Catalog</td>
</tr>
<tr>
<td></td>
<td>Technology Services Catalog (TRM)</td>
<td>Technology/App Matrix</td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>User Interface Services</th>
<th>Transaction Processing Services</th>
<th>Operating System Services</th>
<th>Software Engineering Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graphical Client/Server services</td>
<td>Starting a transaction</td>
<td>Kernel Operations</td>
<td>Programming Language services</td>
</tr>
<tr>
<td>Display Objects services</td>
<td>Co-ordination of recoverable resources in a transaction</td>
<td>Command Interpreter and Utility services</td>
<td>Object Code Linking services</td>
</tr>
<tr>
<td>Window Management services</td>
<td>Committing or rolling back transactions</td>
<td>Batch Processing services</td>
<td>CASE Environment and Tools services</td>
</tr>
<tr>
<td>Dialogue Support services</td>
<td>Controlling timeouts on transactions</td>
<td>File and Directory Synchronization</td>
<td>Graphical User Interface (GUI) Building services</td>
</tr>
<tr>
<td>Printing services</td>
<td>Chaining transactions together</td>
<td>Scripting Language services</td>
<td>Language Binding services</td>
</tr>
<tr>
<td>Computer-Based Training and Online Help services</td>
<td>Monitoring transaction status</td>
<td></td>
<td>Run-Time Environment services</td>
</tr>
<tr>
<td>Character-Based services</td>
<td></td>
<td></td>
<td>App Binary Interface services</td>
</tr>
<tr>
<td>Graphics and Imaging Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Graphics services</td>
<td>Data Dictionary/Repository services</td>
<td>Electronic Mail services</td>
<td>Object Request Broker (ORB) services</td>
</tr>
<tr>
<td>Graphical Object Management services</td>
<td>Database Management System (DBMS) services</td>
<td>Distributed Data services</td>
<td>Implementation Repository services</td>
</tr>
<tr>
<td>Drawing services</td>
<td>OO Database Management System (OODBMS) services</td>
<td>Distributed File services</td>
<td>Installation and Activation services</td>
</tr>
<tr>
<td>Imaging functions</td>
<td>File Management services</td>
<td>Distributed Name services</td>
<td>Interface Repository services</td>
</tr>
<tr>
<td>User Interface Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International Operation Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Character Sets and Data Representation services</td>
<td>Screen Generation functions</td>
<td>Remote Process (Access) services</td>
<td>Common Object services</td>
</tr>
<tr>
<td>Cultural Convention services</td>
<td>Report Generation functions</td>
<td>Remote Print Spooling and Output Distribution services</td>
<td>Change Management services</td>
</tr>
<tr>
<td>Local Language Support services</td>
<td>Networking/Concurrent Access functions</td>
<td>Enhanced Telephony functions</td>
<td>Collections services</td>
</tr>
<tr>
<td>Graphics and Imaging Services</td>
<td>Warehousing functions</td>
<td>Shared Screen functions</td>
<td>Concurrency Control services</td>
</tr>
<tr>
<td>International Operation Services</td>
<td></td>
<td>Video-Conferencing functions</td>
<td>Data Interchange services</td>
</tr>
<tr>
<td>Character Sets and Data Representation services</td>
<td></td>
<td>Broadcast functions</td>
<td>Event Management services</td>
</tr>
<tr>
<td>Cultural Convention services</td>
<td></td>
<td>Mailing List functions</td>
<td>Externalization services</td>
</tr>
<tr>
<td>Local Language Support services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data interchange services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Document Generic Data Typing and Conversion services</td>
<td>Directory services</td>
<td>User Management services</td>
<td>Licensing services</td>
</tr>
<tr>
<td>Graphics Data Interchange services</td>
<td>Special-Purpose Naming services</td>
<td>Configuration Management (CM) services</td>
<td>Lifecycle services</td>
</tr>
<tr>
<td>Specialized Data Interchange services</td>
<td>Service Location services</td>
<td>Performance Management services</td>
<td>Naming services</td>
</tr>
<tr>
<td>Electronic Data Interchange services</td>
<td>Registration services</td>
<td>Availability and Fault Management services</td>
<td>Properties services</td>
</tr>
<tr>
<td>Fax services</td>
<td>Filtering services</td>
<td>Accounting Management services</td>
<td>Query services</td>
</tr>
<tr>
<td>Raw Graphics Interface functions</td>
<td>Accounting services</td>
<td>Security Management services</td>
<td>Relationship services</td>
</tr>
<tr>
<td>Text Processing functions</td>
<td></td>
<td>Print Management services</td>
<td></td>
</tr>
<tr>
<td>Document Processing functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Security Services</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Publishing functions</td>
<td>System Entry Control services</td>
<td>Network Management services</td>
<td>Start-Up services</td>
</tr>
<tr>
<td>Video Processing functions</td>
<td>Security Management services</td>
<td>Backup and Restore services</td>
<td>Time services</td>
</tr>
<tr>
<td>Audio Processing functions</td>
<td>Audit services</td>
<td>Online Disk Management services</td>
<td>Trading services</td>
</tr>
<tr>
<td>Media Synchronization functions</td>
<td></td>
<td>License Management services</td>
<td></td>
</tr>
<tr>
<td>Multimedia Processing functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information Presentation and Distribution functions</td>
<td>Trusted Recovery services</td>
<td>Capacity Management services</td>
<td></td>
</tr>
<tr>
<td>Hypertext functions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Encryption services</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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
<table>
<thead>
<tr>
<th>Solution level BUSINESS ARCHITECTURE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Enterprise Strategy and Portfolio level</strong></td>
</tr>
<tr>
<td><strong>Motivation</strong></td>
</tr>
<tr>
<td><strong>Business</strong></td>
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<td></td>
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<tr>
<td><strong>Applications</strong></td>
</tr>
<tr>
<td><strong>Data</strong></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
</tr>
</tbody>
</table>
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
  - behaviors to structures
  - logical structures to physical structures
TOGAF artefact: Goal/Objective/Service Diagram

• 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.

<table>
<thead>
<tr>
<th>Driver</th>
<th>Goal</th>
<th>Objective</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

Copyright Avancier Ltd 2009-2018
• Hand made by
• Pieter Van Ostaeyen
Partial match in ArchiMate

- A lower-level requirements realization view
TOGAF artefact: Process flow Diagram

- 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)
• 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

Surely a process?
TOGAF promotes definition of Business Scenarios

- **Business 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**

<table>
<thead>
<tr>
<th>Precondition: Sales visit agreed and scheduled</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Scenario process</th>
<th>Human roles</th>
<th>Computer roles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Customer</td>
<td>Sales</td>
</tr>
<tr>
<td>1 Initiate sales process with the customer</td>
<td>Open door</td>
<td>Greet customer</td>
</tr>
<tr>
<td>2 Discuss customer requirements</td>
<td>Accept sales visit</td>
<td>Ask about requirements</td>
</tr>
<tr>
<td>3 Work with customer to create a product configuration</td>
<td>Explain requirements and discuss options</td>
<td>Get product descriptions</td>
</tr>
<tr>
<td></td>
<td>Assemble configurations</td>
<td>Use case</td>
</tr>
<tr>
<td>4 Verify desired configuration can be delivered</td>
<td>Select option based on capabilities</td>
<td>Check configuration availability</td>
</tr>
<tr>
<td></td>
<td>Confirm interest</td>
<td>Inventory</td>
</tr>
<tr>
<td>5 Determine price of requested configuration</td>
<td>Accept date</td>
<td>Price configuration and show</td>
</tr>
<tr>
<td>6 Confirm customer desire to purchase</td>
<td>Accept price</td>
<td>Recap and ask for confirmation</td>
</tr>
<tr>
<td>7 Place an order</td>
<td>Confirm purchase</td>
<td>Enter order details, get email reply</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Print out email, request signature</td>
</tr>
<tr>
<td>8 Capture customer signature</td>
<td>Sign</td>
<td>Confirm signature</td>
</tr>
</tbody>
</table>

Post condition: Order captured
Partial match in ArchiMate

- Imagine combining this scenario drawn by Pieter Van Ostaeyen

- With this process
- application realization
TOGAF artefact: Actor/Role Matrix

- 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.

<table>
<thead>
<tr>
<th>Actor</th>
<th>Role</th>
<th>A</th>
<th>B</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td></td>
<td>Performs</td>
<td>Performs</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td></td>
<td>Performs</td>
<td>Performs</td>
<td>Performs</td>
</tr>
</tbody>
</table>
Surely communication path rather than interface?
• **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.

<table>
<thead>
<tr>
<th>Org level 1</th>
<th>Org level 2</th>
<th>Org level 3</th>
<th>Location</th>
<th>Actor *</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Beware conflation of or confusion between organization unit and location
## Solution level APPS ARCHITECTURE

<table>
<thead>
<tr>
<th></th>
<th>Enterprise Strategy and Portfolio level</th>
<th>Solution or Capability Increment level</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Motivation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Applications</strong></td>
<td>Referred to, refined and updated</td>
<td>Process App. Real. Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>App Use Case Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>App User Location Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software Engineering Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Software Distribution Diagram</td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technology</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TOGAF artefact: Process/App Realization Diagram

- **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.
• Simulation in ArchiMate of a UML Sequence Diagram
Partial match in ArchiMate

- An App usage view

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

A use case

An App providing two discrete services

Process → 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

- An App usage view (again)

[Diagram showing a process flow with activities like Register, Accept, Valuate, and Pay, connected to services like Scanning service, Customer administration service, Claims administration service, Printing service, and Payment service.]

A process step at which two use cases are needed

A use case

An App providing two discrete services
Use case: an app-enabled process that an external actor plays a role in

A role engaged in the use case process

One-Actor Role

ABC Limited

Supplier

Supplier

Driver

Manager

BACS

App/IS Service

Application Component

One-Actor Role

One-Actor Role

One-Actor Role

One-Actor Role

Record goods receipt

Report monthly

Record goods delivery

Settle payment

Hand made
• **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?
TOGAF artefact: Software Engineering Diagram

- **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?

- An App Behavior view?

Aargh! Operation shown using function symbol!

Function accesses data

Transition arrow

A kin to a use case header

Service realised by Process

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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

<table>
<thead>
<tr>
<th></th>
<th>Enterprise Strategy and Portfolio level</th>
<th>Solution or Capability Increment level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Applications</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Data</td>
<td>Referred to, refined and updated</td>
<td>Business Service/Info Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Logical Data Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data Security Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data Lifecycle Diagram</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Data Migration Diagram</td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TOGAF artefact: Business Service/Information Diagram

- 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

<table>
<thead>
<tr>
<th>Information needed</th>
<th>Customer account</th>
<th>Sender address</th>
<th>Receiver address</th>
<th>Depot address</th>
<th>Package description</th>
<th>Package status</th>
<th>Journey route</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business services</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Order delivery</td>
<td>Use</td>
<td>Create</td>
<td>Create</td>
<td>Use</td>
<td>Create</td>
<td>Initialise</td>
<td></td>
</tr>
<tr>
<td>Collect from sender</td>
<td>Use</td>
<td>Use</td>
<td>Use</td>
<td>Use</td>
<td>Use</td>
<td>Update</td>
<td>Use</td>
</tr>
<tr>
<td>Deliver to depot</td>
<td></td>
<td></td>
<td>Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sort in depot</td>
<td>Use</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Collect from depot</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Update</td>
<td>Use</td>
</tr>
<tr>
<td>Deliver to receiver</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Update</td>
<td></td>
</tr>
</tbody>
</table>
• A Business Process View
• Here, maps data to process, rather than the service

This access arrow shows direction of flow (not access)

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

- **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!)
• 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
Salesforce.com has a structural model of a typical style.

Two dozen 1-to-N associations
One 1-to-0 or 1 association
• 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

<table>
<thead>
<tr>
<th>Role/Actor</th>
<th>Data entity</th>
<th>Customer</th>
<th>Product</th>
<th>Invoice</th>
<th>Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR manager</td>
<td></td>
<td>Can read</td>
<td></td>
<td></td>
<td>Can read</td>
</tr>
<tr>
<td>Product manager</td>
<td></td>
<td>Can read</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salesman</td>
<td>Can read</td>
<td>Can read</td>
<td>Can read</td>
<td>Can read</td>
<td></td>
</tr>
<tr>
<td>1st line support</td>
<td>Can read</td>
<td>Can read</td>
<td>Can read</td>
<td>Can read</td>
<td></td>
</tr>
<tr>
<td>Fulfilment agent</td>
<td>Can read</td>
<td>Can read</td>
<td>Can read</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data quality scoring scheme

- Score each the data item/group/store thus

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

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Enterprise Strategy and Portfolio level</th>
<th>Solution or Capability Increment level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
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<tr>
<td><strong>Applications</strong></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Data</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| **Technology** | Referred to, refined and updated | Environments and Locations Diagram  
Networked Computing/Hardware Diagram  
Communications Engineering Diagram  
Processing Diagram  
Platform Decomposition Diagram |

**Diagram**

- Application Catalog
- Physical App Component
- Location Catalog
- Physical Technology Component
- Software Distribution Diagram
- App/Technology Matrix
- Environments & Locations Diagram
- Processing Diagram
- Networked Computing/Hardware Diagram
- Communications Engineering Diagram

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TOGAF artefact: Environments and Locations 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.
A Technology view (note locations)
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.
• Implementation and Deployment
• 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.
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
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

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**Structural view**
Activities grouped by *logical cohesion*

**Behavioral view**
Activities in *sequence*
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

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Enterprise / Strategy / Portfolio level artefacts</th>
<th>Solution or Capability Increment level artefacts</th>
</tr>
</thead>
</table>
| Driver Goal/Objective Catalog | 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 | Goal/Objective/Service Diagram  
Process Flow Diagram  
Business Scenario  
Actor/Role Matrix  
Organization/Actor Diagram |
| **Business**       | 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 |
| **Applications**   | 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 |
| **Data**           | 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 |
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.
Recap

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
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