((o))LEADing Practice
Best & Leading Practice Research | Standards Development

Layered Enterprise Architecture Development Body of Knowledge

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Contents

Purpose

This document provides a summary of the LEAD Enterprise Architecture Body of Knowledge, setting out the concepts, terms, and descriptions as well as a description of our structured way of thinking, working, modelling, implementation, and governance.
The key feature of this document is that it captures the LEAD Enterprise Architecture ontology for each of the layers, showing the objects of each layer.

Through the specification of each LEADing Practices Object, the Glossary captures the meaning, or way to think about the object.

Basic Principles for the LEAD Body of Knowledge:

LEAD BOK Should (Be)	**LEAD BOK Should Not (Be)**
Use a standardized terminology	Sell anything (not vendor driven)
Ease the communication about LEAD	Redefine other disciplines
Support a common understanding of LEAD	Too detailed
Reference related disciplines	Miss the audience (practitioner)
Contain commonly accepted practices	Incomplete in width
Practitioner driven	'How to' (recipe)
Vendor neutral	Hard to read
Guide (non-prescriptive)	Have a Vendor opinion
Facilitate evaluation of solutions	Have a specific solution opinion
Consistent within itself	Prerequisite any specific software

The LEAD BOK summarizes the way of thinking and way of working for each LEAD objects, showing how it exists in its layer and therefore its role within the modelling disciplines.

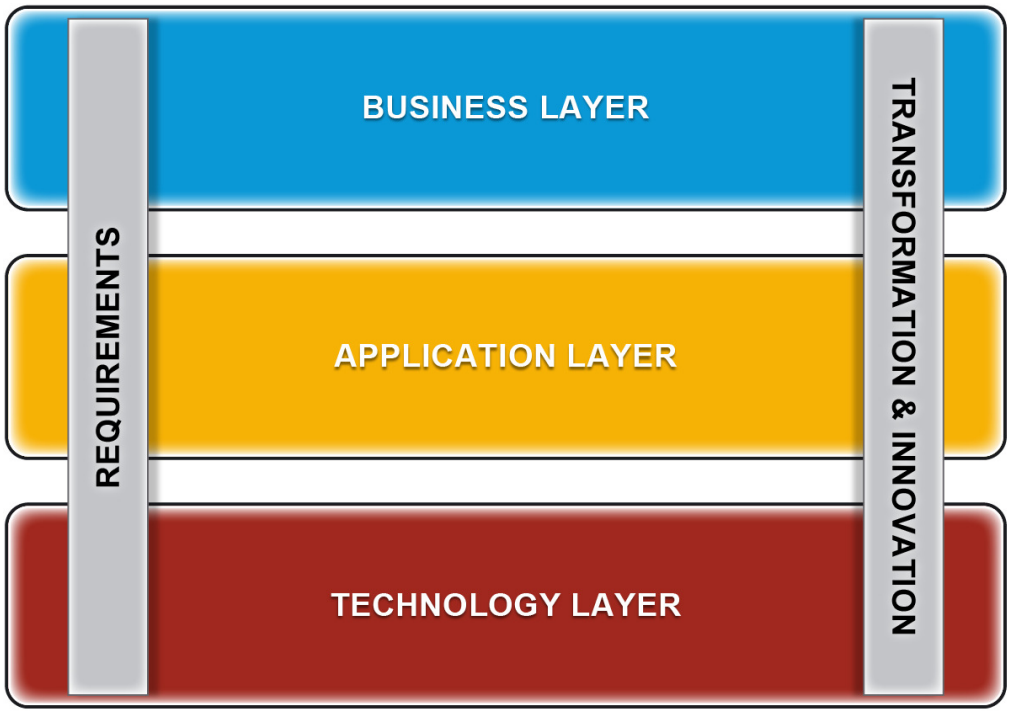
Additional details about how the BOK is used in analysis, architecture, and design can be found in other LEADing Practices Reference Material, including the Way of Modelling of each of the LEAD Objects, which is identified in the specification of the LEAD meta model and LEAD Object Specification.

Layered Enterprise Architecture Development (LEAD)

The main principle behind the Layered Enterprise Architecture Development (LEAD) concept, and what makes it different from other, more traditional Enterprise Architecture frameworks, is the fact that it does not only work in domains, but across layers (business, application, and technology). The ability to work across layers and thereby simultaneously work within multiple domains through the use of the decomposition and composition of meta objects, effortlessly integrate the right objects across the different layers when interlinking the different enterprise modelling, engineering and architecture principles.

The Layered Enterprise Architecture Reference Content consist of the following:

- Business Layer
- Application Layer
- Technology Layer



((o))LEADing Practice LEAD Layer Structure Source: www.LEADingPractice.com

Figure 1 – A view of the Layered Enterprise Architecture

The terms "layer" is used when representing the orientation of the different conceptual or physical objects that make up an entire level. For example, the Application Layer is supposed to be designed to provide some functions about what the systems (application) can do, with all its logical and physical application components, application functions, application tasks, application services as well as the application roles, screen flow and application interfaces. The idea to think in layers, also considers aspects that are interrelated between the various layers. For example, business layer users can log in a system, and in this application action (login), application layer codes will be the client codes for the Infrastructure Layer, in which retrieves User domain object and apply this object's methods to implement the 'login' function. They can automate with the various application tasks, parts or full parts of a business process.

Being able to think and work in layers includes the architecture description of the individual layers as well as the formal description how they are organized and a representation of how they interact,

A system architecture can comprise system components, the externally visible properties of those meta objects, the relationships (e.g. the behavior) between them. It can provide a plan from which products can be procured, and systems developed, that will work together to implement the overall system.

The LEAD Meta Objects spread among the three main layers, have various different enterprise modelling, engineering and architecture principles appropriate for handling the different tasks, correlations, relationships and connections. As a matter of fact do the mentioned Meta Objects not only have one associations and correlations, but multiple interaction points within one layer and across the layers.
To identify and capture all of these objects and their relations correctly within the structural way of working and modelling, it is necessary to understand the decompose meta objects in terms of their ontology and nature as well as the different semantic relations they are connected with (e.g. competency, function, process, service, role, flow, application, media, channel, etc.).

As shown in the below information example, each layer's tasks and functions are defined by its needed task and objects (that are requested) "n'th layer protocol" (1st layer, 2nd layer, etc.). The semantic relations between the various objects are thereby dependent upon the functions that a layer

wants to provides (based on the meta object used) and the layers relationship in terms of linking and 'using" the other meta objects services since a layer provides a set of functions and tasks and thereby services to its upper layer. In turn, the upper layer uses the lower layer's services (functionality and tasks) to achieve its own functions (services).

A higher layer can therefore be seen as a service user since it uses the services provided by its lower layer. A lower layer can therefore in the layered architecture approach be seen as a service provider

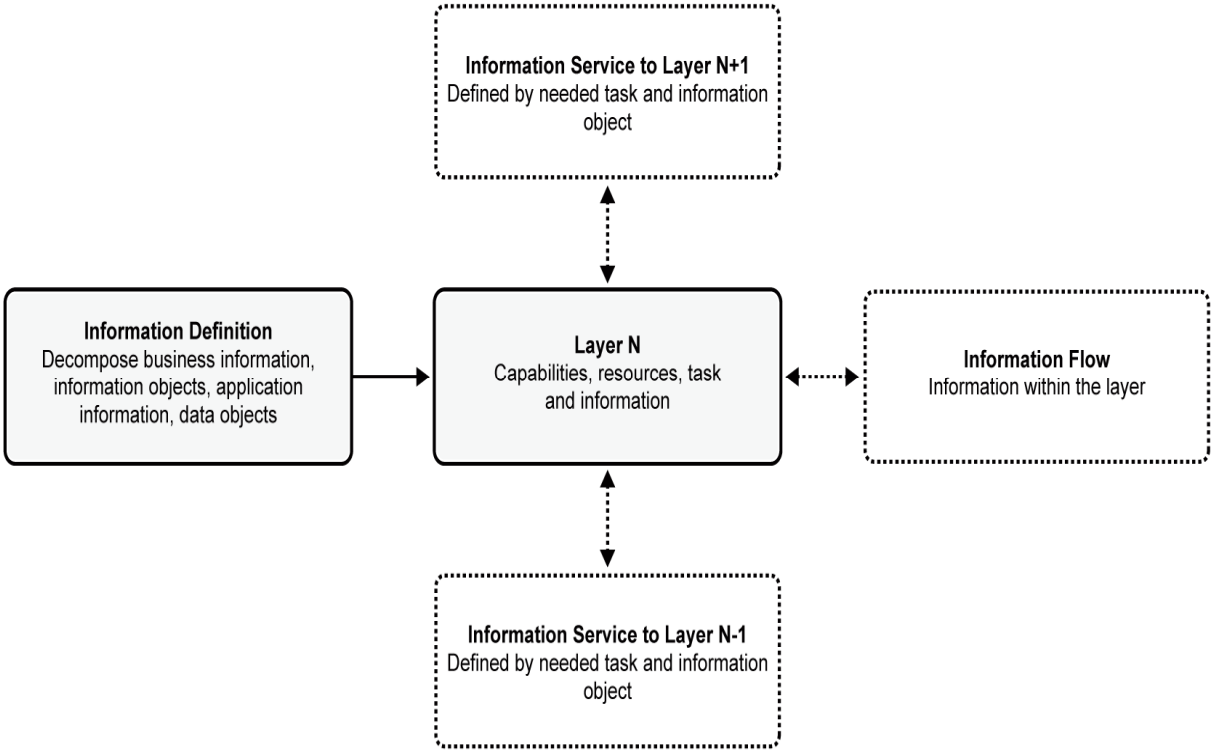
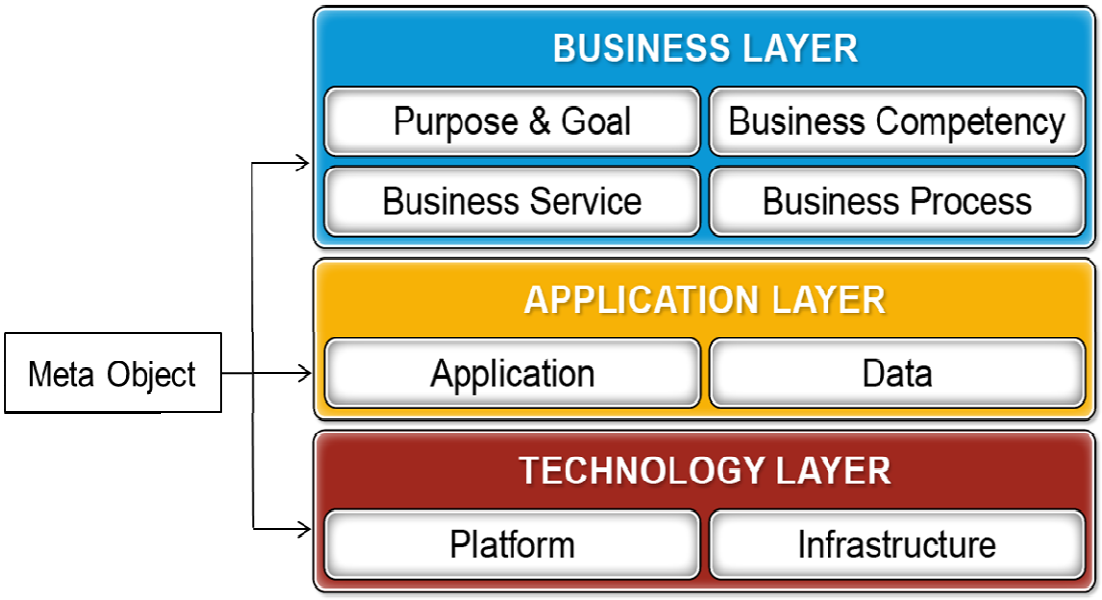


Figure 2 - Example, of how meta objects relate within and through the various layers

To achieve the right alignment between layers such as business and IT, one would have to decompose the business and compose into IT the right way. Working an attaching the different layers and their objects in the right way is a challenging task and this is where the LEADing Practice Reference Content uses decomposition and composition principles among the layers and its specific objects.



((o))LEADing Practice Layered Enterprise Architecture Reference Content [#LEAD-ES40001AL]

Figure 3 - Example of how the business, application and technology layer could and should interact with different meta objects within the layers

The Layers and the related Meta Objects.

Working with object in the right layer and relating together in the right way is an important task. For this we have identified 114 Meta Objects that are unique to the layer as well as the cross layers. The identified Meta Objects are entities that manipulate, create, describe, or implements other objects. These meta object define the object's type, relation attributes, functions, control structures, etc. Below is a list of these meta objects and their description. Each of these entities captures a technique in which the meta objects which are described in words and statements to distinguish the characteristic or quality it contributes to the body of knowledge.

In order to have a structured way of thinking, working and modelling across the layers the following three main properties characterizing the meta-objects relevant to modelling and architecture principles across the layers are applied:

- **Identity:** the decomposed objects that distinguishes it from other meta-object areas.
- **State & Nature:** describes the purpose of the decomposed object.
- **Behaviour:** describes how the decomposed or composed objects can be used with other meta-object's relations across other modelling disciplines and architectural layers.

The understanding of where which of the objects relate, goes hand in hand with an explicit description (constructs, full relations and rules) of how the specific model are built. In particular, this comprises a formalized specification of the layer and or domain-specific notations. The layers and the domains within the layers are – and always should follow - a strict rule set.

1. Ontologies: express something meaningful within a specified universe or domain of discourse by utilizing a grammar for using vocabulary. The grammar specifies what it means to be a well-formed statement, assertion, query, etc. (formal constraints) on how terms in the ontology's controlled vocabulary can be used together.
2. Semantics: The notion of semantics is very important to the various models within the layers. The term "semantic" reflects the need to not only model something in the real world, but to model the meaning and relations that this something has for the purpose of the layer and its semantic relations.
3. Rules: Because it is all about "precising" the relationships rules and their meaning. The layers are built on a strict rule set, derived from a object relationship-attribute and object-oriented Modelling perspective

Business Layer

The Business Layer describes the deliverables within the Business layer e.g. the Business Goals and Business Competencies are linked to Business Requirements and Business Processes.
The concept is built upon the idea of the interlinked layers and objects.

While the business layer objects may have different modelling principles, they do however still have correlations, relationships, and/or connections with each other and that these need to be, as described below, connected in the correct way:

- Business competencies create and work with business objects to execute the defined goals.
- Business goals define the reason and purpose of the business object.
- Rules are set in place to govern the business, information and data objects (the different rules are, however, defined differently for the different objects and areas).
- When business competencies deliver business services, they have activities (business processes) which interact with the business objects as well.
- Business competencies/functions and processes have business roles.
- Business roles work with both business objects as well as information objects.
- Business objects may contain information object

Layer	Group	"Meta Object	"Description
Business	Purpose & Goal (Value)	**Forces (external/ internal)**	An external or internal factor which pushes some aspect of an enterprise in a specific direction.
		Driver	An external or internal factor which influences and pushes some aspect of an enterprise in a specific direction.
		Value Indicator (Critical Success Factor)	Any of a series of metrics used by an enterprise, to indicate its overall ability to achieve its mission.
		Value Expectation	The anticipated benefits that are of worth, importance, and significance to a specific stakeholder.
		Value Driver	A factor which is based on benefit or merit which pushes some aspect of an enterprise in a specific direction.
		Value Proposition	The merit and benefit that a customer, added value partner, or the market itself can obtain from their perspective and point of view.
		Performance Indicator	Any of a series of metrics used by an enterprise, to indicate its overall success or the success of a particular area in which it is engaged.
		Performance Expectation	The manner in which, or the efficiency with which, something reacts or fulfils its intended purpose as anticipated by a specific stakeholder.
		Performance Driver	Those variables that are critical to develop the means and overall performance of an enterprise.
		Vision	The desired future state of the enterprise, an imagination of the future aspirational state of how the enterprise could or should be like without regard the how this will be achieved.
		Mission	The purpose and nature of the enterprise.
		Strategy (Strategic Business Objective)	The direction and ends which the enterprise seeks, as well as the means and methods by which these ends will be attained.
		Goal (e.g. business, application, technology)	A desired result considered a part of the organizational direction, aims, targets, and aspirations.
		Objective (Critical Success Factor)	Time-bounded milestones to measure and gauge the progress towards a strategy or goal.

Layer	Group	"Meta Object	"Description
		Quality	A state of excellence or worth, specifying the essential and distinguishing individual nature and the attributes based on the intended use.
		Risk	The combined impact of any condition or events, including those caused by uncertainty, change, hazards, or other factors that can affect the potential for achieving these objectives).
		Security	The objects or tools that secure, make safe and to protect through measures which prevent exposure to danger or risk.
		Business Measure	Any type of measurement used to gauge some quantifiable component of an enterprise's performance
		Report	The exposure, description, and portrayal of information, about the status, direction or execution of work within the functions, services, processes, and resources of the enterprise.
		Timing	A plan, schedule, or arrangement when (something) should happen or be done or to take place.
	Business Competency	**Organizational Construct**	The components of the organization and how they are assembled.
		Organizational Unit	A self-contained unit of resources with strategic business objectives, critical success factors, goals and measures.
		Business Area	The highest level meaningful grouping of the activities of the enterprise.
		Business Group	An aggregation within an enterprise which is within an enterprise Area.
		Business Capability	An enterprise capability is an abstraction that represents the ability to perform a particular skillset i.e. function, process or service.
		Business Competency	An integrated and holistic set of related knowledge, skills, and abilities, related to a specific set of resources (including persons and organizations) that combined enable to do something well.
		Resource	A specific person, expertise, data, information, materiel, machine, land, capital or organization that is required to accomplish an activity, or as means to undertake an enterprise and achieve desired outcome.
		Actor	A person, organization, or system that has a role that initiates or interacts with activities. Actors may be internal or external

Layer	Group	"Meta Object	"Description
			to an organization.
		Business Role	A part that someone or something has in a particular defined function, activity or situation. A resource/actor may have a number of roles.
		Business Function	A cluster of tasks creating a specific class of jobs.
		Business Owner	A role performed by an actor with the rights, rules, competencies, and capabilities to take decisions for the part of enterprise for which stewardship responsibilities have been assigned.
		Cost	An amount that has to be paid or given up to obtain the use or access to something.
		Revenue	The realized income of an enterprise or part thereof.
		Business Object	A real world thing, which relate to the enterprise's means to act.
		Product	A result and output generated by the enterprise. It has a combination of tangible and intangible attributes (features, functions, usage).
		Contract	An agreement between two or more parties that establishes conditions for interaction.
		Business Rule	A statement that defines or constrains some aspect of behavior within the enterprise and always resolves to either true or false.
		Business Compliance	The process or tools for verifying adherence to rules and decisions.
		Location	A point, facility, place, or geographic position that may be referred to physically or logically.
		Business Channel	A means of access or otherwise interacting within an enterprise or between an enterprise and its external partners (customers, vendors, suppliers, etc.)
		Business Media	The material or matter used to store information (printed page digital tape and disk as well as non-volatile storage, screen, or memory.
		Business Workflow	A stream, sequence, course, succession, series, progression as well as order for the movement of information or material from one enterprise function, enterprise service, enterprise

Layer	Group	"Meta Object	"Description
			activity (worksite) to another.
	Business Service	**Service Construct (setup and delivery)**	The set up and arrangement, which creates, organizes, and delivers business services.
		Service Area	A high level, conceptual, aggregation of provided business services.
		Service Group	An aggregation of services based on a common factor or domain which exist within a common service area.
		Business Service	The externally visible ("logical") deed or effort performed to satisfy a need or to fulfil a demand, meaningful to the environment).
		Service Flow (incl. output/input)	A set of one or more service input output states, where each service state defines a step in the service flow that when entered executes a behavior.
		Service Measurement (SPIs & SLAs)	The basis by which the enterprise evaluates or estimates the nature, quality, ability, or extent of the services, the commitments of a business service are assessed.
		Service Owner	A role performed by an actor with the rights, rules, competencies and capabilities to take decisions for the business service for which accountability has been assigned.
		Service Role	A specific and prescribed set of expected behavior and rights (authority to act) that is meant to enable its holder to successfully carry out his or her responsibilities in the delivery of value. Each role represents a set of allowable actions within the organization in terms of the rights that are required for the enterprise to operate.
		Service Rule	A statement that defines or constrains some aspect of the creation of value within the enterprise.
		Service Channel	A logical or physical communication path used to requisition provision or deliver outputs to or by business services.
	Business Process	**Process Area (categorization)**	The highest level of an abstract categorization of processes.
		Process Group (categorization)	A categorization and collection of processes into common groups.
		Business Process	A set of structured activities or tasks, with logical behavior that produce a specific service or product

Layer	Group	"Meta Object	"Description
		Process Step	A conceptual set of behaviors' bound by the scope of a process which, each time it is executed leads to a single change of inputs (form or state) into a single specified output. Each process step is a unit of work normally performed within the constraints of a set of rules by one or more actors in a role that are engaged in changing the state of one or more resources or enterprise objects to create a single desired output.
		Process Activity	A part of the actual physical work system which specifies how to complete the change in the form or state of an input, oversee, or even achieve the completion of an interaction with others actors and which results in the making of a complex decision based on knowledge, judgment, experience, and instinct.
		Event	A state change that recognizes the triggering or termination of processing.
		Gateway	Determines forking and merging of paths, depending on the conditions expressed.
		Process Flow (incl. Input/output)	A stream, sequence, course, succession, series, progression, all based on the process input output states, where each process input/output defines the process flow that together executes a behavior.
		Process Role	A specific and prescribed set of expected behavior and rights (authority to act) that is meant to enable its holder to successfully carry out his or her responsibilities in the performance of work. Each role represents a set of allowable actions within the organization in terms of the rights that are required for the enterprise to operate.
		Process Rule	A statement that defines or constrains some aspect of work and always resolves to either true or false.
		Process Measurement (PPI)	The basis by which the enterprise evaluates or estimates the nature, quality, ability, extent, as to whether a process or activity is performing as desired.
		Process Owner	A role performed by an actor with the fitting rights, competencies, and capabilities to take decisions to ensure work is performed.

Table 1: Business Layer meta objects and their description

Application Layer

The Application Layer describes the features and objects within the application, data, and Information Architecture. The maps, matrices, and models of this layer depict how Data Goals, Data Flow & Service, Data Requirements, and Data Components are linked to Application Goals, Information Flow & Service, Application Requirements, and Application Flow & Component. The Application layer objects have their own unique modelling principles, however, they do still maintain correlations, relationships, and/or connections with each other and that these need to be, as described below, connected in the correct manner:

- Applications can automate one or more processes (business processes), which interact with the business objects, information objects and data objects.
- An application is decomposed into one or more application component(s).
- Application components host data objects.
- Data objects are called upon and used and thereby processed within information objects.
- An application component is decomposed into one or more application module(s).
- An application module is decomposed into one or more application function(s).
- An application function defines (a part of) an application service flow (which supports the business service flow).
- An application service is related to one or more application function(s).
- Application functions work through information objects with business objects.
- An application function is decomposed in multiple application tasks.
- Also application service can be decomposed in application tasks.
- Application tasks create, read, update and delete data and therefore work with data objects.
- The application task triggers one or more application features.
- An application feature is related to one or more application function(s) and thereby application features work with information objects.
- Application tasks work through the application functions with the information objects and thereby the real-world business objects.
- Application users have roles that use the application functionality that call upon information objects.
- In an application, the information objects called upon by a user are processed data objects.
- All objects use both media and channels.

- Business roles interact with both manual and automated processes and deliver both manual (business) and automated (IT) services

Layer	Group	"Meta Object	"Description
APPLICATION LAYER	Application	**Logical Application Component**	An encapsulation of application functionality that is independent of a particular implementation.
		Physical Application Component	A deployable part of a software product, providing identifiable functions and existing within a specific version of the product.
		Application Module	A single executable part, which is part of a larger *application*, providing identifiable functions and existing within a specific application component.
		Application Feature	A notable property or characteristic of an application can include a trait or design constraint.
		Application Function	The specification of a significant aspect of the internal behavior of the application which acts as a broader description of a set of application features.
		Application Task	The automated behavior of a process activity performed by an application.
		Application Service	An externally visible unit of functionality, provided by one or more components, exposed through well-defined interfaces, and meaningful to the environment.
		Information Object	Information about the real world objects, this can be in any medium or form.
		Application Owner	A role performed by an actor with the rights, rules, competencies and capabilities to take decisions for the application for which accountability has been assigned.
		Application/System Flow	The specification of the sequence in which two application tasks processes, or an application task and an application event or gateway are executed, one of which provides an output, which is an input to the other.
		System Measurement	Measures that are defined and implementable within an application.
		Application/System Report	Reports that are defined and implementable or implemented within or by an application.

Layer	Group	"Meta Object	"Description
		Application/System	A collection of software adding capability to the enterprise through its ability to enable work.
		Application Roles	A role performed by an actor with the rights, competencies, and capabilities to take decisions about an application, its behavior, and properties.
		Application Rule	A business rule implemented within and able to be executed by an application.
		Application Compliance (incl. Security)	Behavior or ability within an application whereby it can certify the integrity of its behavior.
		Application Media	Material or matter used by an application as the source or method of accepting or providing inputs and outputs.
		Application Channel	A physical communication path used by one or more applications to requisition, provision, or deliver outputs.
	Data	**Data Component**	A cohesive collection of data that is part of an application.
		Data Object	A logical cluster of all sets of related data representing an object view of a business object.
		Data Entity	An encapsulation of data. Logical data entities are specification of the organization of the information to store the data as a physically persistence structure e.g. data tied to applications, repositories, and services.
		Data Table	A physical specification of the means of arranging data in rows and columns while be stored in physically persistence structure.
		Data Service	A standards-based, uniform means of accessing information in a form useful to enterprise applications without requiring knowledge of its physical persistence structure.
		Data Flow	The specification of the sequence in which data moves from one state to another.
		Data Owner	A role performed by an actor with the rights, competencies, and capabilities to take decisions about the aspects of data for which stewardship responsibilities have been assigned.
		Data Rule	Criteria used in the process of determining or verifying values of data or generalizes certain features of data.
		Data Compliance (incl.	The means of adhering to and verifying adherence to

Layer	Group	"Meta Object	"Description
		Security)	policies and decisions about the data.
		Data Media	The matter or material used to store physical persistent data.
		Data Channel	A physical communication path used to requisition, provision or deliver data.

Table 2: Application Layer meta objects and their description

Technology Layer

The Technology Layer describes the deliverables within the platform and infrastructure areas. The maps, matrices and models depict how Platform Goals, Platform Flow & Service, Platform Requirements and Platform Components are linked to Infrastructure Goal, Infrastructure Flow & Service, Infrastructure Requirements and Infrastructure Component.

Also the Technology Layer objects have different modelling principles, however, they do still have correlations, relationships and/or connections with each other and that these need to be, as described below, connected in the right way. Below is a technology layer example working across the layers:

- A platform is used to enable an application on several hierarchical levels: platform component enables application component, platform service enables application service and platform service element enables application task.
- The application components and modules reside on infrastructure components. Infrastructure services support the platform, data and application services.
- The business service in the business layer is automated by the application service, data service (application layer), platform service and infrastructure service (technology layer).

As mentioned does each layer of business, application and technology has different models and modelling principles appropriate for handling the different tasks, and these principles have more correlations, relationships and connections than what currently exists in most other Enterprise Architecture approach.

Layer	Group	"Meta Object	"Description
TECHNOLOGY LAYER	Platform	**Logical Platform Component**	An abstract description of the features of the pre-existing environment the application software is expected to have to allow it to execute.
		Physical Platform Component	A discrete physical item within the pre-existing environment the application software executes and which is part of a platform device.
		Platform Device	A set of platform components configured to act as a modular part of a platform.
		Platform Function	The specification of a significant job and or task of the internal behavior of the platform.
		Platform Service	A technical delivery task required to provide enabling platforms that supports the delivery of one or more parts of an application.
		Platform Owner	A role performed by an actor with the fitting rights, competencies, and capabilities to take decisions about the platform devices for which stewardship responsibilities have been assigned.
		Platform Rule	Criteria used in the process of determining the behavior of the platform.
		Platform Compliance (incl. Security)	The means of adhering to and verifying adherence to policies and decisions about the platform.
		Platform Media	The matter or material provided by a platform as the source or method of storage data
		Platform Channel	A physical path used by a platform to host an application software
	Infrastructure	**Logical Infrastructure Component**	An abstract description of the features of the pre-existing environment the platform requirements to operate.
		Physical Infrastructure Component	A discrete physical item within the pre-existing environment the platform operates and which is part of an infrastructure device.
		Infrastructure Device	A set of infrastructure components configured to act as a modular part of the infrastructure.

Layer	Group	"Meta Object	"Description
		Infrastructure Function	The specification of a significant aspect of the internal behavior of the infrastructure which acts as a broader description of a set of infrastructure features.
		Infrastructure Feature	A notable property or characteristic of the infrastructure, can include a trait or design constraint.
		Infrastructure Service	A technical capability required to provide enabling infrastructure that supports the delivery of one or more parts of a platform.
		Infrastructure Owner	A role performed by an actor with the rights, competencies, and capabilities to take decisions about the components within the infrastructure for which stewardship responsibilities have been assigned.
		Infrastructure Rules	Criteria used in the process of determining the behavior of the infrastructure.
		Infrastructure Compliance (incl. Security)	The means of adhering to and verifying adherence to policies and decisions about the infrastructure.
		Infrastructure Media	The matter or material provided by a platform as the source or method of transmission of data
		Infrastructure Channel	A physical communication path used by an infrastructure component to provide the resources needed by a platform.

Table 3: Technology Layer meta objects and their description

Way of Working with the layers and the Meta Object

In terms of the way of working with the layers, it provides an agile way to capture the right and relevant objects throughout the layers. It is a means to an end. Newer studies reveal[1] that more than 70% of all IT projects suffer and have failed in terms of being on time, quality and budget, because of a lack of effective modelling principles. Most IT practitioners however blame it on technology-driven issues, but studies, even around SAP[2] has proven that less than 10% were perceived to have failed because of technology-driven causes. All IT blueprint, development, implementation and maintenance groups and departments would fundamentally do things better if they would have a common way of working and modelling their objects throughout the entire enterprise artifacts/models. Therefore purpose of any enterprise artefact/model is to either understand the business or to provide the means to support how to construct or support some aspect of it.

An effective way how to capture the relevant objects in the layers is using artefacts that have been design to capture the object and relate it across the relevant layers and thereby subjects. For this LEAD uses 3 specific types of Enterprise Models (architects often refer to them as artefacts and engineer as models):

- A **LEAD Map** is an accurate list and representation of the decomposed and/or composed the relevant Meta Objects. A LEAD Map is often in the form of a list (or lists within lists) that can be in a simple set of rows, or as a catalog, and has the purpose of building an inventory or index list of the objects that are to be either decomposed and/or composed in the different Layers (e.g. Business Layer, Application Layer and/or Technology Layer).
- A **LEAD Matrix** is a representation that accurately shows the relationship between specific decomposed and composed relevant Meta Objects. The core idea of a matrix is that it typically consists of aspects of one idea each in a list or row, another idea as a set of columns and a third as the cross product between the rows and columns. This allows the LEAD Matrix to relate the unfamiliar to the familiar objects in the different layers (composition) usually through the form of a table or chart e.g. rows and columns in a matrix, thereby outlining direct connection points and showing a common pattern of the relevant Meta Objects.
- A **LEAD Model** is a representation that graphically shows the relationship and the interconnection of specific composed relevant Meta Objects. The key ideal of a model is that it is a graphical representation, an illustration, of a composition of information intended to represent an aspect of an enterprise (e.g. business, application and/or technology) using a specific set of rules which express a logic or grammar. Based on already acquired information from either a LEAD Map or a LEAD Matrix (or both), a LEAD Model is usually crafted to enable complex information to be communicated more easily to stakeholders, management and leadership within their domain through the use of a more detailed, graphical illustration and/or depiction.

The mentioned Enterprise models may be used to capture a structural view, behavioural aspect, or the decomposition or composition of the components of which the layers (business, application and

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[1] McKinsey & Company study "Beyond Performance" 2010 conclude that 72% of transformation programs fail to deliver their actual targets due to internal organizational modelling issues.
Deloitte Global Survey 2008 conclude that over 70% of IT projects fail to deliver any business value due to a lack of common IT modelling principles.

[2] SAP Project implementation analysis 2011: http://www.sdn.sap.com/irj/scn/go/portal/prtroot/docs/library/uuid/e0c94c57-1434-2d10-2a91-8e242c17fb8a?QuickLink=events&overridelayout=true

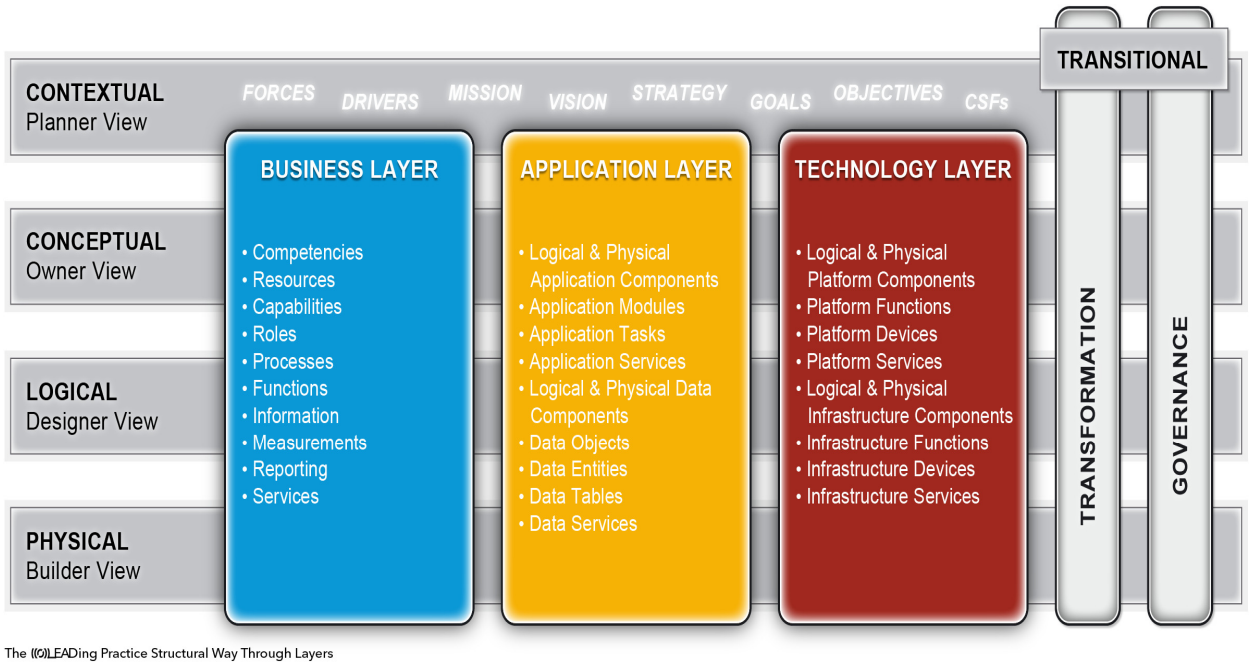
technology) are, might, or should be assembled. In addition, the LEAD artefacts may be contextual, logical, or physical in nature.
A structural artefact expresses some aspect of the static organization of a feature or set of features within the enterprise. Structural Enterprise models may express ideas about the relationship between business objects, organizational structure, or any aspect of the business which does not, in its nature or in the viewpoint, move.

Behavioural Enterprise models express how some aspect of the functioning enterprise will work, or how, for example, the flow of control or data may behave or be expected to behave, by presenting some aspect of the dynamic nature of the enterprise. Within the structural way of thinking, a decomposition map, matrix, or model shows how the larger parts of the enterprise organize, or are decomposed to more simple components, as the means to explore and find the full inventory of primitive components needed for the business to achieve its purpose, deliver value, and to control cost.

Finally, a composition map, matrix or model shows how the primitives found during decomposition may be assembled, reorganized, or reassembled within the architectural principles of the enterprise to create the aspects of the enterprise it requires to have the structure and behaviour requisite for it to be fit to purpose and deliver the required value.

Working with Enterprise Models at different abstraction Levels and Views

Generally the enterprise may be viewed within four levels[3]. As can be seen in figure At the highest level the contextual, then the conceptual level.This is then followed by the logical and then the physical level.



The ((O))LEADing Practice Structural Way Through Layers

Figure 4- *basic illustrative perspective of the various views, the relationship to contextual, conceptual, logical and physical way of thinking and modelling*

The figure 4 levels and views should be understood the following ways:

- "Contextual Models" are the perspective of the Planners of the Enterprise
- "Conceptual Models" are the perspective of the Owners of the Enterprise
- "Logical Models" are the perspective of the Designers of the Enterprise
- "Physical Models" are the perspective of the Builder's of the Enterprise.

What differentiates the views and models is not levels of details, the models in the different Rows are different views and subsequently different context in terms of purpose and goals to the models. The reason this is so important is that the different views have all different value potential e.g. purpose and goals and *as a result* the different views have their specific transformation potential and governance concept that need to be explored and interlinked throughout the layers (see figure 2 and 3). The views are therefore not a decomposition view. Decomposition and composition happens through the relevant objects across the views and their models (see figure 2 and 3).

The terms "Contextual, "Conceptual", "Logical" and "Physical" are used in the context of the ENTERPRISE in which case, "Contextual" means the Planners view and models, "Conceptual"

[3] John A. Zachman, Henrik von Scheel & Mark von Rosing, The focus of Enterprise Architecture, The Complete Business Process Handbook, Morgan Kaufman, 2014

means the Owner's view and models, "Logical" means the Designer's view and models and "Physical" means the Builders view and models. One could use the terms "Contextual", "Conceptual", "Logical" and "Physical" relative to an application or a system to mean high level, medium level and excruciating level of detail, given an indication of way of thinking, way of working and a way of modelling (building) but that is not all, one can and should use it relative to the ENTERPRISE. [4] An abstraction that represents and considers the enterprise as a whole. As illustrated in figure 2, an enterprise should be considered as a whole which subsequently includes the views and models that capture the:

- Business Perspective such as the resources, roles, enterprise competencies, enterprise capabilities, functions, process, and service
- Application Perspective such as the application components, application modules, tasks, application services, as well as the data components, data objects, data entities, data tables and data services
- Technology Perspective such as the platform components, platform function, platform devices and platform services, as well as the infrastructure components, infrastructure functions, infrastructure devices, infrastructure services

Below is an example of enterprise layers with relevant meta objects and how the relate to multiple views.

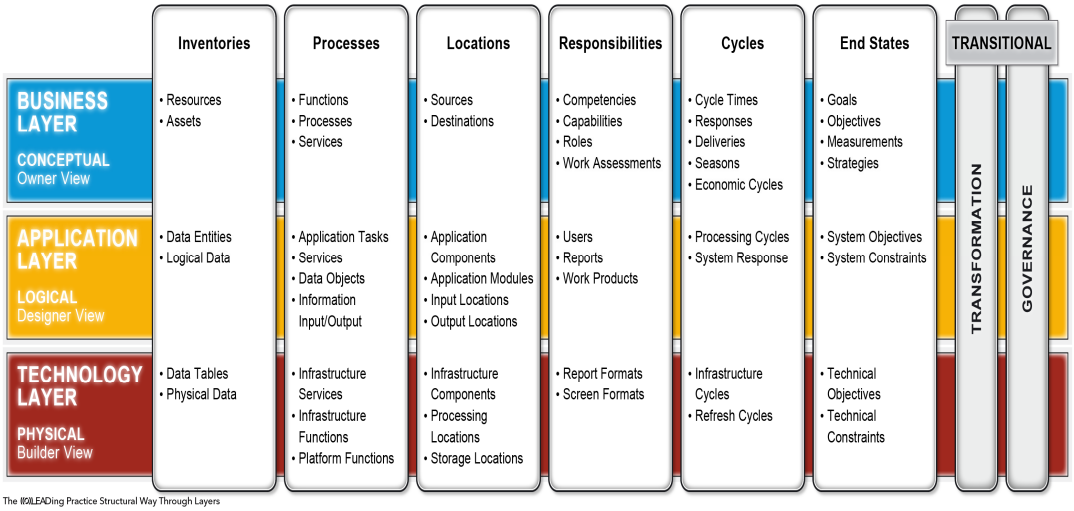


Figure 5) example of enterprise views and subjects modelled through the enterprise layers[5]

While Enterprise Architecture is relative, it is very precise and it is not arbitrary, it is absolute in the context of the ENTERPRISE.

[4] A new way of thinking, working and modelling Information & Applications, The Application Reference Framework, von Rosing, M., von Scheel, H. ,Academic Pub, 2013-08

[5] John A. Zachman, Henrik von Scheel & Mark von Rosing, The focus of Enterprise Architecture, The Complete Business Process Handbook, Morgan Kaufman, 2014

For that reason, the Enterprise Architecture principle that applies is an agile way of working, wherein the Enterprise Architecture one works on depends 1) what one is trying to do 2) which roles are involved. If you are trying to transcribe the Executive Stakeholder's (the "Owner's") perspective, one will be working on the conceptual models e.g. the Business Concepts Models. If one however, is the Architect (the "Designer") trying to design the system logic to support the Executive Stakeholder's concepts, one would be working on the Systems Logic Models. If you however, are the Engineer (the "Builder") trying to build the systems as designed by the Architects, you will be working on the Technology Physics Models, etc.,. For further specification, if you were working on the Business Processes, one would be working on the Process Models and so on. There is therefore a connection between the views, roles involved, the concern/challenge and or goal they need to solve and which models in terms of artefacts they work with.

Therefore, while Enterprise Architecture is relative in that it needs to be very Agile in the way of thinking, working, modelling and implementation, it is still absolute. There is a well-defined set of descriptive representations that constitute Enterprise Architecture. Just like there is a well-defined set of descriptive representations that constitute architecture for buildings, airplanes, locomotives, battleships, computers, automobiles, oil refineries, space shuttles, nuclear reactors and every other complex object humanity has ever built.

Architecture for anything is not arbitrary. If every Building Architect, General Contractor, Airplane Manufacturer, Electrical Engineer, Aeronautical Engineer, Plumber, Manufacturing Engineer, Electrician, Lathe Operator, and Dry Wall Hanger decided that architecture was whatever they wanted it to be, it would be chaos. We would not have hundred story buildings, Boeing 747's, super computers, PC's, ocean liners any other complex object. We would still be living in log cabins, riding horses, shooting muzzle- loaders, writing on parchment paper and using candles.

Not understanding this basic but important principle is what is killing Enterprise Architecture work all over the globe. Every computer programmer, systems designer, software architect, solutions architect, technology architect, computer operator, PC owner, data architect, database architect, network architect, business analyst, systems analyst, enterprise architect, service architect, object architect, project manager and CIO calls whatever they want to or maybe, whatever they are doing, "Architecture". How can something without a joint structure, standards or even view be architecture? It is more disturbed and siloed engineering and modelling that if solved need principles from chaos theory. No wonder we don't have Enterprises that are coherent, integrated, flexible, dynamic, interoperable, reusable, aligned, lean and working.

As long as we continue to do siloed modelling and architecture, we are going nowhere. We are just adding to the legacy. "Keeping on doing the same thing and expecting different results is one definition of insanity" (Albert Einstein). In LEAD we therefore follow the *ISO 42010*[6] *as the* fundamental concepts or properties of any system, in its environment embodied in its elements, relationships, and in the principles of its design and evolution.

[6] ISO/IEC/IEEE 42010:2011, *Systems and software engineering — Architecture description.*

Before going through views and layers, it is useful to understand the *context of architecting*. Figure 6 depicts key elements of the context, following ISO/IEC/IEEE 42010. We briefly describe it and then "translate" it to a layered architecture concept.

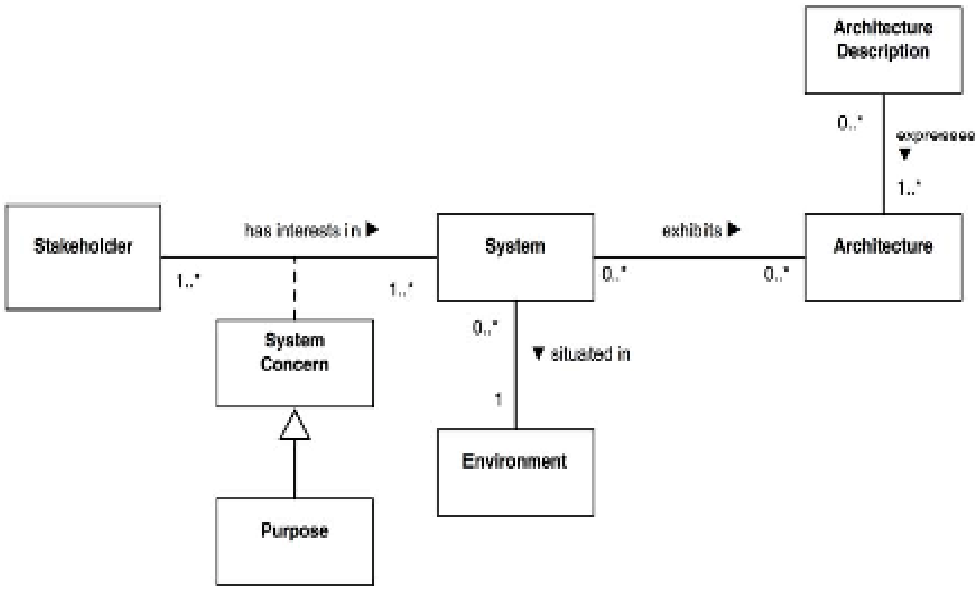


Figure 6. Architecting in context (taken from ISO/IEC/IEEE 42010)

Systems can be any subjects of interest: man-made systems, natural systems, organizations, process systems, etc. Each system is located in its **Environment** – the sum total of influences on that system. A **System** with its relevant meta objects and its relations and flows etc., is situated in its **Environment** which could include businesses, organizations, other systems, such as services, application and data systems. Within the Environment, a system has diverse **Stakeholders** whose interests influence the System. Those interests are called **Concerns**. Generally, concerns range over "developmental, technological, business, operational, organizational, political, economic, legal, regulatory, ecological and social influences" (ISO 42010). For a Process System, these could both be value and performance concerns that the stakeholder have for a specific process, the entire process system or all the related systems as a whole. A process system's **Purpose** is one very common Concern. One way of understanding a system is to consider its **Architecture** (defined in ISO 42010 as the *fundamental concepts or properties of a system in its environment embodied in its elements, relationships, and in the principles of its design and evolution*). In this sense, a Process System has an **Architecture**, independent of whether the organization has identified and structured this architecture. To bring architecture, and therefore systems, to human understanding and control, we create models, of systems and of their architectures. An **Architecture Description** is a model, often a collection of models, used to express the Architecture of the Process System to enable understanding, analysis and modelling for various stakeholders, using various viewpoints of various concerns related to those systems.

It can therefore be summarized that conceptual level with its environment, stakeholders, concerns, the various purpose and its specific architecture can be described on a contextual, conceptual logical and physical architecture. The conceptual architecture, in the case of LEAD, the layered

architecture views, and the decomposition and composition perspectives, the logical view contains the logical architecture of a specific enterprise and the layer model and the physical level are comprised of the operational model of the enterprise in question. Together the conceptual level and the logical levels contain the functional aspects of the architectural context and design, as well as its description and specification of the environment, stakeholders, concerns and the purpose. The non-functional aspects of the enterprise are, by way of contrast, captured entirely within the concrete description of the execution details.

Any of the aforementioned levels may have views of the enterprise which may be structural or behavioural in nature, and can consist only of logical and abstract primitives. A view of the physical aspect of the enterprise will be comprised only of physical primitives and possibly also their abstract counterparts. A decomposition map, matrix, or model will consist only of logical and abstract components, whereas a composition map, matrix, or model may be comprised of primitives of any type; logical, abstract, or physical.

Logical Enterprise models, decomposition Enterprise models, and composition Enterprise models may all be used to understand the business. Physical maps, matrices, and models and composition maps, matrices, and models are all used to construct or support the business. All the Enterprise models are necessary to cover all the aspects and thereby relevant objects of the business.
Any Enterprise model may be expressed at one of three levels. While no level is better than another, each has its own properties and brings a particular value to its audience.[7]

1. Descriptive Enterprise modelling, requiring a high-level understanding of fundamental concepts of a particular rule set but does not address the complexities
2. Analytical Enterprise modelling, more detailed, showing all the steps required either to analyse features of the business.
3. Executable Enterprise modelling, where the representation becomes part of the executable of the enterprise as its level of precision is so detailed and rigorously implemented relative to its implementation specification that the “application of electricity”, by executing the rules captured in the specification, achieves “life” (causes the resulting software to exhibit the rules set out in the specification).

Enterprise Models Primitives

All of the above types of enterprise models may be expressed using various types of primitives. These primitives may represent things, actors, which have the ability to act on things, or connections between either of the other types of primitives.
In terms of the way of thinking, LEAD maps may provide:

1. Context to the circumstances that form the setting the subject or object within the map, by capturing its details or properties. For example the context shown by a competency map may detail components leading to its primitives
2. A Conceptual, or high level description of features of an object within the map by describing an object, for example the context shown by a competency map will define the purpose or nature of a competency
3. A means of making the properties of an object concrete

[7] http://www.brsilver.com/three-levels-of-process-modeling-with-bpmn/

4. Context to or of an object by allowing the analyst to understand or expose the nature of the properties of each object
5. The Specification of properties of an object within the enterprise, as with the feature or nature of a process activity map, which will expose the profile of each activity
6. Descriptions or explanations of aspects of the properties of an object
7. Understanding about the boundary or design of a competency by situating relative to the environmental variable it responds to or leverages.
8. Execution – (completing, performing & realization)

Within the way of thinking with LEAD matrices, this structure of information in this form may be used to provide:

1. Context by showing a perspective of the relationship between two sets of objects, thus providing insight as to how they relate or interlink
2. A Conceptual ,or high level description of features of the relationships between two object within the matrix by describing the nature of these relationships
3. A means of making the relationships between two or more objects concrete
4. Context to or of objects by allowing the analyst to understand or expose the nature of the relationship between two objects,
5. Specification (requirement, order/pattern & arrangement)
6. Descriptions or explanations of aspects of the relationships between two objects
7. Design – (plan, intend & aim)
8. Execution – (completing, performing & realization)

In terms of using LEAD enterprise models to enable a way of thinking, such a representation of the enterprise may provide:

1. Context as to how asset of objectives may be achieved by providing traceability to how manual operations, automation, achieves realization of some aspect, flow, structure or other feature of a situation within the perspective of viewpoint of the model
2. Conceptual (theoretical, abstract & intangible) the high level description of the logical
3. To make concrete or tangible existing or possible relationships between objects
4. A means of making the features of a complex set of objects concrete
5. The specification of the requirements of a process flow, which will show the interaction of a process activity with the involved roles and its use and transformation of resources
6. To depict and portray the relationships across the structure of a set of objects, how they behave or how they may decompose or compose
7. To explore how to achieve the intent and aim of the enterprise as expressed in this principles
8. Insight into how parts of the enterprise is or might be executed

The Way of Working with Enterprise Models

In terms of the structural way of working with enterprise models it is useful to see how the differing types of these models may be used to achieve understanding of the enterprise and to document the environment, systems, stakeholders, concerns and the purpose.

In general, in LEAD:

1. **Conceptual** maps, matrices, or models are key to providing the context to the structure of LEAD itself and of the resulting architectures. This context shapes how the designs, expressed at the logical and physical levels, will be organized and how design elements are connected

2. **Logical** maps, matrices, or models capture the implementation nature of a domain of interest. They typically seek to capture things of importance to an organization and how they relate to one another without addressing real world constraints of implementation i.e. performance, data distribution strategies, etc.
   All objects are treated as though there is never anything but exactly one instance of a component within the scope of the description with the exception that logistics aspects may be captured by recognizing the types or classifications of locations as they exist or under consideration to exist within the enterprise

3. The **physical** maps, matrices, or models describe the structure of the real world, including the effects of location, i.e. that data are replicated in multiple locations and the impact of addressing real world constraints, i.e. variations in process standards and process integration

LEAD conceptual, logical and physical enterprise models

These connections and relationships are presented by way of illustration in Figure 7– Aspects of the LEAD way of working with Enterprise Models. This figure shows how the conceptual architecture, which is done at the conceptual level, sets the context for the logical architecture and the logical models, all within the logical level. It also shows how the aspects of the logical level in turn set the context for the operational models captured at the physical level.

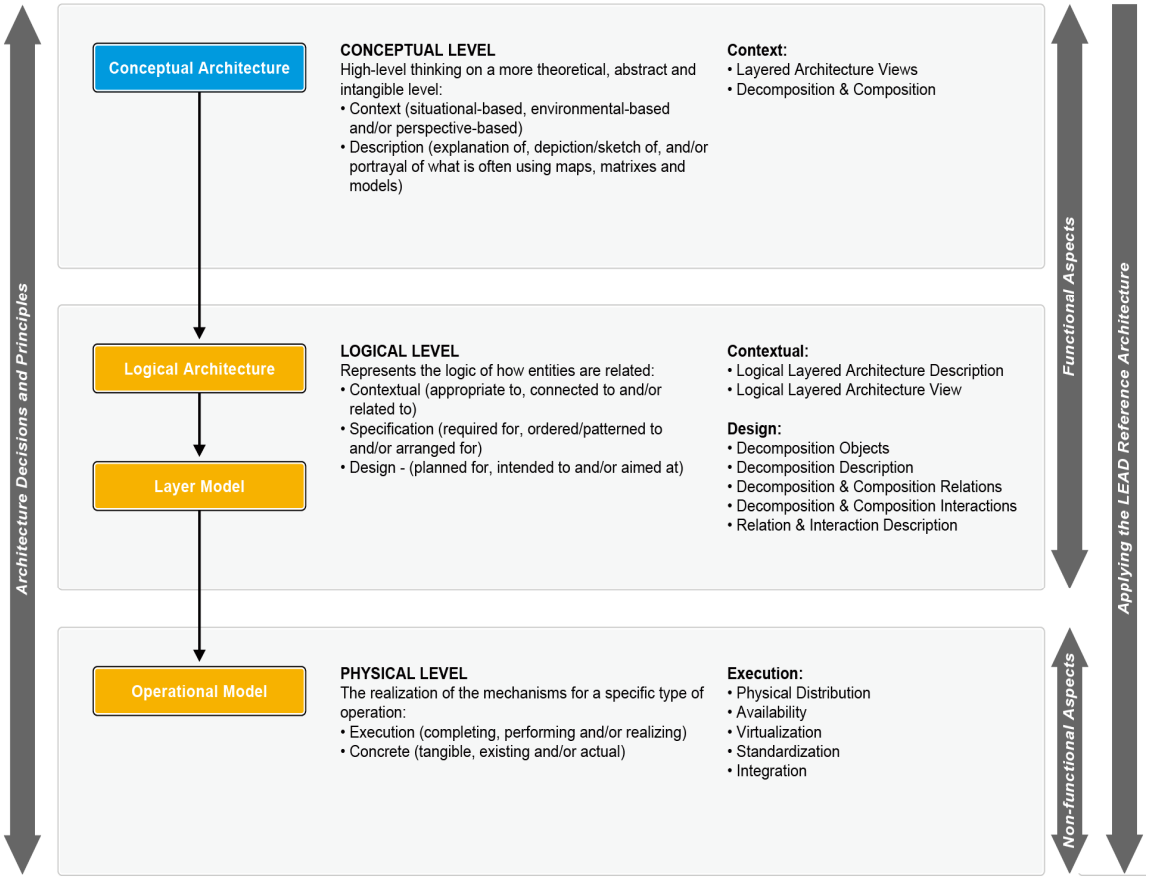


Figure 7– Aspects of the LEAD way of working with Enterprise Models

In LEAD, logical and physical Enterprise models are composite, each made up of some combination of classes of primitives based on the viewpoint of the particular type of Enterprise model. Decomposition maps, matrices, and models are not "composite" in that their purpose is not to assemble the primitive components of the enterprise into a composite view, but to allow architects to explore ways of finding the primitive building blocks from which a complete and well-formed enterprise may be derived from their larger context and to record their existence. Decomposition breaks down a contextual aspect of the business, using it to bound, level, and orchestrate the primitives extracted from the analysis.

When working with LEAD maps, information in this form provides:

1. Context by setting the properties of objects into their perspective
2. A Conceptual framework to describe the features of an object
3. Concrete capture of the existing or desired attributes or features of an object
4. Contextual (appropriate, connected & related)…
5. The specification of the requirements of objects, their order, pattern and arrangement
6. Description (explanation, depiction/sketch & portrayal often using Matrix, Map & Model)
7. Design - (plan, intend & aim)
8. Execution – (completing, performing & realization)

When working with LEAD matrices, information in this form provides:

1. Context by setting the relationships between objects into their perspective

2. A conceptual framework to describe the relationships between two or more objects
3. Concrete capture of the existing or desired relationships between two or more objects
4. Contextual (appropriate, connected & related)
5. The specification of the requirements of the relationships between two or more objects
6. Description (explanation, depiction/sketch & portrayal often using Matrix, Map & Model)
7. Design - (plan, intend & aim)
8. Execution – (completing, performing & realization)

Within the way of working with LEAD models, the organization and presentation of information in a structured model:

1. Context to the situation or viewpoint
2. Can capture conceptual or high level description of the logical components of the business and show how they relate
3. Can capture in concrete, implementation specific terms existing or target designs
4. Contextual (appropriate, connected & related)
5. Can provide a specification of the requirement for organizing a set of primitives
6. Provides a description (explanation, depiction/sketch & portrayal often using Matrix, Map & Model)
7. Design - (plan, intend & aim)
8. Execution – (completing, performing & realization)

The Way of Modelling the Enterprise Model's

Using the of LEAD way of modelling with maps, matrices, and models, the LEAD eXpert and LEAD Architect has a structured way of representing viewpoints of the enterprise in accordance with the following **10 LEAD Enterprise Modelling principles**:

1. **Structure**: This principle classifies how the work will be structured, how the work is divided up, and how the modeller ensures consistency of style and structure within and between individual maps, matrices, and models. In this regard the question that always needs to be considered is whether there is an adequate fit between the purpose and the defined structures of the individual map, matrix, or model.

2. **Expressiveness**: This principle recognizes the degree to which a given modelling technique is able to denote the models of any number and kinds of layered domains (business, application, technology).

3. **Arbitrariness**: This principle recognizes the amount of freedom one has when decomposing and composing different models on one and the same domain is based on set modelling rules or in addressing requirements. Architecturally, design decisions and the way they are represented should not be arbitrary, but should be repeatable and evidence based.

4. **Suitability**: This principle recognizes the extent to which a given modelling technique is specifically tailored for a specific kind of intended output or result.

5. **Comprehensibility**: This principle recognizes that it is preferable that the way of working and way of modelling are each relatively easy and accessible in terms of understanding what they communicate.

6. **Coherence**: This principle recognizes the desirability that the viewpoint represented by the individual map, matrix, or model is interlinked to other enterprise models and viewpoints and thereby collectively they constitute a whole (i.e. that the various classes and instances of enterprise models can be used separately, but are ultimately designed to work together).

7. **Completeness:** This principle recognizes the need for all necessary information of the LEAD frameworks, methods, and approaches be represented in the specific map, matrix and/or model (i.e. content is relevant and consistent).

8. **Efficiency**: This principle recognizes the need for relations and associations within the enterprise models (e.g. LEAD method-decomposition and composition links) are predefined and that they need to be followed so as to be useful.

9. **Effectiveness**: This principle recognizes the desirability that enterprise modelling rules and principles (e.g. layers and decomposition and composition steps) are predefined and that they need to be followed to be successful in producing a desired or intended result.

10. **Audit ability:** This principle recognizes that enterprise models build in sequence upon each other and need to pass value gates to ensure the models each individually and collectively achieve their purpose.

The layered architect will start exploring an enterprise through a process of decomposition which starts with the largest elements of the enterprise, successively breaking these elements down until the smallest behaviour and structural primitive components are found.

Using the primitive components found during decomposition, the enterprise architect and analyst may apply the architectural principles of the enterprise to assemble them into composite models. Depending which subject and thereby enterprise models the eXpert or Architect is working with different maps, matrices and/or models might be for the one modelling principle e.g. value modelling, physical and for another modelling principle like application modelling it might be conceptual and/or logical.

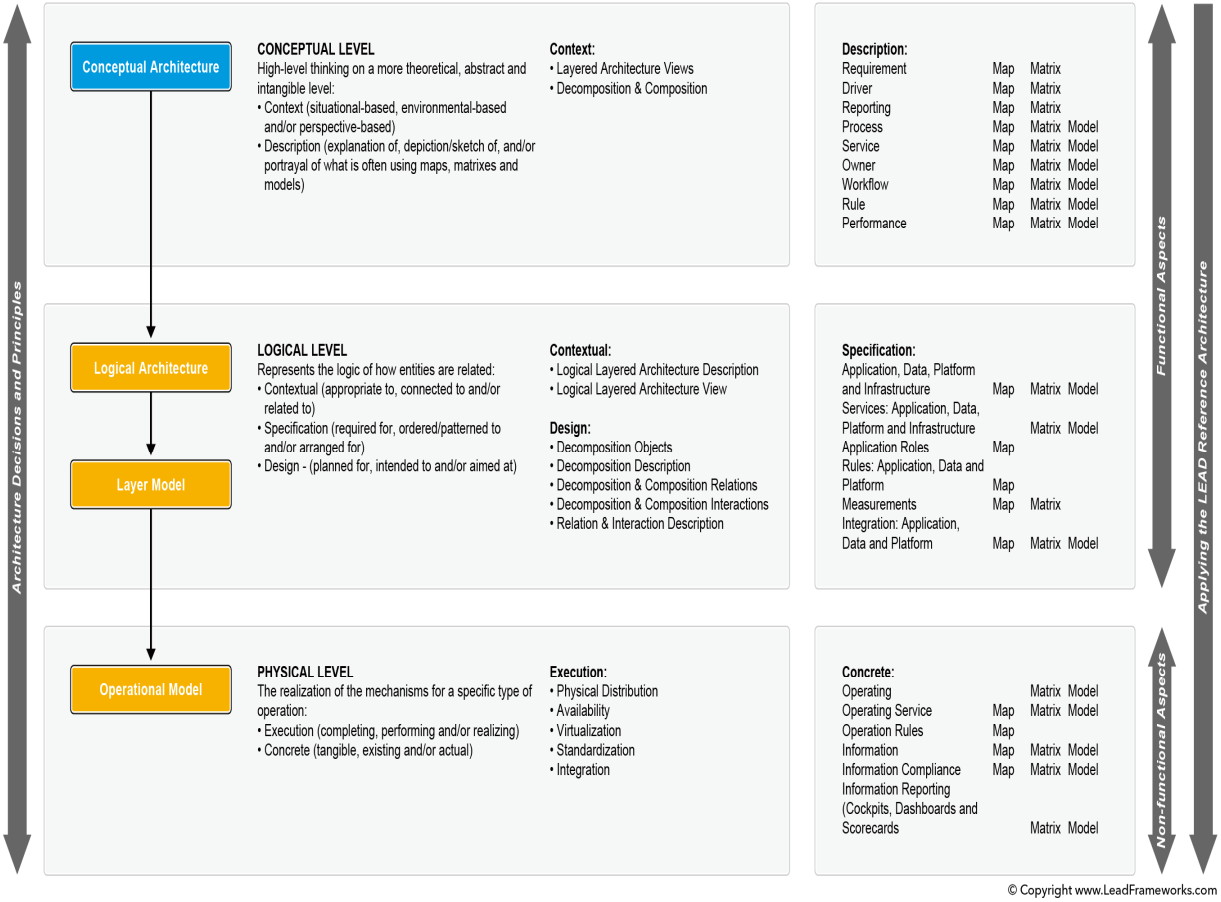


Figure 8- Example of the way of modelling with Enterprise Models

Figure 8- Example of the way of modelling with Enterprise Models shows how an analyst might work. At the Conceptual Level the analyst exposes the context, by capturing requirements, drivers, reporting needs, processes, services and so on within a set of Maps, matrices, and models as appropriate. Using this information the details of the logical level are fleshed out, whereby the specification of the applications, data, platform and other details are developed into a design using the decomposition objects. This detail is then developed to expose the method of execution in concrete terms with the operating services, rule and so on. Not to draft. Should we not show and specifically mentions link to composition aspects at this level?

Conceptual Enterprise models are used to create the Layered Architecture views and to develop the rules and form of the decomposition and composition. The resulting maps, matrices, and models applied within the context of this structure.

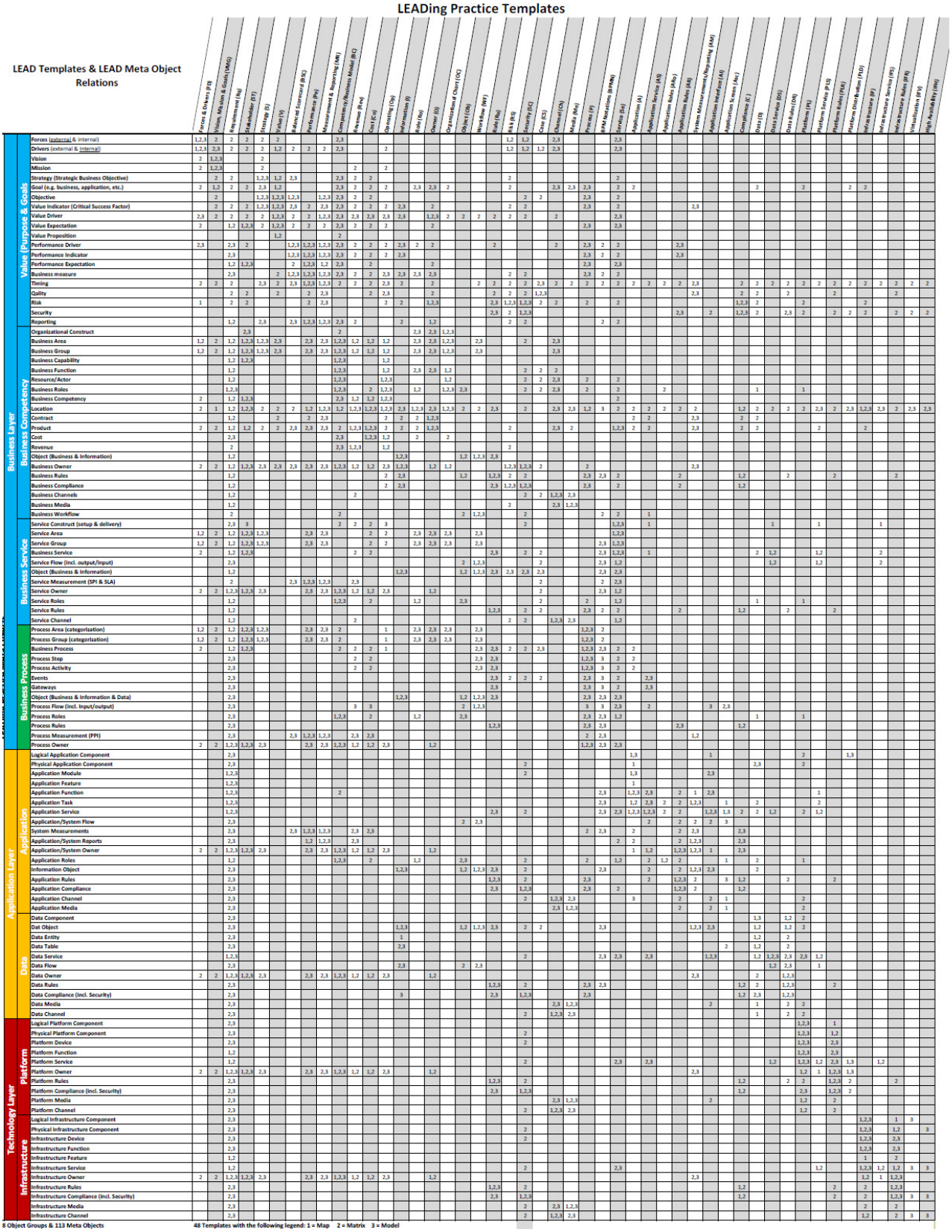
Generally the eXpert and/or architect will assemble logical Enterprise models of maps, matrices, and models, first so as to understand the structure and behaviour of the enterprise in the target design and then in physical models to understand how to build an enterprise that exhibits the desired behaviour.
When logical analysis is complete, the primitives in each composite logical map, matrix, or model will be a logical or abstract business object which was identified during decomposition.

When physical design is complete, the primitives in each composite physical map, matrix, or model will:

- Be a physical or abstract business object or link to the logical specification of a business object which exists in a logical map, matrix, or model
- Trace its composition back to its primitive, which in turn can trace its decomposition back to its context

In both cases the record of decision used to compose the Enterprise Model must show how the architectural principles of the enterprise were applied to organize the primitives.

LEADing Practice Templates



8 Object Groups & 113 Meta Objects

48 Templates with the following legend: 1 = Map 2 = Matrix 3 = Model

Conceptual & Logical Object Clustering

In addition to the before mentioned categorization, where the meta objects are grouped first according to their main layers e.g. Business, Application and Technology Layers and then according to their ideas, set, collection and nature, recognized and differentiated in their sub-layers. The Layers illuminate a relationship between the layered objects and the various subjects as well as provide the basis for the conceptual & logical clustering of the mentioned meta objects. Where Conceptual & Logical Object Clustering is the technique in which objects are identified, understood and differentiated.

Conceptual & Logical Object Clustering implies that objects are either grouped into categories* or classified** usually for some specific purpose. Ideally, the Conceptual & Logical Object Clustering illuminates a relationship between the subjects and objects of knowledge into types, tiers or nature.

LEAD Conceptual & Logical Object Clustering

LEAD Meta Object	Value		Competency		Process		Service		Application		Data		Platform		Infrastructure	
	#	Name	#	Name	#	Name	#		#	Name	#	Name	#	Name	#	Name
Type**	H	High	(D)	Core Differentiating	(R)	Management	(R)	Management			(A)	Master				
	M	Medium	(C)	Core Competitive	(M)	Main	(M)	Main			(E)	Meta				
	L	Low	(N)	Non-Core	(S)	Supporting	(S)	Supporting			(T)	Transaction				
Level *(decomposition)	1	SBOs	1	Competency Area	1	Process Area	1	Service Area	1	Component	1	Component	1	Component	1	Component
	2	BPIs	2	Competency Group	2	Process Group	2	Service Group	2	Module	2	Data Object	2	Device	2	Device
	3	CSFs	3	Competency	3	Process	3	Service	3	Function	3	Entity	3	Function	3	Function
	4	KPIs			4	Steps			4	Task	4	Data Service	4	Platform Service	4	Infrastructure Service
	5	PPIs/SPI			5	Activities			5	Service	5	Data Table				
Tiers*	S	Strategic	S	Strategic	S	Strategic	S	Strategic								
	T	Tactical	T	Tactical	T	Tactical	T	Tactical								
	O	Operational	O	Operational	O	Operational	O	Operational								
Nature**			n.a	Simple/Static	n.a	Simple/Static	n.a	Simple/Static				Structured				
			n.a	Generic/Hybrid	n.a	Generic/Hybrid	n.a	Generic/Hybrid				Unstructured				
			n.a	Complex/Dynamic	n.a	Complex/Dynamic	n.a	Complex/Dynamic								

*Classify = to assemble by order **Categorize = to divide into groups A part of the LEAD Modelling & Architecture Principles

Figure 5 – The Conceptual & Logical Object Clustering

As already pointed out in 1986, by R Stepp and R. Michalski [8]: "classifications obtained by traditional methods are often difficult to interpret, the system must be equipped with the ability to recognize configurations of **objects** that correspond to certain **concepts**. This idea is the basis of

[8] http://www.mli.gmu.edu/papers/81-85/85-12.pdf

conceptual clustering". However until the Global University Alliance[9] did their conceptual clustering based on principles of Enterprise Ontology, Enterprise Semantics, Enterprise Object Modelling, decomposition & composition as well as working in layers, a conceptual clustering based on objects that correspond to certain concepts and relate through the layers, has not been identified.

We realize that the conceptual and logical object clustering is a paradigm shift to traditional grouping, categorization or even ordinary data clustering by generating a concept description for each generated categorization or classification potential. Providing clustering labels for certain objects, enabling integrated and standardized classification and categorization within and across the layers. This allows accurate prediction of class labels as well as future proofing areas that will be added. This includes the specification of object attribute relations, semantic rules and sublayer category labels. The task of clustering involved therefore recognizing the inherent structure in a set of objects together by similarity into classes based on the mentioned:

- attribute relations
- semantic rules
- specific sublayer categories and how the clustered objects can relate to other objects.

Thus generating a logical clustering structure. On the other side, clustering areas with no standardized classification and categorization labels are referred to as unsupervised classification or clustering.

[9] http://www.globaluniversityalliance.net/research-areas/

Conclusion

While this document should be seen and used as a description of how Layered Enterprise Architecture Development can be applied in terms of objects and layers, it does not have all aspects of the Layered Enterprise Architecture reference content. It attempted to build a basis of a structured way of thinking, working, modelling and implementation of the meta objects. It endeavored to provide a standardized terminology, build common understanding and make available the standardized and integrated templates. Enabling practitioners to use the reference content to:

- Identify the relevant meta objects.
- Decompose the relevant meta objects into the smallest parts that can, should and needs to be modelled, and then compose the meta objects entities to the right layer through mapping, simulation and scenarios.
- Model the relevant meta objects through the architectural layers (see Layered Architecture Reference Content).
- Visualize and clarify the meta object relationships with the artefacts by using maps, matrices and models (alternative representation of information).
- Reduce and/or enhance complexity of modelling, engineering and architecture principles applying the decomposition and composition standard (see Decomposition and Composition Reference Content)
- Adding Requirements (see Requirement Reference Content)
- Provide a structured Blueprinting and Implementation (see Blueprint & Implementation Reference Content).

For further learning around semantic object relations, decomposition and composition, layered modelling, engineering and architecture or how the role reference content can be used within the other LEADing Practice Reference Contents we refer both to the LEADing Practice Body of Knowledge document as well as the other LEADing Practice Enterprise Standards and their Reference Content on www.LEADingPractice.com.

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